campus plan 2

Part One briefly documented Fermilab's beginnings and evolution over its nearly 50-year history. It then presented guiding principles and laboratory strategic themes that describe goals and aspirations for future campus design and development. A 20-years-from-now vision described a state-of-the-art, open and green, consolidated and integrated, connected and engaged international research community.

In that context, Part Two presents the Campus Plan. We describe our plan for organizing and designing the campus to best achieve the laboratory vision. The planning process takes into consideration the organization of the campus, functional relationships, environmental issues, landscapes, vehicular and pedestrian traffic patterns, visitor experience, architectural character and the future aspirations of the laboratory. The planning initiatives, responding to the aspirations expressed in the guiding principles, as well as the current gaps and shortcomings noted in the self-critique, create a framework and foundation to guide improvement plans and efforts.

The result will be a functionally and visually unified campus, setting the stage for future developments. When fully implemented, the initiatives will result in a campus organized to support cutting-edge research, foster international collaboration and community, and harmoniously integrate new developments with the natural setting. This campus will be inviting, easily navigated by all, and welcoming and informative to visitors.

Consolidate and centralize

Create planning regions

Define core campus districts

Establish design guidelines

Strengthen campus landscapes

Integrate sustainability

Improve mobility and wayfinding

organizing the campus

The Campus Plan looks at what type of experience we want to offer Fermilab's users, users of the future, as well as our own scientists and staff, and our community neighbors.

Tim Meyer, Fermilab chief operating officer

Consolidate and centralize

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Consolidate and centralize

Condensing our footprint will enable concentrated integrated, connected and engaged, workplaces.

Approximately 500 staff members currently work in numerous, distant and antiquated facilities scattered throughout the campus. The first diagram, Fig. 2.1, identifies regional clusters of these outdated facilities. The table below quantifies the candidate structures. Figures 2.2. and 2.3 illustrate gathering and moving to the center.

The initiative to consolidate and centralize recommends moving many staff into newly proposed facilities near Wilson Hall. The resulting condensed footprint will enable the envisioned consolidated and integrated, connected and engaged workplaces. Pedestrian-friendly outdoor connections, as well as climate-controlled links between buildings, will create a collaborative community where researchers work nearby, easily meeting together to exchange ideas. Obsolete facilities will then be decommissioned and demolished.

This initiative will also contribute to an enhanced visitor experience. As the campus becomes consolidated, visitors will more easily integrate into the centers of activity. New buildings will provide the opportunity to include designated visitor areas as part of their programming and design. Concourse and mezzanine levels, open to the public, can provide views into tech spaces, assembly areas, cleanrooms and operations centers. As major new developments link to Wilson Hall with traffic flowing into the atrium, this area will be energized, and visitors can share the experience.

Area	Number of buildings	Total area in square feet	Number of occupants
1	40	135,000	50
2	10	75,000	80
3	20	185,000	370
4	40	30,000	0
Totals	110	425,000	500

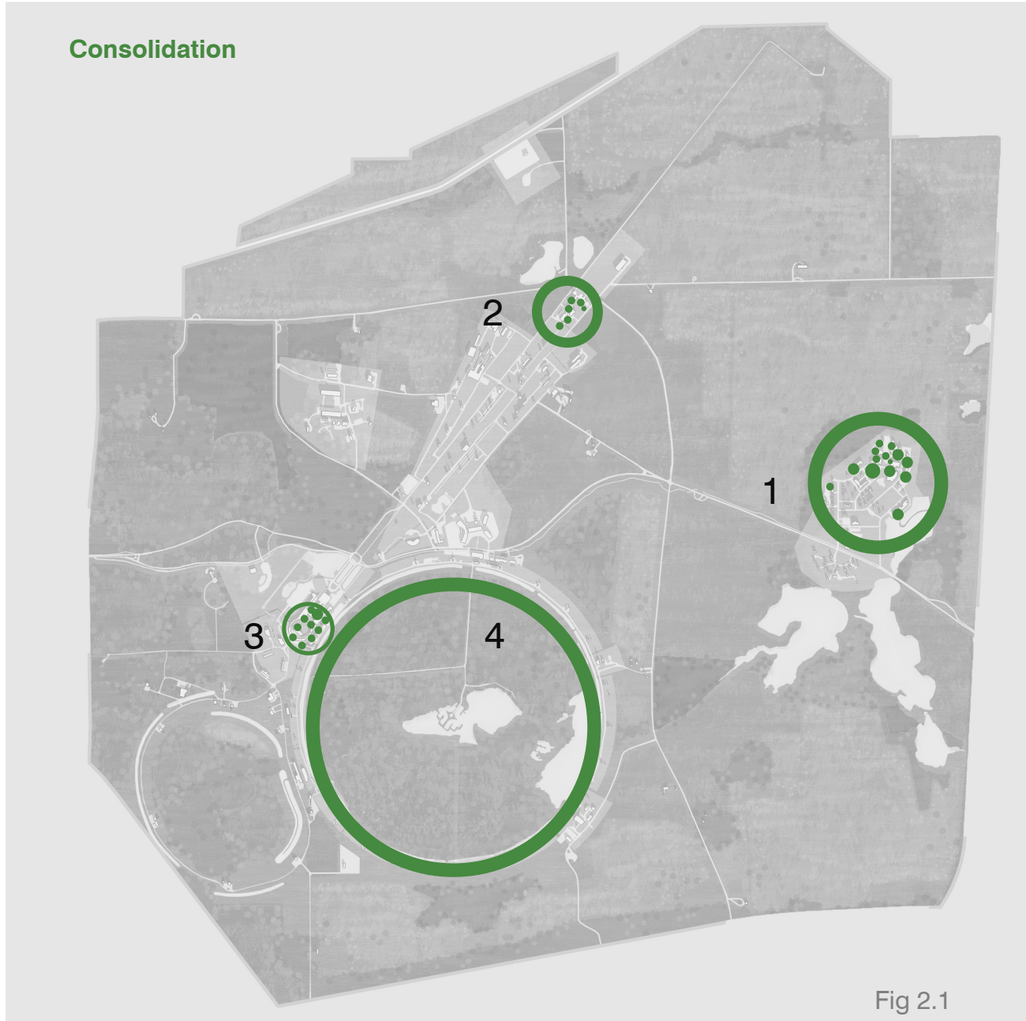


Fig 2.1

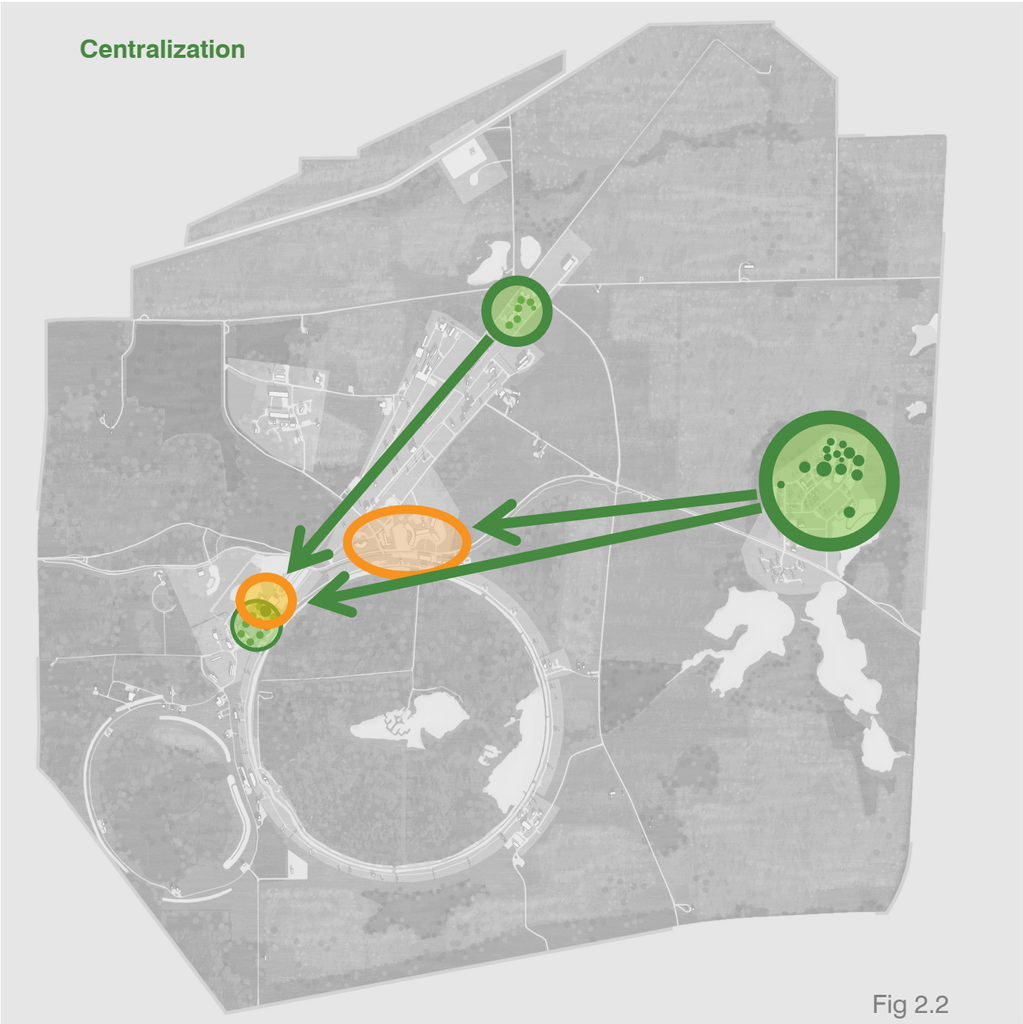


Fig 2.2

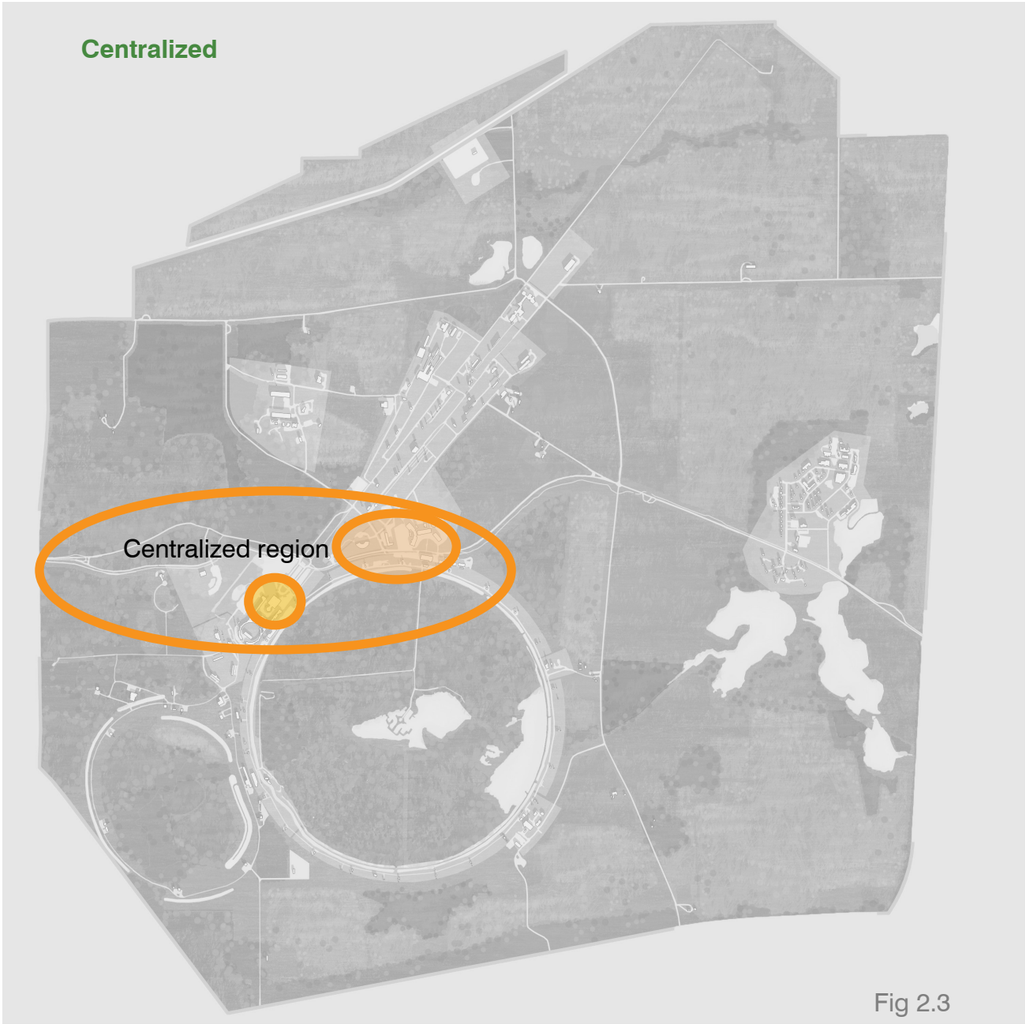


Fig 2.3

Consolidate and centralize

Create planning regions

Define core campus districts

Establish design guidelines

Strengthen campus landscapes

Integrate sustainability

Improve mobility and wayfinding

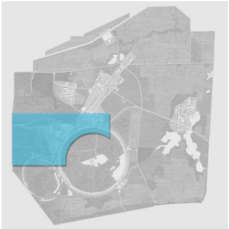
Create planning regions

Creating an organizational system will provide context, logic and a framework for future campus design and development.

Create planning regions

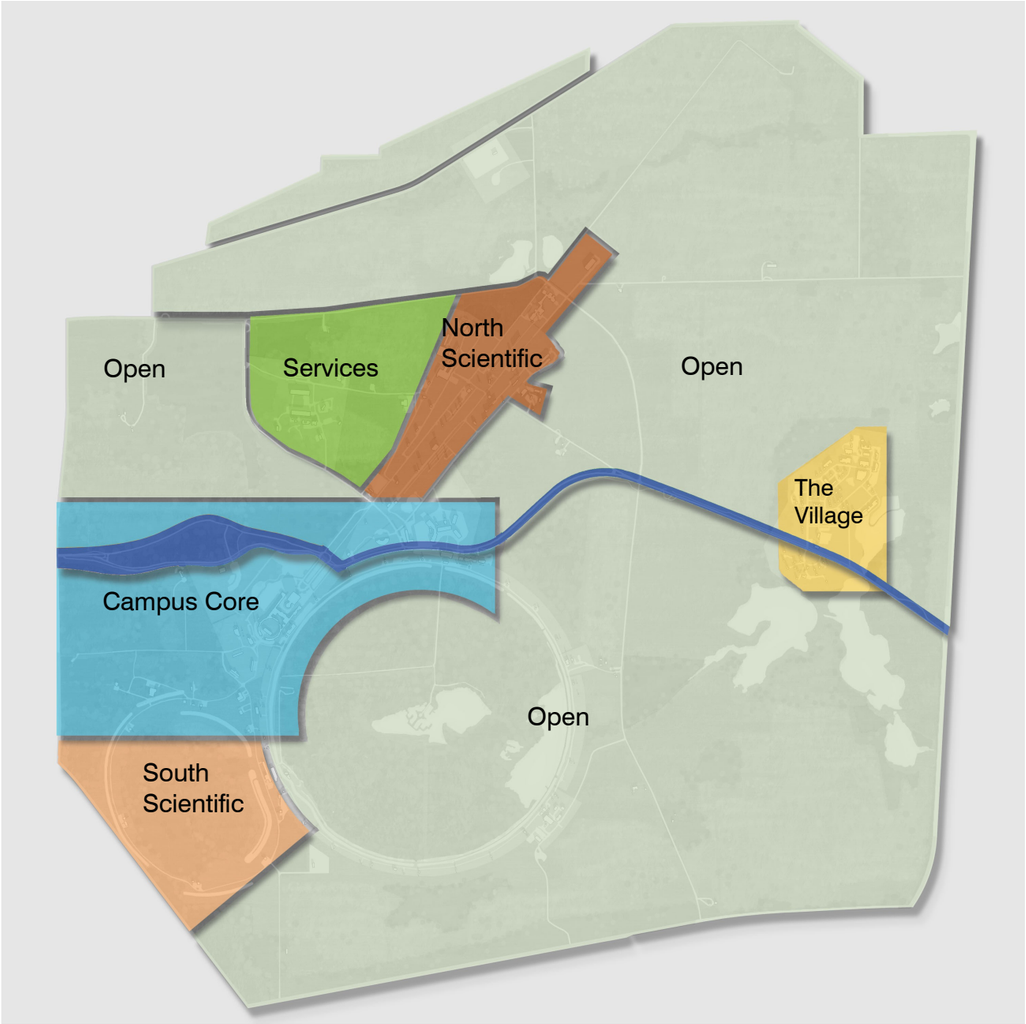
Part one of the Fermilab Campus Master Plan has noted the haphazard feel of the campus due to the scattered nature of the structures, roadways and utilities about the site. Creating an organizational system will address this issue, providing context, logic and framework for envisioned future campus design and development.

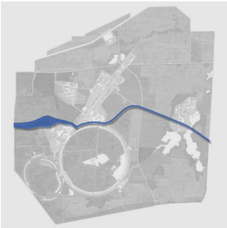
Here we describe the proposed organizational system for the developed regions. The illustration to the right delineates and identifies the major developed regions of the campus. Undeveloped ecological areas are labeled open.



Campus Core

This region is the center of activity and will become even more critical to the lab's mission as future plans unfold. It is home to laboratory research and engineering, computing, technology and science.



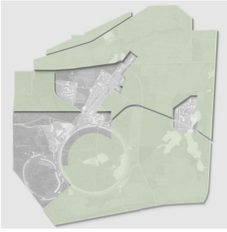


Boulevard

The proposed “Boulevard” creates a distinctive, functional and visually unified east-west transportation corridor across the Fermilab campus. Upgrades and improvement will include streetscaping, signage, lighting and landscaping.

North Science

The oldest science district, it includes the Meson detector area, Labs A through G, the landmark Robert Wilson-designed NML building and the recently built Cryomodule Test Facility.



Open

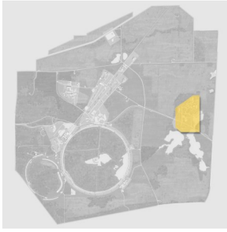
Much of the open land consists of important ecological areas and habitat communities. These important areas carry intrinsic weight. Balanced consideration is given to all issues when considering developments within these regions to avoid unnecessary impacts.

South Scientific

This is the home to the Main Injector accelerator and related supporting facilities and cooling ponds, as well as the Kautz Road electrical substation.

Services

The Services region is home to many support groups such as shipping and receiving, vehicle refueling, operations and maintenance, and the Fire Department.



Village

The Village is the founding district of the laboratory. As its major focus is housing and recreation for staff and users, consolidation and centralization will ultimately remove the obsolete shops and laboratories occupying the north end of the Village.

Define core campus districts

Campus core districts are driven by the laboratory strategic plan.

Consolidation and centralization drive the focus toward a core campus. The Campus Plan identifies seven districts within the core campus region. The districts' identities and functions are guided by the priorities of the guiding principles, and laboratory strategic planning themes.

Arrival District

Fermilab's main entrance should be impactful. The creation of a unique district will serve to focus creative planning efforts on this part of the campus. Campus Plan initiatives and development projects will transform this district into a welcoming and informational entry point for local and international visitors.

Central District

With Wilson Hall at its core, the Central District is the focus of consolidation and centralization efforts. Campus Plan initiatives and major development projects will energize and populate this district to become the heart of the envisioned, open, inviting and collaborative international research community.

Computing District

Focusing on computational science, the Computing District is home of the Computing Sector headquarters, Feynman Computing Center. Campus Plan initiatives and development projects will enhance its quality and identity, as well as its integration with the core campus.

Technical District

The Technical Division builds for science by developing and building accelerator and detector components. Future plans envision refurbishing its existing buildings, constructing new facilities, and improving the site to integrate and unify this district into the campus core region.

Neutrino District

Defined for neutrino science, the district encompasses existing neutrino facilities as well as the future planned Long-Baseline Neutrino Facility. The scope of the district development will include additional roadways, site configuration changes and other initiatives to fully service and access LBNF and integrate within the core campus.

Muon District

This district's theme of precision science encompasses the early-era antiproton buildings, along with the recently completed MC-1 building and the soon to be completed MC-2 building and beamline. The Campus Plan aims to provide connection and continuity within this core region.

Superconducting Linac Complex

This district, developed around the theme of accelerator science, will be home to new experiments and facilities. Campus Plan efforts include roadway and pedestrian connections to this area, tucked inside of the landmark Main Ring, easily accessible.

designing the campus

Campus improvements and new facilities will be undertaken with a view toward qualitatively reinforcing what makes Fermilab a unique and special place.

Tim Meyer, Fermilab chief operating officer

Establish design guidelines

The design of buildings and open spaces should encourage interaction, creating the settings to bring staff, users and visitors together, becoming vibrant centers of laboratory life.

A major goal of the Campus Plan is to create a campus with a sense of community, fostering the free exchange ideas that is central to the laboratory's scientific mission. The design of buildings and open spaces should support this goal by encouraging interaction, bringing staff, users and visitors together, and creating vibrant centers of laboratory life.

The following guidelines, informed by the guiding principles, will guide the creation of modern, state-of-the-art facilities. New buildings and structures should be designed to be fresh, inviting, innovative, dynamic and forward-looking. They should be designed with a view toward flexibility and efficiency, enabling them to meet the needs of current and future generations of staff and users.

Continued care and stewardship of the campus requires an appreciation for the existing buildings and open spaces defining Fermilab. New buildings and future renovations must create the best campus environment possible. Design teams should recognize Fermilab's legacy and make efforts at continuity.

Enhance the campus experience, reinforce community and ensure the campus is welcoming to visitors

Entrances and ground floors:

- Buildings should be welcoming, strengthen existing gathering spaces and provide new opportunities for social interaction.
- Entrances should be evident in the daytime and at night.
- The ground floor of buildings should emphasize transparency.
- Service and utility areas should be located so as not to negatively affect pedestrian paths, important streets or building entrances.

Public spaces:

- Public spaces should be generous, promote interaction and be visible to those using the buildings or walking past them.
- Outdoor and indoor public spaces should be designed to allow for informal gatherings and social interactions during both the daytime and evening hours.
- Lighting and security of public spaces are critical for their success.
- Rooftops and terraces should be considered participatory spaces for the campus community, accommodating social spaces, conferencing and unique offices.
- Buildings should provide universal access so they are not encumbered unnecessarily by level changes, ramps and stairs.

Long-term flexibility and life cycle value

Buildings on campus should be seen as having the capacity and flexibility to outlive the original program. Appropriate attention to the design of floor plates, floor-to-floor heights and structural systems will enable a high degree of flexibility for unanticipated future uses

Over time, campus buildings should anticipate a variety of programs and uses, responding to new needs and unanticipated demands. New projects should be designed with a commitment to flexibility, quality and durability to provide long-term usefulness.

Building design should also anticipate future changes in technology and scientific methods in the planning and design of buildings and research spaces. They should incorporate building systems and support infrastructure, facilitating easy adaptation for new programs and future demands.

When making building system decisions, consider initial capital investments as they affect long-term operational costs in the full life cycle of the project.

Uphold the unique character of Fermilab

The Fermilab campus is rooted in the tradition of architectural innovations and excellence representing the architectural innovations of the time in which they were built.

A strong component of the campus includes architecture significant for and symptomatic of its time. Design of new and renovated facilities should acknowledge this legacy while pursuing design excellence appropriate and symptomatic of the current era, continuing the tradition of design excellence. The collection of landmark buildings within the community can be captured into a community of architectural styles resulting in a dynamic relationship between the past and the future. Buildings contributing to the legacy of the campus should be retained and revitalized when feasible. Open spaces and significant landscapes should be identified and respected as critical components of the campus experience.

Strengthen campus landscapes

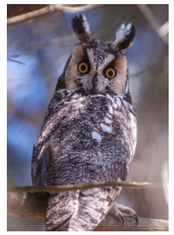
The natural landscape is a significant identifying characteristic of the Fermilab campus, making it unique among laboratories.

Conserve natural resources

The Campus Plan envisions smart growth and development to conserve open space. The land and its ecological integrity is one of the most important assets at Fermilab. The Fermilab campus is spread across four watersheds and boasts over 2,500 acres of natural areas such as tallgrass prairie, oak savanna, open water marsh, sedge meadow and floodplain forest. There are also many acres of agricultural lands and old -field grasslands. Responsible management of the physical site is an important consideration for realizing the campus of the future. Indeed, the abundant open space on the site allows for construction of the large machines needed to carry out cutting-edge particle physics research.

DOE and Fermilab recognize the significance of conserving and restoring biological diversity. Both are members of the Chicago Wilderness partnership and are committed to supporting their Biodiversity Recovery Plan for the region. The Fermilab Ecological Land Management (ELM) Committee is charged with providing sound, ecologically informed recommendations during lab planning through formal review mechanisms. The ELM Committee is composed of consulting professionals and internal experts, and together, they author a plan for enhancing the natural resources of the Fermilab site through an ecosystem management approach. This includes monitoring plant and animal communities as indicators of environmental health and assessing presence and viability of keystone and rare species. Ultimately, these contribute to restoration and expansion of core habitat, wildlife corridors and connecting remnant ecosystems across the 6,800 acre site and with adjacent public areas. This is especially true in old-field grasslands and agriculture areas. These efforts require that Fermilab remain open to experimenting with new and different land management techniques as a part of how it does business effectively.

The ecological science behind managing open land continues to guide approaches to land stewardship and resource conservation. The Elm Committee also reference the Illinois Wildlife Action Plan and relevant Executive Orders concerning environmental protection. The committee works closely with the Roads and Grounds Department to integrate the ecosystem management approach into their broader responsibility of managing the site. Individual members of the ELM Committee also serve on the Campus Facility and Planning Board and Fermilab's ESH&Q Committee, chaired by the laboratory director.



Strengthen campus landscapes

The natural landscape is a significant identifying characteristic of the Fermilab campus, making it unique among laboratories.

Create new landscapes

Landscapes beautify the Fermilab Campus, helping establish the identity of different areas, and balance development with green space and outdoor amenities. Currently, many of Fermilab's existing buildings and utility installations tend to dominate and distract from the laboratory's natural setting. Proposed landscape initiatives at select portions of the Core Campus will screen and moderate the intrusiveness of the built environment, bridging the gap between natural settings. A "connective tissue" will be created, helping shape and define the character of Fermilab for the coming generations.

The initiatives have a number of specific objectives. One is to screen utility elements and building services to minimize their detraction from the natural setting. Another is to provide structure to the open spaces along the public ways. A third is integration of new developments with the existing landscape. And a fourth is to add new courtyards and other outdoor pedestrian spaces.

It should be noted the landscape initiatives are concepts with parameters and goals; they are not designs. They are a means of articulating the vision for different areas of the Fermilab Campus within the overall Master Plan, but each will be subject to its own master plan or landscape design. Due to their scale and role as shared spaces and infrastructure, these landscaping initiatives will likely be realized in an incremental manner over many years. New development projects should include landscape improvements to soften and integrate them into the character of the site. The following diagrams illustrate example locations and conceptual designs for landscape initiatives.

The use of native plants in landscaping has become Fermilab's preferred model driven by economy and ecological value. Ongoing planting of native species to replace existing invasive ornamental species will ultimately create a more blended and sustainable campus design. The diagrams on the following pages illustrate example locations and conceptual designs for landscape initiatives.

New landscapes ~ Example A

The before-and-after photos to the left illustrate the potential positive impact of creating new landscapes. The top photo shows current conditions. The bottom photo illustrates a combination of improvements, including transportation and mobility improvements. Note the following details:

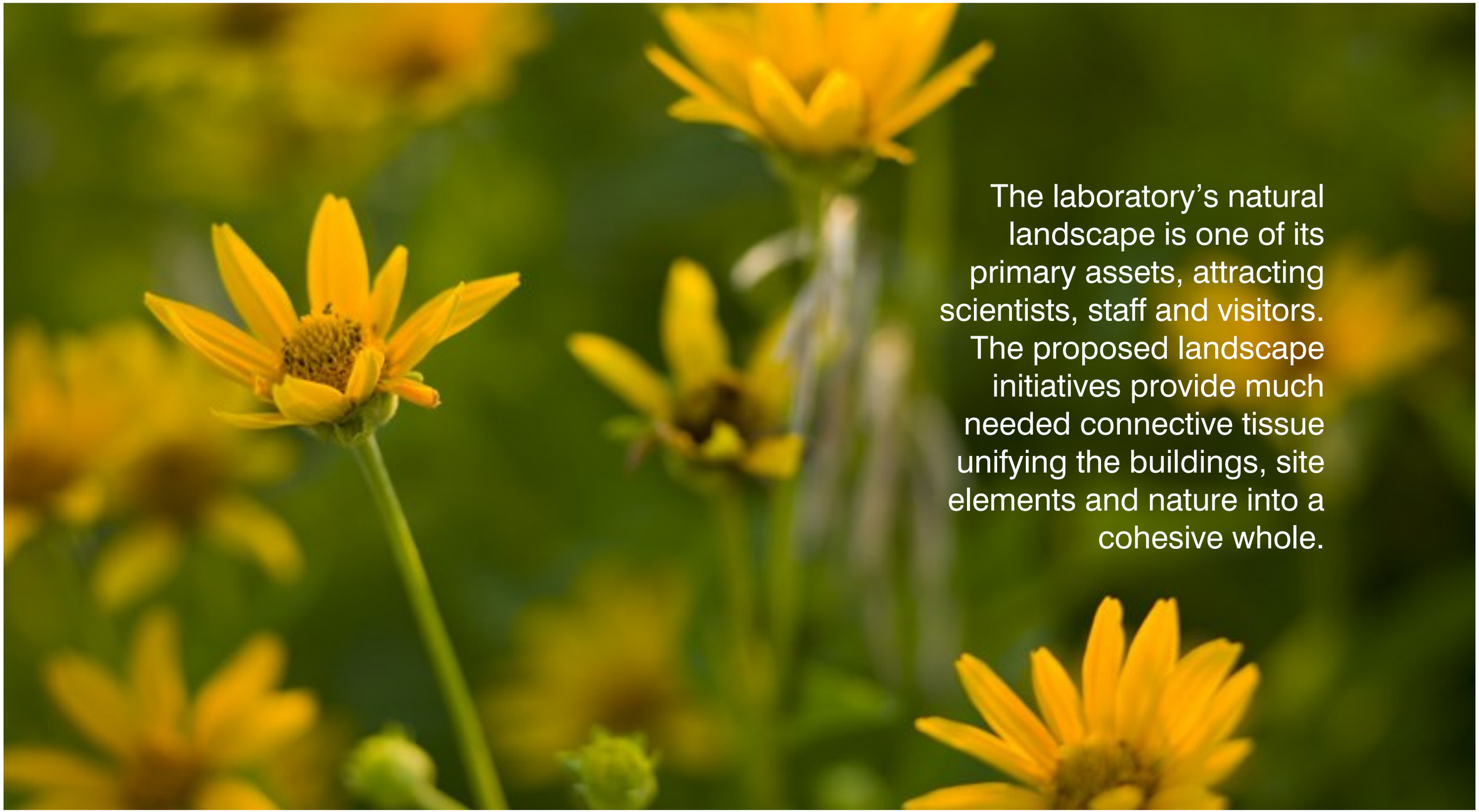
1) The road is redefined as a boulevard with curbed and planted median between the two directions of traffic.
2) Dedicated bike lanes are provided alongside the road
3) Signage is added to improve wayfinding
4) Landscaping to softens the meeting of the building and ground, moderating the starkness.
5) Landscaping screens unsightly site elements and utilities.

Consolidate and centralize
Create planning regions
Define core campus districts
Establish design guidelines
Strengthen campus landscapes
Integrate sustainability
Improve mobility and wayfinding

New landscapes ~ Example B

The before-and-after photos to the left illustrate the potential positive impact of creating new landscapes. The top photo shows current conditions. The bottom photo illustrates a combinations of improvements including transportation and mobility improvements. Note the following details:

1) Signage is added to improve wayfinding.
2) Landscaping softens the meeting of the building and ground, moderating the starkness.
3) Landscaping enhances visual interest and the campus experience.



The laboratory's natural landscape is one of its primary assets, attracting scientists, staff and visitors. The proposed landscape initiatives provide much needed connective tissue unifying the buildings, site elements and nature into a cohesive whole.

Integrate sustainability

The Campus Plan incorporates sustainability in an integrated way at all levels of the planning process.

Sustainable design comprises numerous interrelated approaches described in this Campus Plan initiative. As a whole, these varied approaches combine to form a complete systematic path to sustainability.

The Campus Plan takes into consideration environmental and sustainability issues and incorporates them in an integrated way at all levels of the planning process. Following are components of a fully integrated approach.

Regional stewardship

There are many facets to Fermilab's relationship with its surroundings: physical, ecological, social, cultural, economic and scientific. A regional view of campus planning and development is useful to ensure that this relationship continues to benefit the laboratory, the surrounding communities and the natural environment.

Climate change adaptation

Fermilab will seek to incorporate climate change resilience into campus planning and facility operations. The potential impact climate change may have on Fermilab will be proportional to incremental weather related variations currently experienced in this region of the country. The implementation of forward thinking, progressive design with an eye towards climate variability ,will help mitigate the potential variability risks to laboratory mission and function.

Surface water management

The land drainage systems at the laboratory depend on topography. Interfaces with neighboring systems are difficult to change and require management on an overall-site basis. A surface water management program will provide criteria to guide long-term development of the site with these systems in mind.

Sustainable buildings

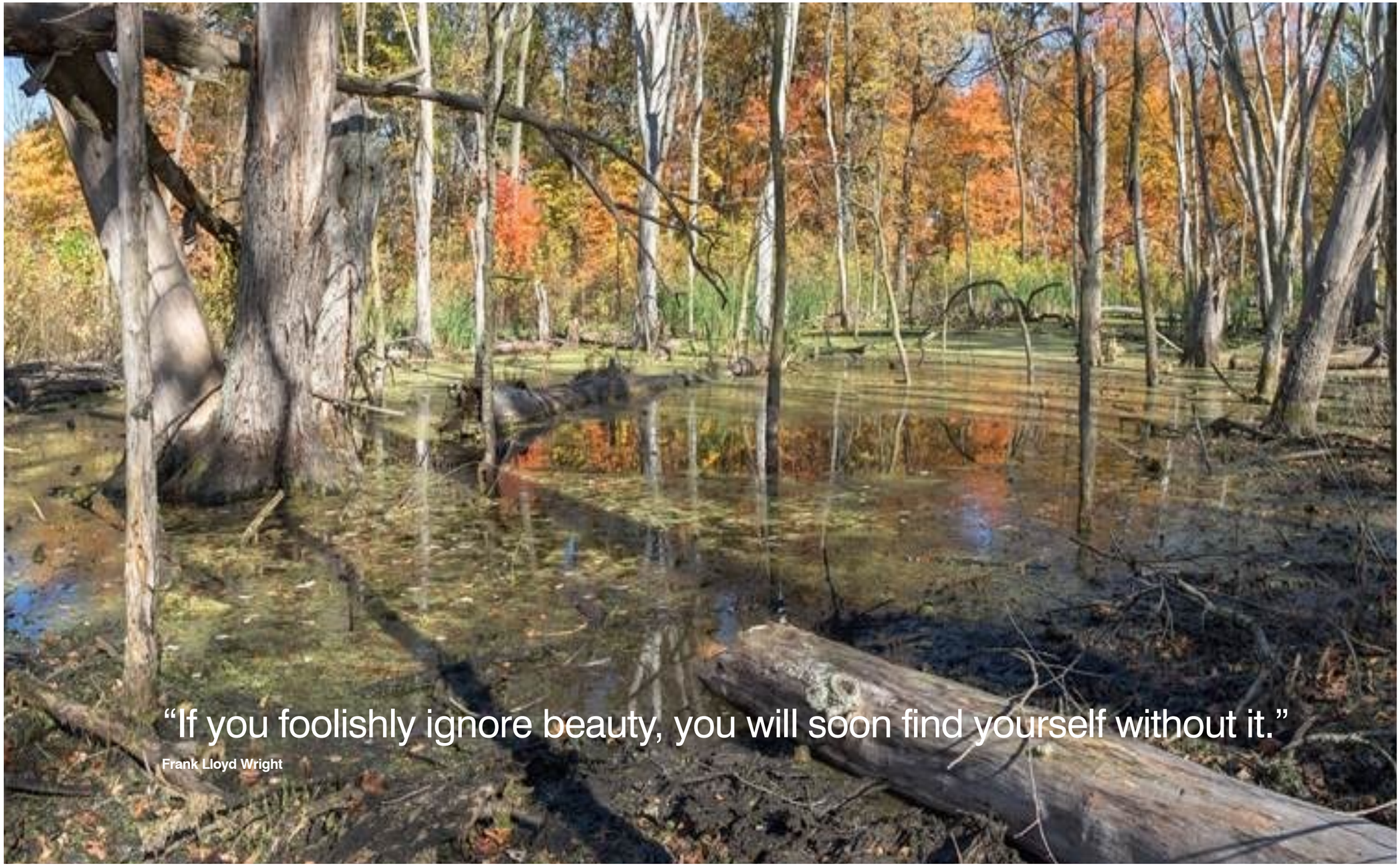
Any new buildings constructed by Fermilab will be built according to sustainability guidelines set forth by the Site Sustainability Plan, referencing the Department of Energy's guiding principles for High Performance Buildings.

Effective use of space

A conservation development strategy shall be applied to ensure the effective use of space in existing buildings. One application of this strategy will be the development of new buildings to be multidivisional and interdisciplinary. This will save space by minimizing duplication of functions and creating movable internal boundaries. Another application of this strategy will be the renovation of existing office spaces into spaces with inherent flexibility and adaptability. A third strategy is to look at space as a collective asset to share and avoid duplications of functionality. This is a transition from a "my space" to an "our space" mindset of planning.

Transportation

A coordinated and integrated transportation system can promote health and reduce emissions. This integrated approach begins with making improvements for pedestrians and cyclists and then looking into the creation of a multipassenger shuttle system between the major central districts and regions within the campus. The desired result is a reduction in the use of private automobiles on campus.

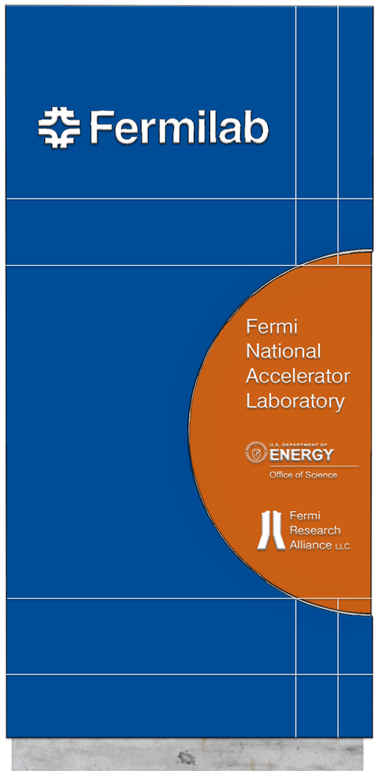

“If you foolishly ignore beauty, you will soon find yourself without it.”
Frank Lloyd Wright

Improve mobility and wayfinding

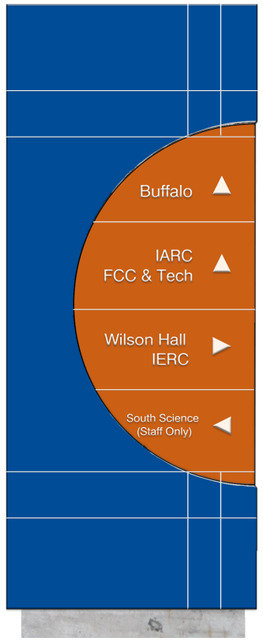
How Fermilab's campus functions and the experience it provides depend in large part on how people move about and how well-connected the lab's various parts are to one another.

How Fermilab's campus functions and the experience it provides depend in large part on how people move about and how well-connected the lab's various parts are to one another. Given its location, size and land-use diversity, Fermilab must accommodate multiple modes of travel. This section addresses aspects of the laboratory's movement systems, focusing on strategies to make the campus more pedestrian- and mass-transit-friendly.

Although upholding Fermilab's unique character is a guiding principle of the Campus Master Plan, at least three instances of its unique character are not desirable for a 21st-century laboratory. One is the dependence on the automobile to move around the site, which conflicts with the sense of community Fermilab seeks to create among its scientists and staff members. The second issue is a direct result of the first: Generally speaking, the campus is not pedestrian-friendly. The third issue is the lack of a coordinated and effective system of signage and wayfinding. Improvements in these three areas are important to creating an open, inviting and collaborative international research community for 21st-century science. Informed by the guiding principles, the "improve mobility and wayfinding" initiative has many facets, as described in the following images and narratives.



Pine Street Entrance



Approach and arrival

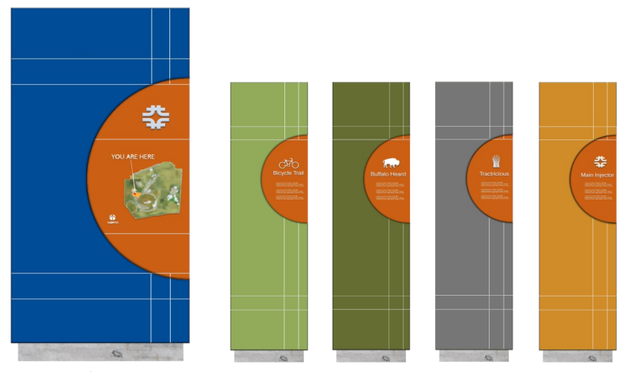
The initial experience of the first-time visitor is via the Pine Street entrance. The experience is unimpressive and possibly disorienting. Jersey barriers, flashing lights, an unoccupied guardhouse, the visual clutter of piping and mechanical equipment west of the MINOS building, the lack of signage, and a confusing intersection as they approach Wilson Hall are components of the visitor's impression upon arrival. Plan initiatives illustrated dovetail to transform this journey.

Visitor experience

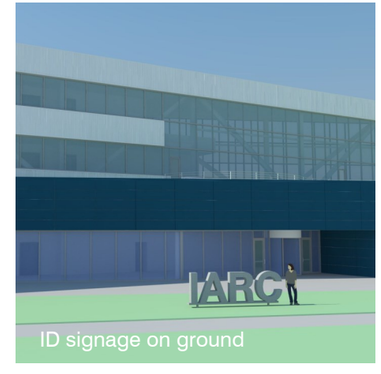
As mentioned previously, a compact core campus with new visitor-friendly buildings can greatly enhance the visitor experience. Improved signage will welcome, inform and direct visitors guiding their visit and helping them understand what happens at Fermilab. The Campus Plan also proposes informative sign kiosks at key points around the site. Examples include the bison field, the prairie, the butterfly trail and the site entrance.

Proposed new gatehouse

ID signage on building



Points of interest and directories



ID signage on ground

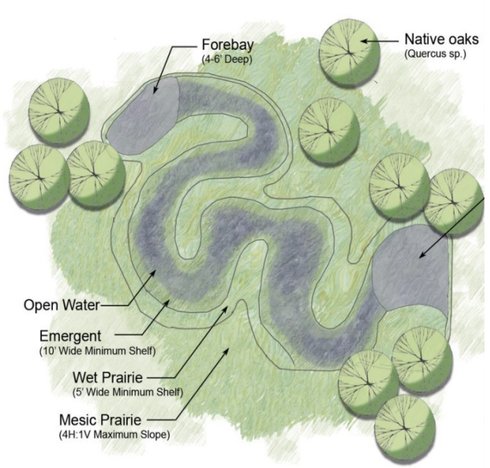
Signage and wayfinding

Signage examples and ideas are illustrated in the adove photo mock ups. It should be noted, however, that these are simply a means of articulating the vision. A complete integrated signage system approach and design needs to be developed and incrementally realized as the campus plan implementation proceeds.

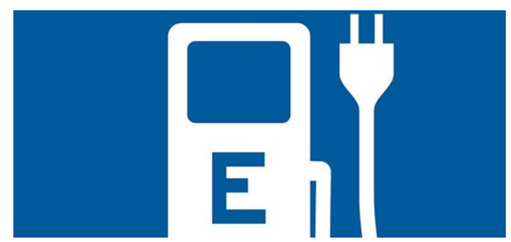
Green parking

Parking

Parking will continue to be a necessary and significant presence on the site. However, large uninterrupted fields of asphalt should be avoided. Parking lot design should be executed in the context of the full array of Campus Plan guiding principles (sustainability, campus experience, integrative planning and design) and other Campus Plan initiatives (upgrade landscapes, design guidelines). Whenever possible, parking should be reduced, consolidated, screened and/or tucked under buildings to minimize its visual impact. Paving areas should be reduced to a minimum throughout the site, and parking lots should be made of porous paving, mitigating storm-water runoff. Where vehicles are welcome, the needs of pedestrians and transit users should be a paramount concern, ensuring the development of a truly pedestrian-oriented campus.

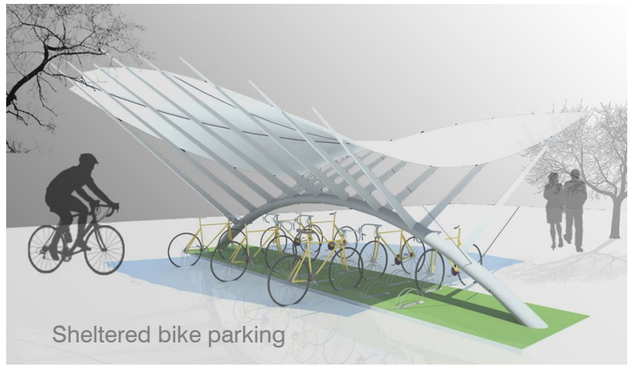


Bioretention system are proposed to handle parking area runoff. This best management practice uses natural filtration to treat storm water runoff. They are modeled after the biological and physical characteristics of a meadow ecosystem.



Electric vehicle charging stations

Green transit


Sheltered bike parking

Vehicles and traffic

Given limited mass transit options to reach Fermilab, cars will continue to have a large presence on the campus. However, as consolidation and centralization progress, the number of vehicles traveling around and across the campus can be reduced. Walking, cycling and transit use can become realistic options for day-to-day business.

Cycling

Cycling initiatives for the campus include the creation of designated bike lanes along the boulevard and improved signage and segregation for primary bike routes through campus. Major new buildings should include indoor bike storage spaces, along with shower and changing rooms. All occupied buildings should have adequate bike rack space. Consideration should be given to a bike sharing program with stations at major populations areas within the campus.

Pedestrian network

Consolidation and centralization support the feasibility of a vibrant pedestrian walkway network. Walkways will provide clear, convenient and interesting ways for people to get around on foot instead of driving. These paths should promote safety by locating them separately from driving and cycling ways. The walkway system will include pedestrian lighting improvements along primary routes within the Central Campus.

Transit

Bus and shuttle transit can affect both how people commute to and from the Fermilab campus and how they travel within the campus upon arrival. Some public mass transit from off site is available to staff living in select locations, including Chicago and its western suburbs.

Within the site, as consolidation and centralization increase, a campus shuttle should be considered to minimize the use of automobiles within the campus.

Consolidate and centralize

Create planning regions

Define core campus districts

Establish design guidelines

Strengthen campus landscapes

Integrate sustainability

Improve mobility and wayfinding

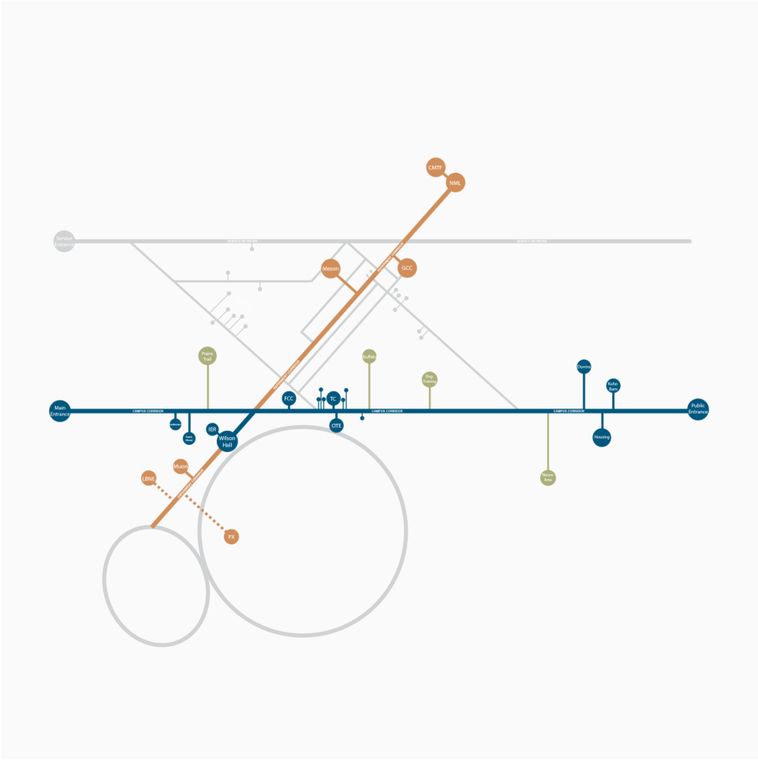
Roadway simplification and hierarchy

The Fermilab Campus Master Plan guiding principles aim to ensure an enhanced campus experience that is welcoming and informative to both local and international visitors. The campus plan initiatives envision integrative design, improvements in campus landscapes, and improvements in mobility and wayfinding,

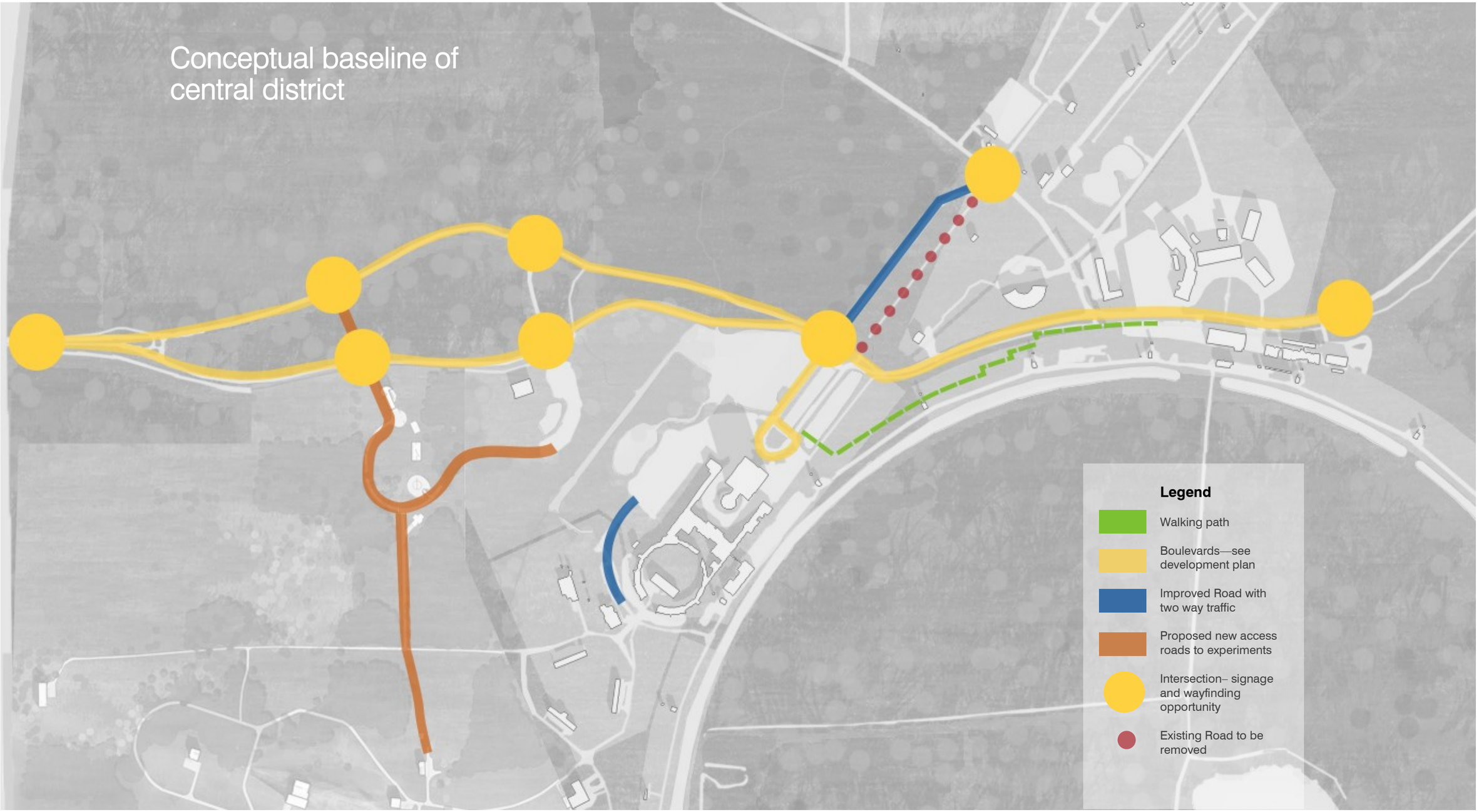
The current campus vehicular circulation system is somewhat complex. It initially grew from the rural roads in place at its founding. As the campus developed over the next 50 years, roads were added (and subtracted) in response to the construction of accelerators, beamlines, raised earth berms and experiments.

Roads are typically the same width, with curbless gravel shoulders, minimal lighting and signage, minimal landscaping, and unscreened, undesirable views of scattered utilities and support structures along the way. Effectively, all roads appear to be service roads. This creates confusion among the uninitiated as to where they should and should not travel. As the campus hosts increasing number of international visitors and users in the years to come, this condition will become more problematic.

As major planned developments and experiments migrate toward the core campus region, the clarity and improvement in the transportation corridor will prove to be an important infrastructure improvement, providing clarity to the mobility and wayfinding experience, enhancing the campus experience and facilitating.



Inspired by Harry Becks' 1933 well know "tube map" of the London Subway system, the above diagram illustrates the Fermilab roadway network. Rather than emphasizing strict accuracy, the diagram strips the sprawling roadway network down to a simple diagram of color coded line and destinations. This clarifies the roads purposes and their relative place in the planned for hierarchy of roads. Color coding is blue for public and major destinations, orange for the experiments, grey for services, green for natural area interest.


Conceptual baseline of central district
Legend
Walking path
Boulevards—see development plan
Improved Road with two way traffic
Proposed new access roads to experiments
Intersection– signage and wayfinding opportunity
Existing Road to be removed