FERMILAB COMPREHENSIVE LAND USE PLAN

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I. REGIONAL CONDITIONS

1. History

Site History and Background

In the early 1960's, the High Energy Physics community came to the conclusion that new frontiers would require an accelerator capable of producing energies on the order of 200 BeV (billion electron volts; also called GeV). It was considered highly desirable to have even higher energies, but machines at these levels would cost more and take longer to build. The peak energy attainable would be set by economic consideration only.

It was also concluded, by a group of university presidents, convened by the National Academy of Sciences (NAS), that the next large high-energy accelerator would have to be managed by a national association of universities. This group would work with and be funded by the government to meet the needs of the scientific community on research at these energy levels. In June 1965, Universities Research Association was incorporated and became the management body for the facility (i.e., National Accelerator Laboratory). Universities Research Association, Inc. (URA) of Washington, D.C., was a consortium of 56 major research-oriented universities with 55 universities in the United States and one in Canada.

The U. S. Congress Joint Committee on Atomic Energy declared in 1965 that it was in the national interest for the United States to support a search for the secrets that lie buried in the heart of the atom. Congress authorized $250 million in 1969 for the construction of the world's largest proton synchrotron (i.e., 200 GeV) at Batavia, Illinois, a giant microscope which uses beams of sub-atomic particles to study the "world of the small."

When dedicated in May, 1974 and named in honor of Enrico Fermi, a famous pioneering scientist, Fermilab's accelerator had reached 400 GeV. Following the construction of the Superconducting Energy Saver and Tevatron projects in the 1980's, the Fermilab accelerator complex achieved the capability of operating at 800 GeV for fixed-target beam and 900 GeV for colliding beam. In 1997, the 800 GeV Fixed Target Program was completed. By 1999, the Main Injector Upgrade will be completed. At that time, the primary focus of the experimental program will be to provide more intense beams for the Tevatron collider program, and a proton source for high-intensity fixed-target experiments.

High-energy physics research presently carried on in this country is funded primarily by the U. S. Department of Energy (DOE) at Fermilab and other DOE institutions such as Brookhaven National Laboratory, Long Island, New York, and the Stanford Linear Accelerator Center, Palo Alto, California. The CERN Laboratory in Geneva, Switzerland, is Europe's counterpart to Fermilab. Other countries including Russia, Japan, and the People's Republic of China also engage in high-energy physics research.

High-energy physics is a field in which scientists from all over the world work together in a common endeavor. Of the approximately 150 institutions that have participated in the Fermilab research program over the years, about half were American based institutions, and half were international. American High Energy Physicists also participate in the research in other countries.

The size requirements for a 200-GeV accelerator laboratory were originally established by a site evaluation committee to be a minimum of 3000 acres with additional land up to a total of 5000 acres desirable for future expansion. The additional land would be reserved for such uses as a greater buffer area for radiation protection, beam extensions not foreseen at that time, extension of the scope of the Laboratory and for growth in areas other than high-energy physics. The committee noted that it would be unwise for a laboratory facility of the size contemplated to be without room for significant future expansion. In a later report, the committee recommended selection of a site with at least 5000 acres of usable land. They further noted that it would be prudent to acquire even more land to provide for the needs of possible future larger accelerators.

The State of Illinois, in response to this, proposed a 6800 acre site, commonly referred to as the Weston Site (one of six finalist sites), about 5 miles east of Batavia, Illinois. When the government accepted the site, a letter from Dr. Glen T. Seaborg, Head of the U. S. Atomic Energy Commission (AEC), confirmed the "statement of understandings" between the State of Illinois and the AEC that the State would be offered first choice to re-acquire title to all, or portions, of the site in the unlikely event the Government might abandon the National Accelerator Laboratory.

The choice of this additional land was endorsed by the early group of scientists who had gathered to undertake the planning of Fermilab. They were confident of reaching 200 GeV and had options for attaining up to 400 GeV within the original accelerator configuration. They further realized that it would be possible to build a 1000 GeV accelerator which would fill the boundaries of the 6800 acre Weston Site using the magnet technology then available.

Fermilab's accelerator was successfully built, and began operation at 200 GeV in 1972. In 1973-74, a full program of fixed-target high-energy physics experiments was underway. The program was carried out in three external experimental areas — the Meson, Neutrino and Proton Laboratories, and in one experimental area located inside the Main Accelerator enclosure called C0. By the mid-1970's, the accelerator was routinely operated for research at 400 GeV, and reached a high of 512 GeV in a brief test run.

In the early 1970's, a steadily growing program of superconducting magnet technology research was undertaken at Fermilab. In 1978, Fermilab had demonstrated that it was technically feasible to construct a 4-mile ring of superconducting magnets in the Main Ring tunnel. In 1979, the Energy Saver Project was approved by the U. S. Department of Energy and the construction of the superconducting accelerator was begun. By July 1983, the new ring of superconducting magnets was fully installed, and commissioning tests of the world's first superconducting synchrotron were complete.

After demonstrating that a beam could be accelerated to 800 GeV, the superconducting accelerator, renamed the "Tevatron", was operated initially at 400 GeV in 1983 in order to complete the program of 400 GeV experiments begun in 1975. In 1982, the U. S. Department of Energy approved a major upgrade program for the fixed-target experimental facilities to pave the way for operations with 800-1000 GeV accelerated protons. Early in 1985, the 800 GeV fixed-target program was begun.

Simultaneously with the construction of the superconducting magnet ring, Fermilab also undertook the design of a high-intensity antiproton source so that the Tevatron could be used as a collider. In 1982, the U. S. Department of Energy gave the go-ahead to the Tevatron I project which enabled Fermilab to transform the Tevatron into the world 's highest energy colliding beams facility. The AntiProton Source was finished in 1985 and the effort culminated in the first test run of the 1.8 GeV proton-antiproton collider in the fall of 1985 and of the Collider Detector at Fermilab, the first of two large general purpose collider detectors which was put into full operation in 1987.

Since 1987 the Tevatron has been operated for both collider and fixed target experiments. The plan then was to alternate the fixed-target and collider programs in beam usage, with about 25% of the running time going to the Fixed Target program. In 1992 the collider was set up to operate for the CDF and D0 detectors. The running period extended from 8/31/92 to 6/1/93. After a short shut-down, Run 1-b began on 12/15/93 and ended on 2/19/96. The goal to reach an integrated luminosity of 100 inverse picobarns was achieved. The program represented the most extensive search for the Top quark ever carried out. Late in 1996, we began fixed-target operation providing secondary beams for a variety of fixed target experiments.

In addition to its high-energy physics programs, Fermilab has performed work for others. Highlights include the Neutron Therapy Facility, utilizing the Fermilab Linac, which is used for the treatment of certain types of cancer. Fermilab was also involved in the construction of a 250 MeV proton synchrotron for the Loma Linda University Medical Center (LLUMC) for the treatment of cancer patients with proton therapy.

Fermilab has engaged in extensive outreach activities in the areas of technology transfer to industry, and of technical science education at all levels from elementary school students to post-doctoral graduate researchers. A new Science Education Center was built in 1990 to provide for a focus of these continuing (and growing) educational outreach efforts.

Fermilab has maintained an aggressive policy toward the responsible management of health, safety, and environment protection concerns. The Fermilab site was dedicated in 1989 by DOE as a National Environmental Research Park (the only one in the Midwest), and an extensive program of both manipulative and non-manipulative research is anticipated in the coming years.

One of Fermilab's strengths is a diverse and experienced technical staff. Among the approximately 2,100 regular Fermilab employees, about 1000 are college graduates, some 330 of whom hold a Ph.D. degree. The professional staff covers a wide variety of scientific and engineering specialties. Some 900 visiting scientists from universities and other national laboratories, and from many foreign institutions, are active participants in Fermilab's high-energy physics research programs, providing valuable opportunities for specialists from different organizations to interact, share ideas, and collaborate in their areas of expertise.

2. Regional Overview

Local and Regional Context

The Fermilab site lies about 30 miles west of downtown Chicago. The site is located in western DuPage and eastern Kane Counties. DuPage is the fastest growing collar county of Chicago, in both population and employment. Currently, the population of DuPage County is approximately 854 thousand and is expected to grow to 985 thousand by the year 2010. Kane county is also beginning to grow with increased development and population. The current Kane County population is approximately 350 thousand and is expected to

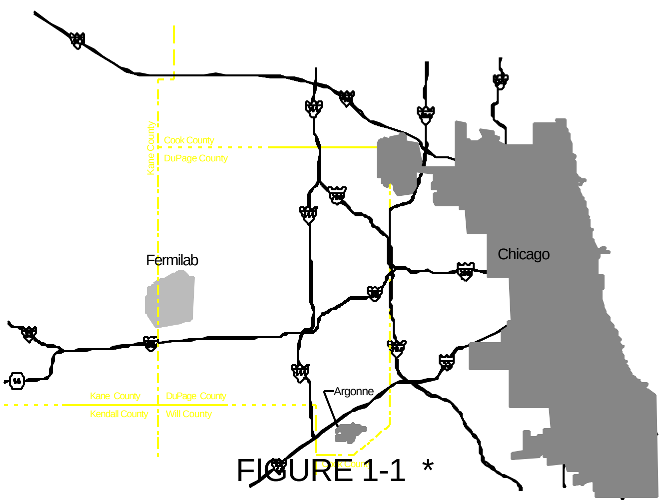


FIGURE 1-1 *

increase another 40% by the year 2010.

Fermilab is a member of the East West Corporate Corridor Association (EWCCA). This corridor is viewed as an intellectual and economic resource to the Chicago area, the Midwest and the nation. Numerous national and international organizations are located near Fermilab along the corridor created by Interstate Highway 88. Among these organizations are the Amoco Research Center, AT&T Bell Laboratory, Argonne National Laboratory, Commonwealth

* See also Figure 1-17 behind tab at end of Section 1

Edison Company, the IBM Corporation, McDonalds Corporation and Nalco Chemical Company. More than 125 companies and organizations along the Illinois Research and Development Corridor comprise the membership in EWCCA. They represent more than 100,000 employees in the Chicago suburban area. The growth of these organizations and their ability to attract similar organizations to the area are among the major forces behind DuPage County's recent rapid growth. EWCCA recognizes that people are a most valuable business asset, and is dedicated to insuring the continuity and quality of area workers through networking and educational programs. Fermilab, along with many other research oriented institutions in the corridor, employ several thousand people holding advanced technical degrees. This concentration of scientific and technical talent offers a wide range of opportunities to bring different levels of experience and points of view to bear on important scientific issues.

Organizations concerned with local and regional planning for the Fermilab area include the Northeastern Illinois Planning Commission (NIPC), the DuPage County Regional Planning Commission and the Kane County Regional Planning Commission. Fermilab maintains close ties with each of these groups to ensure that future plans for the region and the Laboratory are compatible and complementary. Throughout the years Fermilab has been considered a good neighbor by the local communities. Both the DuPage County and Kane County Planning Commissions classify the Fermilab site in the favored "office / research / development" land use category.

The Chicago metropolitan area contains about 7.3 million people, making it by far the most populous inland area in the United States. Its population rivals those of the major coastal population centers, such as the New York-Boston-Washington urban complex in the east and the San Diego-Los Angeles-San Francisco region in the West.

In recent decades, many of the region's heavy manufacturing industries have been going through the painful economic transitions needed to maintain their ability to compete successfully in national and international markets. While other areas, such as the sunbelt states, have grown more rapidly than this region in industry and population, the Chicago area, in general, and DuPage County, in particular, has continued to grow. DuPage is currently ranked as one of the fastest growing counties in the nation.

Because of its large population and strong economy, the Chicago area offers an enviable range of business services and cultural, educational and recreational opportunities. The region is endowed with exceptionally strong colleges and universities, which work actively with Fermilab in scientific and educational programs. It has a skilled, well-educated labor force. These strengths and many others ensure that the region will continue as a major contributor to the nation's economic, cultural and intellectual growth.

3. Specific Local Conditions

Zoning and Land Use

Two organizations concerned with local and regional planning for the Fermilab area are the DuPage County Development Department - Planning Group and the Kane County Comprehensive Planning Program. Both planning agencies classify the Fermilab site in the office/research/development land use category. References to both population distribution and designated land use in a number of the surrounding communities can be found in Figure 1-2 (Section 1, Page 11) and in the following figures:

Insert Figure 1-2: Population Distribution

Insert Figure 1-3 (Comp. Land Use Plan)

Insert Figure 1-4 (Milton Township)

Insert Figure 1-5 (Winfield Township)

Insert Figure 1-6 (Naperville Township)

Insert Figure 1-7 (Lisle Township)

4. Public Transportation

Fermi National Accelerator Laboratory (Fermilab) is located on a 6,800 acre site about thirty-five miles west of Chicago. Fermilab is just north of the East-West Tollway (I-88) and about thirty miles southwest of O'Hare International Airport. About 5,500 acres are in DuPage County; 1,300 acres are in Kane County. The towns of Aurora, Batavia, Geneva, Naperville, North Aurora, St. Charles, Warrenville, West Chicago, and Wheaton are all within a twenty minute drive of Fermilab (See Figure 1-17 behind tab at end of Section 1).

Airports

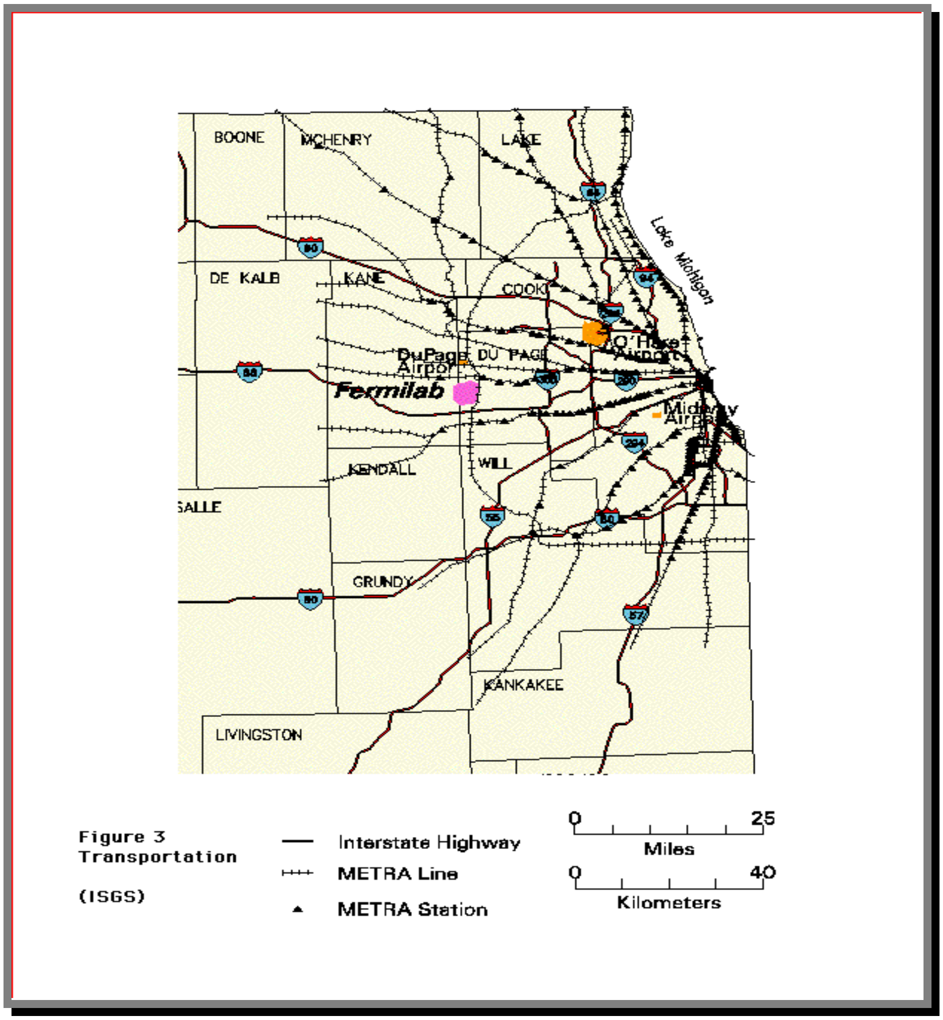
The northeastern Illinois region enjoys exceptional access to air travel services. O'Hare International Airport, the world’s busiest airport located about 30 miles northeast of Fermilab and Midway Airport, located about 30 miles southeast, offer air service throughout the country and the world. DuPage County Airport, a few miles north of the Lab, is considerably smaller but provides regional commercial air service. Airports located near the vicinity of Fermilab are identified in Figure 1-17 behind the tab at end of Section 1.

Commuter Rail

The METRA commuter rail system provides commuter rail service on a series of 12 rail lines, fanning out radially from downtown Chicago into the suburbs as shown in Figure 1-8 on the following page (see also Figure 1-17 behind tab at end of Section 1). The METRA / Union Pacific West Line runs just north of the

Lab, serving Geneva, West Chicago, Winfield, Wheaton and points east. To the south, the METRA/Burlington Northern, Sante Fe serves Aurora, Naperville and points east. Currently, there are no circumferential commuter rail lines joining the radial "spokes." There is a proposal under study by the Elgin Joliet and Eastern Railway (EJ&E) to build such a line.

Figure 1-8: Train routes near Fermilab



(See also Figure 1-17 behind tab at end of Section 1)

Bus System

Pace Bus Company is the only other major provider of mass transit services in DuPage County. Originally it was established to carry commuters to and from the commuter rail lines. It is currently being expanded to include more of the traditional bus transportation role and fill a broader transportation need within the county.

Roads Adjoining the Fermilab Site

The Chicago area has a network of interstate highways as shown in Figure 1-9 (see also Figure 1-17 behind tab at end of Section 1). East-west interstate highways include I-80, I-88, I-90 and I-94. North-south interstate highways include I-55, I-57, I-65. Within the metropolitan area, interstate spurs and beltways, I-355 and I-294, connect these major interstate highways. In the immediate Fermilab region, I-88 runs about 2 miles south of the Fermilab.

Figure 1-9: Major Roads Near Fermilab

The primary Fermilab local traffic ways include, IL 59 about a mile east, Butterfield Road (IL 56) along the southern boundary, Kirk Road along the western boundary, and Roosevelt Road (IL 38)/ Fabyan Parkway to the north.

Commuter Traffic

Until about a decade ago, the major commuter traffic from DuPage was to downtown Chicago. Thus, the existing infrastructure fits that need reasonably well. However, commuter needs are now quite different. Not only has there been very rapid population growth in DuPage County, there has also been a rapid growth of office/research and light industry throughout DuPage County resulting in a large number of job opportunities in this area. As a result, there is now as much commuter traffic from Chicago (Cook County) to DuPage as there is from DuPage into Chicago. There is also as much commuter traffic from southern DuPage to northern DuPage, around O'Hare airport, as commuter traffic into Chicago.

The existing roads and mass transit is poorly designed to handle these newer transportation needs. In particular, there is a great need for better roads for north/south transportation. One of the solutions to the heavy north-south traffic in the immediate Fermilab area being explored by the planning groups is the extension of Eola Road through Fermilab.

There is also a great need for better mass transit to handle transportation of commuters coming into the region via commuter rail once they arrive here.

One of the primary tasks of the previously mentioned regional planning groups is to deal with these transportation problems. There is a strong effort to encourage expansion of the Pace Bus system to help fill the needs resulting from these changing commuter patterns.

Most employees elect to travel to and from work by personal vehicle. There are a few organized car pools; however, the number of employees who participate is very small. Local roads are very heavily traveled during the morning and evening rush hours.

On-Site Circulation

References to existing land use at Fermilab can be found at the end of Section 1 in the following Figures:

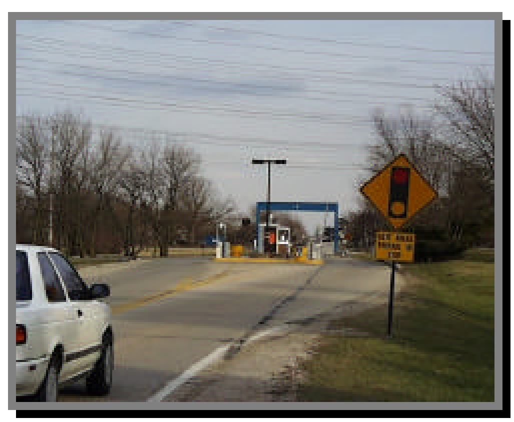
Figure 1-18 Existing Site Utilization Map (behind tab at end of Section 1)
Figure 1-19 Existing Land Use Map (behind tab at end of Section 1)
Figure 1-10 Outlying Facilities (Section 1, Page 17)

The existing roadway configuration on the Fermilab site has proven to be adequate for the movement of materials and personnel on a daily basis. All facilities on the site are accessible by motor vehicle with the greatest majority of the roadways having a paved surface. The motor vehicle is the most common method utilized for on-site travel. Both private and government-owned vehicles are used by employees for travel between facilities in the course of their daily activities. During normal employee hours, there is also a taxi service which utilizes government-owned vehicles to transport employees on their work-related trips. In addition to the roadways, there is a paved bicycle path which

Insert Figure 1-10 (Outlying Facilities) extends from the East Entrance at Batavia Road to the West Entrance at Pine Street. This path is used primarily for recreational purposes including cycling, jogging, and walking.

There are seven (7) points of access to the Fermilab site, three of which are used on a daily basis. The East Entrance (Batavia Road as shown in bottom picture) and the Main Entrance (Pine Street as shown in top picture), offer daily gated access to the site. Fermilab employees are issued cards to operate the gates for entering and leaving the site at any time. Visitors may gain entry, and exit the site by an automatic ticket system that provides for gate operation between the hours of 6:00 AM and 8:00 PM.

The West Entrance (Wilson Street) offers guard-monitored access to the site and is used primarily for the daily delivery of materials and goods to the site receiving area. The Town Road, Eola Road and Kautz Road Entrances are controlled by normally locked gates which can be opened for limited access on a monitored basis. The Wilson Street Entrance at



the eastern boundary of the site has been barricaded to prevent access at any time.

On-Site Parking

Parking lots exist in reasonable proximity to virtually all facilities on the site. The layout and size of parking lots varies with respect to the facility use and employee requirements. The greatest concentration of parking is located in the Technical Support Area and the Wilson Hall/Footprint Area. In both of these areas, there are limited duration parking spaces designated for visitors and normal short-term employee parking. There are also spaces designated for particular government vehicle assigned to specific groups located within the adjacent buildings. There is currently no assigned employee parking. At the present time, parking areas are adequate for the facilities they support with the exception of the Wilson Hall/Footprint Area. Recent expansion of office and technical space within this area has generated the need for additional employee and visitor parking.

On-Site Transportation

Virtually all movement of persons, goods, and materials into and out of the Fermilab site is by motor vehicle. Trucks used to deliver material to the site generally enter at one of the three primary entrance and proceed along Roads A, B, and D to the Main Receiving Area at Warehouse #2 (Building 940). The Burlington Northern Railroad does maintain a right-of-way through the extreme northwest portion of the Fermilab site adjacent to the Railhead Storage Area. Occasionally, this rail access is utilized for the delivery of large items when rail delivery proves to be more economical than over-the-road transit.

5. Geology/Seismic Risk/Topography/Hydrology

Geology

A number of studies have documented the subsurface characteristics in the vicinity of the Fermilab site (DOE88, Pf74, Sa82,Vi85,Vi88). The upper geology of the site is characterized by 18.2 - 30.5 m (60 to 100 feet) of glacial till overlaying bedrock of Silurian dolomite (Sa82). Beneath this upper bedrock are older sedimentary formations of Cambrian and Ordovician dolomite and sandstone. The lower bedrock units are effectively confined from the upper bedrock by the Maquoketa shale group.

The till unit is composed primarily of low permeable clays interspersed with areas of higher permeable sand and gravel. The clays act as an impedance to ground water flow through the till, but the sporadic occurrence of the higher permeable regions and the existence of extensive, undocumented drain tile lines from past agricultural use make localized predictions of ground water flow difficult. The water table fluctuates seasonally between 1.5 - 4.6 m (5 and 15 feet) below the ground surface. This region and the fractured upper 3m (10 feet) of the Silurian dolomite formation yield sufficient quantities of water for private production wells.

Seismic Risk

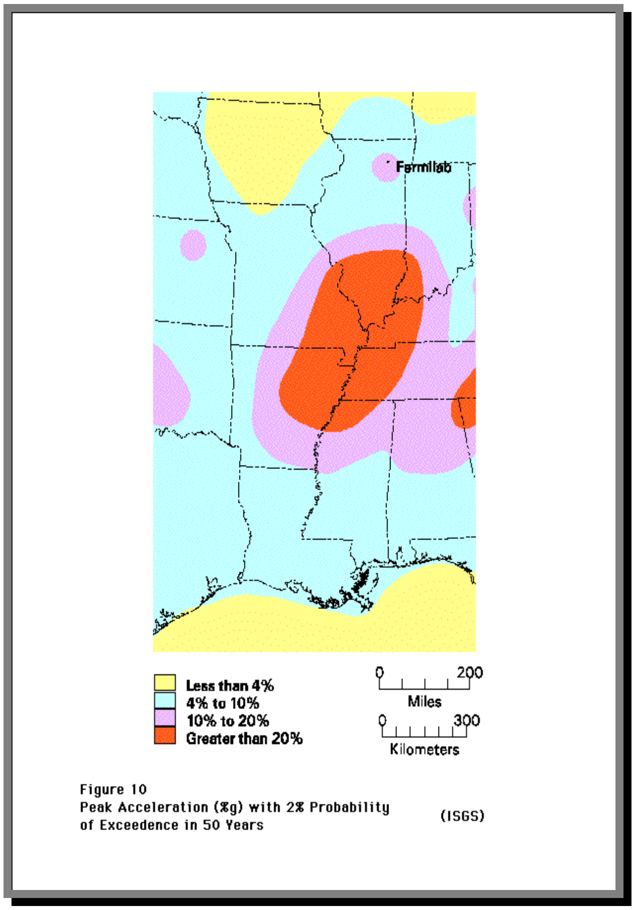


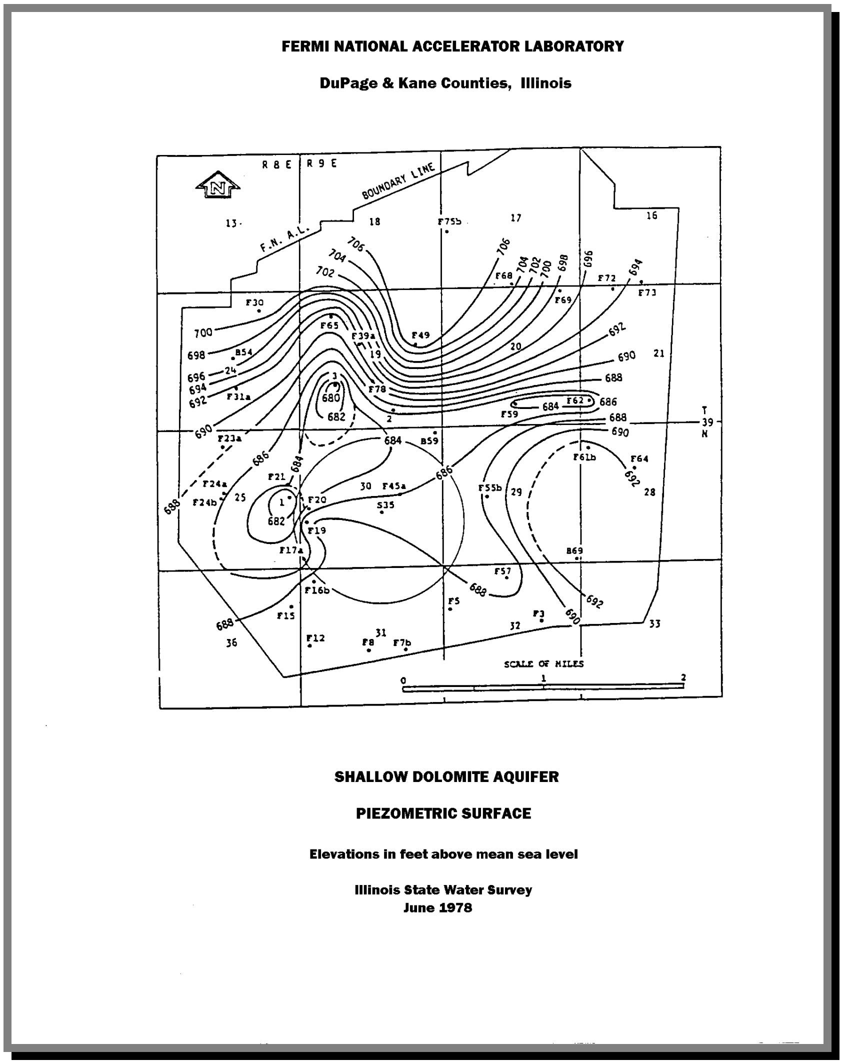
Figure 1-11: Peak Acceleration

Figure 1-11, Peak Acceleration, is a contour map of peak acceleration probability in the central part of the US. Earthquakes epicentered in northern Illinois have been infrequent and non-destructive. Records dating from 1804 indicate only ten seismic events of note. No earthquake has had a magnitude as great as 6.1 on the Richter Scale, i.e. associated with significant property damage. In fact the whole of the northern Illinois study falls into a low seismic risk category.

Topography

The site is relatively flat as a result of past glacial action. The highest area, with an elevation of 244 m (800 ft) above mean sea level is near the northwestern corner. The lowest point, 218 m (715 ft) above mean sea level is toward the southeast. The drainage of most of the surface water is to the southeast toward the DuPage River. A smaller amount of the surface water flows toward the southwest toward the Fox River. There are three watersheds that collect water on site: Kress Creek (located in the north portion of the site), Indian Creek (located in the southwest portion of the site) and Ferry Creek (located in the southeast portion of the site). Kress and Ferry Creeks are tributary to the west branch of the DuPage River. Indian Creek flows to the Fox River.

Hydrology



Generally, communities east of Fermilab, Cook County and the eastern three fourths of DuPage County, obtain their domestic water from Lake Michigan.

Figure 1-12:

Shallow Dolomite Aquifer

However, particularly in DuPage County, many residents who live outside of community boundaries still receive their water from water distribution companies that obtain water from the Silurian aquifer. Quarry operations and heavy pumping for general use have partially dewatered large areas of the Silurian dolomite formation, thus speeding up the transition to use of Lake Michigan water. Only a few people still have their own wells in the glacial drift. The dominant river basins include the Fox, Des Plains, Rock and Illinois Rivers. All the rivers drain into the Mississippi. The two major streams near the Lab are the Fox River to the west and the West Branch of the DuPage River which passes to the east of the site. The Fox River flows south through Batavia with an average of about 580 million gallons of water per day. The west branch of the DuPage River flows south with an average of 53 million gallons per day. West of the Lab, communities generally obtain their water from the deeper wells.

Geological units which supply domestic community wells include the Galena-Platteville (especially where not overlain by the Maquoketa), St. Peter sandstone, Ironton-Galesville sandstone, and the Mt. Simon sandstone. Some communities along the Fox River also draw water from the river for domestic use. Shallow wells ending in sand and gravel units of the glacial drift and the upper bedrock are used extensively throughout Kane County (refer to Figure 1-21 behind tab at end of Section 1) for individual and small community wells. The direction of natural ground water flow beneath Fermilab is generally toward the south/southeast. Flow is heavily influenced, however, by ground water extraction wells used to supply drinking water to the majority of the site.

Figure 1-12, shown previously on page 27, is a piezometric contour map for this aquifer.

Table 1-1 shown below (see also Figure 1-20 "Fermilab Site Well Locations" behind tab at end of Section 1) identifies Fermilab's site well locations. The well at F62 is no longer in production and is currently slated for decommissioning. Well W-3 is maintained for backup supply to W-1, which is now the primary water supply and influence on the piezometric contour.

Table 1-1 / Fermilab Wells

Well Number	Map Number	County	Use	Depth (feet)	Well Number	Map Number	County	Use	Depth (feet)
3	76	DuPage	Monitoring	120	MWS3	64	DuPage	Monitoring	16
5	69	DuPage	Monitoring	110	MWS4	53	DuPage	Monitoring	15
7	67	Dupage	Monitoring	122	MWS5	58	DuPage	Monitoring	15
8	66	DuPage	Monitoring	68	S-1058	27	DuPage	Monitoring	60
12	65	Dupage	Monitoring	80	S-1059	28	DuPage	Monitoring	62
16	64	DuPage	Monitoring	90	S-1060	31	DuPage	Monitoring	62
19	51	DuPage	Monitoring	115	S-1061	21	DuPage	Monitoring	57
20	50	DuPage	Monitoring	120	S-1062	20	DuPage	Monitoring	60
39	14	DuPage	Monitoring	170	S-1063	19	DuPage	Monitoring	66
43	34	DuPase	Monitoring	100	S-1087	28	DuPage	Monitoring	61
45	60	DuPage	Monitoring	100	S-1088	29	DuPage	Monitoring	22
49	15	DuPage	Monitoring	95	S-1089	30	DuPage	Monitoring	32
50	16	DuPage	Monitoring	80	S35	59	DuPage	Monitoring	83
57	74	DuPage	Monitoring	66	SSC2	70	DuPage	Monitoring	#########
59	36	DuPage	Monitoring	80	W-2	33	DuPage	Monitoring	326
62	37	DuPage	Monitoring	261	W-4	18	DuPage	Monitoring	1432
64	40	Dupage	Monitoring	90	23	41	Kane	Monitoring	110
65	4	DuPage	Monitoring	165	30	3	Kane	Monitoring	135
59	6	DuPage	Monitoring	120	31	12	Kane	Monitoring	210
72	7	DuPage	Monitoring	90	24a	42	Kane	Monitoring	100
73	8	DuPage	Monitoring	120	24b	43	Kane	Monitoring	80
74	9	DuPage	Monitoring	85	B54	10	Kane	Monitoring	117
75	1	DuPage	Monitoring	80	BH13	48	Kane	Monitoring	70
76	2	DuPage	Monitoring	75	BH15	48	Kane	Monitoring	55
78	23	DuPage	Monitoring	160	S-1111	2	Kane	Monitoring	27
79	22	DuPage	Monitoring	81.5	S-1115	45	Kane	Monitoring	30
80	26	DuPage	Monitoring	71	S-1118	47	Kane	Monitoring	33.5
39d	15	DuPage	Monitoring	25	S-1124	63	Kane	Monitoring	50
61b	39	DuPage	Monitoring	70	S-1126	44	Kane	Monitoring	42.5
61c	38	DuPage	Monitoring	243	W-3	17	DuPage	NCNT	222
B56	68	DuPage	Monitoring	63	W-5	71	DuPage	NCNT	220
B59	35	DuPage	Monitoring	82	W-1	49	Kane	NCNT	224
MSS 5S	24	DuPage	Monitoring	16	17	61	DuPage	Semi-private	114
MSS 5D	24	DuPage	Monitoring	40	52	32	Dupage	Semi-private	100
MSS B6	25	DuPage	Monitoring	28	55	72	DuPage	Semi-private	145
MWD1	56	DuPage	Monitoring	43	56	73	DuPage	Semi-private	174
MWD2	57	DuPage	Monitoring	41	58	75	DuPage	Semi-private	140
MWS1	52	DuPage	Monitoring	15	68	5	DuPage	Semi-private	169
MWS2	55	DuPage	Monitoring	17	29	11	Kane	Semi-private	130

NTC = Non-Community, Non Transient

A new well, Well W-5, was installed in the southeast corner of the Main Ring to supply the D0 Experimental Hall. Its influence on the piezometric contour has not yet been mapped. The Village area in the east part of the site is supplied by groundwater from the City of Warrenville distribution system. The majority of ground water supplies used in community systems surrounding the Fermilab site are withdrawn from the sandstone aquifer in the Cambrian/Ordovician formations at depths of approximately 366 m (1200 feet). Recent changes to the use of surface water supplies drawn from Lake Michigan by communities east of Fermilab is reducing the demand on these lower formations. The shallow Silurian dolomite aquifer is used heavily to supply water to private wells in the area. In the past, heaviest withdrawals have occurred in DuPage County, east of Fermilab, where the estimated 1984 pumping rates (not including rural domestic and livestock wells) exceeded the withdrawal rate from the deeper Ordovician aquifer (Ki85). Quarry operations and heavy pumping for general use have partially dewatered large areas of the Silurian dolomite formation.

Vegetation

Most of the land that Fermilab now occupies was actively farmed. Approximately 680 ha (1680.8 acres) has remained in crop production, primarily corn. A total of 371 ha (918 acres) has, to date, been planted in native prairie vegetation.

The biotic communities within Fermilab include upland forests, oak savannas, prairie remnant, reconstructed prairie, non-native grasslands, old fields, pastures, turfgrass lawns, fence rows, row-crop fields, and various types of wetlands. A mature mesic upland forest, about 28 hectares in size, has bur oak as the dominant canopy tree with other common species including red oak, sugar maple, white ash, swamp white oak, hop hornbeam, basswood, hawthorn, black cherry, bitternut hickory, and box elder. Wetlands include persistent emergent palustrine wetlands, palustrine forested wetlands along the flood plain of Indian Creek, and small palustrine scrub-shrub wetlands.

Figure 1-13: Fermilab abundant vegetation supports co-habitation with wildlife.

Fauna

The mixture of vegetational communities -- open fields, deciduous forests, restored prairie, wetlands, and mowed areas -- coupled with a large degree of protection from human intrusion, makes the Fermilab site an effective refuge for many species of animals including many mammals and numerous bird species.

These animals are characteristically found in open fields, forests, and forest-edge communities. In addition, many bird species use the site as a stopover during spring and fall migration.

Figure 1-14:

Fermilab's restored prairie.

6. Meteorology

The climate of the area is continental, with cold winters and hot, humid summers and frequent short period fluctuations in temperature, humidity, and wind speed and direction. About two-thirds of the average annual precipitation falls between April 1 and September 30, often in the form of heavy showers and thunderstorms. Topography does not significantly affect air flow over or near the site.

Three major air masses influence the region. Low temperatures are common in winter due to the unrestricted flow of cold air from Canada (polar continental). Hot, humid conditions are frequent in summer due to tropical Gulf air masses (maritime tropical) that bring south or southwest winds. The other air mass is cool, relatively dry modified Pacific air (maritime polar). Annual precipitation in the area averages about 33.2 inches. Summer thunderstorms are often locally heavy and variable so that some locations in the region receive substantial rainfall while others receive little or none. Longer periods of continuous precipitation occur mostly in fall, winter, and spring. About 50 percent of the winter precipitation and about 10 percent of the yearly total falls as snow. Possible sunshine is about 70 percent in summer and 45 percent in winter.

The average daily maximum air temperature of the site in January is 33°F, and the average daily minimum is 19°F. The long-term normal value at Chicago's Midway Airport is 50.5°F. July is normally the warmest month with average daily maximum of 84.1° F and average daily minimum of 67.1° F . In about half the summers, 99° F has been exceeded. Half the winters have had a minimum as low as -10°F. The lowest recorded temperature was -27°F in 1985.

7. Floodplains/Wetlands

On most of the Fermilab site, surface water runoff is to the southeast into Ferry Creek. The northern part of the site drains to Kress Creek. These two creeks drain to the West Branch of the DuPage River. Surface drainage in the west and southwest is to Indian Creek and the Fox River.

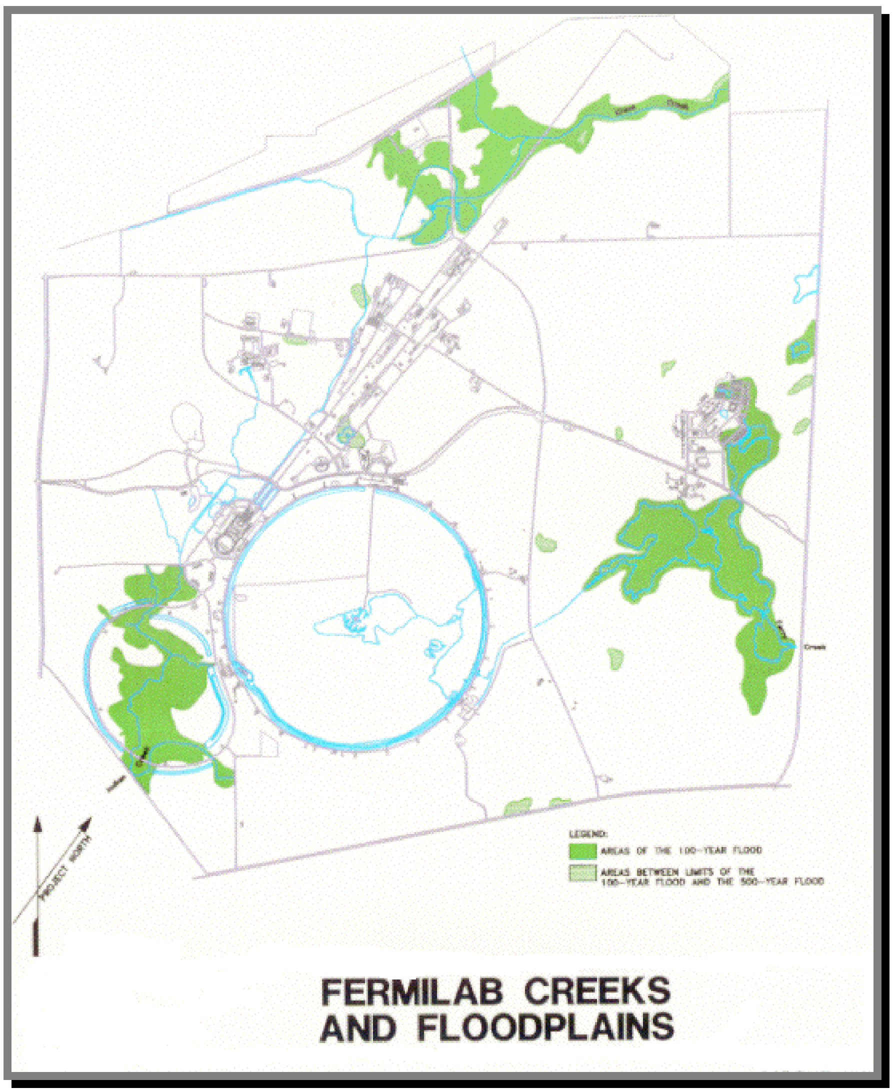
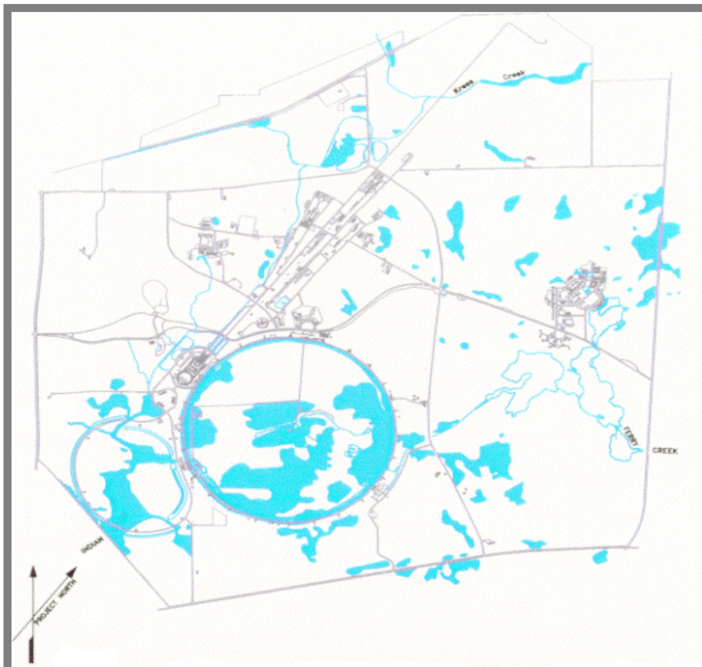


Figure 1-15: Floodplains

Floodplains that are associated with these creeks are shown on page 34 in Figure 1-15. The 100 year and 500 year limits depicted were taken from the Federal Emergency Management Agency's Flood Insurance Rate Maps.

Various types of wetland communities exist around the Fermilab site. Wetlands taken from the U.S. Fish & Wildlife Service National Wetland Inventory data bank are shown below in Figure 1-16. The wetland types at Fermilab include primarily palustrine emergent, forested, scrub-shrub and unconsolidated bottom varieties, lacustrine limnetic and littoral wetlands and riverine intermittent wetlands. Many of the wetlands exist along the creek banks and in the area surrounded by the Main Ring ponds.



FERMILAB WETLANDS

A field delineation of the wetlands in the Main Injector project area has been completed. A U.S. Army Corps of Engineer's permit under Section 404 of the Clean Water Act is in effect.

Figure 1-16: Wetlands

The permit allows for the mitigation of the wetlands that were affected by the Main Injector project. The mitigation involved creating about ten acres of sedge meadow and forested wetlands adjacent to an existing wetland area.

II. EXISTING SITE CONDITIONS

All Building numbers referred to in this document are taken from the Facility Management Information System (FIMS) database.

1. Existing Land Use (Refer to Figure 1-18 "Existing Site Utilization Map" and Figure 1-19 "Existing Land Use Map" behind tab at end of Section 1.)

Figure 2-1:

Site view looking south toward Wilson Hall

2. Mission and Program.

Existing Mission

Fermi National Accelerator Laboratory uses its core competence -- development of superconducting magnets, design and operation of particle accelerators, detector development, high-performance computing, and experimental and theoretical physics -- in its mission to provide the resources for qualified researchers to conduct basic research at the frontiers of high-energy physics and related disciplines. Fermilab fosters and stimulates science education, transfers to industry technologies developed at the laboratory, and conducts operations with the goal of excellence in health, safety and the protection of the environment.

Science Education

The scientific education of U.S. students will continue to need strong support from the active scientific community in order to achieve the levels of excellence set forth in emerging national goals for education. The Lederman Science Education Center affirms our continuing commitment to putting Fermilab's unique resources in high-energy physics to work in strengthening science and mathematics education for students at all levels. Fermilab recognizes a particular opportunity to serve the very young, by increasing the number of pre-college students who retain their interest in the natural world; and to encourage the advanced study of science by women and minorities, who have historically had little participation in our country's scientific endeavors. In pursuit of these goals, over the next five years, Fermilab will add and enhance educational programs for students from kindergarten through graduate school, and for their parents and teachers.

3. Laboratory Staff Composition

Table 2-1 / Laboratory Staff Composition

PROFESSIONAL STAFF	Ph.D. (Educational Attainment)	MS/MA	BS/BA	Other
Scientists	304	34*	19*	4*
Engineering Physics	14	21	20	4
Technical Support	1	9	49	198
Engineers	8	88	81	23
Admin. & Mgmt.	11	42	53	86
Computer Professional	15	39	94	47
SUPPORT STAFF				
Technicians	0	10	84	478
Others	0	4	33	432
Laboratory Total	353	247	433	1272
Users (1800 x 0.5 occupancy factor)				900
Grand Total				3205

** Includes students assigned to the Laboratory as guests.*

4. Functions

The 6,800 acre Fermilab site was acquired by the Atomic Energy Commission from the State of Illinois. The dividing line between Kane County and DuPage County passes through the site from north to south with the majority of the site located in DuPage County. Refer to Figure 1-21 (behind tab at end of Section 1) to locate the boundary line for Kane County. The unoccupied land around the perimeter of the site serves as a buffer zone between the site boundaries and the conventional facility development.

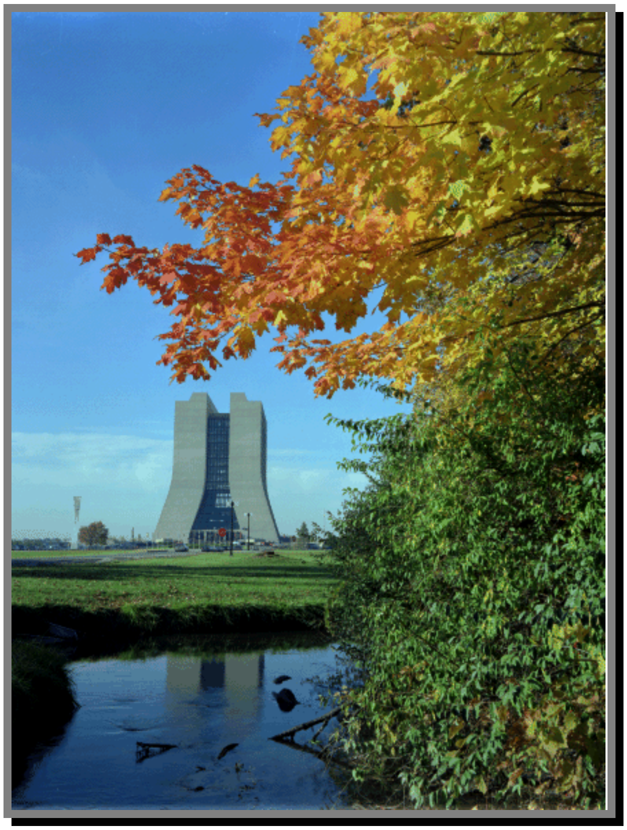


Figure 2-2:

Wilson Hall, constructed in 1972, is the Main Administrative Center

Development

The development of permanent facilities has generally followed the initial site planning which was accomplished in the late l960's and early 1970's. The main accelerator enclosure is located in the south central portion of the site with the adjacent linear and booster accelerators located to the west. Three major fixed-target beam lines extend from the northwest side of the main accelerator enclosure in a northeasterly direction. Later development of the site has consisted of refinements and additions to the original configuration as well as additional support facilities. The most recent addition to the permanent facilities of the site is the Main Injector Ring and associated support and service buildings which are located to the southwest of the main accelerator enclosure. The following pages contain tables which have information concerning development and individual building data.

TABLE 2-2 TECHNICAL AREA / Wilson Hall Footprint and Antiproton Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
1	WILSON HALL & AUDITORIUM	100	100	421,100	275,000
5	SCIENCE EDUCATION BUILDING	99	100	8,500	6,800
201	AP30 SERVICE BUILDING	100	99	7,498	6,748
202	AP10 SERVICE BUILDING	100	99	7,498	6,748
203	AP50 SERVICE BUILDING	100	99	8,842	7,958
205	AP50 GAS STORAGE 8UILDING	100	98	260	234
206	BOOSTER GALLERY EAST & WEST	100	100	20,709	18,638
207	BOOSTER TOWER SOUTHWEST	100	100	15,239	13,715
208	BOOSTER TOWER SOUTHEAST	100	100	15,278	13,750
212	ACCELERATOR - LINAC. X-GALLERY	100	100	133,629	120,266
214	CENTRAL UTILITY BUILDING	100	100	20,661	18,595

TABLE 2-3: TECHNICAL AREA / Main Ring Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
911	SITE 17 BARN	102	97	4,782	4,304
912	SITE 17 SHED	102	97	3,663	3,297
309	C-3 REFRIGERATION BUILDING	106	101	214	193
310	C-4 REFRIGERATION BUILDING	106	100	214	193
311	D-l REFRIGERATION BUILDING	106	99	214	193
312	D-2 REFRIGERATION BUILDING	106	99	214	193
313	D-3 REFRIGERATION BUILDING	106	98	214	193
314	D-4 REFRIGERATION BUILDING	105	99	214	193
315	E-l REFERATION BUILDING	104	97	214	193
316	E-2 REFRIGERATION BUILDING	104	97	214	193
317	E-3 REFRIGERATION BUILDING	103	97	214	193
318	E-4 REFRIGERATION BUILDING	102	97	214	193
319	F-l REFRIGERATION BUILDING	101	97	214	193
320	F-2 REFRIGERATION BUILDING	101	98	448	403
321	F-3 REFRIGERATION BUILDING	100	98	299	269
322	F-4 REFRIGERATION BUILDING	100	100	214	193
323	COLLIDER DETECTOR FACILITY/CDF	102	103	55,375	49,838
325	DO ASSEMBLY BUILDING	106.5	100	66,398	59,758

TABLE 2-3 (continued) TECHNICAL AREA / Main Ring Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
2	MAIN RING GAZEBO	103	100	628	565
204	APO TARGET HALL	98	101	13,231	11,908
216	A-0 KICKER BUILDING	101	100	1,782	1,604
217	A-0 LAB BUILDING	101	100	9,375	8,437
218	A-0 SERVICE BLDG./VEHICLE	100	100	4,633	4,170
220	A-l SERVICE BUILDING	100	101	1,146	1,031
221	A-2 SERVICE BUILDING	101	l0l.0	1,146	1,031
222	A-3 SERVICE BUILDING	101	102	1,146	1,031
223	A-4 SERVICE BUILDING	102	102	1,146	1,031
224	B-0 SERVICE BUILDING	102	103	3,760	3,384
225	B-l SERVICE BUILDING	102	103	1,146	1,031
226	B-2 SERVICE BUILDING	103	103	1,146	1,031
227	B-3 SERVICE BUILDING	102	103	1,146	1,031
228	B-4 SERVICE BUILDING	102	103	1,146	1,031
229	B-48 KICKER BUILDING	102	103	576	518
230	C-0 SERVICE BUILDING	105	103	5,656	5,090
231	C-l SERVICE BUILDING	105	102	1,146	1,031
232	C-17 KICKER BUILDING	105	102	578	520
233	C-2 SERVICE BUILDING	106	101	1,146	1,031
234	C-3 SERVICE BUILDING	106	101	1,146	1,031
235	C-4 SERVICE BUILDING	106	l00.0	1,146	1,031
236	C-4 PUMP HOUSE	106.5	100	620	558
237	C-48 KICKER BUILDING	105	103	578	520
238	D-0 SERVICE BUILDING	106	99	2,639	2,375
239	D-0 VEHICLE ACCESS BUILDING	106	99	4,053	3,648
240	D-l SERVICE BUILDING	106	99	1,146	1,031
241	D-2 SERVICE BUILDING	106	99	1,146	1,031
242	D-3 SERVICE BUILDING	106	98	1,146	1,031

TABLE 2-4 TECHNICAL AREA / Proton Experimental Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
324	G2 SERVICE BUILDING	100	102	1,645	1,481
500	PROTON PAGODA	101	105	1,485	1,337
502	PROTON ASSEMBLY	100	107	10,660	9,594
504	PROTON TAGGED PHOTON	101	107	5,408	4,867
506	HIGH INTENSITY LABORATORY	101	107	6,600	5,940
508	PROTON SERVICE #1	100	104	3,415	3,074
510	PROTON SERVICE #2	100	105	3,000	2,700
512	PROTON SERVICE #3	100	106	432	389
514	PROTON SERVICE #4	100	105	3,166	2,849
516	PROTON SERVICE #5	100	106	1,796	1,616
518	PROTON SERVICE #6	100	106	1,244	1,120
520	PROTON POLE BUILDING	101	106	2,484	2,236
603	RD T&M SHOP	101	106	576	518
626	WIDE BAND LAB	101	107	14,661	13,195
628	PB6/PB7	101	107	9,725	8,753
809	MAGNET STORAGE	101	107	6,308	5,677
943	SITE 50 BUILDING A	101	106	367	330
944	SITE 50 BARN	101	106	5,700	5,130
945	SITE 50 BUILDING B	101	106	774	697
946	SITE 50 HOUSE	101	106	3,426	3,083
947	SITE 50 BUILDING C	101	106	656	590
951	SITE 50 WASTE STORAGE BUILDING	101	106	105	95

TABLE 2-5 TECHNICAL AREA / Nuetrino Experimental Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
522	EXP AREA OPERATIONS CTR	100	105	10,452	9,407
600	NEUTRINO LAB A	100	108	11,047	9,942
602	NEUTRINO LAB B	100	108	9,176	8,258
604	NEUTRINO LAB C	100	108	5,342	4,808
606	NEUTRINO LAB D	100	108	S365	4,829
608	NEUTRINO LAB E	100	108	5,225	4,703
610	LABORATORY F	100	108	15,524	13,972
612	LABORATORY G	101	108	4,290	3,861
613	NEUTRINO SERVICE BUILDING (NSE)	100	108	605	545
614	NEUTRINO LAB NWA	100	107	6,804	6,124
615	NEUTRINO SERVICE #0	100	103	480	432
616	NEUTRINO SERVICE #1	100	102	3,234	2,911
618	NEUTRINO SERVICE #2	100	102	1,217	1,095
620	NEUTRINO SERVICE #3	100	105	1,215	1,094
622	NEUTRINO SERVICE #4	100	102	1,215	1,094
623	NEUTRINO SERVICE #7	100	104	1,302	1,172
624	NEUTRINO TARGET SERVICE	100	103	11,534	10,381
625	NEON COMPRESSOR BUILDING	100	108	924	832
700	MUON LABORATORY	100	110	35,611	32,050
854	MASTER SUB-STATION	100	102	3,197	2,877
855	CASEYS POND PUMP HOUSE	99	108	496	446
942	SITE 49 BARN 1 & 2	101	105	8,604	7,744

TABLE 2-6 TECHNICAL AREA / Meson Experimental Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
400	MESON WONDER ENCLOSURE	99	100	6,498	5,848
402	MS-l MESON SERVICE BUILDING	100	104	2,305	2,075
404	MS-2 MESON SERVICE BUILDING	100	103	2,466	2,219
406	MS-3 MESON SERVICE BUILDING	100	103	2,033	1,830
408	MESON DETECTOR BUILDING	99	106	38,644	34,780
410	MESON CENTRAL CRYOGENICS	99	106	3,943	3,549
412	MESON ASSEMBLY BUILDING	99	106	7,574	6,817
414	MESON SERVICE #4	99	106	1,355	1,220
416	POLARIZED PROTON LAB - MP	101	107	14,900	13,410
418	MESON SERVICE MS7	101	107	1,940	1,746
420	MESON WEST LAB -- MW	101	107	12,800	11,520

TABLE 2-7 TECHNICAL AREA /Technical Campus Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
3	FEYNMAN COMPUTER FACILITY	100.4	103	83,580	75,222
800	INDUSTRIAL BUILDING #1	101	103	16,091	14,482
801	INDUSTRIAL BUILDING #2	101	103	16,091	14,482
803	INDUSTRIAL SHED #2B	101	103	2,063	1,857
804	INDUSTRIAL BUILDING #3	101	103	16,351	14,716
805	INDUSTRIAL BUILDING #4	101	103	16,351	14,716
806	INDUSTRIAL CENTER	101	103	44,835	40,352
807	INDUSTRL COMPRESSOR BLDG	101	103	2,588	2,329
851	CENTRAL HELIUM LIQUEFIER	101	103	13,715	12,344

TABLE 2-8: Support Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
921	SITE 37 SHOP	97	104	16,591	14,932
922	SITE 38 MAINTENANCE	98	103	14,681	13,213
923	ROADS/GROUNDS EQUIP STGE	97	104	5,850	5,265
924	SITE 38 MAINTENANCE SHED	98	103	3,105	2,795
925	SALT STORAGE FACILITY	97	104	4,450	4,005
926	SITE 39	97	104	10,950	9,181
928	SITE 38 STORAGE GARAGE	98	103	2,410	2,169
930	SITE 38 BARN	98	103	13,509	12,158
931	RADIATION PHYSICS CALIBRATION	98	103	4,200	3,780
932	SITE 38 FIRE STATION	98	103	5,183	4,665
934	SITE 38 EXTINGUISHER BLDG	98	103	617	555
936	SITE 38 HAZARDOUS STORAGE	98	103	3,428	3,085
938	RECEIVING WAREHOUSE #1	97	104	40,000	36,000
940	RECEIVING WAREHOUSE #2	97	104	43,000	38,700
941	SCALE HOUSE	97	104	96	86
992	SITE 65 BARN	97	105	7,832	7,049

TABLE 2-9 TECHNICAL AREA / Village Technical Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ.FT.	RIPS NET SQ FT
60	36 SAUK BLVD - METALS DEV. LAB	106.5	109	2,298	2,068
81	20 NEUQUA - LAB 7 HOUSE	107	109	1,103	993
82	22 NEUQUA - LAB 7 HOUSE	107	110	1,103	993
85	26 NEUQUA - LAB 6 HOUSE	107	110	1,103	993
86	26A NEUQUA-LAB 6-GARAGE/	107	110	658	592
87	28 NEUQUA - LAB 6 HOUSE	107	110	1,103	993
88	30 NEUQUA - LAB 6 HOUSE	107	110	1,103	993
89	28A NEUQUA-LAB 6 POLE BUILDING	107	110	1,652	1,487
90	32 NEUQUA - LAB 6 HOUSE	107	110	1,103	993
91	34 NEUQUA - LAB 5 HOUSE	108	110	1,103	993
92	36 NEUQUA - LAB 5 HOUSE	108	110	1,103	993
93	36A NEUQUA - LAB 5 POLE BLDG.	108	110	2,449	2,204
94	38 NEUQUA - LAB 5 HOUSE	108	110	1,103	993
95	36 SHABBONA - LAB 5 HOUSE	108	110	1,103	993
102	27A WINNEBAGO - LAB 1 HOUSE	107	110	1,103	993
103	27B WINNEBAGO - LAB 1 HOUSE	107	110	1,103	993
104	27C WINNEBAGO - LAB 1 HOUSE	107	109.5	1,103	993
105	29 WINNEBAGO - MACHINE REPAIR	107	110	1,000	900
106	32 WINNEBAGO - LAB 4 HOUSE	107	109.5	1,103	993
107	35A WINNEBAGO-LAB 2 COMPRESSOR	107	109.5	1,000	900
108	40 SHABBONA-LAB 4 HOUSE/OFFICE	107	110	1,103	993
109	30 WINNEBAGO - MACHINE REPAIR	107	110	3,100	2,790
118	25 BLACKHAWK - LAB 8 HOUSE	108	109	1,103	993
119	25A BLACKHAWK - LAB 8 SOUTH	108	109	1,686	1,517
120	27 BLACKHAWK - LAB 8 HOUSE	108	109	1,103	993
122	31 BLACKHAWK - LAB 8 HOUSE	108	109	1,103	993
123	31A BLACKHAWK - LAB 8 NORTH	108	109	1,430	1,287
124	33 BLACKHAWK - LAB 8 HOUSE	108	109	1,103	993
136	14 SHABBONA - ES&H HOUSE	107.5	109	1,103	993
137	14A SHABBONA - ES&H GARAGE	107.5	109	575	518
140	21 SHABBONA - ES&H HOUSE	107.5	109	1,103	993
141	CURIA I - 34 SHABBONA	107.5	109.5	22,232	20,009
143	35A SHABBONA - LAB 3 HOUSE	107.5	110	1,103	993
144	35B SHABBONA - LAB 3 HOUSE	107.5	110	1,103	993
145	35C SHABBONA - LAB 3 HOUSE	107.5	110	1,103	993
146	35D SHABBONA - LAB 3 HOUSE	107.5	110	1,103	993
147	35E SHABBONA - LAB 3 HOUSE	107.5	110	1,103	993
148	37A SHABBONA-MATERIAL DEV. LAB	107.5	110	2,206	1,985
149	37 SHABBONA-MATERIAL DEV. LAB	107.5	110	2,220	2,000
150	39 SHABBONA-MATERIAL DEV. LAB	107.5	110	1,103	993
179	27 WINNEBAGO - LAB 1	107	109.5	9,555	8,600
180	35 WINNEBAGO-LAB 2 BUTLER BLDG	107	110	8,640	7,776
181	35 WINNEBAGO - LAB 3	107.5	109.5	11,360	10,224
182	38 SHABBONA - LAB 4	107.5	110	8,976	8,078
183	36A SHABBONA-LAB 5 BUTLER BLDG	107.5	109.5	9,555	8,600
184	32A NEUQUA- LAB 6 BUTLER BLDG.	107	109.5	11,952	10,757
185	22A NEUQUA-LAB 7 BUTLER BLDG.	106.5	109	9,600	8,640
186	27A BLACKHAWK-LAB 8 BUTLER BLD	108	109	10,055	9,050

TABLE 2-10: RESIDENTIAL AREA / Village Residential Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
19	11 SAUK CIRCLE	108	107	6,835	6,152
20	1 SAUK CIRCLE - RESIDENCE	108	108	3,014	2,713
21	3 SAUK CIRCLE - DORM 7	107	108	2,318	2,086
22	4 SAUK CIRCLE - RESIDENCE	108	108	2,891	2,602
23	5 SAUK CIRCLE - RESIDENCE	108	107.S	2,131	1,918
24	6 SAUK CIRCLE - RESIDENCE	107	107	2,887	2,598
25	7 SAUK CIRCLE - RESIDENCE	107-5	107	1,283	1,155
26	8 SAUK CIRCLE - RESIDENCE	108	107	884	796
27	9 SAUK CIRCLE - RESIDENCE	108	107	1,782	1,604
28	10 SAUK CIRCLE - RESIDENCE	108	108	3,571	3,214
29	12 SAUK CIRCLE - RESIDENCE	108	107	2,414	2,173
30	13 SAUK CIRCLE - RESIDENCE	108	107	1,774	1,597
31	14 SAUK CIRCLE - RESIDENCE	108	108	2,632	2,369
32	15 SAUK CIRCLE - RESIDENCE	108	108	1,652	1,487
33	17 SAUK CIRCLE - RESIDENCE	108	108	1,552	1,397
34	18 SAUK CIRCLE - RESIDENCE	108	108	3,755	3,380
35	19 SAUK CIRCLE - RESIDENCE	108	107.5	2,164	1,948
36	1 SAUK BLVD - ASPEN EAST	107.5	107.5	17,117	15,405
40	14 SAUK BLVD - RESIDENCE	107	108	1,103	993
41	16 SAUK BLVD - RESIDENCE	107	108	1,103	993
42	18 SAUK BLVD - VENDING/LAUNDRY	107	108	1,103	993
43	20 SAUK BLVD - RESIDENCE	107	108	1,103	993
44	1 SHABBONA - DORM 3	107	108	3,188	2,869
04S	22 SAUK BLVD - RESIDENCE	107	108	1,103	993
46	24 SAUK BLVD - RESIDENCE	107	108	1,103	993
47	24A SAUK BLVD - GARAGE	107	108	626	563
48	26 SAUK BLVD - RESIDENCE	107	108	1,103	993
49	28 SAUK BLVD - RESIDENCE	107	108	1,103	993
50	28A SAUK BLVD - GARAGE	107	108	443	399
51	28B SAUK BLVD - GREENHOUSE	107	108	l957	1,761
52	28C SAUK BLVD - R&G EQUIP SHED	107	108	892	803
53	29 SAUK BLVD - RESIDENCE	107	108.5	1,103	993
54	30 SAUK BLVD - MAID HDQTRS	106.5	108.5	1,762	1,586
55	30A SAUK BLVD - POLE BUILDING	106.5	108.5	1,653	1,488
56	31 SAUK BLVD - PUMP HOUSE	107	108.S	578	520
57	32 SAUK BLVD - DORM 1	107	108.5	2,206	1,985
58	33 SAUK BLVD - RESIDENCE	107	108.5	1,103	993
59	34 SAUK BLVD - RESIDENCE	106.5	108	1,103	993
69	2 CHE CHE PINQUA-USERS CENTER	107.5	108	17,277	15,549
70	1 CHE CHE PINQUA - KUHN BARN	107.5	108	6,819	6,137
77	13 NEUQUA - RESIDENCE	107	109	1,103	993

TABLE 2-10 (continued): RESIDENTIAL AREA / Village Residential Area Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
78	16 NEUQUA - RESIDENCE	107	109	1,103	993
79	18 NEUQUA - RESIDENCE	107	109	1,103	993
80	19 NEUQUA - RESIDENCE	107	109	1,103	993
83	23 NEUQUA - RESIDENCE	107	109	1,103	993
84	25 NEUQUA - RESIDENCE	107	109.5	1,103	993
116	22 BLACKHAWK - RESIDENCE	107.5	108.5	1,103	993
117	24 BLACKHAWK - RESIDENCE	107.5	108.5	1,103	993
125	35 BLACKHAWK - RESIDENCE	108	l09.0	1,103	993
131	2 SHABBONA - DORM 2	108	109	5,587	5,028
121	29 B~ACKHAWK - RESIDIENCE	108	l09.0	1,103	993
132	8 SHABBONA - RESIDENCE	108	109	1,103	993
133	8A SHABBONA GARAGE	108	109	443	399
134	10 SHABBONA - RESIDENCE	108	109	1,103	993
135	12 SHABBONA - RESIDENCE	108	109	1,103	993
138	19 SHABBONA - RESIDENCE	108	108	1,103	993
139	20 SHABBONA SHELTER	108	109	319	287
142	33 SHABBONA - RESIDENCE	108	110	1,103	993
156	11 POTAWATOMI - RESIDENCE	108	109	1,103	993
157	12 POTAWATOMI - RESIDENCE	107	109	1,103	993
158	13 POTAWATOMI - RESIDENCE	107	109	1,103	993
159	14 POTAWATOMI - RESIDENCE	107	109	1,103	993
160	15 POTAWATOMI - RESIDENCE	107	109	1,103	993
161	15 A POTAWATOMI GARAGE	107	109	440	396
162	16 POTAWATOMI - SHOWER ROOMS	107	109	1,103	993
163	16A POTAWATOMI - EXERCISE RMS	107	109	2,626	2,363
164	16B POTAWATOMI - GYNASIUM/	107	109	7,200	6,480
165	17 POTAWATOMI - RESIDENCE	107	109	1,103	993
166	17A POTAWATOMI GARAGE	107	109	320	288
167	18 POTAWATOMI - RESIDENCE	107	109	1,103	993
168	20 POTAWATOMI - DORM 4	107	109	1,667	1,500
169	20-A POTAWATOMI DORM 4	107	109	1,103	993
170	22 POTAWATOMI - RESIDENCE	107	109	1,103	993
171	24 POTAWATOMI - RESIDENCE	107	109	1,103	993

TABLE 2-11 East and West Areas Building Data

RPIS NO.	RPIS FACILITY NAME	GRID X	GRID Y	RPIS GROSS SQ. FT.	RIPS NET SQ FT
852	PINE STREET GUARD HOUSE	96	98	96	86
856	BATAVIA ROAD GUARD HOUSE	110	108	80	72
902	SITE 3 BARN	110	100	2,049	1844
904	SITE 3 SHED	110	100	1,827	1644
906	SITE 12 BARN	104	95	8,437	7593
914	SITE 29 HOUSE	95	101	5,327	4794
916	SITE 29 GARAGE	95	101	1,187	1068
918	SITE 29 SHED 1	95	101	1,728	1555
920	SITE 29 SHED 2	95	101	1,659	1493
948	SITE 52 HOUSE	102	106	3,263	2937
949	SITE 52 BARN	102	106	6,146	5531
964	SITE #55 - COORDINATION & OPS	106	103	3,117	2,805
966	SITE #55 - JANITORIAL STORAGE	106	103	1,229	1,106
968	SITE #55 - VEHICLE GARAGE	106	103	980	882
970	SITE #55 - WS-3 WASTE STORAGE	106	103	1,815	1,634
972	SITE #55 WS-2 WASTE STORAGE	106	103	1,740	1,566
974	SITE #55 - WS-l WASTE STORAGE	106	103	2,208	1,987
976	SITE #56 T&M CONTRACTOR HOUSE	108	101	3,628	3,265
978	SITE 56 BARN 1	108	101	983	885
980	SITE 56 BARN 2	108	101	3,383	3045
982	SITE 56 SHED 1	108	101	1,095	986
984	SITE 56 SHED 2	108	101	5,852	5267
986	SITE #58 - RESIDENCE	109	101	3,697	3,327
988	SITE #58 - BARN	109	101	1,002	902
994	SITE 67 BARN	101	109	2,751	2476
996	SITE 68 HOUSE	102	110	3,134	2821
998	SITE 70 BARN	103	112	6,385	5747

The majority of the buildings on the Fermilab site are clustered within any one of the areas shown in Figures 1-18 and 1-19 located behind the tab at the end of Section 1. Figure 1-10 (Section 1, Page 22), Figures 2-14 through 2-21 (Behind tab at end of Section 2), and Figure 3-3 (Section 3, Page 14), can also be referenced for more detailed information. These figures give specific site locations for all of the buildings that were listed in the previous tables.

5. Utilities

Site Utility Systems

Primary distribution systems for utilities on the Fermilab site include Domestic Water, Industrial Cold Water, Sanitary Sewer, Natural Gas, Electrical Power, and Telecommunications. For more information, refer back to Table 1-1: Fermilab Wells (Section 1, Page 29) and also Figure 1-20 (Behind tab at end of Section 1). There is only one centralized utility plant, Building 214, on the Fermilab site. It supplies both hot and chilled water to Wilson Hall and the buildings in the Footprint Area for heating and cooling needs. Also located at this central plant is the main water source for the Fermilab site, Well No. 1, which is the main site public water supply. Water is pumped from Well No. 1 to the Central Utility Building for chlorination and then to the site distribution system. A description of the site utility systems and site plans are contained in the following sections.

Domestic Water Systems

There are three public water supplies that provide domestic water to the various areas of the Fermilab site. Figure 2-3 (Section 2, Page16) illustrates the locations of these areas. The Main Site system supplies domestic water through a piping network to the majority of the facilities on site. The primary source for this system is Well No. 1 which is located near the Central Utility Building (214). Water is pumped from the well into a 50,000 gallon reservoir within the plant. There it is chlorinated and then pumped through the site-wide distribution system.

Insert Figure 2-3 (Domestic Water)

The secondary source for this system is Well No. 3 which is located north of Road B and east of Receiving Road. When Well No. 1 is not in use, water is pumped from Well No. 3 into another 50,000 gallon reservoir at the well site

Domestic water is supplied to the Village Residential Area and the Village Technical Area by a direct metered connection to the community water supply of the neighboring Village of Warrenville. This is a separate distribution system, independent of the main site distribution which, in addition to drinking water, provides the source of water for the fire protection systems located within the Village Areas.

The third public water supply at Fermilab is the water supply located at D0. This system supplies water to the Colliding Beams Experimental Facility at D0.

Figure 2-4: CUB Facility

The water is pumped from nearby Well W-5 and is chlorinated at D0 prior to distribution.

Seven additional shallow water wells serve individual buildings at outlying sites. These are wells associated with the farm sites that existed when the land was originally acquired by the Atomic Energy Commission. They are kept in service to supply water to the adjacent, former farm residences and storage buildings which are still utilized for various laboratory requirements.

Wells used for potable domestic water at Fermilab have a combined capacity of 830 gpm. The site has 32,000 linear feet of piping used for potable water distribution. Total capacity of pumping stations used for potable water is about 3,500 gpm.

Industrial Cooling Water (ICW) Systems

The Industrial Cooling Water system (see Figure 2-5 Section 2, Page 19) at Fermilab has a dual purpose. It is used to supply water to the various fire protection sprinkler systems located in buildings across the site. In addition, ICW is utilized in many of the experimental areas as a source for conventional magnet cooling. The distribution system for ICW extends from the main pumping station at Casey's Pond to the Support Area, Wilson Hall and Footprint Area, and most of the Experimental Areas located on the Fermilab site.

Insert Figure 2-5: Industrial Cooling Water

The main storage reservoir for the ICW system is Casey's Pond which is located in the northern portion of the Fermilab site. There are two sources which provide water to the reservoir.

Figure 2-6: Looking over Casey's Pond

A site-wide network of lakes and ditches is used to collect runoff water, as well as heat exchanger and sump discharge water, and return it to the main reservoir at Casey's Pond. Water is also collected in the Main Ring Lake, located within the main accelerator ring, and Lake Law, located in the southeast portion of the site. The water from these lakes is then transferred to the main reservoir by means of a pumping station located at the Main Ring Lake. It is important to note that the whole of the 6,800 acre Fermilab site provides runoff to this network of ditches and lakes and thus even open areas of the site contribute to the experimental effort of the Laboratory. There is a second source that is used to supply water to the main reservoir. A contract with the State of Illinois allows Fermilab, when water levels are sufficient, to pump water from the nearby Fox River to supplement and maintain water levels at Casey's Pond.

Figure 2-7: Archimedes Spiral

The present total capacity of the on-site ICW supply system is 185.7M gallons based on existing lake and ditch sizes and average rainfall. Building 855, the pumping station at the main reservoir, contains 3-5,000 gpm variable speed primary pumps and 4-1,000 gpm single-speed secondary pumps which supply water to the site-wide distribution system. The average pumping output of the Casey's Pond Pumping Station is primarily dependent on the water temperature of the reservoir supply. This temperature varies with the time of year and the amount of experimental equipment requiring cooling. In the winter months, with minimum cooling demand from equipment, the output may be as low as 4,000 gpm. In the summer months, with a maximum cooling demand, the output could exceed 11,000 gpm, a level which approaches the upper limit of the overall system capacity. The site has about 105,000 linear feet of piping for the non-potable water distribution system.

Sanitary Sewer System

There are two (2) underground sewage collection systems at the Laboratory. These can be seen in Figure 2-8 (Section 2, Page 23). One serves the main site, the other serves the Village. The main site collection system has six (6) lift stations; the Village system has one. No sewage is treated on site. Sewage from the main site is treated on a fee basis by the City of Batavia. Sewage from the Village is handled by the City of Warrenville under a similar arrangement.

The collection system which serves the main site facilities is in generally good working condition. There has been an increase in the infiltration rate of the Village system in recent years due, primarily, to the age of the system. A portion of this system has been repaired. Investigation continues to identify and remedy the remainder of this problem. The sewage system at the site contains 37,000 linear feet of gravity feed sewage line, 12,000 feet of pressure fed sewage line, and septic tanks with a capacity of 14,000 gal.

Natural Gas Distribution

From two separate metered source points, gas is delivered to Fermilab by NICOR and purchased under a supply contract with the Defense Logistics Agency. (See Figure 2-9, Section 2, Page 24) The primary gas supply is an 8-inch line which is metered at the Wilson Road boundary. Two branch lines extend south. One serves the Village while the other terminates at the Central

Insert Figure 2-8: Sanitary Sewer

Insert Figure2-9: Natural Gas

Utility Building. A second 4-inch back-up supply line has been recently completed which supplies gas through a meter station at the west boundary of the site, adjacent to Giese Road. This line is connected to the Central Utility Building gas supply. Through a system of sectioning valves, gas supply can be maintained to the site in the event of an interruption of the 8-inch primary supply. The pressure site-wide is regulated to maintain 100 psi. The Village and Site 38 are regulated to maintain 60 psi. Natural gas is primarily used for heating; however, it is also used to drive turbine engines for generating emergency electricity at Casey's Pond, Well #3, the Master Substation, and Wilson Hall. The site has approximately 65,000 lineal feet of underground natural gas piping.

Electrical Power Distribution

Electric power for the Fermilab Main Site is provided by the Commonwealth Edison Company from 345 kV transmission lines. (See Figure 2-10, Section 2, Page 26.) Line 11120 is the preferred line between the Electric Junction and Lombard Substations with Line 11119 between the Electric Junction and Wayne Substations serving as the emergency line. At the Master Substation, the 345 KV bus is transformed through five (5) 40 MVA and one (1) 60 MVA transformers to 13.8 KV for underground distribution through 22 feeder breakers. In addition, 34.5 KV lines from Electric Junction serve the Village 12.4 KV overhead distribution system and provide emergency 13.8 KV from the Village and Giese Road.

Insert Figure 2-10: Electrical Power

Figure 2-11: Substation near Wilson Hall

Approximately 280 substations are fed from 15 miles of overhead cable and 100 miles of underground cable. The federally-owned and Fermilab-operated system is maintained by Fermilab personnel including substation maintenance consisting of switch/fuse, breaker, and protective relay assemblies. All high voltage systems are operated and coordinated in accordance with Fermilab safety procedures. During FY 94/95, a SCADA system was installed to monitor the power to the main feeder distribution systems.

Figure 2-12: New Substation at Kautz Road

The Fermilab Main Injector Project installed a new Substation at Kautz Road which in addition to supplying power for the main Injector, will supply emergency backup power for the Main Substation. The project will also provide for replacement of some of the aging buried cable system. The system has 18 miles of electrical cable: 4 miles of primary, 9 miles of secondary and 5 miles of tertiary distribution. Total substation capacity is 220 MVA.

Telecommunication Systems

Voice and dial-up data transmission systems are provided by a Remote Module of the Geneva, IL, #5 Electronic Switching System (ESS) provided by Ameritech as Centrex service. Approximately 4000 lines are in use on this system.

Primary commercial network access is provided by 137 9-level two way trunks, although eight (8) foreign exchange (FX) lines are utilized for access to Chicago and 24 lines (T1) carry domestic long distance traffic on the AT&T FTS2000 network. All of these lines are carried to the Geneva, IL, Central Office over a DS-3 link, via a D-4 channel bank, using a fiber optic transmission carrier.

Various area code 406 and 879 lines are provided as standalone lines for individual area access in the event of a Centrex system malfunction. These lines, pay phones and Ameritech alarms for the remote module are provided via copper.

Primary data communications capability is provided by the Micom port selector system operated by the Data Communications Group in the Computing Division. Supplemental data communication is provided on a dial-up basis via the on-site telecommunications system.

Radio communications is provided to the Laboratory via a variety of antennas and government frequencies. At present the Laboratory has approximately 1000 pagers, 130 emergency pagers, 125 two-way mobile units and 225 hand held 2 way units that are assigned to personnel on site.

The Laboratory has ten emergency warning sirens: six outdoor and four indoor.

The existing telecommunications system is under a rate stabilized contract from Illinois Bell Communications which started on 1/1/93 and will continue for five years.

6. Security

The Security Department is responsible for the protection of Fermilab, its employees, subcontractors, visitors and guests, and for compliance with applicable DOE orders. Fulfilling these responsibilities allows high-energy physics research to take place unimpeded. With DOE orders, the Security Department operates in the physical security arena only. There is no classified activity of any type at Fermilab nor is any classified material stored. No SNM (special nuclear material) is stored or used at Fermilab; however, a minor amount of Category IV nuclear material is on hand for instrument calibration purposes only. In addition to providing for the physical security of government property, equipment, and other assets, the Security Department also conducts traffic safety operations. The site consists of about 6,800 acres of land containing approximately 36 miles of roadways on which traffic safety rules are enforced.

Fermilab facilities are a combination of research laboratories, office complexes, support facilities, and housing units in a campus-like atmosphere. Physical facilities range from those "open to the public", generally from 6:00 a.m. to 8:00 p.m., to areas categorized and designated as "Property Protection Areas". The site perimeter is unfenced but does have road gates and control points for access control. Buildings and other areas of security interest are protected by locked doors and/or fences.

7. Safety

The following policy and goals were adopted by the director of Fermilab, John Peoples, on February 25, 1998.

Policy: ***"Fermilab employees and users will only conduct work and operations in a save and environmentally sound manner."***

Goals: ***"Fermilab will reduce its Lost Workday Case Rate (LWCR) from 3.1 (present rate) to 2.1 by the end of CY98, to 1.6 by the end of CY99, and to .08 by the end of CY2000.***

Policy Background

Organizational Responsibility

The ES&H Program functions are the responsibility of the line organizations at the Laboratory. There are eight (8) divisions/sections, each with its own head including an ES&H organization. Each division/section is ultimately responsible for the ES&H aspects of its activities. The size and nature of the division/section environmental, safety and health groups varies according to the requirements of their organizations. In addition, there is a central ES&H Section which provides Lab-wide ES&H oversight, promulgates Lab-wide ES&H policy, provides several centralized ES&H services, and acts as liaison with external organizations in ES&H matters.

Emergency response personnel include the Fermilab Fire Department, Site Security, and Communications in the ES&H Section. The Fire Department answers calls for serious on-site injuries as well as fires. In addition to responding to emergencies, these organizations have various monitoring and service responsibilities such as fire extinguisher maintenance, building surveillance, training, and consultation. Emergency response planning is coordinated by the ES&H Section.

Emergency response services are administered through the ES&H Section. The monitoring, design, installation, testing, maintenance, and repair of fire protection systems in existing structures is the responsibility of the Facilities Engineering Services Section. With the services of experienced fire protection engineers, they are also responsible for the design, specification, and monitoring of the installation of fire protection systems in new facilities

Fermilab has a Medical Department which is responsible for conducting placement exams and managing minor injuries which have occurred on site. Seriously injured personnel are transported to nearby hospitals for treatment. The Medical Department is part of the Laboratory Services Section.

Fermilab has a Laboratory Safety Committee which is chaired by the Directorate and deals with ES&H problems which cannot be adequately addressed through other avenues. This organization has approximately eleven subcommittees addressing specific topics such as cryogenic, mechanical, or fire safety. These subcommittees are often used by division/section heads to provide formal independent reviews of unusual hazards such as large cryogenic systems, large particle detectors containing flammable gases, and custom lifting devices for large objects.

A higher level committee, the Environment, Safety and Health Executive Committee (ESHEC), is chaired by the laboratory Director. This is the primary policy making organization for all ES&H issues for the laboratory.

Traffic Safety

Fermilab allows use of its roads by the public during the day. Traffic controls and road designs comply with the "Illinois Manual on Uniform Traffic Control

Devices" so there is consistency as individuals travel from off site to on site and off site again. Issues which arise regarding controls and designs are reviewed and acted upon by Fermilab management.

Site Security monitors traffic, issues/tracks citations, and provides personnel to direct traffic in special situations (such as emergencies or large gatherings). Division/Section heads are periodically provided with a report of traffic tickets issued to personnel with their organizations. Repeat offenders are disciplined according to a point system similar to that used by states. Site Security is administered by the Emergency Services Department in the ES&H Section.

Emergency Response

The Communications Center in Wilson Hall is notified of emergencies via telephone or computer. On-site personnel are instructed to report emergencies using the "3131" emergency phone number. Automatic fire protection systems are also monitored by computer and provide an alarm in the Center if there is a problem. The operator will issue a "code" over the Lab-wide emergency paging system and notify appropriate personnel for response.

Most emergency calls require an action from the Fire Department and/or Site Security. The problem needing a response is typically a fire alarm or personal injury. A fire protection technician, electrician, mechanic, ES&H expert, or local expert may be summoned for advice to inactivate/correct a malfunctioning piece of equipment or to initiate an investigation. Minor injury cases are referred to the Medical Department or may be handled by the Fire Department on the scene. Personnel with major injuries are transported to an area hospital.

Each division/section prepares plans to respond to credible major emergencies. The most likely major emergencies at Fermilab are a fire or tornado. Some areas also have a potential to expose personnel to a hazardous atmosphere (primarily oxygen deficiency from spills of inert liquefied gases). Alarms are located in structures to inform people of major emergencies. Outside sirens are also strategically located throughout the Fermilab site. The alarms/sirens need only convey two different instructions, either to evacuate the structure or to take shelter, and this is accomplished by modulating the sound.

Less likely emergencies would involve a radiation exposure/contamination of an employee/experimenter or spill of a toxic chemical. Fermilab has facilities to assess accidental radiation exposures and decontaminate personnel. In addition, the Fermilab Fire Department is trained and equipped to respond to foreseeable chemical spills.

Fire Protection

The primary means used by Fermilab to maintain an "improved risk" status are automatic fire detection and suppression as well as fire resistant construction. Most fire detection apparatus are connected to a computer monitoring system and structures are generally provided with water sprinkler suppression. Halon has been used in special applications but is being employed less often due to concerns about the ozone layer.

Over the past several years, the fire protection of experimental enclosures has been undergoing a program of improvement including installation of high sensitivity fire detection, suppression systems to protect the apparatus as well as the structures, and smoke/heat venting. In addition, experimental apparatus containing large amounts of flammable gases are subject to formal review and mandatory corrective measures.

As noted above, Fermilab maintains an ability to rapidly respond to fires with its own Fire Department. In addition, there are mutual aid agreements with the fire departments from the surrounding communities.

Occupational Hazards

Most of the occupational hazards at Fermilab are not peculiar to particle accelerators. Two major exceptions are ionizing radiation and oxygen deficiency. Radiation exposure may occur from radioactive materials as well as from particles scattered from the beam during accelerator operation. Exposures are controlled through design of facilities and equipment When an area has an increased exposure rate, warning signs are posted and personnel are provided with training and radiation monitoring devices. Access to areas with potentially-lethal dose rates is strictly controlled using physical barriers.

Personnel working near cryogenic systems such as superconducting magnets are exposed to a risk of oxygen deficiency. If there is a leak, the escaping liquefied gas will expand 700 times and push out surrounding air. A quantitative risk analysis is used to prescribe precautions necessary to reduce the chance of fatality to an acceptable level. These precautions include posting of warning signs, training, medical surveillance, and oxygen monitoring.

Most other occupational hazards can be characterized as typical of general industry. These include manual material handling, powered lifting equipment, wood/metal working equipment, electricity, pressurized gas, chemicals, and noise. In fact, the most common occupational injuries involve material handling (back/shoulder injuries, items dropped onto workers, etc.) and slips/falls. Fermilab has a broad spectrum of programs to address these problems including protective devices, inspections, "environmental" monitoring, incident tracking, policies, training, and in-depth reviews. An attempt is made to evaluate and correct hazards during the earliest stages of an operation.

8. Environmental Issues

Environmental Monitoring

Fermilab uses appropriate monitoring to assure environmental quality. All monitoring results continue to indicate that off-site exposures when measurable, are many times below applicable guidelines.

The emphasis in radiological monitoring is placed on exposure pathways appropriate to high-energy physics laboratories. External exposures may result from direct penetrating radiation scattered from the beam (primarily muons) or short-lived air activation products (C-11, N-13, and Ar-41). Internal exposures may result when activation products (H-3 and Na-22) leach into water, which can subsequently be consumed.

Penetrating radiation measurements are primarily conducted using a Mobile Environmental Radiation Laboratory (MERL), a vehicle with detection equipment, and a site-wide network of 120 fixed detectors with continuous data recording. The volume of water discharged off-site is estimated and samples are collected and analyzed monthly. Additional monitoring for radionuclides has been conducted on sediments and vegetation to investigate other possible exposure pathways.

Non-radiological environmental monitoring includes analysis of surface and ground water quality on an as-needed basis. Fermilab operates two on-site public water supplies and monitors drinking water quality to assure compliance with Illinois Department of Public Health (IDPH) standards. PCB's were once used as a dielectric in transformers and capacitors because of their fire-resistive characteristics. Although the majority of on-site PCB's have been disposed of off-site, monitoring is conducted at previous use sites to assure compliance with applicable standards. Heavy metal contamination includes chromium, copper, and lead. Zinc chromate (a source of chromium) was used for a short time to clean cooling towers at the Central Utilities Building and disposed of off-site. Copper sulfate is applied to surface waters as an algaecide, and copper concentration is monitored to avoid build-ups. Lead is used as a radiation shielding material, and stored lead can leach into surrounding soil. Monitoring for these contaminants is conducted as needed to assure compliance with applicable standards.

Radioactive/Hazardous Wastes: Fermilab generates low-level radioactive and chemical wastes. Accelerating and transport equipment, as well as anything nearby, may become radioactivated from interaction with high intensity particle beams. Typical radionuclides produced are Na-22, Mn-54, and Co-60. Radioactive equipment which is no longer useful is stored and, if necessary, repackaged at Site 40 (994). In the past, much of this material was incorporated into cement "shielding blocks" to be reused later. A fraction of this equipment cannot be used for this purpose and is disposed of off-site as radioactive waste.

Chemical wastes are typical of those found in a medium-sized industry and include ethylene glycol, oils, solvents, corrosives, coatings, PCB's, asbestos, and lead. These are stored and, if necessary, repackaged at Site 55 (970,972,974), until they are shipped off site for disposal. Chemical wastes are handled in accordance with the Resource Conservation and Recovery Act

(RCRA), the Toxic Substance Control Act (TSCA), the Superfund Amendments and Reauthorization Act (SARA), and the special waste regulations of the State of Illinois.

TABLE 2-12 / Solid Waste Management Units (SWMU) Building Data

SWMU No.	SWMU NAME
1	East Booster Tower
2	Industrial Building No. 2
3	Industrial Building No. 3
4	Machine Repair Shop
5	Village Machine Shop (Laboratory No. 4)
6	Site 38, High Use Storage Area
7	Laboratory No. 3
8	Laboratory No. 6
9	Site 37
10	Southeast Annex
11	Master Substation
12	Central Utilities Building (CUB)
	Pipe and Clay Tile Field
13	Meson Hill Landfill
14	Railhead Storage Yard
15	Meson and Neutrino Activated Areas

See also Figure 2-13(Section 2, Page 40)

No radioactive or hazardous wastes are disposed of on the Fermilab site. In addition, all such wastes leaving the site for disposal are packaged in accordance with Department of Transportation (DOT) regulations.

Insert Figure 2-13: Solid Waste Management Units

III. PLANNING ANALYSIS

1. Mission Resource Requirements

Planning Analysis Overview

The mission of Fermilab covers a broad range of activities in high-energy physics research and technology and also includes technical and science education and environmental programs. The mission includes the design, and construction of accelerator, detector and computing facilities for use by university, national laboratory, Fermilab and international researchers. The primary goals and objectives for Fermilab, support the mission statement and give the direction on which the planning analysis section has been developed. This section considers the planning assumptions and limitations and their long-range programmatic impact on population and facility needs. It also addresses the need to recognize the useful life of the site facilities.

2. Facility and Land Requirements

Currently the projected mission of the laboratory will not require the acquisition of any new land to enlarge the size of the existing site. The amount of land available on the existing site is consistent will all plans contained in this document for the future use of the laboratory facilities. Considerations for appropriate radiological buffer zones, NERP areas, wildlife refuges and the proximity to populated areas are all considerations which will be incorporated into the overall planning process.

3. Goals

Fermilab is the most active research laboratory for high-energy physics in the United States. Since Fermilab’s founding in 1967, our mission has remained unchanged: to provide unequaled resources for talented people from around the world as they seek to understand the fundamental particles and forces of the universe.

Long-Range Plan Input

In accordance with the Laboratory's mission, the Long-Range Master Plan must allow for new programmatic efforts requiring offices and laboratories. The Long-Range Master Plan must also be able to accommodate future programs such as those designated as possibilities for "The Next Phase" of the Tevatron and Main Injector. In addition, there is a requirement to recognize the finite life of existing facilities and outline a means for renovation or replacement.

Recommended Percentage Growth Planning Base

It is recommended that a planning base of 0% total growth of full-time Fermilab personnel be used for long-range master planning purposes. This no growth estimate should apply over the next five years and represents a stable base of personnel to approximately 2,300.

These estimates are based on Fermilab receiving funding for the proposed Tevatron III, for continued operation of the Tevatron for collider physics and fixed-target physics at the present level of effort and for the operation of detector test beams. These estimates do not include DOE employees on site, personnel anticipated to operate the Lederman Science Education Center and NERP Research programs, visiting users, and no-pay appointees. All of these groups will use substantial portions of the Fermilab facilities and add approximately 700 people to Fermilab full-time personnel. The total estimated site population (in the year 2003) is then around 3,000 people.

Long-Term Program Projections

The programs that require further use of existing facilities and new construction during the next five years have already been discussed. Facility requirements 10 and 20 years from now are more difficult to specify. Individual programs and the Laboratory's overall mission will be examined continually to identify potential facility needs. Some needs will change as time passes. Some of the proposed new initiatives may not be funded, or their funding may be significantly delayed. At the same time, new program initiatives, especially in the area of the Laboratory's principal mission (namely high energy physics accelerators, detectors, and advanced computing facilities), can be expected to be continuously identified as the Laboratory's research program progresses. As these new initiatives are identified it will be important for Fermilab to incorporate them into the Comprehensive Land Use Plan.

The Laboratory is driven by the programmatic effort. All service and support needs result directly from research and development and outreach programs. Therefore the long-range plan is based upon current and future programmatic effort. Support-service needs are based on program facilities and staff.

TABLE 3-1 a: Program Facility Needs Identified

Initiative Description	Input on Site	When - Years Base - 1993
Tevatron Upgrade	Main Injector (MI) Enclosure, associated service buildings, utilities and roads; enclosures connecting MI to existing Tevatron facilities	0 - 5 years
National Environmental Research Park	Dedicated manipulative areas of 140 acres in southwest part of site and 331 acres in southeast part of site;	0 - 15 years
Work for Others	May require additional office, laboratory and high bay space as work and staffing increases.	0 - 15 years
Experiments at other Laboratories	Utilization of existing space Possible future need for detector subsystems assembly space.	0 - 15 years
Ongoing Experimental Program	Facility upgrades and improvements to support the on-going research program.	0 - 20 years

Table 3-1a&b, Program Facility Needs Identified (current and next phases), summarizes the identified program activities that require new, upgraded or expanded facilities. For each program activity, the second column identifies the incremental impact on the site. The last column indicates when the site impact is likely to occur. The current year, FY 1998, is considered as the base year. Obviously, not all of the identified needs will develop as illustrated or be funded, but they do indicate the general direction that Fermilab site development is expected to follow.

TABLE 3-1b: Program Facility Needs Identified

Initiative Description	Input on Site	When - Years Base - 1993
The Next Phase :		
a.) Collider Detector Upgrades	Major modifications to facilities for the construction of detector components for collider detector upgrades	1-10 years
b) Kaon Facility	Major modifications and additions to the target and beam-line enclosures, and additional detector facilities	0 - 15 years
c.) Neutrino Facility	Major modifications and additions to target and beam enclosures and additional detector facilities	2 - 15 years
d.) Bottom Detector	Major modifications to facilities to support the construction of a detector to do bottom physics	3 - 15 years
e) High Energy Tevatron	Major modifications and additions to the target and beam-line enclosures, and additional detector facilities	5 - 15 years
f) Large Independent Collider (LRC)	Enclosures to house the LIC. Utilities, roads, service buildings, collision halls and detector assembly areas for the LIC. Local office and laboratory work areas at key locations around the LIC ring.	10 - 20 years

A major goal of Fermi National Accelerator Laboratory is to meet or exceed customer needs as seen by:

- the scientific community for the purpose of attracting top flight scientists for its research and development programs
- the funding agencies to attract future programmatic funds
- the Fermilab staff who take pride in their work and their position in world science
- the general public for the purpose of maintaining good community relations

The ability to meet customer needs is developed, in part, through the establishment and maintenance of a high quality work environment.

Projected Long-Range Growth Patterns

Since 1984 there has been a change in the ratio of programmatic to support personnel. In 1984, Fermilab had 2,192 employees of whom 1,307 (62%) were support staff and 885 were professional staff (38%). In 1993, Fermilab has 2,342 employees of whom 1,141 (49%) are support staff and 1,201 (51%) are professionals.

Significant efforts have been made to improve effectiveness in the administrative and support functions. These administrative and support services are now being provided on a lean, strong basis. While care will be exercised not to get so lean that the level of service to the professional staff--that is to the programmatic operation of the Accelerator, Research, and Computing Divisions -- would be adversely affected, it is expected that the on-going levels of 49% support staff and 51% professional staff will be maintained in the future. The ratio 50:50 has been used as the basis for making long-range projections for total Fermilab personnel on site.

In Table 3-2, Personnel Growth Projections are shown for total Fermilab personnel on site for -10%, 0%, and 10% growth over the next 10 years. These are based on continuing a 50:50 ratio of support staff to professional staff.

TABLE 3-2 / Fermilab Personnel Growth Projections

Total Growth	FY 1994 Present Total	Years Ahead Planning Periods			
		1 to 3	3 to 6	6 to 9	10 +
-10%	2,280	2,230	2,175	2,135	2,050
0%	2,280	2,280	2,280	2,280	2,280
10%	2,280	2,330	2,375	2,435	2,500

Table 3-2 reflects the personnel impact of the programmatic initiatives. If all of these initiatives (or equivalent alternatives) are approved and funded, a total growth of 20% would occur over the next five (5) years at Fermilab. Although this is quite possible, a practical basis for long-range master planning for the Fermilab site use and facilities needs is considered to be a total growth of 0% in Fermilab personnel.

Of the long-range programmatic independent plans for the next 5-15 years presently under construction, only the construction of large new collider facilities would require the additions of significant numbers of personnel. All the other program plans would, in effect, "replace" existing programmatic activities.

Incremental Facilities Requirements

For the purposes of estimating facilities needs it is assumed that additional personnel will be located in general purpose laboratory and office areas, with the exception of those located in the Lederman Science Education Center and in major experimental facilities. Depending on agency funding for major new projects, the Laboratory may require additional office space in 10-15 years.

Maintenance and Upgrade of Existing Facilities

Most of the Laboratory facilities were built in the 1970's and early 1980's. Some outlying facilities -- most notably the facilities on the Village area -- were built in the 1960's. In general, the facilities are structurally sound and will require only limited maintenance in the next several years.

Figure 3-1: View facing Aspen East in Fermilab's village

However, many of the isolated outlying buildings, especially the former farm houses which were built before the Laboratory site was acquired by the government, do not offer the most suitable facilities for the functions they support. The Laboratory plans to reprogram these isolated buildings in the next several years, and to consolidate their present functions close to the major technical and support center facilities. An important example of this consolidation plan is the relocation of all radioactive material management and hazardous waste management facilities to the eastern part of the Support Services area of the site. Ongoing maintenance will, of course, always be required to preserve the useful condition of all the facilities on the Laboratory site.

Flexibility in Facilities Planning

Space needs and utilization seldom follow a predictable growth pattern. They tend to fluctuate as particular Laboratory projects start or finish. The uncertainties of congressional funding and the balancing of the nation's high-energy physics program among the national laboratories can have major impact of Fermilab's space needs in any given year. But certain basics are clear:

- the need for flexibility to respond quickly to changing facility requirements;
- the importance of rehabilitating and upgrading facilities and infrastructure so that future effectiveness of operations is assured;
- the requirement to provide facilities in support of new program initiatives such as the Tevatron Upgrade, and the Lederman Science Education Center; and
- the requirement to be able to accommodate future projects such as those identified as "The Next Phase" (Table 3-1b, Section 3, Page 5)

Master Plan Direction

The current site is adequate for the present programs of the Laboratory, for the new initiatives which are planned for the next few years, and for the long-term new initiatives which have been studied in a preliminary way. Some previously little-used areas of the site are now being designated for new Laboratory projects. For example, the National Environmental Research Park (NERP) program, may be used to provide improved surface water drainage and industrial cooling water storage, for the new Main Injector and Detector Tests Areas, and associated radiation buffer zones.

The state of Illinois and various planning commissions are considering road improvements and extensions around the perimeter of the Laboratory. These activities may, in the future, lead to some moderate changes in the Laboratory boundaries.

The counties of DuPage and Kane have explored the use of the Fermilab site for a landfill. Environmental and safety concerns make this proposal unworkable at Fermilab, and we do not consider it in our long range plan. Furthermore the heavy truck traffic through the site that such an operation would bring would significantly affect public safety at the site, where we typically have several hundred visitors during any given weekend.

Long term research programs could lead to the need for land acquisition well beyond the present boundaries of Fermilab. Although these possibilities exist, their development hasn't reached the stage where inclusion in this report would be warranted. The possibility of future projects that call for major construction that exceeds Laboratory boundaries cannot be ruled out.

Protection of Resources

Environmental Compliance

It is the policy of Fermilab to conduct its operations in an environmentally safe and sound manner. The Laboratory is responsible for implementation of the DOE's Environmental Restoration and Waste Management Five-Year Plan. Protection of the environment and the public are responsibilities of paramount concern and importance to the Laboratory. All activities of each division/section recognize and reflect this policy. To that end, the Laboratory is firmly committed to assuring incorporation of the National Environmental Protection Act (NEPA) in the planning and execution of its projects. Accordingly, it is the policy of each division/section to conduct its operations in compliance with the letter and spirit of applicable environmental statutes, regulations and standards. In addition, each division/section is committed to good environmental management on all of its projects; to correct existing environmental problems, to minimize risks to the environment or public health and to anticipate and address potential environmental problems before they pose a threat to the quality of the environment or the public welfare.

Protection of Cultural Resources

Previous studies and surveys have identified the presence of several cultural resources on the Fermilab site. Presidential directives and federal legislation mandate that all construction projects on the site be reviewed for their potential impact on historic and prehistoric cultural resources. Where such resources are identified, they must be evaluated and appropriate action determined for preservation or mitigation. This is accomplished through the NEPA review process.

Site Enhancement Program

The quality and appearance of the Fermilab complex is an intentional and integral part of the overall site planning effort and of all individual development projects in the future. With the adoption of this philosophy, road alignment, building configuration and location, parking, utilities, storm water management, and all other site improvements required for programmatic purposes, are planned in a manner which best preserves the existing natural amenities and provides an attractive, yet economical, research setting.

Site planning, architecture, landscape architecture and engineering are considered simultaneously for all new buildings and site improvements. This collaborative approach provides a more powerful, yet economical means to incorporate the image and quality functions along with fundamental program and development requirements.

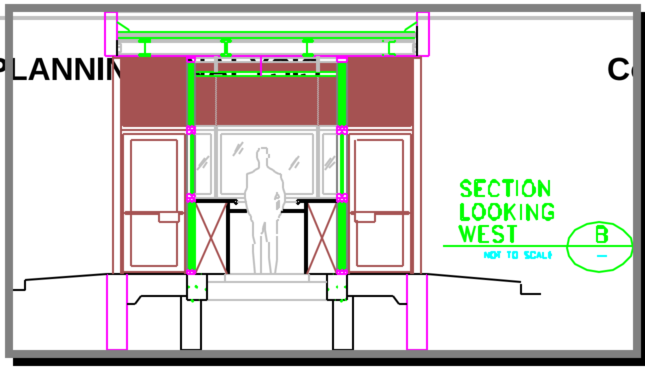


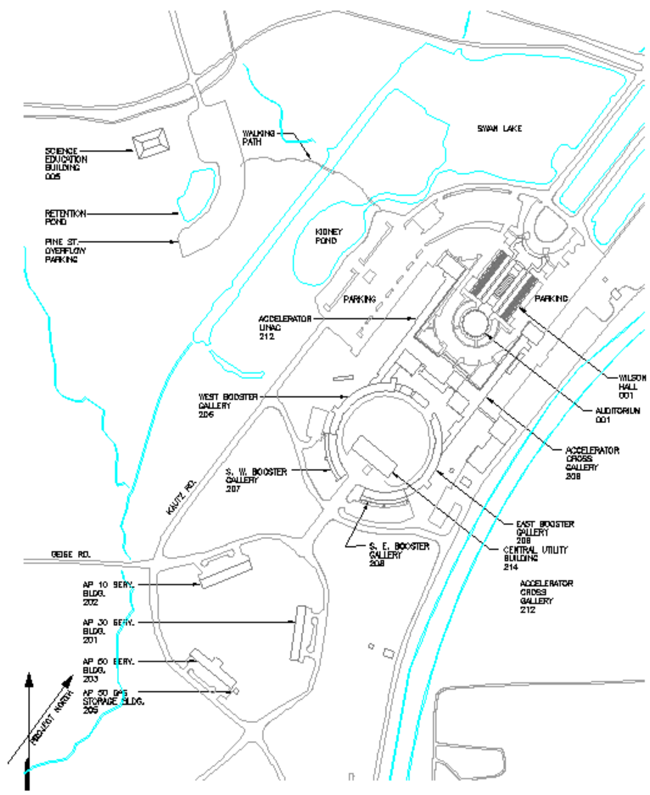
Figure 3-2: Architectural sketch for a renovation project

The short and long-term maintenance considerations of each site improvement are addressed, in advance, to provide for the successful management of the landscaping and grounds.

4. Evaluation

Growth of Educational and Other Outreach Programs

Figure 3-3: Wilson Hall Footprint and Antiproton Areas



WILSON HALL,
FOOTPRINT & ANTIPROTON AREAS

Technical and science education and training are an important outreach activity at Fermilab. The Lederman Science Education Center at Fermilab reflects the Laboratory's mission and strong commitment to engage in outreach activities. It is located in a relatively central location on the site, off Pine Street and just west of the Central Laboratory Footprint Area. Further expansion of these facilities may become important in the future through increased laboratory commitment to outreach programs.

Contaminated Facilities

In accordance with the results of a DOE/HQ Environmental Survey and the DOE Environmental Restoration and Waste Management 5-Year Plan, Fermilab is investigating contamination and subsequent cleanup as a part of a Resource Conservation and Recovery Act (RCRA) Facility Inspection (RFI).

Included is the assessment of contamination and potential cleanup of a number of sites.

Holes have been drilled and sampling conducted at the Target Tube, Master Substation, and Main Ring Perforated Tile Field. Although some follow-up sampling is necessary at the Target Tube and Master Substation, no requirement for clean up is anticipated. Chromate sampling to date in the Main Ring tile field indicated that contamination is limited to the interior of the vessels. Follow-up sampling will be conducted as appropriate. The cleanup in areas near Main Ring Service Buildings has been initiated as part of an expensive clean up project.

Vacant Facilities

Emphasis will continue to be placed on re-using special purpose technical facilities whenever practical. Those facilities that are suitable for future use will be maintained in a sound structural condition. At the present time, the Laboratory is making use of all available facilities. Whenever a particular use of a facility comes to an end, a new programmatic use for that facility is immediately undertaken.

Future vacant space is anticipated in small increments at certain facilities scattered at isolated locations around site as their functions are gradually consolidated in the Support Services area. Funding for demolition of these facilities will be required.

Green Areas and NERP Research Areas

Green areas or buffer zones will be maintained where appropriate to provide buffer areas between programmatic facilities and to provide space for possible future modifications or expansion of these facilities.

Due to the large variety of habitats at Fermilab, the entire site was designated as a National Environmental Research Park. Figure 3-4 (Section 3, Page 17) shows these NERP areas in relation to the rest of the site.

Insert Figure 3-4: NERP Areas

Research proposals are being sought and an Environmental Advisory Committee has been set up to review them.

Areas presently slated for research are a 140 acre tract in the northeast corner of the site and a 331 acre tract in the southeast corner. The eastern half of the northeast tract has been planted in native grasses and the western half will be sequentially planted to conduct succession studies. The southeast tract will continue to be leased for agricultural production until a program of research is established at this location.

Environmental Monitoring

Fermilab will continue to monitor the environment. An Environmental Monitoring Strategy (EMS) has been prepared, which describes Fermilab's environmental monitoring surveillance program including the status of current sampling as well as new initiatives such as the groundwater monitoring program.

Energy Conservation

All facilities in use including modifications or additions will be constructed and operated in such a manner as to optimize energy conservation and efficient use of energy.

Fermilab Utility Plan

The Fermilab utility plan consists of two (2) elements: Procurement of Electricity and Procurement of Natural Gas.

TABLE 3-3 / Electric Power and Natrual Gas	1993 ACTUAL	1994 Estimate	1995 Estimate	1996 Estimate	1997 Estimate
Electric Power Annual Load (Thousands of MWH)	311,692	300,000	320,000	375,000	375,000
Annual Cost (Thousands of Dollars)	13,844	11,800	14,400	16,875	16,875
Natural Gas Annual Consumption (MCF)	92,841	100,000	110,000	110,000	110,000
Annual Cost (Thousands of Dollars)	310.5	348	401	416	438

Procurement of Electricity

Electricity is provided to Fermilab through a contract with Commonwealth Eddison. Estimated demand levels and costs for electric power are given above in Table 3-3, Electrical Power and Natural Gas.

Procurement of Natural Gas

Fermilab will continue its procurement of natural gas through a blanket procurement order administered by the Defense Logistics Agency. Demand and costs for natural gas are also shown in Table 3-3, Electrical Power and Natural Gas (Section 3, Page 19).

Water Supply

Fermilab will continue to draw from wells and treat its own potable water. Domestic water for the Village Area is provided by the City of Warrenville. The Laboratory normally has two sources of industrial cooling water: the rainfall on the site which is collected in a system of lakes, ponds, and streams, and the Fox River. To provide for adequate industrial cooling water during periods of drought, the Laboratory enlarged the capacity of Casey's Pond by 11 million gallons.

Waste Sewage

Fermilab will continue to send sanitary waste to the City of Warrenville or to the City of Batavia, depending on location and system, for treatment at their treatment plant.

Parking

Parking will continue to be provided near all work areas. No plans are being made to provide shuttle service to and from distant parking areas. Fermilab will continue to operate an on-site taxi service.

Maintenance of-Roads

Fermilab will continue its responsibility for maintenance of all on-site roads.

Housing

Fermilab will continue to provide rental on-site housing for visitors and users at current levels or higher.

Figure 3-5: Temporary on-site housing available for visitors and users.

Central Storage

Central storage facilities (Warehouse #1 and #2 in the Support Services area) will continue to be provided for excess equipment or furniture.

Highway Easement: West Side of Site

A State / County highway easement, which runs along the west boundary of the site, will continue to be dedicated to possible future use. The right-of-way for this highway extends eastward to a line 200 feet east of the center-line of Kirk Road. Our internal records indicate that this easement was never implemented. The legal rights then are now in question.

Utility Easement: East Side of Site

A combined utility easement runs along the eastern boundary of the site. The 300 foot wide easement provides space for overhead Commonwealth Edison electric lines and also space for underground pipelines for the Natural Gas Pipeline Company of America. This easement will continue in its present state in the future.

Fox Valley Freeway Proposal

Fermilab acts as a consultant to the Fox Valley Freeway Planning Board. The Freeway might include easement rights at either the East or West boundary of the site. Fermilab advises the board with regard to the location of structures on the site and future Fermilab construction plans that might interfere with the new highway. However, this proposal was abandoned by the State of Illinois.

Kirk and Batavia Road Improvement Projects

Local communities have begun various studies for improvement of transportation near and around the Laboratory. These studies include the possibility for increasing the road width of Kirk road on the west boundary of the site, or Butterfield road on the South boundary. The Mooseheart Bridge project, crossing the Fox River, might involve an extension of Mooseheart road to Butterfield that would come near the southwest boundary of the site. These projects might involve minor changes in Fermilab site boundaries. The laboratory is working closely with state and local officials to help with these projects.

5. Plan Development

The plan for Fermilab focuses on curing or eliminating deficiencies resulting from aging and obsolescence of facilities. Replacement of inefficient structures, maintenance and upgrading of sound but depreciated facilities, and provision of new efficient facilities are the salient features of the plan.

IV. MASTER PLAN

1. Future Land Uses

Fermilab has no plans to change any of its land uses in the near future. New land uses might develop as part of major new programmatic initiatives. Land use and boundaries of the site could have a significant change depending on the acceptance of any number of programs currently under review. For example, if a new linear collider program were to be awarded to the laboratory, plans for the East side of the site would undergo significant change. Pending such major additions to Fermilab's mission, no additional land uses are anticipated at this time.

2. Future Functional Locations

Fermilab is a relatively mature site, where location of various activities is relatively fixed. Fermilab's master plan will continue to be in effect for some time to come.

3. Future Facility Locations and Uses

To more fully accommodate space requirements, Fermilab will tend to locate new office and Laboratory facilities near the location of work that the new space would support. The long-term prospects are therefore for the movement of office and laboratory space away from the Wilson Hall footprint area.

4. Utilities and Infrastructure

The completion of the Main Injector Project will bring with it an additional power substation at Kautz road. This will give Fermilab a capability of operating at reduced levels at either the Master substation or the new Kautz road substation. The Master substation will have to be shut down for some period in the future to allow for the replacement of the wooden poles that bring the high voltage lines to that substation.

* TABLE 4-1 / Major Construction Projects (mm)

	FY99	FY00	FY01
Funded Construction			
Program Line Item Projects			
NuMI Project	14.30		
Wilson Hall Project	6.7		
General Plant Projects (GPP)	3.93		
Accelerator Improvement Projects (KA)	3.52		
In-House Energy Management (IHEM)	0.00		
Total Funded	**28.45**	**0.00**	**0.00**
Budgeted Construction			
Program Line Item Projects			
NuMI Project		22.00	
Wilson Hall Project		4.70	
General Plant Projects (GPP)		4.80	
Accelerator Improvement Projects (KA)		4.30	
In-House Energy Management (IHEM)		0.00	
Total Budgeted	**0.00**	**35.80**	**0.00**
Total Funded and Budgeted	**28.45**	**35.80**	**0.00**
Proposed Construction			
Program Line Item Projects			
NuMI Project			23
Wilson Hall Project			4.2
General Plant Projects (GPP)			5.00
Accelerator Improvement Projects (KA)			5.80
In-House Energy Management (IHEM)			0.00

* **Note: The above cost estimates for initiated FY99-FY01 do not include G&A. A first order approximation of G&A costs would be 20% of the listed direct estimated cost.**

	Cross Gallery Fire Protection		100	
	Subtotal	**200**	**170**	**0**
Business Services Section				
	Add Phone Lines to Labs A through G	240	45	
	Subtotal	**240**	**45**	**0**
Computer Division				
	Feynman Computer Center Utilities Improvements		200	1,500
	Subtotal	**0**	**200**	**1,500**
ES&H Section				
	Site 39 Addition	400	1050	
	Subtotal	**400**	**1,050**	**0**
Facilities Engineering				
	Improvements to CUB ICW System	29		
	Village Domestic Water Upgrades		500	560
	Target Area Feeder Upgrades		165	
	Support Facilities Feeder Upgrades	80	170	330
	Conventional Accelerator Feeder Upgrade			520
	Tevatron Cryogenics Systems Feeder Upgrade		370	
	Septic Tank/Fields Upgrades			200
	Site Sanitary Sewer/Lift Station Upgrades	250	100	450
	Sewer Network Mains Upgrade			350
	Substation Improvements		150	560
	Feeder 44 Extention to LSC	230	50	
	MSS to P71 Duct Bank		750	
	Subtotal	**589**	**2,255**	**2,970**
Laboratory Services				
	Subtotal	**0**	**0**	**0**
Particle Physics Division				
	Lab 8 Extention	214		
	Lab A-B Bridge Building	30	200	500
	Subtotal	**244**	**200**	**500**
Technical Support Section				
	IB1 Addition	1371	530	
	Subtotal	**1,371**	**530**	**0**
DIRECTORATE				
	Atrium West Conference Room	161		
	Auditorium Upgrades-Safety, Toilets and Lounge	220	80	
	Wilson Hall Catacombs		200	
	Subtotal	**381**	**280**	**0**
	TOTAL	**3,425**	**4,730**	**4,970**

* TABLE 4-3 / AIP PROJECTS	FY98	FY99	FY00	FY01
Beams Division				
PBar Target Sweeping	1,100			
Tevatron Short Batch Kicker		1,800		
Accumulator Stacktail Upgrade (Cooling)		1,000		
C-0 Test Area	5,000			
B0/D0 Interactiopn Region Improvements			1,900	
Booster Extraction (Kickers)		1,300		
TeV BPM Upgrade			2,700	
PBar Kicker and Septa Improvements		1,300		
120 GeV A0 to Proton			2,000	
Tevatron Correction Package Upgrade		2,100		
Tevatron 159 MHz RF				
Main Injector Gamma-Jump			2,000	
Subtotal	**6,100**	**7,500**	**8,600**	
Particle Physics Division				
Subtotal	**0**	**0**	**0**	
TOTAL	**6,100**	**7,500**	**8,600**	

*** Note: The above cost estimates for projects initiated FY98-FY00 do not include G&A. A first order approximation of G&A costs would be 20% of the listed direct estimated cost.**

5. Future Circulation

Fermilab will continue to work at reducing the amount of traffic at the site. This will be accomplished by reducing the number of vehicles on the site, as required by the Clean Air Act, and somewhat greater restricted access at the main entrances to the laboratory. Traffic safety is a significant concern for laboratory management, and improved safety will probably require further restrictions in use of Laboratory roads by off-site traffic.

6. Future Security

Laboratory security often finds itself in confrontation with the public over proper use of the site. Although clear rules and procedures exist within the laboratory to guide public use of Fermilab Facilities, these rules are not readily available to the public. The laboratory has developed a better way of alerting the public to restrictions associated with it use of Fermilab facilities.

V. MODIFICATIONS TO THE SITE

1. Line Item Construction

The facilities improvement budgets shown in Table 4-1 Major Construction Projects, reflect the plan to make the most effective use of the upgraded Tevatron, including one line item construction project funded by DOE-ER: the Main Injector Project. The Main Injector Project,FY92-FY98, will replace the present Fermilab Main Ring accelerator.

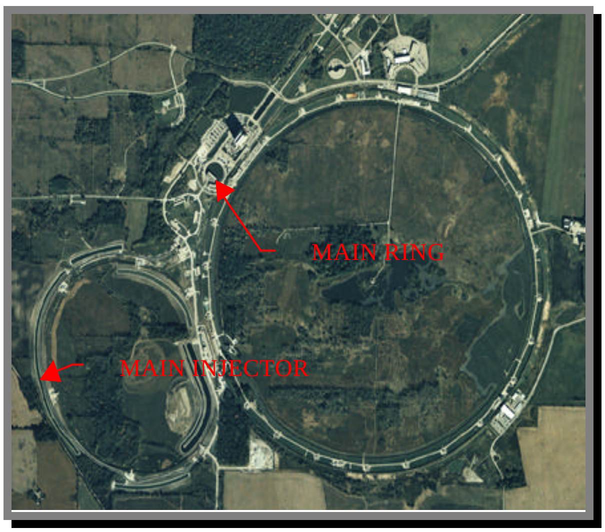


Figure 5-1: Main Injector Project

2. General Plant Projects

The General Plant Projects (GPP) lines of the budgets shown in Table 4-2 cover small construction projects funded by DOE-ER that we cannot identify beforehand and whose total estimated costs do not exceed $2 million per project. The Laboratory annually updates a list of such project requests. We assign priorities at the beginning of each fiscal year in order to respond to the needs of the Laboratory and its programs. The FY98 list includes such projects as: improvements to the Industrial Cooling Water System, the Village sanitary sewer system, replacement of various electrical feeder systems, increasing the workspace for Lab C and Lab 3, Lab C to D cross-connection as well as an addition to Industrial Building I. There is also a project to upgrade Wilson Hall on the Ground Floor and Atrium levels.

3. Accelerator Improvement Projects

The Accelerator Improvement Projects (AIP) line of the budgets in Table 4-3 covers projects too small to be proposed as line items, funded by DOE-ER, that either improve the performance of existing accelerators or allow for better use of existing accelerators. The Laboratory annually updates the list of such project requests and assigns priorities at the beginning of each fiscal year in order to respond to the needs of the program. The proposed list for FY98 includes such projects as P bar Target Sweeping and the C-0 Test Area.

4. In-House Energy Management Projects

The In-House Energy Management (IHEM) budgets shown in Table 4-1 Major Construction Projects, fund energy retrofit projects proposed as energy conservation measures. DOE-ER funds these projects. Analysis of our energy usage needs by the Fermilab Facility Management staff and suggestions arising from the Fermilab Energy Conservation Award Program generate most of these funding requests. Funding for IHEM is expected to return in 1999. Fermilab has a number of energy saving projects ready to propose when that funding becomes available.