LA-UR-99-6192

NMCRIS 66253

Isotope Production Facility Addition: Building TA-53-3

Historic Building Survey Report No. 177

Los Alamos National Laboratory

November 8, 1999
Survey No. 770

Prepared for the Department of Energy
Los Alamos Area Office

prepared by

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Abstract

In October 1999, an historic building survey was conducted for the proposed Isotope Production Facility addition to the Los Alamos Neutron Science Center (LANSCE). A linear accelerator, TA-53-3, built in the early 1970s, is the main facility of LANSCE. The addition to the accelerator building is to be located at the east end of "sector A," which is at the western end of the structure. The LANSCE facility is located on Department of Energy (DOE) managed land at Los Alamos National Laboratory (LANL) Technical Area 53.

The LANSCE facility's initial construction occurred in 1968 through 1972 and is one of LANL's key facilities that house activities critical to meeting LANL's mission as directed by the DOE. The linear accelerator is more than a half a mile in length and is the "world's most powerful proton linear accelerator" (Los Alamos National Laboratory 1999). It is also "one of the highest powered and largest research accelerators in the world" (U.S. Department of Energy 1999:2-84). This accelerator is considered to be an exceptional significant historic property based on its role and function at LANL. It is eligible for the National Register of Historic Places under Criterion A (criteria consideration G: properties that have achieved significance within the last fifty years) (U.S. Department of the Interior 1991).

The proposed building addition will house new experimental areas that are an outgrowth of current LANSCE research. Activities in the new addition will use part of the existing beam line in the same manner as other beam line "spurs" at the linear accelerator. The significance of the linear accelerator is in its continued use in the evolving field of nuclear physics. The addition of the new beam tunnel "spur" will not affect the historic significance of the linear accelerator building because the new research is part of the ongoing scientific mission of the facility (Advisory Council on Historic Preservation 1991).

Following the Secretary of Interior's Standards for the Treatment of Historic Properties, the new addition should be compatible with but visually distinct from the main building. This can be achieved through employing a slightly different type of metal siding or making slight changes to the color of the addition (Weeks and Grimmer 1995).

The New Mexico State Historic Preservation Officer (SHPO) is requested to concur with the eligibility determination contained in this report. Additionally, the SHPO is requested to concur with a "Determination of No Adverse Effect" for the proposed building addition.

As a result of this historic building survey, this project complies with the National Historic Preservation Act of 1966 (as amended).

Provenience and Environmental Setting

Location: Technical Area (TA) 53 Los Alamos National Laboratory (LANL)

Land Manager: The Department of Energy (DOE)

Legal Description: Township 19 North, Range 6 East, Section 23
SE ¼, NE ¼, NE ¼

Maps: USGS Frijoles Mountain 7.5 Minute Series (Appendix A, Maps 1 and 2)

Project Area: 0.1 hectares (0.3 acres)

Topography: Mesita de los Alamos

Nearest Drainage: Sandia Canyon to the south

Elevation: 2127.5 meters (6980 feet)

Current Land Use: Developed TA-53

Project Description

The proposed Isotope Production Facility (IPF) addition to the Los Alamos Neutron Science Center's (LANSCE) proton linear accelerator, building TA-53-3, is a new irradiation facility whose "mission will be to produce neutron deficient radioisotopes for biomedical research and applications, as well as for other tracer applications." The new beam line will use part of the existing beam (approximately 100 million-electron-volts [MeV]) produced by the accelerator. "The beam will be transported through a new beam line that will be housed in a new beam tunnel spur" (Lockwood Greene Technologies, Inc. *et al.* 1997:E-1).

The project is located in an area that has been previously disturbed/developed by the construction of the LANSCE facility and has been utilized as a storage yard. Five transportainers along with the existing semi-trailer were previously parked in the project area. No archaeological sites are located in the area of potential effect (Worman and Steen 1978).

The proposed new facility is to be located on the north side of the accelerator building near the west end of the accelerator complex. The building will be approximately 3000 sq. feet in area (100 feet in length by 30 feet wide) and 50 feet high and will include a high bay area with overhead cranes, with the beam line center between 20 and 35 feet below grade. About half of the facility will be below grade.

The facility is to be constructed of concrete with a possible steel arch for the below grade portion and steel frame on a concrete floor for the upper portion (Lockwood Greene Technologies, Inc. *et al.* 1997). The targeting facility will be located within the new building. It will house the magnet power supplies, water chillers, and other support equipment. It will also "provide a hot cell immediately above the target chamber so that the irradiated target can be safely extracted, packaged in a cask, and shipped to chemical separation facilities that the Medical Radioisotope Program presently operates" (Lockwood Greene Technologies, Inc. *et al.* 1997:E-1).

The new IPF will accommodate "a new 100-million electron volt station in an add-on to building TA-53-003B" (U.S. Department of Energy 1999:2-92). "Some important safety and operational advantages [of the new facility] include: lower beam energies (100 MeV instead of 800 MeV) [that] allow more rapid production of the desired isotopes . . . lower beam energies [that] allow reduced production of unwanted isotopes thereby reducing radioactive wastes . . . the beam is more readily available for production of isotopes, [and the] impact to other accelerator users is minimized" (Lockwood Greene Technologies, Inc. *et al.* 1997:G-1).

Methods

In October 1999, Kari L.M. Garcia and John Isaacson, Environmental, Safety, and Health Division, Ecology Group (ESH-20), LANL conducted an historic building evaluation for structure TA-53-3, to which a new addition is proposed to be constructed (Appendix A, Maps 1 and 2).

The historic building evaluation was accomplished by conducting a field visit to TA-53 compiling existing engineering drawings of the facility and the proposed elevation plans and plot plan of the new facility, taking photographs, and conducting records research on the history of the LANSCE facility. This facility is the "world's most powerful proton linear accelerator" (Los Alamos National Laboratory 1999). It is also "one of the highest powered and largest research accelerators in the world" (U.S. Department of Energy 1999:2-84). A New Mexico Historic Building Inventory Form, existing building drawings, and current photographs of the building are in Appendix B. Appendix C contains the design elevation and plot plans for the new facility.

> The LANSCE facility is a national user facility providing intense neutron and other particle beams produced by and including 800-MeV protons. The program includes fundamental and applied research in type condensed matter sciences, biophysics, and nuclear physics; and medical isotope production (Los Alamos National Laboratory 1999).

Culture History Overview

World War II and Early Cold War (1942–1956)

A. Site Selection, Acquisition

In 1942, Albert Einstein wrote a letter to President Franklin Roosevelt warning him of a possible German atomic bomb threat (Rothman 1992). President Roosevelt, acting on Einstein's concerns, gave approval to develop the world's first atomic bomb and appointed Brigadier

General Leslie Groves to head the "Manhattan Project." Groves, in turn, chose Robert Oppenheimer to coordinate the design of the bomb.

A single research facility, isolated and secret, was proposed. General Groves had several criteria: security, isolation, a good water supply, an adequate transportation network, a suitable climate, an available labor force, and a locale west of the Mississippi located "at least 200 miles from any international border or the West Coast" (Rothman 1992). Oppenheimer, who had visited the Pajarito Plateau on a horseback trip, suggested the Los Alamos Ranch School.

B. Manhattan Project (1942 – 1945)

A suitable site selected, Oppenheimer and his staff moved to Los Alamos to begin work. The recruitment of the country's "best scientific talent" and the construction of technical buildings were top priorities. The University of California agreed to operate the site, code name "Project Y," under contract with the government (an arrangement that has continued to this day). Although the fission bomb was conceptually attainable, many difficulties still stood in the way of producing a usable weapon. Technical problems included the timing of the release of energy from fissionable material and the engineering aspects of producing a deliverable device. Nuclear material and high explosive (HE) studies were of immediate importance (Los Alamos National Laboratory 1995).

Two bomb designs appeared to be the most promising: a uranium "gun" method and a plutonium "implosion" method. The "gun" method bomb involved bringing fissionable material together to form a critical mass by firing one subcritical mass of uranium-235 at another. This method led to the development of the "Little Boy" device. Scientists were less confident about the second "implosion" method, a design that necessitated the compression of fissionable material using HE. The compression action would increase the density of a slightly subcritical mass of plutonium-239 and cause a critical reaction (Los Alamos National Laboratory 1995). In 1944, due to the uncertainties surrounding the second design, the search began for an appropriate test site for the implosion method, later used in the "Fat Man" device. The Alamogordo Bombing Range in south-central New Mexico was selected. A trial run involving 100 tons of TNT was conducted at "Trinity Site" on May 7, 1945. This "dress rehearsal" provided measurement data and simulated the dispersal of radioactive products. The Trinity test was planned for July, and its objectives were "to characterize the nature of the implosion, measure the release of nuclear energy, and assess the damage" (Los Alamos National Laboratory 1995). The HE components of the "Trinity" device were test assembled in building TA-16-516 at Los Alamos in an area known as V-site. Other buildings at V-site were used to prepare and finish the HE components and to run preliminary tests on the "Trinity" bomb (Wilder 1991). The world's first atomic bomb was successfully detonated in the early morning of July 16, 1945. "Little Boy," the untested uranium gun-type bomb, was exploded over the Japanese city of Hiroshima on August 6, 1945. "Fat Man" was exploded over Nagasaki three days later on August 9, 1945, thus essentially ending the war with Japan.

C. Early Cold War Era (1946–1956)

The Manhattan Project had come to a close with the end of World War II, and many Los Alamos scientists and site workers went back to their prewar existences. The future of Los Alamos was in question. With the beginning of the Cold War, continued weapons research was a top priority. Norris Bradbury had been appointed director of the Laboratory following Oppenheimer's departure from Los Alamos. Bradbury felt that the nation needed "a laboratory for research into military applications of nuclear energy" (Los Alamos National Laboratory 1993). In 1945, stockpiling and development of additional atomic weapons was an important mission. In 1946, the Laboratory became involved in the technical direction of the atmospheric testing program in the Pacific, dubbed "Operation Crossroads." Later in 1946, the U.S. Atomic Energy Commission (AEC) was established to act as a civilian steward for the new atomic technology born of World War II. The AEC formally took over the Laboratory in 1947, making a commitment to retain Los Alamos as a permanent weapons research facility. Postwar weapons research revolved around the development of advanced fission weapons and, acting on an idea born in 1942, the development of the hydrogen bomb. The combined work of Edward Teller and Stanislaw Ulam led to the beginning of the Laboratory's thermonuclear research program (Los Alamos National Laboratory 1993).

In 1952, the first thermonuclear device, known as "Mike," was detonated at Eniwetok atoll in the Pacific (Los Alamos National Laboratory 1993). The Mike shot used liquefied deuterium fuel. The Castle-Bravo shot, conducted in the Pacific in 1954, was revolutionary in that it contained dry, solid thermonuclear fuel. Other early Cold War weapons-related developments include (1) from 1952 to 1956, "improvements to the primary stage of a nuclear weapon" and (2) in 1956, "the first use of plastic-bonded explosives in a nuclear explosion" (Los Alamos National Laboratory 1995).

Technical Area 53 (Los Alamos Neutron Science Center - LANSCE) Historical Background

TA-53, LANSCE, (formerly called Los Alamos Meson Physics Facility – LAMPF), is a large developed technical area at LANL. It contains the Laboratory's "major accelerator research and development complex. The facility produces intense proton beams and sources of pulsed spallation neutrons for neutron research and applications" (U.S. Department of Energy 1999:2-84). LANSCE facilities include a high-power 800-MeV proton linear accelerator; neutron production targets at the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center) and the Weapons Neutron Research (WNR) facility; a proton storage ring (PSR); Areas A, B, and C; and a variety of associated experiment areas and spectrometers.

> In 1968, new accelerator technology culminated in the building of the Los Alamos Meson Physics Facility (LAMPF) – a linear accelerator providing 1-milliampere pulses of 800-million-electron-volt protons at a repetition rate of 120 per second. To support the Laboratory's nuclear physics programmatic needs in the early 1970s, the Weapons Neutron Research (WNR) facility was built as an adjunct to LAMPF. The WNR facility gave the Laboratory an intense neutron source that could be used to obtain

> nuclear data needed for weapons design. . . . The facility was designed as a multi-user facility to serve both scientific communities – nuclear physics, with neutrons of kilo-electron-volt energies, and material science, with neutrons of milli-electron-volt energies. The WNR facility produced neutrons for the first time in May of 1977, and routine operation ensued the following year. Shortly thereafter, the Laboratory administration sponsored the idea of making the WNR facility a national user facility for materials science research (Los Alamos National Laboratory 1999).

In the early 1980s, the scientific community recommended that the WNR experiment area be expanded to facilitate hosting a national user program in neutron scattering and that there be separate neutron-producing targets so that both the nuclear physics and neutron scattering programs be optimized. In October of 1986, the WNR facility was designated as a national facility for neutron scattering. This led to the construction of a large addition to the experiment hall, office space, and several new neutron spectrometers. Also a new facility was constructed for nuclear physics experiments (Los Alamos National Laboratory 1999).

> This expanded materials science facility was called the Los Alamos Neutron Scattering Center, and was later renamed the Manuel Lujan Jr. Neutron Scattering Center in honor of long-term New Mexico Congressman Manuel Lujan Jr. The neutron Scattering Center was designated a national user facility in October 1985 and a formal user program was initiated with the 1988 run cycle (Los Alamos National Laboratory 1999).

During the early 1990s with

> the increased national need for neutrons, Los Alamos National Laboratory decided to refocus the mission of the linear accelerator complex away from nuclear physics and toward neutron research and applications. In October 1995, the accelerator complex was renamed the Los Alamos Neutron Science Center [LANSCE] (Los Alamos National Laboratory 1999).

In 1997 a new LANL Division was formed (LANSCE Division). The Division's mission and role are "to support the DOE's Defense Programs in the Stockpile Stewardship and Accelerator Production of Tritium programs" and to develop "LANSCE as a center of excellence in the application of accelerator technology to defense and civilian research, principally through the exploitation of spallation neutron sources" (Los Alamos National Laboratory 1999).

> [LANSCE] will provide the scientific underpinning for the confidence that the government must have in the remaining weapons in the U.S. nuclear weapons stockpile. LANSCE can address some of the materials aging and manufacturing issues directly using neutron scattering and high-energy neutron radiography. . . . [Additionally, LANSCE continues as a center for] basic and industrial research. As a result, DOE's Office of Basic Energy Sciences sponsors LANSCE as a national user facility for basic research in condensed-matter sciences (Los Alamos National Laboratory 1999).

This facility uses particle beams to conduct basic and applied research in the areas of condensed matter science, materials science, nuclear physics, particle physics, nuclear chemistry, atomic physics, and defense-related experiments. LANSCE also produces medical radioisotopes. As a National User Facility for research in condensed matter sciences, LANSCE hosts scientists from universities, industry, LANL, and other research facilities from around the world (U.S. Department of Energy 1999:2-84).

The heart of TA-53 is the linear accelerator, or linac, located in Building TA-53-3. It is more than 0.5 mile (0.8 kilometer) in length, and has 316,000 square feet (29,390 square meters) of floor space. The building contains equipment to form hydrogen ion beams (protons and negative hydrogen ions), and to accelerate them to 84 percent of the speed of light. Ancillary equipment is used to transport the ion beams, maintain vacuum conditions in the beam transport system, and provide ventilation and cooling. Creating and directing the ion beam requires large amounts of power, much of it ultimately removed as excess heat. The beam tunnel itself is located 35 feet (11 meters) below grade (i.e., below the ground) to provide radiation protection. Above-surface structures house radio-frequency power sources used to accelerate the beam (U.S. Department of Energy 1999:2–89).

The linear accelerator is set up in three stages. The first stage (TA-53-3J) contains injector systems. Each injector system has a 750-keV Crockroft-Walton generator and an ion source. When particles leave the injectors, their velocity is 4% of the speed of light. The second stage of the accelerator, the drift-tube linear accelerator (TA-53-3A), has a length of 203 feet (62 meters). After this stage, the particles are accelerated to 43% of the speed of light. The third and longest stage of the accelerator is the side-coupled-cavity linear accelerator (2400 feet [731 meters] long). This stage, TA-53-3B through TA-53-3H, accelerates particles to 84% of the speed of light with an energy level of 800 MeV. Particle beams from the linear accelerator are separated at a switch yard, TA-53-3S, and directed down three main beam lines to various experimental areas – Areas A, B, C, the WNR facility, and the Lujan Center (Los Alamos National Laboratory 1999 and U.S. Department of Energy 1999).

Besides the 800-MeV proton linear accelerator at TA-53, a new Low-Energy Demonstration Accelerator (LEDA), located in building TA-53-365, has become operational (U.S. Department of Energy 1999 and Larson and Manz 1996). "LEDA . . . generate[s] lower-energy protons (40-MeV as compared to the 800-MeV beam [from the linear accelerator], but at a much higher beam current (200 milliamps versus 1)" (U. S. Department of Energy 1999:2–89).

The capabilities of LANSCE include accelerator beam delivery, maintenance, and development; experimental area support; radio-frequency technology and operations; neutron research and technology; accelerator-driven transmutation technology, subatomic physics research, medical isotope production; and high-power microwaves and advanced accelerators (U.S. Department of Energy 1999).

Description of Building

The new Isotope Production Facility building is an addition to the linear accelerator building, TA-53-3. It is to be located on the north side towards the western end of the accelerator building near the east end of sector A (TA-53-3A).

TA-53-3 Linear Accelerator

Building Name: TA-53-3 Original Name: Meson Physics Facility (MPF-3)

Location:

City - Los Alamos, New Mexico

County - Los Alamos

UTMs - Zone 13 Easting 385635 Northing 3969953 West end
Easting 386093 Northing 3969951 Central portion
Easting 386638 Northing 3969955 East end

Legal Description - Township 19 North, Range 6 East, Section 23

Surroundings - TA-53 is the Laboratory's major accelerator research and development complex. In addition to the main accelerator building TA-53-3, other buildings in this TA associated with the accelerator house equipment, other experimental/laboratories, or offices. This TA is a conglomeration of building styles and construction materials.

Relationship to surroundings - Similar in the sense that there are other ribbed metal siding buildings located in this TA.

Construction Date: 1968 to 1972

Original Use: Structure TA-53-3 is the linear accelerator building (originally named the Los Alamos Meson Physics Facility or LAMPF).

Use History: Building TA-53-3 has always been a 800-MeV proton linear accelerator at Los Alamos.

Use at Time of Survey: This building continues to house the "world's most powerful proton linear accelerator" (Los Alamos National Laboratory 1999) the TA and accelerator were renamed the Los Alamos Neutron Science Center, or LANSCE, in 1995.

Condition at Time of Survey: Excellent

Building Description: (see also Appendix B)

Building style - TA-53-3 is constructed of a steel frame with ribbed metal siding on a concrete floor for the above ground portion and concrete for the below grade portion.

Foundation material - Concrete

Wall material/surface - The beam tunnel that is located approximately 35 feet below grade is constructed of concrete. The above grade portion is steel frame with insulated metal wall panels that have pre-finished interior and exterior surfaces.

Architectural features - The accelerator at LANSCE is a high-power 800-MeV proton linear accelerator. The building has approximately 316,000 sq. feet of floor space and is approximately ½ mile in length. It contains equipment to form hydrogen ion beams and to accelerate them to 84 percent the speed of light. Ancillary equipment is used to transport the ion beams, maintain vacuum conditions, and provide ventilation and cooling. Above-surface structures house radio-frequency power sources used to accelerate the beam.

The building's beam tunnel spurs are constructed of concrete and are approximately 35 ft below grade. The above ground structure is of insulated ribbed metal wall panels.

The building is designated into several different sectors, A-H, J, M-N, P, and R-S, over its ½ mile length.

Remodeling History: The original accelerator building (Los Alamos Meson Physics Facility, or LAMPF) was built from 1968 through 1972. Later in the early 1970s, the WNR facility was built as an adjunct to LAMPF. The WNR facility includes the PSR, a proton-beam-transport system and spallation target. This facility was built on the south side of the main accelerator building and beam line, towards the eastern end.

In the early to mid 1980s, the Los Alamos Neutron Scattering Center (later renamed the Manuel Lujan Jr. Neutron Scattering Center) was constructed. This new addition was constructed on the north side of the main LAMPF accelerator building and beam line, also towards the eastern end. The Lujan Center includes and experiment hall, office space, and several neutron spectrometers. In 1995, the entire LAMPF was renamed the Los Alamos Neutron Science Center, or LANSCE.

Associated Buildings: TA-53-3, the accelerator building, has many associated buildings throughout the TA that house accelerator equipment, other experimental/laboratory areas, and offices.

District Potential: None

Integrity: Excellent

Eligibility: Eligible under A

National Register Eligibility Determination

Based on the information gathered during this building survey, property TA-53-3, LANSCE, "the world's most powerful proton linear accelerator" (Los Alamos National Laboratory 1999) and "one of the highest powered and largest research accelerators in the world" (U.S. Department of Energy 1999) is eligible for nomination to the National Register of Historic Places.

This accelerator is considered to be an exceptional significant historic property based on its role and function at LANL. It is eligible for the National Register of Historic Places under Criterion A (criteria consideration G: properties that have achieved significance within the last fifty years) (U.S. Department of the Interior 1991).

LANL proposes to construct an addition to the LANSCE facility, TA-53-3, the Isotope Production Facility. It is to be located at the east end of sector A, which is at the western end of the accelerator building. This proposed addition will house new experimental areas that are an outgrowth of current LANSCE research. Activities in the new addition will use part of the existing beam line in the same manner as other beam line "spurs" at the linear accelerator. The significance of the linear accelerator is in its continued use in the evolving field of nuclear physics. The addition of the new beam tunnel "spur" will not affect the historic significance of the linear accelerator building because the new research and building addition reflects the ongoing and changing missions of the Laboratory.

Recommendations

The New Mexico State Historic Preservation Officer (SHPO) is requested to concur with the eligibility determination contained in this report. Additionally, the SHPO is requested to concur with a "Determination of No Adverse Effect" for the proposed building addition.

Following the Secretary of Interior's Standards for the Treatment of Historic Properties, the new addition should be compatible with but visually distinct from the main building. This can be achieved through employing a slightly different type of metal siding or making slight changes to the color of the addition (Weeks and Grimmer 1995).

As a result of this historic building survey, this project complies with the National Historic Preservation Act of 1966 (as amended).

References Cited

Advisory Council on Historic Preservation

1991 *Balancing Historic Preservation needs with the Operation of Highly Technical or Scientific Facilities.* Advisory Council on Historic Places, Washington, D.C.

Larson and Manz

1996 *Facility and Utility Modifications for the Low Energy Demonstration Accelerator (LEDA)*, Cultural Resource Survey Report No. 121, LA-CP-96-77, Los Alamos National Laboratory, Los Alamos, New Mexico.

Lockwood Greene Technologies, Inc., and Los Alamos National Laboratory

1997 *Conceptual Design Report for Isotope Production Facility at the Los Alamos National Laboratory, TA-53.* CDR-DP-97-026, Lockwood Greene Technologies, Inc., Los Alamos, New Mexico, and Los Alamos National Laboratory, Los Alamos, New Mexico.

Los Alamos National Laboratory

1993 *Los Alamos: Beginnings of an Era 1943-1945.* Los Alamos Historical Society, Los Alamos, New Mexico.

1995 *Dateline: Los Alamos, Special Issue, LALP-95-2-6&7.* Los Alamos National Laboratory, Los Alamos, New Mexico.

1999 "Los Alamos Neutron Science Center," http://lansce.lanl.gov, accessed on 9/29/1999, Los Alamos National Laboratory, Los Alamos, New Mexico.

Rothman, Hal

1992 *On Rims and Ridges, The Los Alamos Area Since 1880.* University of Nebraska Press, Lincoln.

U. S. Department of Energy

1999 *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Volume 1 – Main Report.* DOE/EIS-0238, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

U.S. Department of the Interior

1991 How to Apply the National Register Criteria for Evaluation. In *National Register Bulletin*, No. 15. U.S. Department of Interior, National Park Service, Washington, D.C.

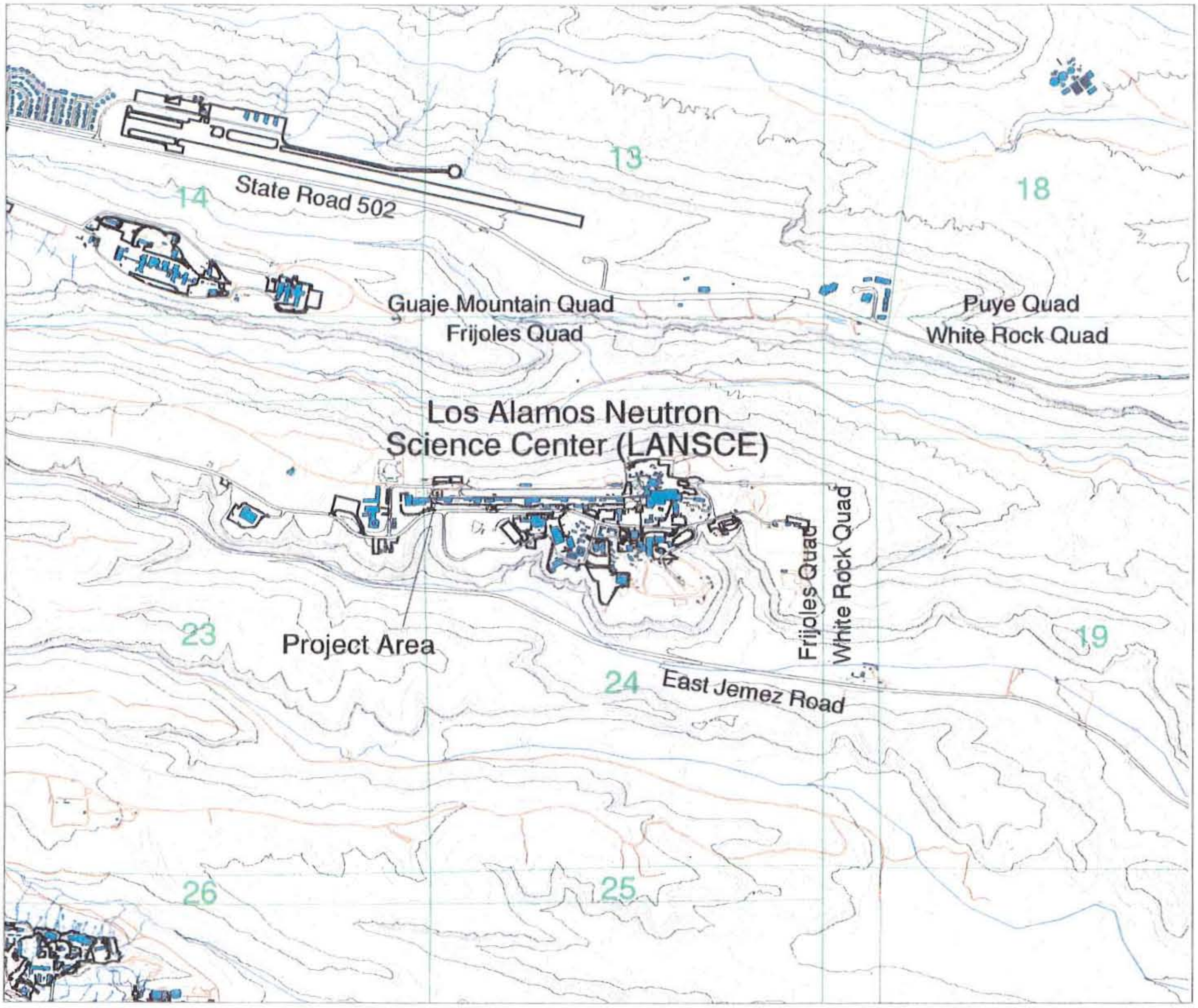
Weeks, Kay D. and Anne E. Grimmer
1995 *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*. U.S. Department of the Interior, National Park Service, Washington, D.C.

Wilder, Edward, Jr.
1991 Early S-site Experiences. In *Manhattan District History: Nonscientific Aspects of Los Alamos Project Y, 1942 through 1946*. Written by Edith C. Truslow, edited by Kasha V. Thayer. Los Alamos Historical Society, Los Alamos, New Mexico.

Worman, Frederick C.V. and Charlie R. Steen
1978 *Excavations on Mesita de los Alamos*, LA-7043-MS, Los Alamos Scientific Laboratory, Los Alamos, New Mexico.

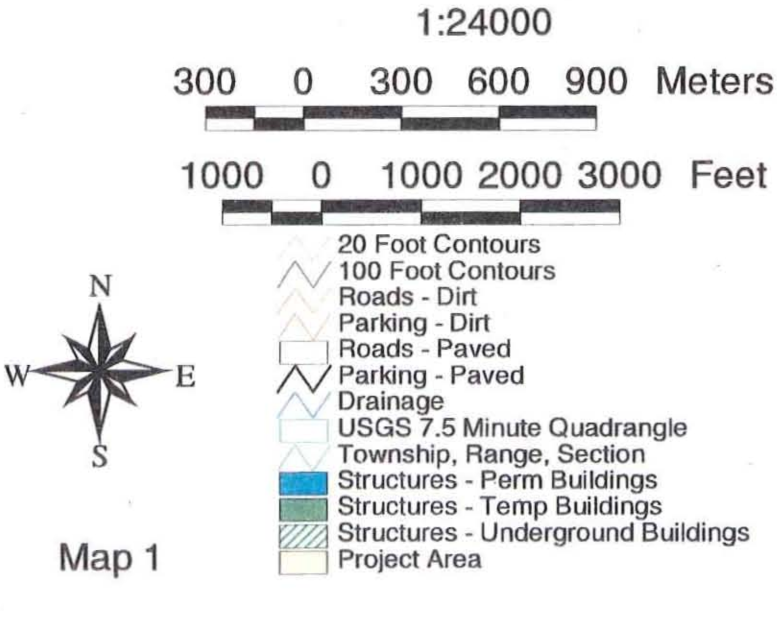
APPENDIX A

Maps

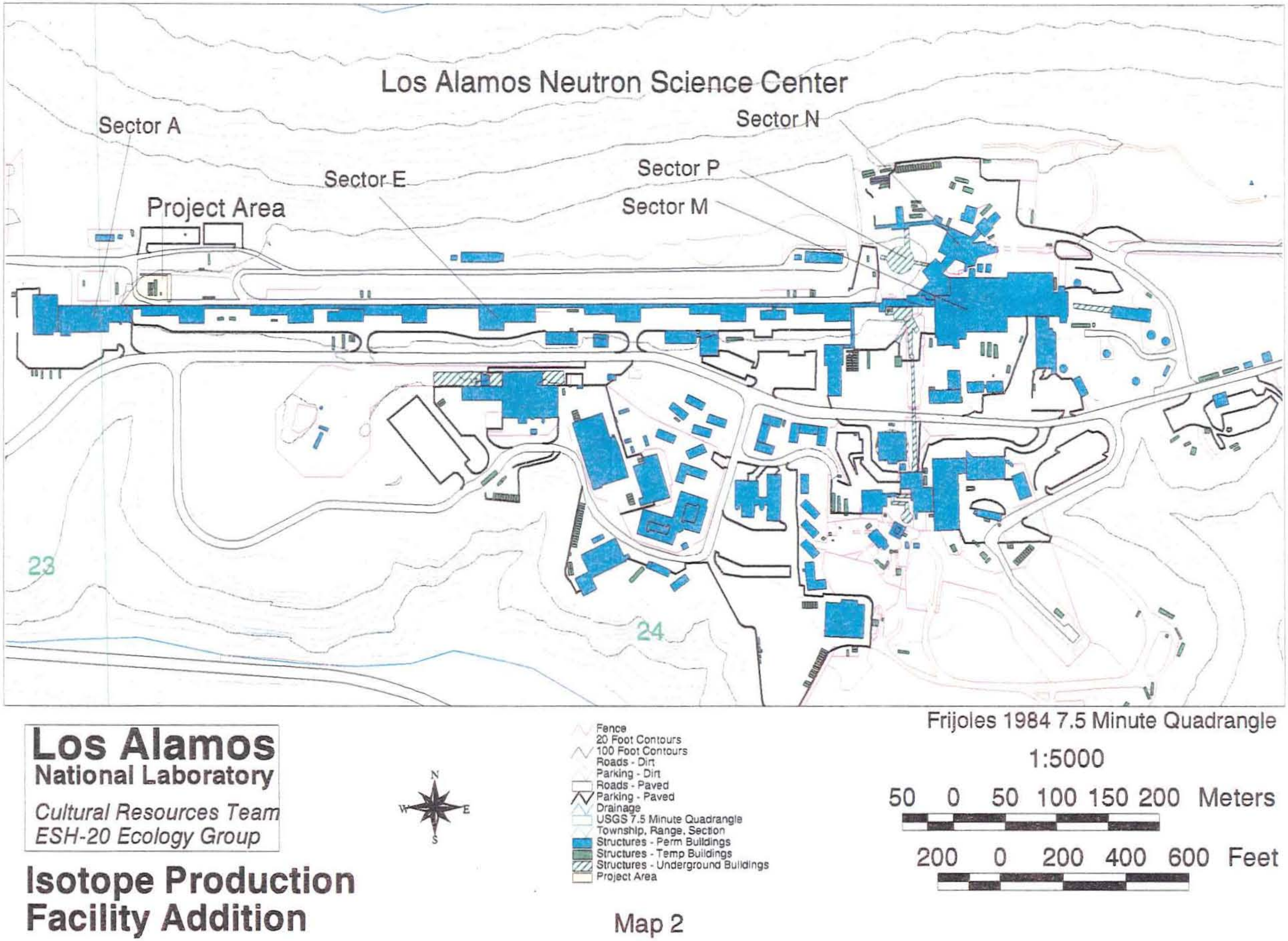


Los Alamos
National Laboratory
Cultural Resources Team
ESH-20 Ecology Group

Isotope Production Facility Addition



Map 1


Los Alamos Neutron Science Center
Sector A
Sector E
Sector N
Sector P
Sector M
Project Area
23
24
Los Alamos
National Laboratory
Cultural Resources Team
ESH-20 Ecology Group
Isotope Production
Facility Addition
N
S
E
W
Fence
20 Foot Contours
100 Foot Contours
Roads - Dirt
Parking - Dirt
Roads - Paved
Parking - Paved
Drainage
USGS 7.5 Minute Quadrangle
Township, Range, Section
Structures - Perm Buildings
Structures - Temp Buildings
Structures - Underground Buildings
Project Area
Frijoles 1984 7.5 Minute Quadrangle
1:5000
50 0 50 100 150 200 Meters
200 0 200 400 600 Feet

Map 2

APPENDIX B

Historic Building Inventory Forms

NEW MEXICO HISTORIC BUILDING INVENTORY FORM

LA#

building threatened? **No**	Surveyed date **10/29/99 & 11/5/99** by **K. L. M. Garcia, J. Isaacson, E. D. McGehee**	County **Los Alamos**	ID no. **TA-53-3**

field map **LANL Orthotopo**	number **Sheets 8 and 14**	UTM reference: Zone **13** easting **385635** northing **3969953** **West end** easting **386093** northing **3969951** **Central portion** easting **386638** northing **3969955** **East end**

Location description **Technical Area (TA) 53, Los Alamos Neutron Science Center (LANSCE)**	City/town **Los Alamos** Land grant/reservation **n/a**
building name **TA-53-3, LANSCE Accelerator Bldg.** Original name **MPF-3, Los Alamos Meson Physics Facility (LAMPF Accelerator Bldg.)**	legal description **USGS Frijoles Mountain 7.5 Series** tnsp <u>**19N**</u> range <u>**6E**</u> sec <u>**23**</u> <u>**SE¼ NE¼ NE¼**</u>

Film roll by nos. **Digital photos by ESH-20 and Roll 1051**	Negative nos. **Digital photos on file with ESH-20 by building number, Roll 1051 Frames 15A through 24A**	Location of neg. **LANL, ESH-20**	Date of construction ______ estimate **1968-1972** actual source **Facility & Waste Operations Division Facility Data Services Group (FWO-FDS) records (LANL).**

Style **Utilitarian; steel frame with ribbed metal siding on a concrete floor for the above ground portion. Concrete for the below grade portion (see below for more information).**	Foundation material **The concrete beam tunnel is located approximately 35 feet below grade.** wall material/surface **The above grade portion of the building is steel frame with insulated metal wall panels that have pre-finished interior and exterior surfaces.**	Use Present residential ✔ other **Linear accelerator** historic residential ✔ other **Linear accelerator**	Condition **X** excellent ___ fair to ___ good ____ deteriorating

degree of remodeling
____minor _X_ moderate ___major
describe: **The original accelerator building (the Los Alamos Meson Physics Facility or LAMPF) was built from 1968 through 1972. Later in the early 1970s, the Weapons Neutron Research (WNR) facility was built as an adjunct to LAMPF. The WNR facility includes the Proton Storage Ring, a proton-beam-transport system and spallation-target. This facility was built on the south side of the main accelerator building and beam line, towards the eastern end. In the early to mid 1980s, the Los Alamos Neutron Scattering Center (later renamed the Manuel Lujan Jr. Neutron Scattering Center) was constructed. This new addition was constructed on the north side of the main accelerator building and beam line, also towards the eastern end. The Lujan Center includes an experiment hall, office space, and several neutron spectrometers. In 1995, LAMPF was renamed the Los Alamos Neutron Science Center or LANSCE.**

Surroundings
Developed Laboratory Technical Area 53

Relationship to surroundings
_X_ similar ___not similar

There are other ribbed metal siding buildings located in this Technical Area (TA) that are support buildings to the accelerator (ie. buildings used to house accelerator equipment and other experimental/laboratory buildings) or that are office buildings. This TA is a conglomeration of building styles and construction materials.

district potential
___ yes _X_ no

Significance
_X_ Eligible _____of interest ____none
if not eligible,
why? **This building houses the "world's most powerful proton linear accelerator (linac)" (Los Alamos National Laboratory 1999a). It is also "one of the highest powered and largest research accelerators in the world" (U.S. Department of Energy 1999:2-84).**

Los Alamos National Laboratory
1999 "Los Alamos Neutron Science Center," http://lansce.lanl.gov, accessed on 9/29/99, Los Alamos National Laboratory, Los Alamos, New Mexico.

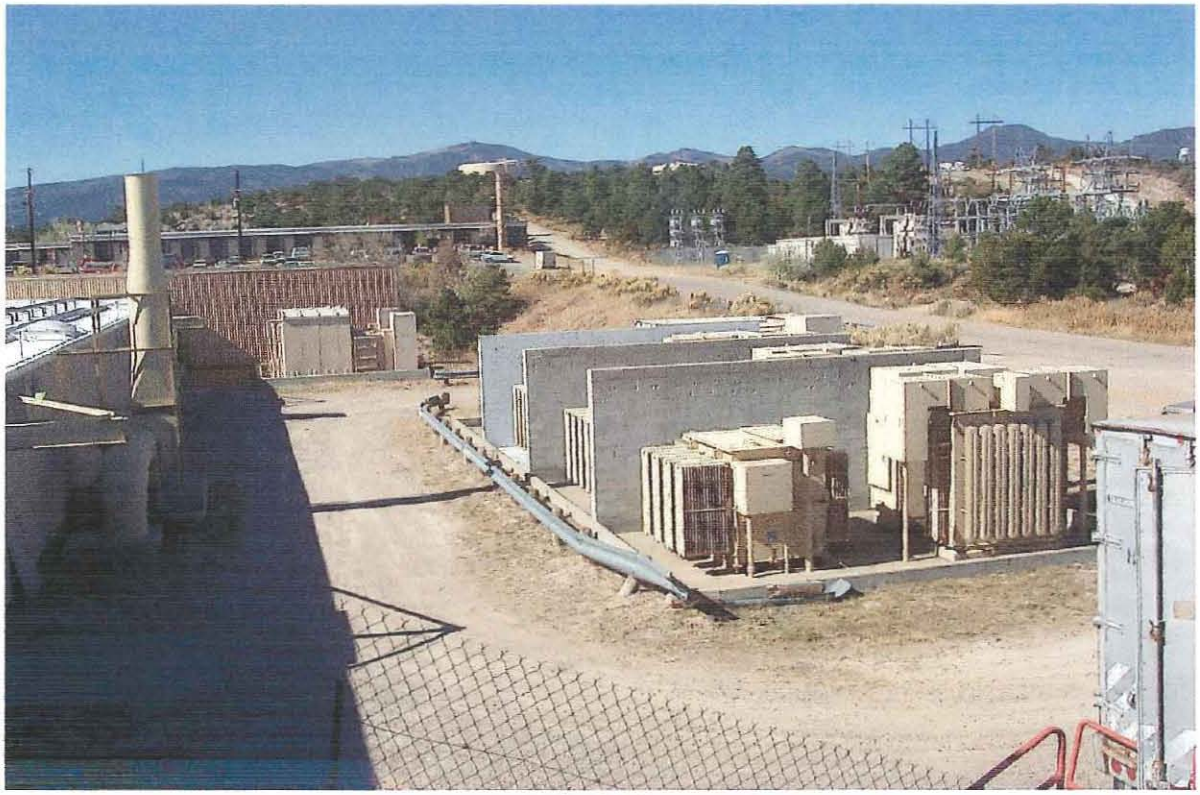
U.S. Department of Energy
1999 *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Volume 1 – Main Report.* DOE/EIS-0238, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

associated buildings? _X_ yes
what type? **Utilitarian, industrial laboratory type buildings**
if inventoried, list ID nos.

Photos and plan drawings are on following pages

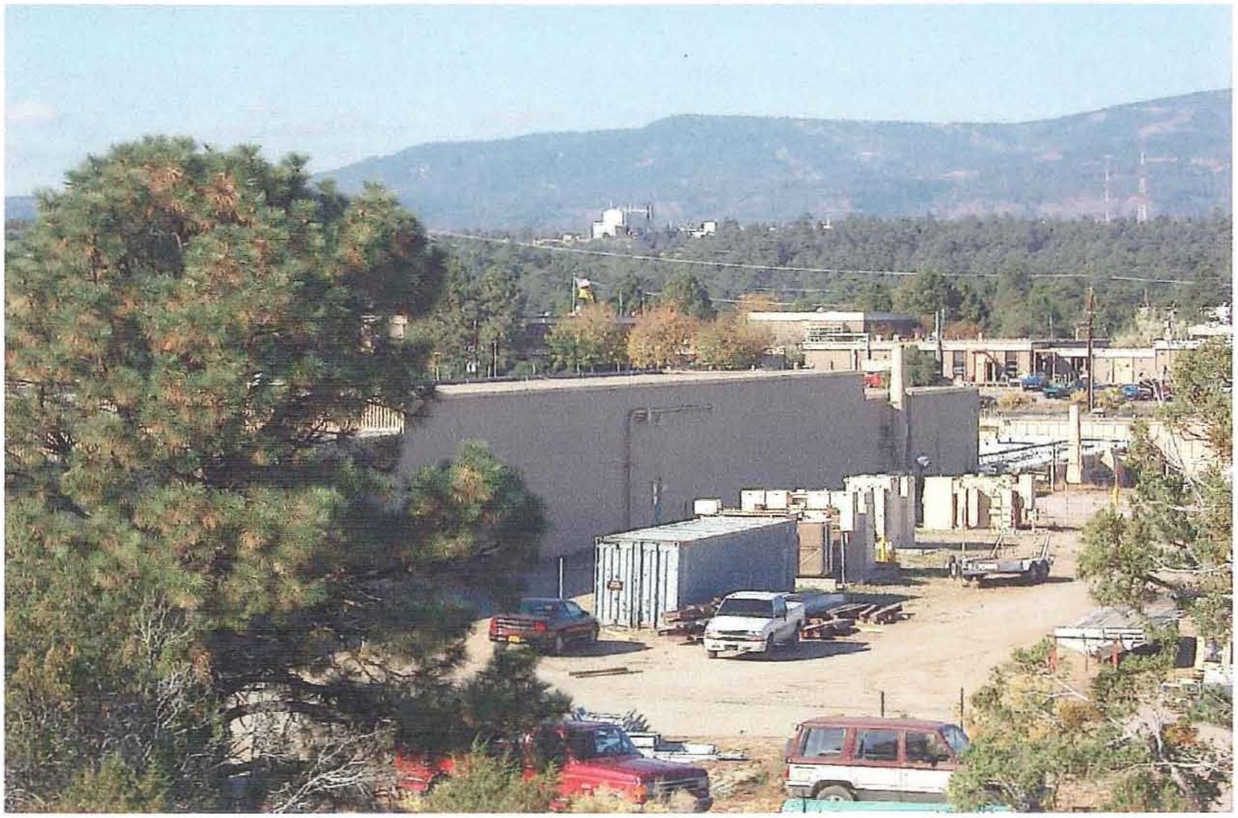
size: **approx. 316,000 ft^2 of floor space**

architectural features/process description: **The accelerator at LANSCE is a high power 800-million-electron-volt (MeV) proton linear accelerator. The building has approximately 316,000 sq. ft of floor space and is approximately ½ mile in length. It contains equipment to form hydrogen ion beams and to accelerate them to 84 percent the speed of light. Ancillary equipment is used to transport the ion beams, maintain vacuum conditions, and provide ventilation and cooling. Above-surface structures house radio frequency power sources used to accelerate the beam. The linear accelerator is set up in three stages. The first stage (TA-53-3J) contains injector systems. Each injector system has a 750-keV Crockroft-Walton generator and an ion source. When particles leave the injectors, their velocity is 4% of the speed of light. The second stage of the accelerator, the drift-tube linac (TA-53-3A), has a length of 203 feet (62 meters). After this stage, the particles are accelerated to 43% of the speed of light. The third and longest stage of the accelerator is the side-coupled-cavity linac (2,400 feet or 731 meters long). This stage, TA-53-3B through TA-53-3H, accelerates particles to 84% of the speed of light with an energy level of 800 MeV. The particle beam from the linear accelerator are separated at a switchyard, TA-53-3S, and directed down three main beam lines to various experimental areas--Areas A, B, C, the WNR facility, and the Lujan Center.** **The above information was obtained from the following sources:** **Los Alamos National Laboratory** **1999 "Los Alamos Neutron Science Center," http://lansce.lanl.gov, accessed on 9/29/99, Los Alamos National Laboratory, Los Alamos, New Mexico.** **U.S. Department of Energy** **1999 *Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory, Volume 1 – Main Report.* DOE/EIS-0238, U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.**	Comments: Integrity: **Excellent** Eligibility: **Eligible under A**



TA-53-3
North side of linear accelerator building at left side of photo

TA-53-3
Sector A, north side of building



TA-53-3
Sectors A and B
North side of building

APPENDIX C

Design Plans of New Isotope Production Facility Addition

ISOTOPE PRODUCTION FACILITY CONTROL POINTS

POINT NO.	NORTHING	EASTING
A5302	1771733.858'	1638264.387'
IPF-1	1771613.61'	1635584.04'
IPF-2	1771606.63'	1635591.23'

GENERAL NOTES:

1. SEE SHEET C1 FOR LEGEND
2. COORDINATES FOR IPF-1 AND IPF-2 WERE PROVIDED BY LANL

KEYED NOTES:

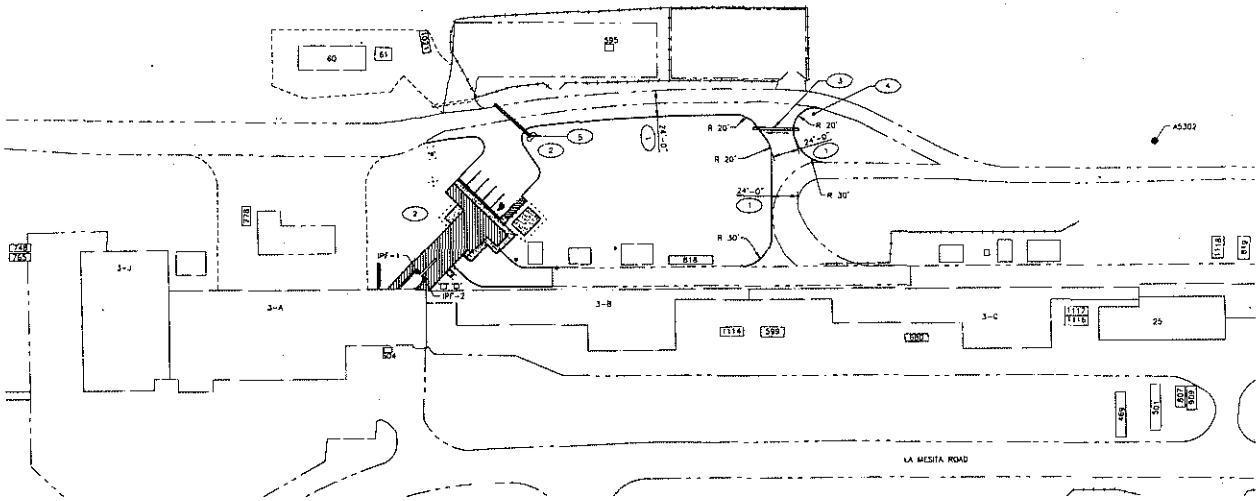
(1) WIDEN EXISTING ROAD TO 24 FEET. SEE TYPICAL ROAD SECTION SHEET C8

(2) SEE SHEET C3, FOR ENLARGED SITE PLAN

(3) INSTALL 42 LF OF 24 INCH CMP AND TWO FLARED END SECTIONS. SLOPE AT 2% MINIMUM. PROVIDE A MINIMUM COVER AT ROADWAY OF 1 FOOT. GRADE ENTRANCE AND EXIT TO ALLOW PROPER DRAINAGE.

(4) PRESERVE AND PROTECT EXISTING NATIVE VEGETATION AND SURVEY MONUMENTS

(5) SEE SHEETS C3 AND C6 FOR DETAILS



N

OVERALL SITE PLAN

SCALE: 1"=50'-0"

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0 50' 100'
1"=50'-0"

NO	DATE	CLASS REV.	REVISIONS	DWN	DES	CHKD	SUB	APP

MERRICK Engineers & Architects — 600 Sixth Street, Los Alamos, New Mexico, 87544, USA (505) 662-0806, Fax (505) 662-3851

ISOTOPE PRODUCTION FACILITY	DRAWN	H GONZALES
	DESIGN	H GONZALES
OVERALL SITE PLAN	CHECKED	K CARR
BLDG. 3 TA-53	DATE	8/25/99
SUBMITTED S. DAUGHERTY	APPROVED FOR RELEASE R. HEATON	
Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545	SHEET C2	01
CLASSIFICATION	REVIEWER	DATE
PROJECT ID 17723	DRAWING NO C52143	REV

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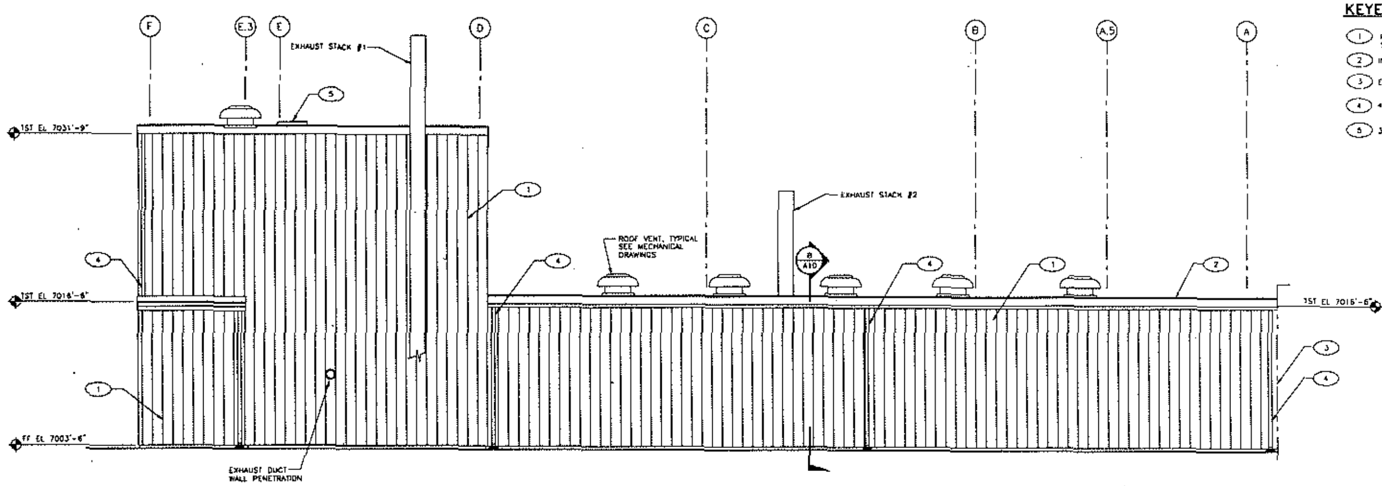
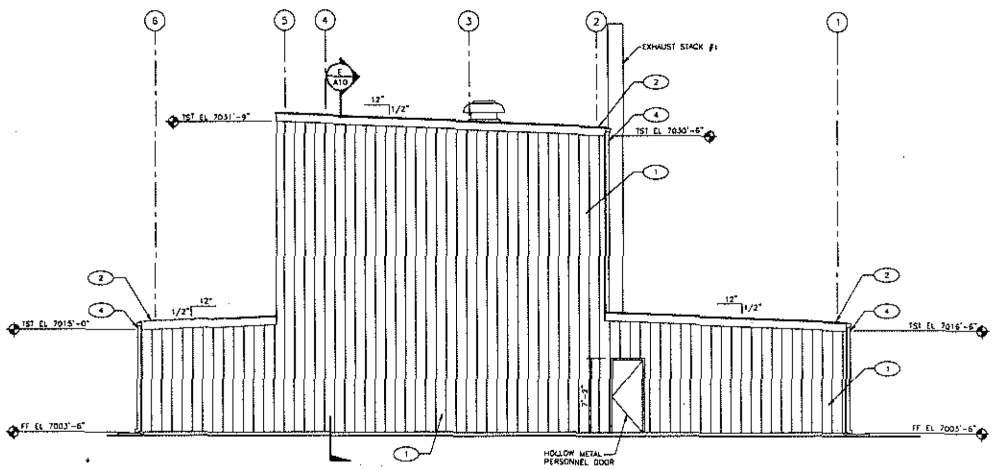


WEST ELEVATION
SCALE: 3/16"=1'-0"



NORTH ELEVATION
SCALE: 3/16"=1'-0"

KEYED NOTES:

1. INSULATED METAL WALL PANEL WITH PREFINISHED INTERIOR AND EXTERIOR SURFACE
2. INSULATED METAL ROOF PANEL, TYPICAL ALL AREAS
3. EXISTING BEAM TUNNEL BUILDING
4. 4" WIDE METAL GUTTERS TO 4" DOWN SPOUTS AND CONCRETE SPLASH BLOCKS
5. 3'-0" X 3'-0" PRE-MANUFACTURED ROOF HATCH WITH INTEGRAL CURB

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2' 1' 0 2' 4' 6' 8'
3/16"=1'-0"

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600 Sixth Street, Los Alamos, New Mexico, 87544, USA (505) 662-0606, Fax (505) 662-3851

ISOTOPE PRODUCTION FACILITY

WEST AND NORTH EXTERIOR ELEVATIONS

BLDG 3 — TA-53

DRAWN	CMGHUNDRO
DESIGN	D.GUARIN
CHECKED	S.KOFFMAN
DATE	8/25/99

SUBMITTED: S. DAUGHERTY
APPROVED FOR RELEASE: R. HEATON

Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET A6 OF

CLASSIFICATION — REVIEWER — DATE

PROJECT ID: 17723
DRAWING NO.: C52143
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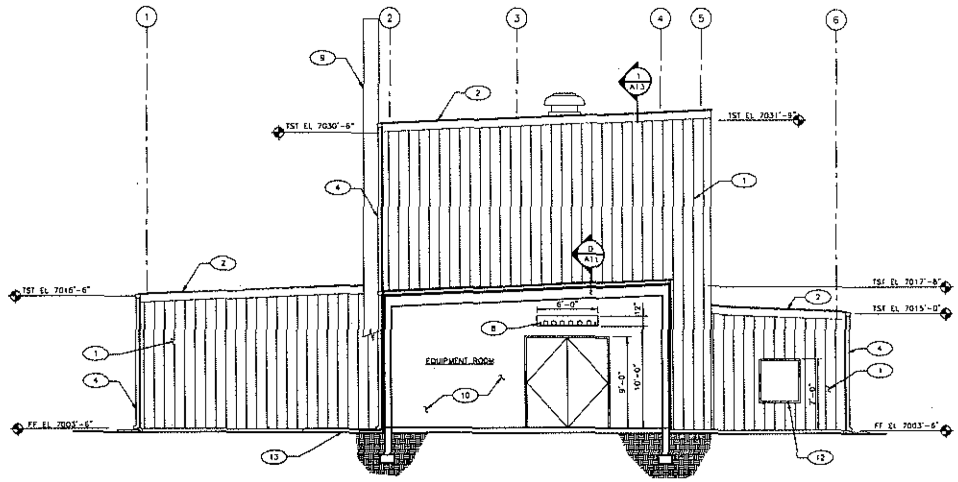
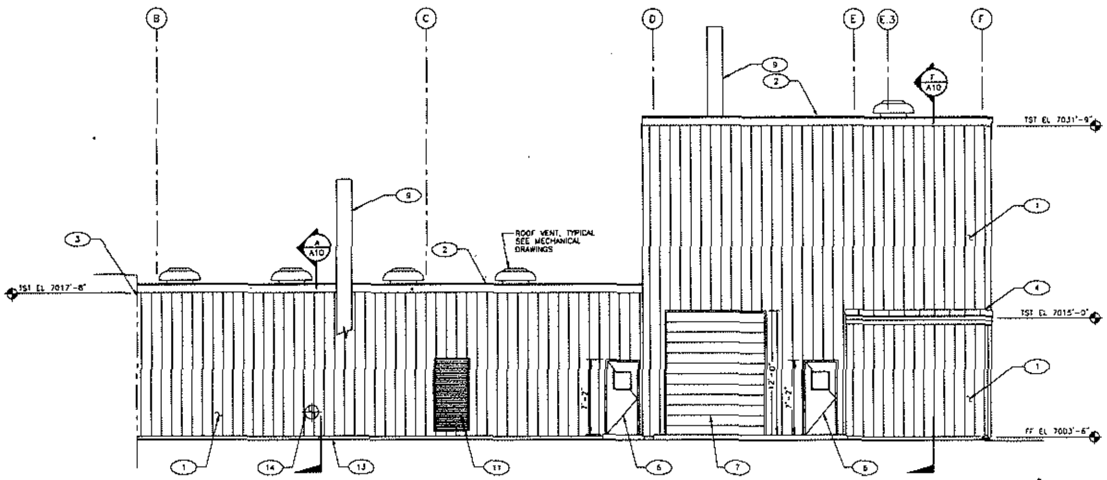


SOUTH ELEVATION
SCALE: 3/16"=1'-0"



EAST ELEVATION
SCALE: 3/16"=1'-0"

KEYED NOTES:

1. INSULATED METAL WALL PANEL WITH PREFINISHED INTERIOR AND EXTERIOR SURFACE
2. INSULATED METAL ROOF PANEL, TYPICAL ALL AREAS
3. EXISTING BEAM TUNNEL BUILDING.
4. 4" WIDE METAL GUTTERS TO 4" DOWN SPOUTS AND CONCRETE SPLASH BLOCKS
5. 3'-0" X 3'-0" PRE-MANUFACTURED ROOF HATCH WITH INTEGRAL CURB
6. HOLLOW METAL PERSONNEL DOORS.
7. OVERHEAD INSULATED COILING DOOR, 10'-0" X 12'-0"
8. PIPE RACEWAY OPENING AT 10'-0" AFF IN EQUIPMENT BAY
9. EXHAUST STACK.
10. PREFINISH METAL LINER PANELS.
11. FIXED METAL WALL LOUVER.
12. FIXED ALUMINUM WINDOW WITH INSULATING GLASS.
13. CONCRETE EQUIPMENT PAD.
14. WALL PENETRATION FOR DUCT, SEE MECHANICAL DRAWINGS FOR SIZE

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2' 1' 0 2' 4' 6' 8'
3/16"=1'-0"

NO	DATE	CLASS REV.	REVISIONS	DWN	DES	CHKD	SUB	APP

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ISOTOPE PRODUCTION FACILITY	DRAWN: OMOHUNDURO
SOUTH AND EAST EXTERIOR ELEVATIONS	DESIGN: D.GUARIN
BLDG 3 — TA-53	CHECKED: S.KOFFMAN
SUBMITTED: S. DAUGHERTY	DATE: 8/25/99
APPROVED FOR RELEASE: R. HEATON	SHEET A7 OF
Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545	
CLASSIFICATION / REVIEWER / DATE	
PROJECT ID: 17723	DRAWING NO.: C52143 — REV

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