Nevada Test Site, Japanese Village
Area 4, Yucca Flat, 4-04 Road near
Rainier Mesa Road
Mercury Vicinity
Nye County
Nevada

HABS No. NV-27

HABS
NEV
12-MERC.V,
2-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Buildings Survey
National Park Service
Western Region
Department of the Interior
San Francisco, California 94107

HABS
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HISTORIC AMERICAN BUILDINGS SURVEY

NEVADA TEST SITE, JAPANESE VILLAGE

HABS No. NV-27

Location: North side of the 4-04 Road approximately 1.15 miles west of its intersection with Rainier Mesa Road, Yucca Lake, Area 4, Nevada Test Site, approximately 40 miles north-northwest of Mercury, Nye County, Nevada.

USGS Yucca Lake Quadrangle (7.5'), Universal Transverse Mercator Coordinates: 11. 581301. 4105720

Present Owner: U.S. Department of Energy, Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89139-8518

Present Use: Vacant

Significance: The Japanese Village has been determined to be eligible to the National Register of Historic Places because of its association with historical and scientific events of exceptional importance. These light-frame wooden structures were constructed as analogs to typical Japanese houses for Operation BREN (Bare Reactor Experiment, Nevada), which was part of Project Ichiban. Project Ichiban was established to investigate radiation fields from the Hiroshima and Nagasaki bombings. The wood frame structures were built for dosimetry experiments designed to determine the shielding effects of traditional Japanese houses. These investigations allowed researchers to calculate radiation doses received by survivors of the Hiroshima and Nagasaki atomic bombs. At the time the dosimetry studies were completed, the results comprised the largest single set of data available on the shielding effects of Japanese housing and by extrapolation, nuclear radiation on human beings. Today, the site provides a direct link between the U.S. nuclear testing program and the only combat use of atomic weapons.

PART I. HISTORICAL INFORMATION

A. Physical History

1. Date of erection: The Japanese Village was erected in the early part of 1962, prior to the beginning of the Operation BREN testing program on the Nevada Test Site (NTS). This time frame is based on the dates of the architectural drawings and the start of the Operation BREN experiments. The concept for Operation BREN was developed in early 1961 (Auxier et al. 1961). Construction of the tower that was to hold the nuclear reactor for the dosimetry experiments took place during 1961 and early 1962 (Auxier 1977:50). Engineering drawings for the wood frame Japanese-style houses indicate that the plans were in place by August 1961 with all as-built revisions completed by June 1962 (Holmes and Narver, Inc. 1961a, 1961b, 1961c). The first experiment was conducted on March 21, 1962 (U.S. Atomic Energy Commission 1962a). Experiments continued during the summer of 1962 (U.S. Atomic Energy Commission 1962b).

2. Architect/Designer: The plans for the Japanese wood frame houses were originally developed from architectural drawings produced for the Atomic Bomb Casualty Commission (ABCC) by a Japanese design firm in Japan. The name of the Japanese company is unknown. These drawings were redrawn by the engineering firm of Holmes and Narver, Inc. (H&N), to reflect U.S. construction techniques, originally for the 1958 Operation Hardtack II experiments that utilized these analog houses and later for Operation BREN.

H&N was established in 1932 in Los Angeles, California, following the Long Beach earthquake in that year. H&N obtained numerous defense contracts during World War II, including the building of Camp Roberts and the construction of the military facilities on Okinawa. After the war, the Atomic Energy Commission (AEC) designated H&N as the architect and operator of the atomic testing facilities in the Pacific. The company built the test sites on Enewetok and Bikini and provided all the camp services. In 1956, H&N took over the NTS engineering contract from the Silas Mason Company. Initially, H&N maintained only a small field office at the NTS with the major engineering support coming out of the Los Angeles office. Between 1958 and 1960, H&N

established a design division in Las Vegas on Main Street. H&N still maintains a Las Vegas office at 6655 W. Sahara Avenue.

The Las Vegas office of H&N dealt with most engineering requests for the NTS, but unusual projects were handled by the Special Projects Division, located at 849 South Broadway in Los Angeles. This division modified the original Japanese drawings. The name of J.A. McCarthy appears as the designer for the analog houses. No other information is known about the individual designer.

3. Original and subsequent owners: The property on which the Japanese Village sits was originally part of the U.S. Air Force's Las Vegas-Tonopah Bombing and Gunnery Range. On December 21, 1951, the Nevada Proving Ground was established when the AEC entered into a lease agreement with the Air Force to use more than 600 square miles of the gunnery range for nuclear testing. Public Land Order 805 made this arrangement permanent on February 19, 1952. Since that time the land has been administered by the AEC and its successors. By the time the Japanese Village was constructed in 1962, the Nevada Proving Ground had been renamed the Nevada Test Site. The AEC continued to administer the land until 1974 when the Energy Research and Development Administration took its place. With the passage of the Department of Energy Organization Act in August 1977, control of the test site passed to the Department of Energy (DOE). The DOE continues to administer the property today.

4. Builder, contractor, suppliers: The AEC's Civil Effects Test Operations (CETO) sponsored the BREN project in conjunction with Oak Ridge National Laboratory (ORNL). ORNL provided the technical direction for the program. Personnel from ORNL and other supporting agencies served in supervisory roles for the construction of the Operation BREN facilities. J.H. Knight (Edgerton, Germeshausen & Grier, Inc.) oversaw engineering and construction on the project (Auxier 1977:56). His signature appears on the H&N engineering drawings for the Japanese Village.

The actual builder of the Japanese Village has not been determined, but it is likely that Reynolds Electrical and Engineering

Company, Inc. (REECo), built the structures. REECo was handling many of the construction projects on the test site by the early 1960s. J.B. Williamson of REECo was in charge of materials and support for the project (Auxier et al. 1962).

Information on individual suppliers is incomplete. Only the source for the asbestos-cement board or "transite" panels is known. The Johns-Manville Company supplied the panels from one of their New England plants (Auxier 1977:43).

5. Original plans and construction: Originally, the Japanese Village consisted of six wood frame structures, three houses and three elevations, positioned within a 200-x-200-ft area. Architectural plans and historic photographs of the Japanese Village indicate that the structures were originally clad in transite panels. Transite also served as roof sheathing. According to Auxier (1977:55), the structures were arranged in 12 different configurations for the Operation BREN experiments. It is unknown whether the current position of the structures is one of the 12 experimental configurations. One of the historic views of the Japanese Village (U.S. DOE file photo no. C62 1227-9) shows Structure #2 (Type C) in an orientation similar to its current position. Several of the engineering drawings have material schedules (H&N 1961b, 1961c), but no cost schedules have been located.

6. Alterations and additions: Over the years, some modifications have occurred to the structures although the exact dates of these alterations are unknown. In addition, exposure to the elements and ground motion from nearby underground testing has caused significant deterioration of the buildings.

Some time after the completion of the BREN experiments (summer 1962) and before 1992, the transite panels were removed from all of the structures.

Two of the three original wall elevations and the second story of the two-story house collapsed prior to 1992. One of two single-story houses collapsed between October 1992 and October 1993.

A general site cleanup occurred in 1994 when collapsed framing members, broken plywood, and miscellaneous litter were removed from the area surrounding the three standing structures. The

standing structures were also stabilized to decrease further decay and prevent collapse from current NTS activities in the vicinity. Stabilization consisted of the reinforcing of each of the joints with galvanized nails.

B. Historical Context

On July 16, 1945, the United States government detonated the first atomic weapon. The successful detonation of this test device, code named Trinity, led to immediate plans for combat use of these weapons and in less than three weeks a nuclear bomb exploded over Hiroshima, Japan. Three days later, a second nuclear weapon fell on Nagasaki. On August 15, 1945, Japan surrendered, thus ending World War II.

The combat use of nuclear weapons had momentous consequences for both the Japanese survivors of the blasts and the future direction of U.S. military policy. At the time, the effects of nuclear radiation were virtually unknown and no method existed for accurately calculating the radiation doses received by blast survivors. There was a critical need to investigate the short- and long-term consequences of radiation exposure. In addition, the bombing exacerbated already strained relations between the U.S. and the U.S.S.R., eventually leading to the Cold War nuclear arms race. In the face of mounting tensions, military strategists needed to know how radiation might affect combat troops.

To address the serious health questions, U.S. medical teams began their studies of radiation effects in Japan shortly after the 1945 events (Cannan 1964). In 1947, the U.S. established the Atomic Bomb Casualty Commission as a permanent medical survey-research organization, with offices in Hiroshima and Nagasaki (Auxier 1964:1). The ABCC continues its work as the Radiation Effects Research Foundation, a private nonprofit Japanese foundation supported jointly by the U.S. and Japan. It maintains a comprehensive program to document and analyze the effects of nuclear radiation on the atomic-bomb survivors and their offspring.

Concurrently with the ABCC's radiation effects research, the U.S. expanded its nuclear weapons development program. Initially, the weapons testing program was limited to sites in the South Pacific. However, logistical problems, increasing U.S.-Soviet tensions, and the outbreak of the Korean War eventually led to the establishment of a continental test site. Carved out of land used by the Las Vegas-

Tonopah Bombing and Gunnery Range, the Nevada Proving Ground (renamed the Nevada Test Site in 1955) became the primary site for the U.S. nuclear testing program for the next 31 years. The nuclear research and testing programs carried out at the NTS were fundamental to weapons development, radiation fallout studies, and radiation exposure experiments (Titus 1986).

The objectives of ABCC researchers and military policy makers coalesced in a series of tests beginning in the mid-1950s. In 1955, Operation Teapot included a series of experiments related to weapons radiation fields. Data from these experiments indicated the possibility of accurately describing radiation fields from the Hiroshima and Nagasaki bombings. As a result, a survey group visited the ABCC in Japan with the objective of determining the feasibility of a dosimetry study. Because records showed that a significant percentage of survivors were in their houses at the instant the bombs fell, and because of the structural uniformity of these houses, the survey group determined that the emphasis of the study should be placed on this group of survivors and the shielding characteristics of their homes (Auxier 1964).

Project Ichiban was the result of the survey group's recommendations. Established in 1956, the program was sponsored by the Civil Effects Branch of the AEC's Division of Biology and Medicine. The Health Physics Division of ORNL ran the project. The program involved nuclear weapons tests, Operation BREN, laboratory experiments, physical surveys in Japan, and calculation studies. The purpose of the project was threefold: to document survivor location at the instant the bombs were exploded, to establish air-dose curves, and to analyze shielding factors for houses (Auxier 1964).

Initially, the plan called for the construction of two Japanese houses at an American air base in Japan, but U.S. State Department concerns about public relations halted the project. As an alternative, traditional building materials were shipped from Japan to the NTS for construction of houses based on ABCC plans and specifications for typical Japanese houses. Imported materials included "the framing and sheathing, bamboo lathing, roof tiles, and clay, oyster shells, and seaweed for the stucco material" (Auxier 1977:31).

This first version of the Japanese Village consisted of two houses that were exposed to radiation from an atmospheric nuclear weapon test during Operation Plumbbob in 1957. Although some accuracy problems

were later discovered with the ORNL dosimetry instruments (Auxier 1977:33), results were promising enough to warrant additional shielding studies. However, the expensive and friable nature of the houses built of traditional Japanese materials made it necessary to find more economical and fire-resistant construction materials.

ABCC studies were used to develop analog houses. Sketch plans of rooms drawn during interviews with bomb victims and measurements of types and sizes of structures at varying distances from the bombs' hypocenters contributed to the design. Room sizes, based on the dimensions of tatami mats, the preferred flooring material, illustrate the modular nature and relative uniformity of Japanese dwellings. Made of woven reed and straw, the tatami mats are 5.3 cm thick, 95.5 cm wide, and 191 cm long. Multiples of these dimensions determine a house's interior divisions and influence its external footprint (Noble 1967, cited in Auxier 1977:9). Given this uniformity, researchers found that three types represented 90 percent of all Japanese residential structures: a large two-story, a middle-sized one-story, and a small one-story. Studies comparing radiation-attenuation characteristics of traditional Japanese building materials with U.S. products identified a cement-asbestos board known as "transite" as a suitable substitute for the Japanese mud and oyster shell stucco (Auxier 1977:42).

Based on these data, a second Japanese Village was erected on the NTS. This version involved modifying the Japanese designs to reflect U.S. construction techniques, which called for using transite board on wood frames (Auxier 1977:43). Seven houses were constructed for use in the 1958 Hardtack II series of atmospheric nuclear weapons tests: two of the large two-story houses, two of the middle-sized houses, and three of the small houses. These were identical to the houses later constructed for the BREN experiments. In fact, many of the construction drawings used for Operation Hardtack II were re-issued for the BREN experiments. Because of the durability of these structures, six of the Hardtack II structures were used three times and the seventh was used twice (Auxier 1964).

Operation Hardtack II provided excellent data on neutron shielding, but discrepancies were found in the gamma radiation data when they were compared to earlier results. A definitive study was therefore planned to answer remaining questions on neutron and gamma radiation fields. This study was to become Operation BREN. Operation BREN utilized an unshielded nuclear reactor, mounted on a tower, to emit neutrons and

gamma rays. This tower was especially noteworthy for its height: at 1,527 ft (465 m), it was, at the time of construction, the tallest tower ever built by the U.S. government. Major objectives of Operation BREN included determining the energy, angular, and spatial distributions of neutrons and gamma radiation from the reactor (Auxier 1964).

The proposed use of a nuclear reactor rather than nuclear weapons in these tests allowed radiation studies to continue during the 1958-1961 moratorium on atmospheric tests. Previous radiation studies involved atmospheric tests, and continued studies had been planned using atmospheric detonations, but were interrupted by the moratorium. Although the BREN tests were not actually conducted until after the moratorium was lifted, planning occurred when the moratorium was in effect (U.S. Atomic Energy Commission 1962c).

Operation BREN experiments took place in the spring and summer of 1962 on Yucca Flat on the NTS (Figure 1). The tower-mounted reactor created the radiation field necessary for the dosimetry experiments. Three analog Japanese houses, one each of the three designs used in Operation Hardtack II, and three wall elevations were constructed to be used for both gamma ray and neutron experiments. One house was to be built concurrently with the experiment. The structures were built on wooden skids, rather than foundations, for easy mobility. Six preliminary configurations of these structures were identified (Sanders et al. 1962). Each house contained sophisticated dosimetry devices placed strategically throughout the rooms. These measured radiation rates in the various rooms, allowing researchers to calculate dose rates received by bomb survivors.

Two 200-x-200-ft (61-x-61-m) areas were prepared as experiment platforms. One was located 2,250 ft (685 m) east of the tower, and the other 3,000 ft (914 m) east of the tower. The area closest to the tower was to be used first. The second area was to be used if radiation intensity was sufficient to make measurement feasible (Sanders et at. 1962). All six structures (three standing [Figure 2] and three collapsed) are located in the first area. No evidence (either physical or documentary) was found to indicate that the second area was used.

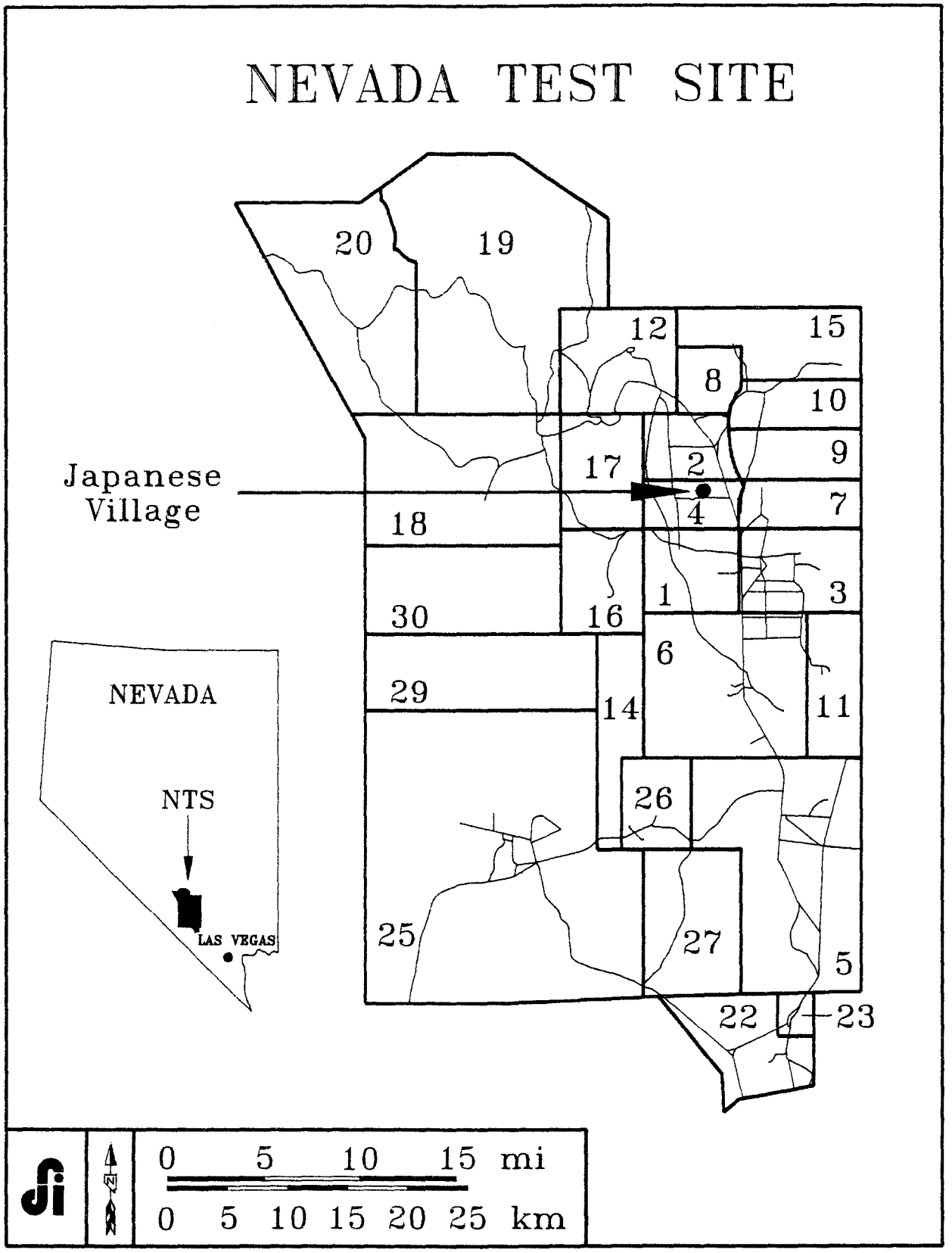


Figure 1. Location of the Japanese Village on the Nevada Test Site.

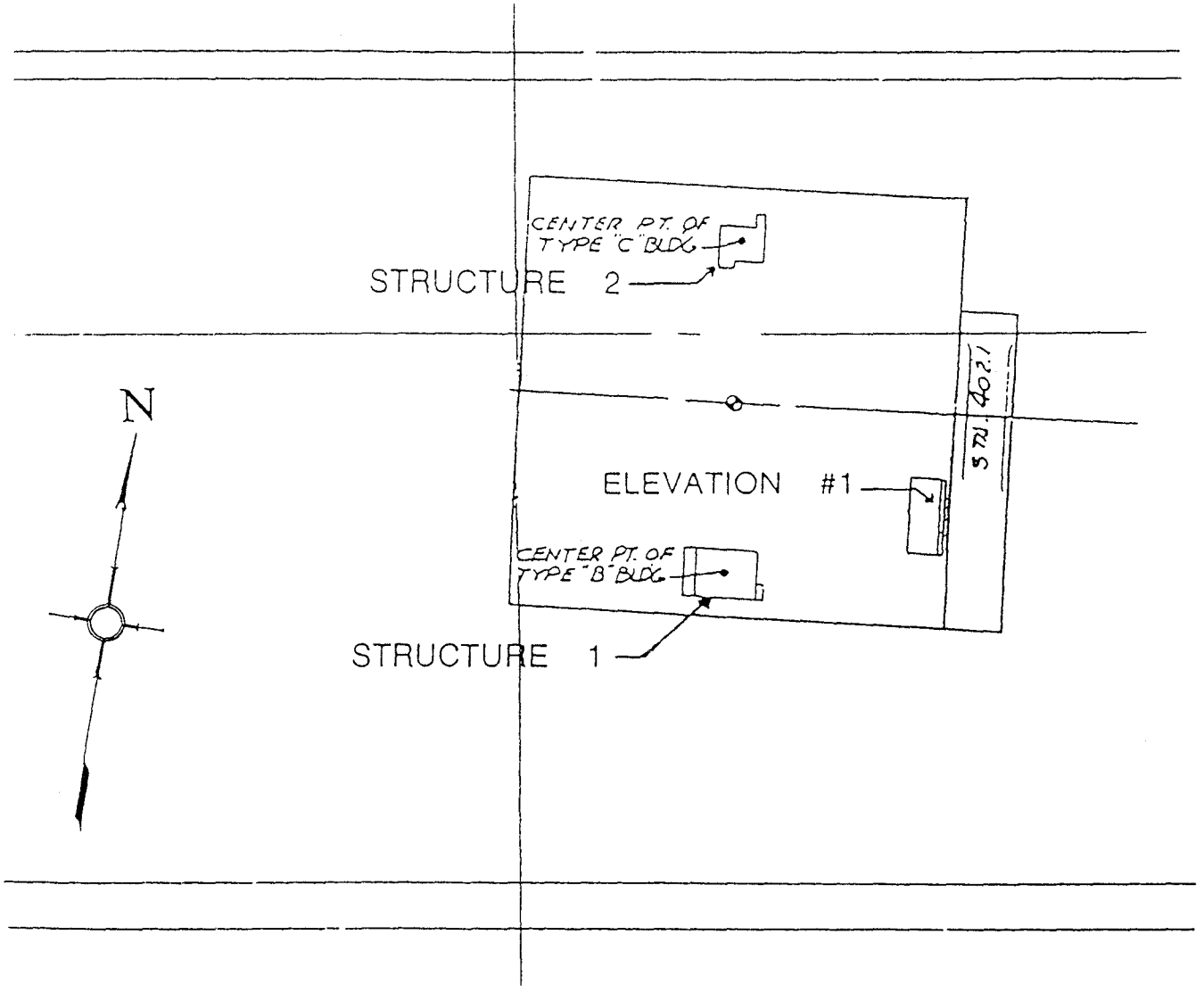


Figure 2. Site plan of the Japanese Village showing location of three standing structures.

According to documents, Operation BREN was highly successful:

> In summary, the shielding factors for Japanese dwellings can now be computed and simple, empirical formulae are being generated to simplify these computations. Spatial and angular distributions of dose are well defined, and spectral distributions are known, crudely. It now appears feasible to calculate the dose distributions in many of the more heavily shielded configurations (Auxier 1964).

Indeed, BREN data (combined with other Ichiban data sets) became the basis for a dosimetry system called the Tentative 1965 Dose (T65D) to estimate individual doses. The T65D estimates were in use in Hiroshima and Nagasaki until the 1980s. Eventually, criticism of the precision of the T65D computation system led to a reassessment of the dosimetry studies by groups in the U.S. and Japan. Their work resulted in a new dosimetry system called Dosimetry System 1986 (DS86). This new system is based on computation of dose rates by a method known as the "Monte Carlo" method (Tajima and Christy 1986) and is still in use today. However, the BREN data, as well as other Ichiban data, have not been discarded but rather serve as verification of the validity of the DS86 model. Woolson and Gritzner (1986:354) state that "Although the BREN experiments did not accurately replicate the radiation fields at Hiroshima and Nagasaki, they were valuable experiments for validating calculational procedures that can be applied to the Japanese house shielding problem."

Upon completion of Operation BREN, the tower was moved to Jackass Flats on the NTS and used for other purposes, including laser scintillation experiments, small missile launch tests, and sonic boom and meteorological experiments (Goldenberg and Beck 1991). However, the tower's foundation and stanchions and the Japanese Village remain in their original location. The Japanese-analog houses were not involved in any further tests.

PART II. ARCHITECTURAL INFORMATION

A. General Statement

1. Architectural character: Sketches of rooms based on interviews with bomb victims and measurements of types and sizes of structures at varying distances from the bombs' hypocenters

contributed to the architectural design. Room sizes were often based on the standard dimensions (95.5 cm x 191 cm) of the tatami mats used as flooring material. Multiples of these dimensions determine a house's interior divisions and influence its external footprint (Noble 1967 cited in Auxier 1977:9). Given this uniformity, researchers found that three types represented 90 percent of all Japanese residential structures: a middle-sized one-story (Type A), a large two-story (Type B) and a small one-story (Type C).

2. Condition of fabric: Originally sheathed with 1.75-in transite panels, the structures are now unsheathed skeletal frames. Fragments of transite paneling lie on the ground but most of the transite panels have been removed. Most connections are nailed, and many of the nails are popping out, causing the connections to separate and, in some cases, to fail. Some of these connections were renailed during a stabilization effort in May 1995.

B. Description of Exterior

1. Overall dimensions:

a. Structure #1 is a "Type B" structure. The building footprint is 22 x 36 ft. It is essentially rectangular, with extensions at both of the short ends. Originally two stories tall with a gable roof, the building now is only one story because of collapse of the second story and roof framing. Because of the roof collapse, the second floor plywood diaphragm now roofs the structure. Immediately east of this structure is a collapsed "Type A" structure. This structure collapsed between October 1992 and October 1993.

b. Structure #2 is a "Type C" building. The overall footprint is 26 x 19 ft, with narrow extensions for a "toilet" and "entrance." The structure is one story, with a gable roof consisting of 4-x-4-in beams with 2-x-4-in rafters. Rafters project 2 ft from the face of the building. Though somewhat deteriorated, it is the most complete structure still standing at the site.

c. Elevation #1 is a wall elevation from a "Type C" structure. It consists of a platform, 24 ft 4 in long x 12 ft wide, on skids. On one of the long sides is a framed wall elevation, 9 ft 8.75 in tall with a gable end 3 ft 11 in high. Diagonals brace the structure, extending from several points on the elevation to the opposite side of the floor platform. Two similar platforms, with collapsed wall elevations, rest nearby.

2. Foundations: The structures were built on wooden skids, rather than foundations, to permit easy movement. Each skid is composed of 2-x-12-in members bolted together and wrapped with steel straps, seven members thick and as long as is required by each structure's footprint. Six skids underlie Structure #1, four underlie Structure #2 and two underlie Elevation #1. Wooden platforms, constructed of 4-x-6-in, 4-x-4-in, and 2-x-4-in framing members with plywood flooring, rest on the skids.

3. Walls: Above the floor platform, the framing consists primarily of 4-x-4-in wall framing, with verticals forming bays approximately 3 ft wide. Horizontal 4-x-4-in members establish "window" and "door" openings. Two-by-six-in diagonals brace the structure from sill to top plate in most bays. Additional components include 1-x-2-in stops. While these structures were originally sheathed with transite panels, they are now unsheathed skeletal frames.

4. Structural system, framing: See above.

5. Porches, stoops, balconies, bulkheads: None.

6. Chimneys: None.

7. Openings:

a. Doorways and doors: No doors are present on these structures. Historic photographs indicate none were present when the structures were in use. All doorways are untrimmed.

1. Structure #1 has three doorways. Two are on the west elevation: a 2.75-x-5.5-ft doorway providing access to the southwest corner room and a larger

8.25-x-5.5-ft doorway that accesses the body of the house. The third doorway is on the east elevation. It is a 6-x-5.5-ft opening that provides access to the southeast corner room.

2. Structure #2 has three doorways. One 2.75-x-5.5-ft doorway is on the west elevation, one 6-x-5.5-ft doorway is on the south elevation, and one 8.25-x-5.5-ft doorway is on the north elevation.

3. Elevation #1 has no doorways.

b. Windows and shutters: No windows or shutters are present on these structures. Historic photographs indicate none were present when the structures were in use. All window openings are untrimmed.

1. Structure #1 has three window openings on the south elevation and one on the east.

2. Structure #2 has one window opening on each of the north, west, and south elevations.

3. Elevation #1 has no window openings.

8. Roof: Structure #1 and Elevation #1 lack roofs. Structure #2 has roof framing.

a. Shape, covering: The roof is gabled. It was covered with transite panels, but now has no covering.

b. Cornice, eaves: Eaves extend 1 to 2 ft from the walls. They were originally sheathed with transite panels, but are now uncovered.

c. Dormers, cupolas, towers: None.

C. Description of Interior

1. Floor plans:

a. Basement: None.

b. First floor: Generally speaking, the interior is simple. Rooms and closets are divided by skeletal framing.

c. Second floor: None. Originally, Structure #1 had a second floor but it collapsed sometime after 1962 and before 1992.

2. Stairways: None. Historic photographs show access to the second floor of Structure #1 was by a ladder that is no longer present.

3. Flooring: Unfinished plywood.

4. Wall and ceiling finish: None at present, but originally transite panels.

5. Openings: No interior doorways. Skeletal framing separates rooms and closets. Window openings described for exterior have no internal trim.

6. Decorative features and trim: None

7. Hardware: None

8. Mechanical equipment:

a. Heating, air conditioning, ventilation: None

b. Lighting: None

c. Plumbing: None

D. Site

1. General setting and orientation: The Japanese Village is located along the 4-04 Road approximately 1.1 miles west of its intersection with Rainier Mesa Road in Area 4 of the NTS. This area is in the northern half of Yucca Flat, a large (135 square mile) oval-shaped bolson located in the northeastern corner of the NTS. Sediments in this area are mostly alluvial, as tributary streams erode the surrounding mountains and deposit sediments in Yucca Flat. Fernald et al. (1968) indicate they are late

Pleistocene and Holocene age deposits. However, the majority of these sediments have been disturbed from scientific use of this area. The average elevation is approximately 1,280 m (4,200 ft). The terrain slopes gently (2 to 4 percent) to the east or southeast.

The village is part of a multicomponent site consisting of seven underground structures associated with atmospheric nuclear testing, one set of unidentified stanchions that may be associated with atmospheric nuclear testing, the BREN Tower foundations and stanchions, the U4ad drill hole and drill sump, and the U4af stayout area. The Japanese Village portion is located within a 200 x 200 ft stabilized area adjacent to a trailer revetment. This area is located 2,250 ft due east of the BREN Tower foundation (which is located adjacent to the seven underground structures). The long axes of Structures #1 and #2 are oriented east-west. The orientation of the long axis for Elevation #1 is north-south. However, during their use all the structures were oriented in different directions for different experiments.

Currently, several trailers and other pieces of mobile equipment (generators, water tankers, earthmoving equipment, and sanitation facilities) are located adjacent to the main complex of underground bunkers in the western portion of the site. These items are temporary and change periodically.

2. Historic landscape design: None.

3. Outbuildings: None.

PART III. SOURCES OF INFORMATION

A. Original Architectural Drawings

Holmes and Narver, Inc., 1961a, *CETO-Operation BREN Wood Frame Structure - Type A, Elevations and Sections, Station 400.1, Area 4.* Microfiche on file, drawing no. JS-004-400.1-S2.1, Engineering Records Library, Mercury, NV. [architectural plans for the collapsed Type A single-story structure at the Japanese Village]

Holmes and Narver, Inc., 1961b, *CETO-Operation BREN Wood Frame Structure - Type B, Elevations and Sections, Station 400.2, Area 4.* Microfiche on file, drawing no. JS-004-400.2-S4.1, Engineering Records

Library, Mercury, NV. [architectural plans for Structure #1-Type B, the two-story structure at the Japanese Village]

Holmes and Narver, Inc., 1961c, *CETO-Operation BREN Wood Frame Structure - Type C, Elevations and Sections, Station 400.3, Area 4.* Microfiche on file, drawing no. JS-004-400.3-S2.1, Engineering Records Library, Mercury, NV. [architectural plan for Structure #2-Type C, the standing single-story structure at the Japanese Village]

Holmes and Narver, Inc. 1958, Wood Frame Structures, Area 7. Microfiche of file, drawing nos. JS-007-700-C1 through C6; JS-007-700-S1 through S3; JS-007-701-S1 through S5; JS-007-702-S1 through S3, Engineering Records Library, Mercury, NV. [site layout and architectural plans for the Japanese analog houses used in Operation Hardtack II; many of these drawings were re-issued for Operation BREN]

B. Early Views: The Japanese Village was extensively photographed while it was in use. The following list provides selected views. Proof books are available at the CIC Library (2621 Losee Road, Bldg. B-3, North Las Vegas, NV 89030-4129; phone: 702-295-0731). The actual photographs and negatives are stored at the NTS but accessibility is through the CIC Library.

Number	Content
1278-11	Overview of Japanese Village showing three house types and three elevation types; view looking west-northwest. Photograph taken 5/9/62 by RB for the Civil Effects Test Organization.
1279-4	Same as above except view looking south-southeast. Photograph taken 5/9/62 by RB for the Civil Effects Test Organization.
1228-8	Japanese house Type A prior to installation of roof panels; view looking northwest. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.
1228-9	Same as above except view looking southwest. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.
1228-5	Japanese house Type B; view looking northeast. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.

1228-6 Japanese house Type B; view looking southeast. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.

1228-7 Japanese house Type B; view looking northwest. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.

1228-10 Japanese house Type C; view looking northwest. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.

1228-11 Japanese house Type C; view looking southeast. Photograph taken 2/16/62 by RB for the Civil Effects Test Organization.

1274-2 Dosimeters on support poles inside Japanese house Type A. Photograph taken 5/3/62 by RB for the Civil Effects Test Organization.

C. Interviews: Interviews have been conducted with Mr. Ray Hubbard and Dr. John Auxier, knowledgeable informants who were directly associated with the Japanese Village.

1. Ray Hubbard was interviewed over the telephone several times during late 1994 and 1995 in Las Vegas. His association with the Japanese Village comes from his employment as a Resident Engineer with Holmes and Narver, Inc., the engineering firm responsible for design of the Japanese Village. He indicated that the initial drawings were done by a Japanese design firm in Japan and were modified by H&N.

2. Dr. John Auxier was interviewed over the telephone in January 1995 (he in Knoxville and the interviewer in Las Vegas). He was the Director of ORNL's Health Physics Division and served as the principal author on publications about the dosimetry studies of survivors of Hiroshima and Nagasaki. He indicated that the data from the Japanese Village were crucial at the time and that they provided an experimental fiduciary for the Monte Carlo method used in later calculations.

D. Bibliography: The extent of published materials concerning this site is difficult to assess. Archived materials are known to be located at the CIC Library in Las Vegas, EG&G's Photographic Services at the NTS, and the Engineering Records Library at the NTS. Additional materials are likely to be archived at the Oak Ridge National Laboratory in Tennessee.

The following list is based on those publications that were useful during historical and archaeological research at the site.

Auxier, J.A.
1964 Ichiban: The Dosimetry Program for Nuclear Bomb Survivors of Hiroshima and Nagasaki - A Status Report as of April 1, 1964. *CEX-64.3 Civil Effects Study*, Civil Effects Test Operations, U.S. Atomic Energy Commission, Washington, D.C. Manuscript on file, Coordination and Information Center Library, document number 14429, Las Vegas.

This is a technical report. It provides a sketch of the history leading to the development of the Japanese Village and its purpose and function.

1977 *Ichiban: Radiation Dosimetry for the Survivors of the Bombings of Hiroshima and Nagasaki.* Report #TID-27080, National Technical Information Service, Springfield, Virginia.

This is a technical report. It provides detail on the development of the Ichiban Program. It is the best source of information on historical events that led to the development of the Japanese Village.

Auxier, J.A., F.W. Sanders, F.F. Haywood, and J.H. Thorngate
1961 *Technical Concept - Operation BREN* (draft), USAEC Report CEX-62.01, Oak Ridge National Laboratory.

This is a draft technical report. It provides detail on the technical concept of the BREN Operation.

Auxier, J.A., F.W. Sanders, F.F. Haywood, J.H. Thorngate and J.S. Cheka
1962 *Technical Concept - Operation BREN*, USAEC Report CEX-62.01, Oak Ridge National Laboratory.

This is the final version of the above technical report. It provides detail on the technical concept of the BREN Operation. The objectives, procedures, and responsibilities of personnel are provided.

Cannan, R.K.
1964 *News Report*, National Academy of Sciences, National Research Council, 12(1).

Fernald, A.T., G.S. Corchary and W.P. Williams
1968 Surficial geologic map of Yucca Flat, Nye and Lincoln Counties, Nevada. *U.S.G.S. Miscellaneous Geological Investigations Map* I-550.

This is a map. It provides detail on the geology of the area.

Goldenberg, N.G. and C.M. Beck
1991 *Historic Structure Inventory and Evaluation: BREN Tower, Area 25, Nevada Test Site, Nye County, Nevada*. Desert Research Institute, Quaternary Sciences Center, Short Report SR092791-1, Las Vegas.

This is a technical report. It provides a historical overview of the BREN Tower and its uses.

Holmes and Narver, Inc.
1961a *CETO-Operation BREN Wood Frame Structure - Type A, Elevations and Sections, Station 400.1, Area 4*. Microfiche on file, drawing no. JS-004-400.1-S2.1, Engineering Records Library, Mercury, NV.

These are architectural plans for the collapsed Type A single-story structure at the Japanese Village.

1961b *CETO-Operation BREN Wood Frame Structure - Type B, Elevations and Sections, Station 400.2, Area 4*. Microfiche on file, drawing no. JS-004-400.2-S4.1, Engineering Records Library, Mercury, NV.

These are architectural plans for Structure #1-Type B, the two-story structure at the Japanese Village.

1961c *CETO-Operation BREN Wood Frame Structure - Type C, Elevations and Sections, Station 400.3, Area 4*. Microfiche on file, drawing no. JS-004-400.3-S2.1, Engineering Records Library, Mercury, NV.

These are architectural plans for Structure #2-Type C, the standing single-story structure at the Japanese Village.

Johnson, W.G., S.R. Edwards and N.G. Goldenberg
1994 A Class III Cultural Resources Reconnaissance of the Proposed Shaped Charge Scaling Project and Utility Corridor, Yucca Flat, Area 4, Nevada Test Site, Nye County, Nevada. Desert Research Institute, Quaternary Sciences Center Short Report SR062994-1, Las Vegas.

This is a technical report. It provides historical context and justification for the National Register eligibility of the Japanese Village.

Johnson, W.G., N.G. Goldenberg and S.R. Edwards
in rev. The Japanese Village at the Nevada Test Site: A Relic of Nuclear War. 2nd review for *Historical Archaeology*.

This is a peer-reviewed journal article. If published, it is the most complete archaeological and historical review of the Japanese Village.

Noble, K.B.
1967 Memorandum for the Record, in *Shielding Survey and Radiation Dosimetry Study Plan, Hiroshima-Nagasaki*, USAEC Report ABCC-TR-7-67, p. 65, Atomic Bomb Casualty Commission.

This reference is provided in Auxier's (1977) technical report. No additional information is known about it.

Sanders, F.W., F.F. Haywood, M.I. Lundin, L.W. Gilley, J.S. Chekaa and D.R. Ward
1962 Operation BREN Operation Plan and Hazards Report, *CEX-62.02 Civil Effects Study*, U.S. Atomic Energy Commission, Civil Effects Test Operations, Washington, D.C. Manuscript on file, Coordination and Information Center Library, Las Vegas.

This is a technical report. It provides details on the layout of the Japanese Village.

Tajima, E. and R.F. Christy
1986 Preface. In *U.S. - Japan Joint Reassessment of Atomic Bomb Radiation Dosimetry in Hiroshima and Nagasaki* (Volume 2) edited by W.C. Roesch, no page numbers. Radiation Effects Research Foundation, Hiroshima, Japan.

This work may be useful for understanding the use of BREN data in today's DS86 model.

Titus, A. Costandina
1986 *Bombs in the Backyard: Atomic Testing and American Politics*. University of Nevada Press, Reno.

A book that provides a detailed discussion of the history and politics of the U.S. atmospheric atomic testing program and the ongoing debate over government liability for human exposure to radioactive fallout.

U.S. Atomic Energy Commission
1962a Operation BREN Press Release dated March 22, 1962. Available at the CIC Library, Las Vegas, under document no. 41123.

This is a three-page press release. It indicates that the first Operation BREN experiment took place on March 21, 1962.

1962b Operation BREN Press Release dated July 3, 1962. Available at the CIC Library, Las Vegas, under document no. 41201.

This is a one-page press release. It indicates that the final experimental program involving the BREN reactor was completed by July 3, 1962, but that other experiments using the Japanese Village were "expected to continue for a few weeks."

1962c Fact Sheet on Operation BREN, dated March 21, 1962, Las Vegas.

This is a five-page document on Operation BREN. It provides information on the history and purpose of the program as well as how it was conducted.

Woolson, W.A. and M.L. Gritzner
1986 Calculation of the BREN House Shielding Experiments. In *U.S. - Japan Joint Reassessment of Atomic Bomb Radiation Dosimetry in Hiroshima and Nagasaki* (Volume 2) edited by W.C. Roesch, Chapter 7, Appendix 1, pp. 352-375. Radiation Effects Research Foundation, Hiroshima, Japan.

This is a technical report. Its most significant contribution to understanding the Japanese Village is the indication of the importance of those data and how they are used today.

E. Likely Sources Not Yet Investigated: Sources that likely have important information but have not been investigated are the Federal Records Center in Laguna Niguel, California; Oak Ridge National Laboratory in Knoxville, Tennessee; and the Radiation Effects Research Foundation offices in Hiroshima and Nagasaki, Japan. The Federal Records Center may have the original Japanese design firm's drawings. Paul Wormser (phone: 714-643-4242) or Suzanne Duberry (phone: 714-643-4241) are the contacts. They indicated that approximately 80 tubes of drawings would have to be investigated to search for those drawings and that they do not have the staff to conduct such an investigation. Oak Ridge National Laboratory maintains archived materials in their facility. They are likely to have data on the Japanese Village. The Radiation Effects Research Foundation is a private nonprofit Japanese foundation supported jointly by the U.S. and Japan. It maintains a comprehensive program to document and analyze the effects of nuclear radiation on the atomic-bomb survivors and their offspring, and likely maintains records of the Japanese Village.

F. Supplemental Material: See Attachment A for drawings and early views.

PART IV. PROJECT INFORMATION

This is a mitigative recording project required by a Memorandum of Agreement (MOA) promulgated by the U.S. Department of Energy, Nevada Operations Office (DOE/NV) and the Lawrence Livermore National Laboratory (LLNL) and agreed to by the Nevada State Historic Preservation Office and the Advisory Council on Historic Preservation. The MOA recognizes that the detonation of high explosives by LLNL near the Japanese Village may have an adverse effect upon the structures, that the structures were partially stabilized according to a stabilization plan prepared for them, that insufficient funding is available to fully carry out the stabilization plan, and that no further stabilization activities

are planned. Stipulations of the MOA are 1) DOE/NV ensures that Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) documentation, as stipulated by the Western Regional Office of the National Park Service (NPS), will be completed for all three structures and approved by the NPS within six months of the date of the last signatory of the MOA (9-14-95) and 2) copies of the HABS/HAER documentation will be sent to the Nevada State Historic Preservation Office in Carson City and the Nevada State Museum and Historical Society in Las Vegas.

Authors: William Gray Johnson and Susan R. Edwards
Desert Research Institute
P.O. Box 19040, Las Vegas, NV 89132-0040

Date: January 17, 1996

ATTACHMENT A
EARLY VIEWS AND DRAWINGS

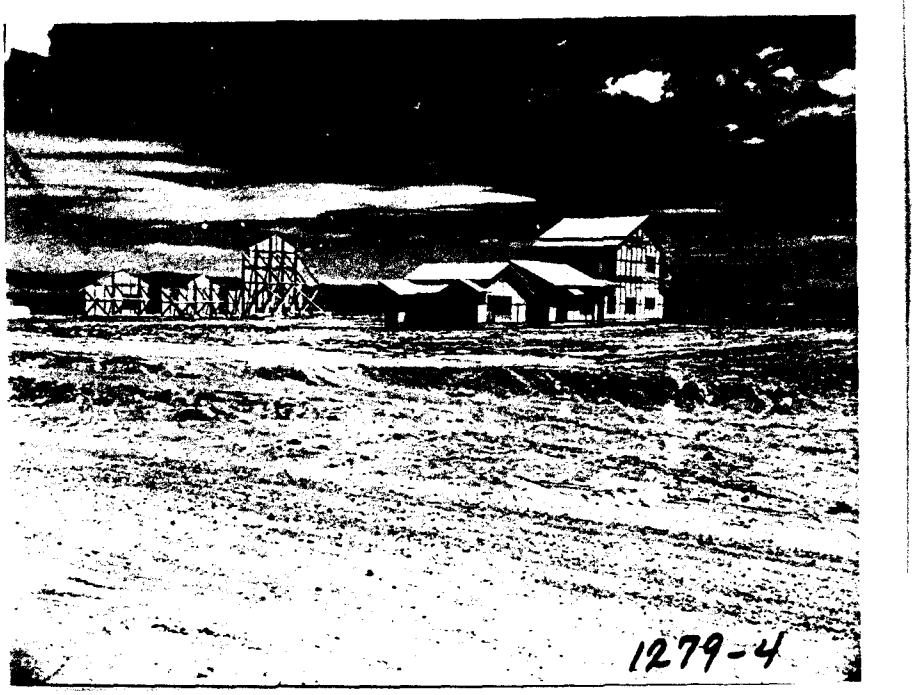
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Overview of structures and elevations

View: West-Northwest

5/9/62

Picture No. 1
CIC Photographic Archives
No. 1278-11



Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Overview of structures and elevations

View: South-Southeast

5/9/62

Picture No. 2
CIC Photograph Archives
No. 1279-4

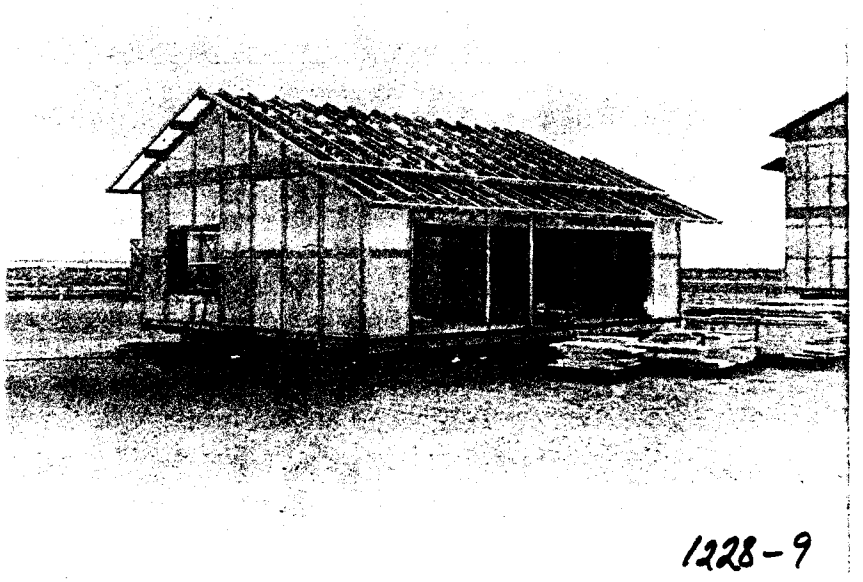
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type A

View: Northwest

2/16/62

Picture No. 3
CIC Photographic Archives
No. 1228-8



Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type A

View: Southwest

2/16/62

Picture No. 4
CIC Photographic Archives
No. 1228-9

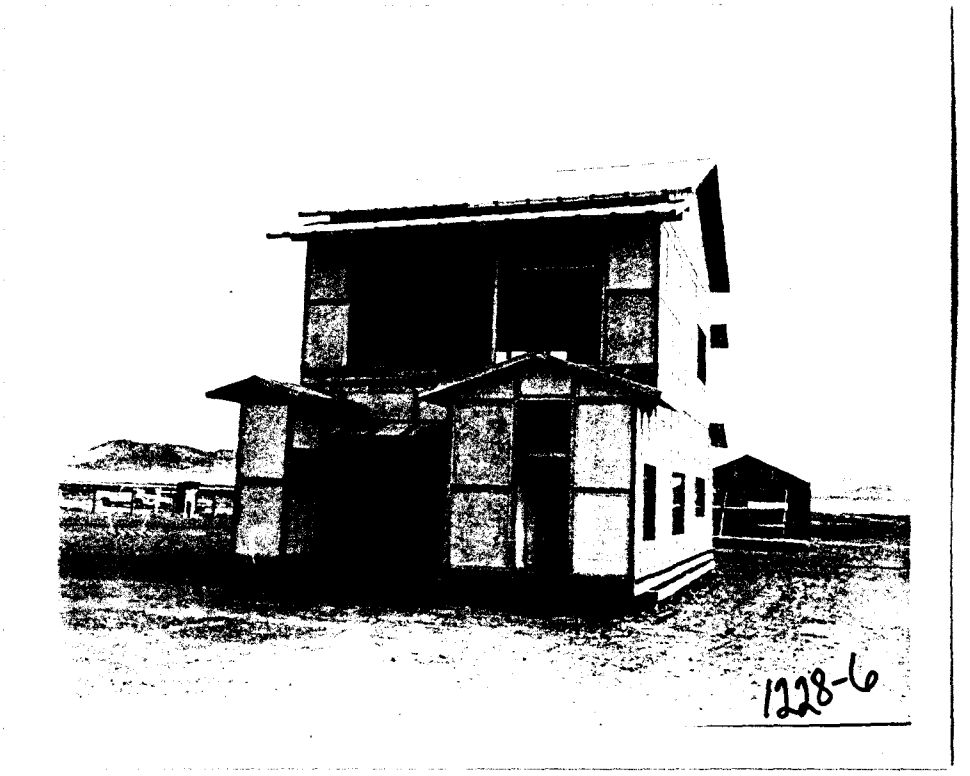
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type B

View: Northeast

2/16/62

Picture No. 5
CIC Photographic Archives
No. 1228-5



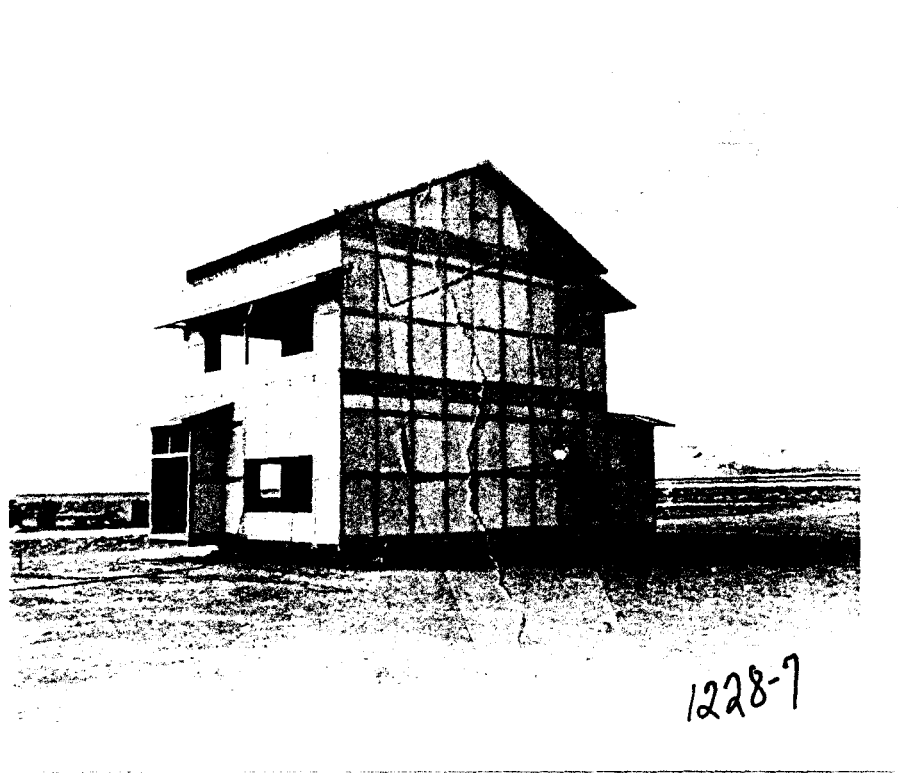
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type B

View: Southeast

2/16/62

Picture No. 6
CIC Photographic Archives
No. 1228-6



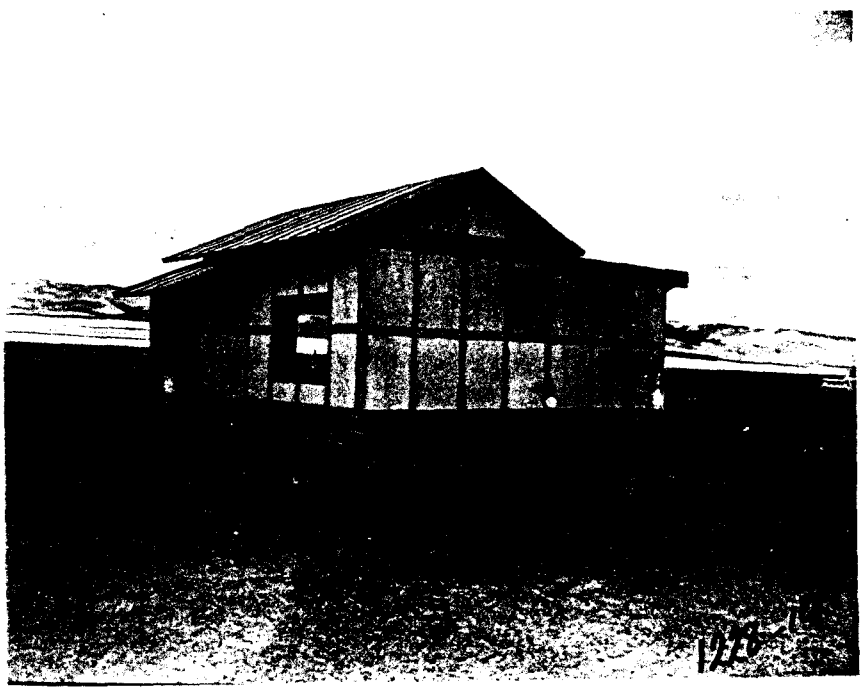
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type B

View: Northwest

2/16/62

Picture No. 7
CIC Photographic Archives
No. 1228-7



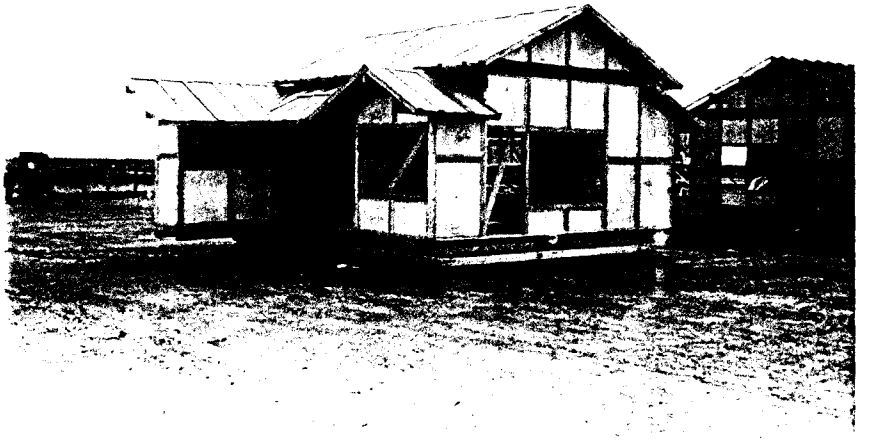
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type C

View: Northwest

2/16/62

Picture No. 8
CIC Photographic Archives
No. 1228-10



1228-11

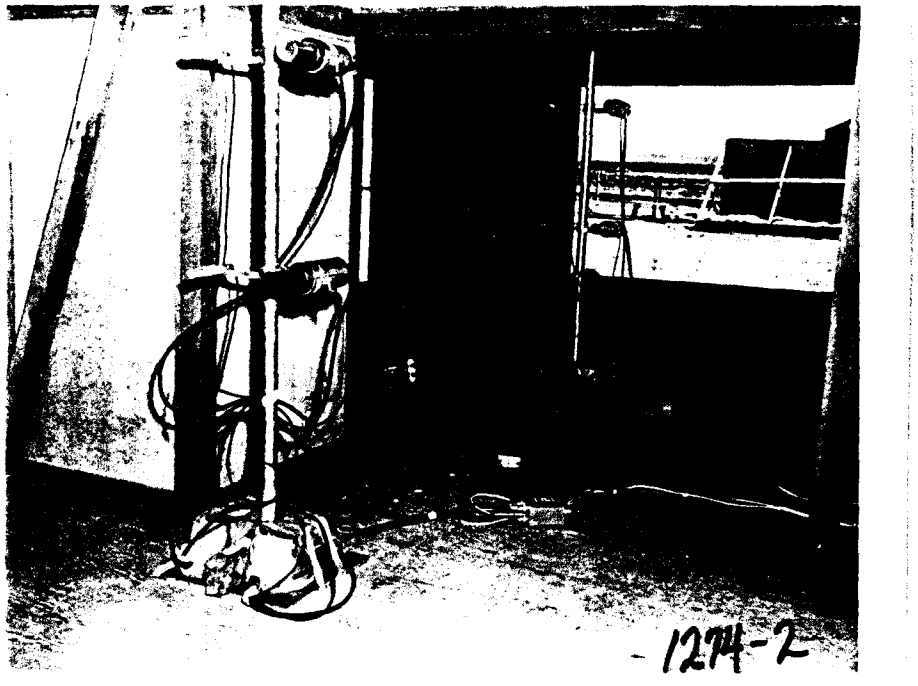
Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

Japanese house type C

View: Southeast

2/16/62

Picture No. 9
CIC Photographic Archives
No. 1228-11

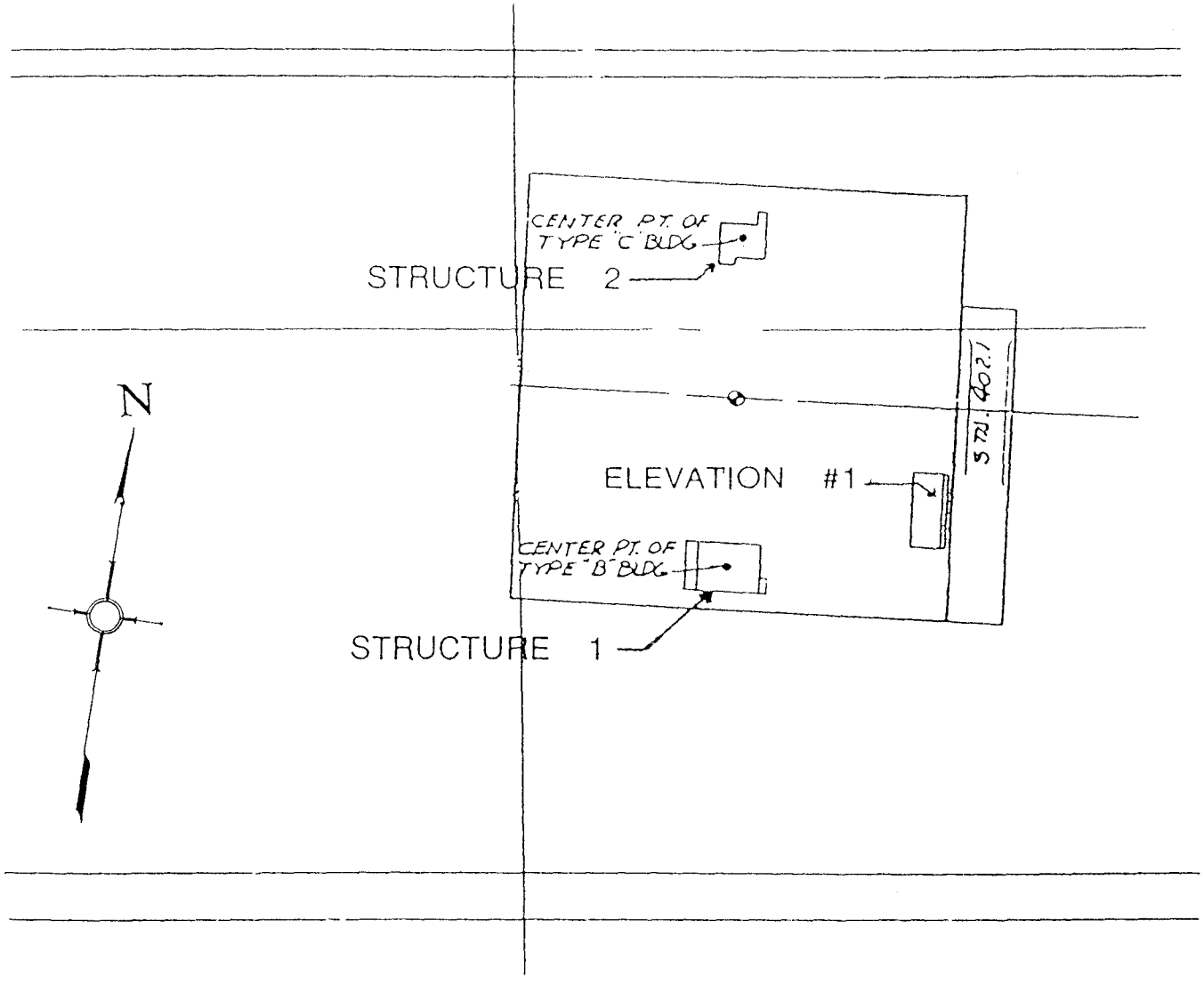


Historic Views
Japanese Village,
Nevada Test Site,
Nye County, Nevada

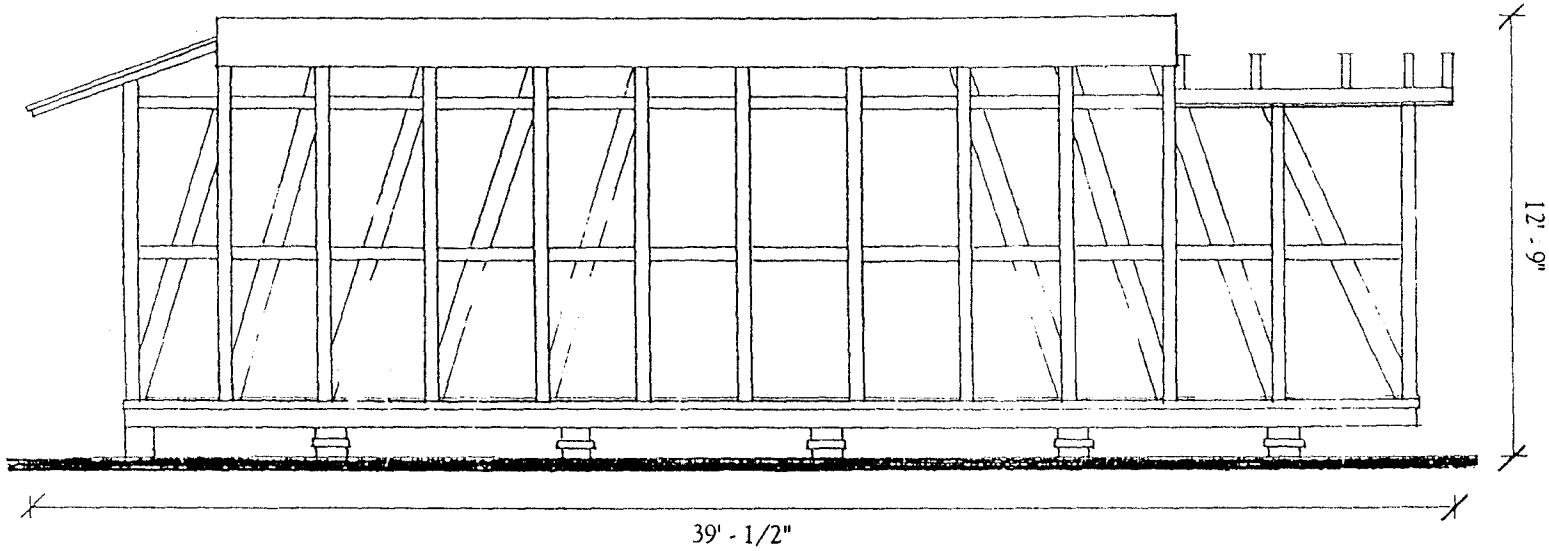
Interior View of Type A
showing dosimeters on poles

5/3/62

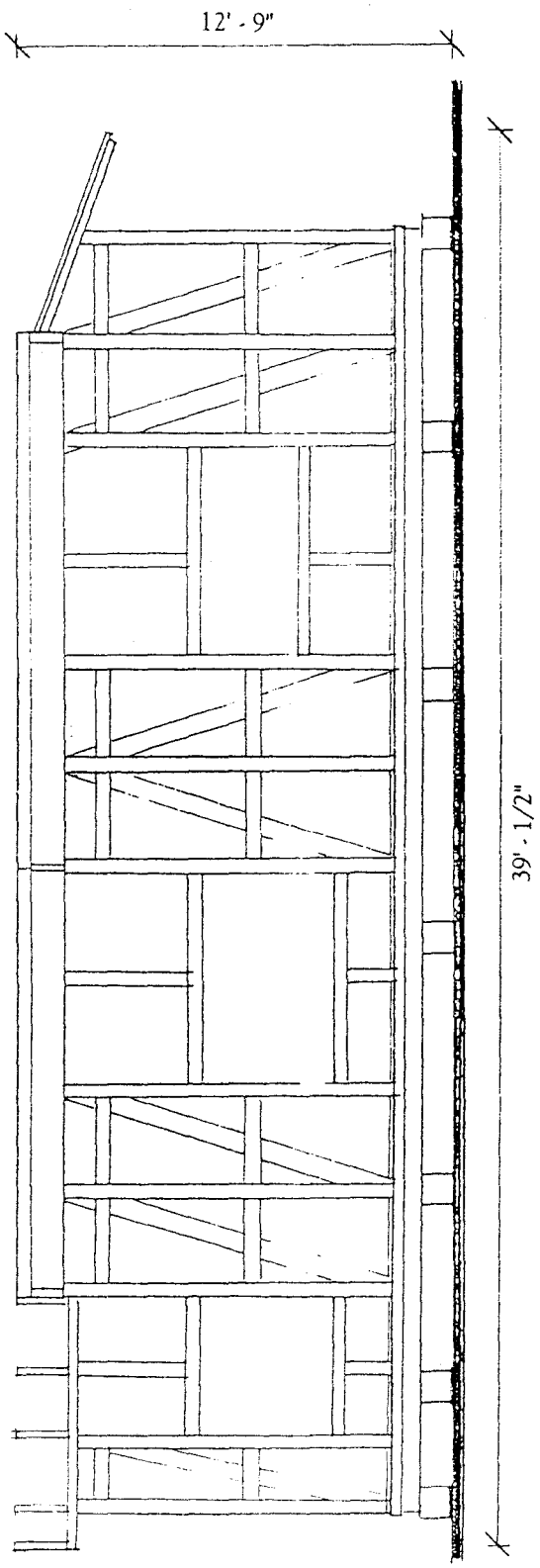
Picture No. 10
CIC Photographic Archives
No. 1274-2



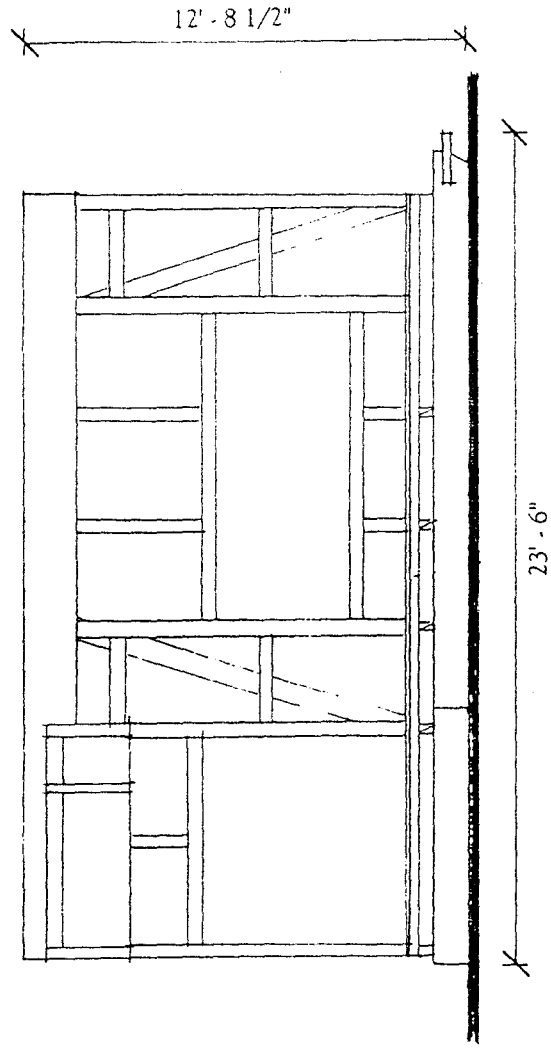
SITE PLAN
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



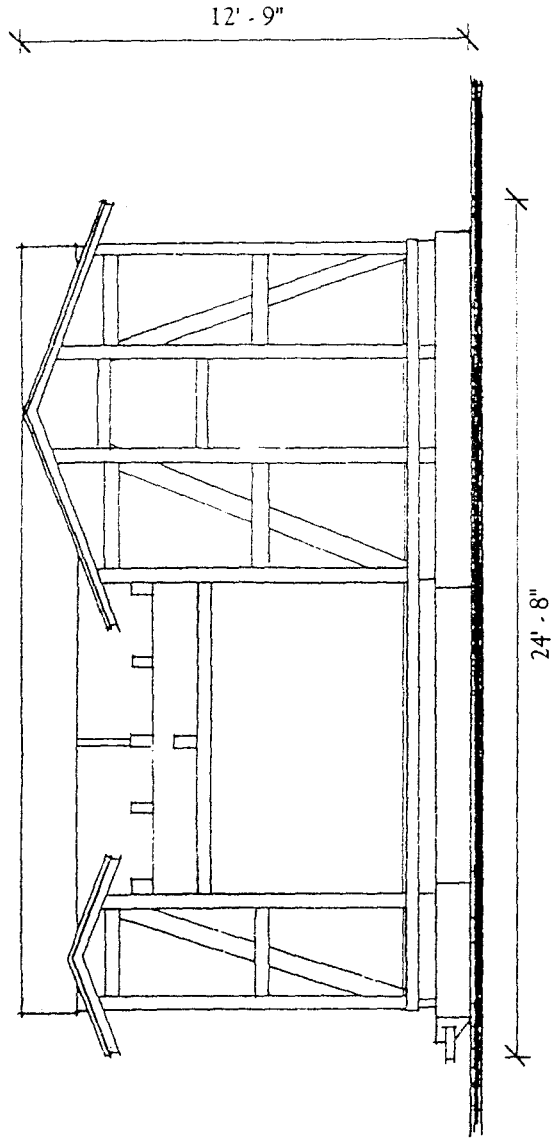
TYPE B
STRUCTURE 1 - NORTH ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



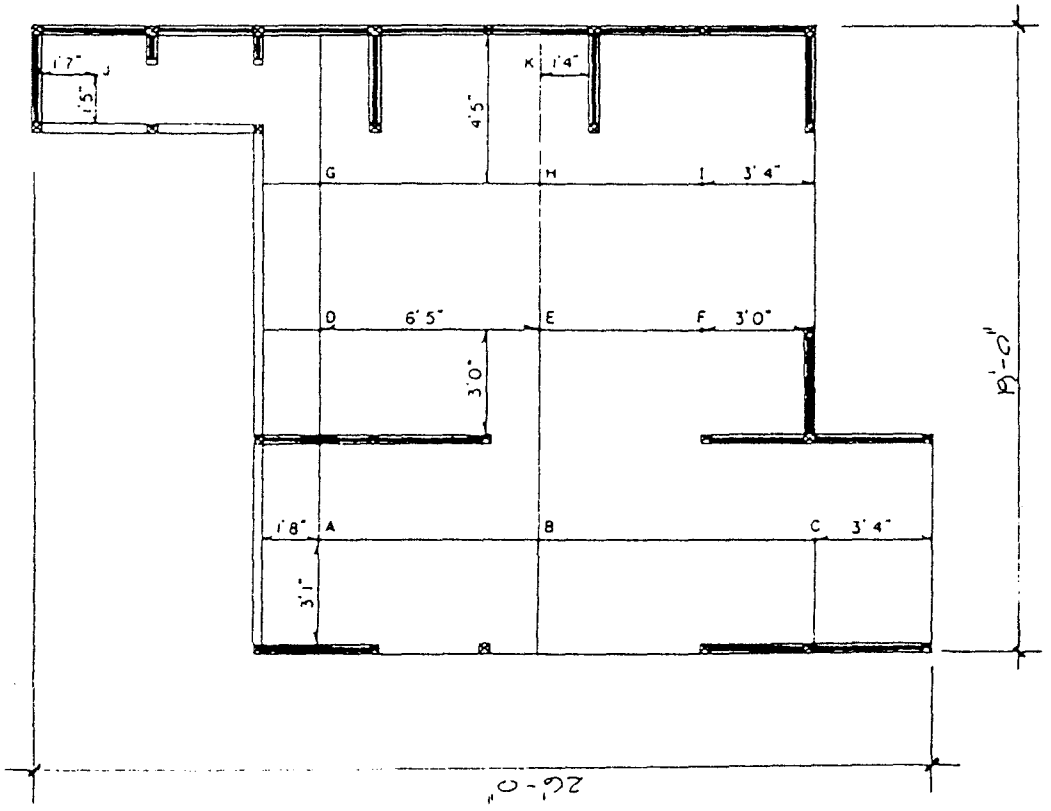
TYPE B
STRUCTURE 1 - SOUTH ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



TYPE B
STRUCTURE 1 - EAST ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE

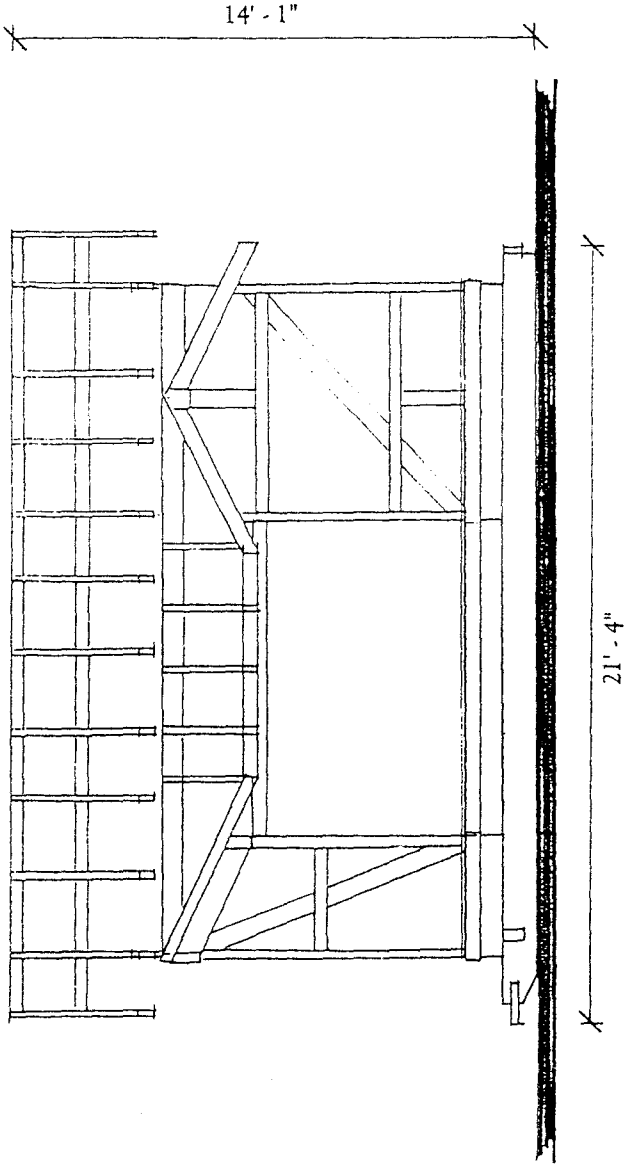


TYPE B
STRUCTURE 1 - WEST ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE

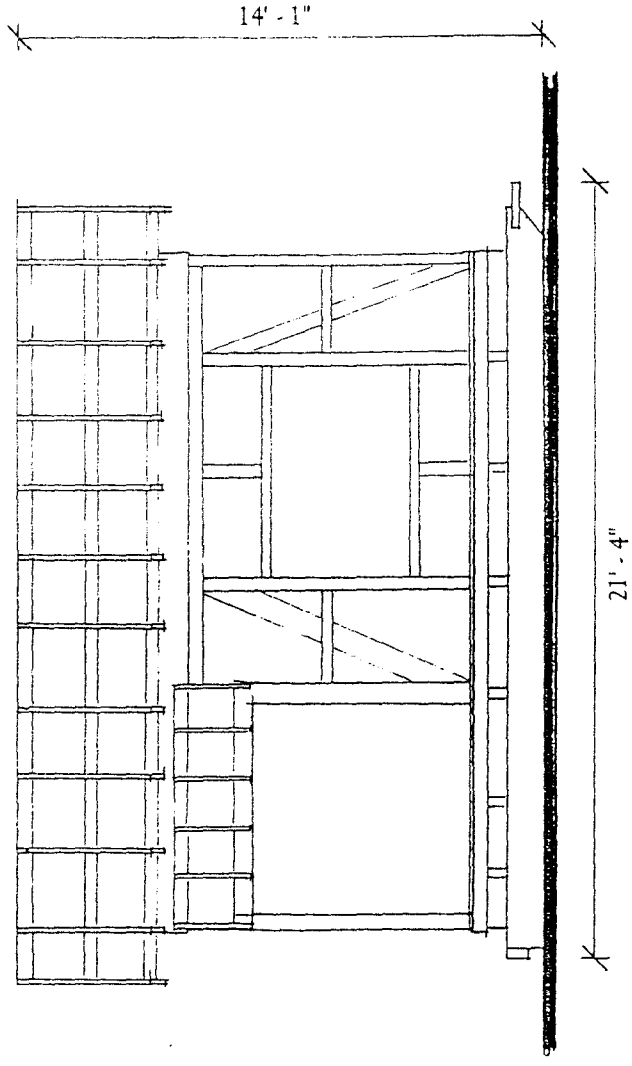


PLAN

TYPE B
STRUCTURE 1 - **PLAN VIEW**
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



TYPE C
STRUCTURE 2 - NORTH ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



TYPE C
STRUCTURE 2 - SOUTH ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
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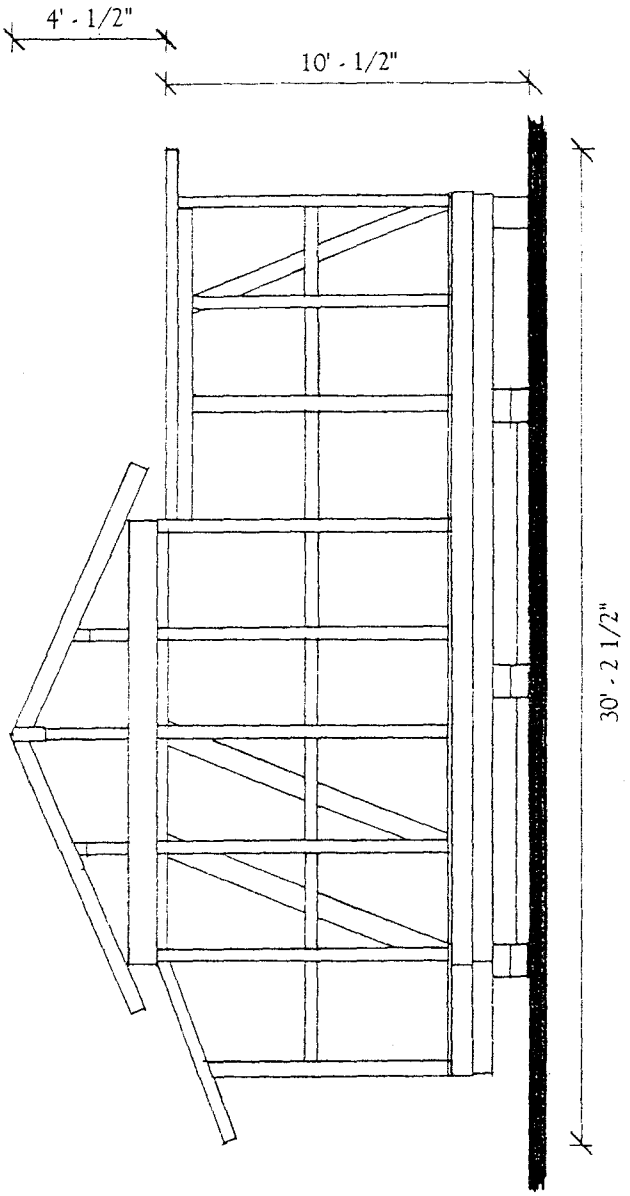

STRUCTURE 2 - EAST ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
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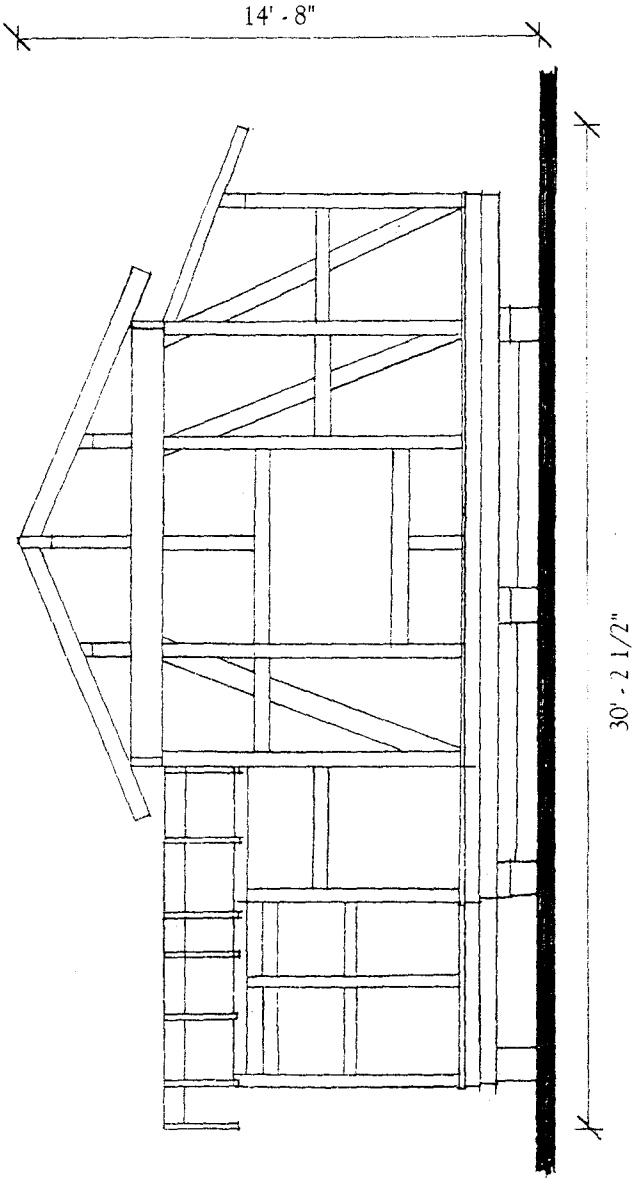

STRUCTURE 2 - WEST ELEVATION
JAPANESE VILLAGE, NEVADA TEST SITE
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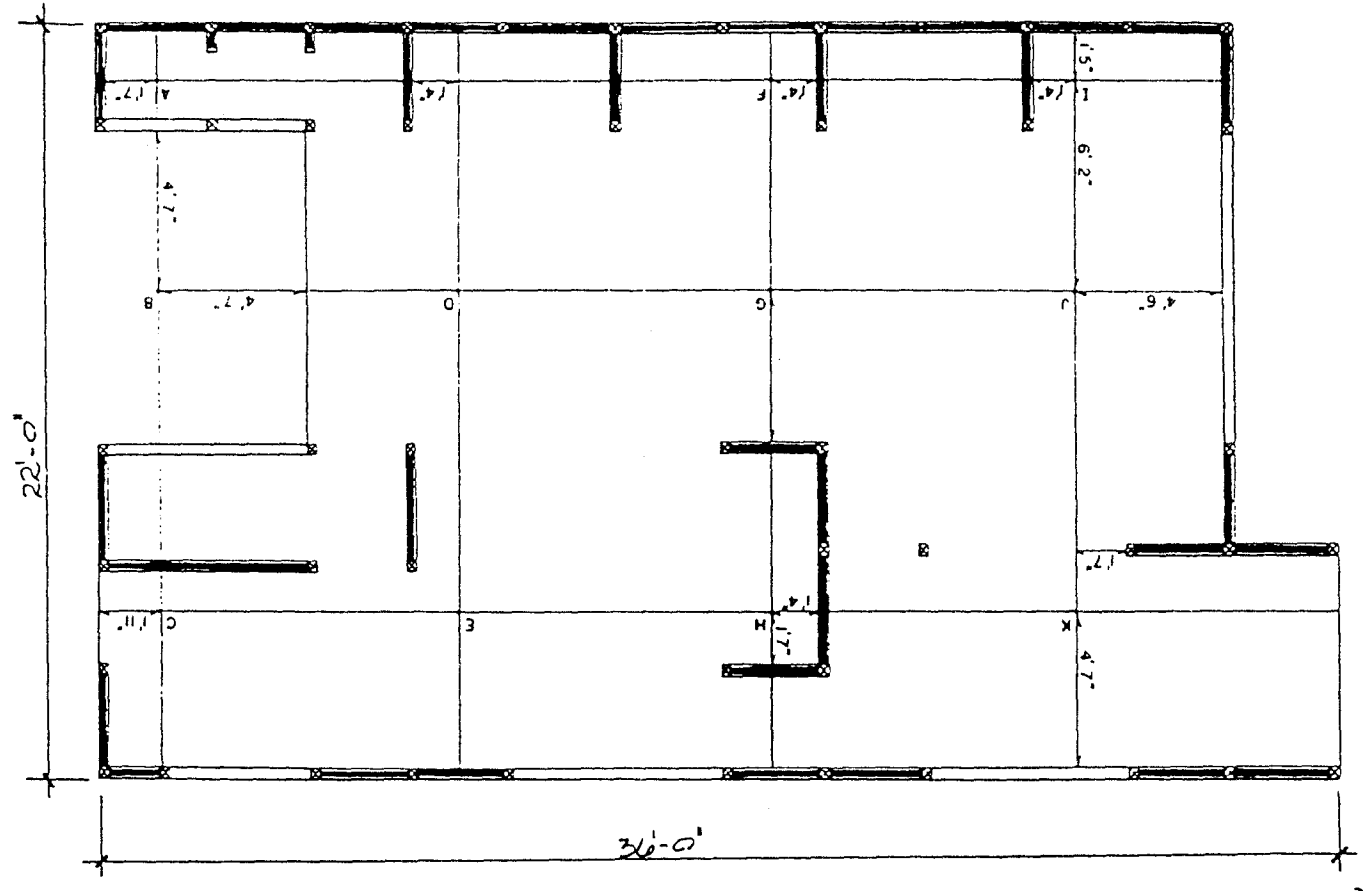

PLAN

TYPE C
STRUCTURE 2 - **PLAN VIEW**
JAPANESE VILLAGE, NEVADA TEST SITE
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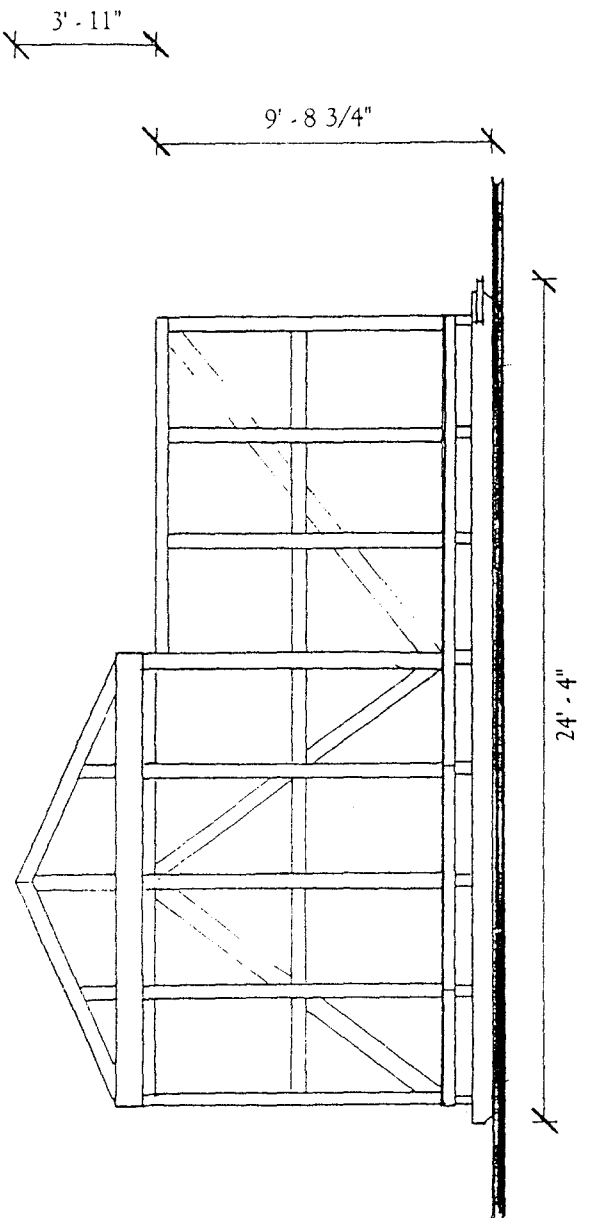
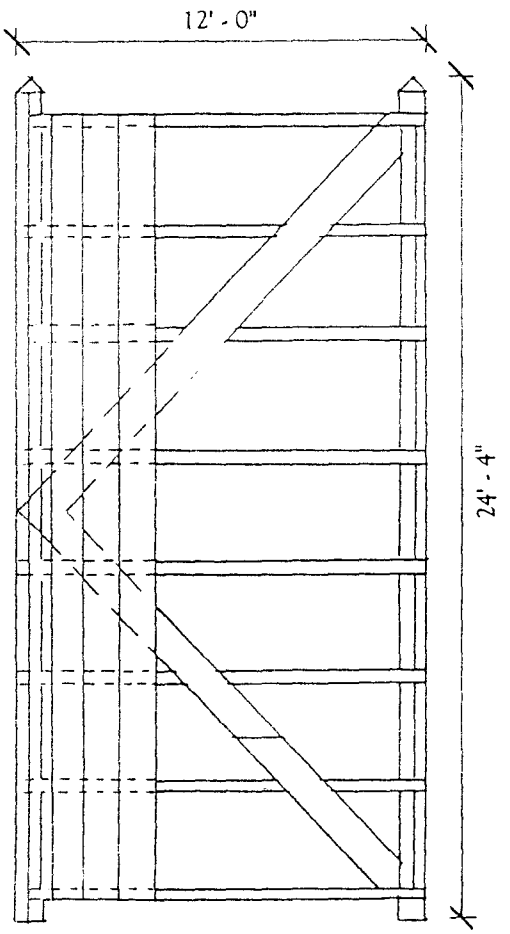


TYPE C
ELEVATION 1 - FRONT VIEW
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE



TYPE C
ELEVATION 1 - PLAN VIEW
JAPANESE VILLAGE, NEVADA TEST SITE
NOT TO SCALE