U.S. NAVAL BASE, PEARL HARBOR, INDUSTRIAL X-RAY BUILDING
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facility No. 315)
Off Sixth Street, adjacent to and south of Facility No. 11
Pearl Harbor
Honolulu County
Hawaii

HABS HI-457
HI-457
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HI-457

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
PACIFIC GREAT BASIN SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
1111 Jackson Street
Oakland, CA 94607

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U.S. NAVAL BASE, PEARL HARBOR, INDUSTRIAL X-RAY BUILDING
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(Facility No. 315)

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Location:

Off of Sixth Street and Adjacent to the South of Facility No. 11
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

This building falls within the UTM coordinates of the Pearl Harbor, Naval Shipyard as defined in the location section of the overview report HABS No. HI-483.

Significance:

Facility No. 315 is a contributing resource to the Pearl Harbor National Historic Landmark and a unique facility introducing new technology for examination of shipyard materials. It is a distinctive building type with a unique function, originally serving as an Industrial X-Ray Building in the shipyard area of Pearl Harbor. Its completion in 1944 was associated with the increased shipyard workflow experienced during World War II and with the need to examine manufactured materials for defects and to examine battle-damaged components. It was used to test castings for flaws at the Foundry (Facility 6). It continues to function as an X-ray facility today.

Description:

The title block used on the drawings for this facility are similar to those for projects designed under the consortium of architects and engineers under Contractors Pacific Naval Air Bases. The architect who signed and checked the drawings had the initials "H. P. C." Facility 315 is a utilitarian structure designed in a modern functional industrial style with minimal detailing. It is a one-story building with a mezzanine level at the northeast corner. Originally the floor plan was nearly square with dimensions of 64'-0" x 59'-0" and a maximum height of 35'-0". Later in 1968 a 43'-0" x 59'-0", one-story addition was constructed on the northwest side of the building, expanding the entire length to 106'-0". The original building has varying sizes of concrete footings ranging from 1'-10" to 4'-3" (depending on the width of the wall) with a 6" concrete slab that rests on a rolled coral fill. A concrete slab to the west of the building had been poured and was used as a parking area. When the 1968 extension was to be added, sections of the slab or paving were removed so concrete footings could be installed. The paving was then patched and a minimum 2" concrete finish floor was poured on top of the existing slab to level the surface.

The original building is a smooth, windowless, poured-in-place concrete shell with walls that are 10" and 12" thick at the north half of the building, 2'-0" at the exterior walls of the x-ray lab at the south half

of the building, and 2'-6" at the bearing wall separating these two areas. The maximum wall height is 35'-0" at the south end, while the north half of the building only rises to 18'-3". The 1968 addition is also constructed of concrete in combination with concrete block. The walls at the north elevation are 8"-thick concrete block. The interior and exterior of the south half of the extension has 8'-0"-high x 2'-0"-thick concrete walls with 8" concrete and concrete block above. Dwarfed in comparison to the original building the extension is only 17'-0" tall at the highest point (south wall) and 10'-0" at the lowest (north wall).

The roof structure at the south half of the original portion of Facility 315 is a 16" reinforced splinterproof concrete slab. It is nearly flat with a central ridgeline that runs east to west and a 2" slope to the north and south. The roof over the lower, north half of the building has an 8"-thick x 2'-0"-high parapet wall and nearly flat, 4" concrete roof slab with a gentle 1 to 9 slope. Reinforced concrete beams support the roof slab. Originally both roofs were finished with 5-ply asphalt and gravel ballast. Flashing was added inside the parapet at the lower roof to prevent water penetration. Crickets and two, 4" roof drains were installed at the north end of the low roof in addition to: a 12" square and 14" square ventilator, 4" diameter vent, and 2'-6" square scuttle hole. Three 8" x 36" ventilators spaced at equal intervals were installed along the ridgeline of the higher roof. It is uncertain if any or all of these elements have been removed or covered over with subsequent roofing.

Like the original building there are two roof levels over the addition. Both are flat concrete slabs with built-up roofing, metal gravel stops, and metal gutters and downspouts along the perimeter. Both roofs have slight ½ to 12 downward slopes from the south to the north of the addition. It is uncertain if the building has been re-roofed. In more recent years (pre-1980) ventilation exhaust systems were installed on the roofs of the building.

There is a concrete rolling door at the north wall of the original building, which opens to the 220kv x-ray room. It measures 13'-2½" x 11'-0" x 12" and weighs approximately 22,000lbs. It is reinforced in both directions and at both faces with ½" diameter steel rebar at 12" on-center and is welded to a steel frame. There are two steel wheels housed in separate 12"-wide cavities at the base of the door. These wheels roll on a steel rail and are covered on the interior face of the door with ¼" steel over ¾" sheet lead that is flush with the door surface. Also at the base of the door is a continuous 6¼"-high x-ray shield. Both the wheel covers and the x-ray shield slide on a 2"-wide recessed guide that is lined with galvanized steel. Welded to the top of the door are three steel idler rollers. Originally an electric drum tugger hoist operated the door. There is an additional concrete rolling door at the east wall of the original building. This door is 14'-5½" x 16'-0" x 24" and weighs approximately 76,000lbs. Like the other

rolling door it is reinforced in both directions but with 5/8" diameter steel rebar at 6" on-center and is welded to a steel frame. It rolls over six, 18" diameter steel pipe rollers and has a ground mounted steel doorstop with stop blocks at opposite ends of the door opening. There are also four pairs of idler rollers welded to the steel frame at the top of the door. The electric hoist for this door was originally base mounted with a capacity of 3,000lbs. Both of the electric hoists for the rolling doors were replaced in 1986 with a hydraulic system, specifically capstan motors to open and close the doors. A continuous lead bar is bolted to the interior face of both doors and at the exterior of the structure near the head and jamb. When the doors are in the closed position, the lead bars form a continuous seal, confining the radiation within the x-rays rooms. Above each of the rolling doors on the exterior of the building is a reinforced concrete cantilevered pent roof slab. Over the smaller door the roof slab projects 3'-6" from the face of the wall, is tapered on top from 5" to 4", and has a ½" drip. The roof slab above the door on the east wall is proportionally bigger. It projects 5'-0", is tapered from 6" to 4" with a 2" drip. The only other extant door from the original building is a 4'-0" x 7'-0" x 1 ¾" wood louvered door at the north wall.

The door at the west end of the original building was removed when the extension was added in 1968. At that time a pair of 4'-8" x 7'-0" x ¾" flush wood doors each with an 8"x12" vision panel were installed at the new west wall. On the south wall there are two 9'-8" x 11'-3" x 3" electronically operated sliding lead-lined doors. The doors slide on a door track and trolley that is protected by an overhead sheet metal canopy.

The original floor plan consisted of two large x-ray rooms (220kv and 1,000kv), a control room, an electrical room, fan room, dark room, film storage and loading room, a bathroom, and janitor's closet. The walls separating the x-ray rooms from the rest of the interior space are 12" and 2'-6" thick reinforced concrete. The 1944 drawings indicate that the interior finishes, aside from the x-ray rooms, were 3/8" plywood walls and ceiling, concrete columns, linoleum floors, and flush wood doors. Within the electrical room and fan room there were concrete floors and 1"x6" tongue-and-groove walls over ¾" canec.

Each of the X-ray rooms has lead lined doors composed of 3/8" veneer facing (both sides) over a 1¾" solid wood core followed by a lead membrane (1/2"-thick at 1000kv x-ray room, 3/8"-thick at 220kv x-ray room) and the wood veneer. Lead gaskets are also inserted at the top and bottom rails to form an absolute contact fit with the doorframe.

In the x-ray room there is a crane that moves along a 5-ton monorail and an industrial x-ray machine. Original 1944 drawings show the large x-ray room as an open rectangular floor plan with 3'-0" narrow-gauge railroad tracks running east to west down the center of the

room and dead-ending at the west wall. Parallel continuous concrete brackets were constructed on the north and south walls at a height of approximately 25'. Bolted to the top of each bracket was a 70 pound crane rail and standard continuous rail clamps. These elements were constructed as part of the crane bay that was designed for a 20-ton bridge crane to be installed in the early 1950s. Drawings dated 1951 show an existing 1000kv x-ray head and crane with scissor hoist as well as the proposed 20-ton bridge crane with a 5-ton auxiliary hoist and 20-ton main hoist. The scissors hoist and crane are still intact. The present bridge crane and corresponding hoists do not appear to be the same ones that were installed in the early 1950s. It is uncertain when these were changed. The steel ladder used to access the crane cab on the east wall was moved a few feet from its initial location on the north wall. It is original to Facility 315 and is now caged for safety purposes. In the 1960s the room was divided up into smaller areas of space with the addition of 2'-0"-thick concrete walls that are still intact.

Located in each x-ray room are ¾" diameter steel pullrings recessed in the wall at a height of 3'-6" from the finished floor. The rings hang from 5/8" U-rods in a cast-in-place lead sheet. These rings are used to tie down the equipment and items to be x-rayed. They are original to the structure.

There have been a few other additions and alterations made to this building since its construction. The most notable is the increased size of the footprint of the building. Drawings dated 1968 show the single-story, 43'-6" x 59'-3" extension on the west end of the structure. The exterior door at the west end was removed to create an open passage between the original and new structure. Two new x-ray rooms, an office, film processing section, and film handling and film storage rooms were added in this new extension. In 1982 the mezzanine was added above the lower (north) half of the original building, but not over the 220kv x-ray room. This level was added without altering the height of the structure. A new women's bath, locker room, and storage room were created and room locations were slightly modified within the space below the mezzanine.

Historical Context:

Facility 315 was originally constructed as an industrial x-ray building for the Naval Shipyard, Naval Station Pearl Harbor in 1944. The Bureau of Yards and Docks prepared the original drawings for this building with an approval date of January 10, 1944. Since its completion, large parts and castings for various Navy vessels have been brought to this building where they have been tested and photographed for flaws and imperfections through the use of x-ray machines.

This building meets the specifications for a "splinterproof" structure (see HABS No. HI-390, WWII Splinterproof Shelters Overview). Its

massively thick and heavily reinforced walls and roof were intended to provide protection against the effects of near-miss bombs, as well as from bullets or small projectiles during an attack. In the case of Facility 315 it was designed to protect, not people, but the materials and equipment within the structure as well as to contain the effects of the radiation from the x-ray machines within the confines of the building.

Over the years Facility 315 has expanded in size, undergone minor alterations in its floor plan, as well as upgrades in machinery and equipment to keep pace with the evolving technology and to meet the Navy's ongoing mission needs. Regardless, the original structure is very well intact and maintains much of its historic integrity.

For an overview of the Naval Shipyard see HABS No. HI-483.

Sources:

The original and subsequent drawings for this building are on digitally scanned images or microfilm at Pacific Division, Naval Facilities Engineering Command (NAVFAC EFD Pacific) Plan Files.

Information about Facility 315 was obtained from a copy of the 1947 Property Record Card, Nav. S. and A. Form 277 that is on file with the Pearl Harbor Naval Shipyard Facility Files.

Bureau of Yards and Docks
1946 "Building the Navy's Bases in World War II, Vol. I and II," U.S. Government Printing Office.

Commander, Navy Region Hawaii
2000 Pearl Harbor Naval Complex, Cultural Resources Management Plan, Pearl Harbor, HI.

Commander, Navy Region Hawaii
2002 Integrated Cultural Resources Management Plan, Pearl Harbor Naval Complex, Pearl Harbor, HI.

HABS/HAER Documents
var. dates For those resources on the Navy database at the time the CRMP (Contract No. NB62742-93-D-0502) was prepared, the HABS/HAER numbers assigned have been included in the electronic database as an additional field, as noted in Appendices: Pearl Harbor Naval Complex Cultural Resources Management Plan, 1998, p. A-6.

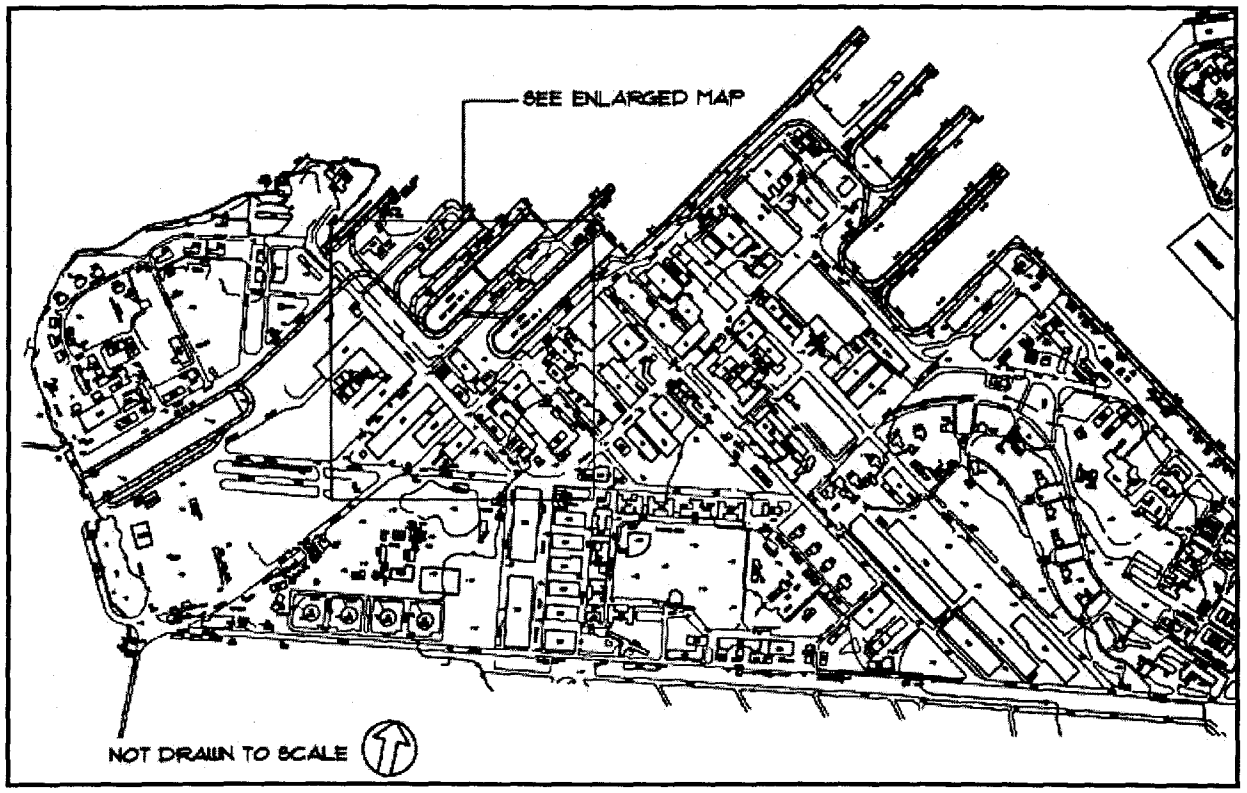
Pearl Harbor Naval Shipyard
1992 Historic Preservation Documentation Program, photocopied document dated 15DEC92 including Appendix B Historic Inventory.

Nakahara, Kenneth
1980 Historic Resources Inventory Form for Bldg #315. Prepared by Pearl Harbor Naval Shipyard, Facilities Planning & Programming for State Historic Preservation Office.

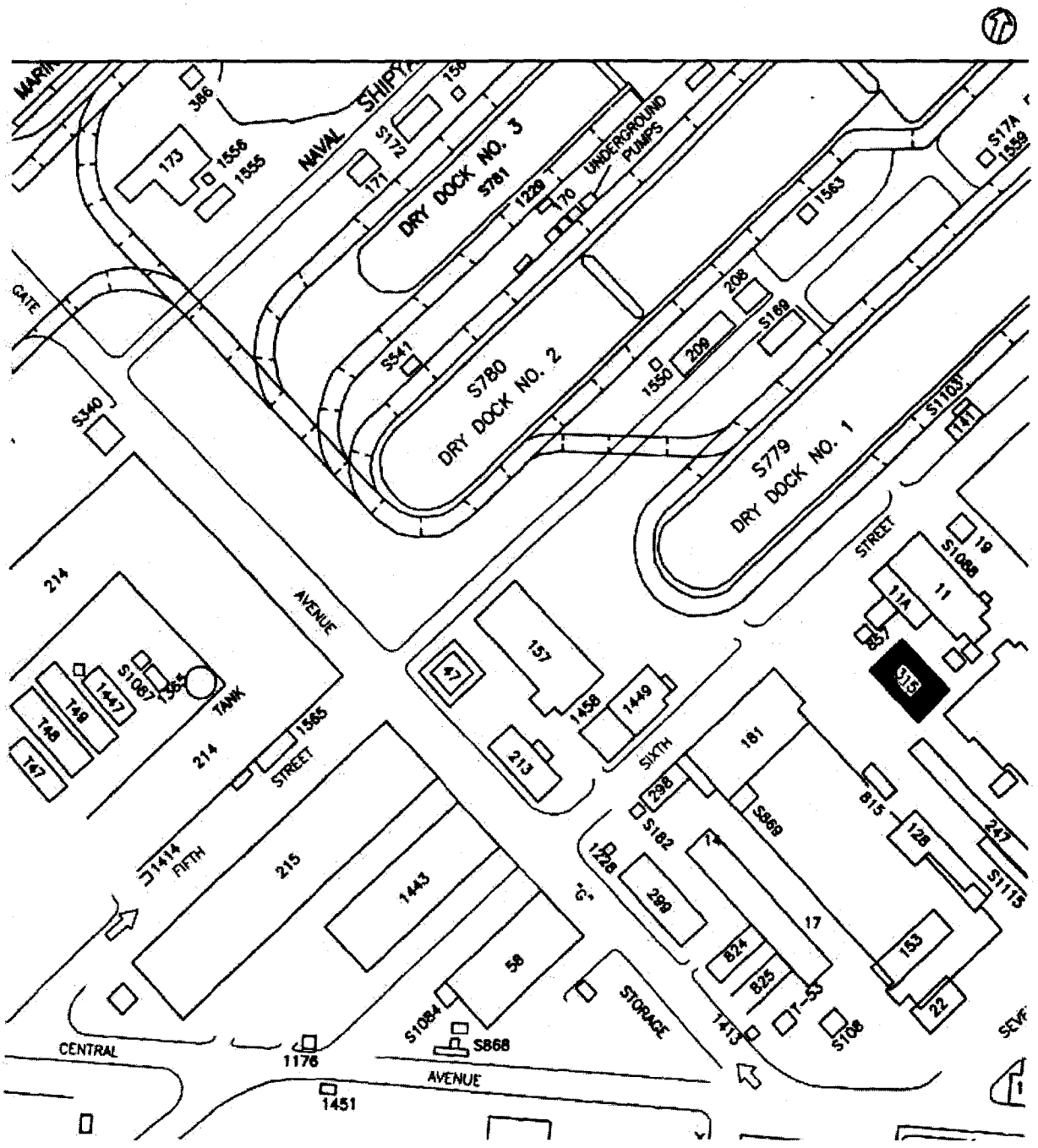
Yoklavich, Ann
2000 HABS No. HI-390. U.S. Naval Base, Pearl Harbor, World War II Splinterproof Shelters Overview Report. Prepared for Pacific Division Naval Facilities Engineering Command.

Project Information: Photo documentation and recordation of this facility by the Navy has been done in anticipation of future alterations or potential demolition of the structure. Photo documentation of historic facilities by the Navy assists in expediting planned undertakings by having the documentation prepared prior to taking actions. Also, photo documentation assists the Navy in gaining more information about its historic facilities to assist in making proactive management decisions. This project is being supervised by Jeffrey Dodge A.I.A., Historic Preservation Specialist at the Pacific Division, Naval Facilities Engineering Command (NAVFAC EFD Pacific). The photographic documentation was undertaken by David Franzen, photographer. Joanmarie N. Orlowski, Architectural Historian, of Mason Architects, Inc. prepared the written documentation. The report was prepared in July 2002.

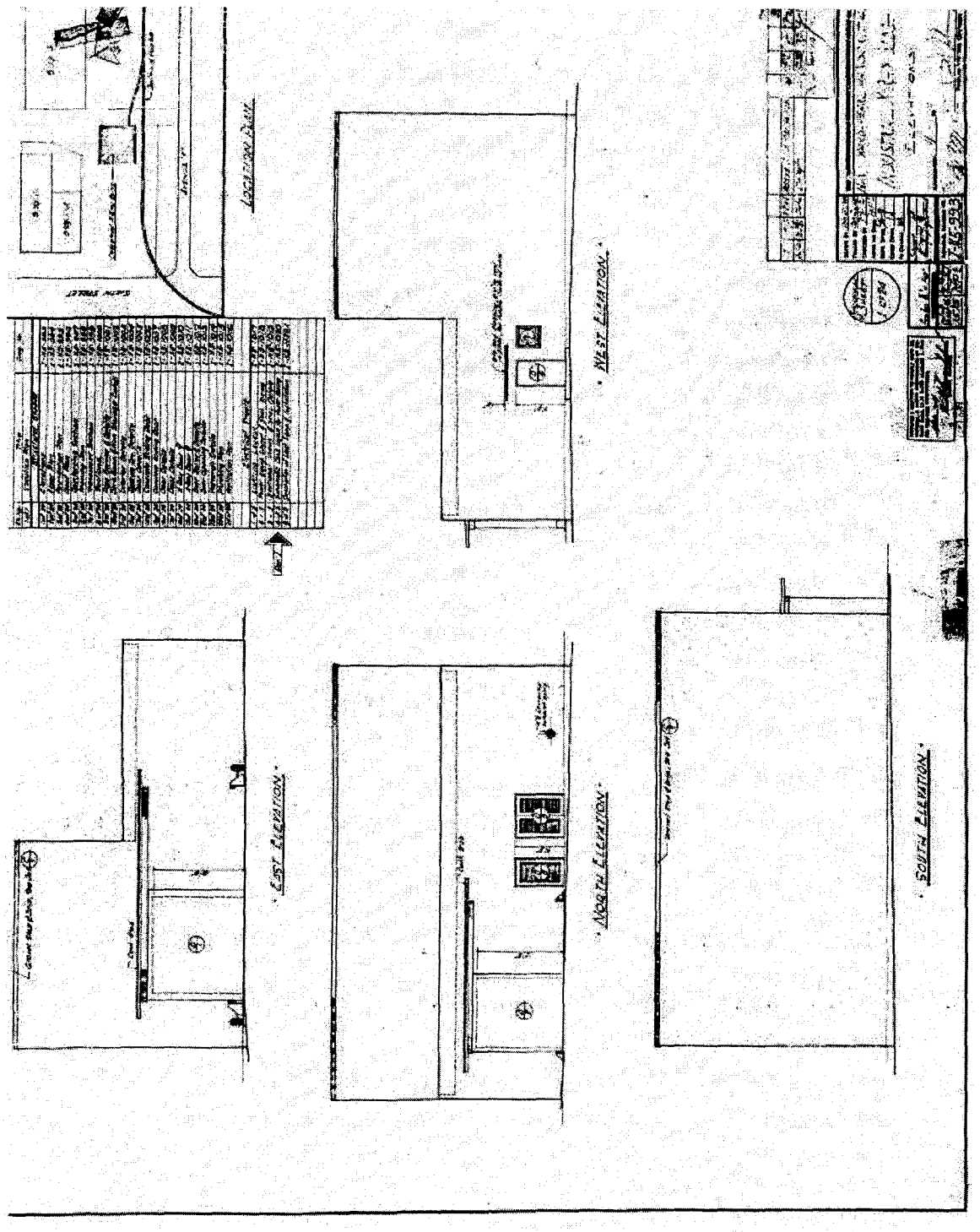
Shipyard Map



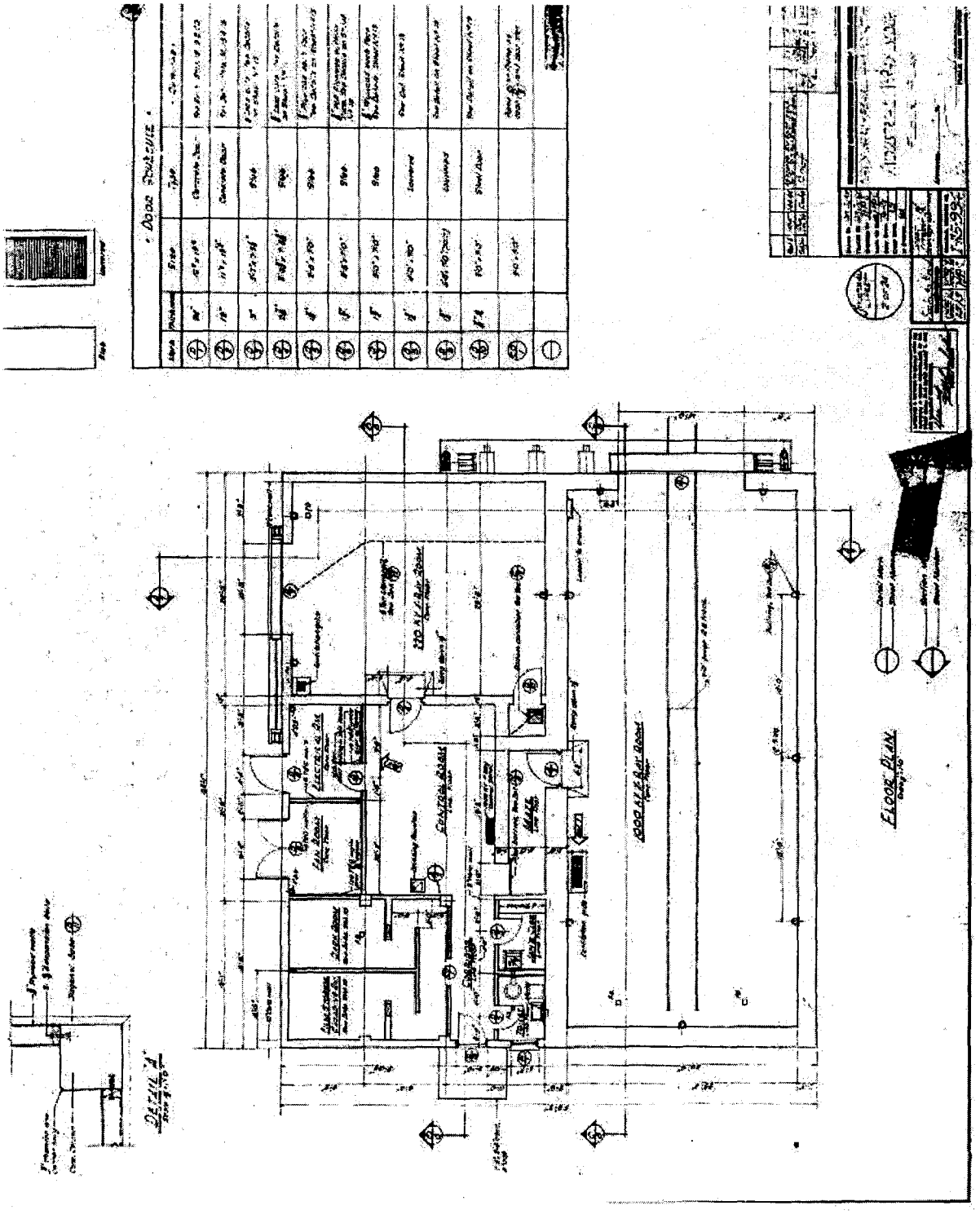
Enlarged Area Map (reduced, not to scale)



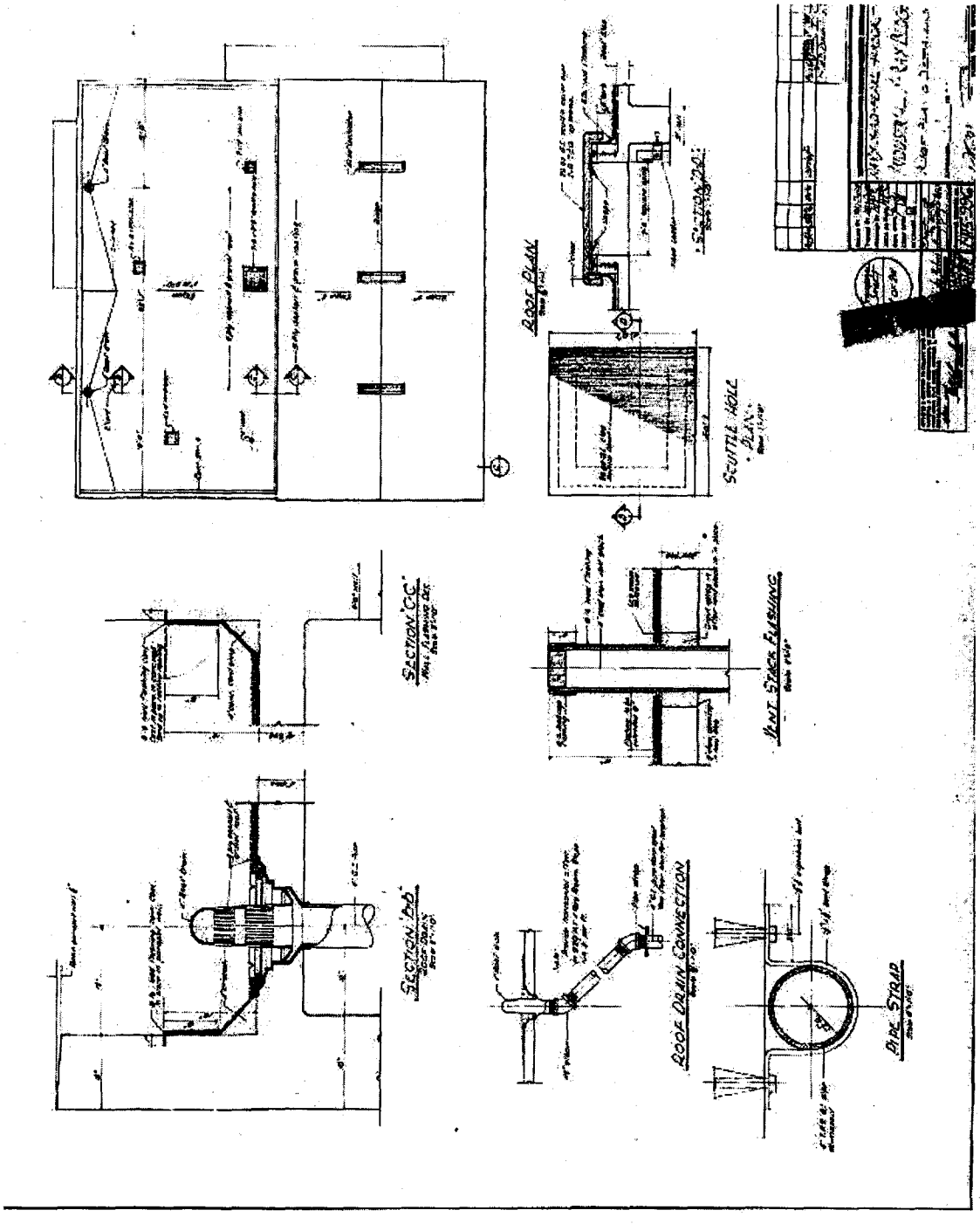
Original Location Plan and Elevations (Drawing No. I-N5-993, dated 3/7/1944) (reduced, not to scale)



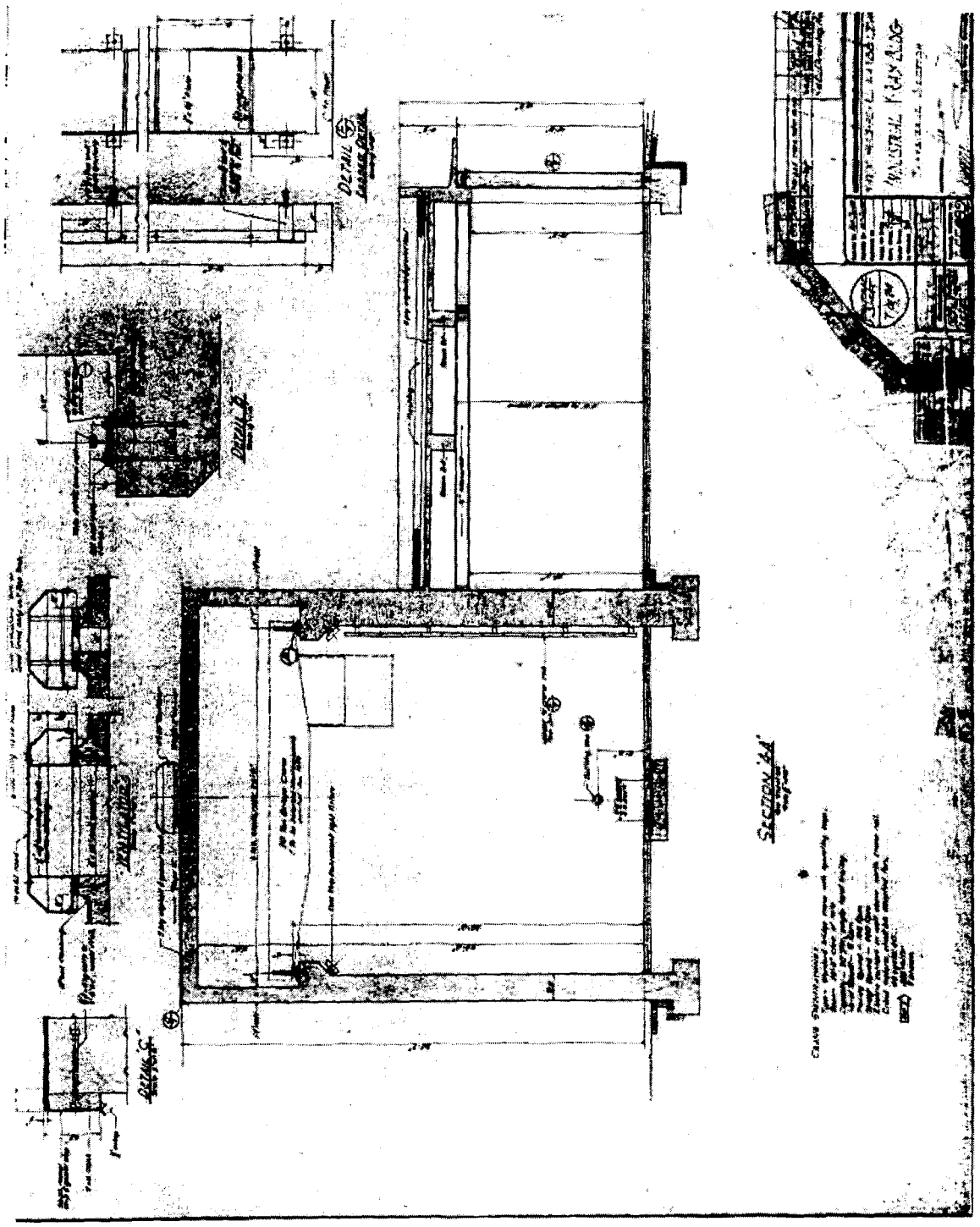
Original Floor Plan (Drawing No. I-N5-994, dated 1/24/1944) (reduced, not to scale)



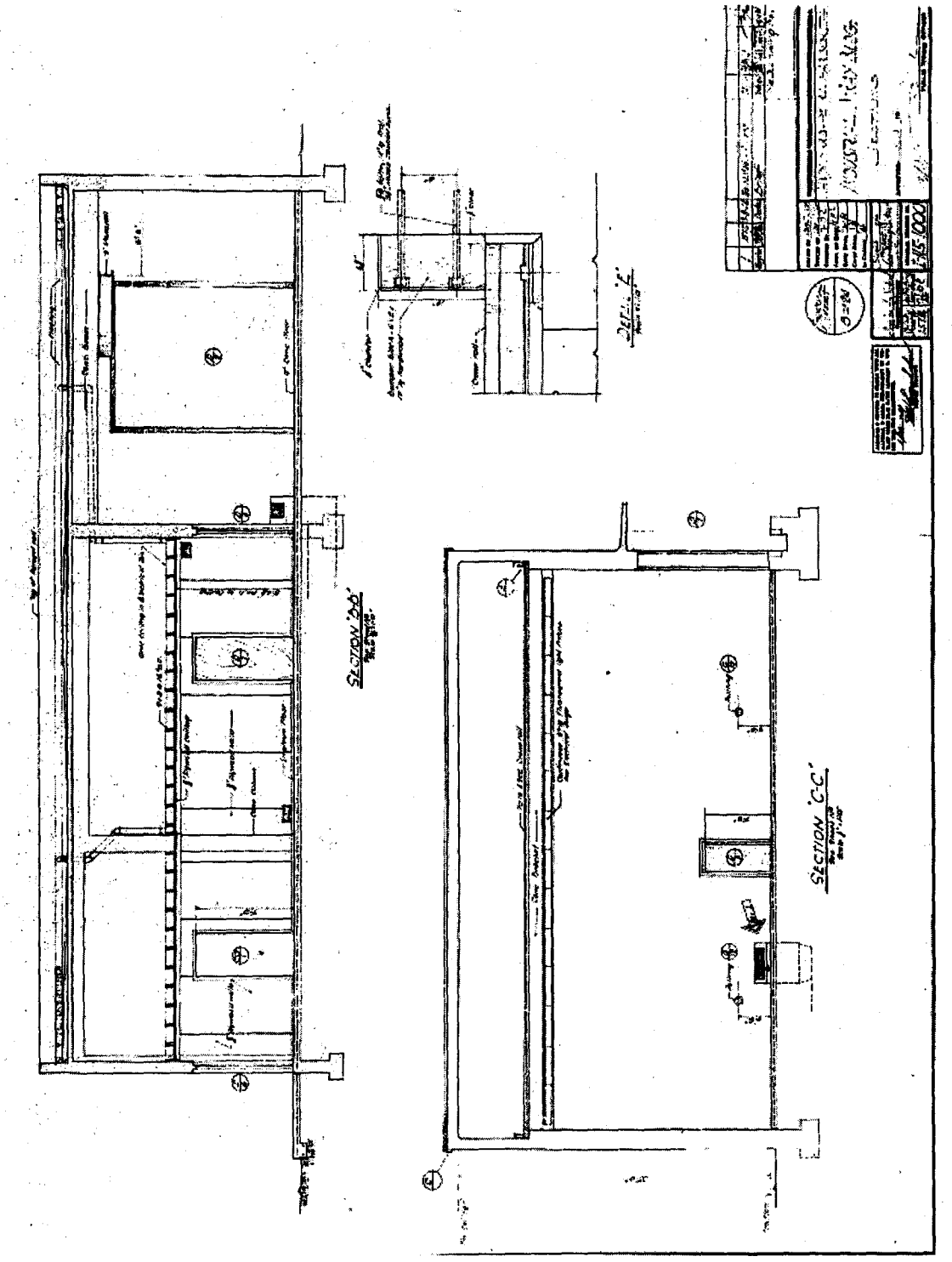
Original Roof Plan and Details (Drawing No. I-N5-996, dated 1/10/1944) (reduced, not to scale)



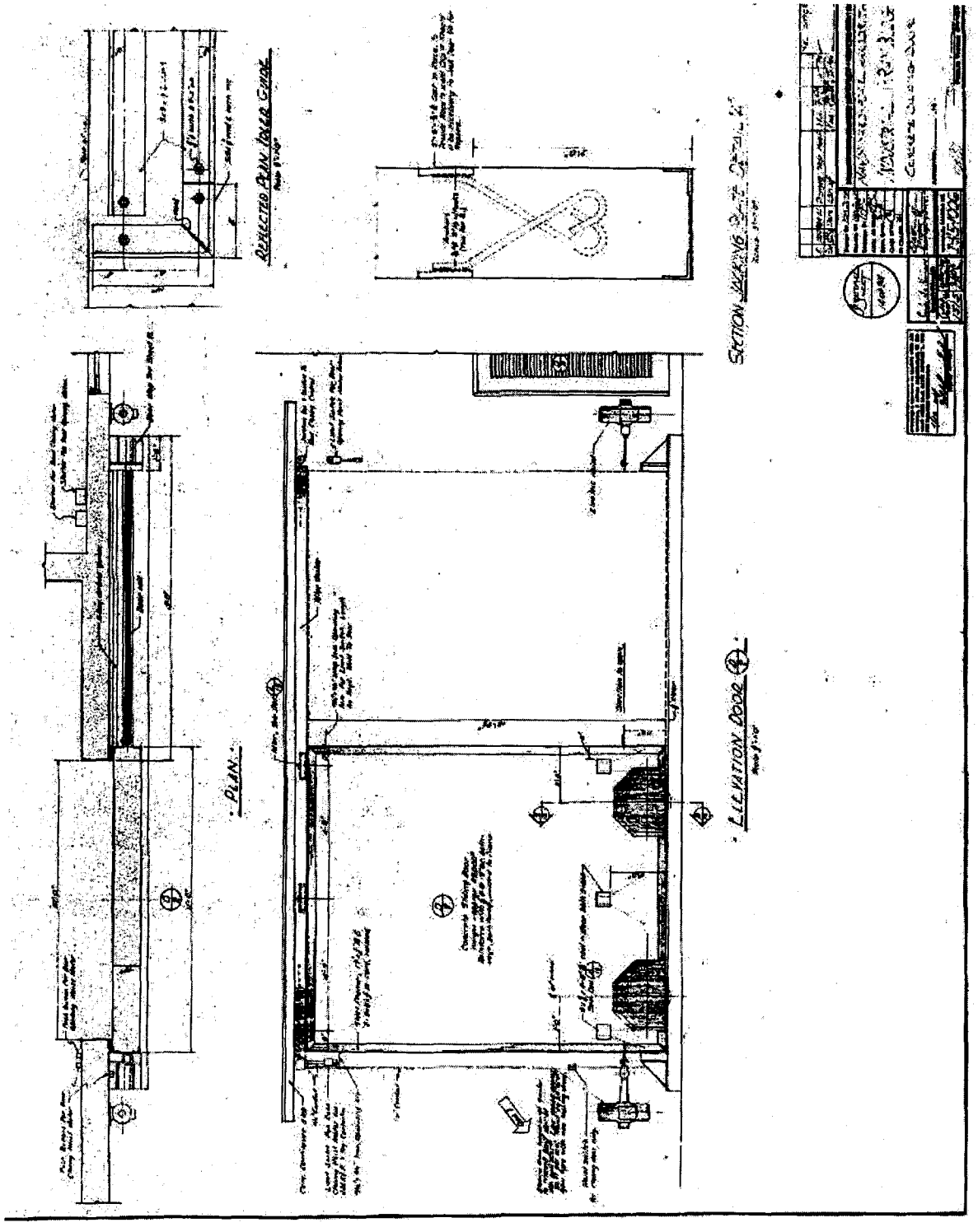
Original Transverse Section (Drawing No. I-N5-999, dated 1/24/1944) (reduced, not to scale)



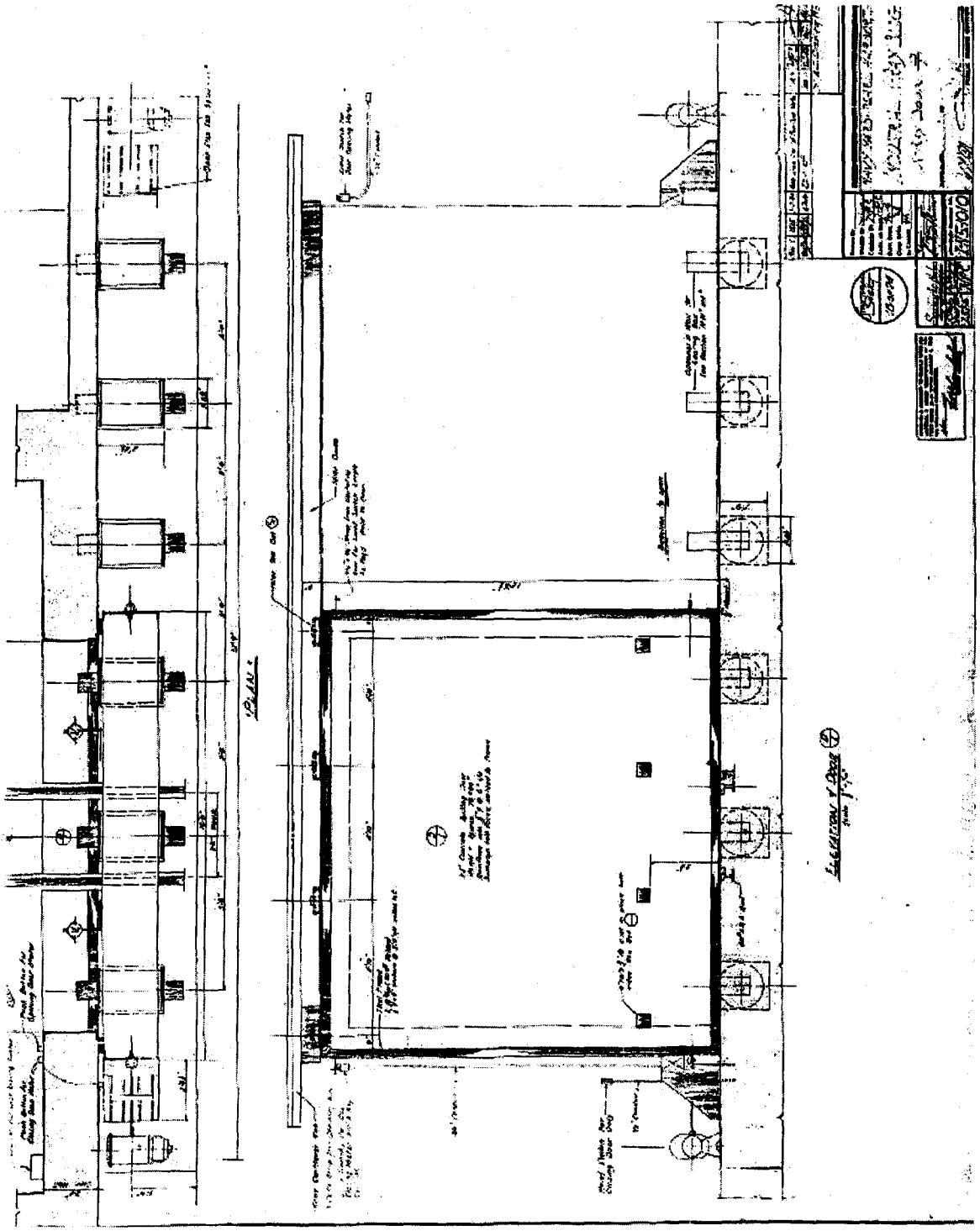
Original Sections (Drawing No. I-N5-1000, dated 3/8/1944) (reduced, not to scale)



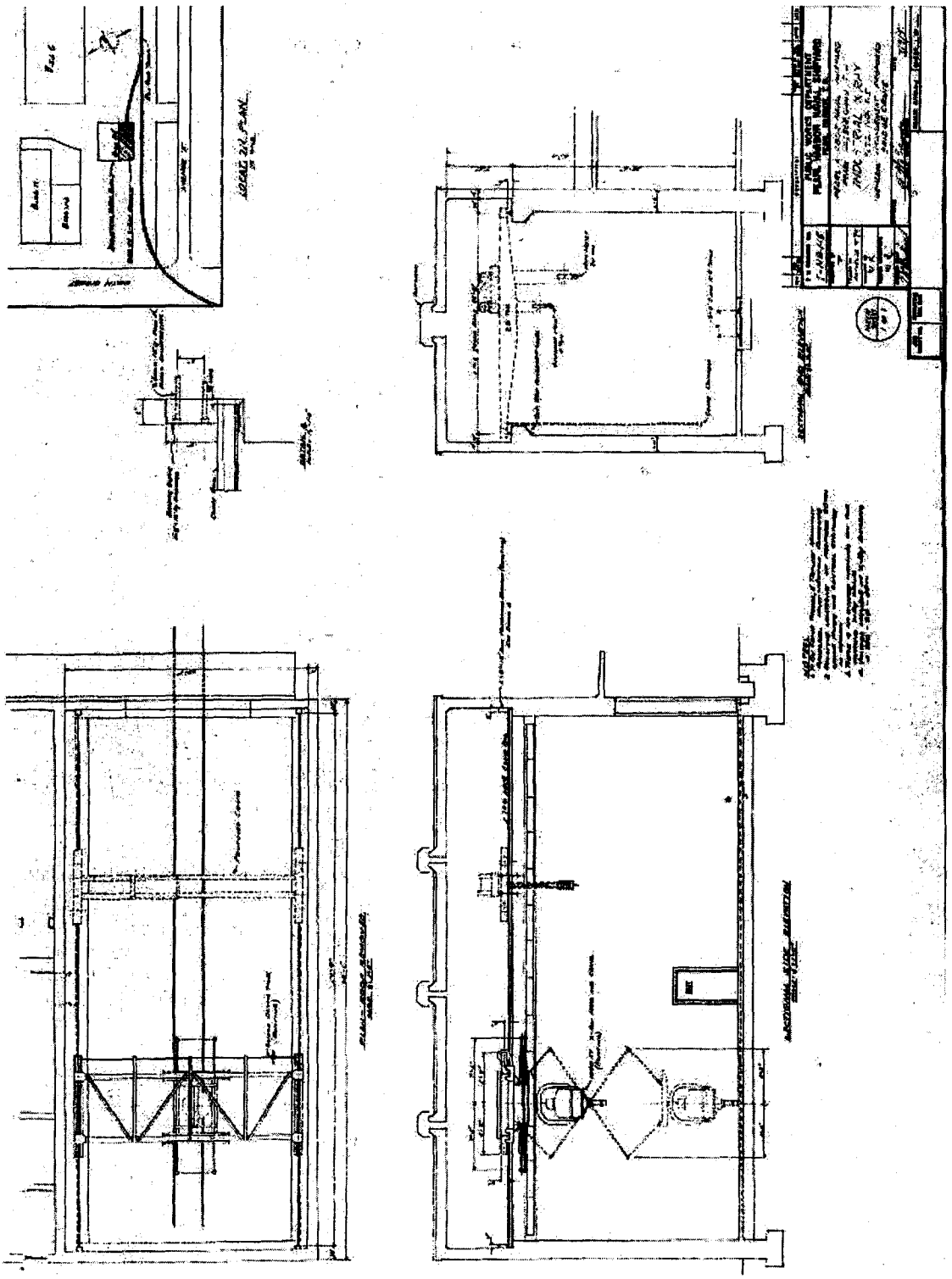
Plan and Elevation of North X-Ray Door (Drawing No. I-N5-1006, dated 1/24/1944) (reduced, not to scale)



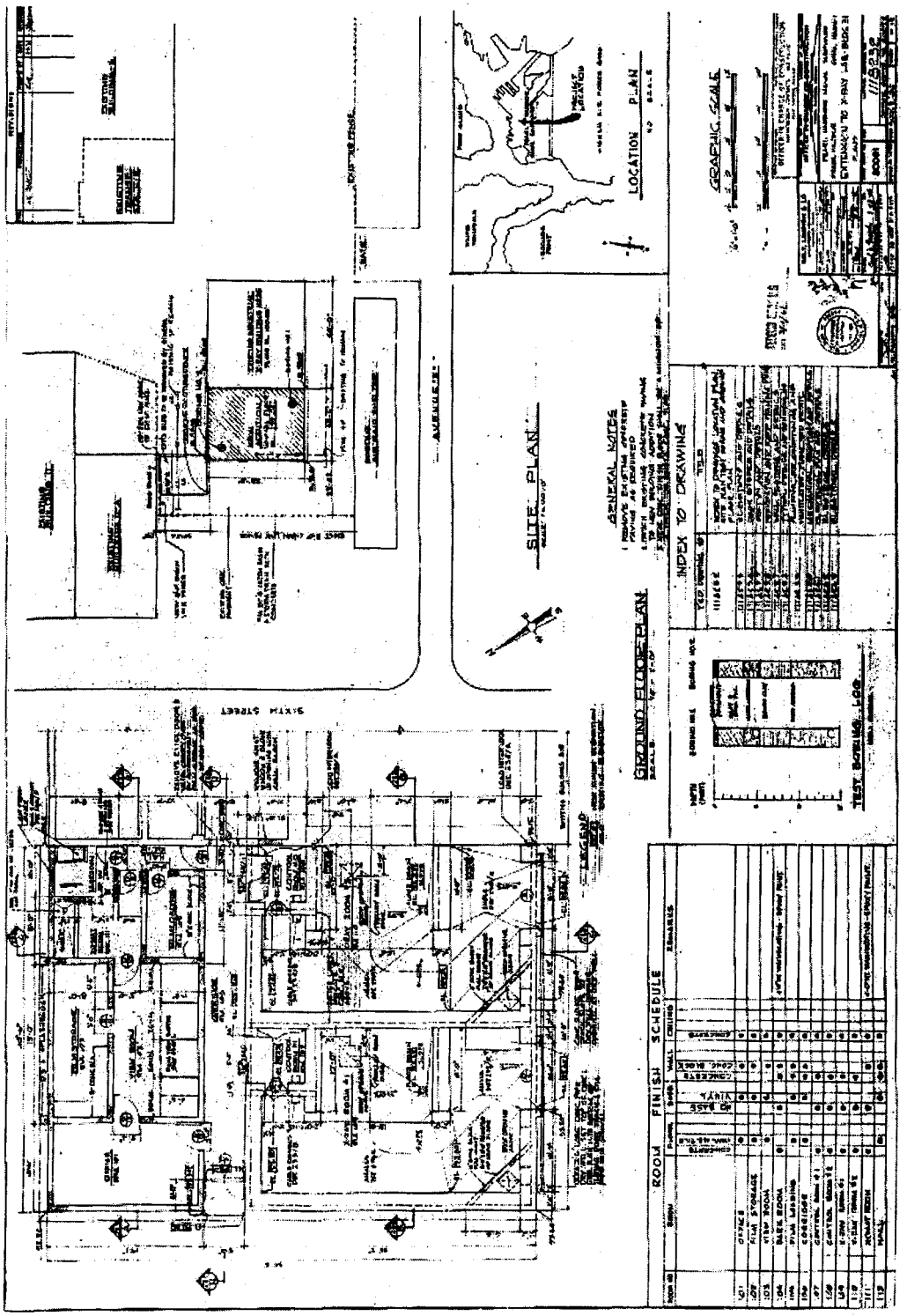
Plan and Elevation of East X-Ray Door (Drawing No. I-N5-1010, dated 3/7/1944) (reduced, not to scale)



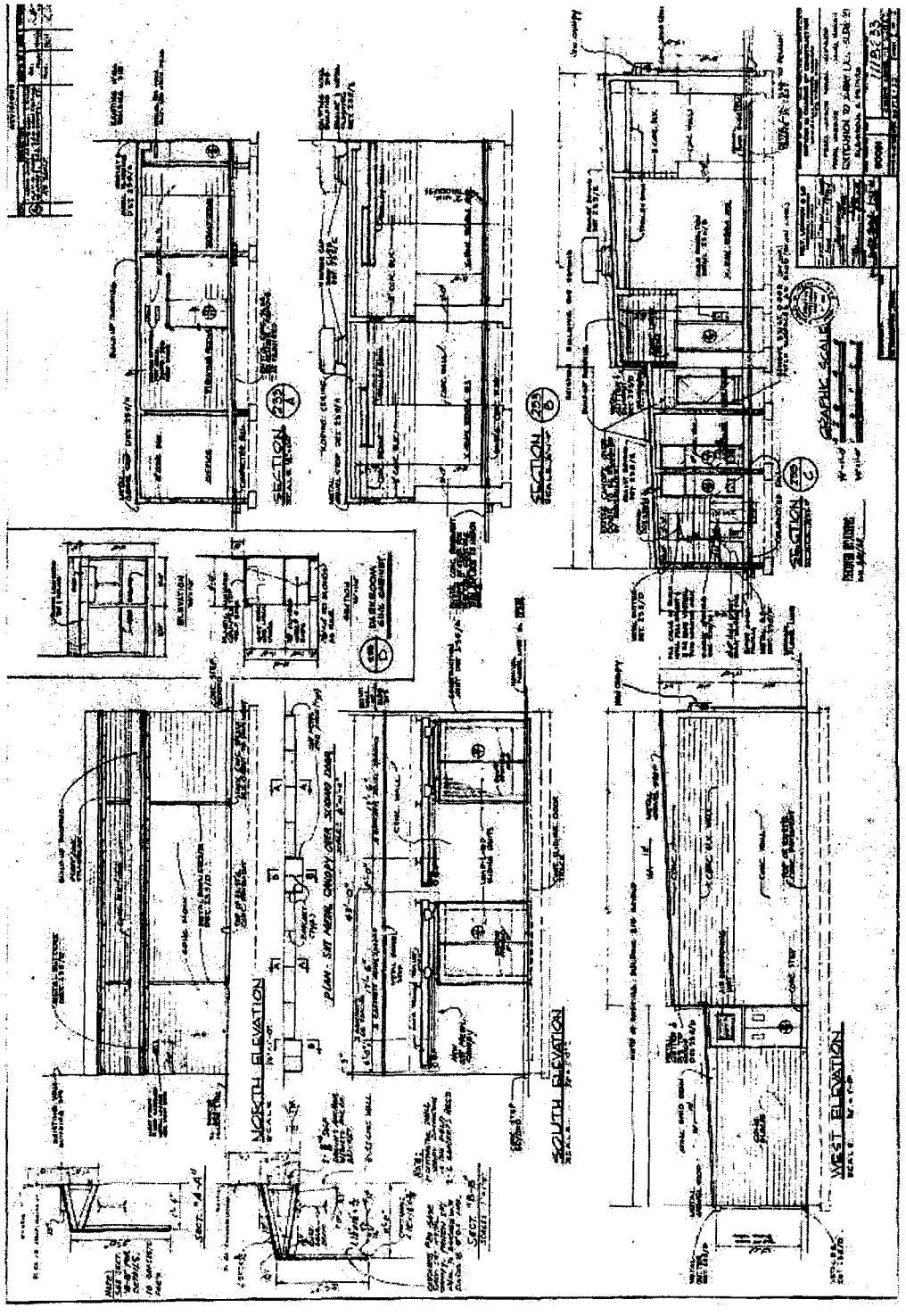
Bridge Crane Plan and Section (Drawing No. I-N8-146, dated 3/9/1951) (reduced, not to scale)



Extension to X-Ray Lab – Site and First Floor Plans
(Drawing No. 1118232, dated 3/11/1968) (reduced, not to scale)



Extension to X-Ray Lab – Elevations and Sections
(Drawing No. 1118233, dated 3/11/1968) (reduced, not to scale)



Alteration to Building 315 – Demolition and Floor Plans, Sections, and Interior Elevations (Drawing No. 7032803, dated 6/5/1980) (reduced, not to scale)