

Bureau of Mines Boulder City Experimental  
Station, Titanium Development Plant  
(Building No. 300)  
Date Street North of U.S. Highway 93  
Boulder City  
Clark County  
Nevada

**HABS No. NV-35-C**

HABS  
NEV  
2-Bouc,  
IC-

**PHOTOGRAPHS**

**WRITTEN HISTORICAL AND DESCRIPTIVE DATA**

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

HISTORIC AMERICAN BUILDINGS SURVEY

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BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION (Date Street Complex)  
TITANIUM DEVELOPMENT PLANT (Building No. 300)

HABS No. NV-35-C

**Location:** Date Street Complex, bordered by U.S. Highway 93 Truck Route, and Elm and Date streets  
Boulder City, Clark County, Nevada

Building 300 is located in the east central portion of the complex. It is located northwest of Building 200 and southeast of Building 400.

*Boulder City, Nev., 7.5' Topographic Quadrangle, U.S.G.S., 1958, Photorevised 1983, Universal Transverse Mercator Coordinates: 11.694580.3983340 (approximate center of building)*

**Present Owner:** U.S. Department of the Interior, Bureau of Reclamation

**Present Use:** Abandoned

**Significance:** Building 300, as part of the Date Street Complex, was a component of the Bureau of Mines Electrometallurgical Research Facility located in Boulder City. As such, it is within the designated Boulder City Historic District. However, because of its 1952 construction date it is considered a non-contributing element to the District. In a report of a survey of the Date Street Complex, Christine Pfaff (1992:3) of the Bureau of Reclamation indicated that when the building had reached the fifty year mark, then it would need to be re-evaluated for eligibility as a significant part of the complex, as well as to the District.

The significance of the Boulder City Historic District is tied to the Boulder Canyon Project (Hoover Dam) and to the history of American City Planning. This was the first community constructed following the federal New Towns model, as well as the "first fully-developed experience in new town planning as promoted by the Community Planning Movement, a movement which is recognized as the force which most influenced contemporary community planning practices" (Woodward et al. 1983:8.1).

## HISTORICAL INFORMATION

### A. Physical History

**Date of erection:** Building 300 is one of the newer buildings in the Boulder City station, built in 1952. Unlike the other buildings, it has two two-story parallel sections. Very few alterations have occurred to the exterior of the building except for the addition of a one million BTU cooling tower at the northwest corner of the building and a fiber glass cupola on the south slope of the north gabled roof. The cooling tower was added in 1962 during the remodeling period ([Blue] 1966:30). The fiber glass cupola was constructed in the late 1970s to provide additional room for a crystallizer (Herb Wells, personal communication 30 November 2000). The cost to construct this building was \$500,000, including equipment. The funds were provided by Army Ordnance (Metallurgical Division 1952:5).

Based on the available plan drawings of the building, it was designed by Herman O. Ruhnau and Stanley C. Meston, Architects A.I.A. of Riverside, California. William E. Nance, an Electrical Engineer, is noted on a drawing entitled "Electrical Details" (Shelter Titanium Pilot Plant 1951:X-300-1225). Several other plan drawings concerned with metal cladding, roofing, framing, and other details involving metal were drawn by the Pascoe Steel and Construction Co. of Pomona, California (Shelter Titanium Pilot Plant 1951:X-300-1235 to X-300-1242).

**Discussion of building use:** The majority of research conducted in Building 300 has been associated with titanium research particularly as a pilot plant and demonstration plant. The building was designed to be split into two sections. One half (south mass) contained a titanium tetrachloride ( $TiCl_4$ ) purification fractionating still with two reduction furnaces and a large dry room. The other half (north mass) held ten furnaces (eight Hevi-Duty and two Stokes Vacuum) serviced by a two vacuum pumps (Beach-Nuss 300-cfa). There was a 5-ton traveling crane in this section, as well. All of this was used to develop a commercially feasible method for processing titanium sponge, particularly a "soft and ductile metal" (Metallurgical Division 1952:11). Not long after construction of the building, a 500-pound high temperature reactor was assembled for trial runs in the processing to reduce production costs. Additional work entailed vacuum purification of crude titanium chips extracted by a lathe from reduction pots taken from reduction furnaces. The lathe was located in the *Dry Room* (Metallurgical Division 1952:11, 15-16). A detailed Bureau of Mines report of the building, complete with photographs, drawings, and a flow chart, described the process used and the design of the building (Baroch et al. 1955).

By 1966, the only titanium research was in electrowinning of titanium tetrachloride due to substantial industrial interests. This work eventually lead to the investigations of using the process on beryllium, zirconium, chromium, and other minerals ([Blue] 1966:27; [Stephens] c. 1983:10). Other work during the 1950s through the 1970s included magnesium research and glass fabrication, although the majority of the glass research was conducted in Building 600.

**B. Description of Building 300**

Although this building is oriented on a northeast/southwest axis, the descriptions of the elevations will be addressed as north, south, east, and west.

**Condition of fabric:** As with the other buildings in this part of the complex, Building 300 was essentially abandoned in 1984. It is in fair to good condition; however, it is subject to disturbance and damage by pigeons.

**Description of exterior:** This is a two-story steel-frame industrial building clad with corrugated aluminum sheets and measuring 107 (east/west) by 72 (north/south) feet. It has a simple rectangle floor plan, consisting of two adjoining rectangular masses (north and south). The roof is a parallel front-gabled with low pitch (17°) covered with corrugated aluminum and having a central gutter. The eaves are open with enclosed rafters and a slight overhang on all sides. The south slope of the north gabled mass has a green fiberglass cupola. Both rooflines each have four cylindrical ventilators with wire mesh (probably to keep birds out). All have flashing at the juncture with the roof. A drain pipe located in the center of the west and east elevations is called an "aluminum scupper" on an original plan drawing of the building (Shelter Titanium Pilot Plant Exterior Elevations 1951:X-300-1230). There are roof vent pipes on the west, south, and east sides of the building, with one vent or fan vent on the south side. The west vent pipe is on the north roof slope of the south mass. The two on the south side are on the south roof slope of the south mass; the pipe at the east end, and the fan on the west. The east side has two vent pipes symmetrically placed, one on the south roof slope, the other on the north roof slope of the south mass. A multi-level (approximately 60 feet high) exhaust stack, measuring approximately 2 feet in diameter at the base with a square concrete pad, is near the center of the south elevation. It is attached by bracing to the building. This was added after the building was constructed. The windows are metal-framed, 9-part divided-light awning types. All of the exterior doors are metal in metal framing. There are two single doors, and the remainder are double. Unless otherwise noted, the doors are half-glass (divided-light, 1/1) hollow-metal flush panel (flat surface). The building sits on a concrete foundation with structural and equipment (furnace area in the northeast section of the building) footings.

The primary (west) elevation has a set of double doors offset north of center. A steel-framed metal and concrete dock runs the length of the north half of the building. It has a height of approximately 2 feet above the ground surface. At the west end of the dock are two 5-foot diameter concrete pads, probably for tanks. A c. 1953 photograph (Pfaff 1992:38) shows that the dock area was added at a later date. A pipe runs the height in the center of the two halves. It appears to be an electrical line. There are braces on the wall that appear to be remnants for removed equipment.

There are six windows on the south elevation located on the second level. Five are 9-part divided-light (3/3/3) types and the sixth is a metal-framed, fixed single-light located at the west end just beneath the roof. A seventh window space is filled with an evaporative cooling unit. On the second and first levels are two air ducts, both near the center of the building, just east of the exhaust stack. There are three sets of double doors on the first level. Two sets are the type noted above, although

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 4)**

the central set has wire glass (fire rated vision panel) windows. The third set of doors is hollow metal with a louvered panel. This set is at the east end of the building. The second set is beneath the metal and concrete stairs leading up to the single door on the second level at the east end of the elevation. An approximate 10-foot long metal platform is midway to the second level. There are two large external evaporative cooling units between the levels held by metal braces and platforms. A smaller unit is on the first level just east of the large pipe. Below this is another pipe (possibly exhaust). A second exhaust pipe is next to the fourth window on the second level. A concrete platform, present since the building was constructed, lies along the edge of the building. It is curved with the west end wider than the east, possibly due to the railroad tracks that once passed through this section of the complex. The height of the platform is greater at the west end, being 3½ feet high with a set of concrete steps with pipe rails. The east end, just before it slopes downward as a metal ramp, is approximately 1¾ feet high. Steel reinforcement rod is visible along the edge of the platform where the concrete has begun to deteriorate. A set of pipe rails are at the east end of the platform near the east set of double doors a the metal ramp. Another set of rails are on the metal ramp that goes beyond the end of the building along the edge of a concrete pad at the east end.

The east elevation has four windows on the second level of the south mass. These are symmetrically placed with two adjacent at the center. The south center window was not originally included on the plan drawing for the building (Shelter Titanium Pilot Plant Ext. Elevations 1951:X-300-1230). Two windows are placed off-center on the first level, with one below the third (from the south) window on the upper level. A series of vertical and horizontal pipes, for electrical and other purposes, cover most of this part of the building. There is an evaporative cooling unit on the lower level near the center of the south section. North of that is a huge, closed duct, noted as one of two *Dry Rm. Ducts* on the 1951 "Exterior Elevations" plan. The north mass has an exhaust fan on the second level. Another series of vertical and horizontal pipes are connected to a small transformer yard at the rear of the building. There is a single door at the south end of the north mass on the first level. It is a half-glass type with wire glass. The transformer is on a section of the concrete platform that lies along the length of the east elevation. The platform has a raised concrete curb with drainage channels cut into it. The south section of the concrete platform has a metal edge and two rectangular pads for tanks or other equipment. The pad on the south end has four tall metal posts on the edges, possibly for providing support for whatever was once here. An eye wash station is located at the southeast corner of the building.

There are seven windows on the second level of the north elevation. Below the easternmost window is a metal "balcony" with an access ladder from ground level. A second metal "balcony" is west of the elevation center and has a solid metal door for access. Both of these are later additions. Two vents are on the east end of the building, one at the east "balcony," and the other below the third window from the east. The second has two sections and may have been a window opening at one time. Plywood covers a former set of double doors in the center of the first level. Beside the building, along the east third of the north elevation, is an 18-inch wide, concrete-lined channel, probably for drainage. It has an 8-inch, steel reinforced concrete block retaining wall that is about 4 inches high at the west end and 2 to 3 feet high on the east end. At the west end of the building are a sump pit, a cooling tower, circulation pipes, and a concrete well and vaults. The

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 5)**

cooling tower retains the manufacturer's plate and reads: "*COOLING TOWER / MODEL NO. 10A80P / SERIAL NO. 1 AT 2381 / FLUOR PRODUCTS COMPANY / AIR CONDITIONING & REFRIGERATION / COOLING TOWER DIVISION SANTA ROSA, CALIFORNIA*" with the names and date of "*DEWEY KREIMEYER CARLTON / MAY 1962*" added below. "Dewey" was Carl Dewey, the physical plant manager (Personal communication 2 December 2000). According to a drawing for the foundations for the cooling tower and wells (Titanium P.P. Found. Plan for Wells & Basin 1951:X-300-1270), cold and hot wells were originally to the west of the cooling tower. The circulation pipes and concrete vaults for these remain. Just to the north of the cooling tower are four concrete pads, all approximately 8 feet square with 5-foot diameter concrete braces in the center used for tanks. Each has two concrete filled metal posts and one or two metal braces. Asphalt and concrete surround the building area.

**Description of interior:** Plan drawings for this building include two from the c. 1953 report (NV-35-C-5; NV-35-C-6), as well as copies of several of the original 1951 drawings for the plant. The report plan drawings include the room designations for the first and second levels. The first level had an area of 7,704 square feet. Most of the space was open for the large machinery, tanks, and stills being used in the purification process. In the south mass the east end was divided into six rooms. The first two were the *Dry Room* and the *Magnesium Storage*. Room dimensions were provided for these two rooms, which were the largest on this level. Beside the *Dry Room* was an unnamed area with a restroom labeled *Men*, an open space containing *Lockers*, and access to the *Showers*. The *Compressor Room* was accessed by the easternmost set of double doors on the south elevation. *Dry Room Equipment* was stored at the east end of the south mass. The drawing indicates there were two sets of stairs on the interior. One was near the northwest corner of the south mass. The second set, also in the south mass, was located between two pads near the central south wall entrance. Neither of these sets of stairs remain.

The second level had a floor space of 2,845 square feet. The plan indicated that in the north mass at the east end was the *Vacuum Distillation Platform* with a set of stairs down to the first level on the north wall. A second set of stairs in the southeast corner of the north mass led from the platform to the second level in the south mass. The remainder of the mass was open. In the south mass the first set of stairs led to the *Still Room Floor*. A walkway connected this area to the main second level rooms. The second set of stairs led up to the *Reduction Furnace Platform* on the south wall. In the second level were seven rooms. On the west end were two laboratories, a restroom for *Women*, an unnamed space to the west of it, and a *Utility* area. A *Hallway* with a *Clo[set]* at the north end separated the laboratories from two rooms labeled *Office*. All but the *Closet* and the restroom had dimensions provided. Exterior access was on the south elevation. The remainder of the south mass was open. A drawing from the 1951 building plans (Shelter Titanium P.P. Floor Plan & Schedules 1951:X-300-1228) shows the two laboratories, the Women's restroom, and storage area, but there are three offices, not two, and no closet at the north end of the hallway. Instead, there is an opening out to the *Vacuum Distillation Platform*. The south and center offices had a connecting door, although not in the same place as noted on the c. 1953 plan with the two offices. That door location was in the west corner, whereas the 1951 plan had it placed in the center of the shared wall. The c. 1953 plan depicts what was actually constructed.

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 6)**

A plan for the plumbing in the building (Titanium P.P. Plumbing Layout Under Floor 1951:X-300-1234), indicates the Stokes and Hevi-Duty furnaces were placed on the first level below the *Vacuum Distillation Platform*. Floor drains were noted in the first level restroom, *Locker*, and *Shower* rooms in the south mass. The north mass has a 4-inch wide channel cut into the center of the floor for most of the length of the mass. There are drains at both ends. A similar, but shorter, drainage channel is in the south mass (Shelter Titanium P.P., Floor Plan & Schedules 1951:X-300-1228). Noted on another plan (Shelter Titanium P.P. Section & Details 1951:X-300-1231) is a 5-ton traveling bridge crane in the north mass of the building. It is still in place. A second traveling crane is in the south mass. No longer present in the building are the two platforms (distillation and furnace) or the *Still Room Floor* and the stairs associated with these features. The connecting walkway in the south mass also is gone.

Renovations done on this building during the period of 1957 to 1965 began in 1957 with the placement of asphalt paving next to the building. In 1961 the *Dry Room* facility had work done it, but no mention is made of what the renovations entailed. The one million BTU cooling tower was added in 1962. The titanium distillation system, determined to be obsolete, was removed in 1963; no mention was made of replacement equipment ([Blue] 1966:28-31).

In the north mass little remains beyond heating and cooling equipment, electrical panels, conduits, and boxes, and the crane. A metal balcony with wire mesh walls is near the center of the north wall just east of the plywood covered entrance. It corresponds with the louvered vent on the north elevation, indicating its part of a ventilation system.

In the west half of the south mass all that remains of the *Reduction Furnace Platform* are two square (approximately 5 feet square) concrete pads. The drainage channel is about 2 feet north of these pads. The area encompassed by the two levels of rooms, laboratories, and offices is between 38 and 45 feet long by 36 feet wide. The varied length is due to an extended opening to the *Dry Room*. The exterior doors (double) to the *Dry Room* are half-glass (divided-light over inset panel) hollow-metal. The exterior walls of the room are corrugated aluminum siding. A vestibule or airlock area separated the exterior doors from the actual room. A door frame indicates that there had been a second set of doors into the *Dry Room*. The room interior has horizontal metal siding on the walls and metal pans on the ceiling that have been welded to provide an airtight environment. This room was designed to maintain a dew point of minus 30° Fahrenheit by using a Pittsburgh Lectrodrying machine (Metallurgical Division 1952:11). In the northeast corner are pipes, electrical equipment, a moveable light outlet, and a concrete pedestal with electrical outlets. A plate hatch covering a concrete pit runs from the north wall to the center of the room. It may have been used for equipment, possibly the drying machine. Storage of materials in this room consisted of placing them in designated locations identified by stenciling on the north wall or in a cabinet on the west wall.

There are double doors to the *Magnesium Storage* area that are the same half-glass type. The walls to this room are corrugated aluminum siding in a metal stud system. All that remains inside the room is a bent metal cage that probably was used for storing the magnesium. It was illuminated by a fluorescent baffle.

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 7)**

The entry into the *Locker* room has a hollow-metal flush panel (flat) door. Two air duct systems are present in the ceiling area--one providing ventilation for the room and the other a part of the major duct system that exits on the east elevation. Lighting was provided by hanging incandescent lamps. A second door leads into the restroom. This is a louvered hollow-metal door. There are two sinks on the north wall, and three stalls with toilets on the south wall. The original drawings indicated a trough urinal on the east wall, but that has been removed or never was added. The *Locker* area has a water heater. The south portion of the room has floor drains for two showers. The walls of the entire room are wallboard, with an open ceiling for all but the shower area, which has a wallboard lid ceiling.

Like the *Magnesium Storage* room, the *Compressor Room* has corrugated aluminum interior walls. There is a 75-gallon propane tank for the water heaters in the west portion of the room. Originally there were two of these. A raised concrete slab covers the east portion of the floor. Along the south and east walls are pipes and electrical boxes. Pipes from the tank run along the north wall to exit through the east wall, or go up through the ceiling. To the west of the door is part of the internal water line system. Lighting in this room is provided by a hanging fluorescent baffle.

Above the *Dry Room* entrance is an open area comprised of a metal deck with a welded steel angle edge guard and steel pipe railing. This was an entry area for the walkway to the *Still Room Floor*. A hollow-metal door at the southeast corner of the deck opens into the north *Laboratory*. The interior walls and ceilings of all of the rooms and the hallway on this level are a painted (cream or white) wallboard. All of the doors are hollow-metal types. Lighting is surface mounted fluorescent. Two interior 9-part divided-light windows are on the north wall that apparently were covered by wallboard. A metal-framed divided-light (1/1) window on the west wall also was covered by wallboard. Although this room originally was a laboratory, the renovations suggest that it was converted into a kitchen/break room. The furnishings consist of a metal cabinet and counter on the north and east walls with two sinks in the north segment. Metal shelves are over this area and on the west wall. No gas fixtures, epoxy counter surface, or typical laboratory splashboard is present in this room. A door leads into the hallway from the southeast corner. Two other doors, on the south wall in the west and east corners, open into the south *Laboratory*.

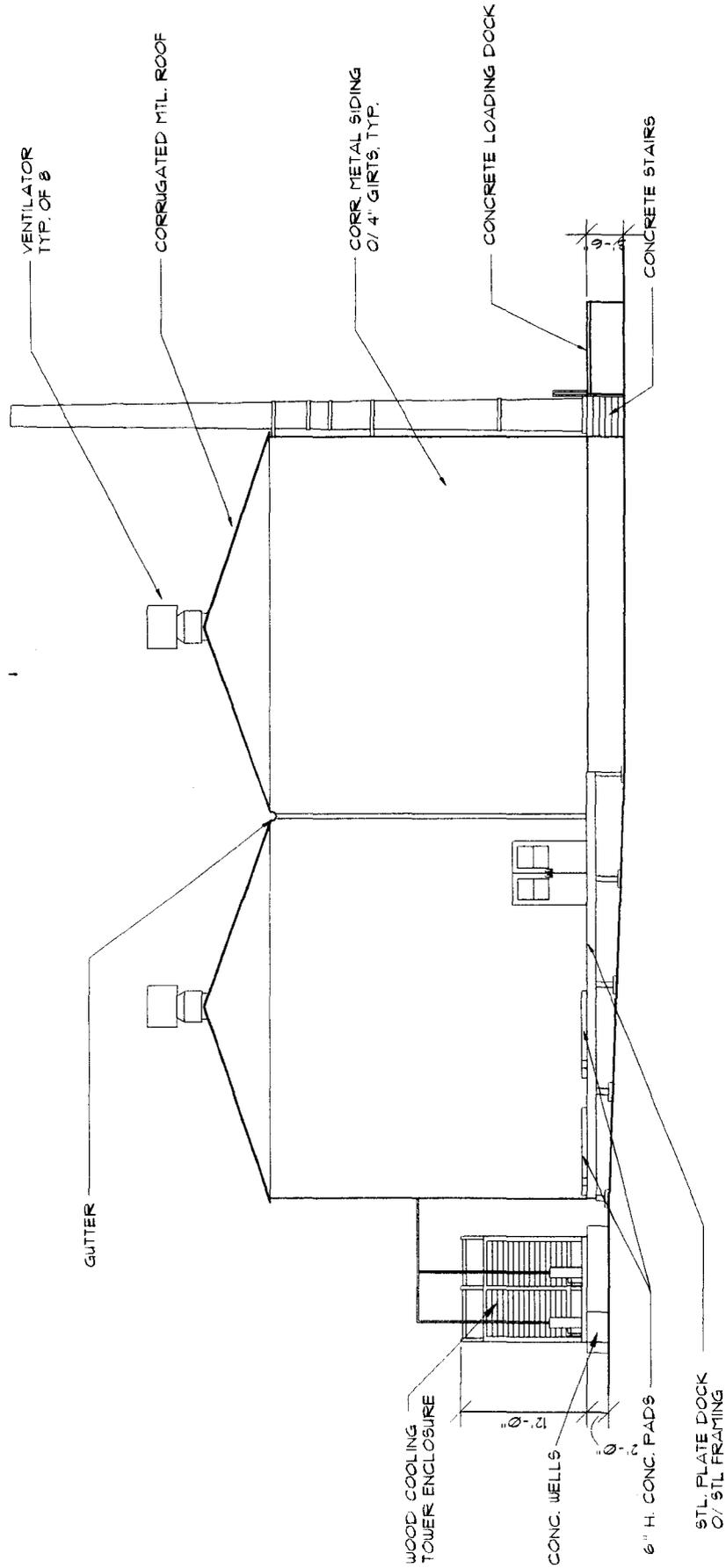
The south *Laboratory* has no furniture. A door opening into the hallway is in the southeast corner. Next to this is the door into the second level restroom. The door in the northeast corner opens into the *Cot Room*. A second doorway (no door is present), also in the northeast corner, leads into the restroom proper, which consists of a toilet and a sink. The last room on this side of the hallway has a door at the southeast corner. In the northeast corner of the room, behind the door, is the heating and cooling unit for the upper level rooms. It has an insulated vent on the top that goes into the ceiling. Near the west end of the room is a second mechanical unit that also appears to be associated with ventilation. It has a mesh screen covering with a squared aluminum vent pipe and it is located on the south elevation where there is a louvered vent below the window with an evaporative cooling unit. An outlet vent is on the west wall of the hallway next to the door to the restroom.

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 8)**

The south *Office* has a door in the southwest corner of the room. A wall vent is near the floor just to the north of the doorway. The north *Office* has a door from the hallway near the center of the west wall. An interior 9-part divided-light awning type window is on the north wall. In the northeast corner is a door leading to where the *Vacuum Distillation Platform* once was. It is visible from the open area in the north mass of the building. Both offices have exterior windows: the north office window is in the east wall, the south office window is in the south wall. The closet at the north end of the hallway has wood shelving for storage.

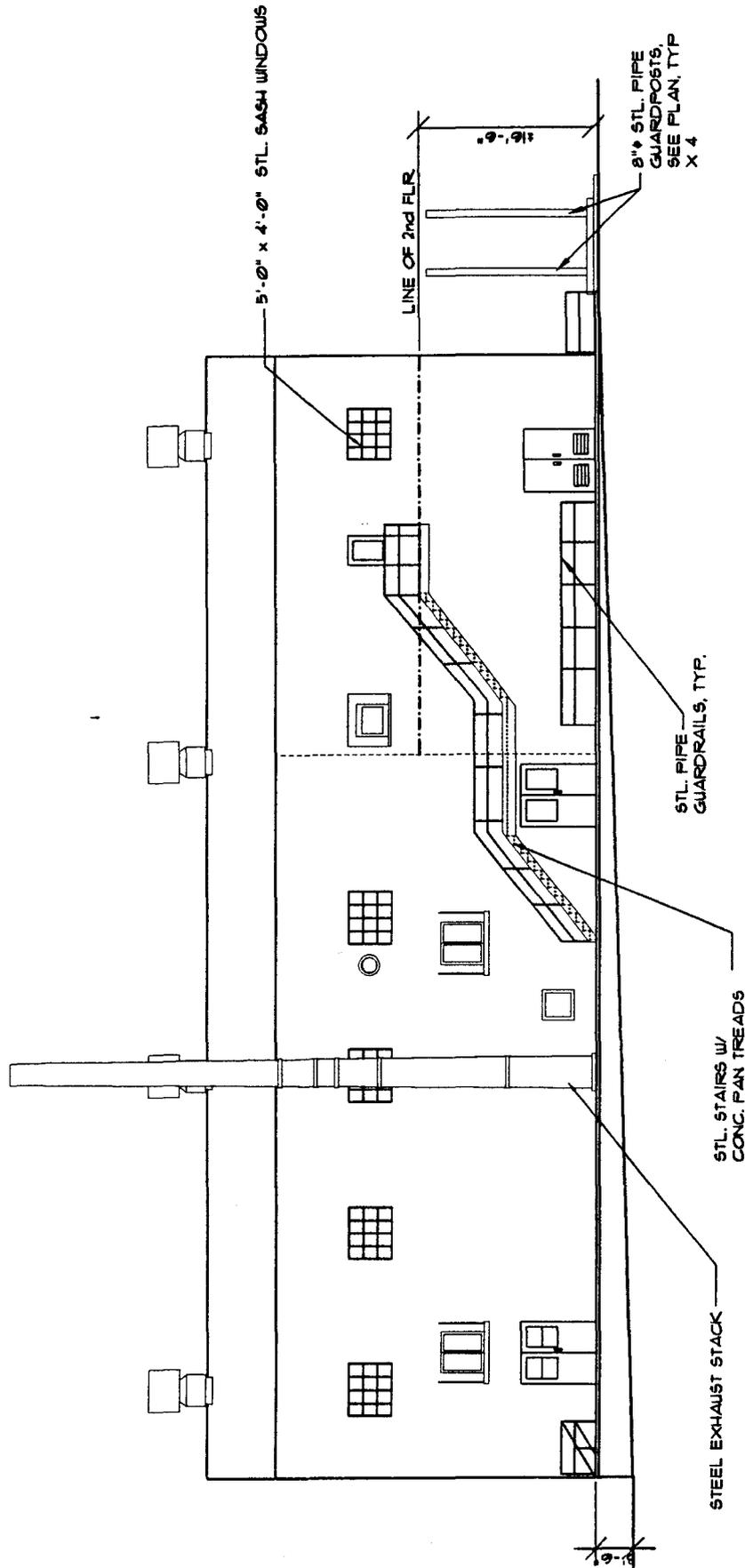
**Additional Documentation:**

Building Elevations and Floor Plans (Attachment 1: 7 pages)

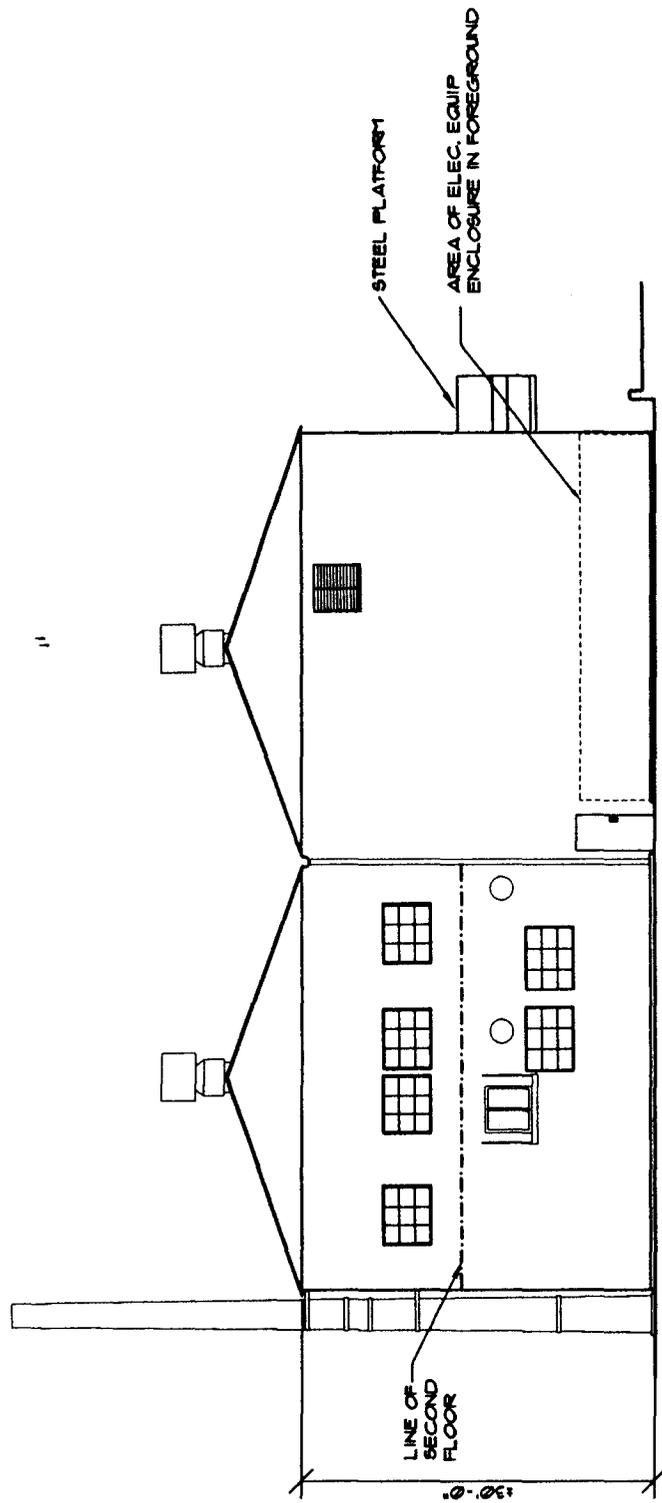


**BUILDING 300  
 WEST DEMOLITION ELEVATION**

SCALE : 1/16" = 1'-0"

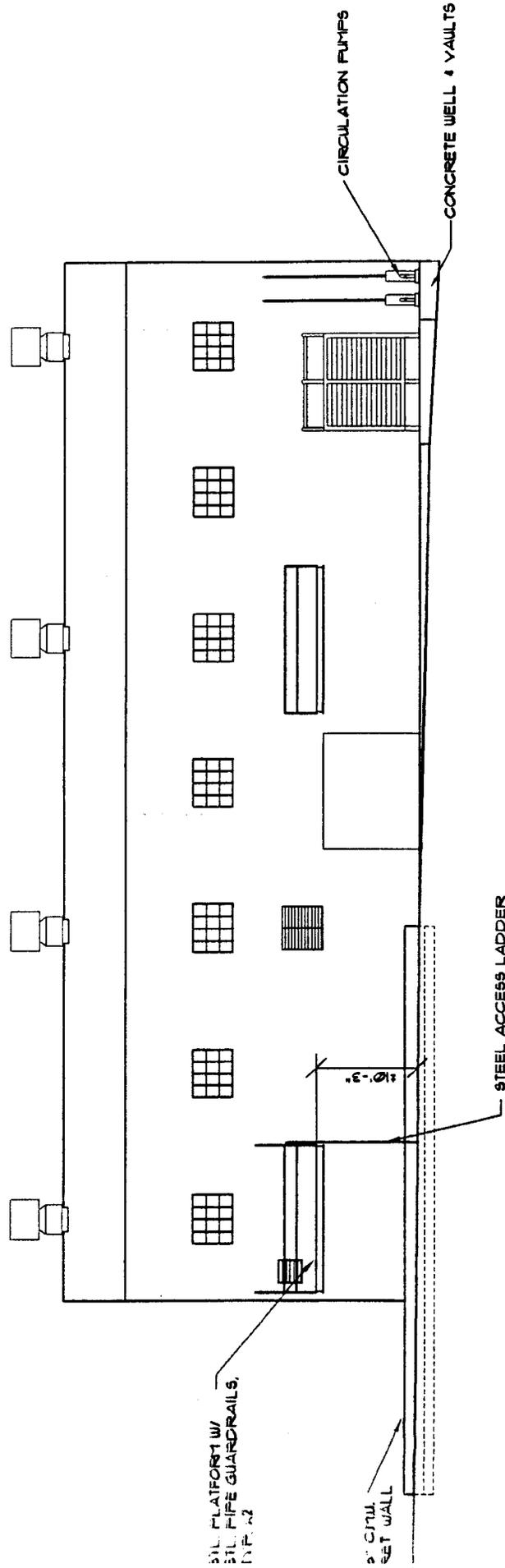


**BUILDING 300**  
**SOUTH DEMOLITION ELEVATION**  
SCALE : 1/16" = 1'-0"



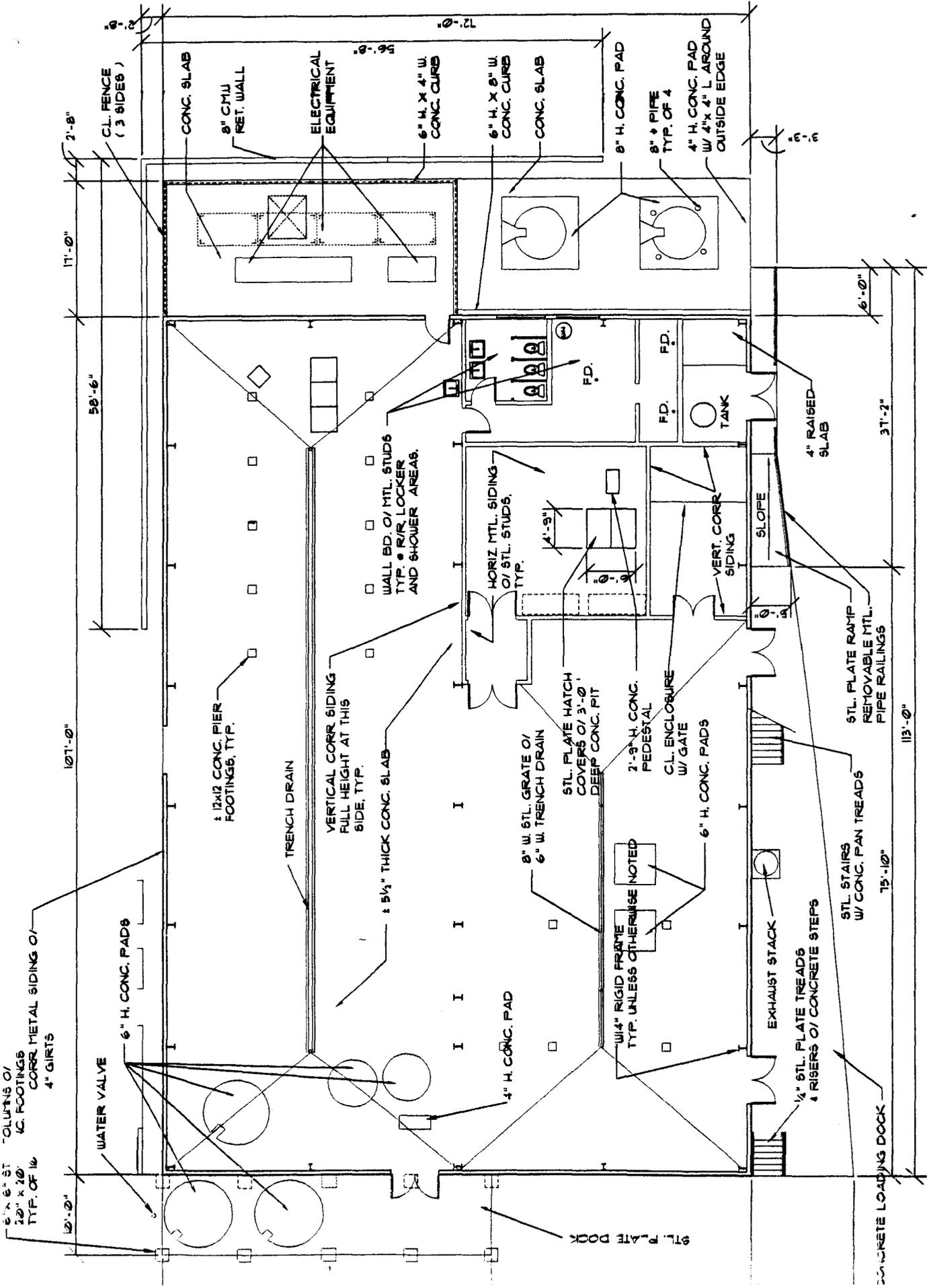
**BUILDING 300  
EAST DEMOLITION ELEVATION**

SCALE : 1/16" = 1'-0"



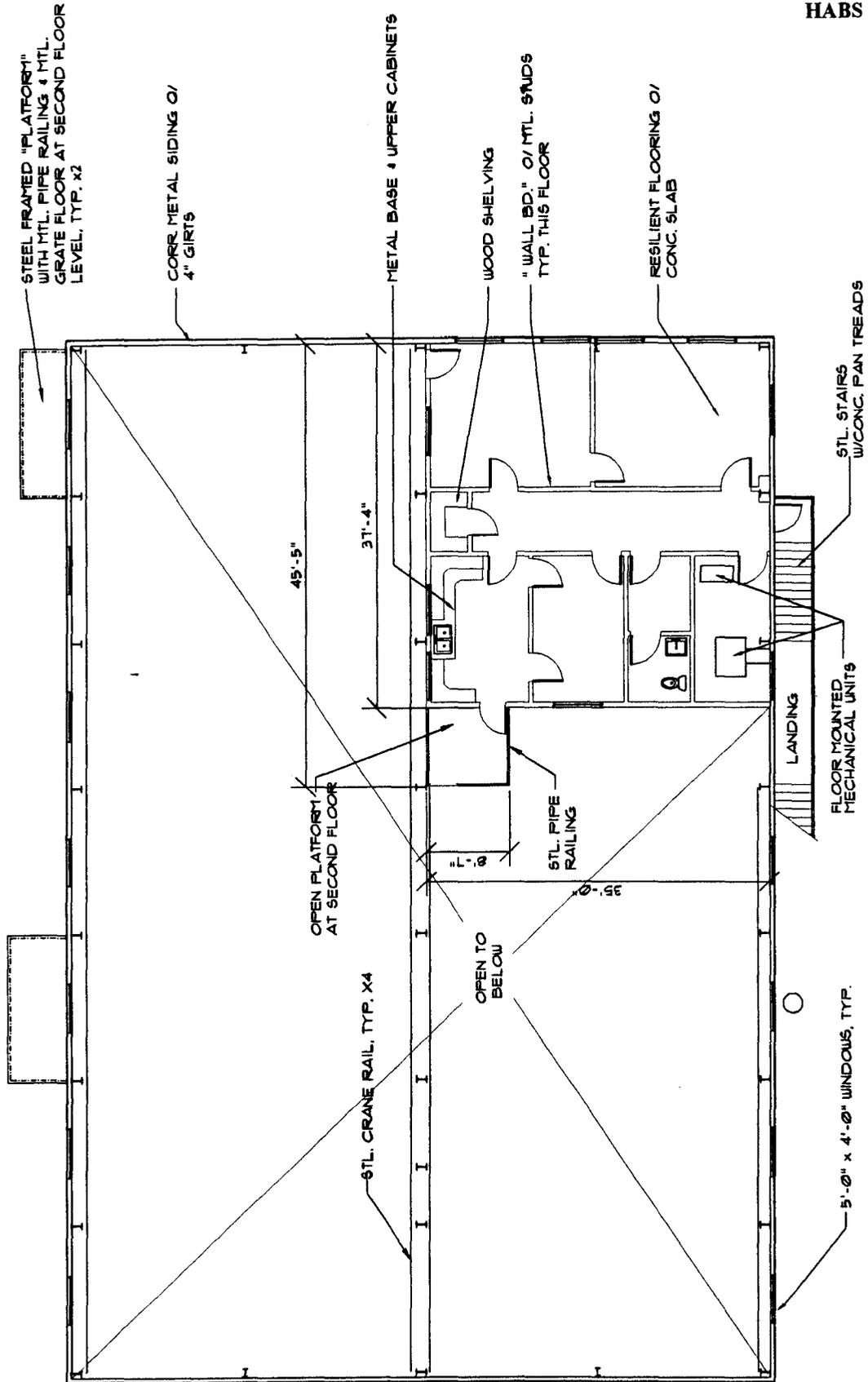
**BUILDING 300  
NORTH DEMOLITION ELEVATION**

SCALE: 1/16" = 1'-0"



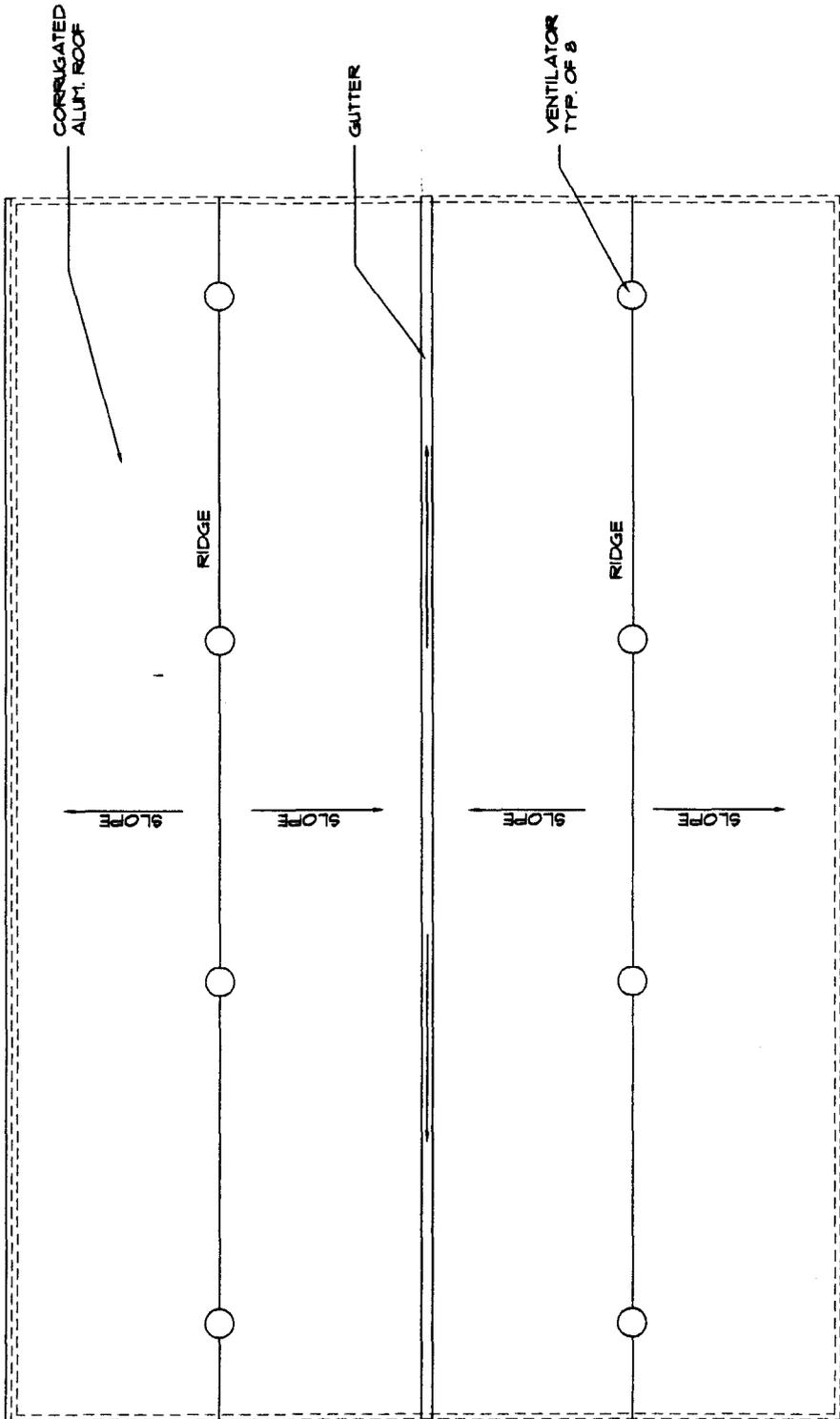
**BUILDING 300  
 FIRST FLOOR DEMOLITION PLAN**

SCALE: 1/16" = 1'-0"



**BUILDING 300  
 SECOND FLOOR DEMOLITION PLAN**

SCALE: 1/16" = 1'-0"



**BUILDING 300  
DEMOLITION ROOF PLAN**  
SCALE : 1/16" = 1'-0"

**BUREAU OF MINES BOULDER CITY EXPERIMENTAL STATION,  
TITANIUM DEVELOPMENT PLANT (Building No. 300)  
HABS No. NV-35-C (Page 16)**

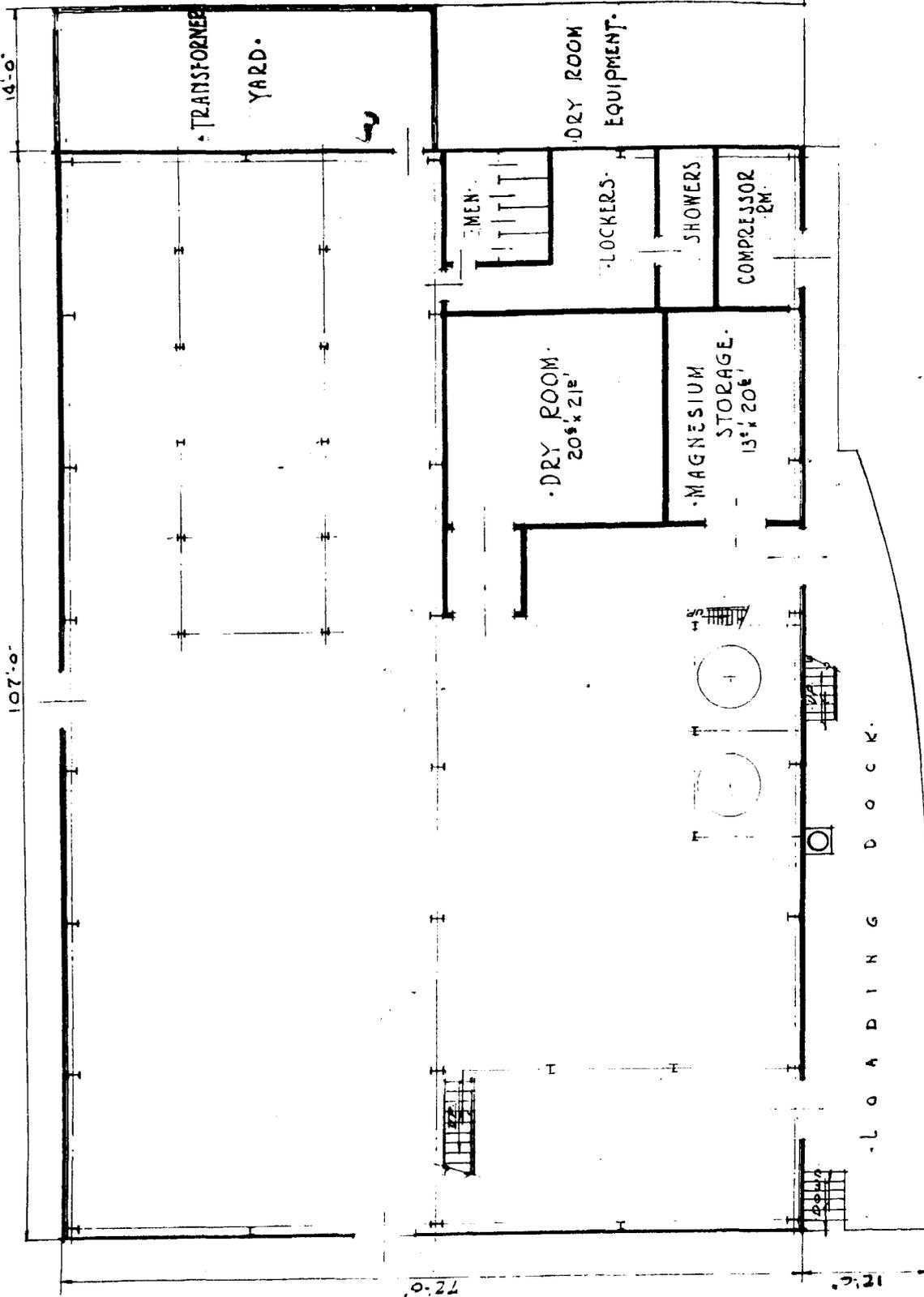
**ATTACHMENT  
PHOTOCOPIES OF PLAN DRAWINGS**

The following attachments are photocopies of c. 1953 plan drawings from the U.S. Bureau of Mines Lab Collection, MS-18, Department of Special Collections, Leid Library, University of Nevada, Las Vegas.

Drawing No. 1: TITANIUM DEVELOPMENT PLANT, FIRST FLOOR PLAN

Drawing No. 2: TITANIUM DEVELOPMENT PLANT, SECONF FLOOR PLAN

Drawing No. 1

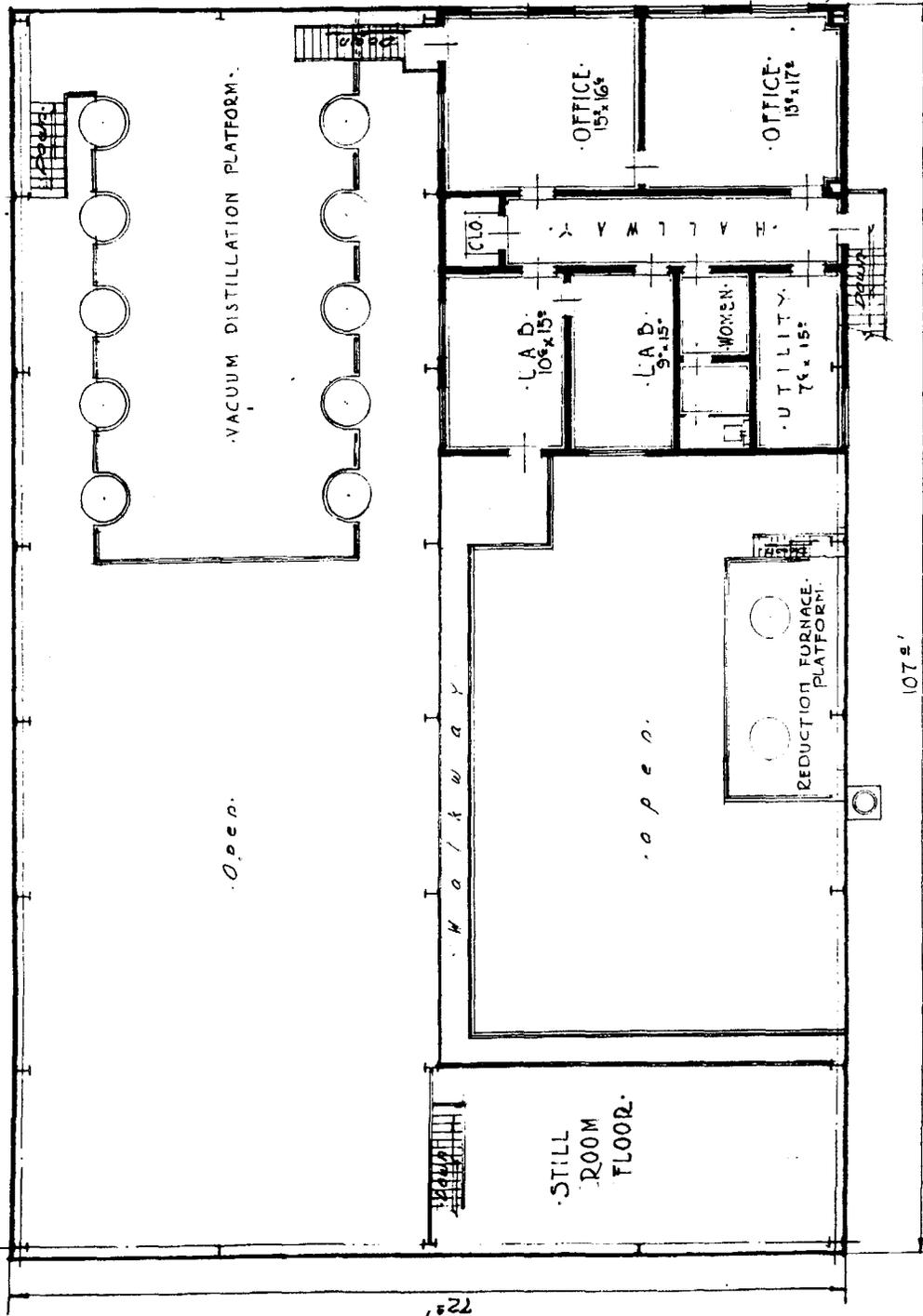


# TITANIUM DEVELOPMENT PLANT

FIRST FLOOR PLAN  
AREA, 7704 SQ. FT.

C-300-300

Drawing No. 2



TITANIUM DEVELOPMENT PLANT  
 SECOND FLOOR PLANE

C-883-BC

FLOOR AREA  
 2845 Sq. Ft.