PORTSMOUTH GASEOUS DIFFUSION PLANT, X-530
ELECTRICAL SWITCHYARD COMPLEX
(X-530A, X-530-B, X-530-C, X-530-D, X-530-E)
3930 U.S. Route 23 South
Piketon vicinity
Pike County
Ohio

HAER OH-142-P
HAER OH-142-P

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240

HISTORIC AMERICAN ENGINEERING RECORD

PORTSMOUTH GASEOUS DIFFUSION PLANT, X-530 ELECTRICAL SWITCHYARD COMPLEX (X-530A, X-530-B, X-530-C, X-530-D, X-530-E, X-530-F, X-530-G)

HAER No. OH-142-P

Location: Portsmouth Gaseous Diffusion Plant (PORTS), 3930 U.S. Route 23 South, Piketon vicinity, Scioto Township, Pike County, Ohio

The X-530 Electrical Switchyard Complex is located at Ohio State Plane South coordinates at easting 1825294.092376 ft, northing 370468.415645847 ft and at Universal Transverse Mercator Zone 17N easting 326500.4219 m, northing 4320470.366 m. The coordinate represents the approximate center of the X-530 Electrical Switchyard Complex. This coordinate was obtained on June 19, 2019 by plotting its location in EnviroInsite 10.0.0.37. The accuracy of the coordinates is +/- 12 meters. The coordinate datum is North American Datum 1983.

Date of Construction: 1954

Designer/Builder: Peter Kiewit Sons' Construction Company

Previous Owner: N/A

Present Owner: The Atomic Energy Commission oversaw construction and operation of PORTS until 1974, when the Energy Research and Development Administration was established with responsibility for research and development duties from 1974-1977. In 1977, the U.S. Department of Energy was established, overseeing operations at PORTS.

Present Use: Power delivery to PORTS

Significance: The X-530 Electrical Switchyard Complex facilitates the delivery of power to the PORTS process buildings and area auxiliaries. The X-530 Electrical Switchyard Complex consists of several structures which cover an area of approximately 18 acres. Electric power was generated by the facilities of the Ohio Valley Electric Corporation and delivered to the switchyard at 330,000 volts (V) by four transmission lines and reduced in voltage by the switchyard equipment and supplied at 13,000 V to the switch houses for distribution to the plant facilities. This facility is part of PORTS, which was a part of the U.S. Cold War nuclear weapons complex. PORTS' primary Cold War era mission was the production of highly enriched uranium by the gaseous diffusion process for defense/military purposes.

Project Information: Fluor-BWXT Portsmouth LLC photographed the site in August 2014. Gray & Pape, Inc., Cincinnati, Ohio, served as the primary author of the historical narrative and resource descriptions drawing from numerous historical records and reports, drawings, photographs and plans. For additional contextual information, see Portsmouth Gaseous Diffusion Plant,

HAER no. OH-142. This X-530 Electrical Switchyard Complex HAER was completed in 2021.

Part I. Historical Information

In support of this report, there are three appendices: Appendix A through C, which consist of survey photographs, historical photographs, and historical drawings, respectively.

Construction History of the X-530 Electrical Switchyard Complex:
Special attention was paid to construction of the X-530 Electrical Switchyard Complex, as it was necessary for completing Phase I of PORTS construction, which followed a tight deadline for getting the first cascades on line. Mount Vernon Bridge Company, of Mt. Vernon, Ohio, received the contract to erect the structural steel and miscellaneous iron for the X-530 Electrical Switchyard Complex. Mount Vernon Bridge Company subcontracted the construction labor to Carl Vestal Steel Erector Company of Indianapolis, Indiana. Construction work began in early 1953 and was completed ahead of schedule in November 1954.

Brown and Kerr, of Chicago, Illinois, won the contract to install metal roof decking for the X-530B Control House and Switch Houses. Elwin G. Smith Company, of Pittsburgh, Pennsylvania, received the contract to fabricate and install aluminum siding panels for the X-530B Control House, as well as the corrugated asbestos siding for the X-530B Switch Houses. Charles Wood & Company, of Newark, New Jersey, won the contract to install standard and special perforated-metal acoustical tile ceilings and accessories in the X-530B Control House. Johns-Manville Sales Corporation, of Cincinnati, Ohio, received a contract to install thermal insulation for air conditioning ductwork and various piping. Thomas Moulding Floor Company, of Chicago, Illinois, received a contract to install asphalt tile flooring in the X-530B Control House and Switch Houses, and Cyclone Fence Department, of Cincinnati, Ohio, won the contract to install all fencing in and around the X-530 Electrical Switchyard.

Taylor-Wheless Company, of Jackson, Mississippi, performed site grading and backfill activities for the X-530 Electrical Switchyard Complex (Appendix B, Figures 12 and 13). Workers began pouring footers in August 1953 (Figures 14 through 16). Installation of structural steel commenced in September and continued through early December 1954 (Figure 17 through 32). By late February 1954, contractors had completed installation of the main control boards (Figure 33). By early September 1954, all work on the X-530 Electrical Switchyard Complex had been largely completed (Figure 34).

Historical drawings of building plans are provided in Appendix C (Figures 35 through 43).

Part II. Site Information

Description of the X-530 Electrical Switchyard Complex:
The X-530 Electrical Switchyard Complex is located in the northwestern portion of PORTS, immediately west of the X-330 Process Building. The X-530 Electrical Switchyard Complex provides power for the operation of electrical equipment, electrical systems, and other components of the X-326 and X-330 Process Buildings, and now provides all electrical power to the gaseous diffusion plant and the Depleted Uranium Hexafluoride Conversion Facility following the removal of the X-533 switchyard in 2011. Power is also supplied to the area system for general use.

The X-530 Electrical Switchyard Complex consists of the switchyard itself (X-530A) on the west of the site, a control house and two switch houses (X-530B), a test and repair facility (X-530C), an oil house (X-530D), two valve houses (X-530E and X-530F), and an oil pumping station (X-530G). The buildings are mainly located on the eastern end of the switchyard, facing the X-330 Process Building. The X-530G Gas Centrifuge Enrichment Plant (GCEP) Oil Pumping Station is located in the northwest corner of the switchyard. The X-530A, B, C, D, and E structures have been identified as historic processing support facilities at PORTS. Although only these five structures are the focus of this HAER documentation, all parts of the X-530 Electrical Switchyard are discussed herein, including X-530F and G.

The X-530A Switchyard is approximately 740' wide and 1,200' long (888,000 square feet) and sits on a limestone gravel bed atop clay soil (Appendix A, Figures 1 through 4). The switchyard contained at one time 12 power transformers, now 10, to reduce the incoming power supply voltage from 330 kilovolts (kV) to 13.8 kV for distribution to plant facilities. Four transmission lines enter the switchyard from the west, carrying power from the Kyger Creek steam plant at Cheshire, Ohio and the Pierce switching station at Pierce, Ohio. Additionally, two smaller transmission lines enter the facility from a Columbus & Southern Ohio Electric Company line and an Ohio Power Company line. These two lines are available as an auxiliary source of power. Equipment in the switchyard, including 10 transformers, 2 of which are in service and 2 in cold standby, actively reduces the voltage for use at PORTS. One transformer is held in reserve.

The X-530B Control House and Switch Houses are oriented from north to south along the eastern edge of the X-530A Switchyard. The X-530B Control House is located in the center of the X-530B Switch Houses. The X-530B Control House is a utilitarian, two-story, steel frame building that measures approximately 120' long by 70’ wide (8,400 square feet) (Figure 5). The building rests atop concrete footings and grade beams under a poured concrete floor slab. Exterior walls are clad in fluted, insulated, metal paneling. Window openings are located only on the second floor in the control room, and consist of industrial metal sash. The roof is relatively flat, consisting of metal deck panels covered with insulation and built-up material. The central bay of the X-530B Control House protrudes from the east façade. The first-floor interior of the X-530B Control House contains switchgear, electrical equipment, buses, and conduit installations, while the second floor contains the control room, offices, restrooms, and other work areas. The interior is functional in nature with few finishes or stylistic detailing.

The X-530B Switch Houses consist of utilitarian, one-story, steel-frame structures with flat roofs of concrete slabs (Figures 6 through 7). Each building is approximately 395' long and 67' wide (approximately 26,500 square feet). The concrete slab roofing supports three separate outdoor enclosures on each X-530B Switch House for 11 switchgear units and six synchronous hydrogen-cooled condensers. Exterior walls are clad in corrugated cement-asbestos siding. Walkways at roof level connect the X-530B Switch Houses to the second floor of the central X-530B Control House. Pedestrian and vehicular access doors are located on the north, south, and west façades of each X-530B Switch House. The first-floor interiors of the switch houses contain three groups of air compressors, two switchgear installations, electrical buses and other mechanical equipment, as well as large fan rooms. Stairways reaching from the ground floor to rooftop penthouses are located at each end of the buildings and in the fan rooms. Like the Control House, the interiors of the X-530B Switch Houses are largely functional in nature with few finishes or detailing. Underground, box-type, concrete, power tunnels run outside the eastern wall of the X-530B Control House and Switch Houses.

The X-530C Test and Repair Facility is a one-story, rectangular plan, steel frame building located in the northeast corner of the switchyard area (Figure 8). The building measures approximately 25' by 50' (1,250 square feet) and features a concrete slab foundation, walls clad in cement-asbestos siding, window openings with industrial steel sash, and a flat roof. An overhead metal door is located on the north façade and is flanked by two metal storage lockers labelled “Tools” and “Materials.”

The X-530D Oil House is a small, one-story, rectangular plan, steel frame building (Figure 9). It is located in the southern section of the switchyard area and measures approximately 17' by 30' (510 square feet). The building has a poured concrete foundation, walls clad in corrugated cement-asbestos siding, window openings with nine lights, and a lightly-pitched roof covered with corrugated metal. Hollow metal double entry doors are located on the west façade. The building houses the equipment necessary to provide oil exchanges in switchyard electrical equipment. The X-530D Oil House is connected to large storage tanks on the east and west by surface piping.

The X-530E Valve House is located on the northeast corner of the switchyard area (Figure 10). The X-530E Valve House consists of an underground, reinforced concrete room. The valve house consists of an enclosed stairway that sits atop a concrete pad. The pad measures approximately 20' by 25' (500 square feet). Built of reinforced concrete, the enclosure features a single, hollow metal door with a small wire-glass window.

The X-530F Valve House is a 500 square foot reinforced-concrete structure located on the south side of the switchyard (Figure 11). It houses an emergency sprinkler main with distribution lines leading to transformers on the southern half of the switchyard.

Unlike the other X-530 Complex buildings that were built during the initial phase of construction at PORTS, the X-530G GCEP Oil Pumping Station was built in 1980. It is a 500 square foot metal building that contains pumps to maintain positive pressure on oil-filled underground pipes containing power cables. It contains two pumps, a diked aboveground storage tank, fluorescent lights, and a sprinkler system. The building sits on a concrete vault structure. There is a below-grade structure where the oil system is connected to the tie line from the X-530A Electrical Switchyard.

Part III. Sources of Information

Department of Energy. *The Role of the Portsmouth Gaseous Diffusion Plant in Cold War History*. Piketon, OH: U.S. Department of Energy, 2017.

Department of Energy. *Remedial Investigation and Feasibility Report for the Process Buildings and Complex Facilities Decontamination and Decommissioning Evaluation Project at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0245&D3. Piketon, OH: U.S. Department of Energy, 2014.

Department of Energy. *Engineering Evaluation/Cost Analysis for the Plant Support Buildings and Structures at the Portsmouth Gaseous Diffusion Plant, Piketon, Ohio*, DOE/PPPO/03-0207&D4. Piketon, OH: U.S. Department of Energy, October 2011.

Department of Energy. *National Historic Preservation Act Section 110 Survey of Architectural Properties at the Portsmouth Gaseous Diffusion Plant in Scioto and Seal Townships, Piketon, Ohio,* DOE/PPPO/03-0147&D1. Piketon, OH: U.S. Department of Energy, January 2011.

Giffels & Vallet, Inc. *Gaseous Diffusion Plant at Portsmouth, Ohio, Project History and Completion Report* (Redacted). Washington, D.C.: U.S. Atomic Energy Commission, 1957.

Appendix A: Survey Photographs

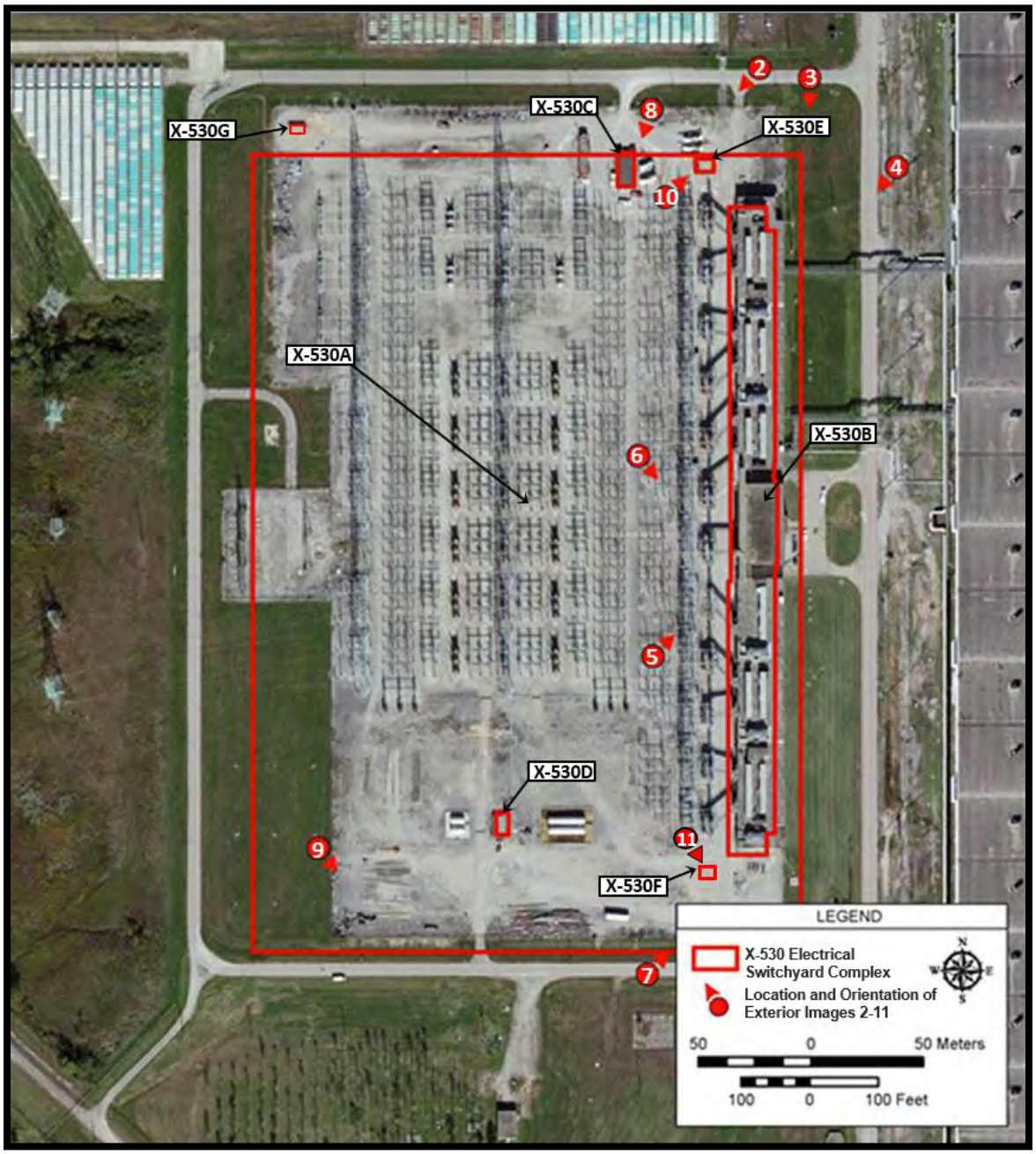

Figure 1: Location and Orientation of Exterior Photographs (Figures 2 through 11)

Figure 2: North Side of the X-530 Electrical Switchyard Complex with the X-530A Switchyard Shown to the Right, August 2014, Facing Southwest

Figure 3: Northeast Corner of X-530B Switch House, August 2014, Facing South

Figure 4: East Side of X-530B Switch House, August 2014, Facing Southwest

Figure 5: The X-530B Control House, August 2014, Facing Northeast

Figure 6: The X-530B Control House, August 2014, Facing Southeast

Figure 7: Southwest Corner of X-530B Switch House, August 2014, Facing Northwest

Figure 8: North Side of X-530C Test and Repair Facility, August 2014, Facing Southwest

Figure 9: Northwest Corner of the X-530D Oil House, August 2014, Facing Southeast

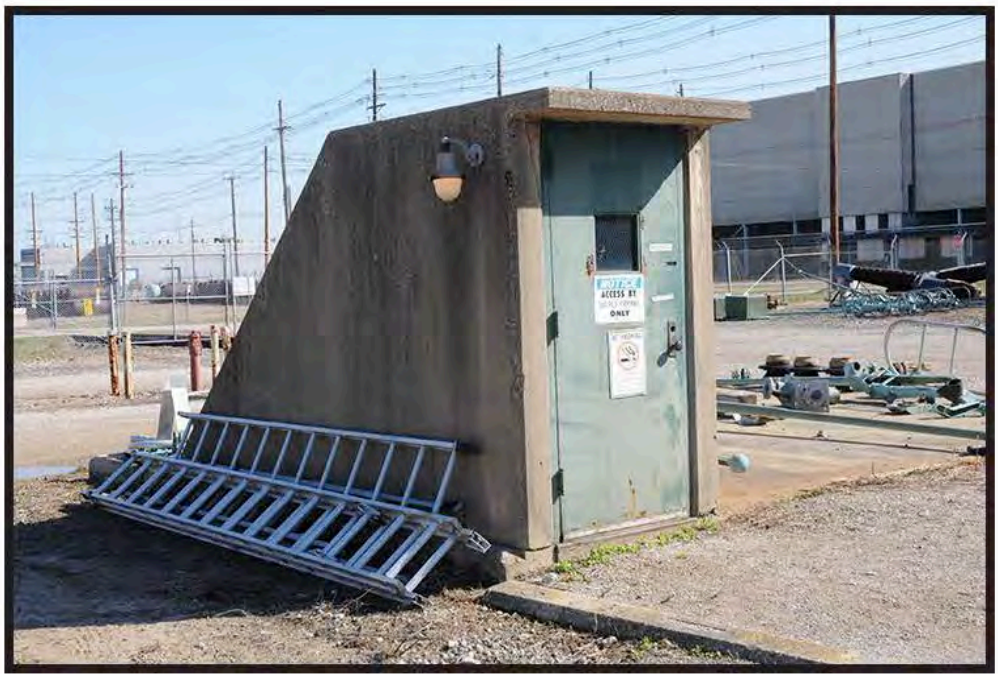

Figure 10: Entrance to the X-530E Valve House, August 2014, Facing Northeast

Figure 11: Entrance to the X-530F Valve House, August 2014, Facing Southeast

Appendix B: Historical Photographs

Figure 12: The X-530 Electrical Switchyard Complex Construction Site, May 1953

Figure 13: The X-530B Control House and Switch House, Looking North, June 1953

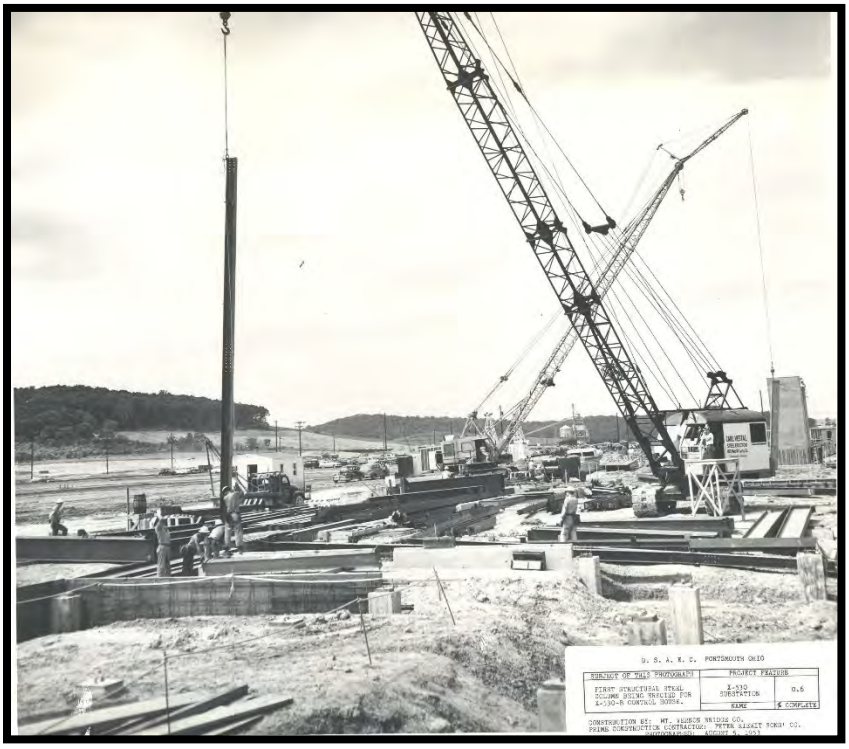

Figure 14: First Structural Steel Column Being Erected for the X-530B Switch House, August 1953

Figure 15: Grading and Foundation Work for the X-530 Electrical Switchyard Complex, August 1953

Figure 16: Foundation Work for the X-530 Electrical Switchyard Complex, September 1953

Figure 17: Foundation Work for the X-530 Electrical Switchyard Complex, September 1953

Figure 18: Foundation Work for the X-530 Electrical Switchyard Complex, September 1953

Figure 19: Foundation Work for the X-530 Electrical Switchyard Complex, September 1953

Figure 20: Steel Framework for the X-530 Electrical Switchyard Complex, October 1953

Figure 21: Steel Framework for the X-530 Electrical Switchyard Complex, October 1953

Figure 22: Steel Framework for the X-530 Electrical Switchyard Complex, November 1953

Figure 23: Steel Framework for the X-530 Electrical Switchyard Complex, December 1953

Figure 24: Steel Framework for the X-530 Electrical Switchyard Complex, December 1953

Figure 25: Looking Northwest at the X-530 Electrical Switchyard Complex, February 1954

Figure 26: Overall View of the X-530 Electrical Switchyard Complex, March 1954

Figure 27: Looking North at Ohio Valley Electric Company (OVEC) 13.8 Kv Switchyard, West of the X-530 Electrical Switchyard Complex, June 1954

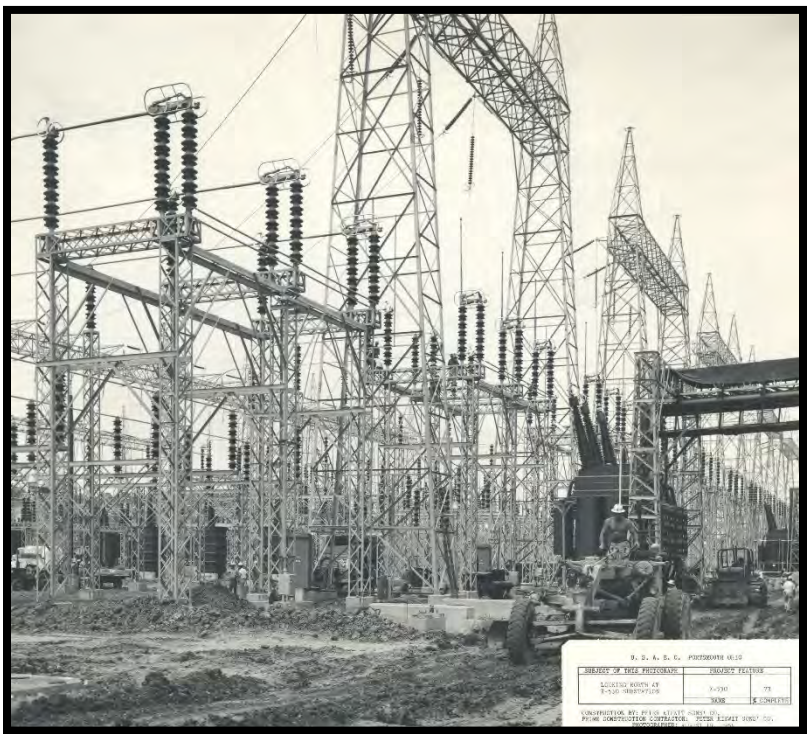

Figure 28: Looking North at the X-530 Electrical Switchyard Complex, August 1954

Figure 29: Extension to North Switch House of X-530 Electrical Switchyard Complex, August 1954

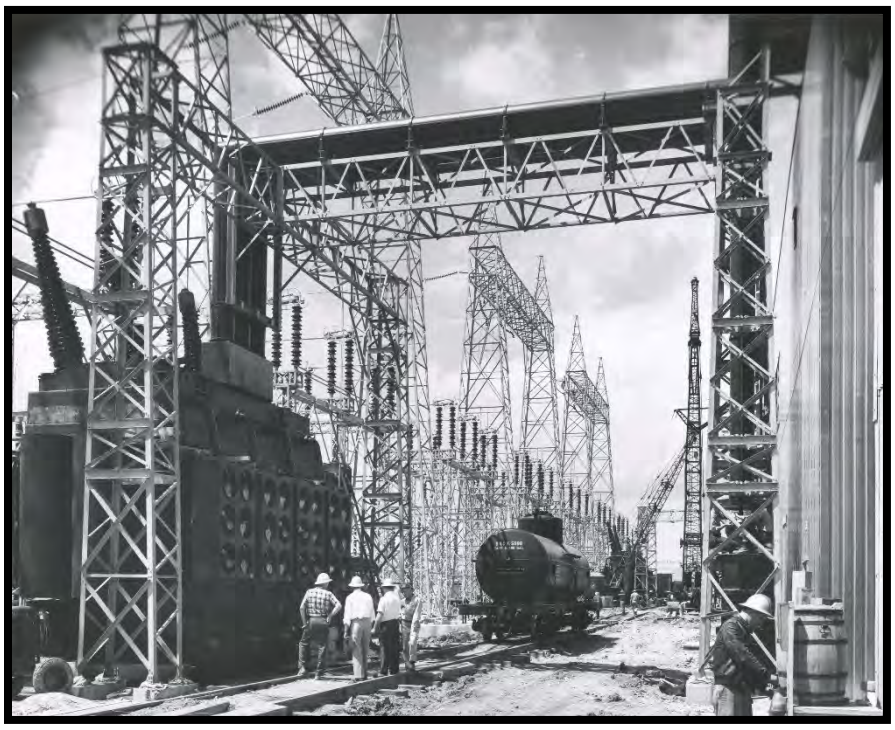

Figure 30: The X-530 Electrical Switchyard Complex, September 1954

Figure 31: The X-530 Electrical Switchyard Complex, September 1954

Figure 32: The X-530 Electrical Switchyard Complex, September 1954

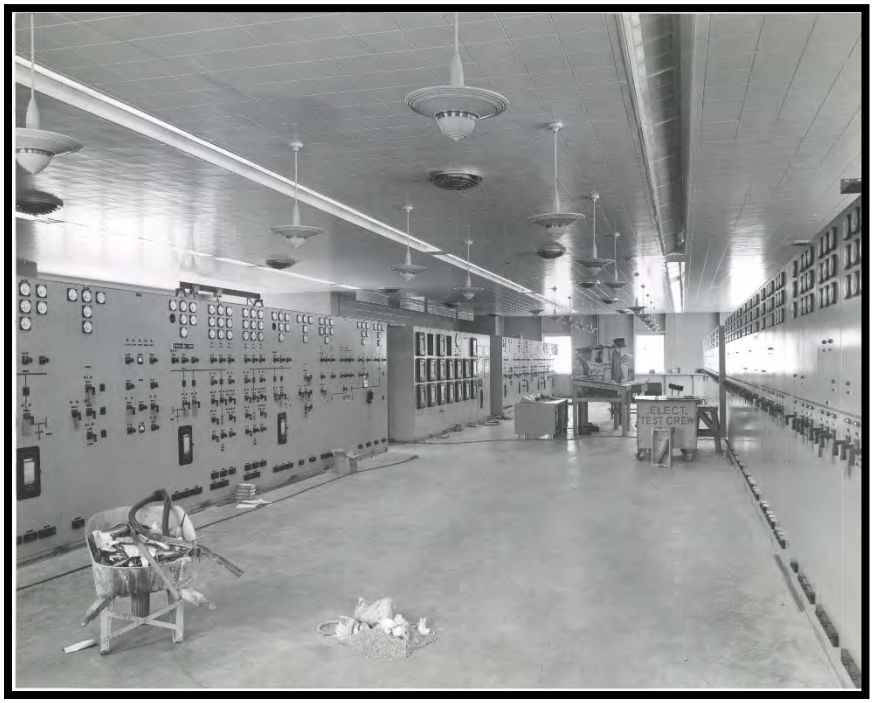

Figure 33: Main Control Board, the X-530 Electrical Switchyard Complex, September 1954

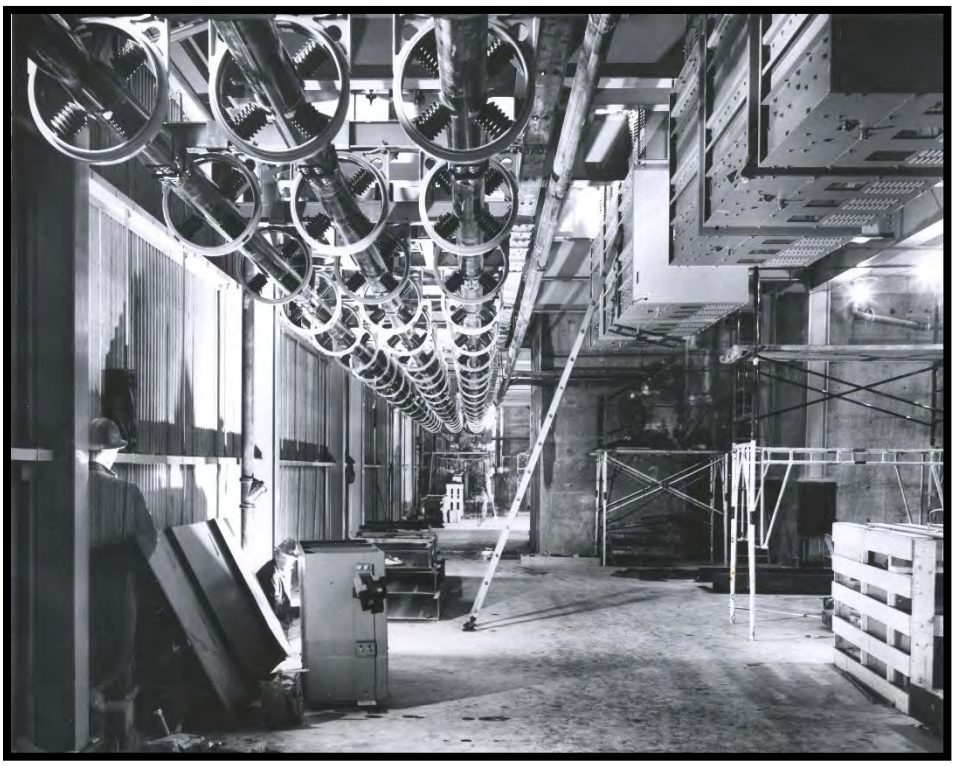

Figure 34: The X-530 Electrical Switchyard Complex, September 1954

Appendix C: Historical Drawings

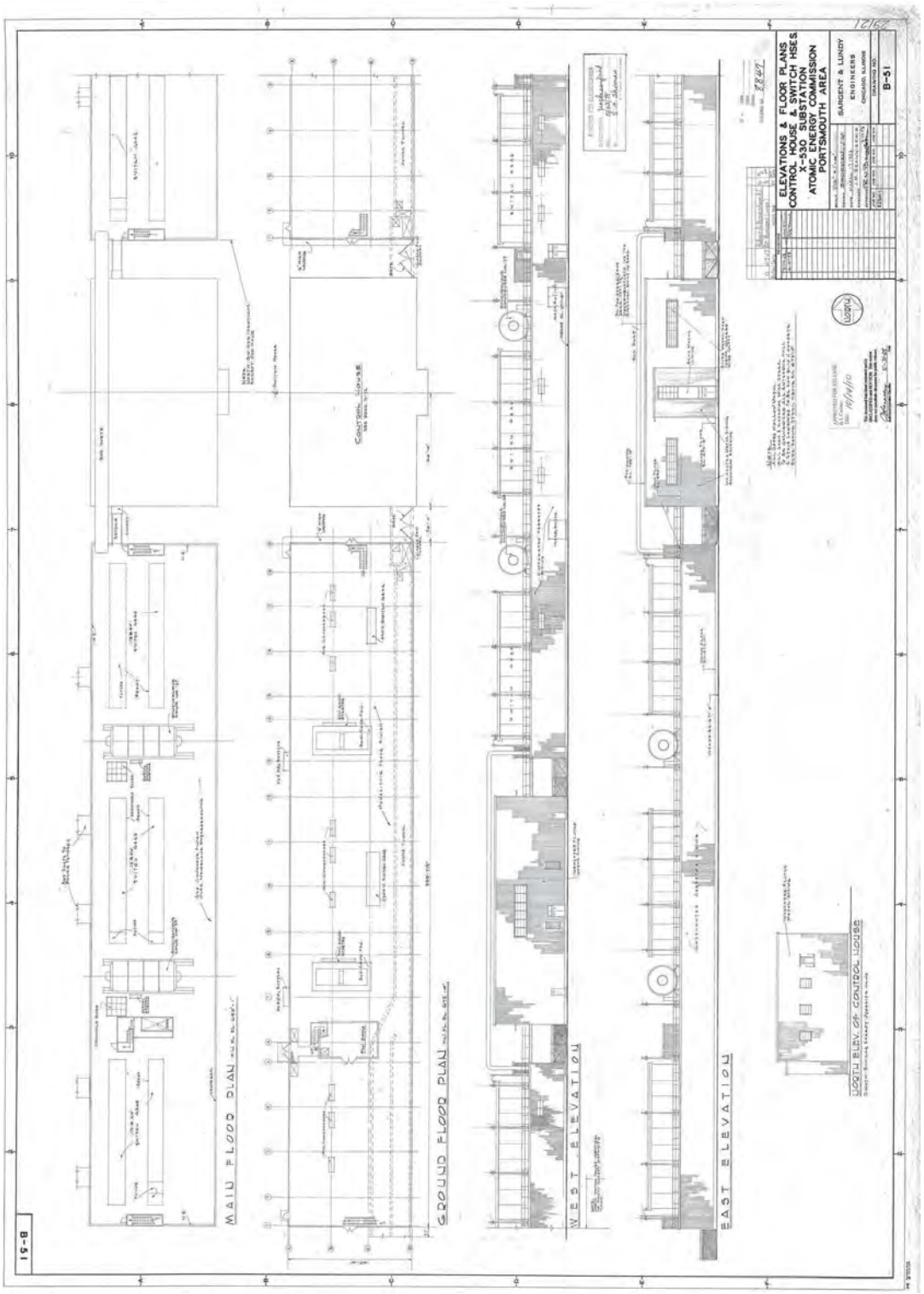

Figure 35: Elevations and Floor Plans

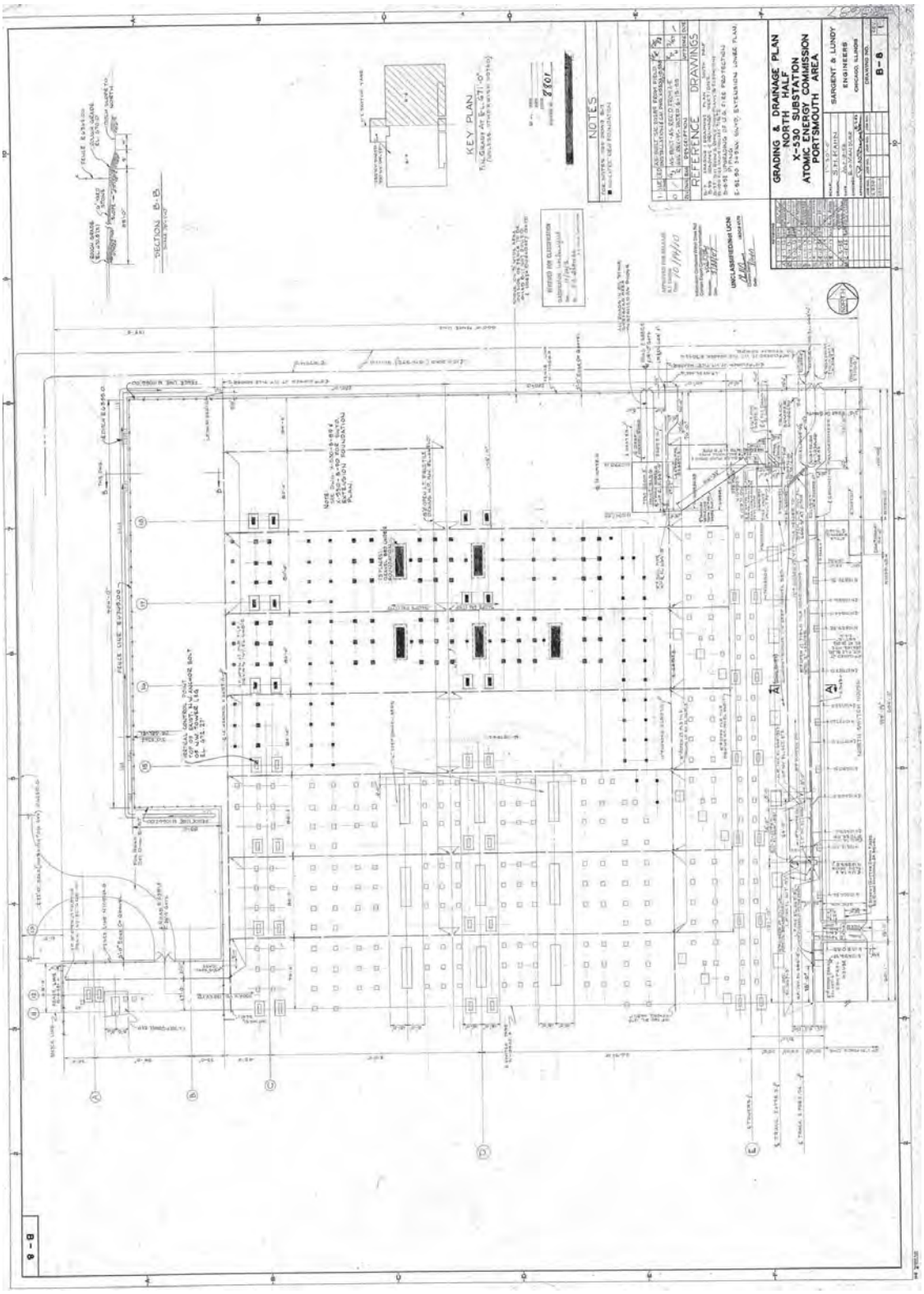

Figure 36: North Grading and Drainage Plan

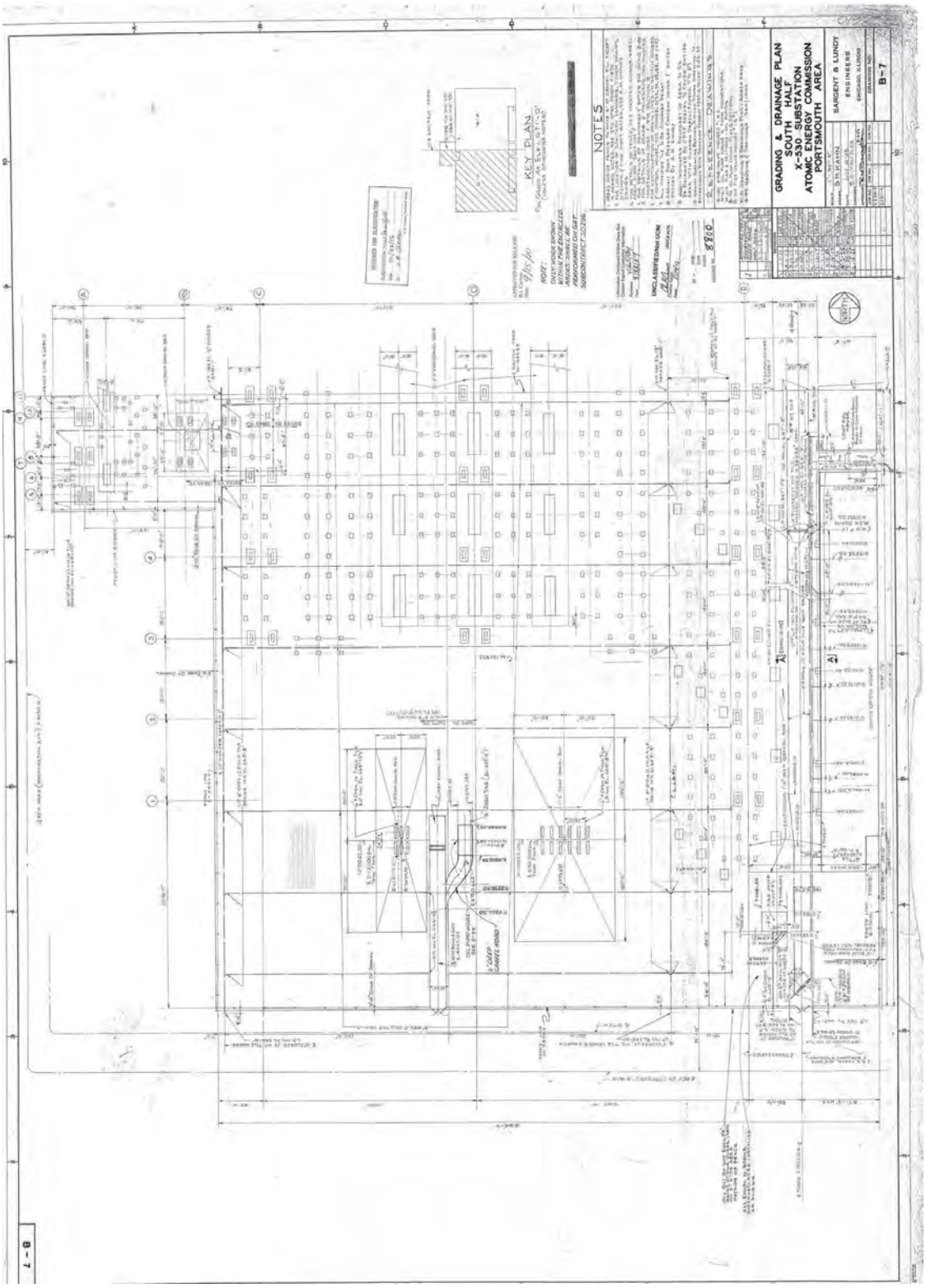

Figure 37: South Grading and Drainage Plan

Figure 38: Log of Test Borings

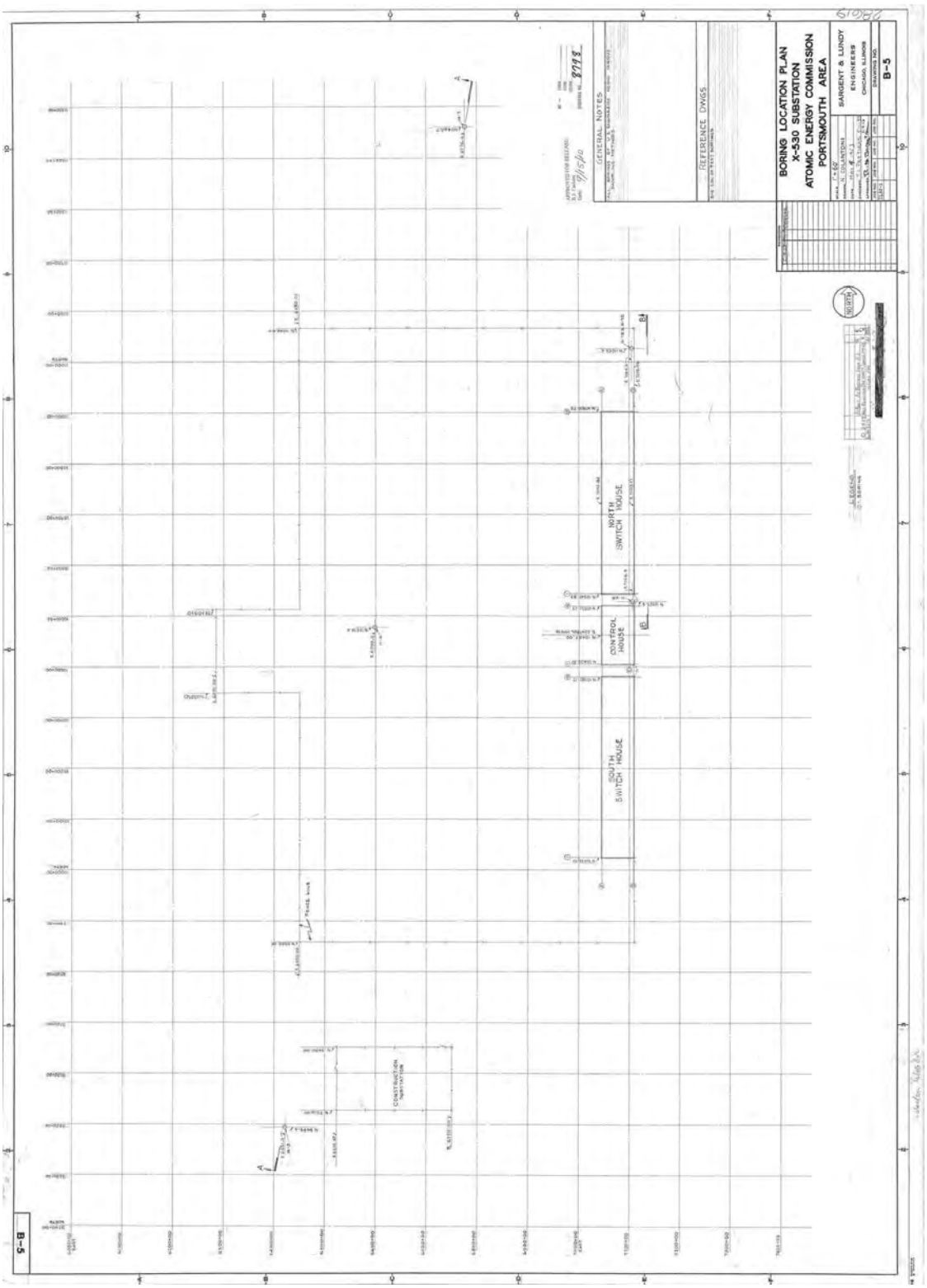

Figure 39: Boring Location Plan

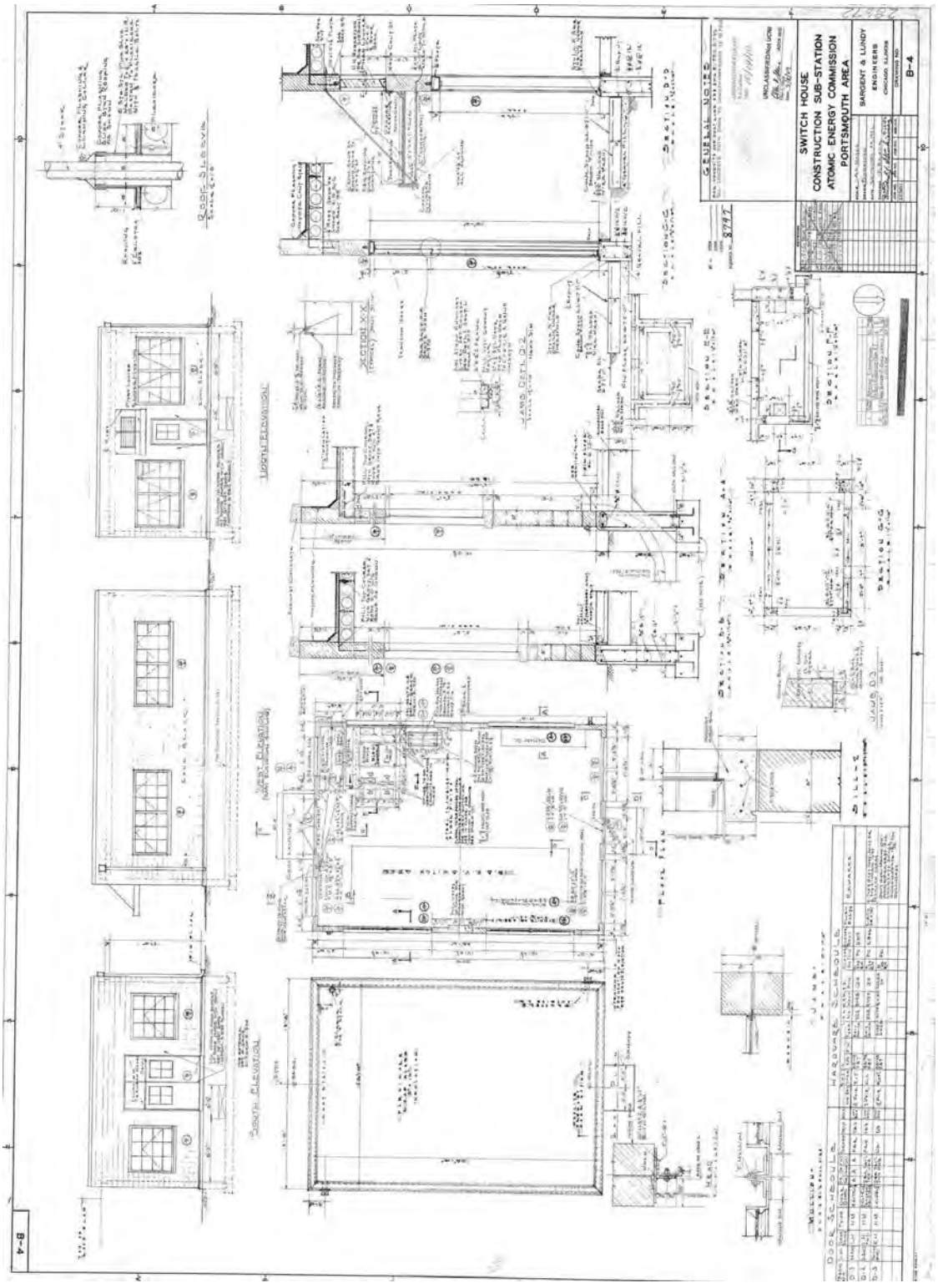

Figure 40: Switch House

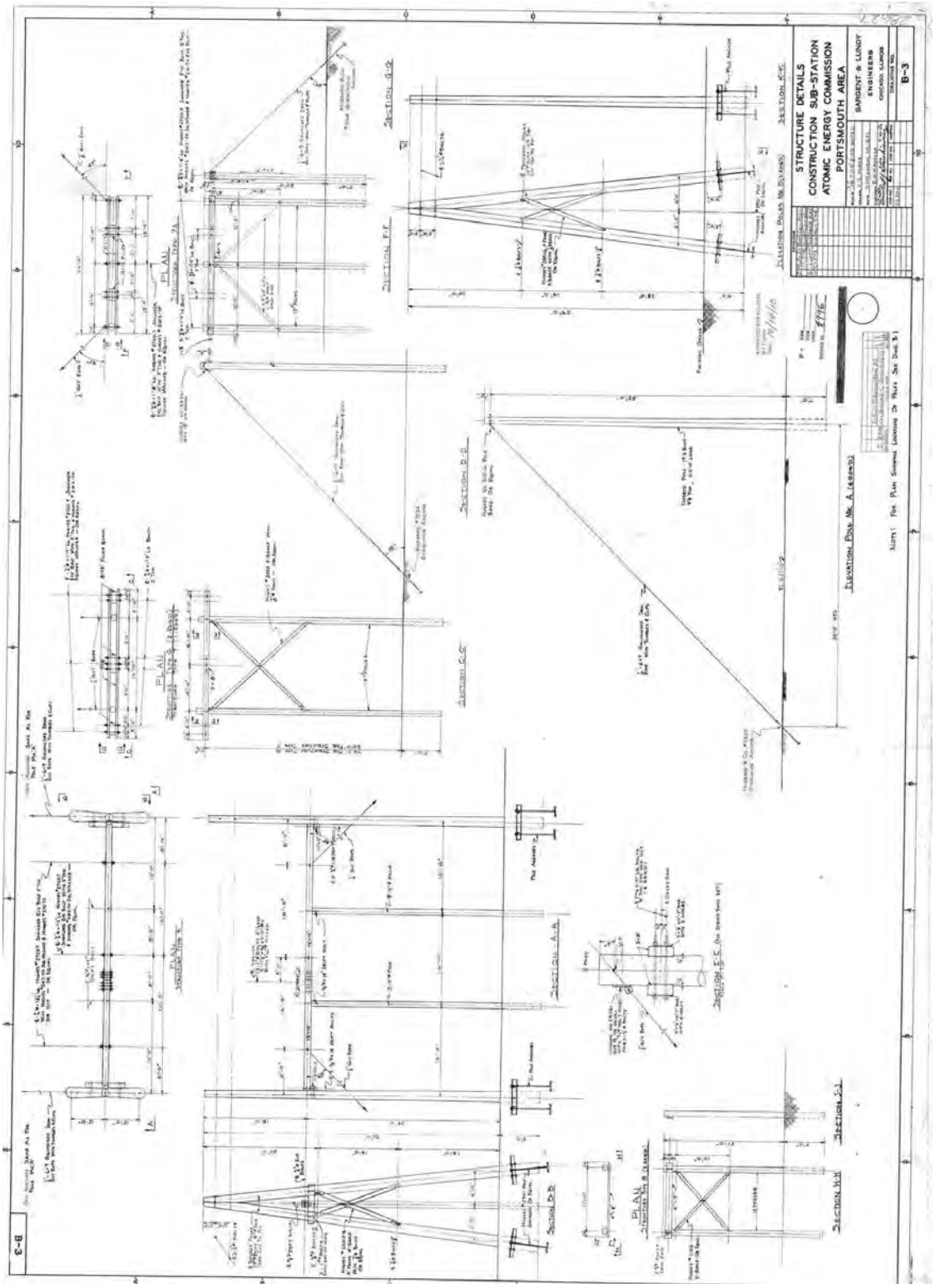

Figure 41: Structure Details

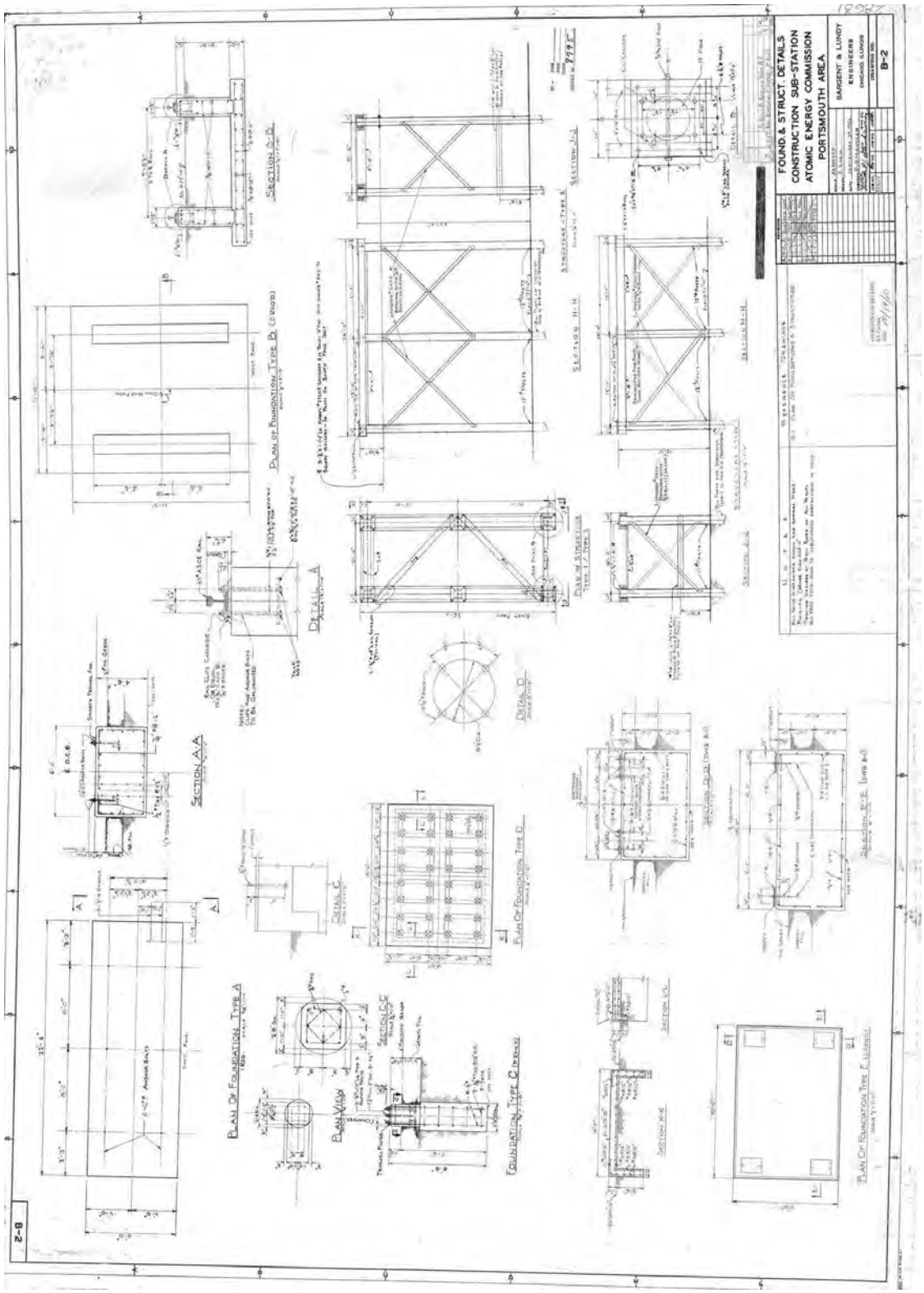

Figure 42: Foundation and Structure Details

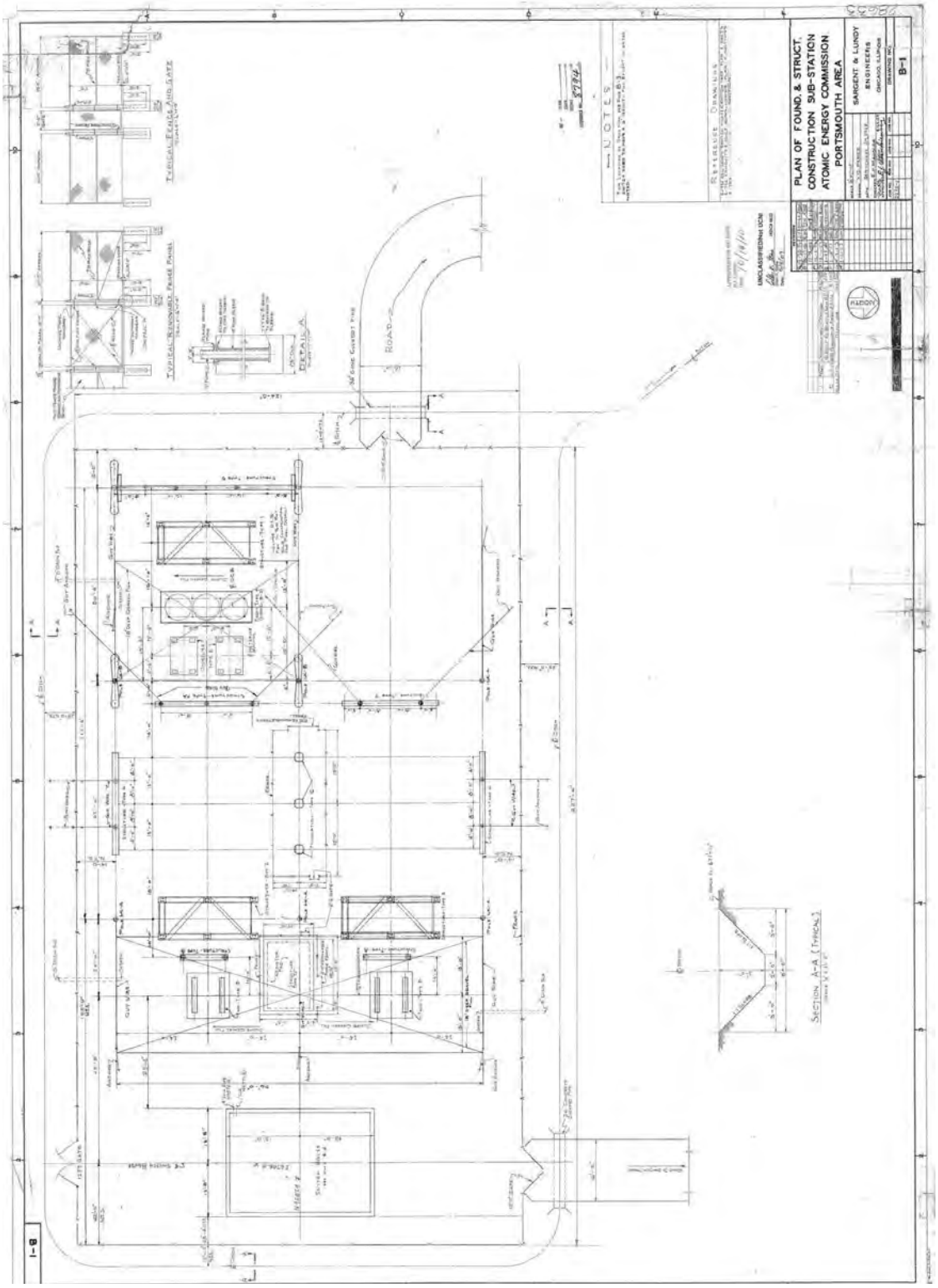

Figure 43: Plan of Foundation and Structure