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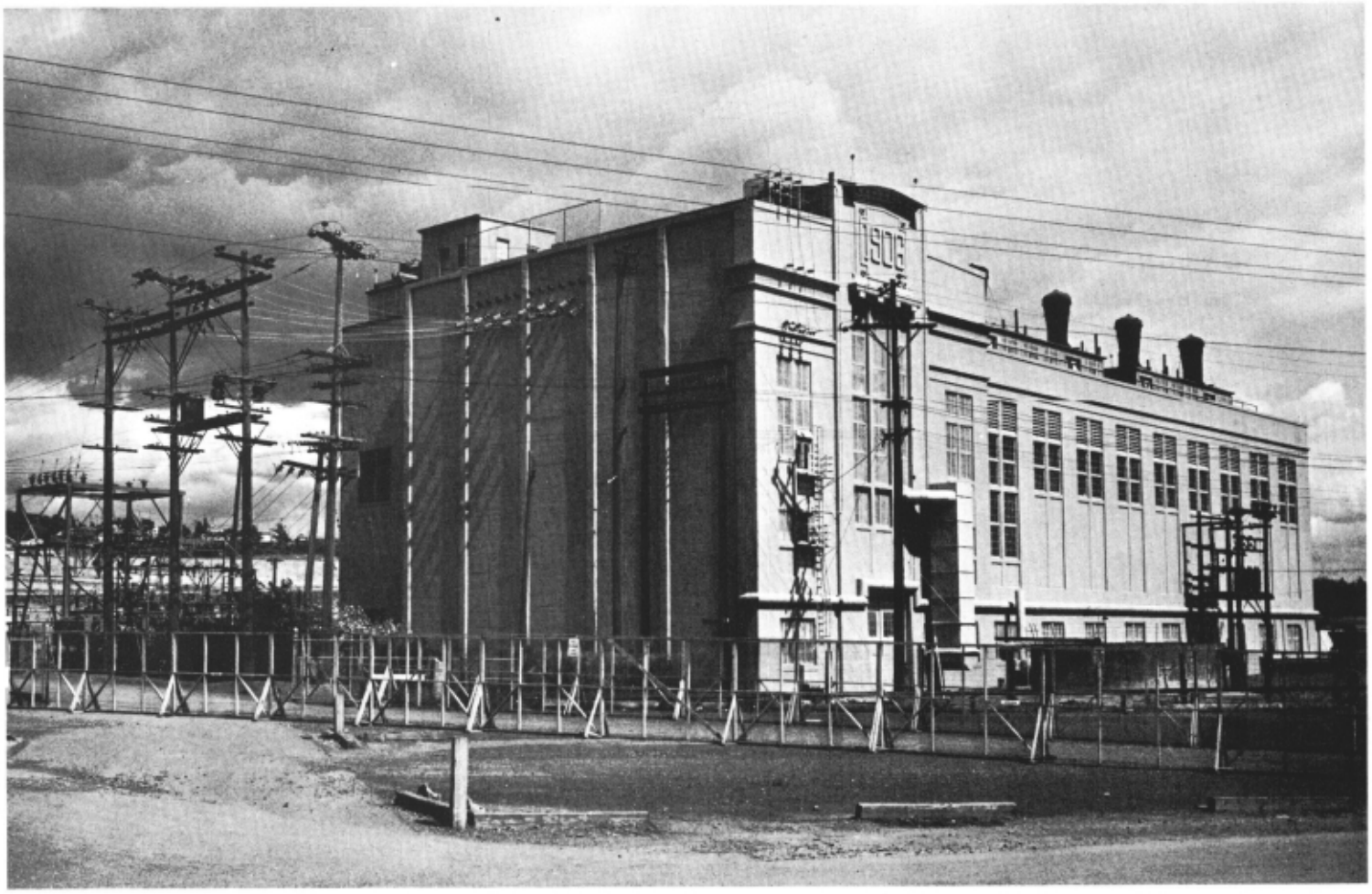


GEORGETOWN STEAM PLANT
Seattle, Washington

NATIONAL HISTORIC MECHANICAL ENGINEERING LANDMARK

Dedication Program
May 7, 1980

Welcome
Harry Reeder, Vice President, Region VIII

Introduction
Thomas Savage, Chairman, Western Washington Section

Mayor's Address
Robert J. Royer, Deputy Mayor of Seattle

ASME Landmark Program
Prof. J.J. Ermenc, Chairman, National History & Heritage Committee

History of Georgetown Steam Plant
Joseph P. Reechi, Assistant Superintendent, The City of Seattle, City Light Department

Presentation of Plaque
Dr. Charles E. Jones, President-Elect, ASME

Acceptance of Plaque

Closing Remarks

INTRODUCTION

The Georgetown Steam Plant stands today as a reminder of the era of electrification of America's cities -- the era when industry was first attracted by Seattle's cheap hydroelectric power and electric trolleys drove along Seattle streets.

The plant was built in 1906 by the Seattle Electric Company on 18 acres of land on the Duwamish River. Georgetown, its site, was the center of considerable manufacturing, of the state's largest brewery, and of a rip-roaring, wide-open entertainment district.

From the beginning, the plant was intended to provide Seattle Electric with peak-load capacity in periods of heavy use. The boilers were fired up to operate in the morning from six to ten o'clock and again in the afternoon from three to eight o'clock -- particularly in fall and winter when low water curtailed operation of the hydroelectric system. Much of its power went to operate the Seattle Electric Company streetcars.

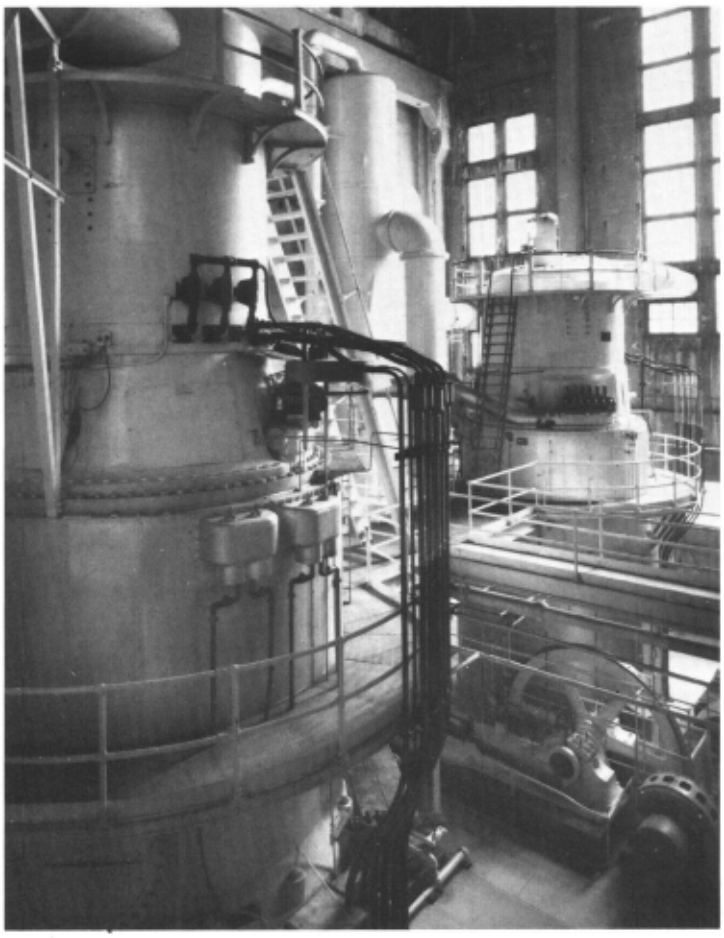
In 1912, Puget Sound Power and Light purchased Seattle Electric Company and consolidated all of the electric companies in the Seattle area except for the municipal utility. In the process, the Georgetown Plant was relegated to a minor role in the system; for a time it was used only to supply steam heat to the company's nearby carbarns.

The City of Seattle Department of Lighting, now the City Light Department, purchased the properties of the Puget Sound Power and Light in 1951. The plant's last production run was in the winter of 1964 during a major water shortage.

From 1971 to 1977, the plant was maintained on "cold standby" as part of a regional reserve for emergency situations, with the City of Seattle receiving credits from the regional Bonneville Power Administration for maintaining the plant in operating condition.

DESCRIPTION

The Georgetown Steam Plant is a reinforced concrete frame building located in the Georgetown district of south Seattle. It contains three steam turbine generators rated at capacities of 3,000 kw, 8,000 kw, and 10,000 kw which were installed in 1907, 1908, and 1917.



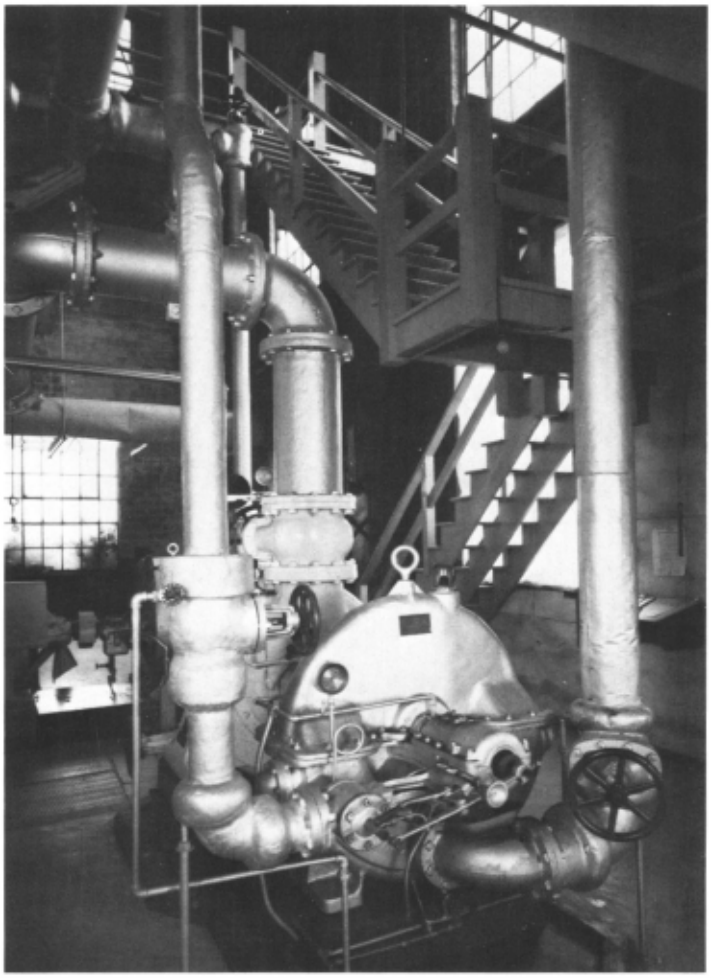
8000 kw Curtis vertical turbine generator located in foreground and 3000 kw Curtis in background.

The two smaller machines are vertical Curtis steam turbine generators with the generating unit positioned directly above the turbine drive and connected by an upright shaft. The 10,000 kw machine is a Curtis turbine of the later horizontal type in which the turbine is mounted beside the generator and the connecting shaft is horizontal. All three turbo-generators are operational and most of the original ancillary equipment is still in place.

The building was designed in Neo-Classic Revival style with such characteristic details as a cornice, belt course, and water table. The steam plant was designed to operate with either oil or coal, and the plant layout reflected an attention to operating efficiency. The longest wing of the plant was devoted to the production of steam. On the top floor was a conveyor for bringing coal into the building. Sixteen boilers were arranged in two rows

running the entire length of the second floor. On the ground level, an ash car rolled on rails below both rows of boilers. There was a coal and ash handling system that allowed the dumping of fuel and waste material from floor to floor without the need for mechanical distribution.

Oriented perpendicularly across one end of the boiler wing, is the second, shorter wing, devoted to generating electricity. The engine room includes the three turbo-generators, each with a circulating pump, a vacuum pump and a barometric or jet condenser. Above the generators, the



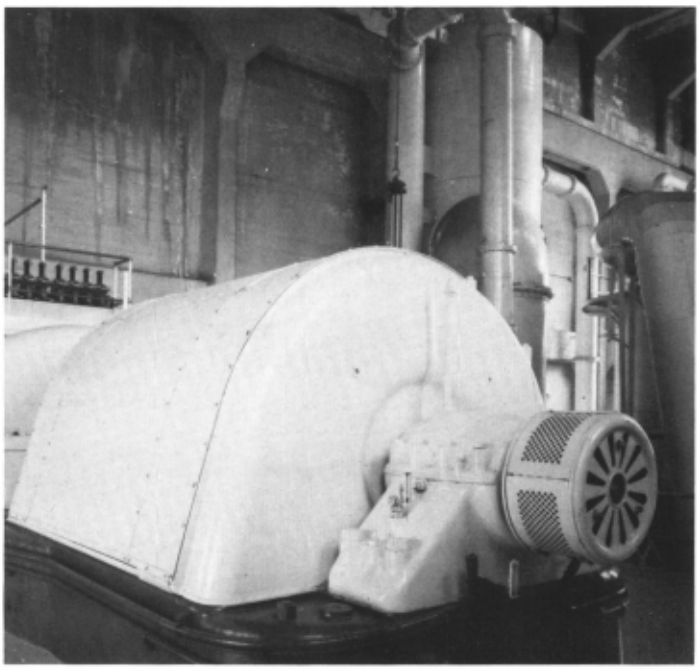
1917 vintage Westinghouse steam turbine drive for the horizontal Curtis steam turbine.

engine room is open to the roof. Across from the generators on the opposite wall, the room is divided into a gallery with five levels. The lower floor is occupied by a bank of transformers and by two ex-

citers (small generators necessary to energize field windings in the turbo-generators to produce the basic electro-magnetic force.) Above this section at various levels are the plant office, the switchboard room, and other control equip-ment.

The 10,000 kw horizontal generator and its condenser are simpler and more compact than the two older vertical machines. It is smaller even than the 3,000 kw unit which has less than one-third of its gen-erating capacity.

The Georgetown Steam Plant has undergone little modernization since the instal-lation of its third generator in 1917. The boilers were converted to steam-atomized oil-fired furnaces beginning in 1918, and the process of conversion continued until 1946. The plant was originally built on the east bank of the Duwamish River to take advantage of the river as a source of cooling water for the condensers and for convenience in discharging wastewater. In the mid-30s, the Duwamish was diverted to accommodate construction of the King County Airport, leaving the plant some distance from the river's new channel. So a pumping station was built to insure a continued supply of river water, and the discharge tunnel was lengthened at that time.



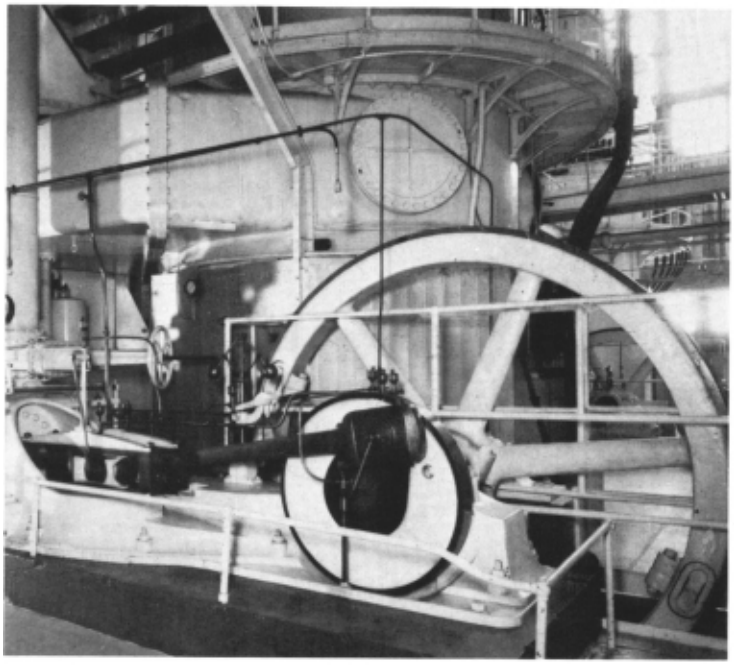
10,000 kw horizontal Curtis turbine generator.

DEVELOPMENT OF THE CURTIS STEAM TURBINES

In 1903, the 3,000 kw Curtis steam turbine generator was the world's most powerful steam-driven turbine. It represented a significant achievement in electric power generation technology that has influenced the design of all major thermal power generators built since that time.

When it was introduced by the General Electric Company, the Curtis steam generator had more than three times the power capacity of turbine generators then in use. It was smaller in size and lower in cost than rotary motion? was significantly smoother in operation. The Curtis design established the steam turbine as a practical and compact prime mover capable of producing large amounts of power.

Early Curtis turbine generators were arranged with the generator positioned directly above the turbine and connected to a vertical shaft. This configuration was an adaptation to steam turbines of an arrangement commonly used for hydroelectric generators. There were two principal advantages of the vertical arrangements. First, stacking the components required less floor space. Second, the rotary shaft was not subject to lateral distortion due to the weight of the revolving parts.



1907 vintage horizontal Tandem Weiss Crank and fly-wheel air pump produces 15 ft. of water vacuum in the barometric steam condenser for each vertical steam turbine.

The vertical shaft was abandoned by General Electric Company between 1908 and 1913 with the development of the horizontal Curtis steam turbine generator. To increase power output and turbine efficiency additional turbine stages were added and operating speeds were increased from 500 rpm to 1800 rpm. A longer shaft and additional shaft support were required to maintain rotor stability, resulting in the development of the horizontal design.

CONCLUSION

The Georgetown Steam Plant contains the last operating examples of the world's first large scale steam turbine.

The invention of a practical steam turbine generator made possible the widespread marketing of large amounts of electricity for home and industrial use. In areas where hydroelectric sources were unavailable, early electric utilities were dependent upon piston driven steam engines. As the demand for electricity grew, larger machines were required to increase production. These engines eventually became so massive that vibrations from large power plants literally shook the earth.

By overcoming these limitation and contributing to the general availability of electricity, the Curtis steam turbine generator came to represent one of the most significant advancements in the history of industrial technology.

WORDING ON ASME PLAQUE:

The Georgetown Steam Plant is a surprisingly complete and still operable steam power plant after a career of nearly seventy-five years. It marks the beginning of the end of the reciprocating steam engine's domination in the growing field of electrical energy generation for lighting and power. The plant's three Curtis turbines, manufactured by the General Electric Company between 1907 and 1917, represent the first two generations of this American innovation. The preservation of the Georgetown Steam Plant is a tribute to the City of Seattle and its City Light Department.

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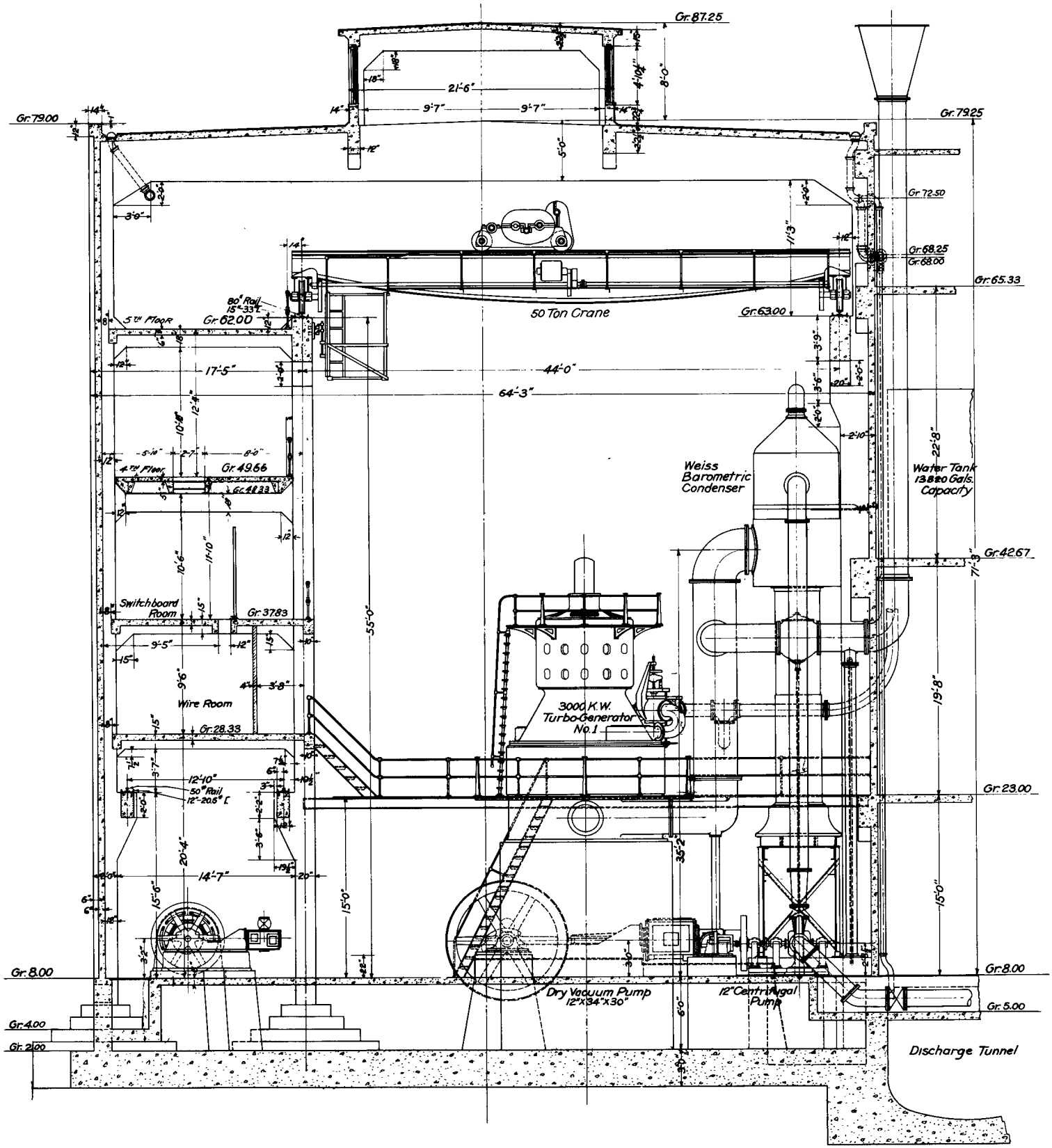
1980


Gr. 87.25
Gr. 79.00
Gr. 79.25
Gr. 72.50
Gr. 68.25
Gr. 68.00
Gr. 65.33
Gr. 63.00
50 Ton Crane
80" Rail
15"-33"
5th Floor
Gr. 62.00
4th Floor
Gr. 49.66
Gr. 48.33
Switchboard Room
Gr. 37.83
Wire Room
Gr. 28.33
50" Rail
12'-20.6" ℄
Weiss Barometric Condenser
Water Tank
13820 Gals.
Capacity
Gr. 42.67
3000 K.W.
Turbo-Generator
No. 1
Gr. 23.00
Gr. 8.00
Dry Vacuum Pump
12"X34"X30"
12" Centrifugal
Pump
Gr. 5.00
Gr. 4.00
Gr. 2.00
Discharge Tunnel
21'-6"
9'-7"
9'-7"
44'-0"
64'-3"
17'-5"
55'-0"
14'-7"
35'-2"
19'-8"
15'-0"
22'-8"
71'-3"

ACKNOWLEDGEMENTS

The Western Washington Section of The American Society of Mechanical Engineers gratefully acknowledges the efforts of all who cooperated on the landmark dedication of the Georgetown Steam Plant, Seattle, Washington.

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We wish to express our gratitude to the City of Seattle, City Light Department, the General Electric Company, and the Westinghouse Company, whose kind cooperation made this dedication possible.

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