St. Paul Gas Light Company Island Station

Part 1

SITE DESCRIPTION

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1.1 Property Location and Setting

The St. Paul Gas Light Company Island Station Plant at 380 Randolph Avenue (437 Shepard Road, formerly 1 Ross Road; RA-SPC-3323) is located in Section 12 of Township 28N R23W, about two miles upstream from downtown St. Paul. It is in Planning District 9 (known as the West 7th/Fort Federation Community Council). The electric-steam plant occupies the foot of a peninsula on the west side of the Mississippi River about 100 feet from the shoreline. This peninsula was originally the 6-acre Ross Island and was reached by a wood bridge (razed). The west half of the island is now infilled in part by ashes sluiced out of the plant furnaces (Figure 2; Westbrook 1983:33).

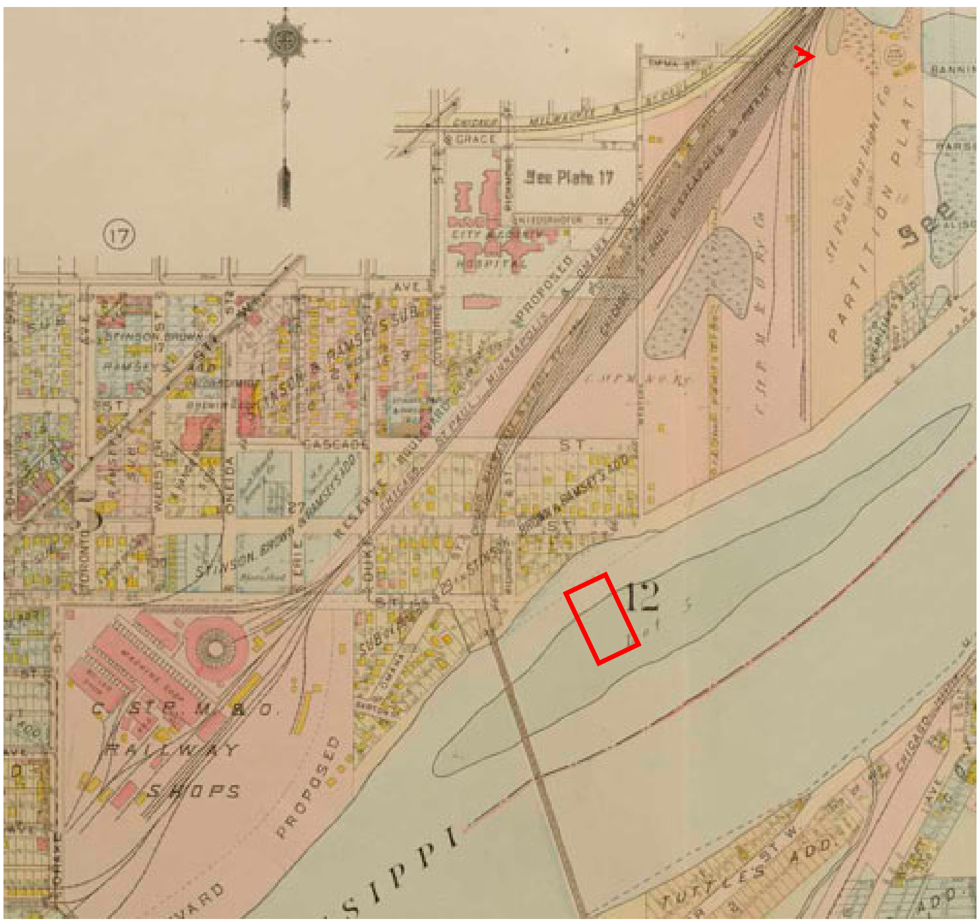

Figure 2. Ross Island and future site of Island Station. Plat Book of the City of Saint Paul, Minnesota (G. M. Hopkins 1916). The St. Paul Gas Light Company's Gas Storage facility (ca. 1914, razed) was located on what is now Xcel Energy's High Bridge Generating Station property (see arrow).

At the time of construction, the plant was part of an industrial district that included the Chicago, St. Paul, Minneapolis and Omaha Railroad shops (1882-) and stockyard and meatpacking facilities. Its own gas storage tank (ca. 1914) stood northeast of the plant near the NSP High Bridge Plant (1924) then also under construction (Figure 2). During the 1930s, development of the 9-Foot Channel by the U. S. Army Corps of Engineers facilitated barge traffic and the 1937 construction of the Shell Petroleum and Socony

Vacuum Oil company tank farms (*SPD* 16 March 1937; Phelps 1984:8-5). The area immediately downriver under the High Bridge was part of Little Italy, an Upper Levee immigrant community.

The riverfront site provided an ideal river water supply for plant condensers and a good rail connection for coal delivery. The site was originally served by a Chicago, St. Paul, Minneapolis & Omaha Railway spur line elevated on wood trestles (Figures 3, 4, 17). The Omaha Swing Bridge Number 15 (1915) is located immediately west of the plant.

A "Study for the Arrangement of the Grounds" prepared by landscape architect George Nason in April 1924 shows a landscaped service court and forecourt for parking and circulation placed on the east and north sides of the building (NWAA). A lawn was planted on the bottom of the land that sloped away from the river, and coal storage was placed along the river's edge.

Today, despite visual competition from the bulk of the downriver High Bridge (1987) and Excel High Bridge Generating Station (2008), the historic Island Station plant remains a prominent landmark visible from many points along the river.

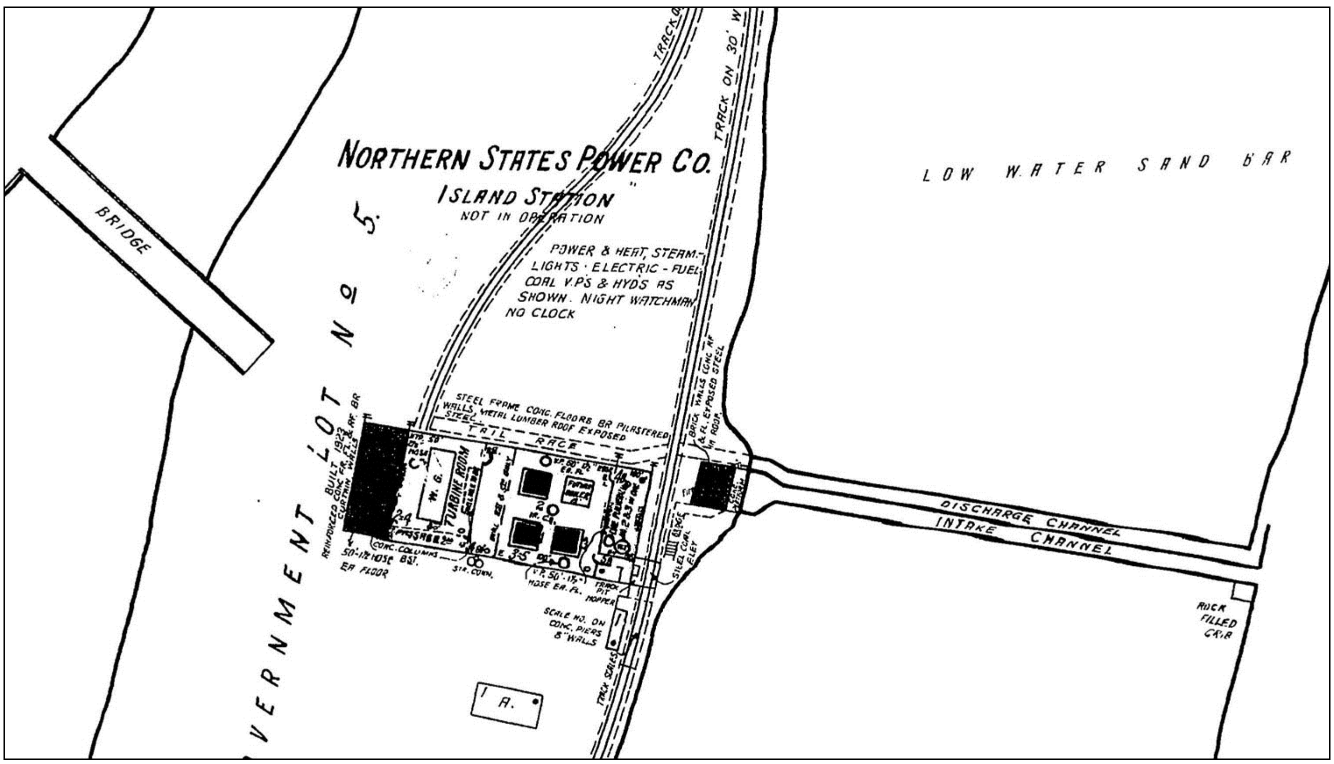

Figure 3. Island Station, Sanborn Map Company, 1926-1951, vol. 1, Sheet 34. Detail of plant and site.

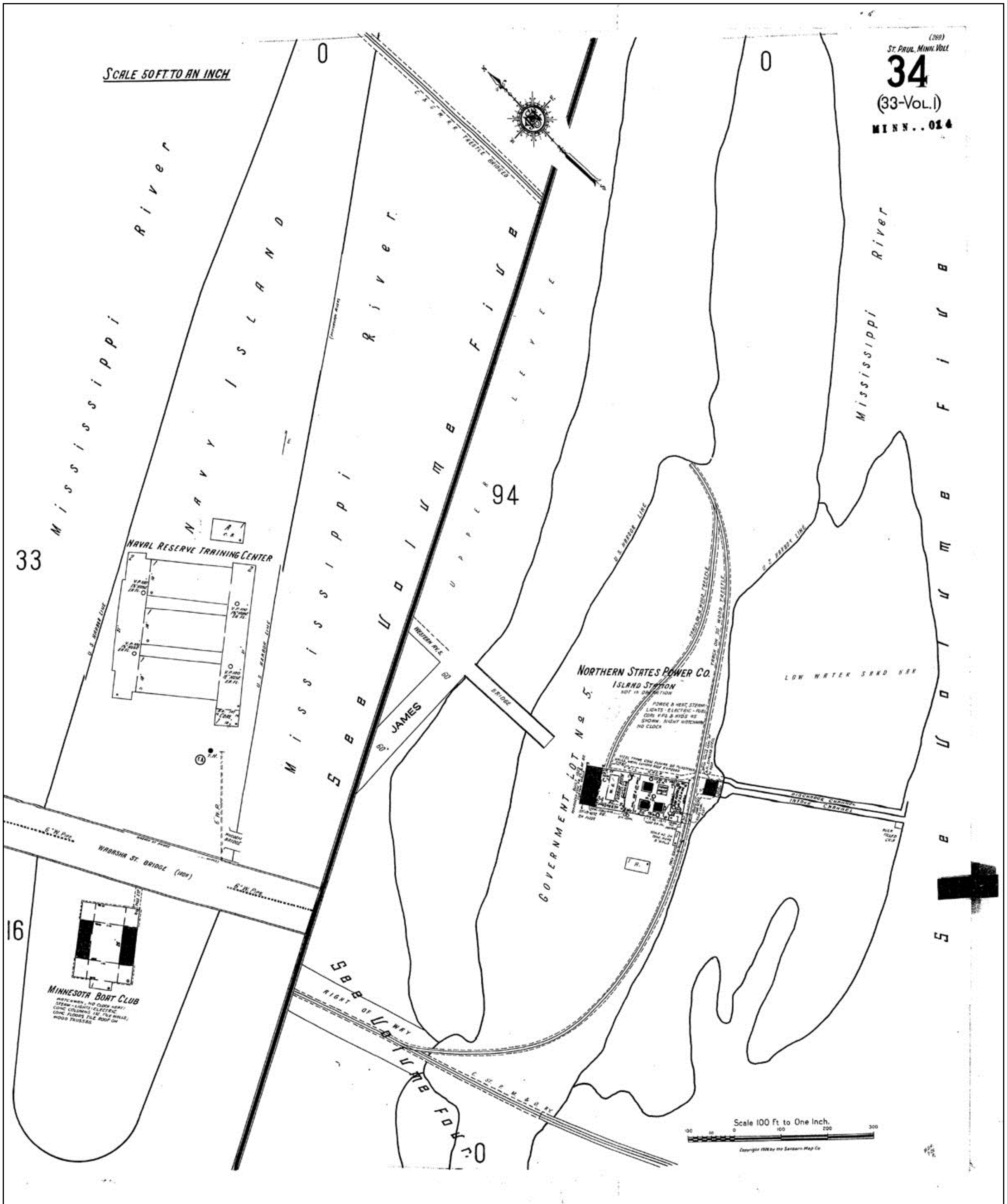

Figure 4. Island Station, Sanborn Map Company, 1926-1951, vol. 1, Sheet 34.

1.2 Island Station Engineers and Architects: Toltz, King & Day

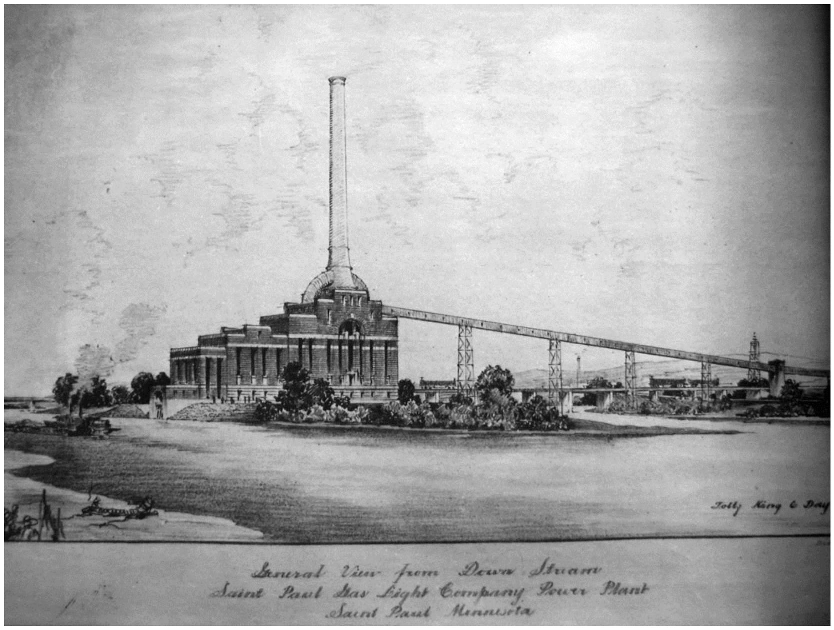

Figure 5. Toltz, King and Day, "Saint Paul Gas Light Company Power Plant," General View, 1923. (NWAA)

The selection of Toltz, King & Day brought a highly experienced firm to the task of designing the $1.6 million plant (Figure 5). The St. Paul firm was founded in 1910 by civil engineer Maximilian Toltz (1857-1932) and structural engineer Wesley E. King (1879–1959). Architect Beaver Wade Day (1884-1931) joined the firm in 1919. In 1956, the firm changed its name to Toltz, King, Duvall, Anderson, and Associates, with the addition of Arndt Duvall, Gerald Anderson, and employees of the firm. Lathrop calls them "One of the most important architecture and engineering firms in Minnesota." He notes, "the company grew into one of the largest and most successful in the Twin Cities, designing and constructing many bridges, power plants, and commercial buildings of all types" (Lathrop 2010:213). The firm is now TKDA.

Toltz was an 1877 graduate of the Royal Academy of Science and Engineering in Berlin. He arrived in St. Paul in 1882 after working in Germany, Switzerland, and Canada. He was chief engineer with the St. Paul, Minneapolis, and Manitoba Railway (later the Great Northern Railway). King was a 1905 graduate of the University of Minnesota with previous experience with the Bridge Department of the Great Northern. Day was a North Dakota native and graduated from the University of Pennsylvania in 1908. His previous experience was with the office of architect Allen Stem of St. Paul (1908-1919; NWAA).

During the period when Island Station was in design and under construction, the firm completed many types of projects in the Upper Midwest, including factories, power plants, schools, courthouses, and railroad and office buildings. They were lauded for bridge design, including the multi-span, reinforced concrete, 1,500-foot-long Robert Street Bridge in St. Paul (1926; NRHP). Notable engineering and/or architectural commissions include the Como Park Conservatory (1915; NRHP), Hamm Building (1920, staff architect Roy Childs Jones, NRHP); Stearns County Courthouse and Jail (1920; NRHP); structural work for the St. Paul Union Depot (1923; NRHP), and the Krank Building (1926; NRHP). About the time of the Island Station project, the firm was also completing the Flaxilinum Insulation Company Power Plant in St. Paul (1923), the Louis F. Dow Company Building in St. Paul (1923), the First Merchants State Bank in Fargo, North Dakota (1924), and the Moorhead, Minnesota Power Plant (1925; NWAA).

George Grant Construction was hired for Island Station foundation work, and Siems, Helmers and Schaffner were general contractors. Construction took place between March 1, 1923, and November 24, 1924, when the plant was placed in service (Phelps 1984:8-3; *SPPP* 24 April 1925).

1.3 Exterior Description

The following description is based on very limited exterior building inspection (see Section 2.1); completion photographs, ca. 1923-24; architectural plans by Toltz, King & Day on file at the Northwest Architectural Archives. Much of the following description was developed for the "Island Power Plant National Register Nomination (Draft)," on file, State Historic Preservation Office, St. Paul (Phelps 1984). The building is oriented southeast; for purposes of this description the river-facing elevation is described as "south" and the elevation facing Shepard Road is "north."

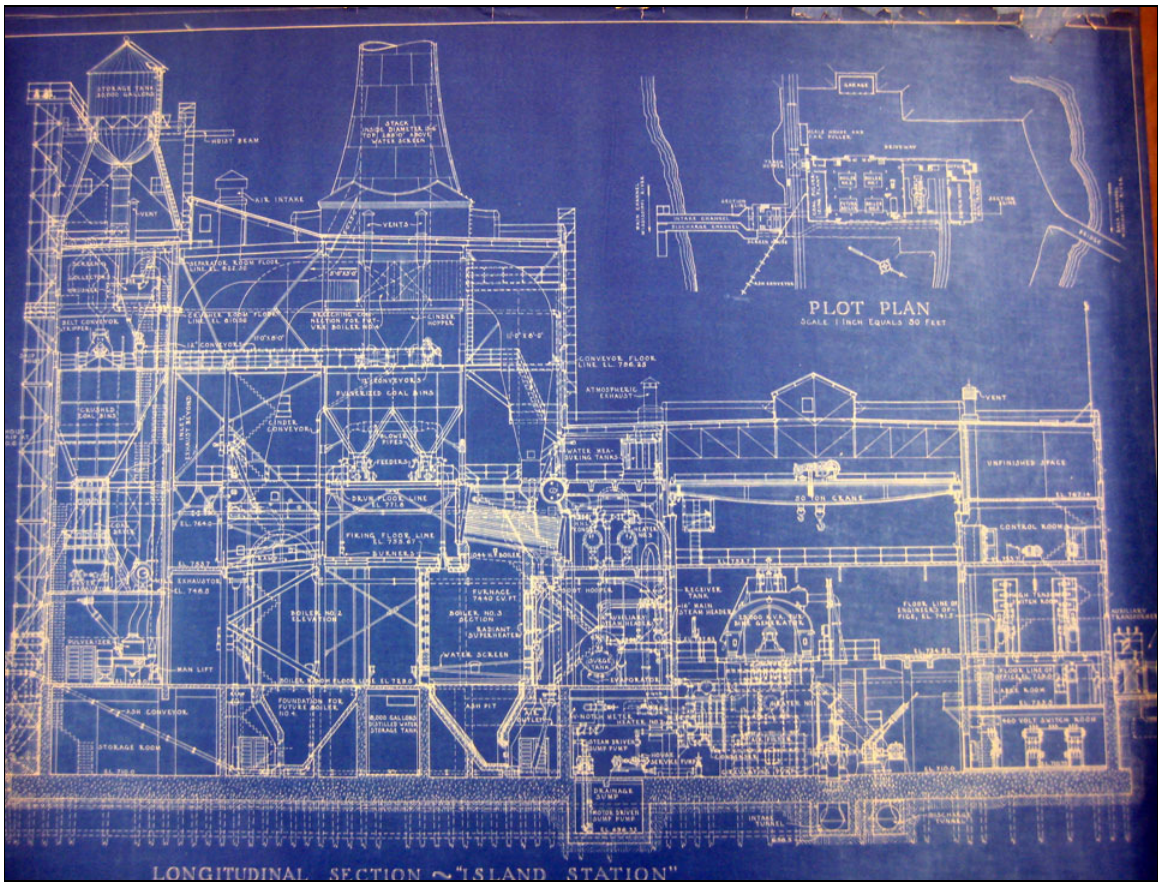

Figure 6. Toltz, King & Day, Island Station Power Plant, Longitudinal Section, 1923. NWAA.

Figure 7. Island Station, looking northeast, 2012. (Bing)

Figure 8. Island Station, looking northwest, 2012. (Bing)

Figure 9. Island Station, looking south, 2012. (Bing)

Figure 10. Island Station, looking north, 2012. (Bing)

The plant structure rests on a concrete slab supported by more than 1,400 wooden piles. A one-foot poured concrete base slab surmounts four feet of concrete reinforced with 140 tons of steel that comprises the plant foundation. Sidewalls of reinforced concrete 24 inches thick rise from the second slab 19 feet on the river-facing (south) elevation and 24.5 feet on the north elevation. A waterproof membrane covered these walls and was protected by a backfilled, four-foot brick wall.

The building is 227 feet long and 89 feet wide, with a stepped roofline 97.6 feet high running horizontally from the river 134 feet to near the center of the plant. Here it drops vertically to 61.7 feet and runs horizontally to the building's north terminus. No major alterations have been made to original dimensions.

The building exterior is articulated as four sections—coal preparation and pulverizing at the south end, followed by boiler, turbine, and switching sections—corresponding to four interior areas of operation. The exterior is clad in hard burned red brick laid in five-course American bond, with curtain walls of sand-lime faced brick. Each of the four sections are linked by paired white stone beltcourses at three levels.

Most of the building is framed in structural steel; only the switching section is reinforced concrete. The switching section is 30 feet long; the turbine section is 89 feet; the boiler section is 107 feet, and the coal preparation plant is 27 feet. The boiler section and coal preparation plant are 97.6 feet high.

The exterior elevations are united by white stone trim edging the parapet and white stone beltcourses that integrate grouped windows of varying heights and dimensions. On the north elevation corresponding to the switching section there are six bays with square windows divided by beltcourses. On the lateral walls of the switching section, two bays of four windows each are similarly divided. The sashes in this section were Lupton sidewalls with central pivoting ventilators operated from the floor by a chain and spring catch (Phelps 1984:7-1). Here, and elsewhere throughout the building, there has been extensive loss of glazing although some metal sash remains. The extent of missing glazing and exterior trim could not be verified.

A smooth stone enframement surrounds a pair of glazed doors at an entry at the northwest corner of the switching section. A shallow, pitched stone cornice above the entry is surmounted by a stone-trimmed window. The entry is accessed by concrete steps.

Shallow brick piers on the east and west elevations separate the switching section from the turbine room. Five bays filled with multi-paned Pond-wire ribbed windows are bisected by a deep beltcourse and brick panels. On the east side of the plant, two of the bays are filled by a large set of double doors allowing rail access. A shallow parapet wall edges the roofline of the switching section and turbine room; a gable-roofed monitor placed perpendicular to the building's long axis contained three-way prism patent windows.

The boiler section is adjacent to the turbine section of the building and rises nearly 35 feet above the turbine section. It is crowned by a riveted 6-gauge cold rolled steel smokestack lined with common brick. The 289-foot stack, erected by Wilhelm Bros Boiler and Manufacturing Company of Minneapolis, has a maximum diameter of 25 feet and is 15.5 inches in diameter at its top. The rise above the turbine section is accentuated by a brick-banded, round-arch window formerly filled with multi-paned glazing. Slender brick piers rising from the building foundation to the base of the arch divided (missing) panels of multi-paned windows. The sashes in these windows were also Lupton types with pivoting ventilators. Gun-slit window openings with stone sills accent the piers framing the arch. A trio of three gun-slit windows surmount the arch below a stone-trimmed, slightly pitched parapet wall.

The coal preparation plant occupies the south end of the structure adjacent to the boiler section. Its east and west elevations are comprised of three bays, each filled with rectangular windows at the central and lower level. The upper story is illuminated with small gunslit windows. The bays in the central level are filled with paired rectangular windows, and the upper and lower level bays are filled with paired square windows.

A rectangular brick hopper house for coal storage stands on the roof at the southeast corner of the building. A bucket from a vertical skip hoist with a 130-foot lift attached filled the hopper. A 30,000-gallon storage tank is adjacent to the hopper house. The tank furnished water for plant service and fire protection. Water came from an eight-inch, 300-foot-deep artesian well and was pumped by three Cameron centrifugal pumps.

The south elevation facing the river has four bays. The window openings in the west bay are obscured by a lift extending to the roof. The remaining three bays are filled with paired windows separated by beltcourses.

The material and condition of the existing roof is unknown. The original roof consisted of Barrett's 4-ply, 20-year specific pitch and gravel roofing on a reinforced base. The base for the roof varied. In the turbine section and coal preparation plant, the base consisted of a reinforced gypsum slab poured in place over sheet rock supported by 25-pound standard rails resting directly on cross channels of steel. The base in the boiler room was a concrete slab because calcination of gypsum was feared from breeching radiation. The switching section was built on a reinforced concrete slab base (Phelps 1984:7-2; 7.3).

Interior Plan

The work flow began at the river on the south side of the building where coal was loaded and next proceeded through the coal preparation and pulverizing plant to the boiler section, and then into the turbine section. The switching section controlled the electrical equipment and generation. Water for the condensers received from the intake canal was screened with a traveling water screen in the brick and concrete screen house on the riverbank, and run through a tunnel to the condenser.

The switching section was comprised of five levels. The first contained auxiliary switching equipment; level two, the cable room; level three, the high tension switch room; level four, the control room, battery room, and switchboard repair shops. Level five was unfinished and unoccupied.

The main office was placed between the second and third levels, and the operating engineer's office had windows looking into the turbine room. The first, second, third, and fifth level had unfinished walls, while the control room was finished with salt-glazed brick walls, quarry tile floor, and a plaster ceiling.

The turbine room had only two levels. The upper level contained a 25,000-kw turbo-generator unit and a Whiting four-motor electric overhead 50-ton crane with a 60-foot span and 56-foot lift. The room was finished with a 10-foot wainscoting of salt-glazed brick and steel-clay buffed brick laid to the ceiling. Quarry tile covered the floor. The lower level of the turbine section contained the room and related condenser equipment along with boiler feed pumps. A light well was placed on each side of a generating unit. A mezzanine subway grating floor around the generating unit supported water heaters, high pressure traps, oil cooler storage, the air ejector, and settling tanks. Irving's Iron Works of New York City produced the subway grating.

The boiler section had five levels or floors serviced by a Lee-Hoff Company 4,000-pound- capacity combined freight and passenger elevator. The first floor or basement contained the ash pits and two 18,000-gallon distilled water storage tanks placed between the ash pits. The second level housed the boiler combustion chambers, evaporator, surge tank, and steam headers. The third or "firing" floor contained boiler meters, master gauges, master and feeder controls, burners, water reservoirs, last stage heaters, condenser and feed water lines, and the boiler room foreman's office. Feeders, feeder blowers, test-coal weighers, and water measuring tanks were found on the fourth floor. The pulverizing fuel conveyors were on the fifth level. The pulverized coal storage bins were suspended between the fourth and fifth levels.

The coal handling and preparation plant had four floors. The basement was devoted to storage and the remaining levels were divided with one fifth of the space consumed by stairways, the coal foreman's office, locker and washrooms, a skip hoist, crushers, and feeders. Most of the second level contained the pulverizers with the exhausters and driers placed above the third level. The fourth level held the crushed-coal belt conveyor, cyclone collectors, and pulverized screw conveyors (Phelps 1984:7-2).

A gable-roofed metal garage of unknown date is located northwest of the plant. There is a brick scale house and car puller near the southwest corner of the building.

1.3.1 Plant Operation

The workflow is documented in drawings and contemporary descriptions of the plant. Much of the following summary was developed for the NRHP Draft Nomination (Phelps 1984) and is supplemented with information from original plans and contemporary engineering journals. Some of the equipment described in 1984 is reported to have been subsequently removed.

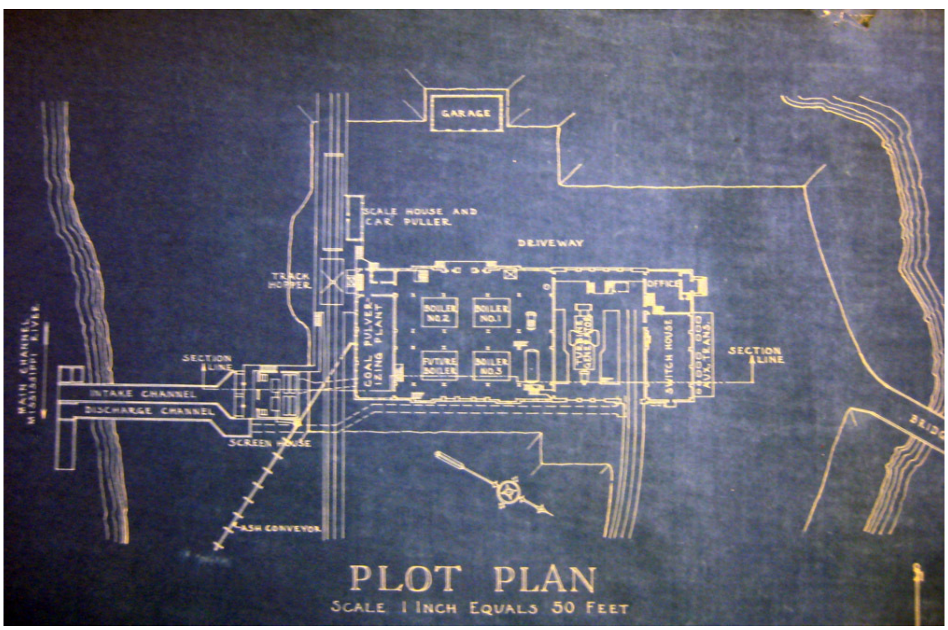

Figure 11. Toltz, King & Day, Island Station, Plot Plan, 1923. NWAA.

A steam-powered turbine, fueled by burning pulverized coal, generated electricity. Coal was delivered over a five-pile bent railroad trestle with switch connections to the Chicago, St. Paul, Minneapolis and Omaha line. The spur wrapped in a semi-circle around the south side of the building and followed along the east side with a wishbone switchback to the turbine room. A motor-driven cable car puller moved drop-bottom coal cars to a track scale on the east side of the building. Coal was next dumped into a concrete pit where it was delivered by the bucket attached to a 130-foot Beaumont Company Lift to a hopper on the roof of the coal preparation plant. A reciprocating feeder took the coal from the hopper to a belt over a pulley-type magnetic separator to a "grizzly." The fine coal was separated in the grizzly and the coarse coal passed over on its way to a crusher. Conveyors transferred the fine and crushed coal to three 200-ton coal storage bins. (Before coal entered the coke oven, it was screened to 2 inches or less.) Once sized, different types were mixed and pulverized by the crusher to fit through a 1/8-inch screen. The Island Station crusher had 1.5- inch pyramid teeth.

Coal from the bins next descended directly through two Lopuco "Wood type" driers fed by flue gas from the boiler and returned to the flue by a parallel duct. The dry coal was gravity-fed to the Raymond-impact, low-side pulverizers at a rate of six tons per hour. A low-pressure air system picked up the fine pulverized coal and elevated it 80 feet to collectors where the air was removed. The pulverized coal next dropped from the collectors to a screw conveyor, which took the pulverized coal to three, 75-ton capacity storage bins. These bins were placed above three Heine-type "M.C." cross-drum, three-pass, inclined baffle-water tube boilers (Phelps 1984:7-2).

Boiler Construction

Each boiler contained 520 tubes, 20 feet in length and 3½ inches on diameter with a total heating surface of 10,440 square feet. The boilers were designed for 325 pounds of pressure, which gave a total steam temperature of 650 degrees F. The boilers were fed by water from either the artesian well or from an intake tunnel running from the river on the east side of the plant. A hopper bottom chamber below the boilers had a volume of 10,420 cubic feet separated into a 2,680 cubic foot ash pit and a 7,440 cubic foot combustion chamber. The entire combustion chamber was contained in a steel casting lined with 22 inches of fire brick and silocell. Burners entered the combustion chamber vertically.

A Lopuco duplex screw feeder removed coal from the 75-ton storage bins and delivered it to mixing chambers supplied with air by two low pressure blowers. The air and coal were mixed by revolving paddles and blown through Lopulco burners into the combustion chamber. A Girtanner jet conveyor removed ashes and refuse from the combustion chamber and deposited on the river flat.

Steam from the boilers powered the turbine attached to the generator. The turbine was a Westinghouse straight-flow reaction type with low-pressure blading designed for bleeding at four points. It operated at 275 pounds of pressure with 650 degrees F. total steam temperature and was cooled by air drawn from a condenser room. Also, water cooled the turbine's oil before being dumped. The Westinghouse generator with a 25,000-kw capacity connected directly to the turbine.

A Westinghouse two-pass surface condenser with a cooling surface of 25,000 square feet received steam directly from the turbine. Condenser cooling water came from the main channel of the river. Two LeBlanc two-stage steam jet surface condenser type air ejectors removed air, and the condenser water ran back to the river. The intake and outtake tunnels to and from the condenser had parallel gates to permit recirculation of the water to keep channels free from ice.

DESIGNATION CRITERIA

The St. Paul Administrative Code establishes seven criteria for the designation of heritage preservation sites (§73.05). The St. Paul Gas Light Company Island Station Site meets criteria 1 and 7.

Designation Criterion 1 (§73.05(a)(1)) states that the Commission shall consider the following about the district:

1. ***Its character, interest or value as part of the development, heritage or cultural characteristics of the City of St. Paul, the State of Minnesota, or the United States.***

   Island Station represented the St. Paul Gas Light Company's attempt to compete with NSP at a time when acquisition and consolidation of such companies was standard practice. St. Paul Gas Light Company became the city's chief gas supplier, but was never its leader in electric power production. The investment in this plant and its new coal pulverization technology, and in a Service Center at Rice and Atwater Streets (1925), demonstrates that the company intended to expand production to meet increasing demand. Investment in this plant did not actually result in a significant contribution to power generation in St. Paul, because after acquisition by NSP it was only used in a standby capacity.

   The planning and construction of this plant, however, is associated with the city's early 1920s neighborhood growth. This was based on reinvigorated railroad, warehousing, retail, and manufacturing interests and corresponding demand for housing supplied with many types of electrical equipment. This included widely advertised, labor-saving household devices. As detailed in St. Paul's Historic Context, "Residential Real Estate Development: 1880-1950" (Zellie and Peterson 2001) and in "The St. Paul Gas Light Company and the Growth of Early Twentieth-Century St. Paul Neighborhoods" the early 1920s were an exceptional period for new housing and neighborhood infrastructure, particularly in the western half of the city including the Highland Park area.

7. ***Its unique location or singular physical characteristic representing an established familiar visual feature of a neighborhood, community, or City of St. Paul.***

Island Station and its 289-foot smokestack are prominent landmarks against the downtown St. Paul skyline and upriver landscape of bluffs and bottomland forest. The vacant building, which declines in condition each passing year, is a well-known local landmark. Since decommissioning in 1973 the building and its setting have inspired artists, designers, explorers, students, neighbors, developers, and all those who imagine the possibilities of the place. Criterion 7 offers a way to address the importance of the building in the public's imagination and therefore, it is recommended as meeting HPC Criterion 7.

1.4 Integrity

Island Station has been vacant since 1973. The building appears to be in very poor condition. It retains fair exterior historic integrity, with extensive areas of missing glass or sash, sections of missing masonry, and graffiti. The surrounding site also retains fair historic integrity, despite removal of railroad trestles and other site circulation. Overall, integrity of design, materials, setting and feeling has been diminished. According to the owner's representative, major interior mechanical equipment has been removed (Tim Pinsen, personal communication, 2/7/13).

PERIOD OF SIGNIFICANCE (1924-1973)

The period of significance for the site is from 1924 when the building was constructed through 1973 when NSP decommissioned the site from use as an electric plant.