CUSHMAN NO. 1 HYDROELECTRIC POWER PLANT, DAM AND VALVE HOUSE
Spanning the North Fork of Skokomish River
Hoodsport vicinity
Mason County
Washington

HAER WA-26-B
HAER WA-26-B

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
333 Bush Street
San Francisco, CA 94104

HISTORIC AMERICAN ENGINEERING RECORD

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HAER No. WA-26-B

Location:	Spanning the North Fork of the Skokomish River, Mason County, Washington USGS Topographic Quad: Hoodsport Township 22 North, Range 4 West, Section 5
GPS Coordinates:	Latitude: 47° 25'374 N, Longitude: 123° 13'361 W This coordinate represents the midpoint of the Cushman No. 1 dam parapet road. Obtained October 17, 2012, using Google Earth (© 2012). The coordinate's datum is North American Datum 1983.
Present Owner:	City of Tacoma, Department of Public Utilities, Light Division (doing business as Tacoma Power)
Present Use:	Hydroelectric Power Production
Significance:	Cushman No. 1 Hydroelectric Power Plant dam and valve house represents a significant achievement in power production for the City of Tacoma. Constructed in response to unprecedented increases in power demands in the city, the Cushman No. 1 Development led to further industrial and commercial expansion. Cushman No. 1 dam is a notable example of medium-head hydroelectric technology from the mid-1920s. Moreover, its construction was an engineering feat, located in steep, nearly inaccessible terrain prone to flooding.
Date:	Constructed 1923–1925
Builder:	Tacoma City Light
Report prepared by:	Natalie K. Perrin, M.S., and Heather Lee Miller, Ph.D. Historical Research Associates, Inc. 1904 Third Avenue, Suite 240 Seattle, WA, 98101 and John Stamets, Photographer 493 14th Avenue East Seattle, WA 98112
Submittal Date:	July 17, 2014

I. PROJECT DESCRIPTION

The City of Tacoma, Department of Public Utilities, Light Division (doing business as Tacoma Power) owns and operates the Cushman Hydroelectric Project (the Project). The Project is operated under a 50-year Federal Energy Regulatory Commission (FERC) license (FERC Project No. 460), which was granted on July 15, 2010, following over 20 years of negotiations with federal, state, local, and tribal entities. The Cushman Hydroelectric Project comprises two historic districts listed in the National Register of Historic Places (NRHP) in 1988, specifically the Cushman No. 1 Hydroelectric Plant Historic District and the Cushman No. 2 Hydroelectric Plant Historic District. At the time of this writing, the two districts are being combined into one historic district known as the Cushman Hydroelectric Project Historic District; the district, as revised, encompasses the Cushman Nos. 1 and 2 Developments and a segment of the Potlatch (Cushman) Transmission Line.

The Cushman Hydroelectric Project plays an integral role in the City of Tacoma's infrastructure and economic development. The Cushman No. 1 Hydroelectric Power Plant or, more accurately, the Cushman No. 1 Development, includes buildings and structures from the initial building campaign of the Project, 1923–1925. The Cushman No. 1 Development impounds Lake Cushman, and includes the Cushman No. 1 dam and valve house (HAER No. WA-26-B), the Cushman No. 1 powerhouse (HAER No. WA-26-C), the inclined tram and tram house (HAER No. WA-26-D), the water conveyance system (HAER No. WA-26-E), and the Potlatch (Cushman) transmission line (HAER No. WA-26-F). The original spillway (HAER No. WA-26-A) was removed and replaced with a modern spillway in 1991.

As part of FERC relicensing, Article 414 requires a floating surface collector (FSC) and net transition structure (NTS) be installed at the Cushman No. 1 Development, to facilitate downstream fish passage. Construction of the FSC and NTS is considered an undertaking under Section 106 of the National Historic Preservation Act of 1966 (as amended), and constituted an unavoidable adverse effect on a historic property. To minimize the adverse effect, Tacoma Power consulted with an architectural historian during project design phases; combined the Cushman Nos. 1 and 2 Hydroelectric Power Plant historic districts into one Cushman Hydroelectric Project historic district via a NRHP nomination update; and completed this Historic American Engineering Record (HAER) documentation to addend the 1989 recordation of the Cushman No. 1 spillway. As such, the Cushman No. 1 dam and valve house is hereby recorded in accordance with HAER Level II documentation.

II. HISTORIC CONTEXT

Attempts to develop a power plant on the North Fork of the Skokomish River at Lake Cushman began in 1912, when Seattle citizens approved a related bond issue. The City of Seattle issued condemnation notices to property owners, but abandoned the project in 1914.[1] However, by 1917, Tacoma was experiencing a population explosion and needed a new source of electric power to meet increasing demands of labor-saving devices in the home and of power-dependent industries.

[1] Neumann et al., *Cultural Resource Management Plan*, A3-9.

Public Utilities Commissioner Ira S. Davisson and Tacoma City Light selected the Lake Cushman site for a new hydroelectric complex. The city applied for a power franchise lease in 1919 and began condemnation proceedings the same year for the needed land. Acquisition of the property consumed two years of often-acrimonious negotiations, including objections by Ed Sims, chair of the Washington State Fisheries board. By 1920, however, the Phoenix Logging Company had been awarded a six-year contract to clear the heavily timbered land that would be inundated.[2] In 1922, Davisson hired Jay L. Stannard from San Francisco to serve as chief engineer for the Cushman project.

The City of Tacoma applied for a permit to "appropriate public waters of the state of Washington" on December 11, 1919. The permit stipulated that actual construction work was required to begin on or before May 23, 1923, for the purposes of "generation of electric current for domestic light, heat and for street lighting in City of Tacoma."[3] The construction of the dam for storage purposes was completed on October 19, 1925, and the dam itself completed to its full height on February 1, 1926.[4] The powerhouse and equipment were completed and in operating condition by May 1926. The certificate of water right for 1,000 cubic feet per second (cfs) of continuous water was awarded on January 20, 1933.

An inspection report dated May 16, 1928, references the initial studies and excellent due diligence completed by Tacoma City Light prior to and during construction: "The city made very complete study of this site before accepting it. Besides having a geological report, many deep holes were drilled, horizontally, diagonally, and vertically at the site for considerable distance each way. The structure appears to have been well designed, well constructed and to be operating with entire satisfaction."[5]

The 1928 inspection came following several years of apprehension (on the parts of some) as to the adequacy of geological reports at the site. This was largely prompted by a relatively recent blunder on the part of the City of Seattle at Cedar Lake, where a $1.8 million dam was constructed and the subsequent reservoir would not hold water. A letter dated March 1922 noted, "It is not only the money that may be wasted by lack of such an investigation, tho (sic) goodness knows, in the present state of our taxation, we should not run any avoidable risk of losing money; but the good name we now have as a Municipal developer of Power must not be put in jeopardy."[6]

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[2] Neumann et al., *Cultural Resource Management Plan,* A3-9; Overland, *Early Settlement,* 38.

[3] Application No. 353, Permit No. 1956, Supplement to Permit 252, Filed by City of Tacoma, County of Pierce, December 11, 1919, Approved January 4, 1933, Recorded in Book 8 of Permits, Page 1956, Chas. J. Bartholet, State Supervisor of Hydraulics, Water Rights files provided by Steve Fischer, Tacoma Public Utilities.

[4] Application No. 353, Permit No. 1956, Supplement to Permit 252, Filed by City of Tacoma, County of Pierce, December 11, 1919, Approved January 4, 1933, Recorded in Book 8 of Permits, Page 1956, Chas. J. Bartholet, State Supervisor of Hydraulics, Water Rights files provided by Steve Fischer, Tacoma Public Utilities; City of Tacoma, Department of Plant Extensions, Additions and Betterments, May 19, 1926, Water Rights files provided by Steve Fischer, Tacoma Public Utilities.

[5] C. E. Crownover, Cushman Dam, May 16, 1928, Water Rights files provided by Steve Fischer, Tacoma Public Utilities.

[6] Fred. A. Smith to the Honorable Mayor and Council, March 20, 1922. Tacoma Public Utility Archives, Tacoma, Washington.

By April 1922, the District and Chief Hydraulic engineers were enlisting the help of geologists to ensure that the available data (collected since at least 1918 and over the course of project exploration), was sufficient. By the time President Coolidge pressed a telegraph key in Washington, D.C., to begin the flow of electricity from the Cushman project to Tacoma, the project stood "an ever ready servant to do your bidding and supply you with comforts."[7]

III. PHYSICAL DESCRIPTION

Cushman No. 1 dam is a constant-angle arch dam that spans a narrow rock gorge. The dam rises 275 feet above bedrock. It is 1,111 feet long, including gravity wing abutments, and has a thickness that telescopes from 52 feet at the base to eight feet at the top. Containing 90,000 cubic yards of concrete, the dam impounds 453,350 acre-feet of water.

The arch portion of the dam has an upstream radius at the base of 118 feet and at the crest of 210 feet with the crest measuring 470 feet long. The south gravity abutment wing measures 278 feet long and the north wing is 130 feet. The north wing extends to a 380-foot-long core wall that rises from bedrock and is supported by earth fill. Concrete parapet walls adorn the dam's crest, flanking an 8-foot-wide roadway.

At the base of the dam on the downstream side is the valve house, which contains a 62-inch Pelton-Johnson jet control valve and a Pelton 90-inch butterfly valve to regulate water flow into the river outlet. The valve house building is square in plan with a flat roof, constructed of reinforced concrete. The building is two stories tall and features two banks of two twelve-light metal sash windows on the east, south and west elevations; the north elevation is integral to the dam face. Near the valve house is a series of metal platforms installed in 2004 to enable facilitation of a FERC-ordered seismic study and a subsequent order to monitor seepage and the ongoing interface of the dam with the rock walls. A new access staircase was also installed on the dam's downstream face.

IV. CONSTRUCTON AND MAINTENANCE

The contract for construction of the dam was let to Guthrie & Company of Portland, Oregon, in spring 1924. (Guthrie & Company would also later be awarded the contract for construction of the Cushman No. 1 powerhouse under a separate bid.) Work on the tunnel shafts began first, on May 1, 1924, with construction and excavation for the diversion tunnel and penstock No. 1 following on May 7. The lower tunnel was opened on July 21, enabling work to begin on excavating the bench for the main power tunnel. Early construction of the tunnels helped alleviate some of the flow when the first floods arrived on September 20, though the continuous flood conditions throughout fall that year did cause delays in sealing the tunnels with concrete. Reports of the construction progress, distributed by the City of Tacoma Light Department, further noted that soon after the contract began,

[7] "The Cushman Power Plant: What Is It?" Cushman Project/Historical Information, 1888–1929, Water Rights files provided by Steve Fischer, Tacoma Public Utilities.

> the canyon was obstructed by a cofferdam. A flume was provided to carry the river in order that the river bed might be excavated to bedrock for the dam foundation. Tunnels were driven around the dam site to help carry the winter freshets which were soon expected. The floods came sooner than expected, however, and the concrete dam foundations had barely been poured when the canyon was transformed into a millrace and all work was halted until the floods should subside. Five times that winter this scene was re-enacted and although work continued on the excavation of the sidewalls for the dam, the power house excavation was entirely re-filled and abandoned until the following spring.[8]

Construction work reached its peak in 1925. Five hundred men "toiled ceaselessly," and fleets of trucks delivered cement day and night. "Two yards of concrete went into the dam every three minutes, requiring from 4,000 to 5,000 sacks of cement daily." Sand and gravel was supplied from a gravel bar located directly above the dam, which proved sufficient for the needs of the entire project. On October 20, 1925, the tunnel gates were closed and the impoundment process began.[9]

After a two-year construction period, Lake Cushman began rising to fill the valley. As water approached the Antlers Hotel and Cushman House (located along the banks of the lake), workers doused the buildings with kerosene then burned them to the ground in an effort to minimize floating debris on the water's surface.

The Cushman No. 1 powerhouse was constructed concurrent with the dam, beginning in spring 1925 and completed in March the following year. Located 700 feet downstream of the dam, the building housed the water turbines and generators, as well as the exciter switchboard and control room. On the ridge 267 feet above the powerhouse stood the station service house and outdoor switchyard, as well as the hoist (tram) house.

The Cushman No. 1 dam has undergone surface and joint repairs throughout its built history as needed; however, the general appearance of the dam has not been altered. In 2004, metal platforms were installed to enable facilitation of a FERC-ordered seismic study and a subsequent order to monitor seepage and the ongoing interface of the dam with the rock walls. A new access staircase was also installed on the dam's downstream face in 2012. Aside from minor alterations to the dam deck and parapet to accommodate minimal attachment of the FSC, limited character-defining features and/or historic fabric will be altered or removed for construction of the FSC. As indicated, modifications to original materials, design, and workmanship were reviewed and revised with the aid of an architectural historian, to ensure compliance with the Secretary of the Interior's *Standards for Rehabilitation*.

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[8] Ira S. Davisson and Llewellyn Evans, "Cushman Power Project," *1924–1925 Information Book of the Light Department, City of Tacoma, Washington,* 59–62, Washington State Archives, Puget Sound Region Branch, Tacoma Municipal Government Collection, Tacoma Public utilities Division, Reports and Publications, PS611-81A-86.
[9] Davisson and Evans, "Cushman Power Project," 62.

V. REFERENCES

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