SPRING GAP-STANISLAUS HYDROELECTRIC SYSTEM, SAND BAR DAM
(Sand Bar Diversion Dam)
Spanning the Middle Fork Stanislaus River
Cold Springs Vicinity
Tuolumne County
California

HAER CA-2306

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Pacific West Regional Office
333 Bush Street, Suite 500
San Francisco, California 94104

HISTORIC AMERICAN ENGINEERING RECORD

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Location:	Middle Fork Stanislaus River 5 miles west of Cold Springs Tuolumne County, California USGS Crandall Quadrangle, 7.5' (1979) UTM Coordinates: Zone 10**,** 748967 E, 4229756 N
Date(s) of Construction:	1909, major reconstruction in 1939
Builder:	Pacific Gas and Electric Company
Present Owner(s):	Pacific Gas and Electric Company
Present Occupant(s):	Pacific Gas and Electric Company
Present Use:	Dam for Stanislaus Power Tunnel and Stanislaus Powerhouse
Significance:	Sand Bar Dam was originally constructed in 1909 by the Stanislaus Electric Company and reconstructed in 1939 as part of the Spring Gap-Stanislaus System by the Pacific Gas and Electric Company. The dam is a unique example of a timber crib hydroelectric dam. The dam has been determined eligible for the National Register of Historic Places on a state level under criteria A and C with a period of significance dating from its original construction in 1900 to its major reconstruction in 1939.
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Date:	February 2013

I. DESCRIPTION

Sand Bar Dam, also known as Sand Bar Diversion Dam and Sand Bar Flat Diversion Dam, is part of the Spring Gap-Stanislaus Hydroelectric System in Tuolumne County, California. It is a 1909 dam built by the Stanislaus Electric Power Company that was largely rebuilt in 1939 by Pacific Gas and Electric Company (PG&E).

Sand Bar Dam is part of the Spring Gap-Stanislaus System (FERC Project No. 2130), licensed by the Federal Energy Regulatory Commission (FERC). The Spring Gap-Stanislaus System is located in Calaveras and Tuolumne counties and consists of two powerhouses, two dams and reservoirs, two diversion dams, associated ditches, tunnels, penstocks, and other hydroelectric features. A comprehensive history and evaluation of the system is available in *National Register of Historic Places Evaluation, Spring Gap-Stanislaus Hydroelectric System, FERC No. 2130, Calaveras and Tuolumne Counties, California*.[1] The Spring Gap-Stanislaus System as a whole is ineligible for inclusion in the National Register of Historic Places (NRHP). Some elements of the system are eligible on an individual basis. Among those elements, Sand Bar Dam was evaluated in 2002 as individually eligible at a state level of significance under criteria A and C with a period of significance from 1909 to 1939.[2] Sand Bar Diversion Dam is an unusual example of a timber crib hydroelectric dam. It appears to be the only dam of its kind on the entire PG&E system and may be the only one of its kind in the state.

The dam in its present condition has been in continuous use for 73 years. The timber dam at the location now incorporated into the current dam is 103 years old. The dam's physical setting is unchanged since its construction in 1939, consisting of undeveloped steeply sloping mountainsides with mature pine forest and other native forest vegetation.

On-site examination of the dam, an analysis of engineering drawings and reports, and archival research indicate that the historical integrity of the original 1939 structural design, materials, workmanship, setting, location, feeling and association are intact.

II. ARCHITECTURAL AND ENGINEERING INFORMATION

Sand Bar Diversion Dam

Sand Bar Dam is a unique rock-filled timber crib dam with timber decking sheathed in plywood. It is 24 feet high with a crest width of eight feet and length of 174 feet. It has an overflow-type spillway that is 174 feet wide and no low level outlet. The dam diverts water to an intake headworks that has eight gates (covered with a gabled gatehouse) that are each four feet by six feet in diameter with slide gates. The intake has a maximum capacity of 530 cubic feet per second. The dam impounds a small reservoir at Sand Bar that is 2,600 feet long, 174 feet wide and 10 feet deep, creating a storage of 45-acre-feet at its maximum capacity.

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[1] Cindy Baker, *National Register of Historic Places, Spring Gap-Stanislaus Hydroelectric System, FERC No. 2130, Tuolumne County, California* (Sacramento: PAR Environmental Services, 2002), 37
[2] Ibid.

The dam is located on the Middle Fork Stanislaus River approximately 36 miles downstream from the Relief Reservoir and 2.5 miles downstream from the Spring Gap Powerhouse. The dam impounds a small storage reservoir on the river and diverts the water into a tunnel that delivers water to the Stanislaus Forebay. From the forebay, the water is carried to the Stanislaus Powerhouse.

When originally constructed, the dam diverted to a 78,000,000-foot-long timber flume perched along the southern canyon wall above the river. Maintenance of the flume required frequent replacement of timbers, a difficult task in the steep terrain. Long-term improvements were built for the production and delivery of the lumber, including sawmills, a small railway and tramways. Eventually the flume was replaced with a tunnel, an equally difficult construction project that put an end to the constant and expensive upkeep problems.

A small camp was constructed on a flat adjacent to the dam for workers at the mill and crews that operated the dam and repaired the flume. This camp included a bunkhouse, cottage, cookhouse, bath house and a garden. Horses were kept in a small corral and stable.

The original dam was built in 1909 by the Stanislaus Electric Power Company. Ten head gates to the flume sat in a concrete wall at a right angle to the dam. These gates allowed water to enter a masonry settling basin to eliminate as much sand as possible in the flume (Dunn 1917:10; Sanderson and Porter 1909:5-6).

In 1921, the California State Fish and Game Commission required the company to install a wooden fish ladder and fish screens at Sand Bar Dam, as well as one at the Philadelphia Diversion Dam. By 1939, the dam had deteriorated considerably, requiring PG&E to rebuild it with the present dam. The present design is an increasingly rare rock-filled timber crib dam with a plywood deck. Timber crib dams are built on a structure consisting of layers of timber (rough logs) consolidated to create a mass. A barrier is then added on the upstream face to create a sloping deck that stabilizes both the mass and the dam itself. These dams were more commonly constructed during the middle to late 19th century in forested areas where timber was more plentiful than native rock.

Its intake today (also known as a gatehouse) is very similar to the original intake or headworks structure, but has eight openings. The structure is covered with a gabled roof finished with corrugated sheet metal. The structure protects the mechanisms that open and close the gates. Three of the gates are radial gates, another is a manual slide gate and four openings have concrete stop logs. Slide gates were installed in four openings and concrete stop lots were placed in the other four. The dam's fish ladder was abandoned in place in 1991. The dam impounds a small reservoir that receives drainage from 332 square miles (Pacific Gas and Electric Company 1999:A-14).

Modifications

Sand Bar Dam received routine maintenance over the years after its reconstruction in 1939. In 1960, a new grizzly (a metal grid designed to block debris) was installed on the

headworks, or intake, to the tunnel. In 1962, the intake structure was revised to hold three radial gates to allow intake flow to be automatically regulated. In the 1970s, other work included installing a replacement grizzly, decreasing water turbulence at the intake by installing a deflection wall and replacing the plywood decking on the upstream face of the dam (Pacific Gas and Electric Company 1971, 1973). In 1981, leakage in the dam prompted the company to install a concrete cutoff pad at the dam. This amounted to an eight-inch-thick concrete apron extending 140 feet from the intake structure (Pacific Gas and Electric Company 1981). This maintenance consisted of in-kind repairs and represented only minor changes to the original dam design.

III. HISTORICAL INFORMATION

Spring Gap-Stanislaus Project

The climate and topography of the Stanislaus River provides an excellent location for a hydroelectric system. Hydroelectric systems exist where conditions make it possible to combine production with convenient transmission to a market. The water source must be higher in elevation than the powerhouse and the powerhouse cannot be too far from the ultimate power consumers. The highest point in the Spring Gap-Stanislaus Project (Project) is the reservoir at Relief Dam at 7,343 feet above mean sea level (amsl), which collects a considerable storage of precipitation runoff. From this high elevation, the water provides a valuable power before its gravitation energy runs out on the Sacramento Valley floor (Baker, *Spring Gap-Stanislaus,* 6).

From Relief Reservoir, water is released to the Middle Fork Stanislaus River where it flows 45 miles to Sand Bar Diversion Dam, which diverts the water to an 11-mile-long tunnel. Water from the tunnel enters a 320-acre-foot forebay and 4,707-foot-long penstock before reaching the Stanislaus Powerhouse in the Stanislaus River canyon below. A second large reservoir, Pinecrest Lake, on the South Fork Stanislaus River is created by Strawberry Dam, which releases stored water to the river. A few miles downstream, it is diverted to the Philadelphia Ditch, which carries it 4.7 miles to Spring Gap Forebay and the penstock to the Spring Gap Powerhouse. Once its head has been expended for hydroelectric generation, the water is released to the Middle Fork Stanislaus River where it joins the water from the Relief Reservoir above Sand Bar Dam (Baker, *Spring Gap-Stanislaus,* 6).

The Spring Gap-Stanislaus Project was formulated and established during the rush in the early twentieth century to develop hydroelectric generation in the United States. Its origins are complex. By 1906, the Stanislaus Electric Power Company began operation of the system with the completion of Relief Dam and the original Stanislaus Powerhouse. After their economic failure, the Sierra and San Francisco Power Company continued the work with the construction of Strawberry Dam, only to suffer economic collapse itself. Pacific Gas &Electric Company then acquired the system and ultimately completed the project with the development of the Spring Gap Powerhouse project (Baker, *Spring Gap-Stanislaus,* 9). The system today is an important power producer of the PG&E's Motherlode Watershed, one of its five watersheds in California between Bakersfield and the Oregon border (Baker, *Spring Gap-Stanislaus,* 4).

Sand Bar Dam

Sand Bar Dam was constructed in 1909 by the Stanislaus Electric Company to divert water to a flume that carried it to the Stanislaus Powerhouse. The Stanislaus hydroelectric project was designed to generate electricity to sell primarily to the transit and industrial market in San Francisco. The project also included construction of the Relief Dam and the Stanislaus flume, forebay, penstocks and powerhouse. Sand Bar Dam diverted water that had been stored at Relief Reservoir to the flume, which carried it to the powerhouse downstream. The dam was an integral part of the Stanislaus system. PG&E began managing the system by 1921 and modified the dam by adding a fish ladder and fish screens. In 1939, PG&E owned the dam and undertook a major replacement of deteriorated materials. The original log dam was left in place and intact when the new timber section was added. The fish ladder was abandoned in place in 1991.

Other than these repairs, the dam has remained largely intact from its original construction design. The upstream slope of the dam is still timber with plywood sheathing. It is the only dam of its kind on the entire PG&E system. The dam has been in continuous use for over 103 years. Today it is a well-visited site on the Middle Fork of the Stanislaus River adjacent to a campground on Stanislaus National Forest.

IV. PROJECT INFORMATION

This documentation has been prepared at the request of PG&E (the Licensee), which owns and operates the Spring Gap-Stanislaus Hydroelectric System (FERC #2130). PG&E proposes to construct or modify elements of the Sand Bar Dam system, including specific facility improvements required to satisfy applicable license conditions. Elements of the improvement project include replacing the existing downstream gauging weir, constructing a cableway upstream of the dam, installing a fish screen and automated trash rake at the intake for the Stanislaus Tunnel, constructing a new control building and increasing the power supply to the dam. Construction of the project elements on federal lands as well as the associated approvals from FERC and the SNF constitute an undertaking subject to Section 106 of the National Historic Preservation Act (NHPA), as set forth in 36 CFR 800.16(y). The documentation is being completed as part of the Section 106 compliance process.

Cindy L. Baker of PAR Environmental Services, Inc. was the Principal Investigator for the written documentation. The document is based on a previous investigation conducted by PAR Environmental Services, Inc. (Baker 2002). The photographer for the recordation was David DeVries of Mesa Technical of Berkeley, California. Michael Taggert of Pacific Gas and Electric Company facilitated the work as PG&E's contact and coordination person.

V. SOURCES

Baker, Cindy. *National Register of Historic Places, Spring Gap-Stanislaus Hydroelectric System, FERC No. 2130, Tuolumne County, California*. Sacramento: PAR Environmental Services, 2002.

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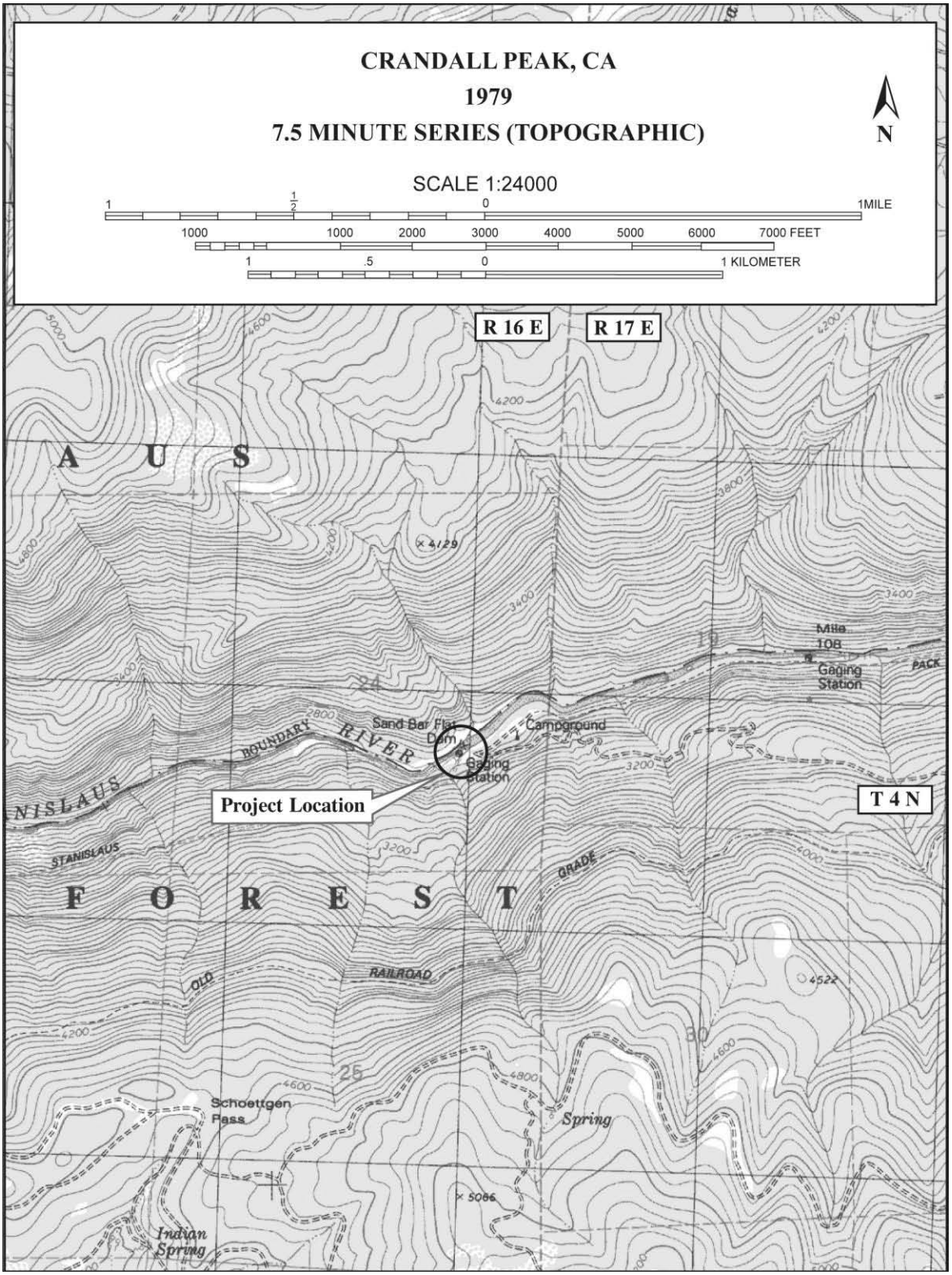
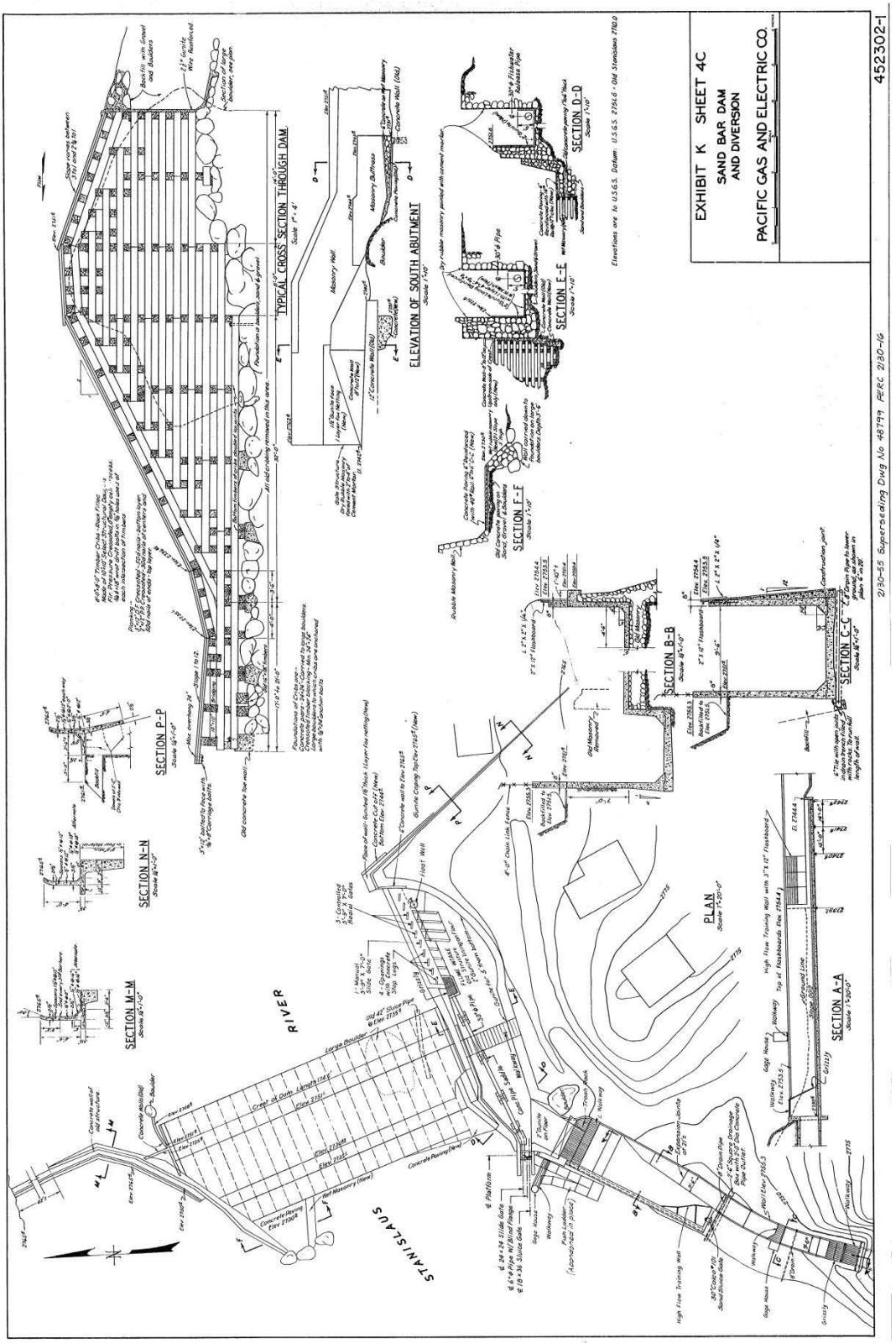
----------, "Spring Gap-Stanislaus Project, FERC Project No. 2130, First State Consultation Document, Draft, 1999."

Sanderson and Potter, "*Sierra and San Francisco Power Company: the Stanislaus Power Development, Sanderson and Porter Engineers, New York"*, 1909.



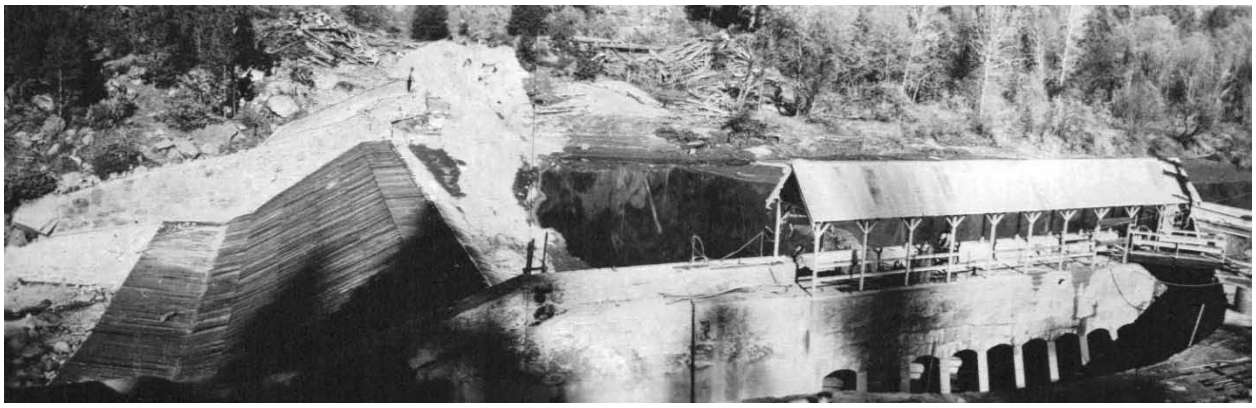
Project Location Map



Plan drawing of Sand Bar Dam

Historic Photo of Gatehouse on Dam, 1930.

Sand Bar Dam after completion of planking, showing gate house and diversion works leading to flume, 1939.



Sand Bar Dam after completion of planking, showing gate house and diversion works leading to flume, 1939.

Sand Bar Dam, 1939, view of downstream face of dam showing timber cribs ready for planking on right and planks in place on the left side of dam.