

WATER POWER ACT LICENCES

PINE FALLS GENERATING STATION SHORT-TERM EXTENSION LICENCE APPLICATION

SUPPORTING DOCUMENTATION

Prepared for:
Manitoba Water Stewardship
200 Saulteaux Crescent
Winnipeg MB R3J 3W3

Prepared by:
Manitoba Hydro
360 Portage Avenue
Winnipeg MB R3C 2P4

October 05, 2010

Report No: PS&O - 10/03

HYDRAULIC OPERATIONS DEPARTMENT
POWER SALES & OPERATIONS DIVISION
POWER SUPPLY

WATER POWER ACT LICENCES
PINE FALLS GENERATING STATION
SHORT-TERM EXTENSION LICENCE APPLICATION
SUPPORTING DOCUMENTATION



PREPARED BY: Original Signed By:
S.Herbert

REVIEWED BY: Original Signed By:
B.W. Giesbrecht

APPROVED BY: Original Signed By:
W.V. Penner

NOTED BY: Original Signed By:
D.Cormie

DATE: 2010 10 05

REPORT NO: PS&O - 10/03



1.0 INTRODUCTION

This report is provided at the request of Manitoba Water Stewardship to provide additional information in support of a short-term extension licence application. Manitoba Hydro requested this extension licence on February 04, 2010 in accordance with Section 92 of The Water Power Regulation, Manitoba Regulation 25/88R of *The Water Power Act*.

Manitoba Hydro operates the Pine Falls Generating Station in accordance with the Final Licence for the Development of Water Power at the Pine Falls Site on the Winnipeg River. This licence was issued in accordance with the provisions of *The Water Power Act* on November 30, 1965. The licence was issued for a term of 50 years to be computed from January 1, 1952.

Manitoba Hydro submitted the application to renew the Final Licence on June 18, 1997. With recent staffing improvements by both Manitoba Hydro and Manitoba Water Stewardship, there is a renewed focus on issuing a renewal of the Final Licence.

2.0 PROJECT COMPONENTS

The Pine Falls Generating Station (GS) is located approximately 120 km (75 miles) northeast of the City of Winnipeg and approximately 13 km (8 miles) upstream of Lake Winnipeg, as shown in Figure 1. Figure 2 is an overall site map that shows the layout of the major project components. Photograph 1 shows the Pine Falls GS powerhouse, spillway and switchyard.

The Pine Falls GS consists of a powerhouse, spillway and dyke and has a name plate capacity of 120,600 horsepower (90 MW). Pine Falls GS is the last station on the Winnipeg River before Lake Winnipeg and was constructed between 1949 and 1952.

The station components include a six unit powerhouse, a six bay gated spillway, a non-overflow dam, a transition dam and an earth dyke protecting the switchyard. The station is located adjacent to Highway 11 and serves as the river crossing for PR 304. Figures 3 to 9 show general arrangements of concrete and earth structures. Table 1 summarizes major characteristics of the station.

Table 1: Pine Falls G.S. Major Characteristics

Construction Period	1949 to 1952
Capacity	120,600 horsepower (90 MW)
Average Annual Generation	620 million kW-h
Waterfall Drop (head)	11.3 m (37.1 ft)
Maximum Licence Forebay Elevation	229.21 m (752.0 ft)
Maximum Operating Forebay Elevation (MOFE)	229.21 m (752.0 ft)
Available Freeboard @ MOFE - Conc. Structures	1.2 m (4.0 ft) *without wind or wave effects
Available Freeboard @ MOFE - Earth Structures	1.8 m (6.0 ft) *without wind or wave effects

Table 2 summarizes the major characteristics of the Pine Falls GS powerhouse, spillway and dyke.

Table 2: Pine Falls G.S. Component Characteristics

Powerhouse	Number of Units	6
	Length	151.2 m (496.0 ft)
	Deck Elevation	230.4 m (756.0 ft)
	Discharge Capability (at full gate)	951 m ³ /s (33,600 ft ³ /s)
	Power Production	
	Unit 1	19,000 horsepower
	Unit 2	19,000 horsepower
Unit 3	19,000 horsepower	
Unit 4	19,000 horsepower	
Unit 5	22,300 horsepower*	
Unit 6	22,300 horsepower*	
Spillway	Number of Bays	6 bays
	Length	95.5 m (313.0 feet)
	Deck Elevation	230.4 m (756.0 ft)
	Discharge Capability (at maximum operating forebay elevation)	3,822 m ³ /s (134,980 ft ³ /s)
North Transition Concrete Dam	Length	123.0 m (404.0 ft)
	Design Crest Elevation	230.4 m (756.0 ft)
Non-Overflow Concrete Dam	Length	80.5 m (264.0 ft)
	Design Crest Elevation	230.4 m (756.0 ft)
Earth Dyke (Switchyard Dyke)	Length	900.0 m (2950.0 ft)
	Design Crest Elevation	231.0 m (758.0 ft)

* Units 5 and 6 were refurbished in 1990 and 1991 with increased unit output.

3.0 WATER POWER LICENSING REQUIREMENTS

3.1 Licence Terms

Condition #2 of the Final Licence stipulates that:

"The undertaking authorized to be maintained and operated by the Licensee under this Final License shall comprise the following: a concrete dam with sluice gates and non-overflow sections: a powerhouse with six vertical type hydro-electric units of 19,000 horsepower capacity...."

The initial capacity of each of the six units was 19,000 horsepower making a total generating station capacity of 114,000 horsepower. Units 5 and 6 were refurbished between 1990 and 1991 with increased capacity to 22,300 horsepower. A renewal of the Final Licence would include the new generating station capacity of 120,600 horsepower. The remaining original units (Units 1 to 4) are candidates for future refurbishment which would further increase the plant capacity. No timeframe for this work has been determined.

Condition #4 of the licence stipulates that:

"The Licensee shall not raise the headwater of its development to an elevation higher than 752.0 above mean sea level, Canadian Geodetic Datum 1929 Adjustment. A higher elevation may be created only with prior written permission by the Director and in accordance with Section 72 of the Regulations."

Manitoba Hydro operates the Pine Falls GS so that the forebay water level does not exceed 752.0 feet.

3.2 Licence Area

The licence area extends from just downstream of Pine Falls GS upstream to within approximately 6.4 km (4 miles) of the Great Falls licence area. Included in this area are downstream sections of Maskwa River, Little Bear Creek and Pine Creek. During the Final Licence renewal, Manitoba Hydro intends to apply to expand the licence area to include land along the Winnipeg River so that the upstream end of the licence area will abut with the Great Falls licence area. The licence area is shown in Manitoba Water Stewardship file number 21-4-1024. New severance line drawings that reflect all approved changes to the licence area and also show the proposed expansion will be submitted as part of the Final Licence renewal process.

4.0 MONITORING PROGRAMS

4.1 Water Levels

The forebay water level at Pine Falls GS is measured and recorded using a water level gauge located in the powerhouse. The gauge consists of a float with a steel tape draped over a pulley on a motor which drives an electronic device in the control room. This device accepts the output of the motor, displays the water level elevation directly to the station operators, and outputs a signal to the Remote Terminal Unit (RTU) for transmission to the System Control Centre. System Control Centre staff monitor the water level data and respond to alarms as required. The water level data is also recorded on Daily Hydraulic Reports that are forwarded to the Operating Supervisor. The report is reviewed, signed and sent to the Hydraulic Operations Department. The Hydraulic Operations Department staff enters the data into a hydrometric database that is accessible to interested parties within Manitoba Hydro.

The station operators at Pine Falls GS calibrate the forebay gauge manually once a week (repetitive work order) or as required, such as prior to Uniform Rating of Generating Equipment (URGE) testing. The calibration is performed by comparing the manual reading to the electronic meter in the control room.

Manitoba Hydro prepares an annual report documenting water levels and flows within Water Power Act licence areas. The report contains analysis of water level and flow data related to the licence conditions for the calendar year. Information specific to Pine Falls GS includes the analysis of forebay level data, maps, photos, project description, and gauge and data collection descriptions. In addition to the annual report, Manitoba Hydro performs weekly licence compliance checks for all Water Power Act licence conditions. Manitoba Hydro reports licence limit exceedances to Manitoba Water Stewardship upon occurrence.

4.2 Dam Safety

Manitoba Hydro's Dam Safety Program is based on the Canadian Dam Association Guidelines. Both concrete and earth structures continue to be inspected at regular intervals for any anomalies or deficiencies. Routine inspections by Manitoba Hydro staff are performed every two weeks for the earth structures and bi-monthly for the concrete structures, including the spillway. Additional inspections of all water retaining structures are performed by specialists from Manitoba Hydro's Engineering Services Division annually. SNC Lavalin performed a Dam Safety Review (DSR) inspection of all the primary structures in 2003/04. Manitoba Hydro has completed a significant amount of work addressing the concerns raised in this DSR. As part of the Water Power Act licence renewal process, we will be providing a condition assessment report of the generating station and its associated structures.

4.3 Aquatic Monitoring

Healthy fish populations exist above and below the Pine Falls GS. Manitoba Hydro is aware that anglers routinely fish on the Winnipeg River between Pine Falls GS and McArthur Falls GS with reasonable success. Downstream of the Pine Falls GS, a world class trophy walleye fishery exists in the Lake Winnipeg / Winnipeg River confluence that attracts tourists from across the continent.

Provincial Fisheries Branch monitoring programs are taking place downstream of the Pine Falls GS on Lake Winnipeg in addition to a system wide monitoring of aquatic ecosystem health including water quality, lower trophic levels and fish sampling under the Coordinated Aquatic Monitoring Pilot Program (CAMPP); a program of activities by which the Government of Manitoba and Manitoba Hydro are working together to provide objective information about hydrometric and environmental effects of hydro-electric development.

5.0 SYSTEM UPGRADES/STUDIES AND AGREEMENTS

5.1 System Upgrades/Studies

The configuration of this station and its primary structures remains unchanged. Units 5 and 6 were refurbished in 1990 and 1991 increasing the capacity of both units to 22,300 horsepower. The original installed name plate rating was 19,000 horsepower.

The structural stability of the Non-Overflow Dam was improved by installing post-tensioned strand anchors in 2001.

Stabilization of the North Transition Dam was undertaken to halt movement of the downstream slope and eliminate possible stability problems with Provincial Highway 304, which is located along the crest of the North Transition Dam. The project was completed in two steps. A large rock stabilizing berm was placed at the toe of the dam in the fall of 2003. In the spring of 2004, eight deep trench drains were dug and filled with free draining sand and gravel.

Remedial works to the Switchyard Dyke were completed in 2001 and 2008. The dyke crest was raised and regraded in 2001. Rip rap was placed to ensure the entire upstream slope was protected and to eliminate a small freeboard deficiency in 2008.

Further to the recommendations made in the SNC Lavalin 2003/04 dam safety review, a stability analysis of all concrete structures is planned. The report is expected to be complete in 2011/12.

5.2 Agreements

Manitoba Hydro and Sagkeeng Nation signed an Agreement and Accord in March 1997 to address issues arising from the effects of Manitoba Hydro works up to November 2006. Negotiations are continuing on an extension/renewal of the Accord.

6.0 CLOSURE STATEMENT

Manitoba Hydro continues to operate the Pine Falls Generating Station in accordance with the Final Licence for the Development of Water Power at the Pine Falls Site on the Winnipeg River. Manitoba Hydro operates and maintains the generating station and associated structures based on the Canadian Dam Association Guidelines.

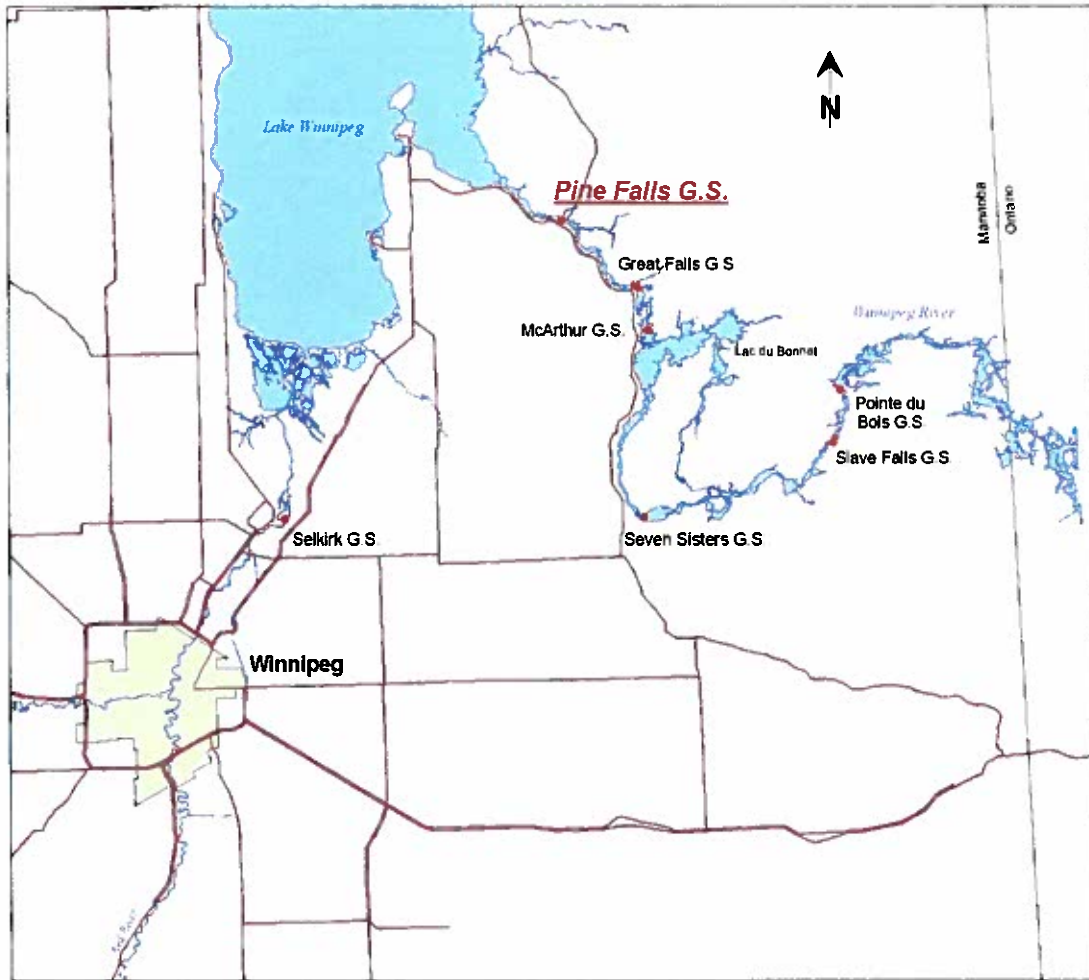


Figure 1: Pine Falls Generating Station - General Location

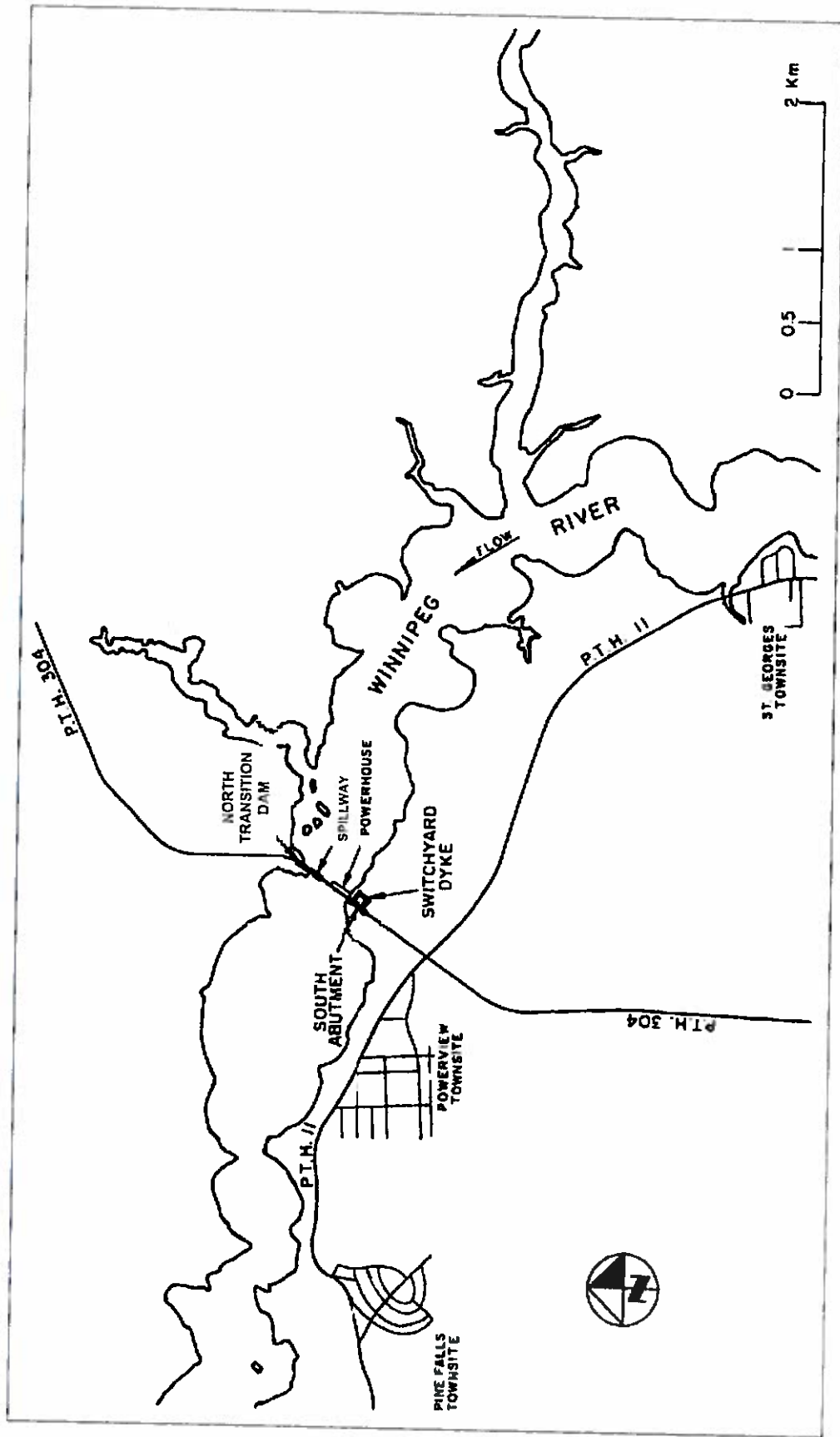


Figure 2: Pine Falls Overall Site Map

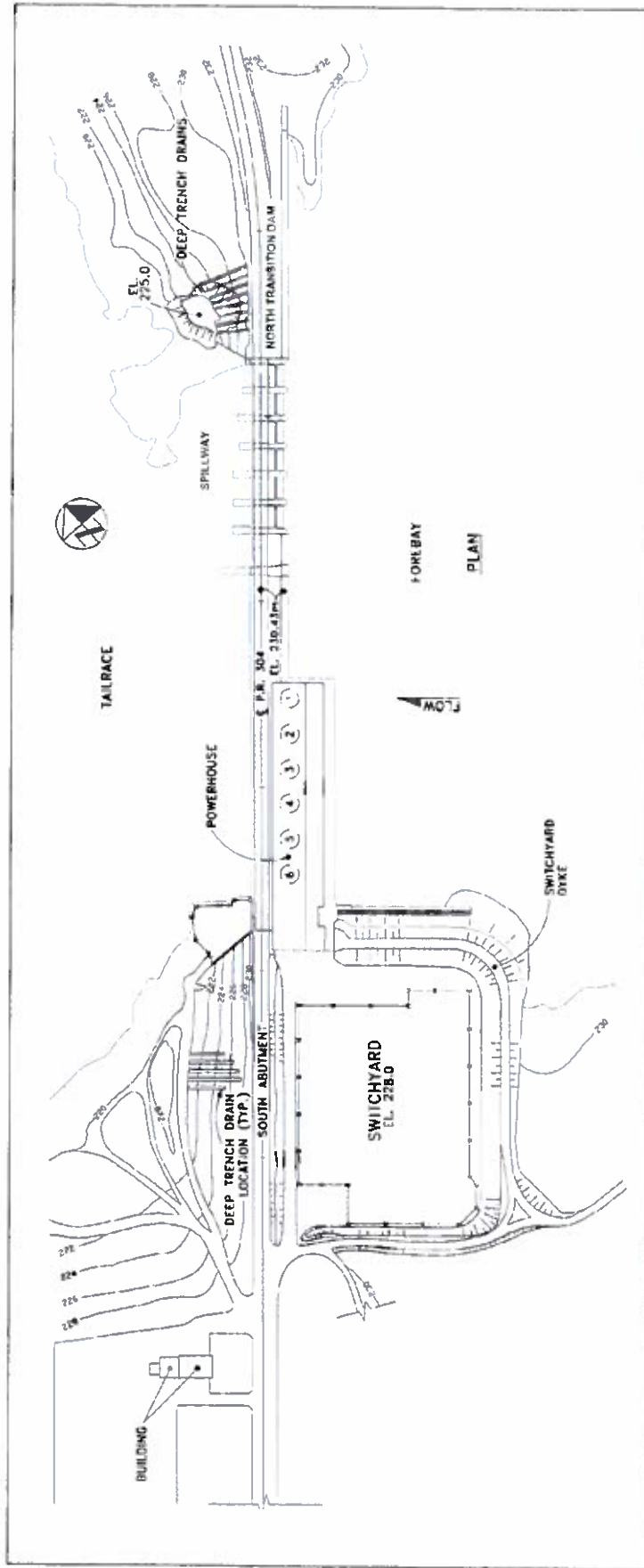


Figure 3: General Arrangement - Earth and Concrete Structures

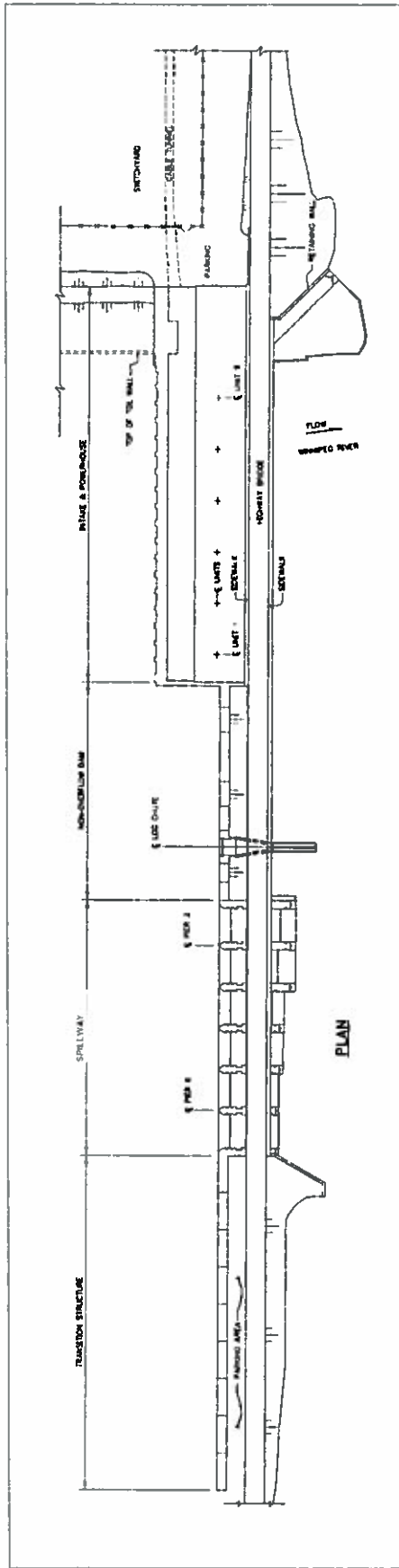


Figure 4: General Arrangement - Concrete Structures

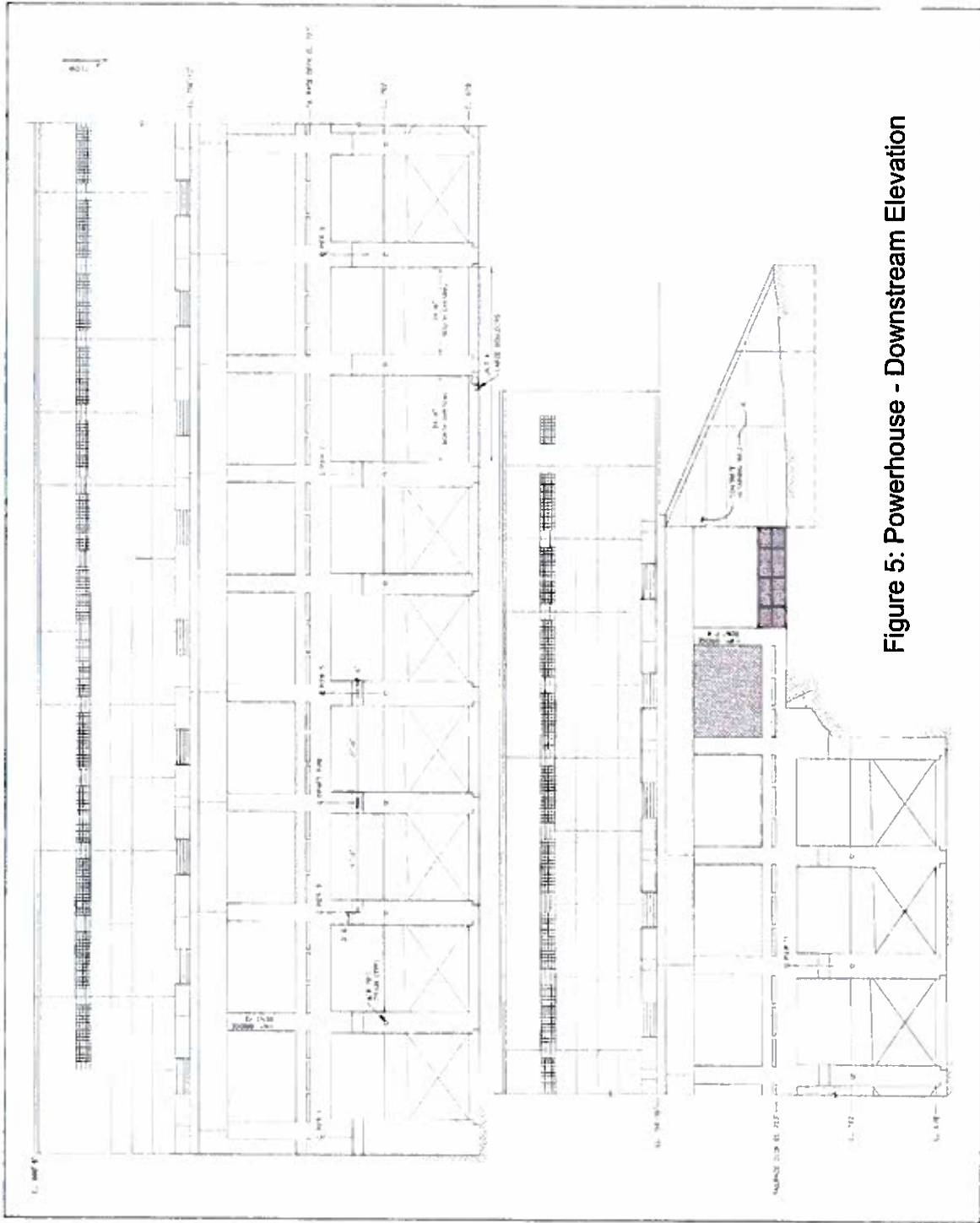


Figure 5: Powerhouse - Downstream Elevation

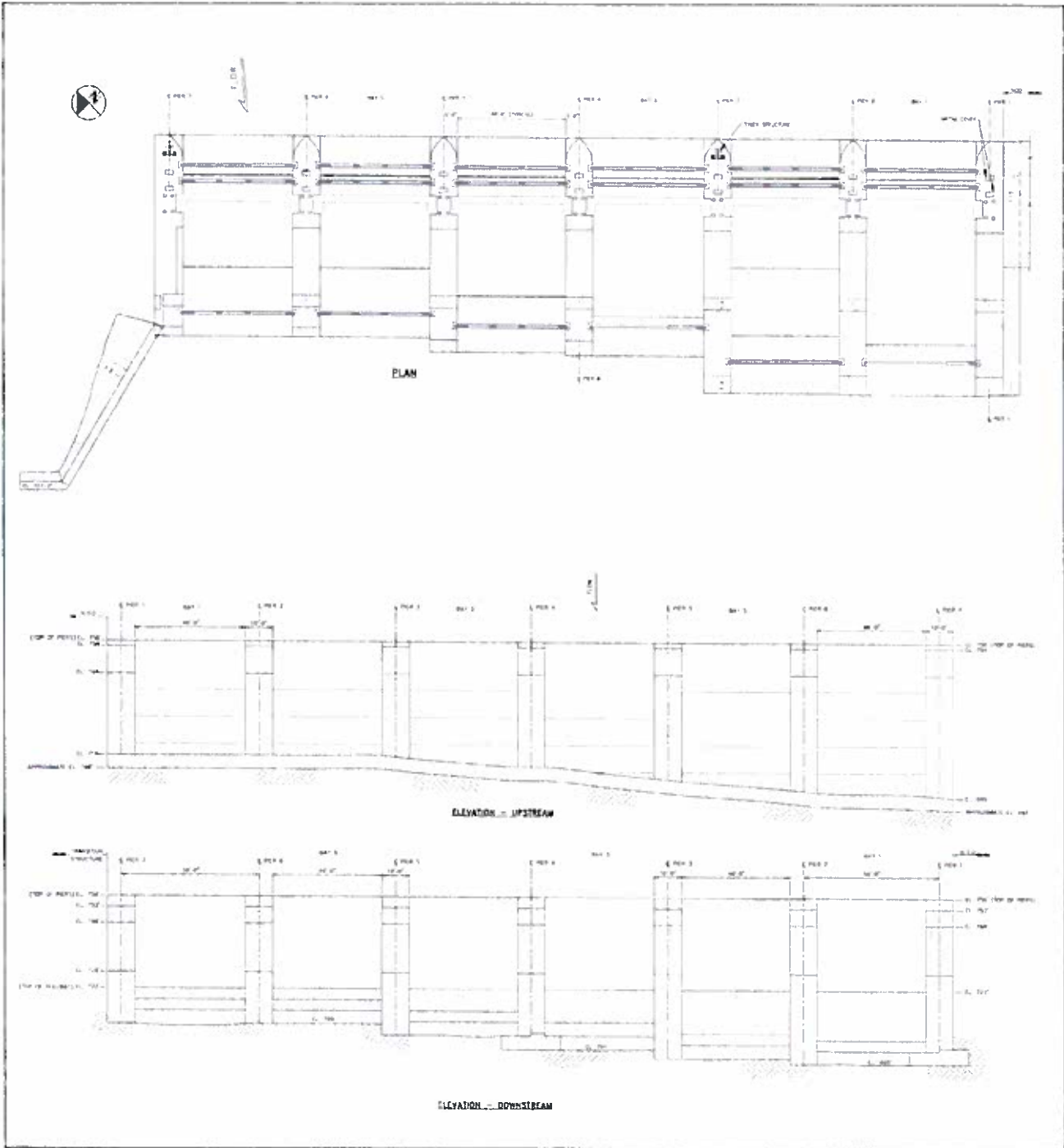


Figure 6: Spillway - Plan and Elevation

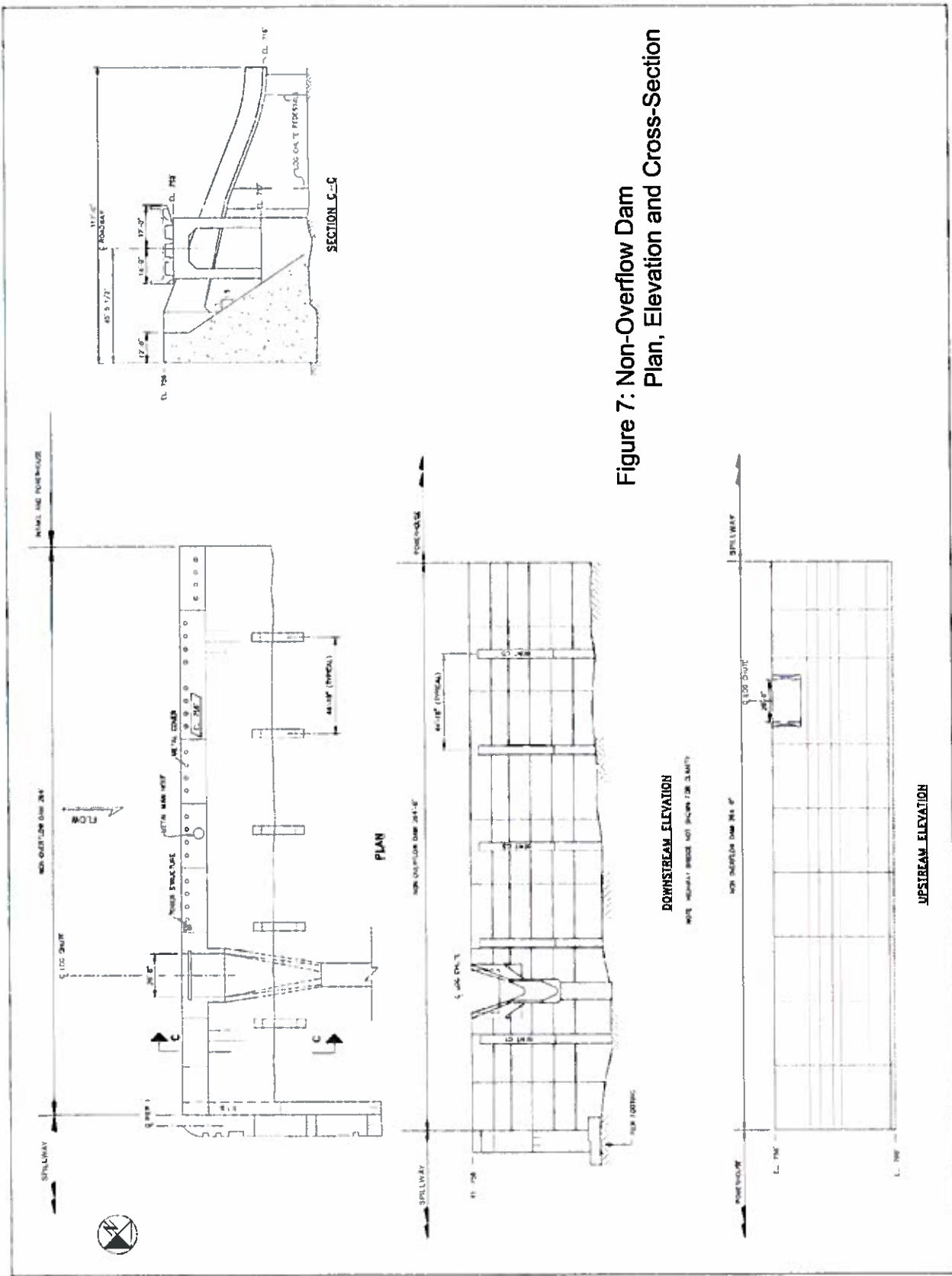


Figure 7: Non-Overflow Dam
Plan, Elevation and Cross-Section

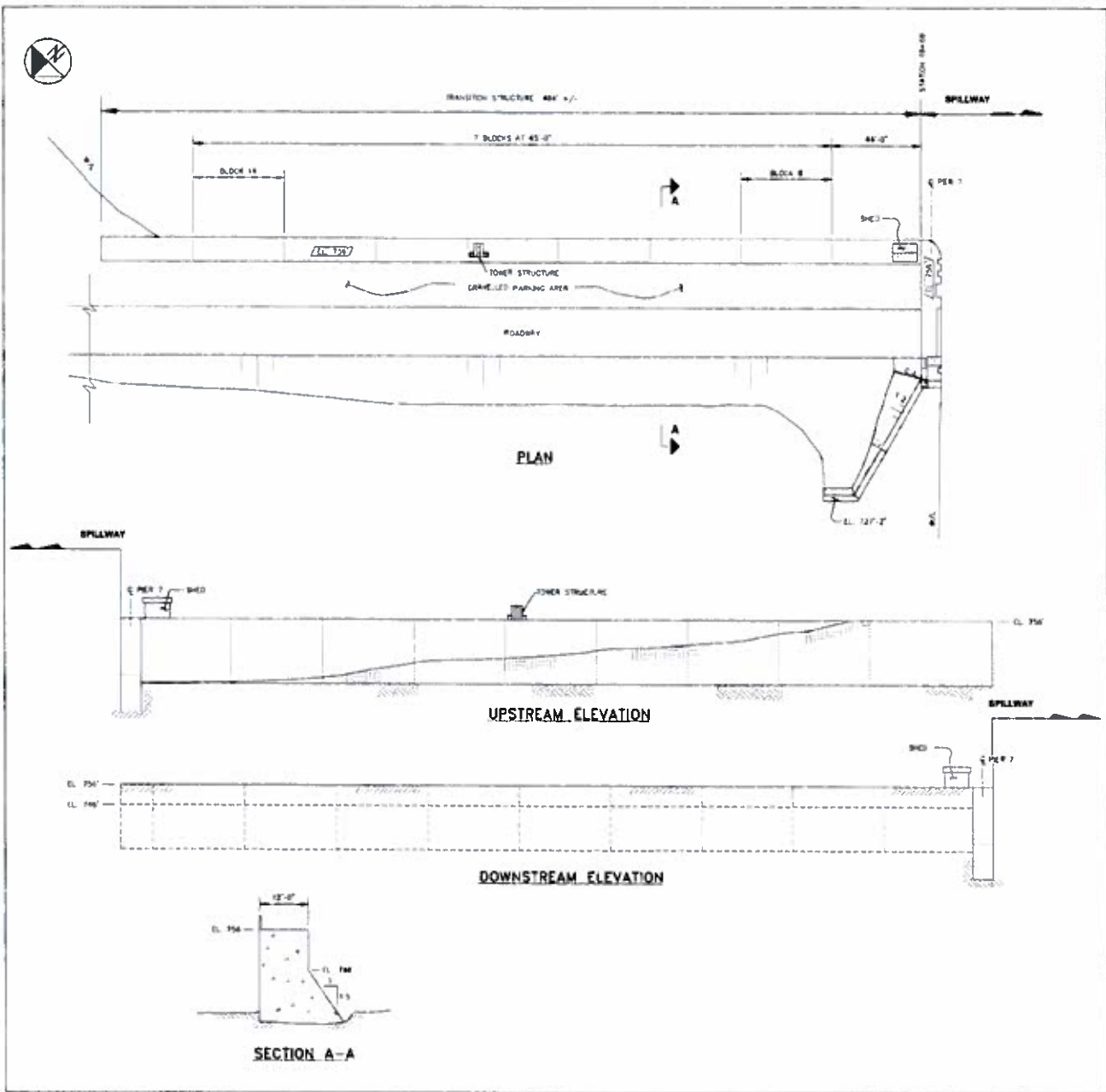


Figure 8: North Transition Dam - Plan and Elevation



Photograph 1: Pine Falls Generating Station