WATER POWER ACT LICENCES

POINTE DU BOIS GENERATING STATION SHORT-TERM EXTENSION LICENCE APPLICATION

SUPPORTING DOCUMENTATION

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Report No: PS&O - 11/06

HYDRAULIC OPERATIONS DEPARTMENT
POWER SALES & OPERATIONS DIVISION
POWER SUPPLY

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SUPPORTING DOCUMENTATION

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DATE: 2011 11 30

REPORT NO: PS&O - 11/06

APEGM
Certificate of Authorization
Manitoba Hydro
No. 38 Date: 2011 11 30

1.0 INTRODUCTION

This report is provided to Manitoba Water Stewardship to provide additional information in support of a short-term extension licence application. Manitoba Hydro requested this extension licence on November 30, 2011 in accordance with Section 92 of The Water Power Regulation, Manitoba Regulation 25/88R of The Water Power Act.

Manitoba Hydro operates the Pointe du Bois Generating Station in accordance with the Fourth Renewal Licence for the Development of Water Power at the Pointe du Bois site on the Winnipeg River. This licence was issued in accordance with the provisions of the Water Power Act on August 17, 1992. The licence was issued for a term of 20 years from and after January 1, 1992. Manitoba Hydro acquired the generating station from Winnipeg Hydro on September 3, 2002.

Manitoba Hydro submitted the application to renew the Fourth Renewal Licence on August 1, 2007. The intent to modernize the facility as outlined in that application has changed. A January 21, 2010 letter to the province provided notification of a change in scope to build a new spillway, concrete and earth dams with upgrades to the existing powerhouse. The Pointe du Bois Spillway Replacement Project will commence in winter 2011/12 and has an anticipated In-Service Date (ISD) of 2014.

2.0 PROJECT COMPONENTS

The Pointe du Bois Generating Station is located approximately 170 km (106 miles) northeast of the City of Winnipeg at the terminus of Highway 313. The station is approximately 120 km (75 miles) upstream of Lake Winnipeg and about the 30 km from the Manitoba-Ontario border, as shown in Figure 1. The station is the most upstream generating station on the Winnipeg River. Figure 2 is an overall site map that shows the layout of the major project components.

The Pointe du Bois Generating Station consists of a powerhouse, east and west gravity dams, 92 spillway bays, a five-bay gated sluiceway, a rock fill dam, a spillway access (or pedestrian) bridge and a vehicle access bridge. The Fourth Renewal Licence states that the station has a nameplate capacity of 78 MW (105,000 horsepower). Pointe du Bois is the oldest station in the Manitoba Hydro system. Construction of the first phase of development began on or shortly after 1906 with the completion of double horizontal shaft Francis Turbines units one to four and unit seven in 1911/12. Additional units were added in 1914, 1917, 1921, 1924, and 1926 when the sixteenth and final unit became operational. In October 1995, Unit 11 was rerunnered and its capacity increased from 6,900 horsepower (HP) to 7,600 HP.

Unit 1 was replaced with a Straflo turbine and commissioned on November 2, 1999 with a rating of 11,300 HP. These two upgrades increased the capacity of the generating station to 83 MW (112,000 HP).

Tables 1 and 2 summarize the operating parameters, and principal structures of the Pointe du Bois Generating Station. Figures 2 and 3 show general arrangements of concrete and earth structures.

Table 1: Pointe du Bois G.S. Construction Specifications and Operating Parameters

Construction Period	1909 to 1926
Licensed Capacity	78 MW (105,000 horsepower)
Current Capacity	83 MW (112,000 horsepower)
Average Annual Generation	580 million kW-h
Waterfall Drop (head)	14 m (45.9 ft)
Maximum Licence Forebay Elevation (measured at the inner forebay)	299.04 m (981.1 ft)
Normal Operating Maximum Forebay Elevation (measured at the outer forebay)	299.1 m (981.3 ft)

Table 2: Pointe du Bois G.S. Principal Structures

Powerhouse	Number of Units	15 double horizontal shaft Francis Turbines and one Straflo turbine
	Length	135 m (442.9 ft)
	Discharge Capacity (at full gate)	712 m^3/s (25,144 ft^3/s)
	Power Production Unit 1 Units 2-4, 7 Units 5, 6, 8 Units 9, 10 Unit 11 Units 12-14 Units 15, 16	 1 unit @ 11,300 HP 4 units @ 5,200 HP 3 units @ 6,800 HP 2 units @ 6,900 HP 1 unit @ 7,600 HP 3 units @ 7,300 HP 2 units @ 8,000 HP
Spillway	Number of Bays	Five sluiceway bays and 92 spillway bays
	Sluiceway Bay Opening	7.62 m (25.0 ft)
	Discharge Capacity (at full supply level*)	2,445 m^3/s (86,344 ft^3/s)
Rockfill Dam	Material	Rockfill, with clay cap
	Crest Elevation	300.1 m (984.6 ft)
	Available Freeboard	1 m (3.5 ft)

*Full Supply Level is 299.1 m measured at the outer forebay

The forebay at Pointe du Bois consists of two parts: the inner forebay, located between the powerhouse and the spillway access bridge, and the outer forebay,

extending upstream of the spillway access bridge to Lamprey Falls. The inner forebay elevation is subject to rapid changes due to wind, flow changes and operations. The outer forebay encompasses a larger area and does not experience the same rapid changes as the inner forebay. The forebay has a total area of 25.1 sq. km (9.7 sq. miles) and a fetch length of approximately 5 km (3.1 miles). The maximum operating level is 299.1 m (981.3 ft) measured at the outer forebay.

The Pointe du Bois Generating Station is operated from the control room on site and is continuously staffed. Maintenance and emergency staff are located at the station.

3.0 WATER POWER LICENSING REQUIREMENTS

3.1 Licence Terms

Condition #2 of the licence stipulates that:

> *"The undertaking authorized to be maintained and operated by the Licensee Under this Fourth Renewal Licence shall consist of the following: The works at present located at the site which include a reinforced concrete powerhouse with sixteen (16) horizontal shaft hydroelectric turbines, rated at a total capacity of one hundred and five thousand (105,000) horsepower..."*

The initial capacity of the generating station was 105,000 horsepower. Unit 11 was updated in 1995 and Unit 1 was replaced in 1999, increasing the plant capacity to 112,000 horsepower. A fifth renewal of the Final Licence will include this increased generating station capacity.

Condition #5 of the licence stipulates that:

> *"The Licensee shall not raise the headwater of the development, as measured at the powerhouse, to an elevation higher than 981.1 feet above mean sea level, Dominion Water Power Survey Datum (with wind effect eliminated). A higher elevation may be created only with written permission by the Director and in accordance with Section 72 of the Regulation."*

The maximum elevation of 981.1 ft as specified in the licence refers to the elevation measured at the inner forebay. An analysis performed for various flow conditions shows that operating the outer forebay to 299.1 m (981.3 ft) provides a sufficient buffer so that the licence limit is not exceeded. The average drawdown from the outer to the inner forebay under most flow conditions is 0.30

m (1.0 ft). During plant shut down, the residual flow through the plant maintains an average drawdown of 0.15 m (0.5 ft).

Historically the plant has been operated to maintain an outer forebay level of 299.1 m (981.3 ft).

3.2 Licence Area

The licence area extends downstream of Pointe du Bois Generating Station at around Elght Foot Falls to the upstream boundary at Lamprey Falls. The licence area is shown in Manitoba Water Stewardship file number 21-12-1018.

Manitoba Hydro is reviewing the licence area and will propose changes/refinements based on current cadastral information, updated geotechnical analysis of shoreline erodability and wind setup and wave uprush analysis. It is expected that the updated licence area will be submitted as part of the licence renewal process.

4.0 MONITORING PROGRAMS

4.1 Water Levels

The forebay water levels at Pointe du Bois are measured and recorded using water level gauges located in the inner and outer forebays as indicated on Figure 3. Measurements are recorded using an ultrasonic transducer and a data logger. The components of the inner and outer forebay gauges are identical in construction. The transducer is installed in a stilling well at a depth of 2 m and is protected from the elements by a small shelter (outer forebay gauge). The data logger transmits a signal to the control room through a cable running to the spillway and across the pole line where it enters the powerhouse at the north-east side of the gateroom.

The outer forebay gauge is located upstream of the spillway access bridge. The inner forebay gauge is located in the north-east section of the gateroom in the powerhouse, upstream of the Unit 1 intake.

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 electronically sent to the Energy Operations Planning (EOP) Department. The EOP department staff enters the data into a WISKI database that is accessible, with permission, to interested parties within Manitoba Hydro.

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 Pointe du Bois includes the analysis of forebay level data, maps, photos, project description, and gauge and data collection description. 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 Dam (CDA) Safety Guidelines. Both the rockfill dam and concrete structures at Pointe du Bois continue to be inspected at regular intervals for any anomalies or deficiencies. Routine inspections of Pointe du Bois' dams by Manitoba Hydro staff are performed every two weeks for the rockfill dam and monthly for the concrete structures, including the spillways. Intermediate inspections of all water retaining structures are performed by specialists from Manitoba Hydro's Engineering Services Division quarterly. These intermediate inspections are done more frequently than for other typical Manitoba Hydro structures due to their age and condition. Data from inspections, engineering analysis and instrumentation readings are used to assess the condition of the structures.

Pointe du Bois spillway does not meet current CDA guidelines with respect to passing extreme floods. The spillway replacement project that is currently underway will address this deficiency and will bring the station up to CDA guidelines. A dam safety operations support group (OSG) was formed in 2006 to manage risks and increase the reliability of existing spill at Pointe du Bois in the interim period while a new spillway was being designed and built. The OSG coordinated a failure modes and effects analysis (FMEA) in 2007 that was facilitated by an international dam safety expert. Projects completed under the advisement of the OSG have included new gates and hoists for some existing spillway bays, a new steaming system to improve reliability of winter gate operations, and development of a spill operation sequence to improve efficiency of spill mobilization. Manitoba Hydro has completed a significant amount of work in increasing flow reliability and the replacement of the existing spillways with two new, modern spillways, and appurtenant structures will eliminate any deficiencies in spillway capacity, condition and reliability.

4.3 Aquatic Monitoring

Healthy fish populations exist above and below the Pointe du Bois Generating Station. Manitoba Hydro is aware that a healthy recreational fishery exists on the Winnipeg River above Pointe du Bois used by cottagers located in the forebay area as well as the commercial tourism industry (fishing lodges). Downstream of the Pointe du Bois GS, in addition to the regular assemblage of fish species and the associated recreational fishery, a healthy population of lake sturgeon exists.

Provincial Fisheries Branch and Manitoba Hydro are partnered in the Coordinated Aquatic Monitoring Program (CAMP) of which a component includes water quality, lower trophic levels and fish sampling upstream of the station. Manitoba Hydro is also monitoring downstream of the station related to proposed spillway upgrade works.

5.0 SYSTEM UPGRADES AND AGREEMENTS

5.1 System Upgrades

Several repairs and upgrades have been made to the Pointe du Bois Generating Station over the years. Some of the major repairs and upgrades include the following:

- Unit 11 rerunnering was completed in October 1995, increasing the capacity of that unit from 6,900 HP to 7,600 HP
- Unit 1 was replaced with a Straflo unit and commissioned on November 2, 1999, with a new capacity of 11,300 HP, shown on Figure 6
- To address stability concerns in the East and West Gravity Dams, anchoring was completed in 1985 and 2002. In the 2002, the East Gravity Dam was also reinforced with concrete gravity blocks downstream of the structure
- A vehicle access bridge was installed in 2010/11 to address dam safety concerns, shown on Figure 7

The Spillway Replacement Project, construction planned to commence winter 2011/2012, will address public and dam safety concerns and provide a safer working environment for staff.

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 Pointe du Bois Generating Station in accordance with the Fourth Renewal Licence under *The Water Power Act* for the development of water power at the Pointe du Bois Site on the Winnipeg River. Manitoba Hydro operates and maintains the generating station and associated structures based on the Canadian Dam Association Guidelines.

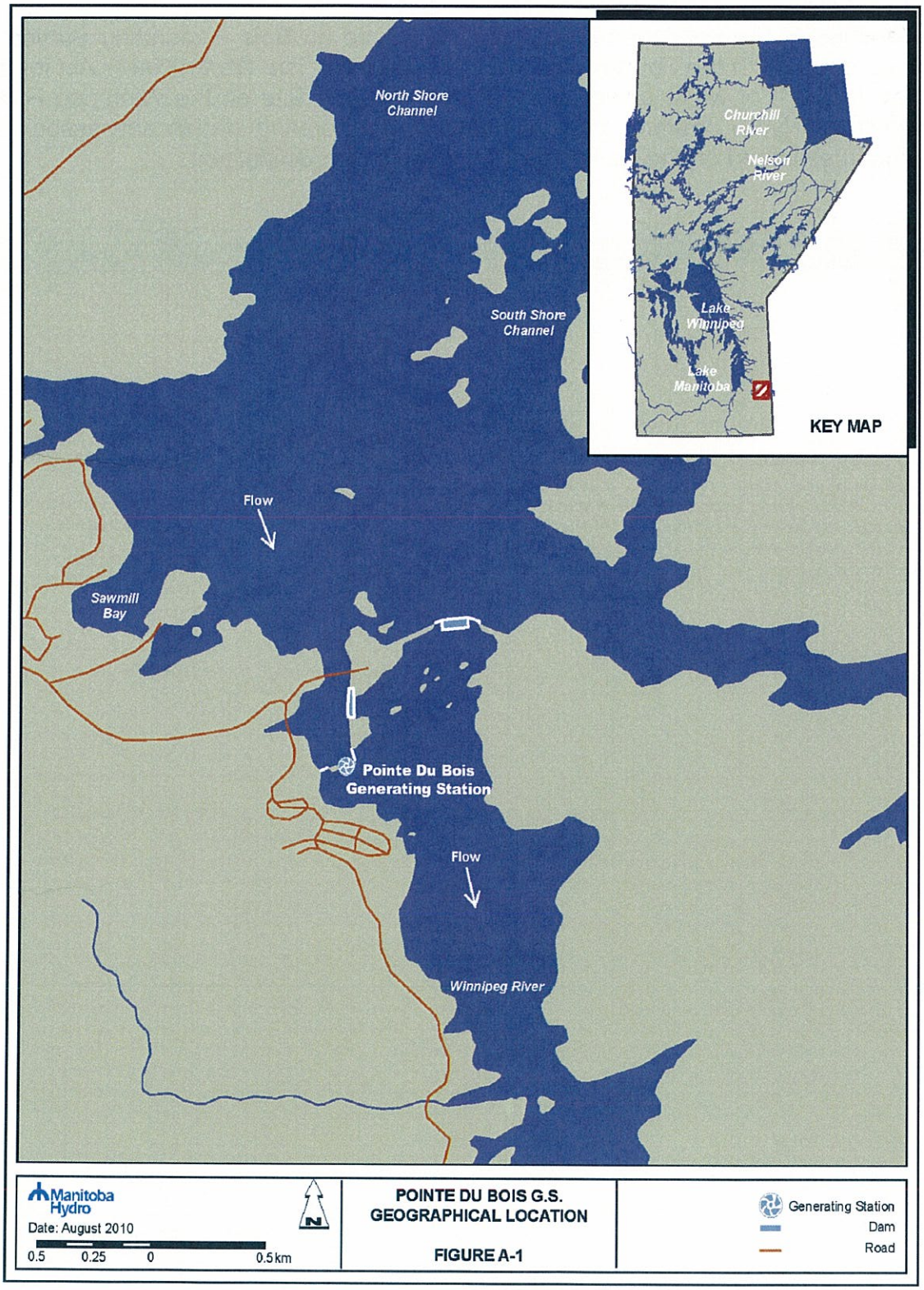

Figure 1: Pointe du Bois Geographical Location

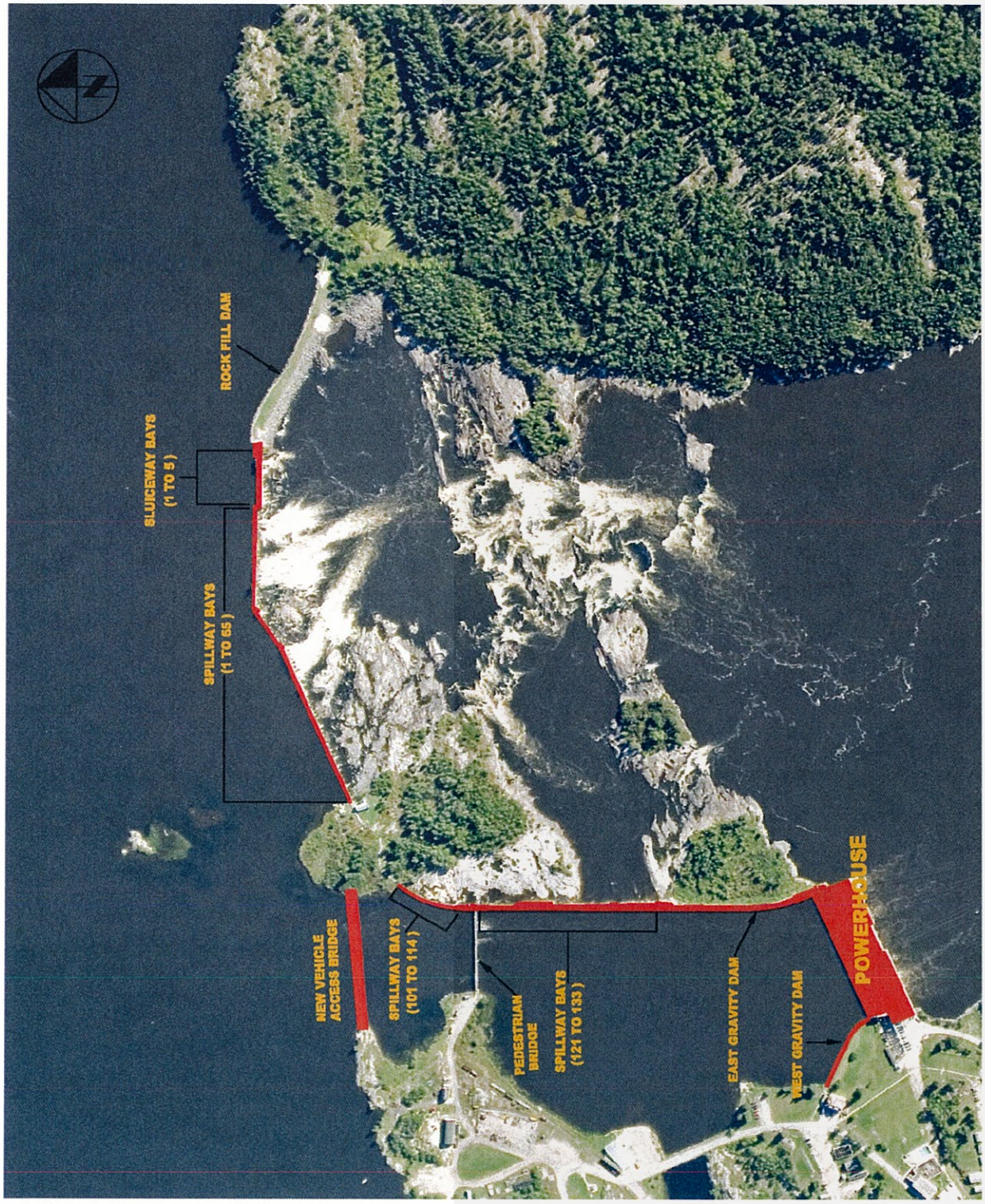

Figure 2: Overall View of Site

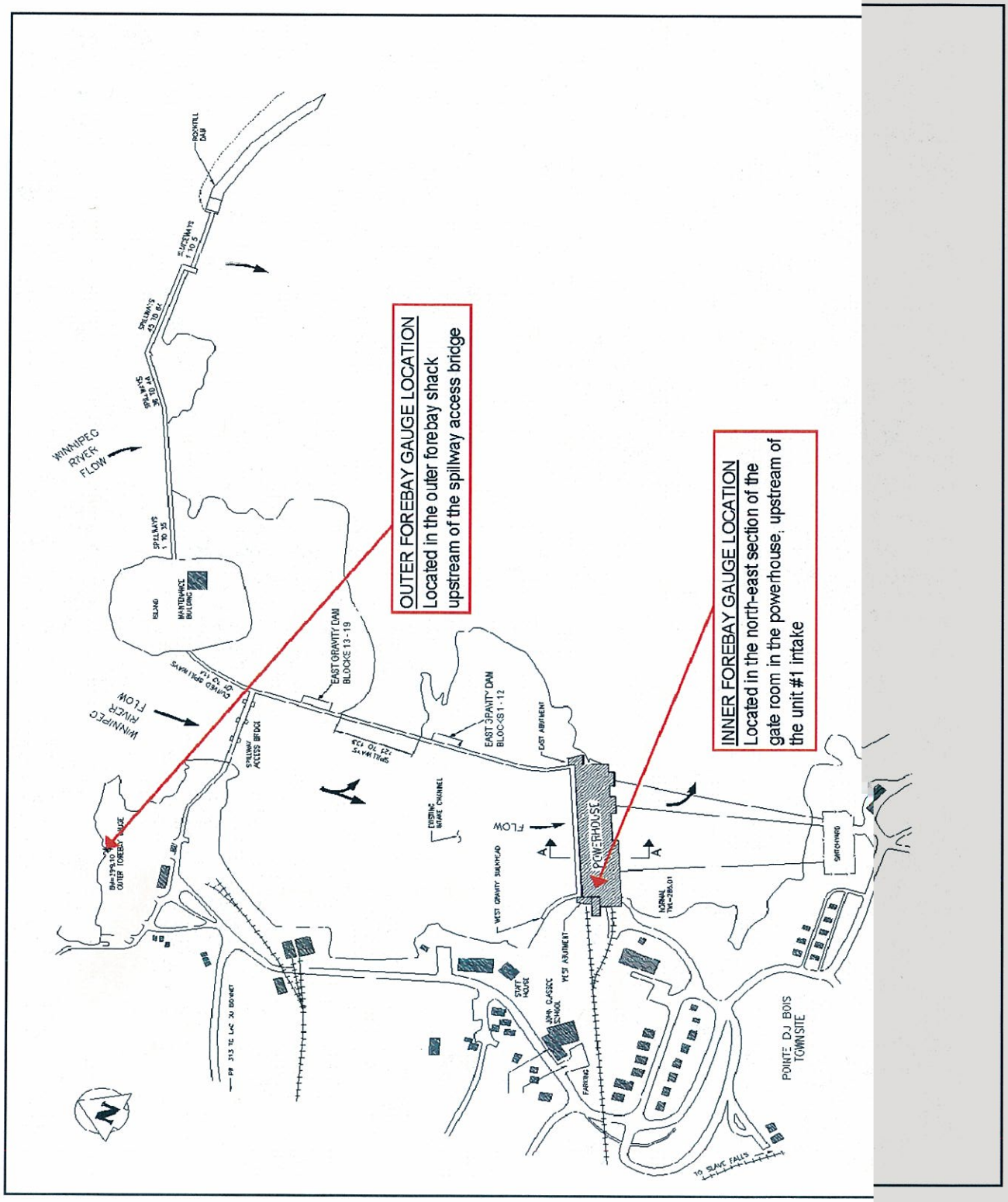

Figure 3: General Arrangement of Principal Structures and Gauge Loc ations

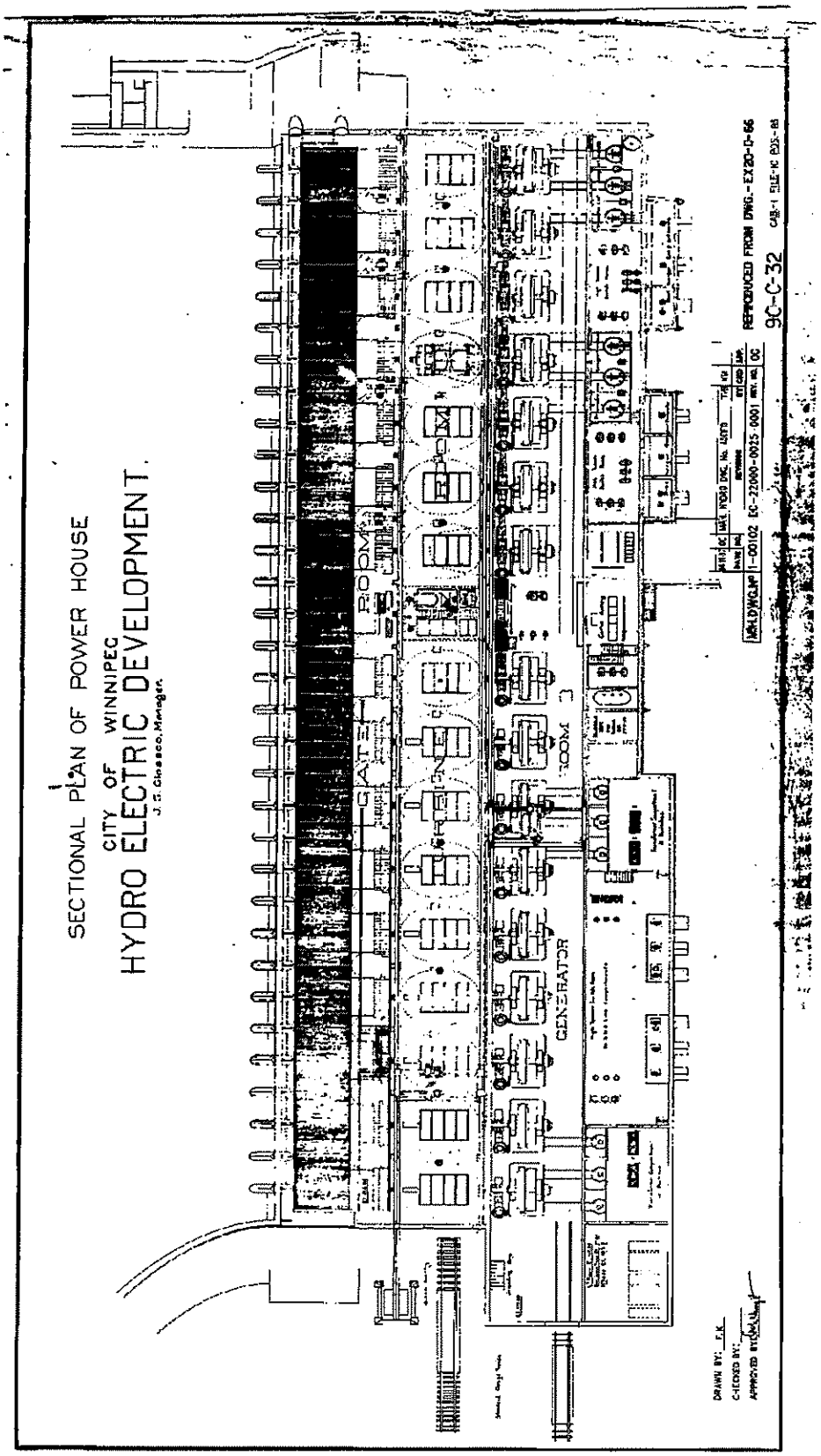

Figure 4: Powerhouse

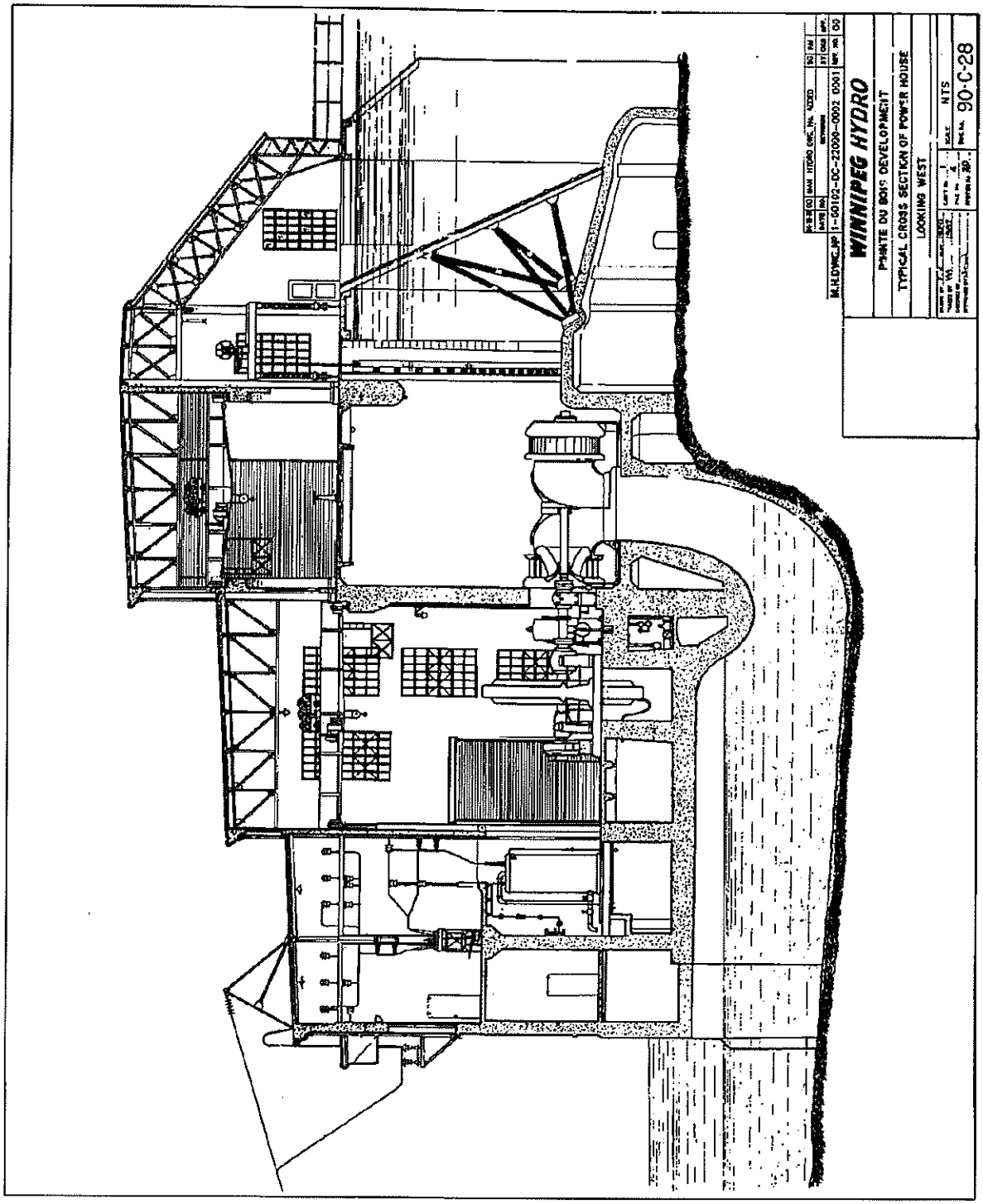

Figure 5: Typical Cross Section of Powerhouse

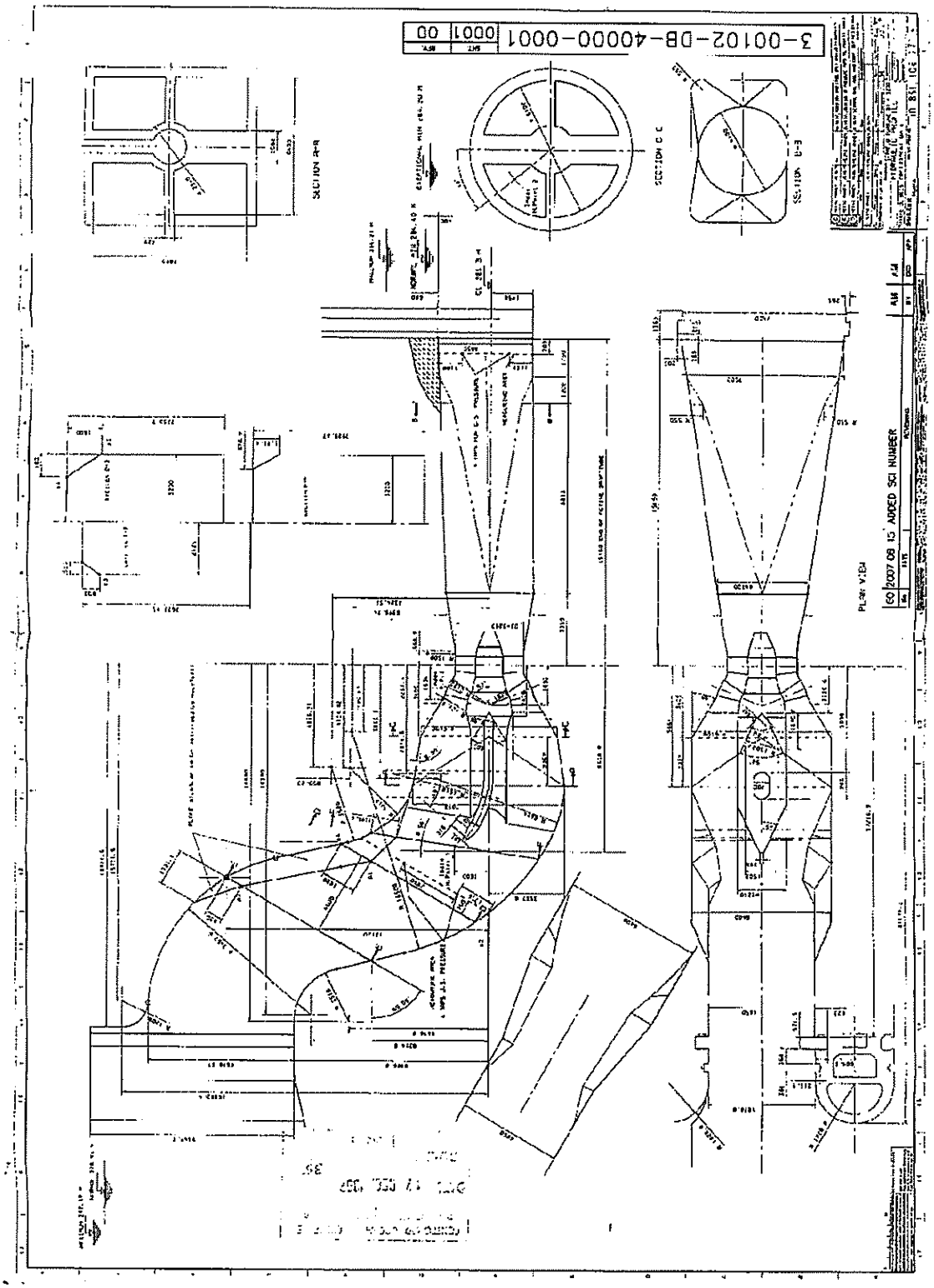

Figure 6: Straflo Unit #1

Figure 7: Vehicle Access Bridge

Figure 8: Aerial photo of site.