

Should questions arise during the processing of this report please contact:
David Shaw - ERO Resources Corp. (208) 373-7983

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

RECEIVED
RECEIVED MAY 30 2013
JUN 03 2013
DEPT OF WATER RESOURCES
WATER RESOURCES
WESTERN REGION

A Beneficial Use Field Report is prepared by a water right examiner as the result of an examination to clearly confirm and establish the extent of the beneficial use of water established in connection with a permit during the development period authorized by the permit and any extensions of time previously approved.

A. GENERAL INFORMATION

Permit No. 63-33329

1. Owner Boise Project Board of Control Phone No. (208) 344-1141

Current Address 2465 Overland Road, Boise, ID 83705-3155

2. Examiner's name David Shaw EXAM DATE 9-17-2012

3. Accompanied by Tim Page, Email

Address 2465 Overland Road, Boise, ID 83705-3155

Relationship to permit holder Employee Phone No. (208) 344-1141

4. Source Boise River tributary to Snake River

B. OVERLAP REVIEW

1. Other water rights with the same place of use None for Power

2. Other water rights with the same point of diversion 63-9206, 63-33599, 63-357 for power

C. DIVERSION AND DELIVERY SYSTEM

1. Point(s) of Diversion:

Ident No.	Gov't Lot	¼	¼	¼	Sec	Twp.	Rge.	County	Method of Determination/Remarks
	13		NW	SW	3	2N	3E	Ada	Aerial Photo

2. Place(s) of Use: Indicate Method of Determination Aerial Photo

TWP	RGE	SEC	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
4N	5W	5		Lt2 P															

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3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size/ditch size/pipe diameter (inside), as applicable. Use the space provided or i.d. ☒ see attached.

Scale: 1" = _____.

- ☐ Copy of USGS Quadrangle attached showing location(s) of point(s) of diversion and place(s) of use (required).
☒ Aerial photo attached (required for irrigation of 10+ acres)
☒ Photo of diversion and system attached

4.

Well or Diversion Identification No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date
Movable crest suppressed rectangular weir		Custom made				

2. **Measurements:** Measurements were taken from the installed movable crest suppressed rectangular weirs. The weirs are each 8 feet wide with a custom staff gage attached to the weir blade to measure the depth of water discharging over the top of the weir. See the attached plans and rating calculations for the location of the 4 weirs and custom staff gages. Discharge was measured as 28 & 29 cfs in the Arena Canal & 15 & 18 cfs in the Golden Gate Canal for 90 cfs total.

E. NARRATIVE / REMARKS / COMMENTS

Water for this water right is diverted as irrigation water for the Boise Project through the New York Canal heading. The location of that heading is shown in Figure 1. Water is delivered through the existing Boise Project water delivery facilities to the location of the Arena Drop power plant shown in Figure 2. Discharge measurements and photos of the discharge from the power plant were taken upon arrival on September 17, 2012 at about 1:30 p.m. as the power plant was reported to be running at full capacity. Photos 1 and 2 show the discharge over the movable weir gates into the Arena Canal. The flow at the Arena Canal weirs has some turbulence due to proximity to the draft tube discharge but the average approach velocity is less than 1 fps. The weir gates are designed as movable suppressed rectangular weirs with flow over the top of the weir gate, i.e., the gate is lowered to increase flow. Figure 3 shows the location of the 4 gates, 2 for the Arena Canal and 2 for the Golden Gate Canal. Figure 4 shows the dimensions for the custom staff gages attached to the weir blades and Figure 5 shows the calculated flow for each of the gage dimensions shown in Figure 4. The Arena Canal weirs do appear to be submerged and may not be fully ventilated. The depth of water measured by the staff gage is about 13 inches in the photos and the water in the canal is estimated to be 10 inches lower than the water elevation at the staff gages. This estimate yields a submergence of 3 inches. The submergence ratio then is $3/13$ or 0.23 . From Table 13 of the 1967 Second Edition of the Department of Interior Water Measurement Manual the error correction for 0.23 submergence is 0.966 . That means instead of 57 cfs in the Arena Canal the actual measurement may be 55 cfs, however, since the weirs do not appear to be fully ventilated the submergence effect may be partially or fully offset. In either event, the measurement accuracy should be acceptable for this site since no new diversion from the Boise River is involved. Photos 3 and 4 are of the weirs discharging into the Golden Gate canal and appear to be properly functioning. The old flume that was used before the power plant and penstock were installed discharges upstream of the Golden Gate weirs. The flume acts as an emergency bypass if the power plant shuts down and to carry excess discharge that is beyond the plant capacity. At the time of the photo less than 1 cfs was discharging in the bypass. Photo 5 shows the intake structure where the penstock takes water through the trash rack on the left and excess spill or emergency spill discharges to the right side of the structure. Photo 6 is taken from the intake structure toward the power house in the center of the photo. Photo 7 shows the generator in the foreground and the turbine in the back ground. Photo 8 is the draft tube for the turbine discharge. Photo 9 is the name plate on the generator and photo 10 is the system control panel. Photo 11 is the pressure gage at the turbine intake while the system was operating.

Has the permit holder met all conditions of permit approval, including any mitigation requirements and/or measuring device installation requirements? ☒ Yes ☐ No If no, what must be done to meet the permit requirements?

F. FLOW CALCULATIONS

Additional computation sheets attached

Measured Method:

Custom staff gages read directly in cfs. Discharge was captured on photos attached for a total of 90 cfs.

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I.R.} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) = \underline{\hspace{10cm}}$$

$$V_{D.R.} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 =$$

$V = \text{Smaller of } V_{I,R} \text{ and } V_{D,R} =$ _____

2. Volume Calculations for Other Uses:

N/A

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use		Rate of Diversion	Annual Volume
	From	To	Q (cfs)	V (afa)
<u>Power</u>	<u>3/15</u>	<u>10/31</u>	<u>80.00</u>	
			Totals:	
			80.00	

2. Recommended Amendments

☒ Change P.D. as reflected on page 1 ☐ Add P.D. as reflected on page 1 ☐ None

☐ Add P.D. as reflected on page 1 ☐ None☐ None

☒ Change P.U. as reflected on page 1 ☐ Add P.U. as reflected on page 1 ☐ Other

☐ Add P.U. as reflected on page 1 ☐ Other☐ Other

Changes are only for the purpose of adding Government Lots to the legal descriptions.

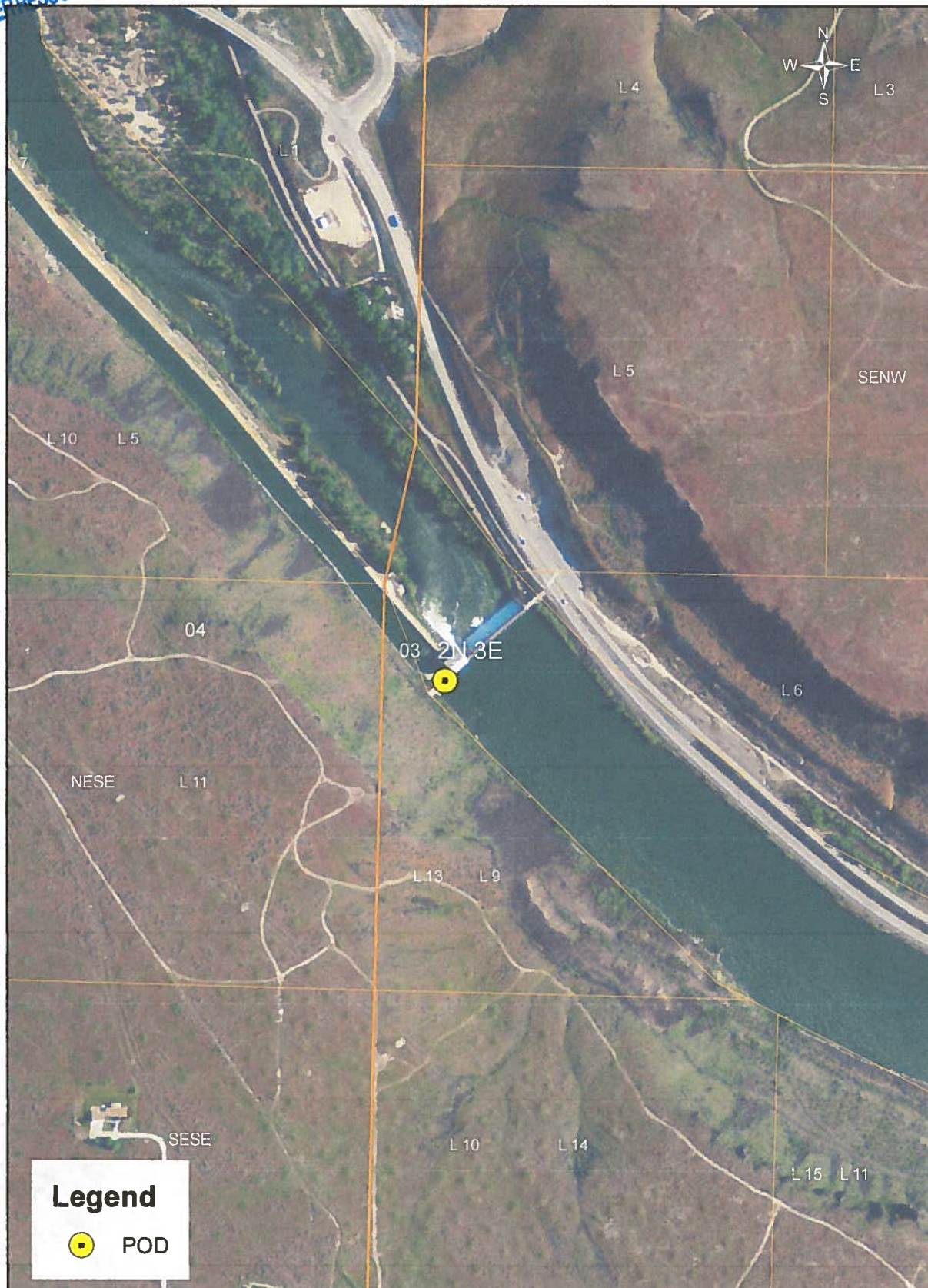
I. AUTHENTICATION

Field Examiner's Signature [Signature] Date 5/23/13

Reviewer _____ Date _____



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NAIP 2011 photography.

Prepared for Boise Project Board of Control by ERO January 2013.

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Figure 2 - Place of Use 63-33329

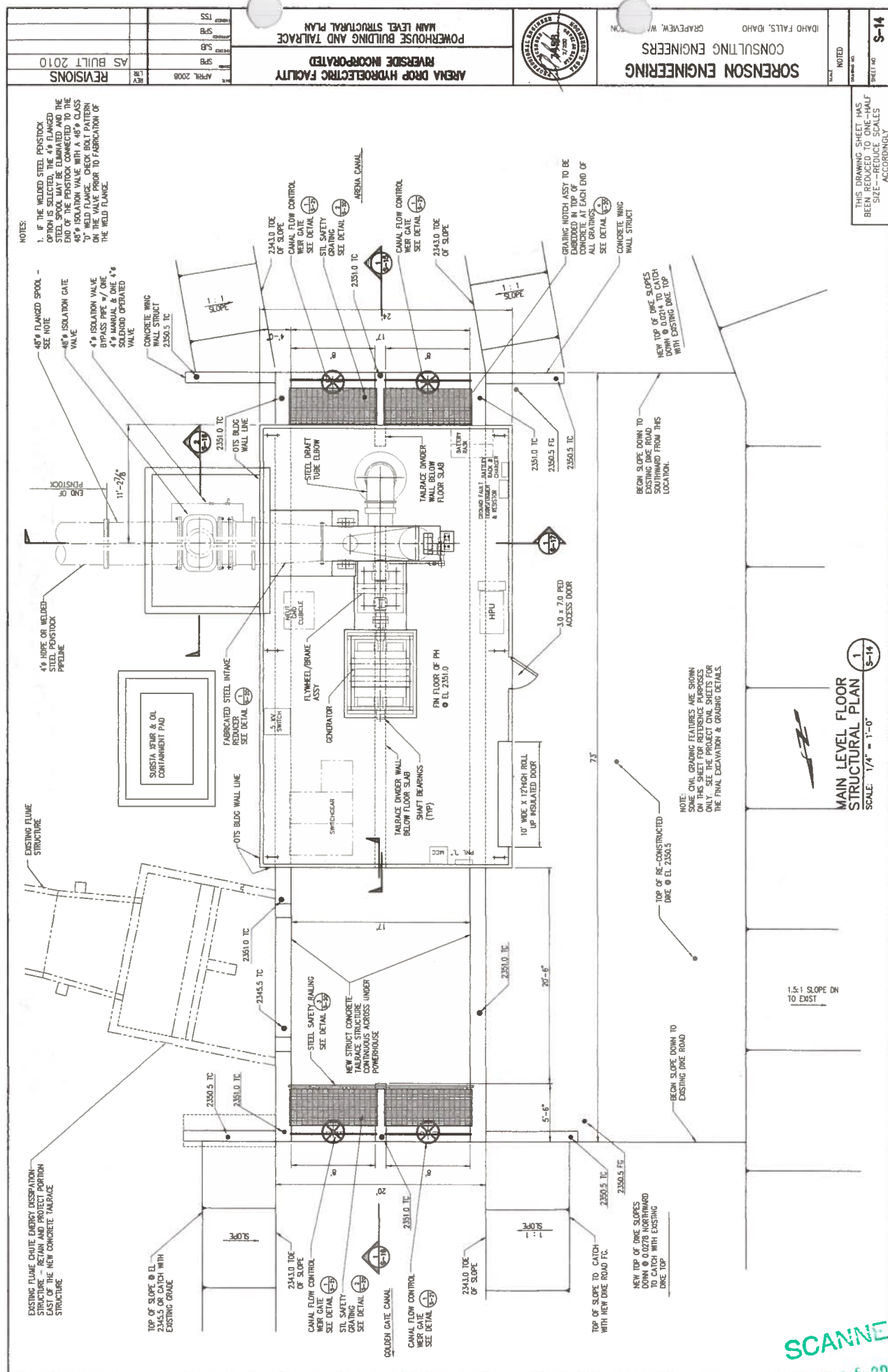


NAIP 2011 Photography.

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Figure 3



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Figure 4

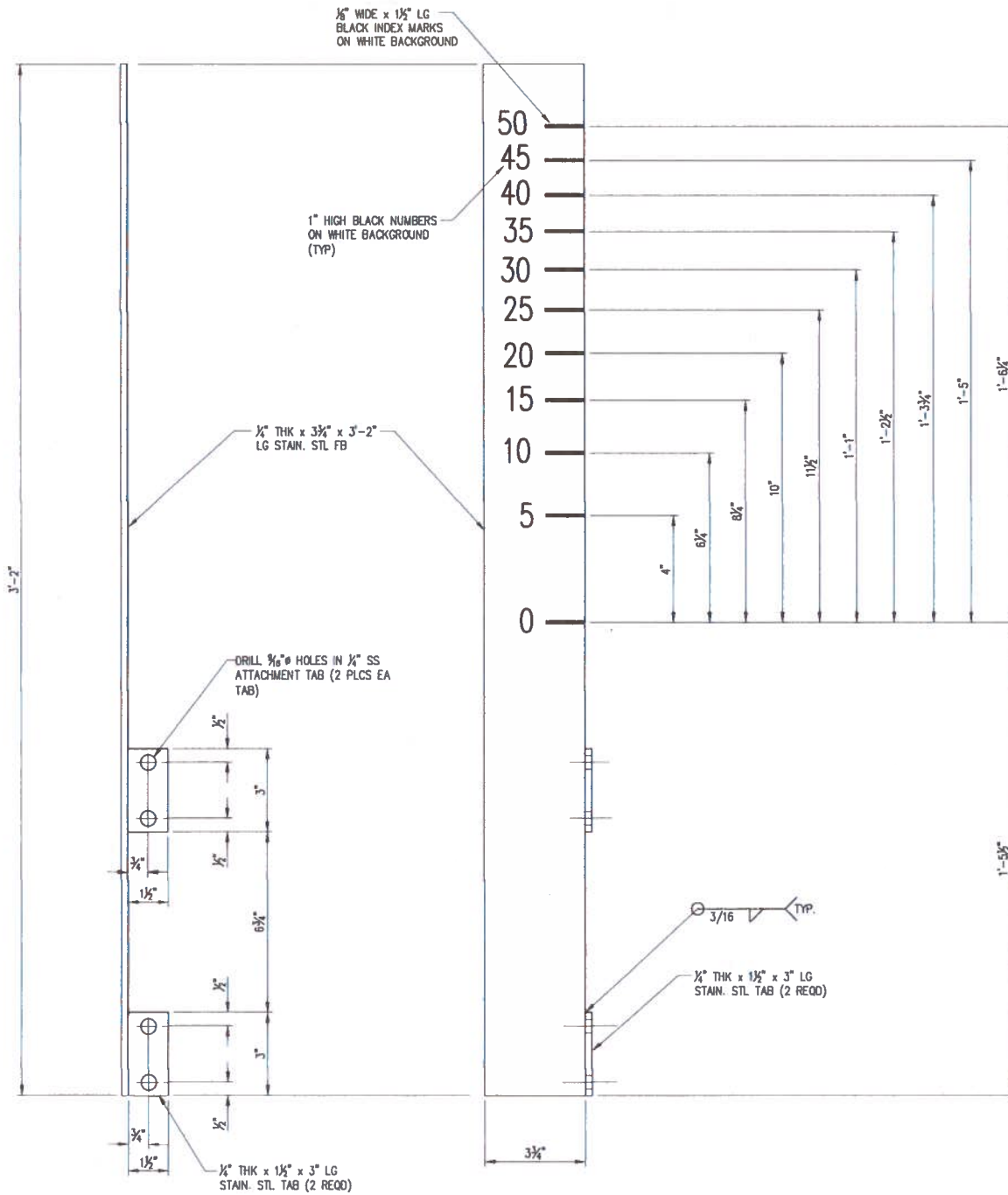


Figure 5

Gate Rating for Arena Drop Power Plant Weir Gates

Suppressed rectangular weirs, weir length (L) = 8 feet.

$$Q = 3.33 \times L \times H^{1.5}$$

H inches	Q cfs
4.00	5.1
6.25	10.0
8.25	15.2
10.00	20.3
11.50	25.0
13.00	30.0
14.50	35.4
15.75	40.1
17.00	44.9
18.25	50.0

Photo 1



Photo 2

Photo 3



Photo 4

Photo 5



Photo 6

Photo 7



Photo 8

Photo 9

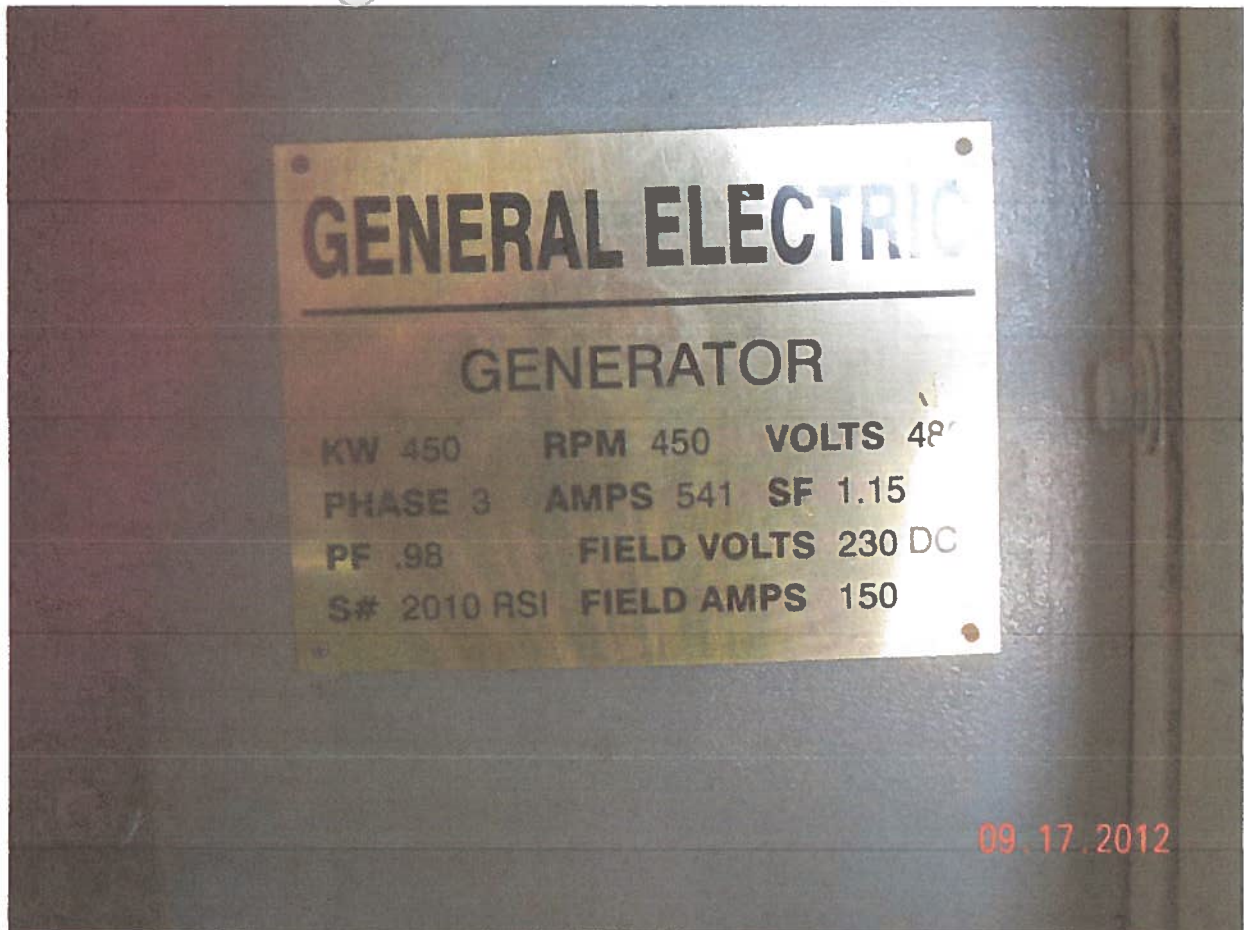


Photo 10

Photo 11

