

P-10810

BOYCE HYDRO POWER, LLC

A W.D. Boyce Trusts Legacy Enterprise
Stephen B. Hultberg & Lee W. Mueller, Co-Member Managers
6000 S. M-30 (P.O.Box 15)
Edenville, MI 48624
tel: (989) 689-3161 / fax: (989) 689-3155



October 4, 2011

Ms. Peggy A. Harding, PE
Regional Engineer
Federal Energy Regulatory Commission
230 S. Dearborn St., Suite 3130
Chicago, IL 60604

Re: Sanford, Edenville, Smallwood
P-2785, P-10808, P-10810
Final Report Apron Repair

Dear Ms. Harding:

Enclosed herewith please find three copies of our Final Report on Repair of Slab Undermining at Sanford, Edenville and Smallwood. This concludes the work proposed in our submittal June 6, 2011.

Sincerely,
Boyce Hydro Power, LLC


Frank O. Christie, PE
General Manager

cc: Lee W. Mueller
Stephen Hultberg

P-10810

**BOYCE HYDRO POWER, LLC
FINAL REPORT ON REPAIR OF SLAB UNDERMINING
AT**



**SANFORD P-2785
EDENVILLE P-10808
SMALLWOOD P-10810
October 4, 2011**

Introduction

On June 1 and 2, 2011 a diving inspection was conducted at the Sanford, Edenville and Smallwood dams to determine the extent of any tailrace or spillway slab undermining as a result of this springs extreme high flows. The investigation at Sanford confirmed the extent of undermining found in a 2007 inspection. There was no significant additional erosion found at Sanford. The undermining found at Edenville required more bags in three places. There was some minor erosion at Smallwood in one spot. We had significant spill at Sanford, Edenville and Smallwood this spring.

General

There were no embankments, anchors, foundations, instrumentation or concrete structures involved in this work. The only element involved was the apron slabs downstream of the spillways and/or powerhouse.

Work Completed

Concrete bags were placed at the three sites over the July through September period. The Sanford Project was completed on July 28, 2011. The Smallwood Project was completed on September 1, 2011. The Edenville Project was completed on September 21, 2011. All bags were staked with steel reinforcing bars. Concrete cylinders were taken of the first significant pour and showed a minimum concrete strength of 4,370 psi at 28 days. In Total approximately 15 cubic yards of concrete was installed.

Construction and Testing Reports

Attached is a Work Report prepared by the supervising diver which documents the work in more detail. It also contains sketches of the site and the location of the bags placed.

Also attached is a copy of the concrete test results.

P-10810

WORK REPORT

SMALLWOOD, EDENVILLE, SANFORD HYDROELECTRIC PLANTS

JULY 28, 2011- THRU -SEPTEMBER 21, 2011

PREPARED FOR:

BOYCE HYDRO POWER LLC
6000 SOUTH M-30
EDENVILLE, MICHIGAN 48620

BY:

DANIEL FELSKE
ABLE DIVING CO. GERACE DIVING SERVICE
448 E. MUNGER RD.
MUNGER, MI. 48747

1.0 INTRODUCTION

Underwater work was conducted at the Edenville, Smallwood, and Sanford Hydroelectric plants from, July 28, 2011-thru- September 21, 2011.

The purpose was to repair the existing conditions of the concrete scour slab downstream end, on both the powerhouse tailrace and spillway tailrace.

A combination of redi-mix concrete bags, and larger grout bags, filled with hoses from a onshore concrete pump truck were utilized in the repair.

Descriptions of the involved structures at Edenville Dam are referred to with North-South, and upstream-downstream designations given for reference during this inspection.

Please refer to rough sketch 4.0 for directions of locations in this report

Surface supplied diving equipment, rigged with two way communication was used for the work.

Water depth	0-15 ft.
Water visibility	0-2 ft.
Water Temp	65 degrees
Air Temp	72 degrees
Current	Nil

Diving crew	Daniel Felske	Supervisor/Diver
	Cade Schafer	Diver
	Ryan Collier	Tender

2.0 FIELD WORK SUMMARY

SMALLWOOD DAM

One diver was utilized for the dive work on September 1, 2011

Diver Ryan Collier repaired the following defect w/ redi-mix concrete bags placed in burlap sacks.

- Defect- Undermining 2ft. Long x 18in. Wide x 3ft. Deep
- Location- On the powerhouse downstream concrete scour slab, 5 ft. South of the concrete divider pier. (See rough sketch)
- Repair- (6) 60lbs. bags of Quickcrete ready-mix staked in place with re-bar pins.

EDENVILLE DAM

One diver was utilized for the dive work on two separate days. September 1, 2011 and September 21, 2011.

Diver Cade Schafer repaired the following defect w/redi-mix concrete bags placed in burlap sacks on September 1, 2011.

- Defect- Undermining under grout bag--- 5 ft. long x 6 in. wide x 1 ft. deep.
- Location- Directly downstream of the divider wall between the powerhouse and spillway. (See rough sketch)
- Repair- (11) 60 lbs. bags of Quickcrete ready-mix staked in place with re-bar pins.

Diver Cade Schafer repaired the following two defects w/ Grout Bags pumped from an onshore pump truck on September 21, 2011.

- Defect #1- Undermining under grout bag---10 ft. long x 4-6 in. wide x 1-3 ft. deep
- Location- Powerhouse downstream concrete scour slab, 3 ft. south of the concrete divider wall between bays #1 & #2 (See rough sketch)
- Repair- (1) 10 ft x 3 ft. concrete filled grout bag. (Grout bag filled w/approx 2 yds.)

- Defect #2- Undermining of concrete scour slab---15 ft. long x 12-18in. wide x 2ft. deep
- Location- On the spillway downstream concrete scour slab from the South retaining wall to 15 ft. North. (see rough sketch)
- Repair- (1) 15ft. x 3ft. concrete filled grout bag. (Grout bag filled w/approx. 3.5 yds)

2.0 FIELD WORK SUMMARY

SANDFORD DAM

One diver was utilized for the dive work on July 28, 2011

Diver Cade Schafer repaired the following two defects w/ Grout Bags pumped from an onshore pump truck on July 28, 2011.

Defect #1- Undermining of concrete scour slab- 30 ft. long x 1-3 ft. wide x 1-4 ft. deep

Location- On the powerhouse downstream concrete scour slab, from the South retaining wall to 30 ft. North. (see rough sketch)

Repair- (4) 10ft x 3 ft. wide concrete filled grout bags. (Grout bags filled w/approx. 5.5 yds.)

Defect #2- Undermining under sheet pile- 16-18 ft. Long x 6-12 in. Wide x 2 ft. Deep

Location- Stub sheet pile wall placed approx. 2 ft. South out paralleling the North concrete retaining wall from 8-24 ft. downstream of the spillway scour slab. (see rough sketch)

Repair- (3)-10 ft. x 3 ft. wide concrete filled grout bags. (Grout bags filled w/approx. 3.5 yds.)

GERACE CONSTRUCTION CO., INC.

4055 South Saginaw Road
MIDLAND, MICHIGAN 48640
(989) 496-2440
FAX (989) 496-2465

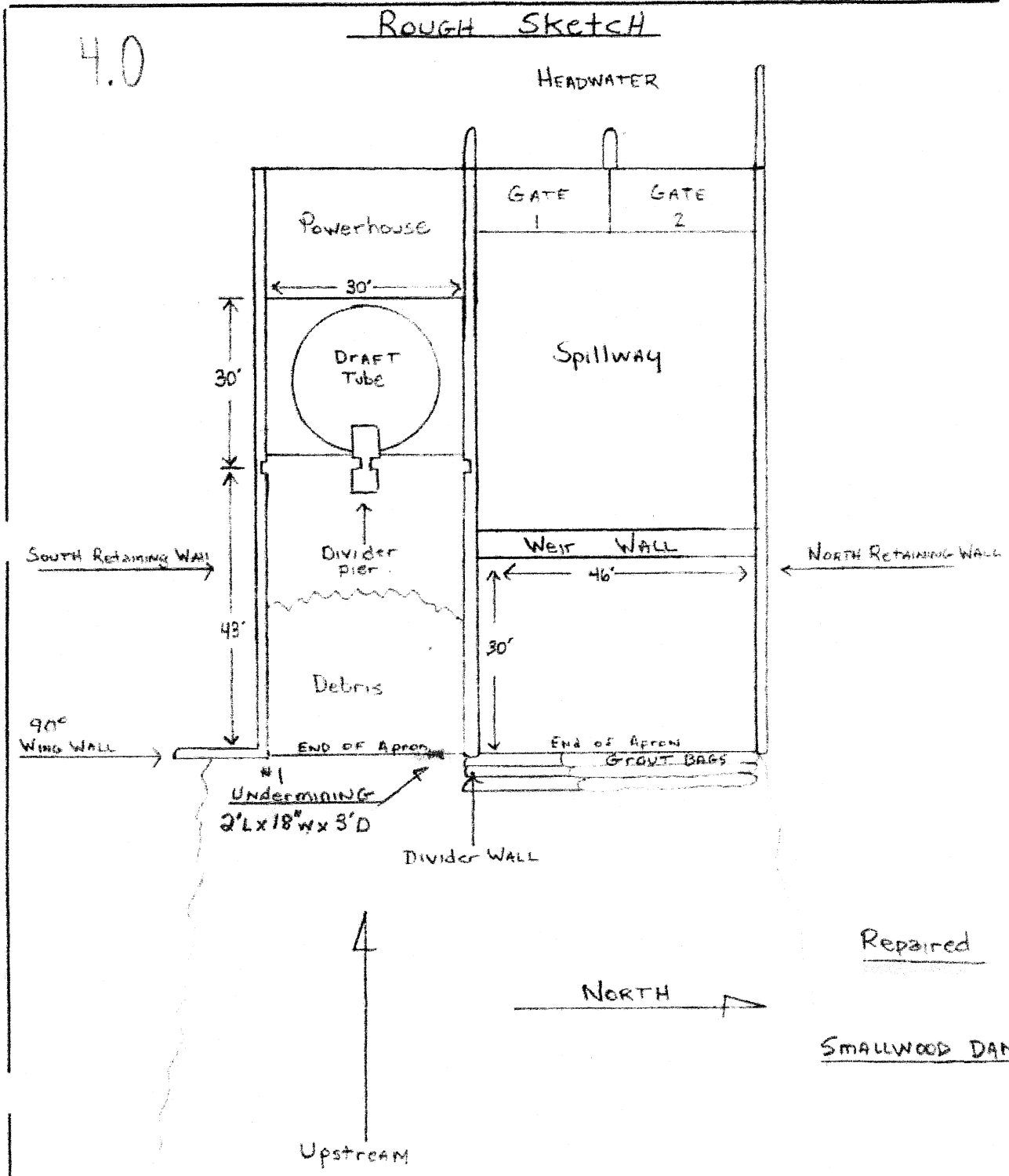
JOB _____

SHEET NO _____ OF _____

CALCULATED BY _____ DATE _____

CHECKED BY _____ DATE _____

SCALE _____



4.0

ROUGH SKETCH

HEADWATER

Powerhouse

GATE 1

GATE 2

30'

DRAFT Tube

Spillway

30'

Divider pier

Weir Wall

NORTH Retaining Wall

SOUTH Retaining Wall

48'

30'

Debris

90° Wing Wall

END OF Apron

END OF Apron

#1 UNDERMINING
2' L x 18" W x 3' D

GRAFT BAGS

Divider Wall

Repaired

NORTH

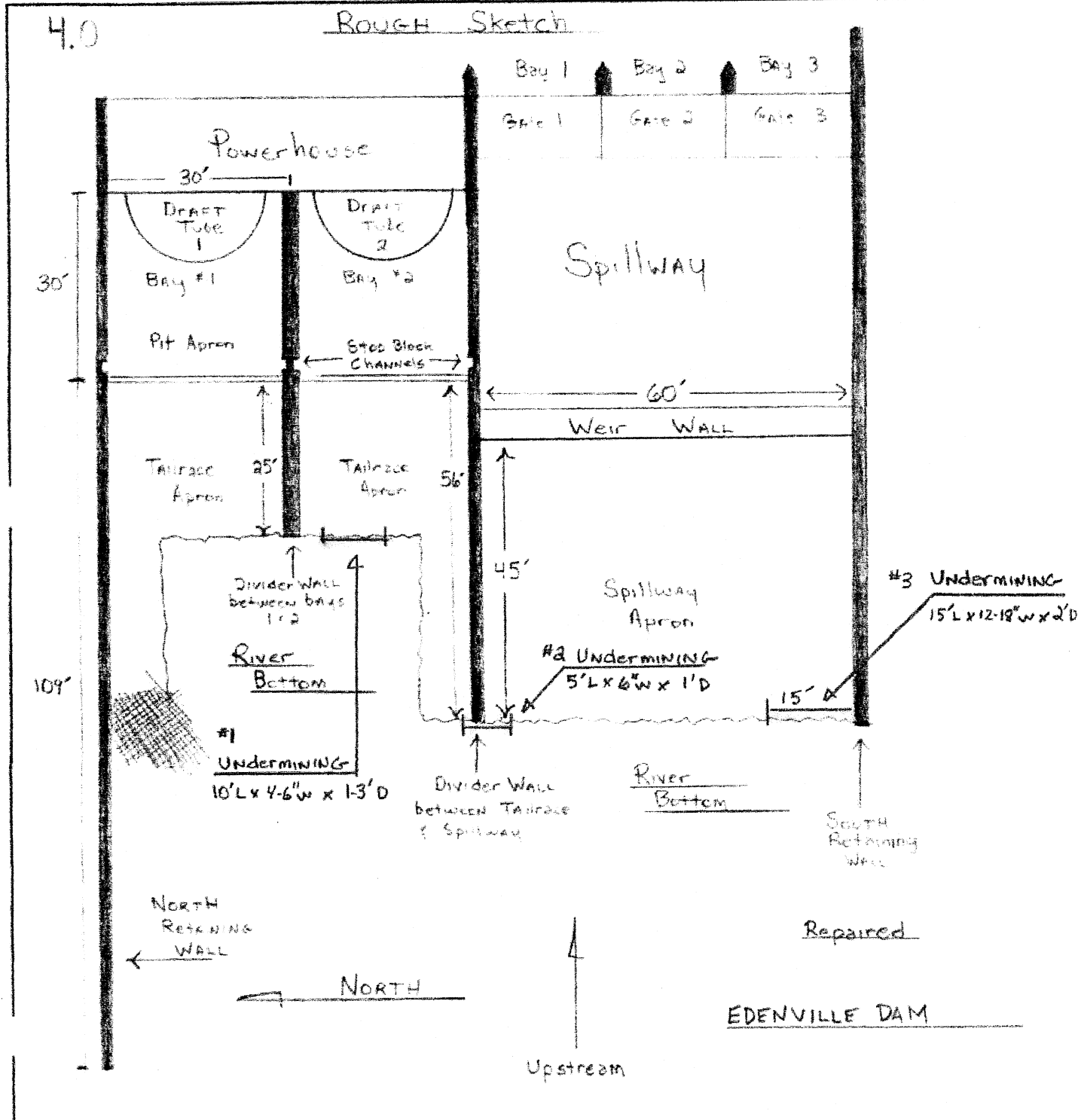
Upstream

SMALLWOOD DAM

GERACE CONSTRUCTION CO., INC.

4055 South Saginaw Road
MIDLAND, MICHIGAN 48640
(989) 496-2440
FAX (989) 496-2465

JOB _____
SHEET NO _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____



GERACE CONSTRUCTION CO., INC.

4055 South Saginaw Road
Midland, Michigan 48640
TEL (989) 496-2440
FAX (989) 496-2465

JOB _____

SHEET NO _____ OF _____

CALCULATED BY _____ DATE _____

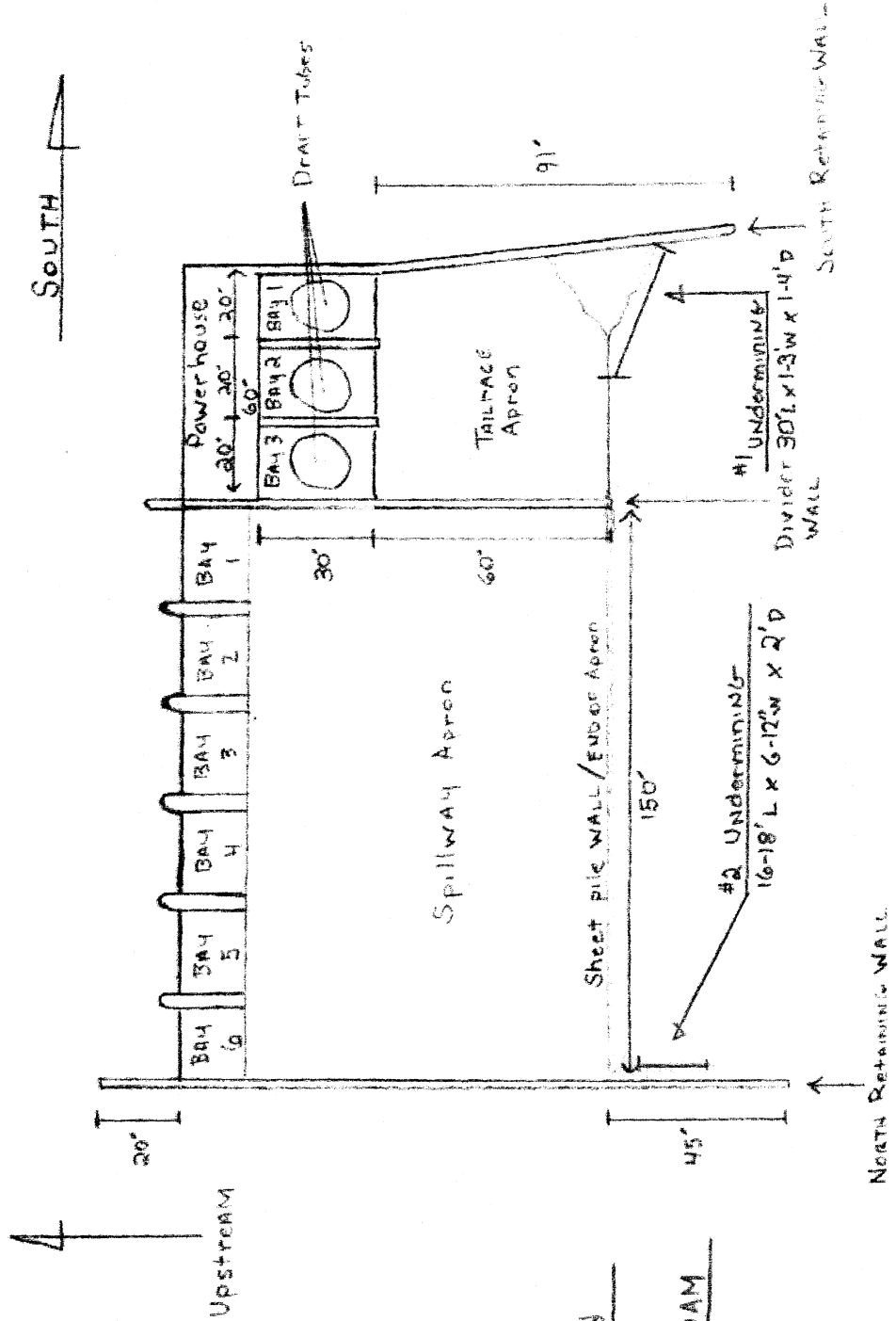
CHECKED BY _____ DATE _____

SCALE _____

4.0

Rough Sketch

Rough Sketch



Repaired

SANFORD DAM



McDOWELL & ASSOCIATES
Geotechnical Engineers
3730 James Savage Road
Midland, Michigan 48642
Phone: (989)496-3610

DAILY CONCRETE INSPECTION REPORT

General Contractor:	Boyce Hydro	Our Job No.:	11-68310
Project:	Sanford Apron Repair	Date:	7/28/2011
Supplier:	Eimer's		
Location:	Sanford, Michigan		

FIELD DATA

Test Set	Concrete Placed Yards	Slump Inches	Air Content %	Yield	Unit Weight P.C.F.	Concrete Temp. °F	Air Temp. °F
1-4	4	7.0	2.5		145.5	80	75

LABORATORY DATA

Required Strength: 3,500 psi

Cylinder No.	Age	Date Molded	Date Broken	Total Load	PSI
1802	7	7/28/2011	8/4/2011	119,250	4,220
1803	28	7/28/2011	8/25/2011	151,820	4,370
1804	28	7/28/2011	8/25/2011	147,510	5,215
1805	12	7/28/2011	8/9/2011	124,970	4,420

AREA OF PLACEMENT

South side under tall race

REMARKS

nm

Field Representative:

Steve Cole

Document Content(s)

12802570.tif.....1-10