Construction Certification Report

2013 Pond 3 Construction Projects
Pond 3 South Vertical Expansion &
Pond 3 North Interior Bench Construction

NPDES Permit No. 0002186
Sherburne County (Sherco) Generating Plant
Northern States Power Company (dba Xcel Energy, Inc.)
Becker, MN

Prepared for:

Xcel Energy, Inc.

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Prepared By:

Construction Certification Report
2013 Pond 3 Construction Projects

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Certification

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Sherco County (Sherco) Generating Plant
Northern States Power (dba Xcel Energy, Inc.)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Daniel J. Riggs, P.E.

Date: November 1st, 2013 License No.: 49559

Section 1 Introduction

This report presents the results of field observations and testing performed during the 2013 construction of the Pond 3 South (Pond 3S) Vertical Expansion and the Pond 3 North (Pond 3N) Interior Embankment at Xcel Energy's (Xcel) Sherburne County Generating Plant (Sherco) in Becker, Minnesota. The original phase of Pond 3 development was the construction of Pond 3N to a finished elevation of 976 (operational elevation of 970) in 2004. In 2008, Pond 3N was vertically expanded to a finished elevation of 999 (operational elevation of 993). Pond 3S was constructed in 2010 to a finished elevation of 988 (operational elevation of 982) and hydraulically connected to Pond 3N through a weir at the east end of the Pond 3 center dike. In 2012, Pond 3S was raised to a finished elevation of 994 (operational elevation 988). This report documents the third phase of Pond 3S development, which consists of raising Pond 3S to a finished elevation of 999 (operational elevation of 993). Future development of Pond 3 consists of a final vertical expansion of the entire Pond 3 footprint to an operating elevation of 1008.

The Pond 3S 2013 Vertical Expansion consisted of constructing the interior embankment, raising the existing clay barrier from an elevation of 990 to 995, and constructing the final exterior embankment four feet above the finished clay barrier for frost protection. The Pond 3S interior embankment (embankment constructed to support the clay barrier) was constructed from compacted bottom ash material excavated from the Bottom Ash Pond, located northwest of Pond 3. Beginning in mid-June, the Bottom Ash Pond was dewatered for four weeks, then excavated to construct the Pond 3S interior embankment. Other activities during Pond 3S construction included clay barrier placement, piping, topsoil placement, and site restoration activities. Construction activities are more completely described in the subsequent sections of this report.

Pond 3N Interior Embankment construction consisted of raising the existing interior bench from an approximate elevation of 990 to 994 with bottom ash material (the Pond 3N clay buttress and clay barrier were previously constructed up to elevation of 995 in 2008).

Construction was performed in accordance with NPDES Permit No. 0002186 and "Construction Documents, 2013 Ash Construction Projects" prepared by Carlson McCain and dated June 2013. The general contractor was Veit & Company, Inc. (Veit). Excavation activities began in July 2013 and construction was completed in September 2013. Deviations from the Specifications and Drawings are noted on the enclosed Record Drawings and are described in the following sections of this report.

Xcel Energy performed construction management activities and the following companies provided services to complete the 2013 Pond 3 Construction Project:

Company	Activity or Products
Carlson McCain, Inc. (Carlson McCain)	Design, QA/QC
Veit & Company, Inc. (Veit)	Earthwork
Neaton Bros.	Turf Establishment (Subcontractor to Veit)
Braun Intertec Corporation	Soil Testing (Field Testing & Lab Analysis)
Soil Engineering Testing, Inc.	Soil Testing (Laboratory Analysis)
Bogart Pederson, Inc.	Survey Verification (Subcontractor to Veit)

Construction observation was performed during the project and consisted of observing and recording activities of the general contractor and subcontractor, answering questions and interpreting information contained in the drawings and specifications as requested by the contractor, and directing testing and quality control activities performed by independent testing firms and construction subcontractors.

Section 2 Construction Methods and Materials

The methods of construction, equipment, and materials used during Pond 3 construction are described in this section. Appendix A contains photographs illustrating the various methods and stages of construction, and the Record Drawings in Appendix F show the project as-constructed.

2.1 Topsoil Stripping and Stockpiling

Prior to construction, topsoil from the top and upper slopes of the existing Pond 3S east and south embankment was stripped and stockpiled below the construction area using a dozer and backhoe. Topsoil was also stripped from the south end of the borrow area east of Pond 3S using a dozer and backhoe and stockpiled in the topsoil stockpile southeast of Pond 3S. Topsoil on all pond slopes and embankments was a minimum of 6-inches thick, and ranged from 9-inches to 18-inches in the borrow area.

2.2 Interior Embankment Bottom Ash

As described in Section 1, the interior embankment was constructed from compacted bottom ash, and used to support the clay barrier.

Construction of the interior embankment began by excavating bottom ash from the Bottom Ash Pond and hauling it to the existing interior embankment, using off-road trucks. Once placed, it was spread into 12-inch lifts by a GPS dozer, watered as needed and compacted using a vibratory smooth drum roller. Construction started in the northeast corner to the finished elevation of 995 and continued clockwise to the southwest corner. Approximately 16,800 cubic yards of bottom ash was used to construct the interior embankment. The exterior of the interior embankment was shaped to a 1.5 to 1 slope (horizontal to vertical) using a backhoe, in preparation for the clay barrier construction.

During construction, an independent soil testing firm retained by Xcel, Braun Intertec, performed in-place density testing to verify compliance with project specifications. Compaction testing was performed to meet the required rate of one test per 3,000 cubic yards. A summary of the field density testing performed during Pond 3S construction is presented in Table 1. Testing locations are presented in Figure 1. Complete data for Standard Proctor and field compaction testing are included in Appendix B.

2.3 Clay Barrier

The Pond 3S clay barrier was constructed using clay excavated from a prequalified off-site borrow source. The base of the clay barrier was connected to the existing clay anchor at elevation 990 by

scarifying and moistening the top of the existing clay prior to placing the first lift of clay. The clay barrier was constructed in lifts approximately 500-feet in length. Each lift was maintained in a rough and moistened condition to promote bonding between lifts and provide uniformity throughout the clay barrier. Clay was placed by belly-dump or side-dump semis. Following placement, a dozer spread the clay into 9-inch loose lifts approximately 10-feet wide (for semi travel) along the clay barrier alignment. The loose lifts were compacted to at least 97 percent Standard Proctor density at or above the optimum moisture content by a vibratory sheepsfoot roller. Once near final height, a backhoe shaped the exterior of the clay barrier by pulling up the extra clay on the sides to a final width of 8-feet at a slope of 1.5 horizontal to 1 vertical. A vibratory sheepsfoot roller followed behind to compact the clay pulled up by the backhoe. In-place density tests were taken on every lift approximately 100-feet apart.

In-place density and moisture content testing, was performed by Braun Intertec. Laboratory testing of the clay was performed by Braun Intertec and Soil Engineering Testing, as described in Section 3.2.2.2. The test results for clay used in the clay barrier are summarized in Tables 2, 3 and 4, and complete clay data is located in Appendix C. Locations of tests are shown on Figure 3.

2.4 Dewatering System Cleanout Extension

During the 2010 construction of Pond 3S, a dewatering system was incorporated to accommodate post-closure dewatering of Pond 3. In order to clean the dewatering pipes at the base of the pond once the pond is closed, clean-out access points were installed as part of the original construction. In 2013, as embankments were raised, the clean-outs and the dewatering riser pipe were also raised. The cleanouts were extended from elevation 992 along the inside slope of the interior embankment to an elevation of 997.5. The dewatering riser pipe was raised from elevation 990 to an elevation of 1001.5. Each cleanout extension is an 8-inch SDR 17 solid wall polyethylene pipe connected to the existing cleanout pipe with an electrofusion coupling. The existing corrugated metal protective casings were salvaged and reinstalled on the extended cleanouts. The dewatering pipe extension is a 30-inch SDR 17 solid wall polyethylene pipe connected to the existing dewatering pipe with galvanized bolts. Record Drawings of the cleanout extensions can be found in Appendix F.

2.5 Borrow Area Development

Random fill was excavated from the borrow area located east of Pond 3S and used to construct the exterior embankment. Prior to excavation, two soil samples from two different test pits in the borrow area were taken and tested for standard proctor density. Results from the analysis are discussed in Section 3.2.3 and complete results can be found in Appendix D.

Random fill was excavated using a backhoe, loaded into off-road trucks, and hauled to the construction area. Excavation started at the north end of the borrow area where 2012 Pond 3S construction had left off and progressed south. The borrow area was excavated down to an approximate elevation of 943 with three to one (horizontal to vertical) side slopes. Excavated material consisted primarily of poorly graded sand, with some gravel and cobbles.

2.6 Exterior Embankment Construction

Construction began on the exterior portion of the embankment (outside of the clay barrier) once all of the in-place clay tests had passed specification. Off-road trucks hauled random fill from the borrow area to the exterior embankment while a dozer spread the random fill into lifts taking care not to damage the clay. Once the clay was properly covered, off-road trucks placed random fill over the entire width of the exterior embankment, to the design grades shown on the Record Drawings. Table 5 summarizes the random fill in-place density summary, the locations of each test can be found on Figure 4. Complete data can be found in Appendix D.

2.7 Site Restoration

Site restoration includes final grading, topsoil placement and turf establishment, and class 5 placement access road construction.

2.7.1 Topsoil Placement and Turf Establishment

Topsoil stripped and stockpiled as described in Section 2.1 was pushed to the upper slopes and top of the exterior embankments by a backhoe and a dozer. From there, the topsoil was spread in single 6-inch lifts by a guided dozer. The topsoiled areas were seeded and covered with an erosion blanket on the 3H:1V slopes or mulched on the flat areas on top of the embankments to minimize erosion until vegetation is fully established.

2.7.2 Access Road Construction

Class 5 aggregate salvaged from the existing roads was spread and compacted on road surfaces and ramps, as shown on the Record Drawings. No Class 5 was imported from off-site.

2.8 Pond 3N Interior Embankment Construction

The Pond 3N Interior Embankment was constructed out of bottom ash from an elevation of approximately 990 to elevation 994. Construction procedures are discussed below.

2.8.1 Bottom Ash

Once the Pond 3S Interior Bench was constructed to finished elevation, the off-road haul trucks began hauling bottom ash to Pond 3N. Construction began in the northwest corner and progressed one lift at a time clockwise around the pond to the southeast corner, allowing the bottom ash material time to dry. In general, water was not needed to meet compaction requirements. Construction continued one lift at a time up to a final elevation of 994.5. The final lift was only 6" because the bottom ash was exhausted from the bottom ash pond. A summary of the field density testing performed is presented in Table 1 and testing locations are presented in Figure 2. Complete data for Standard Proctor and field compaction testing are included in Appendix B.

Section 3 Testing and Quality Control

Testing and quality control activities were conducted by independent consultants, testing firms, and construction contractors. Testing and quality control activities were directed by and results were reported to the on-site Carlson McCain personnel. Testing and quality control procedures and results are presented below.

3.1 Surveying

An independent registered land surveyor, Bogart Pederson & Associates, Inc., was retained by the general contractor to provide location and grade verification as required. Earthwork verification surveying included verifying shots at grade breaks and 50-foot intervals of the clay buttress and clay barrier, and 100-foot intervals on random fill and topsoil thickness verification. Other survey data included clean-out extensions, class 5 aggregate, and a topographic survey of the Pond 3S finished grades, Pond 3N interior embankment, and borrow area. The surveyor collected data using GPS equipment, and periodically provided results of field data gathered during construction for review by Carlson McCain personnel. Complete survey data is contained in Appendix E.

3.2 Soil Testing

The following soil tests were performed during construction: bottom ash material in-place compaction and moisture testing, clay source permeability and index property testing, clay barrier in-place compaction and moisture content testing, clay barrier in-place permeability and index property testing, random fill in-place compaction and moisture testing. Field compaction and laboratory tests were performed by Braun Intertec. Soil testing procedures and test results are described below.

3.2.1 Bottom Ash Material Testing

Samples of bottom ash were collected and analyzed for Standard Proctor results, and these results were used as compaction criteria for field density testing. Specifications for bottom ash require 95 percent of the Standard Proctor maximum dry density. Compaction testing was performed by Xcel's independent soil testing firm, Braun Intertec, under the direction of Carlson McCain personnel. Testing was performed with a nuclear density gauge at a minimum frequency of one test per 3,000 cubic yards of material placed. In total 26 tests were conducted on approximately 60,000 cubic yards of material with an average of 2,300 cubic yards per test.

Samples of bottom ash were collected at the beginning of the project and as different material types were encountered. Each field density test result was compared to the Standard Proctor

results of similar material to determine if the field density met the 95 percent compaction criteria. All the in-place density tests passed the compaction. Field compaction results are presented in Table 1. Locations of the field compaction tests can be found in Figure 1 and 2. Complete data is located in Appendix B.

3.2.2 Clay Testing

The Pond 3S clay barrier was constructed with prequalified clay from an off-site source. Quality control testing performed during construction included in-place compaction and moisture content tests, laboratory analysis of in-place permeability, and index property tests (Atterberg Limits, sieve and hydrometer analysis, and classification). Testing procedures and results are discussed below.

3.2.2.1 Clay Pre-qualification Testing

Clay used during the construction project was imported from an off-site source. The source, referred to as the Anderson pit, is located near Monticello, MN. Carlson McCain personnel collected seven clay samples from the pit for pre-qualification testing prior to construction. Six of the samples were sent to Xcel's independent laboratory (Braun Intertec) for analysis of Atterberg Limits, particle size distribution, Standard Proctor, in-place moisture content, and re-compacted permeability. Three samples consisted of a brown clay similar to that used in previous projects. The other three samples consisted of a grey clay that appeared to have a higher in-place moisture and fines content than the brown clay. Although the clay samples appeared suitable for clay barrier construction, only one sample of each variety met the MPCA guidelines for classification, permeability, Atterberg Limits and percent fines. As a comparison, one more sample of grey clay from a failing test location was collected and sent to Soils Engineering Testing for laboratory analysis. This sample returned with passing values for the MPCA guidelines. All re-compacted permeability samples used by both laboratories were tested at or slightly above optimum moisture content and at 97 percent of the Standard Proctor maximum dry density. This is higher than the MPCA guidelines because two pre-qualification samples collected from the Anderson Pit in 2008 did not meet the minimum re-compacted permeability tests ($1x10^{-7}$ cm/s) at 95 percent Standard Proctor density. Thus, subsequent samples were tested at greater Standard Proctor densities (99 percent in 2008, 97 percent in 2010, 97 percent in 2012) and met or exceeded specifications for permeability. The results of the clay prequalification testing are summarized in Table 2, with complete results in Appendix C.

3.2.2.2 Clay Barrier In-place Testing

During clay construction activities, a representative from Braun Intertec was on site to perform in-place density and moisture content testing of the clay using a nuclear density gauge. Compaction testing was completed at the minimum rate of once per horizontal lift at intervals of approximately

100 feet. In order to determine passing or failing results, the contractor used 97 percent of the Standard Proctor maximum dry density at or above optimum moisture content. These samples were compared to Standard Proctor and moisture data analyzed by SET. This was done to ensure that the clay met the permeability specification of $1x10^{-7}$ cm/s as discussed in Section 3.2.2.1. When a field density test indicated a failing result, the area received additional compaction if the density was low, or was moistened and reworked to meet the moisture requirement. Re-testing was performed in the same location after the material had been reworked, and this procedure was repeated until passing test results were obtained. In addition to field testing of the clay, placement of the clay was constantly observed and monitored to verify that consistent processing and compaction procedures were being used, and that lift thicknesses were within tolerance. The on-site quality control personnel worked closely with the contractor during clay placement to ensure the clay was placed and compacted to meet the project requirements.

Compaction testing was distributed across the site to give complete coverage of the clay placed. Compaction test locations are shown in Figure 3 and results of clay compaction tests are summarized in Table 3. Complete testing data can be found in Appendix C.

3.2.2.3 Clay Permeability and Index Properties Testing

In addition to prequalification testing, laboratory analysis was completed on additional clay samples collected on-site. The samples were collected by pushing thin-wall tubes into the clay after placement and compaction to recover undisturbed cores of clay. Voids created in the clay barrier during sample collection were backfilled with bentonite. Two samples were collected, one from the east embankment and another from the south embankment. Approximately 3,400 cubic yards of clay were placed, resulting in one test per 1,400 cubic yards, less than the MPCA requirement of one per 3,000 cubic yards. Samples were tested for permeability, Atterberg Limits, sieve and hydrometer analysis, and classification. The coefficient of permeability of the two acceptable clay samples was 4.0×10^{-8} and 2.2×10^{-8} cm/s, with an average of 3.1×10^{-8} cm/s, significantly slower than the required maximum rate of $1x10^{-7}$ cm/s. All of the soil classifications and Atterberg Limits test results met the MPCA guidelines. The percent fines in both TW-1 and TW-2 were less than the 50 percent minimum guideline (48.4% and 45.5% respectively), but the other tests for those samples met the minimum requirements. The results from clay samples collected on site are summarized in Table 4, locations are presented Figure 3, and complete results are included in Appendix C.

3.2.3 Random Fill Testing

Samples of random fill were collected and analyzed for Standard Proctor results, and these results were used as compaction criteria for field density testing. Specifications for random fill require at

least 95 percent of the Standard Proctor maximum dry density. Compaction testing was performed by Xcel's independent soil testing firm, Braun Intertec, under the direction of Carlson McCain personnel. Testing was performed with a nuclear density gauge at a minimum frequency of one test per 3,000 cubic yards of material placed.

Samples of random fill were collected prior to embankment construction. Each field density test result was compared to the Standard Proctor results of similar material to determine if the field density met the minimum 95 percent compaction criteria. All the in-place density tests passed the compaction. Field compaction results are presented in Table 5. Locations of the field compaction tests can be found in Figure 4. Complete data is located in Appendix D.

Section 4 Conclusion

Construction of the Pond 3S Vertical Expansion and the Pond 3 North Interior Embankment at Xcel Energy's Sherburne County Generating Plant has been completed in material conformance with the "Construction Documents, 2013 Ash Construction Projects" prepared by Carlson McCain and in compliance with the requirements for notification, construction, materials, and testing contained in NPDES Permit No. 0002186. This report presents the results of all observation, documentation, and testing performed during the course of construction of this facility.

Tables

Table 1
Bottom Ash In-Place Density Testing Summary
2013 Pond 3 Construction

	Test No.	Date	Northing	Easting	Elevation	In-Place Density (pcf)	In-Place Moisture (%)	Max Dry Density (pcf)	Optimum Moisture (%)	Percent Compaction
Pond 3 South	BA-1	7/23/13	863,550	2,031,982	992.7	96.1	7.8	94.0	21.6	102%
	BA-2	7/23/13	862,959	2,031,979	992.7	95.7	8.9	94.0	21.6	102%
	BA-3	7/23/13	862,810	2,031,971	995.0	95.0	9.1	94.0	21.6	101%
	BA-4	7/23/13	862,486	2,031,846	995.0	96.4	8.1	94.0	21.6	103%
	BA-5	7/24/13	862,535	2,031,952	994.0	90.5	10.6	88.9	28.7	102%
	BA-6	7/24/13	862,502	2,031,895	992.0	91.8	10.2	88.9	28.7	103%
	BA-7	7/24/13	862,493	2,031,778	991.5	88.0	8.4	88.9	28.7	99%
	BA-8	7/25/13	863,503	2,031,931	991.0	87.9	11.5	88.9	28.7	99%
	BA-9	7/25/13	863,097	2,031,945	992.0	96.2	3.4	94.0	21.6	102%
	BA-10	7/25/13	862,446	2,031,524	993.0	89.8	6.9	94.0	28.7	96%
	BA-11	7/26/13	862,476	2,031,057	992.0	96.5	4.7	94.0	21.6	103%
	BA-12	7/26/13	862,454	2,031,315	995.0	79.1	10.6	80.5	33.6	98%
	BA-13	7/29/13	862,517	2,031,740	993.0	96.9	6.5	94.0	21.6	103%
	BA-14	7/29/13	862,470	2,031,612	995.0	94.4	8.7	94.0	21.6	100%
	BA-15	7/30/13	862,433	2,031,040	995.0	98.0	4.9	94.0	21.6	104%
	BA-16	7/30/13	862,473	2,030,906	994.0	89.2	6.4	88.9	28.7	100%
	BA-17	7/31/13	863,599	2,031,924	995.0	86.2	8.6	88.9	28.7	97%
	BA-18	7/31/13	863,267	2,031,929	995.0	92.3	9.2	94.0	21.6	98%
Pond 3 North	P3NBA-1	8/1/13	864,310	2,031,935	991.0	93.8	7.5	94.0	21.6	100%
	P3NBA-2	8/1/13	863,991	2,031,966	992.0	95.8	7.5	94.0	21.6	102%
	P3NBA-3	8/1/13	865,298	2,031,042	991.0	90.8	5.0	94.0	21.6	97%
	P3NBA-4	8/1/13	865,302	2,031,701	992.0	89.0	5.2	94.0	21.6	95%
	P3NBA-5	8/2/13	865,332	2,031,667	993.0	98.7	4.5	94.0	21.6	105%
	P3NBA-6	8/5/13	865,313	2,031,405	993.0	107.6	4.7	111.0	14.3	97%
	P3NBA-7	8/6/13	864,781	2,031,969	994.0	113.0	-	111.0	14.3	102%
	P3NBA-8	8/6/13	865,215	2,031,936	994.5	110.0	-	111.0	14.3	99%

Note:

Specifications: Minimum 95% compaction

Complete laboratory test data is located in Appendix B.

In-place moisture readings for P3NBA-7 and P3NBA-8 were misplaced by Braun Intertec. All tests met in-place density specifications

Table 2
Clay Source Prequalification Testing Summary
2013 Pond 3 South Vertical Expansion

	Sample No.	Soil Classification	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Atterberg Limits			% Passing No. 200	Field Moisture Content (%)	Permeability[1] (cm/sec)
					Liquid Limit	Plastic Limit	Plasticity Index			
Braun	CLS-1	Clayey Sand	121.4	10.6	***24.0***	13.0	***11.0***	43.1	13.1	1.55×10^{-8}
Braun	CLS-2	Sandy Lean Clay	119.7	11.7	29.0	13.0	16.0	49.1	14.5	8.33×10^{-9}
Braun	CLS-3	Sandy Lean Clay	111.9	15.0	33.0	14.0	19.0	48.8	14.1	3.31×10^{-8}
Braun	CLS-4	Clayey Sand	119.1	12.0	25.0	13.0	12.0	41.2	12.4	3.36×10^{-8}
Braun	CLS-5	Sandy Lean Clay	110.4	13.2	33.0	13.0	20.0	49.7	11.9	***2.99×10^{-6}***
Braun	CLS-5 re-test	-	-	-	-	-	-	-	-	***1.29×10^{-6}***
Braun	CLS-6	Sandy Lean Clay	118.2	12.9	30.0	14.0	16.0	51.6	15.6	***3.25×10^{-7}***
Braun	CLS-6 re-test	-	-	-	-	-	-	-	-	***5.44×10^{-7}***
SET	CLS-7		118.6	13.4	27.2	13.1	14.1	50.1	14.8	5.60×10^{-8}
SET	CLS-8		119.4	13.3	28.5	***12.5***	16.0	53.9	15.4	2.60×10^{-8}
	MPCA Guidelines	CL, CH, SC	NA	NA	$\geq$ 25	$\geq$ 13	$\geq$ 12	$\geq$ 50	NA	$\leq 1.0 \times 10^{-7}$

Notes:

[1] Permeability Tested at 97% compaction and optimum moisture content

Complete laboratory test data is located in Appendix C

Samples CLS-1 through CLS-6 were tested by Braun Intertec. Samples CLS-7 & CLS-8 were tested by Soil Engineering Testing.

Table 3
Clay In-Place Density Testing Summary
2013 Pond 3 South Vertical Expansion

Test No.	Date	Northing	Easting	Elevation	In-Place Density (pcf)	In-Place Moisture (%)	Max Dry Density (pcf)	Optimum Moisture (%)	Percent Compaction
CL-01	8/19/13	862,398	2,030,962	990.4	***115.9***	14.9	119.7	11.7	96.8%
CL-01A	8/19/13	Retest of CL-01			117.2	14.4	119.7	11.7	97.9%
CL-02	8/19/13	862,408	2,031,099	991.2	***115.0***	15.4	119.7	11.7	96.1%
CL-02A	8/19/13	Retest of CL-02			116.9	14.9	119.7	11.7	97.7%
CL-03	8/19/13	862,398	2,030,911	991.5	118.1	15.1	119.7	11.7	98.7%
CL-04	8/19/13	862,403	2,031,074	992.1	117.3	14.8	119.7	11.7	98.0%
CL-05	8/19/13	862,421	2,031,030	992.6	118.8	14.7	119.7	11.7	99.2%
CL-06	8/19/13	862,406	2,031,076	993.3	119.6	13.7	119.7	11.7	99.9%
CL-07	8/19/13	862,420	2,031,396	990.8	***110.3***	17.8	119.7	11.7	92.1%
CL-07A	8/19/13	Retest of CL-07			***115.3***	16.0	119.7	11.7	96.3%
CL-07B	8/19/13	Retest of CL-07A			***115.9***	16.2	119.7	11.7	96.8%
CL-07C	8/20/13	Retest of CL-07B			117.7	15.1	119.7	11.7	98.3%
CL-08	8/20/13	862,441	2,031,819	990.4	119.1	14.9	119.7	11.7	99.5%
CL-09	8/20/13	862,444	2,031,611	991.1	116.4	16.7	119.7	11.7	97.2%
CL-10	8/20/13	862,441	2,031,729	992.1	***115.2***	16.5	119.7	11.7	96.2%
CL-10A	8/20/13	Retest of CL-10			***115.0***	16.7	119.7	11.7	96.1%
CL-10B	8/20/13	Retest of CL-10A			116.2	16.1	119.7	11.7	97.1%
CL-11	8/20/13	863,391	2,032,006	990.6	115.7	15.6	118.6	13.4	97.6%
CL-12	8/20/13	862,489	2,031,509	992.9	116.4	15.9	118.6	13.4	98.1%
CL-13	8/20/13	863,070	2,032,005	991.3	116.9	15.3	118.6	13.4	98.6%
CL-14	8/20/13	863,246	2,032,007	992.2	115.0	15.1	118.6	13.4	97.0%
CL-15	8/20/13	863,323	2,032,004	993.0	116.9	16.8	118.6	13.4	98.6%
CL-16	8/21/13	862,408	2,030,989	994.5	119.0	14.0	119.7	11.7	99.4%
CL-17	8/21/13	862,418	2,031,229	994.0	117.6	15.8	119.7	11.7	98.2%
CL-18	8/21/13	862,413	2,031,110	994.9	117.8	15.1	119.7	11.7	98.4%
CL-19	8/22/13	862,446	2,031,888	991.5	120.0	13.2	119.7	11.7	100.3%
CL-20	8/22/13	862,477	2,031,938	992.9	121.0	12.9	119.7	11.7	101.1%
CL-21	8/22/13	862,525	2,031,987	992.4	120.9	13.1	119.7	11.7	101.0%
CL-22	8/22/13	863,519	2,032,002	993.5	117.4	15.6	119.7	11.7	98.1%
CL-23	8/22/13	862,637	2,032,007	990.8	116.3	15.8	118.2	12.9	98.4%
CL-24	8/22/13	862,884	2,032,001	991.6	118.2	14.1	119.7	11.7	98.7%
CL-25	8/22/13	862,810	2,032,005	992.2	118.3	14.8	119.7	11.7	98.8%
CL-26	8/22/13	862,981	2,032,003	992.5	117.1	14.9	119.7	11.7	97.8%
CL-27	8/22/13	862,747	2,032,003	993.1	117.4	13.9	119.7	11.7	98.1%
CL-28	8/23/13	863,441	2,031,998	995.0	120.9	13.2	119.7	11.7	101.0%
CL-29	8/23/13	863,291	2,031,998	994.1	116.1	15.8	118.2	12.9	98.2%
CL-30	8/23/13	863,182	2,031,995	994.4	116.5	15.4	118.2	12.9	98.6%
CL-31	8/23/13	862,801	2,032,001	994.5	116.3	15.5	118.2	12.9	98.4%
CL-32	8/23/13	862,447	2,031,773	995.0	115.6	15.1	118.2	12.9	97.8%

Note:

Specifications: Minimum 97% compaction and at or above optimum moisture content (failing tests are noted in bold italics)
Complete laboratory test data (passing tests only) is located in Appendix C.

Table 4
Clay In-Place Index Properties and Permeability Testing Summary
2013 Pond 3 South Vertical Expansion

Sample No. [1]		Soil Classification	In-place Dry Density (pcf)	In-place Moisture Content (%)	Atterberg Limits			% Passing No. 200 [2]	In-place Permeability (cm/sec)
					Liquid Limit	Plastic Limit	Plasticity Index		
Thinwall:	CLTW-1	SC/CL	115.2	12.6	---	---	---	---	4.00×10^{-8}
Bulk:	CLTW-1	SC/CL	---	13.9	26.0	12.9	13.1	48.4	---
Thinwall:	CLTW-2	SC/CL	121.7	13.5	---	---	---	---	2.20×10^{-8}
Bulk:	CLTW-2	SC/CL	---	11.4	27.2	13.1	14.1	45.5	---
MPCA Guidelines		CL, CH, SC	NA	NA	$\geq$ 25	$\geq$ 13	$\geq$ 12	$\geq$ 50	$\leq 1.0 \times 10^{-7}$
Average									3.10×10^{-8}

Notes:

[1] At each sample location, a bulk sample and thinwall sample was collected

[2] Soils with less than min. P_{200} have been used successfully when permeability guideline is met

Complete laboratory test data is located in Appendix C

Table 5
Random Fill In-Place Density Testing Summary
2013 Pond 3 Construction

Test No.	Date	Northing	Easting	Elevation	In-Place Density (pcf)	In-Place Moisture (%)	Max Dry Density (pcf)	Optimum Moisture (%)	Percent Compaction
RF-1	8/27/13	862,507	2,031,984	994.0	112.9	4.0	110.3	12.5	102.3
RF-2	8/27/13	862,426	2,031,751	993.7	113.6	5.7	110.3	12.5	102.9
RF-3	8/27/13	862,433	2,031,372	996.5	111.9	6.3	110.3	12.5	101.4
RF-4	8/27/13	862,408	2,031,028	995.6	111.8	3.1	110.3	12.5	101.3
RF-5	8/28/13	863,309	2,031,998	995.4	108.5	10.1	110.3	12.5	98.3
RF-6	8/28/13	862,964	2,031,995	996.5	111.9	9.7	110.3	12.5	101.4
RF-7	8/28/13	862,741	2,032,017	995.9	112.4	7.3	110.3	12.5	101.9
RF-8	8/29/13	863,490	2,032,023	998.6	114.1	8.4	110.3	12.5	103.4
RF-9	8/29/13	863,065	2,032,027	998.9	114.2	7.5	110.3	12.5	103.0
RF-10	8/30/13	862,446	2,031,930	998.8	132.3	7.1	130.7	7.7	101.2
RF-11	8/30/13	862,409	2,031,173	996.0	115.2	6.7	110.3	12.5	104.4
RF-12	9/3/13	862,411	2,031,506	998.7	135.6	6.8	130.7	7.7	103.7

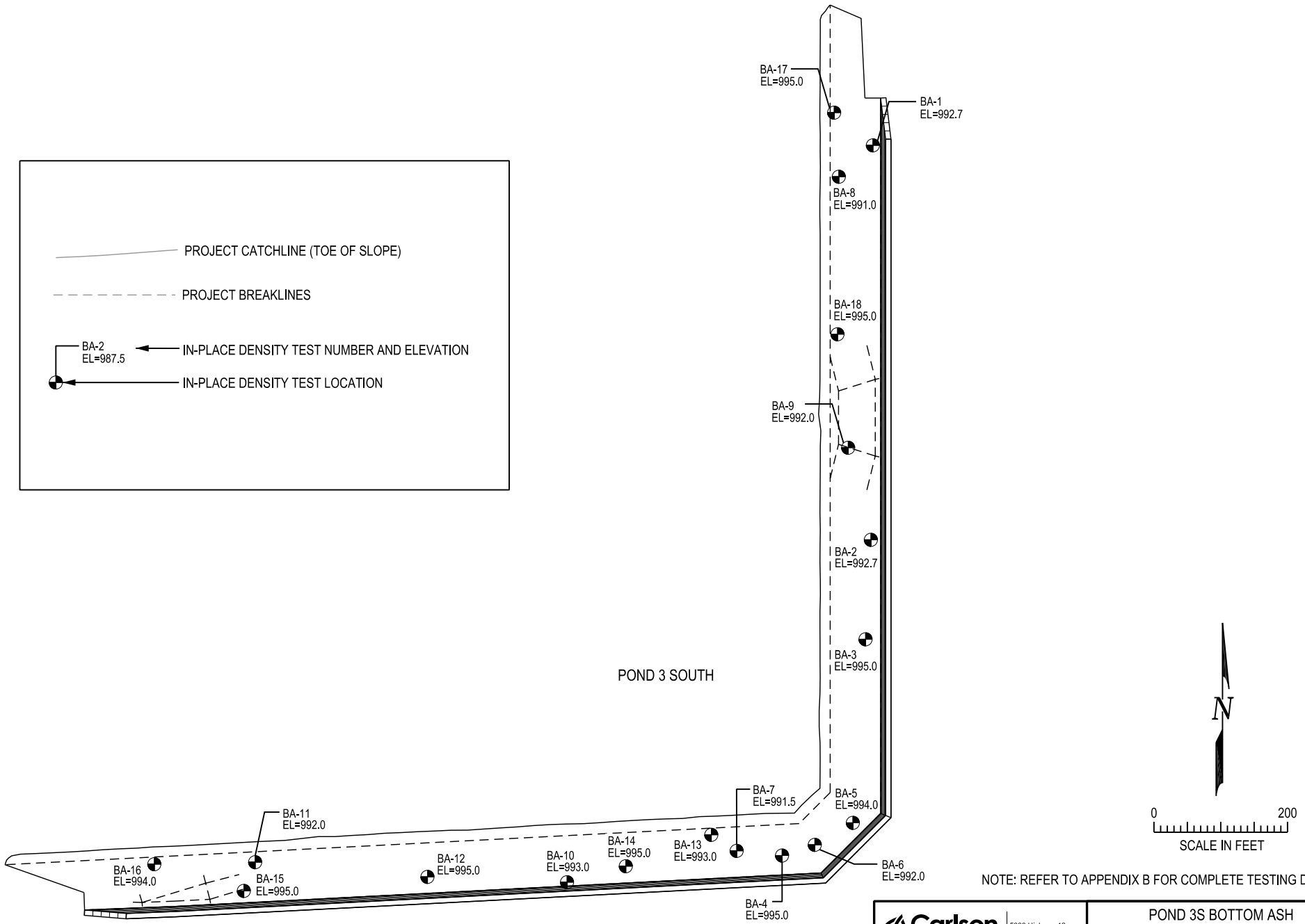
Note:

Specifications: Minimum 95% Compaction

Complete laboratory test data (passing tests only) is located in Appendix D.

Figures

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Cert Report\Figures\Figure 1 - Pond 3S BA testing locations.dgn

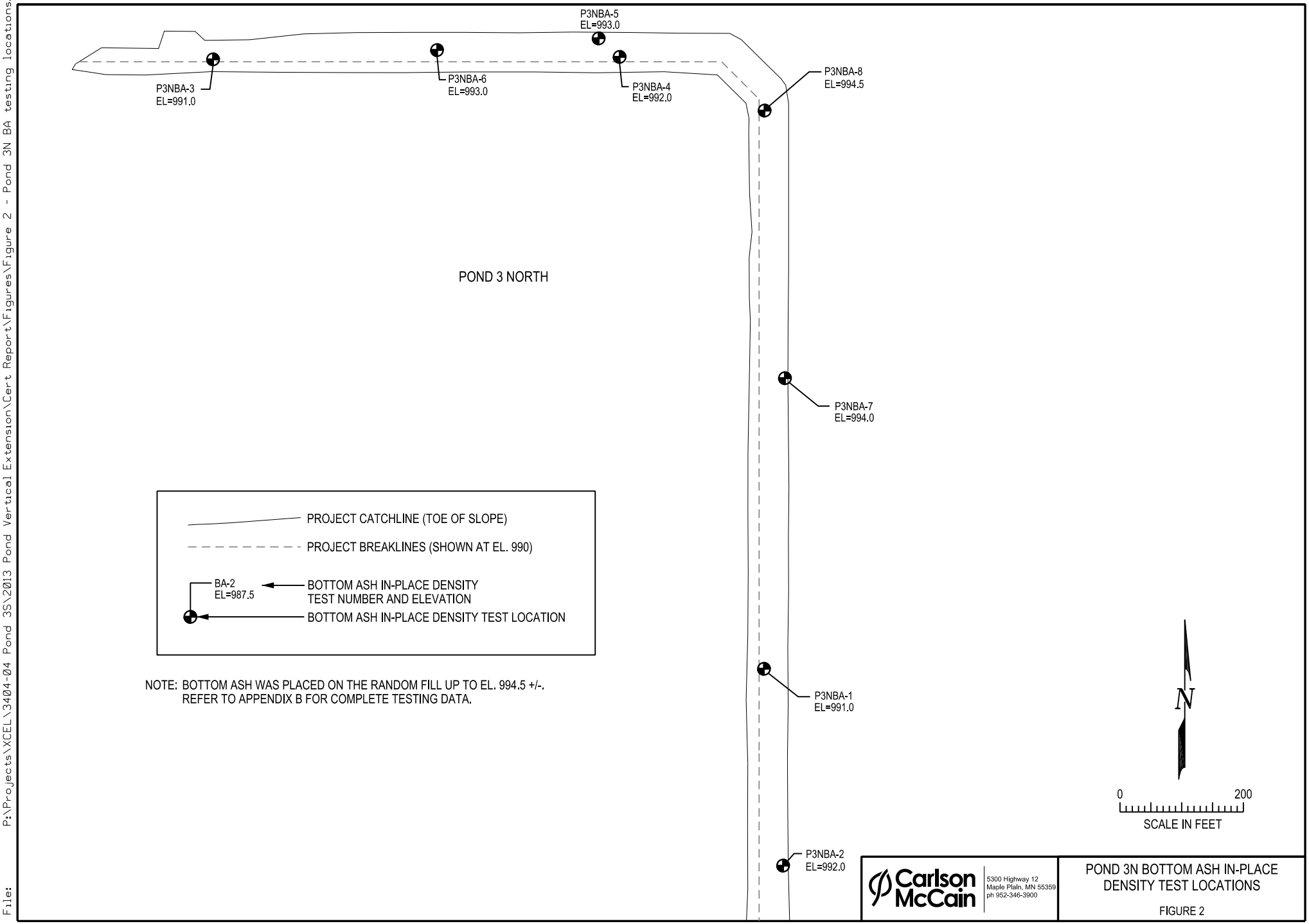


NOTE: REFER TO APPENDIX B FOR COMPLETE TESTING DATA

Carlson McCain
5300 Highway 12
Maple Plain, MN 55359
ph 952-346-3900

POND 3S BOTTOM ASH IN-PLACE DENSITY TEST LOCATIONS

FIGURE 1



NOTE: BOTTOM ASH WAS PLACED ON THE RANDOM FILL UP TO EL. 994.5 +/-.
REFER TO APPENDIX B FOR COMPLETE TESTING DATA.

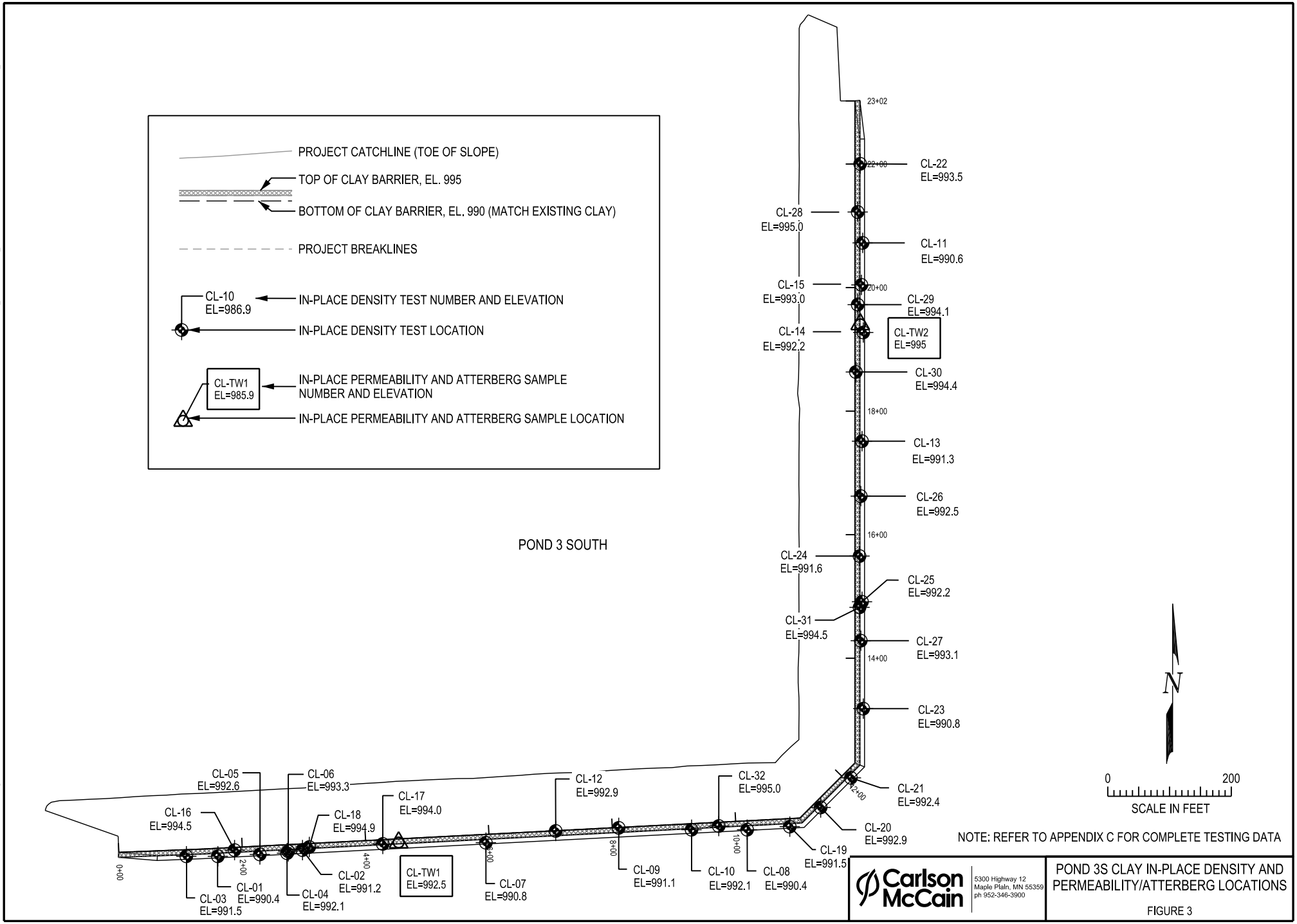
Carlson McCain
5300 Highway 12
Maple Plain, MN 55359
ph 952-346-3900

POND 3N BOTTOM ASH IN-PLACE DENSITY TEST LOCATIONS

FIGURE 2

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Cert Report\Figures\Figure 2 - Pond 3N BA testing locations.dgn

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Cert Report\Figures\Figure 3 - Clay density testing locations.dgn



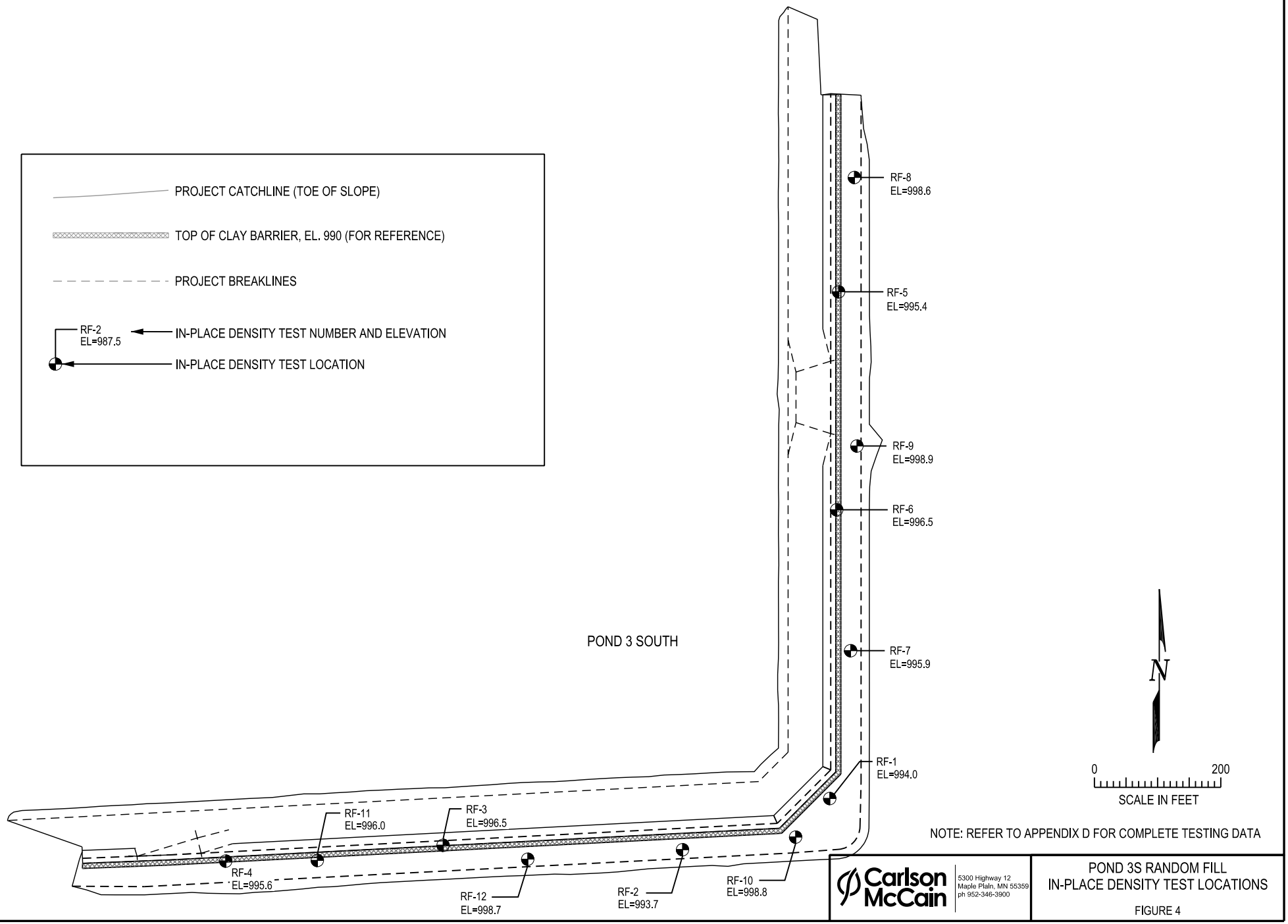
NOTE: REFER TO APPENDIX C FOR COMPLETE TESTING DATA

Carlson McCain
5300 Highway 12
Maple Plain, MN 55359
ph 952-346-3900

POND 3S CLAY IN-PLACE DENSITY AND PERMEABILITY/ATTERBERG LOCATIONS

FIGURE 3

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Cert Report\Figures\Figure 4 - Pond 3S RF testing locations.dgn



NOTE: REFER TO APPENDIX D FOR COMPLETE TESTING DATA

Carlson McCain
5300 Highway 12
Maple Plain, MN 55359
ph 952-346-3900

POND 3S RANDOM FILL
IN-PLACE DENSITY TEST LOCATIONS

FIGURE 4

Appendix A - Construction Photographs

2013 Pond 3 Construction Projects

Photo 1 7/17/2013	GPS dozer stripping topsoil from the top of the existing Pond 3 South East embankment, looking south.

Photo 2 7/18/2013	Backhoe excavating random fill Pond 3S south embankment and exposing existing clay barrier. Looking west.

2013 Pond 3 Construction Projects

Photo 3 7/23/2013	Backhoe excavating bottom ash to be hauled from Bottom Ash Pond to Pond 3 South. Looking Southwest.

Photo 4 7/22/2013	Left: Exposed existing clay anchor. Middle: Dozer spreading lifts of bottom ash for interior embankment. Right: Smooth-drum vibratory roller compacting lifts. Looking south.

2013 Pond 3 Construction Projects

Photo 5 7/24/2013	Middle: Off-road truck dumping bottom ash onto interior embankment of Pond 3 South for GPS dozer to grade. Right: Water truck watering bottom ash for dust control and compaction enhancement.

Photo 6 8/6/2013	Middle: Backhoe shaping 1.5 to 1 (horizontal to vertical) outside slope of the interior embankment (inside slope of future clay barrier). Left: Exposed existing clay anchor. Looking south.

2013 Pond 3 Construction Projects

Photo 7 8/19/2013	Middle: Laborer removing rocks larger than 3” in diameter from clay barrier.

Photo 8 8/19/2013	Left: Dozer preparing to grade placed clay. Middle: Tractor pulling scarifying equipment to churn up clay and allow for moisture distribution. Right: Truck preparing to dump clay. Looking west.

2013 Pond 3 Construction Projects

Photo 9 8/19/2013	Right: Dozer spreading clay placed by belly dumps and side dumps into lifts. Middle: Vibratory sheepsfoot roller compacting clay lifts. Looking west.

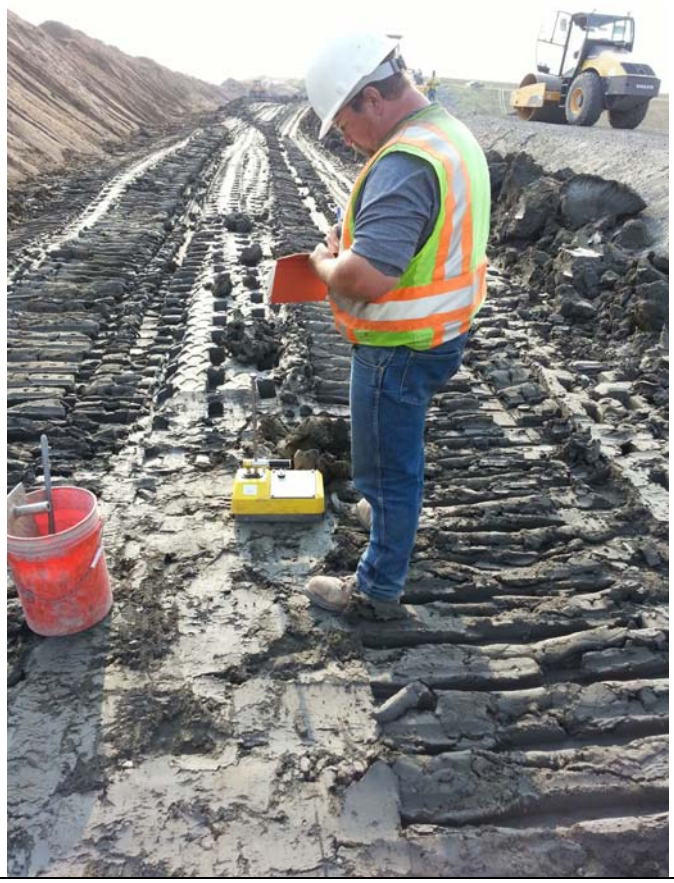


Photo 10 8/19/2013	Soil testing technician using nuclear gage to determine clay in-place density and moisture.

2013 Pond 3 Construction Projects

Photo 11 8/7/2013	Electrofusion coupler used to extend 8-inch high density polyethylene cleanout pipe on the east side of Pond 3 South. Looking north.

Photo 12 8/26/2013	Foreground: Laborers bolting extension of Pond 3S dewatering riser pipe. Background, backhoe raising pipe to grade. Looking northeast.

2013 Pond 3 Construction Projects

Photo 13 8/28/2013	Backhoe loading off-road truck with random fill from the borrow area to be hauled to the Pond 3 South embankment. Looking northeast.

Photo 14 8/28/2013	Left: Backhoe pulling random fill from exterior sideslope and placing on clay barrier. Middle Left: Dozer grading random fill in lifts over clay barrier. Middle Right: Water truck placing water on random fill. Right: Smooth drum roller compacting random fill.

2013 Pond 3 Construction Projects

Photo 15 9/4/13	Middle: Backhoe placing topsoil on the constructed random fill embankment. Right: Dozer spreading topsoil in 6-inch lifts. Looking south.

Photo 16 9/9/13	Laborers placing erosion blanket on topsoil placed in photo 15. Looking southwest.

2013 Pond 3 Construction Projects

Photo 17 9/10/2013	Tractor spreading mulch on top of top of the embankment. Looking south.

Photo 18 8/6/2013	GPS dozer grading bottom ash on Pond 3 North in lifts. Looking northwest.

Appendix B - Bottom Ash Test Reports

Bottom Ash Standard Proctor Test Reports
Bottom Ash In-place Density Test Reports (Pond 3S)
Bottom Ash In-place Density Test Reports (Pond 3N)

Bottom Ash Standard Proctor Test Reports

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003954-S1
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800

Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308

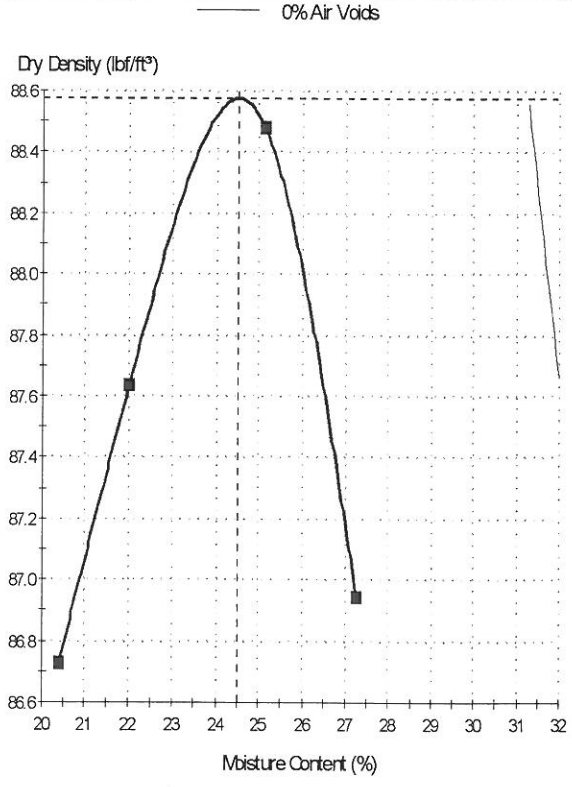
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/19/2013

Sample Details

Sample ID:	W13-003954-S1	**Alternate Sample ID:**	BAP-1
Date Sampled:	7/18/2013	**Date Submitted:**	7/18/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Bottom Ash		
Specification:			
Location:			
Date Tested:	7/19/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**88.6**
Corrected Maximum Dry Density (lbf/ft³):	**94.0**
Optimum Moisture Content (%):	**24.5**
Corrected Optimum Moisture Content (%):	**21.6**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.55
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	12
Passing Sieve 3/8" (9.5mm) (%):	88
Specific Gravity (Oversize):	2.65
Excluded Oversize Retained Sieve 3/8" (9.5mm) (%):	12
Visual Description:	Bottom Ash, dark brown

Comments

The 200 wash value equals 4.3%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003940-S1
Issue No: 1

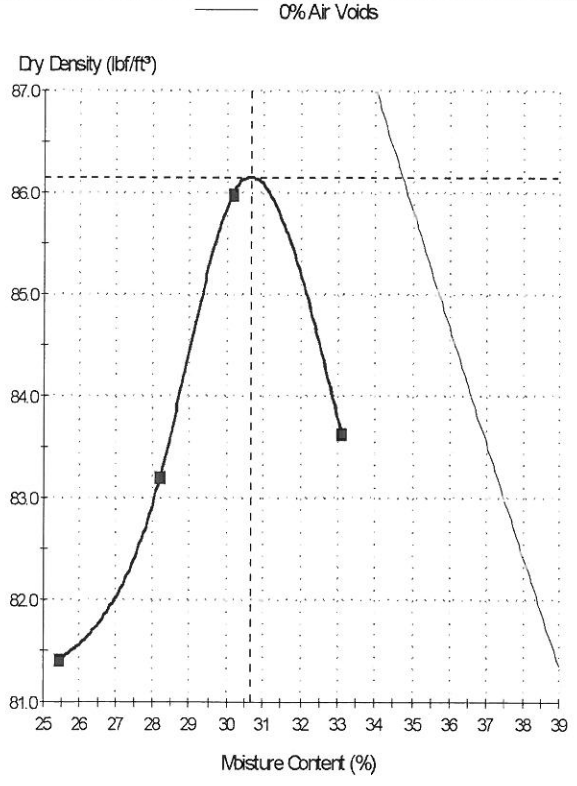
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/19/2013

Sample Details

Sample ID:	W13-003940-S1	**Alternate Sample ID:**	BAP-2
Date Sampled:	7/18/2013	**Date Submitted:**	7/18/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Bottom Ash		
Specification:			
Location:			
Date Tested:	7/19/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**86.1**
Corrected Maximum Dry Density (lbf/ft³):	**88.9**
Optimum Moisture Content (%):	**30.7**
Corrected Optimum Moisture Content (%):	**28.7**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	7
Passing Sieve 3/8" (9.5mm) (%):	93
Specific Gravity (Oversize):	2.65
Excluded Oversize Retained Sieve 3/8" (9.5mm) (%):	7
Visual Description:	Bottom Ash, dark grey

Comments

The 200 wash value equals 3.1%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003965-S1
Issue No: 1

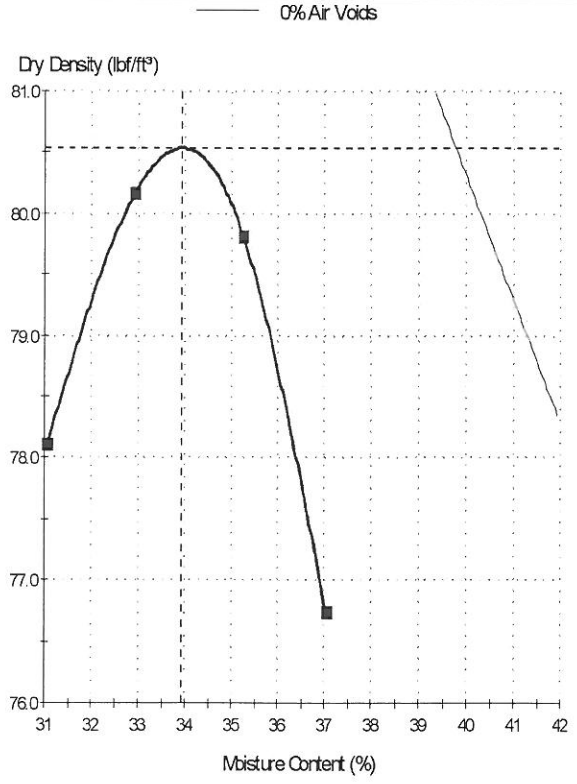
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/19/2013

Sample Details

Sample ID:	W13-003965-S1	**Alternate Sample ID:**	BAP-3
Date Sampled:	7/18/2013	**Date Submitted:**	7/18/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Bottom Ash		
Specification:			
Location:			
Date Tested:	7/19/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**80.5**
Corrected Maximum Dry Density (lbf/ft³):	**80.5**
Optimum Moisture Content (%):	**33.9**
Corrected Optimum Moisture Content (%):	**33.9**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	2
Passing Sieve 3/8" (9.5mm) (%):	98
Visual Description:	Bottom Ash, dark grey

Comments

The 200 wash value equals 8.7%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003960-S1
Issue No: 1

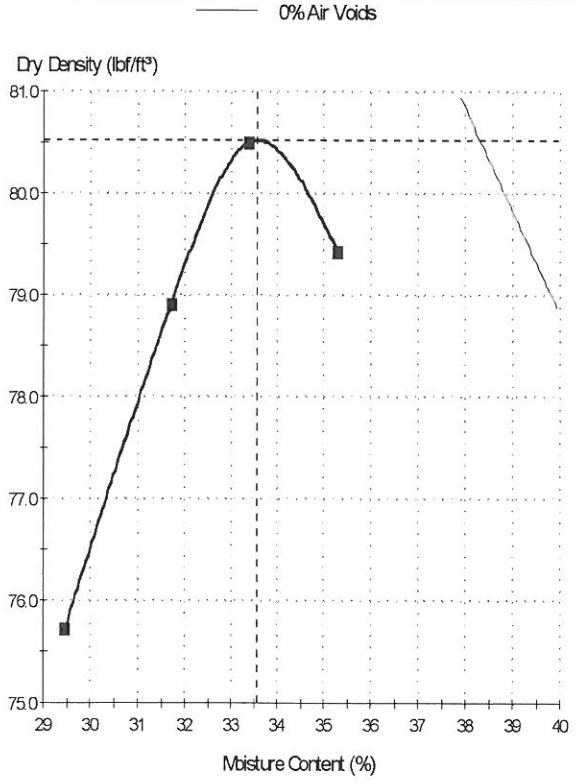
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/19/2013

Sample Details

Sample ID:	W13-003960-S1	**Alternate Sample ID:**	BAP-4
Date Sampled:	7/18/2013	**Date Submitted:**	7/18/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Bottom Ash		
Specification:			
Location:			
Date Tested:	7/19/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**80.5**
Corrected Maximum Dry Density (lbf/ft³):	**80.5**
Optimum Moisture Content (%):	**33.6**
Corrected Optimum Moisture Content (%):	**33.6**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.55
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	2
Passing Sieve 3/8" (9.5mm) (%):	98
Visual Description:	Bottom Ash, dark grey

Comments

The 200 wash value equals 15%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-004840-S1
Issue No: 1

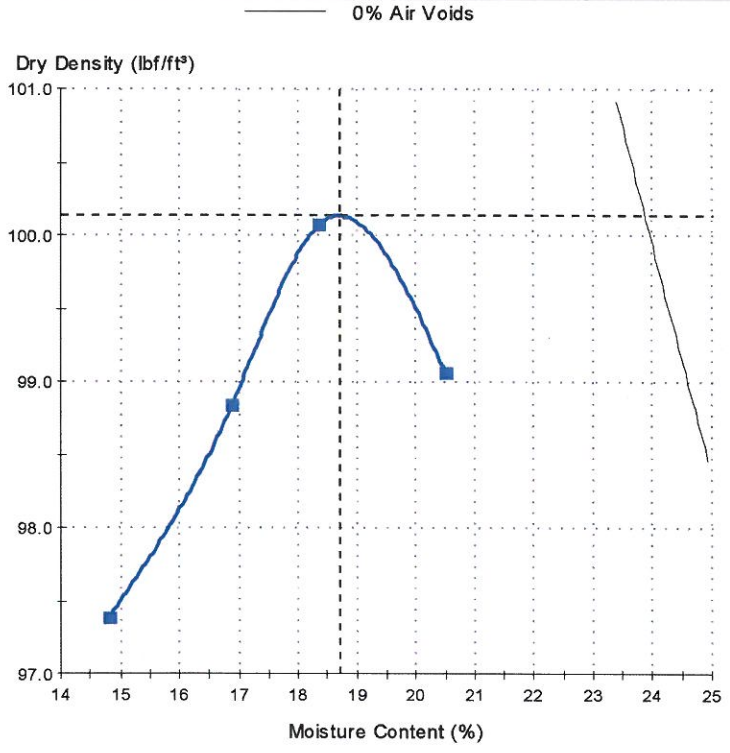
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 8/6/2013

Sample Details

Sample ID:	W13-004840-S1	**Alternate Sample ID:**	BAP-5
Date Sampled:	8/5/2013	**Date Submitted:**	8/5/2013
Sampled By:	Tyler Antil	**Sampling Method:**	In place
Source:	Onsite material		
Material:	Bottom Ash		
Specification:			
Location:	P3N East Embankment		
Date Tested:	8/6/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**100.1**
Corrected Maximum Dry Density (lbf/ft³):	**111.0**
Optimum Moisture Content (%):	**18.7**
Corrected Optimum Moisture Content (%):	**14.3**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.60
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	25
Passing Sieve 3/8" (9.5mm) (%):	75
Specific Gravity (Oversize):	2.65
Excluded Oversize Retained Sieve 3/8" (9.5mm) (%):	25
Visual Description:	Bottom Ash

Comments

The 200 wash value equals 3.7%

Bottom Ash In-place Density Test Reports (Pond 3S)

BRAUN INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: July 30, 2013

Project: SC-13-02383

Report: 1

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
BA-1	7/23/13	N	BAP-1 BA	21.6	94.0	7.8	96.1	102	95	A
BA-2	7/23/13	N	BAP-1 BA	21.6	94.0	8.9	95.7	102	95	A
BA-3	7/23/13	N	BAP-1 BA	21.6	94.0	9.1	95.0	101	95	A
BA-4	7/23/13	N	BAP-1 BA	21.6	94.0	8.1	96.4	103	95	A
BA-5	7/24/13	N	BAP-2 BA	28.7	88.9	10.6	90.5	102	95	A
BA-6	7/24/13	N	BAP-2 BA	28.7	88.9	10.2	91.8	103	95	A
BA-7	7/24/13	N	BAP-2 BA	28.7	88.9	8.4	88.0	99	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
BA-1	Mass Grading: East Embankment	992.7
BA-2	Mass Grading: East Embankment	992.7
BA-3	Mass Grading: West Embankment	995.0
BA-4	Mass Grading: West Embankment	995.0
BA-5	Mass Grading: South Embankment	994.0
BA-6	Mass Grading: South Embankment	992.0
BA-7	Mass Grading: South Embankment	991.5

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: July 30, 2013

Project: SC-13-02383

Report: 2

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
BA-8	7/25/13	N	BAP-2: BA	28.7	88.9	11.5	87.9	99	95	A
BA-9	7/25/13	N	BAP-2: BA	21.6	94.0	3.4	96.2	102	95	A
BA-10	7/25/13	N	BAP-2: BA	28.7	94.0	6.9	89.8	96	95	A
BA-11	7/26/13	N	BAP-1: BA	21.6	94.0	4.7	96.5	103	95	A
BA-12	7/26/13	N	BAP-4: BA	33.6	80.5	10.6	79.1	98	95	A
BA-13	7/29/13	N	BAP-1: BA	21.6	94.0	6.5	96.9	103	95	A
BA-14	7/29/13	N	BAP-1: BA	21.6	94.0	8.7	94.4	100	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
BA-8	Mass Grading: East Embankment	991.0
BA-9	Mass Grading: East Embankment	992.0
BA-10	Mass Grading: South Embankment	993.0
BA-11	Mass Grading: South Embankment	992.0
BA-12	Mass Grading: South Embankment	995.0
BA-13	Mass Grading: South Embankment	993.0
BA-14	Mass Grading: South Embankment	995.0

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN INTERTEC

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3900 Roosevelt Road
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Report of Field Compaction Tests

Date: August 1, 2013

Project: SC-13-02383

Report: 3

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
BA-15	7/30/13	N	BAP-1: BA	21.6	94.0	4.9	98.0	104	95	A
BA-16	7/30/13	N	BAP-2: BA	28.7	88.9	6.4	89.2	100	95	A
BA-17	7/31/13	N	BAP-2: BA	28.7	88.9	8.6	86.2	97	95	A
BA-18	7/31/13	N	BAP-1: BA	21.6	94.0	9.2	92.2	98	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
BA-15	South Embankment	995
BA-16	South Embankment	994
BA-17	East Embankment	995
BA-18	East Embankment	995

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

Bottom Ash In-place Density Test Reports (Pond 3N)

BRAUN
INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 6, 2013 **Project:** SC-13-02383 **Report:** 1

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
P3NBA-1	8/1/13	N	BAP-1	21.6	94.0	7.5	93.8	100	95	A
P3NBA-2	8/1/13	N	BAP-1	21.6	94.0	7.5	95.8	102	95	A
P3NBA-3	8/1/13	N	BAP-1	21.6	94.0	5.0	90.8	97	95	A
P3NBA-4	8/1/13	N	BAP-1	21.6	94.0	5.2	89.0	95	95	A
P3NBA-5	8/2/13	N	BAP-1	21.6	94.0	4.5	98.7	105	95	A
P3NBA-6	8/5/13	N	BAP-5	14.3	111.0	4.7	107.6	97	95	A
P3NBA-7	8/6/13	N	BAP-5	14.3	111.0	-	113.0	102	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
P3NBA-1	N 864310, E 2031935, East Embankment	991
P3NBA-2	N 863991, 2031966, East Embankment	991
P3NBA-3	N 865298, E 2031042, East Embankment	992
P3NBA-4	N 865302, E 2031701, North Embankment	992
P3NBA-5	N 865332, E 2031667, North Embankment	993
P3NBA-6	N 865313, E 2031405, East Embankment	993
P3NBA-7	N 864,781 E 2,031,969, East Embankment	994

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN INTERTEC

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Saint Cloud, MN 56301

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Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 6, 2013

Project: SC-13-02383

Report: 2

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
P3NBA-8	8/6/13	N	BAP-5	14.3	111.0	-	110	99	95	A

Key:
N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
P3NBA-8	N 865,215 E 2,031,936, East Embankment	994.5

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

Appendix C - Clay Test Reports

Clay Source Prequalification Test Reports
Clay Source Standard Proctor Test Reports
Clay In-place Density Test Reports
Clay In-place Permeability and Index Property Test Reports

Clay Source Prequalification Test Reports

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S1
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S1
Alternate Sample ID:	CLS-1
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Clayey Sand
Sample Location:	CLS-1

Other Test Results

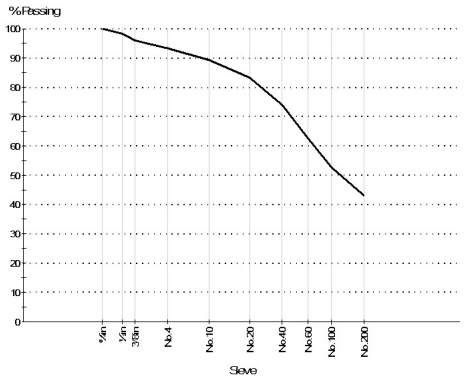
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	24	
Method		Method B	
Plastic Limit		13	
Plasticity Index		11	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		25.9	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.210	
Final Sample Height (in)		2.210	
Initial Sample Diameter (in)		2.810	
Final Sample Diameter (in)		2.810	
Initial Sample Cross-Section Area (in²)		6.202	
Final Sample Cross-Section Area (in²)		6.202	
Initial Sample Volume (in³)		13.71	
Final Sample Volume (in³)		13.71	
Initial Sample Mass (g)		426.0	
Final Sample Mass (g)		426.0	
Maximum Dry Density (lb/ft³)		121.4	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
¾in (19.0mm)	100	
½in (12.5mm)	98	
3/8in (9.5mm)	96	
No.4 (4.75mm)	93	
No.10 (2.0mm)	89	
No.20 (850µm)	83	
No.40 (425µm)	74	
No.60 (250µm)	63	
No.100 (150µm)	53	
No.200 (75µm)	43	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S1
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S1
Alternate Sample ID:	CLS-1
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Clayey Sand
Sample Location:	CLS-1

Other Test Results

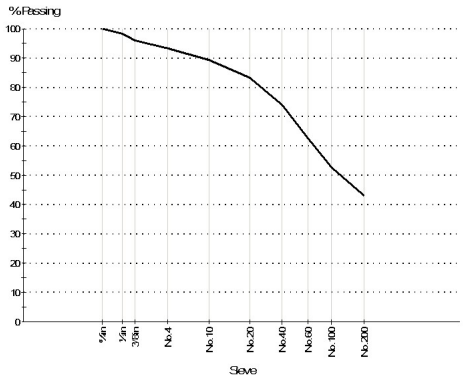
Description	Method	Result	Limits
Optimum Moisture Content (%)		10.6	
Relative Compaction (%)		97	
Moisure Content		2.0 % above optimum	
Dry Density (lb/ft³)		118.4	
Initial Moisture Content (%)		12.6	
Final Moisture Content (%)		15.6	
Initial Saturation (%)		81	
Final Saturation (%)		100	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		1.62E-08	
Corrected Hydraulic Conductivity (cm/s)		1.55E-08	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
¾in (19.0mm)	100	
½in (12.5mm)	98	
3/8in (9.5mm)	96	
No.4 (4.75mm)	93	
No.10 (2.0mm)	89	
No.20 (850µm)	83	
No.40 (425µm)	74	
No.60 (250µm)	63	
No.100 (150µm)	53	
No.200 (75µm)	43	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S2
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S2
Alternate Sample ID:	CLS-2
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-2

Other Test Results

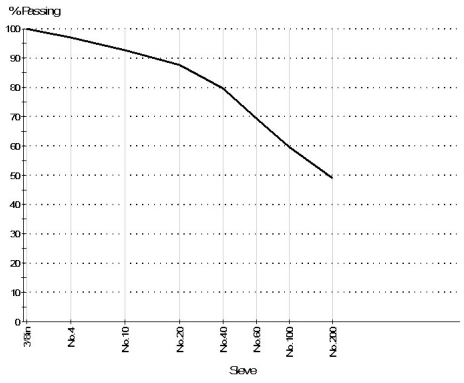
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	29	
Method		Method B	
Plastic Limit		13	
Plasticity Index		16	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		20.3	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.213	
Final Sample Height (in)		2.213	
Initial Sample Diameter (in)		2.806	
Final Sample Diameter (in)		2.806	
Initial Sample Cross-Section Area (in²)		6.184	
Final Sample Cross-Section Area (in²)		6.184	
Initial Sample Volume (in³)		13.69	
Final Sample Volume (in³)		13.69	
Initial Sample Mass (g)		418.8	
Final Sample Mass (g)		418.8	
Maximum Dry Density (lb/ft³)		119.7	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	88	
No.40 (425µm)	80	
No.60 (250µm)	69	
No.100 (150µm)	60	
No.200 (75µm)	49	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S2
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S2
Alternate Sample ID:	CLS-2
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-2

Other Test Results

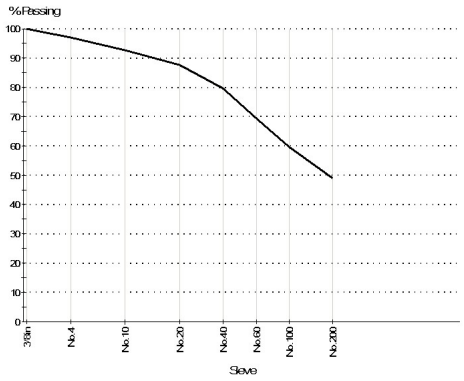
Description	Method	Result	Limits
Optimum Moisture Content (%)		11.7	
Relative Compaction (%)		97	
Moisure Content		1.7 % above optimum	
Dry Density (lb/ft³)		116.6	
Initial Moisture Content (%)		13.4	
Final Moisture Content (%)		16.4	
Initial Saturation (%)		81	
Final Saturation (%)		100	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		8.74E-09	
Corrected Hydraulic Conductivity (cm/s)		8.33E-09	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	88	
No.40 (425µm)	80	
No.60 (250µm)	69	
No.100 (150µm)	60	
No.200 (75µm)	49	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S3
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S3
Alternate Sample ID:	CLS-3
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-3

Other Test Results

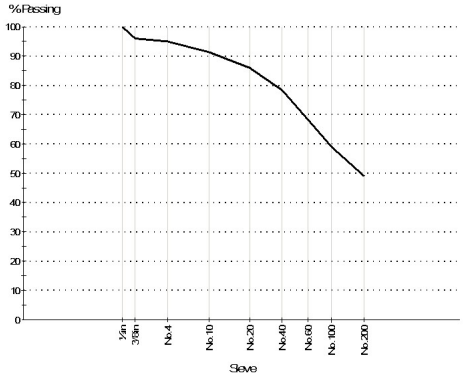
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	33	
Method		Method B	
Plastic Limit		14	
Plasticity Index		19	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		21.6	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.196	
Final Sample Height (in)		2.196	
Initial Sample Diameter (in)		2.812	
Final Sample Diameter (in)		2.812	
Initial Sample Cross-Section Area (in²)		6.210	
Final Sample Cross-Section Area (in²)		6.210	
Initial Sample Volume (in³)		13.64	
Final Sample Volume (in³)		13.64	
Initial Sample Mass (g)		390.5	
Final Sample Mass (g)		390.5	
Maximum Dry Density (lb/ft³)		111.9	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
½in (12.5mm)	100	
3/8in (9.5mm)	96	
No.4 (4.75mm)	95	
No.10 (2.0mm)	91	
No.20 (850µm)	86	
No.40 (425µm)	78	
No.60 (250µm)	68	
No.100 (150µm)	59	
No.200 (75µm)	49	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S3
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S3
Alternate Sample ID:	CLS-3
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/17/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-3

Other Test Results

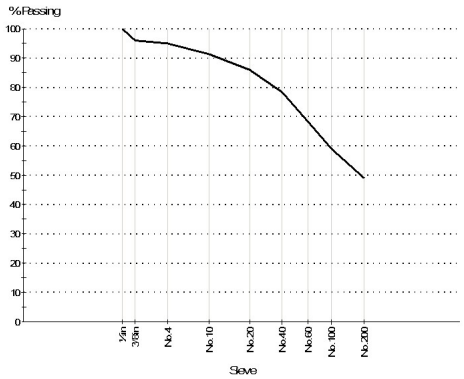
Description	Method	Result	Limits
Optimum Moisture Content (%)		15.0	
Relative Compaction (%)		97	
Moisure Content		2.0 % above optimum	
Dry Density (lb/ft³)		109.1	
Initial Moisture Content (%)		17.0	
Final Moisture Content (%)		20.1	
Initial Saturation (%)		84	
Final Saturation (%)		100	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		3.47E-08	
Corrected Hydraulic Conductivity (cm/s)		3.31E-08	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
½in (12.5mm)	100	
3/8in (9.5mm)	96	
No.4 (4.75mm)	95	
No.10 (2.0mm)	91	
No.20 (850µm)	86	
No.40 (425µm)	78	
No.60 (250µm)	68	
No.100 (150µm)	59	
No.200 (75µm)	49	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S4
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S4
Alternate Sample ID:	CLS-4
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/26/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Clayey Sand
Sample Location:	CLS-4

Other Test Results

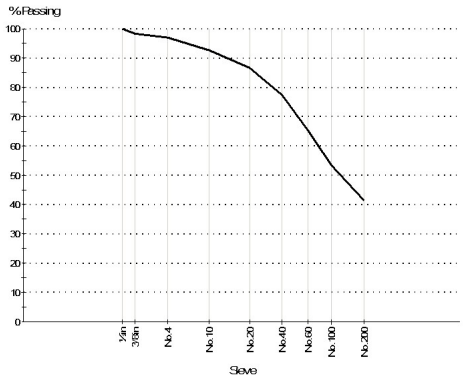
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	25	
Method		Method B	
Plastic Limit		13	
Plasticity Index		12	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		22.7	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.082	
Final Sample Height (in)		2.082	
Initial Sample Diameter (in)		1.384	
Final Sample Diameter (in)		1.384	
Initial Sample Cross-Section Area (in²)		1.504	
Final Sample Cross-Section Area (in²)		1.504	
Initial Sample Volume (in³)		3.132	
Final Sample Volume (in³)		3.132	
Initial Sample Mass (g)		93.10	
Final Sample Mass (g)		93.10	
Maximum Dry Density (lb/ft³)		119.1	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
½in (12.5mm)	100	
3/8in (9.5mm)	98	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	87	
No.40 (425µm)	77	
No.60 (250µm)	65	
No.100 (150µm)	53	
No.200 (75µm)	41	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S4
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID: W13-005814-S4
Alternate Sample ID: CLS-4
Sampled By: Client
Sampling Method:
Date Sampled:
Date Submitted: 7/26/2013
Specification: Sieve ASTM D 6913
Source:
Material Type: Clayey Sand
Sample Location: CLS-4

Other Test Results

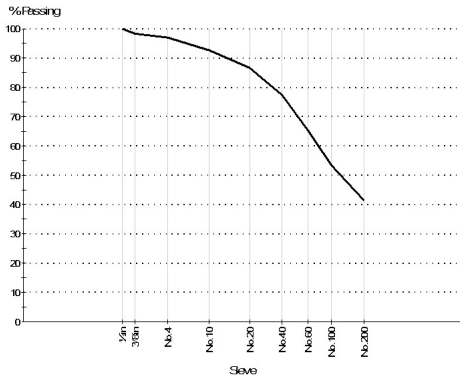
Description	Method	Result	Limits
Optimum Moisture Content (%)		12.0	
Relative Compaction (%)		95	
Moisure Content		1.9 % above optimum	
Dry Density (lb/ft³)		113.2	
Initial Moisture Content (%)		13.9	
Final Moisture Content (%)		27.8	
Initial Saturation (%)		84	
Final Saturation (%)		100	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		3.52E-08	
Corrected Hydraulic Conductivity (cm/s)		3.36E-08	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
½in (12.5mm)	100	
3/8in (9.5mm)	98	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	87	
No.40 (425µm)	77	
No.60 (250µm)	65	
No.100 (150µm)	53	
No.200 (75µm)	41	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S5
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S5
Alternate Sample ID:	CLS-5
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/26/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-5

Other Test Results

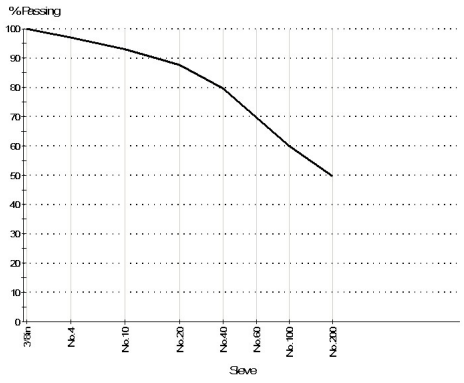
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	33	
Method		Method B	
Plastic Limit		13	
Plasticity Index		20	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		20.2	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.004	
Final Sample Height (in)		2.004	
Initial Sample Diameter (in)		1.391	
Final Sample Diameter (in)		1.391	
Initial Sample Cross-Section Area (in²)		1.520	
Final Sample Cross-Section Area (in²)		1.520	
Initial Sample Volume (in³)		3.045	
Final Sample Volume (in³)		3.045	
Initial Sample Mass (g)		85.45	
Final Sample Mass (g)		85.45	
Maximum Dry Density (lb/ft³)		110.4	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	88	
No.40 (425µm)	80	
No.60 (250µm)	70	
No.100 (150µm)	60	
No.200 (75µm)	50	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S5
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID: W13-005814-S5
Alternate Sample ID: CLS-5
Sampled By: Client
Sampling Method:
Date Sampled:
Date Submitted: 7/26/2013
Specification: Sieve ASTM D 6913
Source:
Material Type: Sandy Lean Clay
Sample Location: CLS-5

Other Test Results

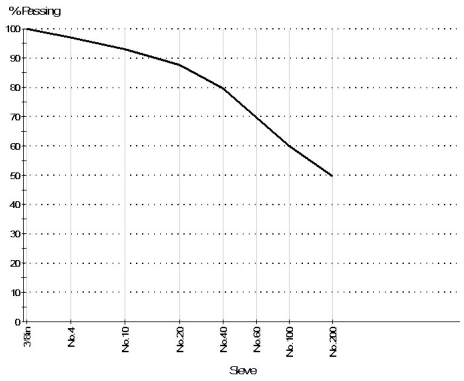
Description	Method	Result	Limits
Optimum Moisture Content (%)		13.2	
Relative Compaction (%)		97	
Moisure Content		2.5 % above optimum	
Dry Density (lb/ft³)		106.9	
Initial Moisture Content (%)		15.7	
Final Moisture Content (%)		20.5	
Initial Saturation (%)		83	
Final Saturation (%)		99	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		3.14E-06	
Corrected Hydraulic Conductivity (cm/s)		2.99E-06	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	97	
No.10 (2.0mm)	93	
No.20 (850µm)	88	
No.40 (425µm)	80	
No.60 (250µm)	70	
No.100 (150µm)	60	
No.200 (75µm)	50	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005265-S1
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/13/2013

Sample Details

Sample ID: W13-005265-S1
Alternate Sample ID: CLS-5, Re-test
Sampled By: Contractor
Sampling Method:
Date Sampled: 7/26/2013
Date Submitted: 7/29/2013
Specification:
Source:
Material Type:
Sample Location: CLS-5

Other Test Results

Description	Method	Result	Limits
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		1.120	
Final Sample Height (in)		1.120	
Initial Sample Diameter (in)		2.805	
Final Sample Diameter (in)		2.805	
Initial Sample Cross-Section Area (in²)		6.180	
Final Sample Cross-Section Area (in²)		6.180	
Initial Sample Volume (in³)		6.921	
Final Sample Volume (in³)		6.921	
Initial Sample Mass (g)		191.5	
Final Sample Mass (g)		191.5	
Maximum Dry Density (lb/ft³)		110.4	
Optimum Moisture Content (%)		13.2	
Relative Compaction (%)		95	
Moisure Content		1.9 % above optimum	
Dry Density (lb/ft³)		105.4	
Initial Moisture Content (%)		15.1	
Final Moisture Content (%)		21.9	
Initial Saturation (%)		68	
Final Saturation (%)		99	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		1.35E-06	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005265-S1
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/13/2013

Sample Details

Sample ID: W13-005265-S1
Alternate Sample ID: CLS-5, Re-test
Sampled By: Contractor
Sampling Method:
Date Sampled: 7/26/2013
Date Submitted: 7/29/2013
Specification:
Source:
Material Type:
Sample Location: CLS-5

Other Test Results

Description	Method	Result	Limits
Corrected Hydraulic Conductivity (cm/s)		1.29E-06	
Date Tested		8/13/2013	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S6
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID:	W13-005814-S6
Alternate Sample ID:	CLS-6
Sampled By:	Client
Sampling Method:	
Date Sampled:	
Date Submitted:	7/26/2013
Specification:	Sieve ASTM D 6913
Source:	
Material Type:	Sandy Lean Clay
Sample Location:	CLS-6

Other Test Results

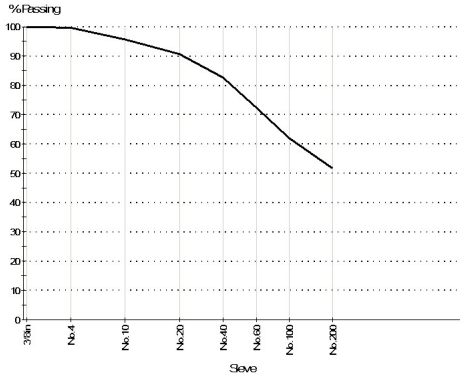
Description	Method	Result	Limits
Dispersion device	ASTM D 422 - 07		
Dispersion time (min)			
Shape			
Hardness			
Liquid Limit	ASTM D 4318 - 05	30	
Method		Method B	
Plastic Limit		14	
Plasticity Index		16	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		17.4	
Date Tested		8/22/2013	
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		2.018	
Final Sample Height (in)		2.018	
Initial Sample Diameter (in)		1.385	
Final Sample Diameter (in)		1.385	
Initial Sample Cross-Section Area (in²)		1.507	
Final Sample Cross-Section Area (in²)		1.507	
Initial Sample Volume (in³)		3.040	
Final Sample Volume (in³)		3.040	
Initial Sample Mass (g)		91.80	
Final Sample Mass (g)		91.80	
Maximum Dry Density (lb/ft³)		118.2	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	100	
No.10 (2.0mm)	96	
No.20 (850µm)	91	
No.40 (425µm)	83	
No.60 (250µm)	72	
No.100 (150µm)	62	
No.200 (75µm)	52	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005814-S6
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/22/2013

Sample Details

Sample ID: W13-005814-S6
Alternate Sample ID: CLS-6
Sampled By: Client
Sampling Method:
Date Sampled:
Date Submitted: 7/26/2013
Specification: Sieve ASTM D 6913
Source:
Material Type: Sandy Lean Clay
Sample Location: CLS-6

Other Test Results

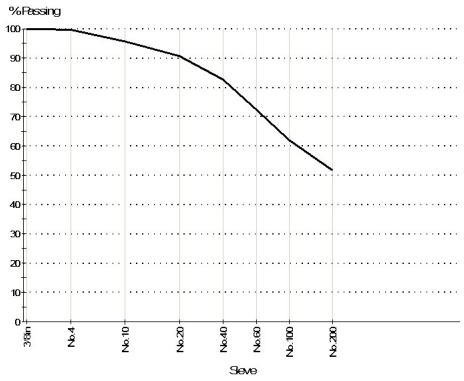
Description	Method	Result	Limits
Optimum Moisture Content (%)		12.9	
Relative Compaction (%)		97	
Moisure Content		1.8 % above optimum	
Dry Density (lb/ft³)		115.0	
Initial Moisture Content (%)		14.7	
Final Moisture Content (%)		29.7	
Initial Saturation (%)		85	
Final Saturation (%)		100	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		3.41E-07	
Corrected Hydraulic Conductivity (cm/s)		3.25E-07	
Date Tested		8/22/2013	

Particle Size Distribution

Method: ASTM D 422 - 07
Drying by:
Date Tested: 8/22/2013

Sieve Size	% Passing	Limits
3/8in (9.5mm)	100	
No.4 (4.75mm)	100	
No.10 (2.0mm)	96	
No.20 (850µm)	91	
No.40 (425µm)	83	
No.60 (250µm)	72	
No.100 (150µm)	62	
No.200 (75µm)	52	

Chart



Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005265-S2
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/13/2013

Sample Details

Sample ID: W13-005265-S2
Alternate Sample ID: CLS-6, Re-test
Sampled By: Contractor
Sampling Method:
Date Sampled: 7/26/2013
Date Submitted: 7/29/2013
Specification:
Source:
Material Type:
Sample Location: CLS-6

Other Test Results

Description	Method	Result	Limits
Temperature (ºC)	ASTM D 5084 - 03	22.0	
Cell Pressure (lb/in²)		99.0	
Top Pressure (lb/in²)		91.0	
Bottom Pressure (lb/in²)		94.0	
Effective Pressure (lb/in²)		5.0	
Pressure Differential (lb/in²)		3.0	
Permeant		De-aired tap water	
Assumed Specific Gravity		2.700	
Initial Sample Height (in)		1.129	
Final Sample Height (in)		1.129	
Initial Sample Diameter (in)		2.803	
Final Sample Diameter (in)		2.803	
Initial Sample Cross-Section Area (in²)		6.171	
Final Sample Cross-Section Area (in²)		6.171	
Initial Sample Volume (in³)		6.967	
Final Sample Volume (in³)		6.967	
Initial Sample Mass (g)		206.0	
Final Sample Mass (g)		206.0	
Maximum Dry Density (lb/ft³)		118.2	
Optimum Moisture Content (%)		12.9	
Relative Compaction (%)		95	
Moisure Content		1.1 % above optimum	
Dry Density (lb/ft³)		112.6	
Initial Moisture Content (%)		14.0	
Final Moisture Content (%)		18.2	
Initial Saturation (%)		77	
Final Saturation (%)		99	
Initial Hydraulic Gradient			
Ending Hydraulic Gradient			
Hydraulic Conductivity (cm/s)		5.71E-07	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Material Test Report

Report No: MAT:W13-005265-S2
Issue No: 1

Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Jim Streier
Geotechnical Laboratory
Date of Issue: 8/13/2013

Sample Details

Sample ID: W13-005265-S2
Alternate Sample ID: CLS-6, Re-test
Sampled By: Contractor
Sampling Method:
Date Sampled: 7/26/2013
Date Submitted: 7/29/2013
Specification:
Source:
Material Type:
Sample Location: CLS-6

Other Test Results

Description	Method	Result	Limits
Corrected Hydraulic Conductivity (cm/s)		5.44E-07	
Date Tested		8/13/2013	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

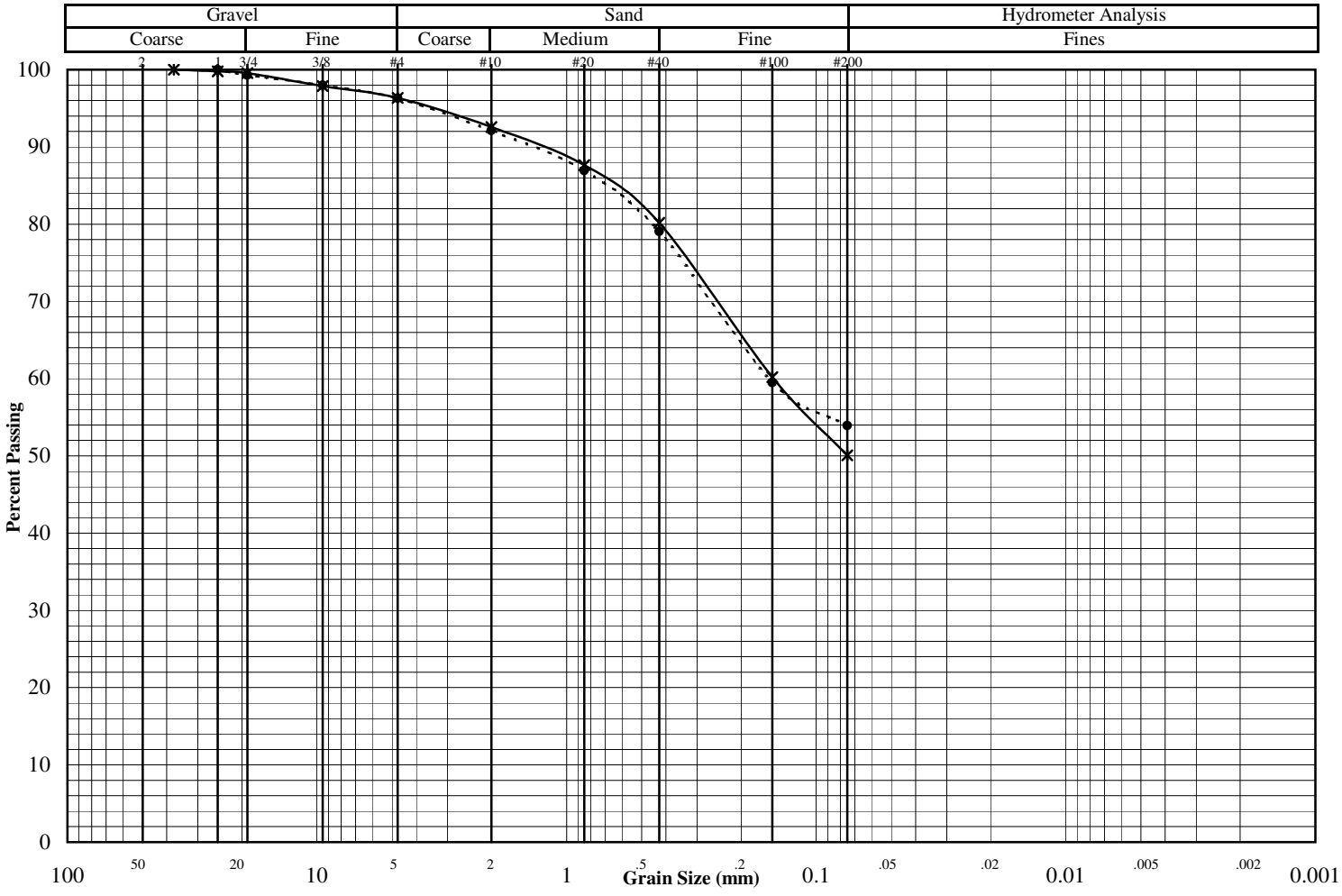
N/A

Grain Size Distribution ASTM D422

Job No. : **9060**

Project:	Sherco - 2013 Pond 3S Construction	Test Date:	8/8/13
Reported To:	Carlson McCain	Report Date:	8/28/13

	Location / Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Classification
*	CL-S-7			Bulk	Sandy Lean Clay with a trace of gravel (CL/SC)
●	CL-S-8			Bulk	Sandy Lean Clay with a trace of gravel (CL)
◇					



Other Tests	*	●	◇
Liquid Limit	27.2	28.5	
Plastic Limit	13.1	12.5	
Plasticity Index	14.1	16.0	
Water Content	14.8	12.2	
Dry Density (pcf)			
Specific Gravity			
Porosity			
Organic Content			
pH			
Shrinkage Limit			
Penetrometer			
Qu (psf)			

(* = assumed)

Percent Passing	*	●	◇
Mass (g)	19148.0	17043.0	
2"			
1.5"	100.0		
1"	99.8	100.0	
3/4"	99.5	99.3	
3/8"	97.9	98.0	
#4	96.3	96.3	
#10	92.6	92.1	
#20	87.7	86.9	
#40	80.2	79.0	
#100	60.2	59.5	
#200	50.1	53.9	

	*	●	◇
D_{60}			
D_{30}			
D_{10}			
C_U			
C_C			

Remarks:

2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

Hydraulic Conductivity Test Data

Project: Sherco - 2013 Pond 3S Construction Date: 9/5/2013

Reported To: Carlson McCain Job No.: 9060

Boring No.:	CL-S-7	CL-S-8					
Sample No.:							
Depth (ft):							
Location:							
Sample Type:	Bulk	Bulk					
Soil Type:	Sandy Lean Clay with a trace of gravel (CL/SC)	Sandy Lean Clay with a trace of gravel (CL)					
Atterberg Limits							
LL	27.2	28.5					
PL	13.1	12.5					
PI	14.1	16.0					
Permeability Test	Reconstituted	Reconstituted					
Before Test Conditions: Saturation %:							
Porosity:							
Ht. (in):	3.00	3.00					
Dia. (in):	2.85	2.85					
Dry Density (pcf):	114.9	116.0					
Water Content:	13.4%	13.2%					
Test Type:	Falling	Falling					
Max Head (ft):	5.0	5.0					
Confining press. (Effective-psi):	2.0	2.0					
Trial No.:	14-18	15-19					
Water Temp °C:	22.0	22.0					
% Compaction	96.9%	97.1%					
% Saturation (After Test)	95.3%	99.0%					
Coefficient of Permeability							
K @ 20 °C (cm/sec)	**5.6×10^{-8}**	**2.6×10^{-8}**					
K @ 20 °C (ft/min)	**1.1×10^{-7}**	**5.1×10^{-8}**					
Notes:							

2401 W 66th Street SOIL ENGINEERING TESTING, INC. Richfield, Minnesota 55423-2031

Clay Source Standard Proctor Test Reports

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003884-S2
Issue No: 1

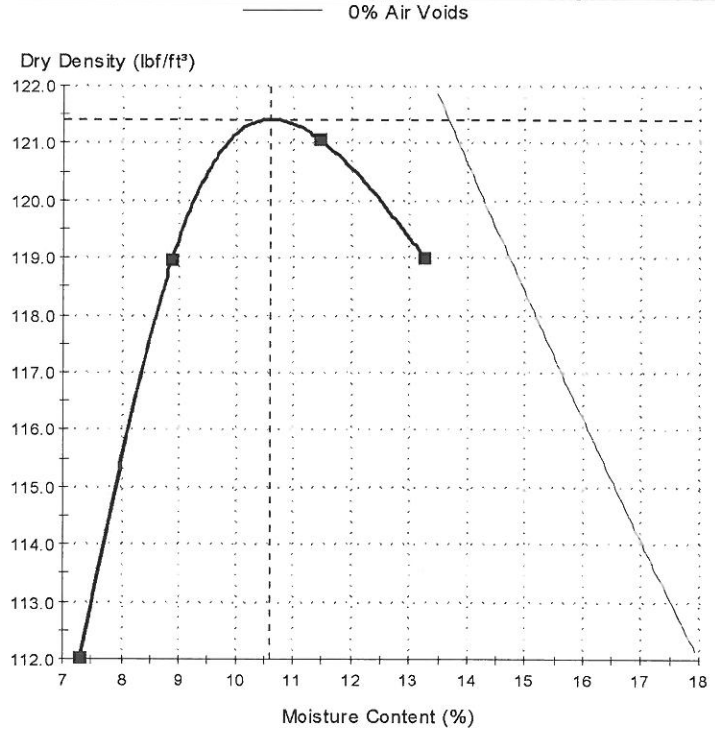
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 7/18/2013

Sample Details

Sample ID:	W13-003884-S2	**Alternate Sample ID:**	P-02
Date Sampled:	7/17/2013	**Date Submitted:**	7/17/2013
Sampled By:		**Sampling Method:**	
Source:			
Material:	Clayey Sand		
Specification:			
Location:	CLS-1		
Date Tested:	7/18/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**121.4**
Corrected Maximum Dry Density (lbf/ft³):	**121.4**
Optimum Moisture Content (%):	**10.6**
Corrected Optimum Moisture Content (%):	**10.6**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	4
Passing Sieve 3/8" (9.5mm) (%):	96
Visual Description:	SC Clayey Sand, fine grained, brown

Comments

The 200 wash value equals 42%

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003884-S1
Issue No: 1

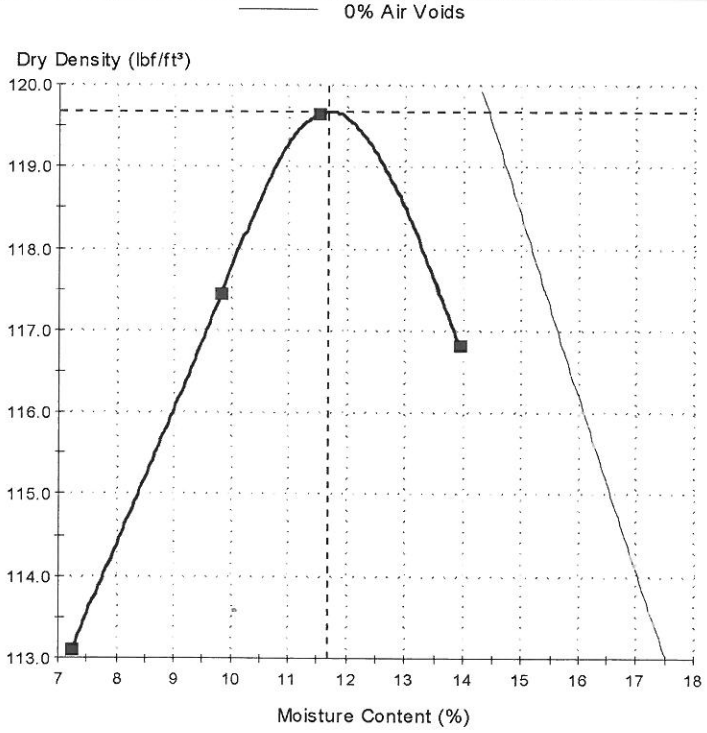
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 7/18/2013

Sample Details

Sample ID:	W13-003884-S1	**Alternate Sample ID:**	P-01
Date Sampled:	7/17/2013	**Date Submitted:**	7/17/2013
Sampled By:		**Sampling Method:**	
Source:			
Material:	Clayey Sand		
Specification:			
Location:	CLS-2		
Date Tested:	7/18/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**119.7**
Corrected Maximum Dry Density (lbf/ft³):	**119.7**
Optimum Moisture Content (%):	**11.7**
Corrected Optimum Moisture Content (%):	**11.7**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	4
Passing Sieve 3/8" (9.5mm) (%):	96
Visual Description:	SC Clayey Sand, fine grained, brown

Comments

The 200 wash value equals 48%

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-003884-S3
Issue No: 1

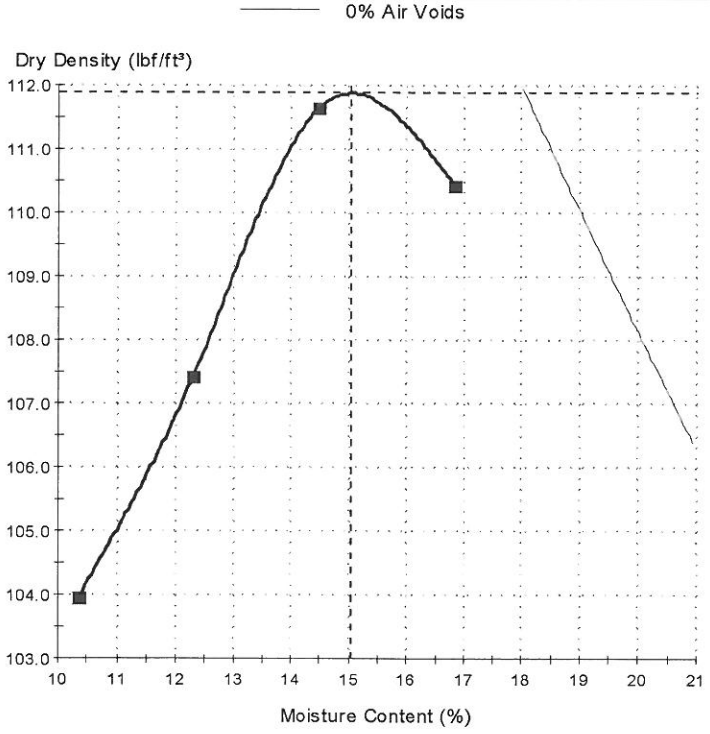
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 7/18/2013

Sample Details

Sample ID:	W13-003884-S3	**Alternate Sample ID:**	P-03
Date Sampled:	7/17/2013	**Date Submitted:**	7/17/2013
Sampled By:		**Sampling Method:**	
Source:			
Material:	CL Sandy Lean Clay		
Specification:			
Location:	CLS-3		
Date Tested:	7/18/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**111.9**
Corrected Maximum Dry Density (lbf/ft³):	**111.9**
Optimum Moisture Content (%):	**15.0**
Corrected Optimum Moisture Content (%):	**15.0**
Method:	A
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve No 4 (4.75mm) (%):	5
Passing Sieve No 4 (4.75mm) (%):	95
Visual Description:	CL Sandy Lean Clay, light brown

Comments

The 200 wash value equals 51%

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-004326-S1
Issue No: 1

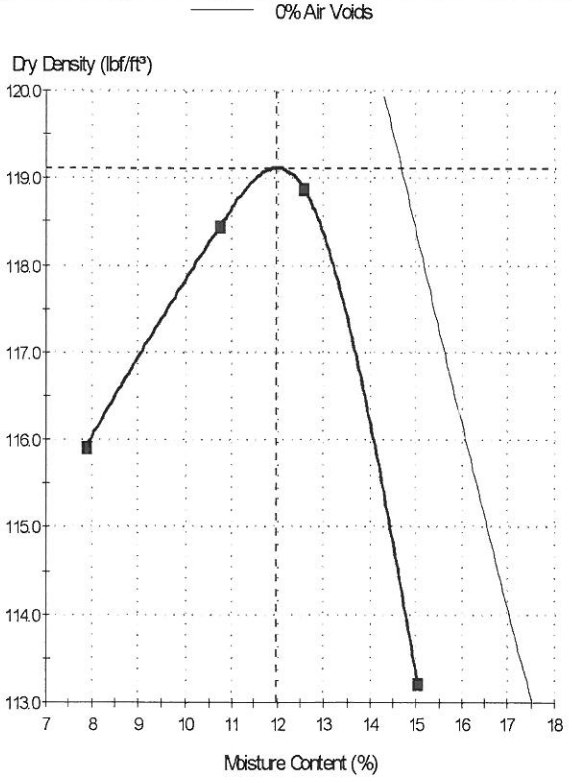
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/29/2013

Sample Details

Sample ID:	W13-004326-S1	**Alternate Sample ID:**	CLS-4
Date Sampled:	7/26/2013	**Date Submitted:**	7/26/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Clayey Sand		
Specification:			
Location:			
Date Tested:	7/29/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**119.1**
Corrected Maximum Dry Density (lbf/ft³):	**119.1**
Optimum Moisture Content (%):	**12.0**
Corrected Optimum Moisture Content (%):	**12.0**
Method:	A
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve No 4 (4.75mm) (%):	5
Passing Sieve No 4 (4.75mm) (%):	95
Visual Description:	SC Clayey Sand, fine grained, brown

Comments

The 200 wash value equals 41%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-004340-S1
Issue No: 1

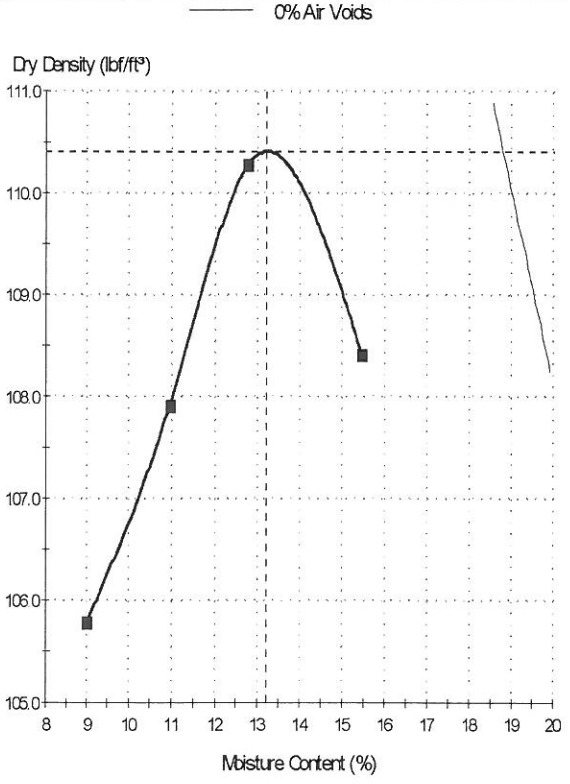
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/29/2013

Sample Details

Sample ID:	W13-004340-S1	**Alternate Sample ID:**	CLS-5
Date Sampled:	7/26/2013	**Date Submitted:**	7/26/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	CL Sandy Lean Clay		
Specification:			
Location:			
Date Tested:	7/29/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**110.4**
Corrected Maximum Dry Density (lbf/ft³):	**110.4**
Optimum Moisture Content (%):	**13.2**
Corrected Optimum Moisture Content (%):	**13.2**
Method:	A
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve No 4 (4.75mm) (%):	5
Passing Sieve No 4 (4.75mm) (%):	95
Visual Description:	CL Sandy Lean Clay, brown

Comments

The 200 wash value equals 51%.

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-004333-S1
Issue No: 1

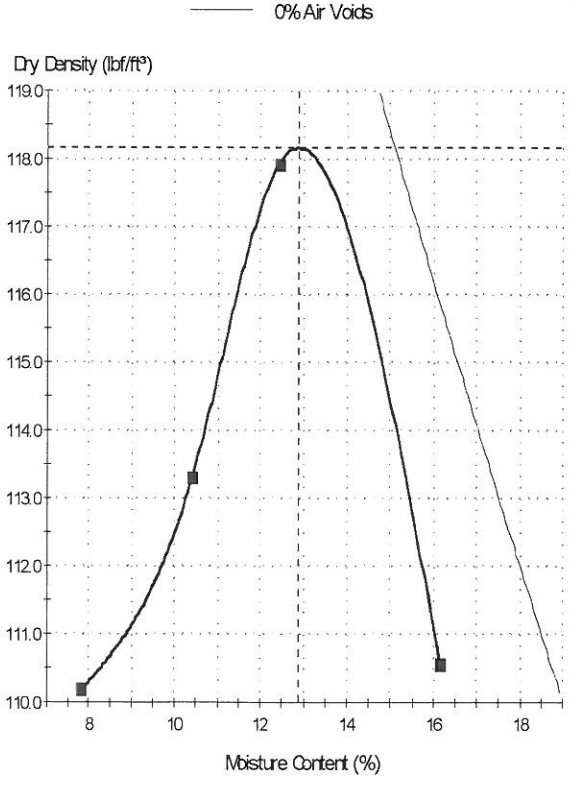
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Dallas Miner
Laboratory Supervisor
Date of Issue: 7/29/2013

Sample Details

Sample ID:	W13-004333-S1	**Alternate Sample ID:**	CLS-6
Date Sampled:	7/26/2013	**Date Submitted:**	7/26/2013
Sampled By:	Contractor	**Sampling Method:**	
Source:			
Material:	Clayey Sand		
Specification:			
Location:			
Date Tested:	7/29/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**118.2**
Corrected Maximum Dry Density (lbf/ft³):	**118.2**
Optimum Moisture Content (%):	**12.9**
Corrected Optimum Moisture Content (%):	**12.9**
Method:	A
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve No 4 (4.75mm) (%):	4
Passing Sieve No 4 (4.75mm) (%):	96
Visual Description:	SC Clayey Sand, fine grained, dark grey

Comments

The 200 wash value equals 50%.

Moisture Density Curve ASTM: D698, Method B

Project: **Sherco - 2013 Pond 3S Construction** Date: **8/9/13**

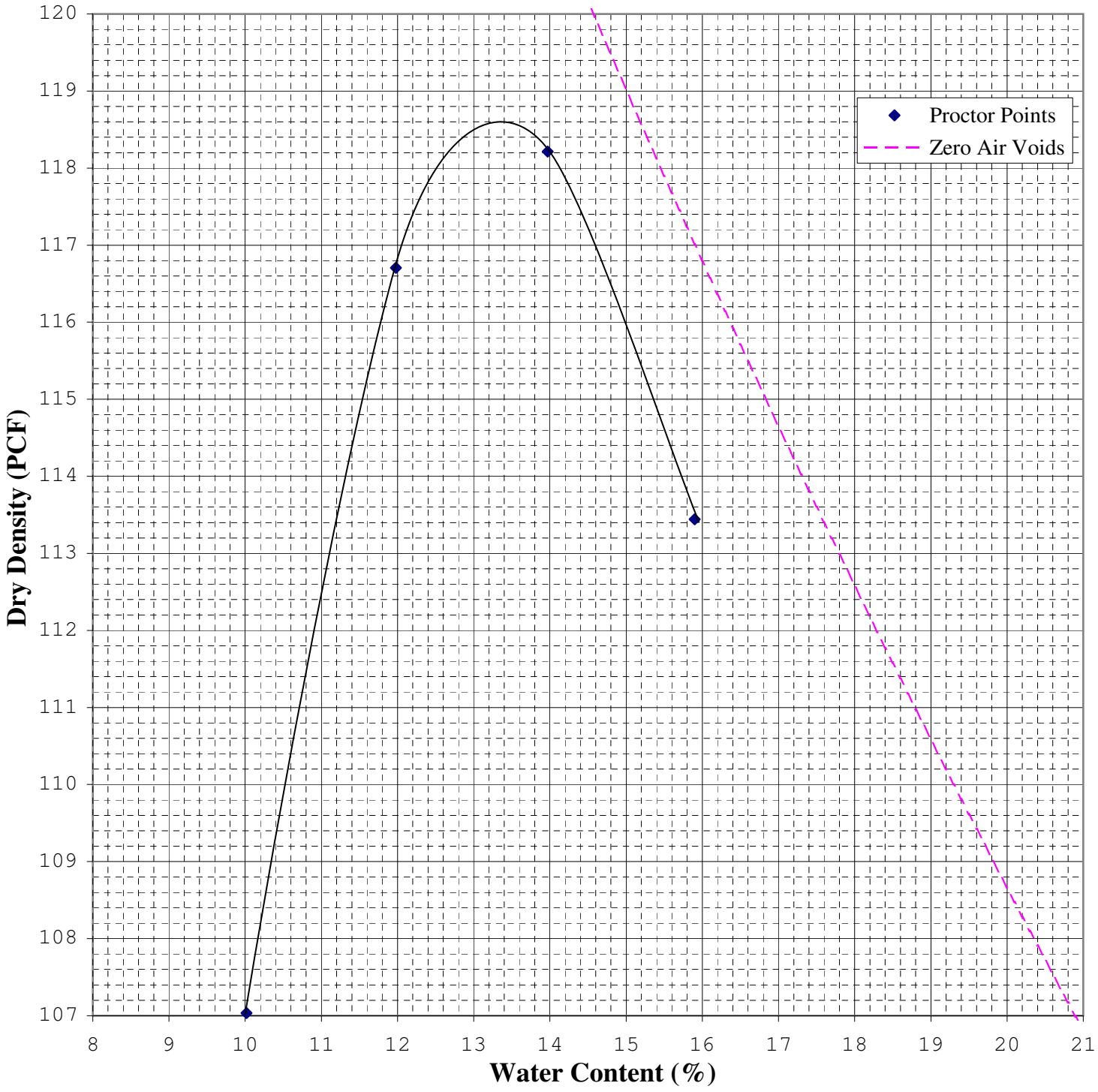
Client: **Carlson McCain** Job No. **9060**

Boring No. **CL-S-7** Sample: Depth(ft): Location:

Soil Type: **Sandy Lean Clay with a trace of gravel (CL/SC)**

As Received W.C. (%): **14.8** LL: **27.2** PL: **13.1** PI: **14.1** Specific Gravity: **2.67** *Assumed

Maximum Dry Density (pcf): **118.6** Opt. Water Content (%): **13.4**



2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

SET-R18a

Moisture Density Curve ASTM: D698, Method B

Project: **Sherco - 2013 Pond 3S Construction** Date: **8/22/13**

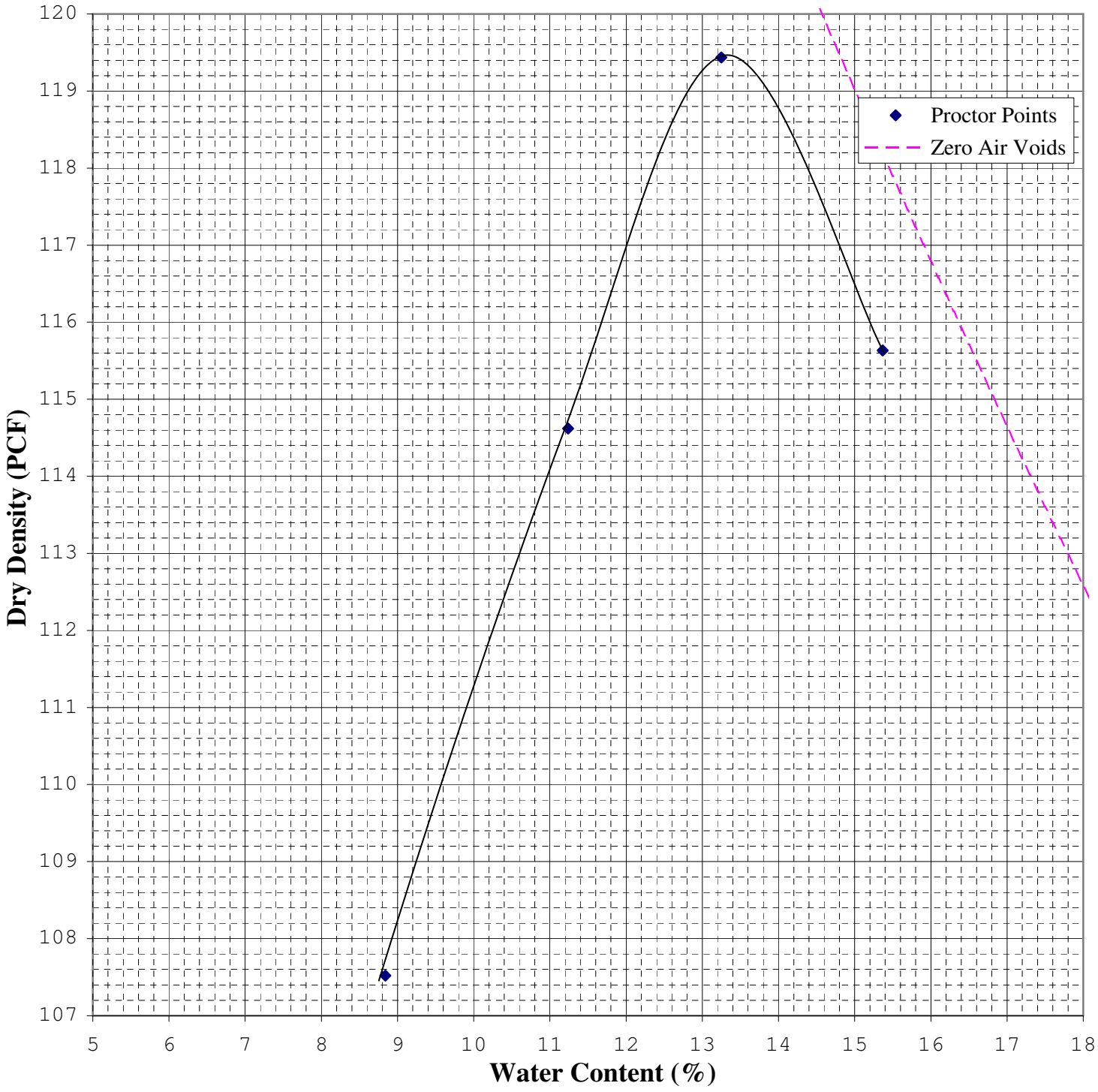
Client: **Carlson McCain** Job No. **9060**

Boring No. **CL-S-8** Sample: Depth(ft): Location:

Soil Type: **Sandy Lean Clay with a trace of gravel (CL)**

As Received W.C. (%): **15.4** LL: PL: PI: Specific Gravity: **2.67** *Assumed

Maximum Dry Density (pcf): **119.4** Opt. Water Content (%): **13.3**



2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

SET-R18a

Clay In-place Density Test Reports

BRAUN INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 28, 2013

Project: SC-13-02383

Report: 1

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-1	8/19/13	N	CLS-2: SC	11.7	119.7	14.9	115.9	96.8	97	B
CL-1A	8/19/13	N	CLS-2: SC	11.7	119.7	14.4	117.2	97.9	97	A
CL-2	8/19/13	N	CLS-2: SC	11.7	119.7	15.4	115.0	96.0	97	B
CL-2A	8/19/13	N	CLS-2: SC	11.7	119.7	14.9	116.9	97.6	97	A
CL-3	8/19/13	N	CLS-2: SC	11.7	119.7	15.1	118.1	98.6	97	A
CL-4	8/19/13	N	CLS-2: SC	11.7	119.7	14.8	117.3	98.0	97	A
CL-5	8/19/13	N	CLS-2: SC	11.7	119.7	14.7	118.8	99.2	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-1	N 862397.6, E 2030962.1 South End of Pond	990.4
CL-1A	N 862397.6, E 2030962.1 South End of Pond	990.4
CL-2	N 862407.7, E 2031098.8 South End of Pond	991.2
CL-2A	N 862407.7, E 2031098.8 South End of Pond	991.2
CL-3	N 862398.0, E 2030911.0 South End of Pond	991.5
CL-4	N 862403.0, E 2031074.2 South End of Pond	992.1
CL-5	N 862420.6, E 2031030.2 South End of Pond	992.6

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN
INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 28, 2013 **Project:** SC-13-02383 **Report:** 2

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-6	8/19/13	N	CLS-2: SC	11.7	119.7	13.7	119.6	99.9	97	A
CL-7	8/19/13	N	CLS-2: SC	11.7	119.7	17.8	110.3	92.1	97	B
CL-7A	8/19/13	N	CLS-2: SC	11.7	119.7	16.0	115.3	96.3	97	B
CL-7B	8/19/13	N	CLS-2: SC	11.7	119.7	16.2	115.9	96.8	97	B
CL-7C	8/20/13	N	CLS-2: SC	11.7	119.7	15.1	117.7	98.3	97	A
CL-8	8/20/13	N	CLS-2: SC	11.7	119.7	14.9	119.1	99.5	97	A
CL-9	8/20/13	N	CLS-2: SC	11.7	119.7	16.7	116.4	97.2	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-6	N 862405.5, E 2031076.3 South End of Pond	993.3
CL-7	N 862420.2, E 2031395.7 South End of Pond	990.8
CL-7A	N 862420.2, E 2031395.7 South End of Pond	990.8
CL-7B	N 862420.2, E 2031395.7 South End of Pond	990.8
CL-7C	N 862420.2, E 2031395.7 South End of Pond	990.8
CL-8	N 862441.4, E 2031819.2 South End of Pond	990.4
CL-9	N 862443.7, E 2031610.8 South End of Pond	991.1

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN
INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 28, 2013 **Project:** SC-13-02383 **Report:** 3

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-10	8/20/13	N	CLS-2: SC	11.7	119.7	16.5	115.2	96.2	97	B
CL-10A	8/20/13	N	CLS-2: SC	11.7	119.7	16.7	115.0	96.1	97	B
CL-10B	8/20/13	N	CLS-2: SC	11.7	119.7	16.1	116.2	97.1	97	A
CL-11	8/20/13	N	CLS-7: CLSC	13.4	118.6	15.6	115.7	97.6	97	A
CL-12	8/20/13	N	CLS-7: CLSC	13.4	118.6	15.9	116.4	98.1	97	A
CL-13	8/20/13	N	CLS-7: CLSC	13.4	118.6	15.3	116.9	98.6	97	A
CL-14	8/20/13	N	CLS-7: CLSC	13.4	118.6	15.1	115.0	97.0	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-10	N 862441.0, E 2031728.8 South End of Pond	992.1
CL-10A	N 862441.0, E 2031728.8 South End of Pond	992.1
CL-10B	N 862441.0, E 2031728.8 South End of Pond	992.1
CL-11	N 863391.2, E 2032005.9 East Side of Pond	990.6
CL-12	N 862428.6, E 2031509.4 South End of Pond	992.9
CL-13	N 863069.6, E 2032005.0 East Side of Pond	991.3
CL-14	N 863245.9, E 2032007.0 East Side of Pond	992.2

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
Suite 113
Saint Cloud, MN 56301

Phone: 320.253.9940
Fax: 320.253.3054
Web: braunintertec.com

Report of Field Compaction Tests

Date: August 30, 2013 **Project:** SC-13-02383 **Report:** 4

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-15	8/20/13	N	CLS-7: CLSC	13.4	118.6	16.8	116.9	98.5	97	A
CL-16	8/21/13	N	CLS-2: SC	11.7	119.7	14.0	119.0	99.4	97	A
CL-17	8/21/13	N	CLS-2: SC	11.7	119.7	15.8	117.6	98.2	97	A
CL-18	8/21/13	N	CLS-2: SC	11.7	119.7	15.1	117.8	98.4	97	A
CL-19	8/22/13	N	CLS-2: SC	11.7	119.7	13.2	120.0	100.3	97	A
CL-20	8/22/13	N	CLS-2: SC	11.7	119.7	12.9	121.0	101.0	97	A
CL-21	8/22/13	N	CLS-2: SC	11.7	119.7	13.1	120.9	101.0	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-15	N 863322.7, E 2032004.0 East Side of Pond	993.0
CL-16	N 862408.3, E 2030988.8 South Side of Pond	994.5
CL-17	N 862417.5, E 2031228.8 South Side of Pond	994.0
CL-18	N 862412.6, E 2031109.6 South Side of Pond	994.9
CL-19	N 862446.4, E 2031887.9 SE Corner of Pond	991.5
CL-20	N 862476.8, E 2031938.1 SE Corner of Pond	992.9
CL-21	N 862525.1, E 2031987.3 SE Corner of Pond	992.4

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

BRAUN INTERTEC

Braun Intertec Corporation
3900 Roosevelt Road
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Phone: 320.253.9940
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Web: braunintertec.com

Report of Field Compaction Tests

Date: August 30, 2013

Project: SC-13-02383

Report: 5

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-22	8/22/13	N	CLS-2: SC	11.7	119.7	15.6	117.4	98.0	97	A
CL-23	8/22/13	N	CLS-7: CLSC	12.9	118.2	15.8	116.3	98.3	97	A
CL-24	8/22/13	N	CLS-2: SC	11.7	119.7	14.1	118.2	98.7	97	A
CL-25	8/22/13	N	CLS-2: SC	11.7	119.7	14.8	118.3	98.8	97	A
CL-26	8/22/13	N	CLS-2: SC	11.7	119.7	14.9	117.1	97.8	97	A
CL-27	8/22/13	N	CLS-2: SC	11.7	119.7	13.9	117.4	98.0	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-22	N 863518.7, E 2032002.0 East Side of Pond	993.5
CL-23	N 862636.7, E 2032007.0 East Side of Pond	990.8
CL-24	N 862883.7, E 2032001.4 East Side of Pond	991.6
CL-25	N 862810.1, E 2032005.0 East Side of Pond	992.2
CL-26	N 862981.0, E 2032002.6 East Side of Pond	992.5
CL-27	N 862746.5, E 2032003.3 East Side of Pond	993.1

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

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3900 Roosevelt Road
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Phone: 320.253.9940
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Report of Field Compaction Tests

Date: August 30, 2013

Project: SC-13-02383

Report: 6

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
CL-28	8/23/13	N	CLS-2: SC	11.7	119.7	13.2	120.9	101.0	97	A
CL-29	8/23/13	N	CLS-7: CLSC	12.9	118.2	15.8	116.1	98.2	97	A
CL-30	8/23/13	N	CLS-7: CLSC	12.9	118.2	15.4	116.5	98.5	97	A
CL-31	8/23/13	N	CLS-7: CLSC	12.9	118.2	15.5	116.3	98.3	97	A
CL-32	8/23/13	N	CLS-7: CLSC	12.9	118.2	15.1	115.6	97.8	97	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
CL-28	N 863440.5, E 2031997.5 East Side of Pond	995.0
CL-29	N 863291.4, E 2031997.5 East Side of Pond	994.1
CL-30	N 863182.0, E 2031995.2 East Side of Pond	994.4
CL-31	N 862800.9, E 2032000.6 East Side of Pond	994.5
CL-32	N 862446.6, E 2031773.4 South Side of Pond	995.0

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

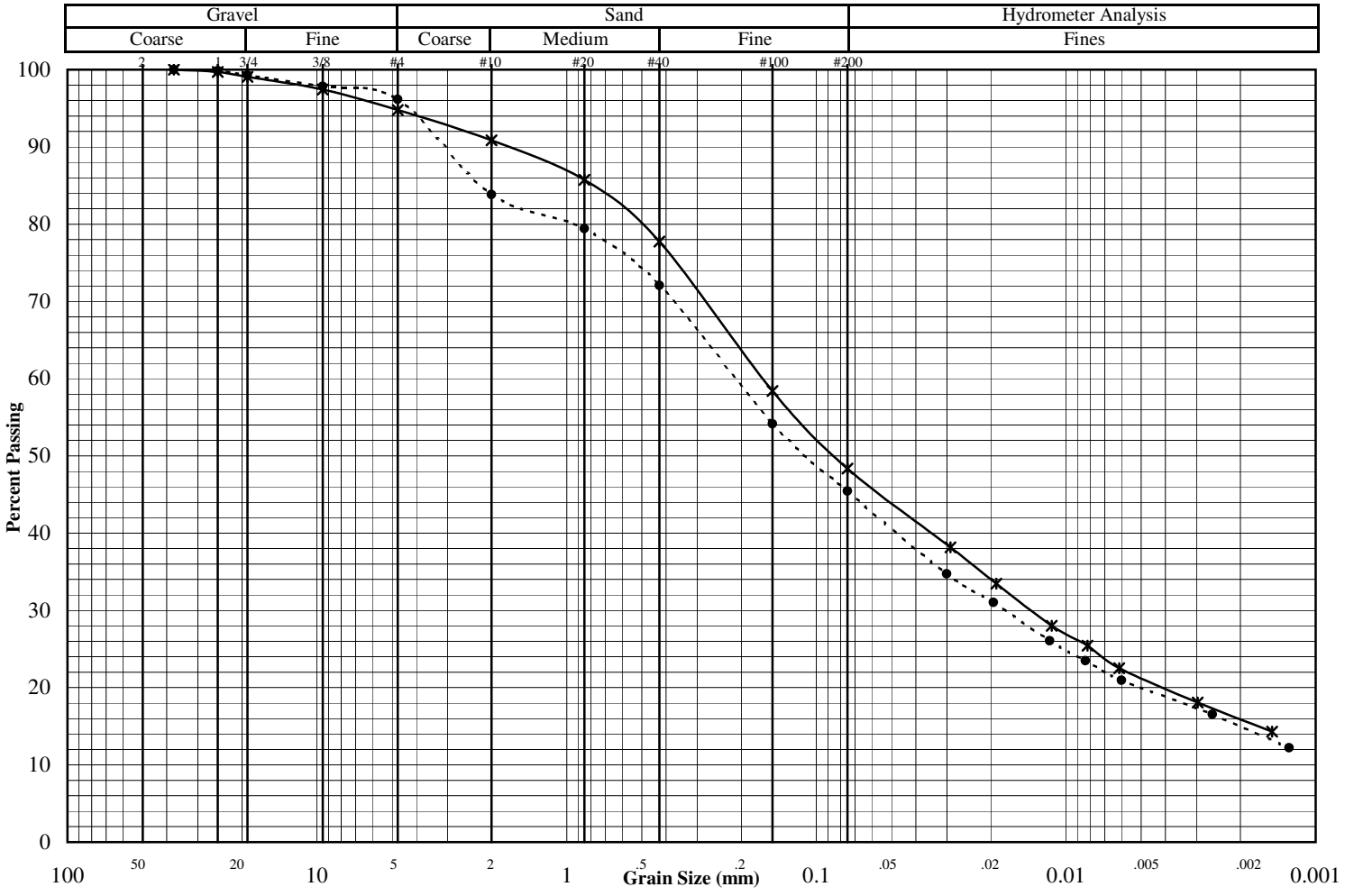
Clay In-place Permeability and Index Property Test Reports

Grain Size Distribution ASTM D422

Job No. : **9060**

Project:	Sherco - 2013 Pond 3S Construction	Test Date:	8/21/13
Reported To:	Carlson McCain	Report Date:	9/7/13

	Location / Boring No.	Sample No.	Depth (ft)	Sample Type	Soil Classification
*	CL TW-1			Bag	Clayey Sand with a little gravel (SC)
●	CL TW-2			Bag	Clayey Sand with a trace of gravel (SC)
◇					



Other Tests	*	●	◇
Liquid Limit	26.0	27.2	
Plastic Limit	12.9	13.1	
Plasticity Index	13.1	14.1	
Water Content	13.9	11.4	
Dry Density (pcf)			
Specific Gravity	2.67*	2.67*	
Porosity			
Organic Content			
pH			
Shrinkage Limit			
Penetrometer			
Qu (psf)			

(* = assumed)

Percent Passing	*	●	◇
Mass (g)	14955.1	15420.1	
2"			
1.5"	100.0	100.0	
1"	99.7	99.8	
3/4"	99.1	99.3	
3/8"	97.4	97.8	
#4	94.8	96.2	
#10	90.9	83.8	
#20	85.8	79.4	
#40	77.8	72.1	
#100	58.4	54.1	
#200	48.4	45.5	

	*	●	◇
D_{60}			
D_{30}			
D_{10}			
C_U			
C_C			

Remarks:

2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

Hydraulic Conductivity Test Data

Project: Sherco - 2013 Pond 3S Construction Date: 9/5/2013

Reported To: Carlson McCain Job No.: 9060

Boring No.:							
Sample No.:	TW-1	TW-2					
Depth (ft):							
Location:							
Sample Type:	TWT	TWT					
Soil Type:	Clayey Sand with a little gravel (SC)	Clayey Sand with a trace of gravel (SC)					
Atterberg Limits							
LL	26.0	27.2					
PL	12.9	13.1					
PI	13.1	14.1					
Permeability Test	Intact	Intact					
Before Test Conditions: Saturation %:							
Porosity:							
Ht. (in):	2.74	2.60					
Dia. (in):	2.99	2.86					
Dry Density (pcf):	115.2	121.7					
Water Content:	12.6%	13.5%					
Test Type:	Falling	Falling					
Max Head (ft):	5.0	5.0					
Confining press. (Effective-psi):	2.0	2.0					
Trial No.:	12-17	11-15					
Water Temp °C:	22.0	22.0					
% Compaction							
% Saturation (After Test)	97.9%	98.7%					
Coefficient of Permeability							
K @ 20 °C (cm/sec)	**4.0×10^{-8}**	**2.2×10^{-8}**					
K @ 20 °C (ft/min)	**7.9×10^{-8}**	**4.4×10^{-8}**					
Notes:							

2401 W 66th Street
SOIL ENGINEERING TESTING, INC.
Richfield, Minnesota 55423-2031

Appendix D - Random Fill Test Reports

Pond 3 South Random Fill Standard Proctor Test Reports

Pond 3 In-place Density Test Reports

Pond 3 South Random Fill Standard Proctor Test Reports

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-005729-S1
Issue No: 1

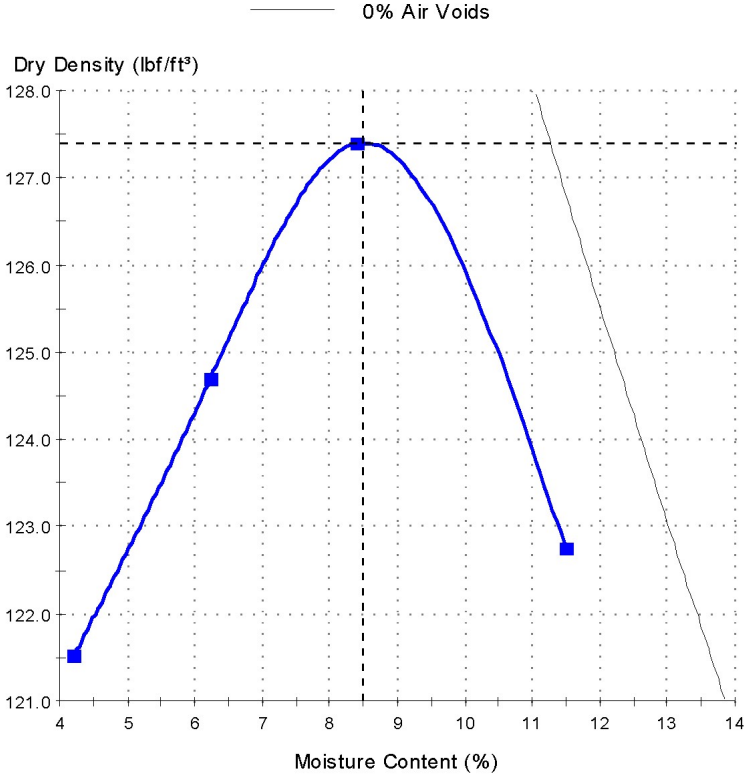
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 8/21/2013

Sample Details

Sample ID:	W13-005729-S1	**Alternate Sample ID:**	RFS #1
Date Sampled:	8/20/2013	**Date Submitted:**	8/20/2013
Sampled By:	Brian G Venem	**Sampling Method:**	Stockpile
Source:	Onsite material		
Material:	Silty Sand with Gravel		
Specification:			
Location:	South End of Project Stockpile		
Date Tested:	8/21/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	**127.4**
Corrected Maximum Dry Density (lbf/ft³):	**130.7**
Optimum Moisture Content (%):	**8.5**
Corrected Optimum Moisture Content (%):	**7.7**
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.65
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	11
Passing Sieve 3/8" (9.5mm) (%):	89
Specific Gravity (Oversize):	2.65
Excluded Oversize Retained Sieve 3/8" (9.5mm) (%):	11
Visual Description:	SM Silty Sand with Gravel, fine-coarse grained, brown

Comments

The 200 wash value equals 14%

Braun Intertec Corporation
11001 Hampshire Avenue South
Minneapolis, MN 55438
Phone: 952.995.2000

Proctor Report

Report No: PTR:W13-005729-S2
Issue No: 1

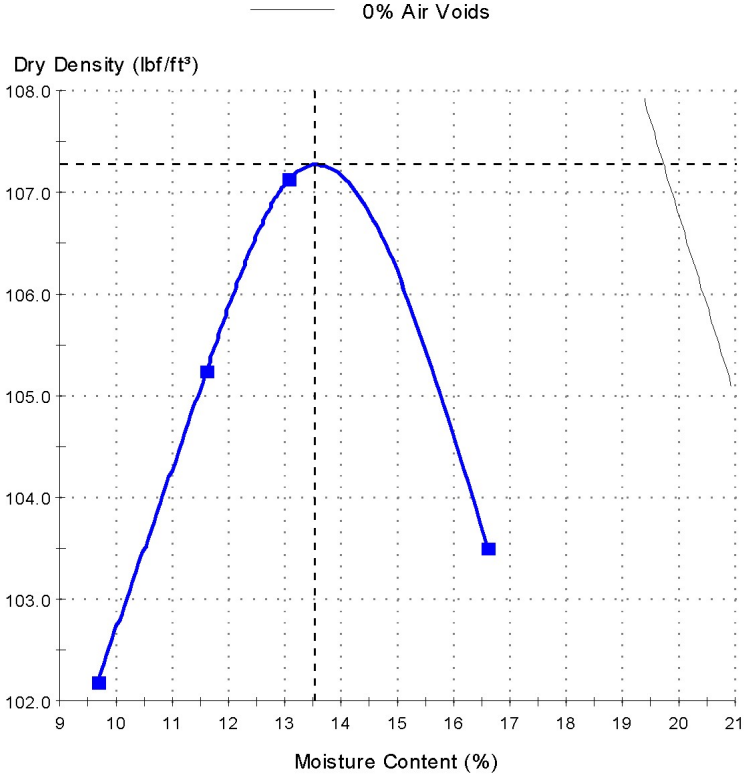
Client: Travis Peterson
Xcel Energy Services, Inc.
Sherburn County Generating Facility
Becker, MN, 55308-8800
Project: SC-13-02383
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, MN, 55308
PM: Thomas L Henkemeyer, thenkemeyer@BraunIntertec.com

Kanhai Seokaran
Proctor Supervisor
Date of Issue: 8/21/2013

Sample Details

Sample ID:	W13-005729-S2	Alternate Sample ID:	RFS #2
Date Sampled:	8/20/2013	Date Submitted:	8/20/2013
Sampled By:	Brian G Venem	Sampling Method:	Stockpile
Source:	Onsite material		
Material:	Poorly Graded Sand		
Specification:			
Location:	South End of Project Stockpile		
Date Tested:	8/21/2013		

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 07

Maximum Dry Density (lbf/ft³):	107.3
Corrected Maximum Dry Density (lbf/ft³):	110.3
Optimum Moisture Content (%):	13.5
Corrected Optimum Moisture Content (%):	12.5
Method:	B
Preparation Method:	Moist
Rammer Type:	Hand round
Specific Gravity (Fines):	2.60
Specific Gravity Method:	Assumed
Retained Sieve 3/8" (9.5mm) (%):	8
Passing Sieve 3/8" (9.5mm) (%):	92
Specific Gravity (Oversize):	2.65
Excluded Oversize Retained Sieve 3/8" (9.5mm) (%):	8
Visual Description:	SP Poorly Graded Sand, fine-medium grained, brown

Comments

The 200 wash value equals 1.2%

Pond 3 In-place Density Test Reports

BRAUN
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Report of Field Compaction Tests

Date: August 28, 2013 **Project:** SC-13-02383 **Report:** 1

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
RF-1	8/27/13	N	RFS-2: SP	12.5	110.3	4.0	112.9	102.3	95	A
RF-2	8/27/13	N	RFS-2: SP	12.5	110.3	5.7	113.6	102.9	95	A
RF-3	8/27/13	N	RFS-2: SP	12.5	110.3	6.3	111.9	101.4	95	A
RF-4	8/27/13	N	RFS-2: SP	12.5	110.3	3.1	111.8	101.3	95	A
RF-5	8/28/13	N	RFS-2: SP	12.5	110.3	10.1	108.5	98.3	95	A
RF-6	8/28/13	N	RFS-2: SP	12.5	110.3	9.7	111.9	101.4	95	A
RF-7	8/28/13	N	RFS-2: SP	12.5	110.3	7.3	112.4	101.9	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
RF-1	N 862507, E 2031984 Southeast Corner of Pond	994
RF-2	N 862426, E 2031751 South End of Pond	993.7
RF-3	N 862433, E 2031372 South End of Pond	996.5
RF-4	N 862408, E 2031028 South End of Pond	995.6
RF-5	N 863309, E 2031998 East Side of Pond	995.4
RF-6	N 862964, E 2031995 East Side of Pond	996.5
RF-7	N 862741, E 2032017 East Side of Pond	995.9

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

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Web: braunintertec.com

Report of Field Compaction Tests

Date: August 30, 2013

Project: SC-13-02383

Report: 2

Client:
Xcel Energy Services, Inc.
Project Support Team
Minneapolis, MN 55401

Project Description:
Sherco 2013 Ash Construction
Pond 3S Vertical Expansion
Becker, Minnesota

Test	Date	Type	Soil ID and Classification	Optimum Moisture* (%)	Max. Lab Dry Density* (pcf)	Inplace Moisture (%)	Inplace Dry Density (pcf)	Relative Compaction (%)	Specified Minimum Compact. (%)	Comments
RF-8	8/29/13	N	RSF-2: SP	12.5	110.3	8.4	114.1	103.4	95	A
RF-9	8/29/13	N	RSF-2: SP	12.5	110.3	7.5	114.2	103.0	95	A
RF-10	8/30/13	N	RSF-1 SM	7.7	130.7	7.1	132.3	101.2	95	A
RF-11	8/30/13	N	RSF-2: SP	12.5	110.3	6.7	115.2	104.4	95	A
RF-12	9/3/13	N	RSF-1 SM	7.7	130.7	6.8	135.6	103.7	95	A

Key: N = Nuclear, ASTM D 2922
SC = Sand Cone, ASTM D 1556
* = O.M. and M.L.D.D. rounded to nearest 0.1

A = Test results comply with specifications.
B = Test results do not comply with specifications.
C = Test results comply with air-voids specifications.

Test	Test Location	Elevation
RF-8	N 863490, E 2032023, East of Pond	998.6
RF-9	N 863065, E 2032027, East of Pond	998.9
RF-10	N862446, E2031930, South End of Pond	998.8
RF-11	N 862409, E2031173, South End of Pond	996
RF-12	N 862411, E 2031506, South End of Pond	998.7

Elevation Reference:

c:

Braun Intertec Corporation

Thomas L. Henkemeyer
Project Manager

Appendix E - Survey Verification Data

Survey Verification Data Tabulation
Survey Verification Drawings

Survey Verification Data Tabulation

Pond 3 South Survey Tabulation

Verification Point No.	Northing	Easting	Finished Grade Elevation	(A)	(B)	(C)	(D)	(E)
				Random		Finished Grade		
				As-Built Elevation	Description	As-Built Elevation	Thickness, ft (B-A)	Finished Grade Description
250	862,368.14	2,030,784.88	999.50	998.93	random	1000.44	1.51	diversion berm
251	862,410.34	2,030,796.38	999.00	998.48	random	999.15	0.67	topsoil
271	863,084.58	2,031,985.60	999.00	998.44	random	998.95	0.51	class 5
272	863,122.86	2,031,985.60	999.00	998.42	random	998.99	0.57	class 5
278	863,161.14	2,031,985.60	999.00	998.45	random	998.98	0.52	class 5
279	862,412.33	2,030,801.62	999.00	998.54	random	999.09	0.55	topsoil grade break
280	862,415.89	2,030,892.24	999.00	998.44	random	999.04	0.59	topsoil grade break
281	862,415.54	2,030,896.57	999.00	998.41	random	998.93	0.52	class 5
282	862,417.65	2,030,937.18	999.00	998.43	random	998.96	0.52	class 5
283	862,367.87	2,030,841.97	999.50	998.91	random	999.41	0.50	topsoil
284	862,367.61	2,030,899.05	999.50	998.94	random	999.50	0.56	topsoil grade break
285	862,422.65	2,031,033.56	999.00	998.49	random	999.02	0.53	topsoil grade break
286	862,427.66	2,031,129.93	999.00	998.43	random	998.98	0.55	topsoil grade break
287	862,432.66	2,031,226.30	999.00	998.41	random	998.96	0.55	topsoil grade break
288	862,437.67	2,031,322.68	999.00	998.40	random	998.94	0.53	topsoil grade break
289	862,442.67	2,031,419.05	999.00	998.41	random	998.96	0.55	topsoil grade break
290	862,447.68	2,031,515.42	999.00	998.41	random	998.97	0.56	topsoil grade break
291	862,452.68	2,031,611.80	999.00	998.43	random	998.97	0.53	topsoil grade break
292	862,457.68	2,031,708.17	999.00	998.47	random	998.98	0.51	topsoil
293	862,462.69	2,031,804.54	999.00	998.47	random	999.03	0.56	topsoil grade break
294	862,467.69	2,031,900.91	999.00	998.42	random	998.94	0.52	topsoil grade break
295	862,510.03	2,031,943.26	999.00	998.41	random	998.96	0.56	topsoil
296	862,552.38	2,031,985.60	999.00	998.47	random	999.02	0.55	topsoil
297	862,641.08	2,031,985.60	999.00	998.44	random	998.96	0.52	topsoil grade break
298	862,729.78	2,031,985.60	999.00	998.52	random	999.03	0.51	topsoil
299	862,818.48	2,031,985.60	999.00	998.46	random	998.97	0.51	topsoil
300	862,907.18	2,031,985.60	999.00	998.48	random	999.02	0.54	topsoil grade break
301	862,995.88	2,031,985.60	999.00	998.45	random	999.00	0.55	topsoil grade break
302	863,199.42	2,031,985.60	999.00	998.45	random	998.97	0.52	class 5
303	863,246.45	2,031,985.60	999.00	998.54	random	999.07	0.54	class 5
304	863,293.48	2,031,985.60	999.00	998.44	random	998.98	0.54	class 5
305	863,340.50	2,031,985.60	999.00	998.52	random	999.11	0.59	class 5
306	863,387.53	2,031,985.60	999.00	998.46	random	999.05	0.59	class 5
307	862,372.43	2,030,992.03	999.50	998.91	random	999.44	0.53	topsoil grade break
308	862,377.26	2,031,085.01	999.50	998.92	random	999.43	0.51	topsoil grade break
309	862,382.09	2,031,177.99	999.50	998.91	random	999.42	0.50	topsoil grade break

Elevation Tolerances:
SG: +/-0.1 foot.
Thickness Tolerances:
GDM: -0.0, to +0.1 feet
Topsoil: -0.0, to +0.1 feet
Random Fill: +/- 0.1
Class 5: -0.0 to +0.1 feet

Pond 3 South Survey Tabulation

Verification Point No.	Northing	Easting	Finished Grade Elevation	(A)	(B)	(C)	(D)	(E)
				Random		Finished Grade		
				As-Built Elevation	Description	As-Built Elevation	Thickness, ft (B-A)	Finished Grade Description
310	862,386.92	2,031,270.97	999.50	998.90	random	999.41	0.51	topsoil grade break
311	862,391.75	2,031,363.95	999.50	998.95	random	999.48	0.53	topsoil grade break
312	862,396.57	2,031,456.93	999.50	998.94	random	999.47	0.54	topsoil grade break
313	862,401.40	2,031,549.90	999.50	998.92	random	999.43	0.51	topsoil grade break
314	862,406.23	2,031,642.88	999.50	998.92	random	999.46	0.54	topsoil grade break
315	862,411.06	2,031,735.86	999.50	998.92	random	999.44	0.53	topsoil grade break
316	862,415.88	2,031,828.84	999.50	998.96	random	999.46	0.51	topsoil grade break
317	862,420.71	2,031,921.82	999.50	998.94	random	999.47	0.53	topsoil grade break
318	862,425.37	2,031,983.04	999.92	999.34	random	999.91	0.57	topsoil grade break
319	862,426.34	2,031,995.32	1,000.00	999.42	random	1000.04	0.62	topsoil
320	862,436.78	2,032,020.65	1,000.11	999.52	random	1000.03	0.51	topsoil grade break
321	862,462.84	2,032,031.82	1,000.00	999.44	random	999.99	0.54	topsoil grade break
322	862,474.45	2,032,032.12	999.92	999.41	random	999.93	0.51	topsoil grade break
323	862,476.60	2,031,977.71	999.50	998.94	random	999.47	0.53	topsoil
324	862,532.50	2,032,033.60	999.50	998.91	random	999.44	0.53	topsoil grade break
325	862,631.05	2,032,033.60	999.50	998.94	random	999.50	0.56	topsoil grade break
326	862,729.60	2,032,033.60	999.50	998.98	random	999.53	0.55	topsoil grade break
327	862,828.15	2,032,033.60	999.50	998.96	random	999.52	0.56	topsoil grade break
328	862,926.70	2,032,033.60	999.50	998.94	random	999.45	0.51	topsoil grade break
329	863,025.25	2,032,033.60	999.50	998.98	random	999.52	0.54	topsoil grade break
330	863,123.80	2,032,033.60	999.50	998.91	random	999.42	0.51	topsoil
331	863,222.35	2,032,033.60	999.50	998.94	random	999.51	0.57	topsoil grade break
332	863,320.90	2,032,033.60	999.50	998.96	random	999.49	0.54	topsoil grade break
333	863,419.45	2,032,033.60	999.50	998.91	random	999.42	0.52	topsoil grade break
334	863,518.00	2,032,033.60	999.50	998.95	random	999.55	0.60	topsoil grade break
335	863,616.55	2,032,033.60	999.50	998.91	random	999.45	0.54	FG
336	863,620.21	2,032,033.60	999.50	998.92	random	999.43	0.51	FG
337	863,434.56	2,031,985.60	999.00	998.50	random	999.03	0.53	class 5
338	863,481.59	2,031,985.60	999.00	998.48	random	999.07	0.59	class 5
339	863,528.62	2,031,985.60	999.00	998.51	random	999.02	0.52	class 5
340	863,575.64	2,031,985.60	999.00	998.50	random	999.05	0.55	class 5
341	863,622.67	2,031,985.60	999.00	998.46	random	999.14	0.68	class 5
342	863,622.67	2,032,010.60	999.26	998.71	random	999.25	0.53	class 5
343	863,573.75	2,032,010.60	999.26	998.70	random	999.28	0.58	class 5
344	863,524.84	2,032,010.60	999.26	998.71	random	999.23	0.52	class 5
345	863,475.92	2,032,010.60	999.26	998.72	random	999.24	0.52	class 5

Elevation Tolerances:
SG: +/-0.1 foot.
Thickness Tolerances:
GDM: -0.0, to +0.1 feet
Topsoil: -0.0, to +0.1 feet
Random Fill: +/- 0.1
Class 5: -0.0 to +0.1 feet

Pond 3 South Survey Tabulation

Verification Point No.	Northing	Easting	Finished Grade Elevation	(A)	(B)	(C)	(D)	(E)
				Random		Finished Grade		
				As-Built Elevation	Description	As-Built Elevation	Thickness, ft (B-A)	Finished Grade Description
346	863,427.00	2,032,010.60	999.26	998.73	random	999.26	0.53	class 5
347	863,378.08	2,032,010.60	999.26	998.71	random	999.33	0.62	class 5
348	863,329.17	2,032,010.60	999.26	998.67	random	999.29	0.63	class 5
349	863,280.25	2,032,010.60	999.26	998.68	random	999.27	0.59	class 5
350	863,231.33	2,032,010.60	999.26	998.67	random	999.32	0.65	class 5
351	863,182.41	2,032,010.60	999.26	998.67	random	999.29	0.62	class 5
352	862,421.66	2,030,800.96	995.32	997.61	random on ramp	996.16	0.54	topsoil
353	862,426.83	2,030,900.51	995.32	994.79	random inside toe	996.82	2.03	BA ramp
354	862,432.00	2,031,000.07	995.32	995.35	random toe at BA Pile	997.92	2.58	BA ramp
355	862,437.17	2,031,099.63	995.32	994.90	random inside toe	995.42	0.52	topsoil
356	862,442.34	2,031,199.19	995.32	994.89	random inside toe	995.39	0.50	topsoil
357	862,447.51	2,031,298.75	995.32	994.85	random inside toe	995.38	0.53	topsoil
358	862,452.68	2,031,398.30	995.32	994.85	random inside toe	995.37	0.52	topsoil
359	862,457.85	2,031,497.86	995.32	994.86	random inside toe	995.38	0.53	topsoil
360	862,463.02	2,031,597.42	995.32	994.81	random inside toe	995.32	0.51	topsoil
361	862,468.19	2,031,696.98	995.32	994.82	random inside toe	995.35	0.52	topsoil
362	862,473.36	2,031,796.53	995.32	994.76	random inside toe	995.28	0.51	topsoil
363	862,478.53	2,031,896.09	995.32	994.84	random inside toe	995.45	0.61	topsoil
364	862,517.75	2,031,935.31	995.32	994.80	random inside toe	995.33	0.53	topsoil
365	862,556.96	2,031,974.53	995.32	994.76	random inside toe	995.42	0.66	topsoil
366	862,652.28	2,031,974.53	995.32	994.84	random inside toe	995.35	0.51	topsoil
367	862,747.60	2,031,974.53	995.32	994.75	random inside toe	995.28	0.53	topsoil
368	862,842.91	2,031,974.53	995.32	994.81	random inside toe	995.32	0.51	topsoil
369	862,938.23	2,031,974.53	995.32	994.73	random inside toe	995.24	0.51	topsoil
370	863,033.55	2,031,974.53	995.32	994.92	random inside toe	995.44	0.53	topsoil
371	863,133.50	2,032,010.60	999.26	998.68	random	999.28	0.60	class 5
372	863,084.58	2,032,010.60	999.26	998.71	random	999.23	0.52	class 5
373	863,250.43	2,031,974.53	995.32	994.91	random inside toe	995.42	0.51	topsoil
374	863,343.03	2,031,974.53	995.32	994.85	random inside toe	995.38	0.53	topsoil
375	863,435.63	2,031,974.53	995.32	994.83	random inside toe	995.35	0.52	topsoil
376	863,528.23	2,031,974.53	995.32	994.75	random inside toe	995.25	0.50	topsoil
377	863,620.83	2,031,974.53	995.32	994.90	random inside toe	995.43	0.52	topsoil
378	862,354.88	2,030,830.15	995.00	994.49	random	995.44	0.96	topsoil thick
379	862,354.56	2,030,899.36	995.00	994.44	random	995.02	0.59	topsoil
380	862,359.41	2,030,992.95	995.00	994.47	random	995.02	0.55	topsoil
381	862,361.33	2,031,085.83	994.00	993.42	random	993.99	0.57	topsoil

Elevation Tolerances:
SG: +/-0.1 foot.
Thickness Tolerances:
GDM: -0.0, to +0.1 feet
Topsoil: -0.0, to +0.1 feet
Random Fill: +/- 0.1
Class 5: -0.0 to +0.1 feet

Pond 3 South Survey Tabulation

Verification Point No.	Northing	Easting	Finished Grade Elevation	(A)	(B)	(C)	(D)	(E)
				Random		Finished Grade		
				As-Built Elevation	Description	As-Built Elevation	Thickness, ft (B-A)	Finished Grade Description
382	862,369.07	2,031,178.93	995.00	994.40	random	994.98	0.58	topsoil
383	862,373.92	2,031,272.36	995.00	994.45	random	994.99	0.54	topsoil
384	862,378.74	2,031,365.07	995.00	994.45	random	994.99	0.54	topsoil
385	862,383.54	2,031,457.56	995.00	994.45	random	994.98	0.53	topsoil
386	862,388.40	2,031,551.25	995.00	994.44	random	995.04	0.60	topsoil
387	862,393.23	2,031,644.18	995.00	994.42	random	994.95	0.54	topsoil
388	862,398.03	2,031,736.57	995.00	994.50	random	995.03	0.52	topsoil
389	862,402.87	2,031,829.87	995.00	994.41	random	995.07	0.66	topsoil
390	862,407.81	2,031,922.64	995.04	994.45	random	995.02	0.57	topsoil
391	862,411.07	2,031,982.71	995.00	994.43	random	994.95	0.52	topsoil
392	862,428.83	2,032,032.97	995.05	994.56	random	995.08	0.52	topsoil
393	862,461.97	2,032,046.06	995.09	994.61	random	995.24	0.63	topsoil
394	862,532.33	2,032,046.60	995.02	994.44	random	994.97	0.53	topsoil
395	862,631.29	2,032,046.66	995.00	994.42	random	994.97	0.54	topsoil
396	862,729.48	2,032,046.65	995.00	994.43	random	994.97	0.53	topsoil
397	862,828.15	2,032,046.59	995.02	994.50	random	995.04	0.54	topsoil
398	862,926.70	2,032,046.54	995.04	994.52	random	995.04	0.51	topsoil
399	863,025.33	2,032,046.65	995.00	994.45	random	994.98	0.53	topsoil
400	863,073.36	2,032,064.05	989.00	out of construction limits				
401	863,123.79	2,032,046.65	995.00	994.51	random	995.03	0.53	topsoil
402	863,222.49	2,032,046.65	995.00	994.42	random	994.98	0.56	topsoil
403	863,320.80	2,032,046.65	995.00	994.44	random	994.99	0.55	topsoil
404	863,419.45	2,032,046.66	995.00	994.42	random	994.96	0.54	topsoil
405	863,518.00	2,032,046.56	995.03	994.55	random	995.07	0.52	topsoil
406	863,567.28	2,032,037.59	998.12	997.54	random	998.09	0.55	topsoil
541	862,420.35	2,030,989.12	999.00	998.46	random	998.99	0.53	class 5
555	862,413.92	2,030,842.28	999.00	998.49	random	999.07	0.58	class 5
556	862,386.93	2,030,792.00	999.26	998.83	random	999.49	0.66	class 5
557	862,389.05	2,030,841.81	999.26	998.76	random	999.33	0.57	class 5
558	862,391.18	2,030,891.63	999.26	998.73	random	999.30	0.57	class 5
559	862,393.30	2,030,941.44	999.26	998.68	random	999.23	0.55	class 5
560	862,395.42	2,030,991.26	999.26	998.69	random	999.25	0.56	class 5

Elevation Tolerances:
SG: +/-0.1 foot.
Thickness Tolerances:
GDM: -0.0, to +0.1 feet
Topsoil: -0.0, to +0.1 feet
Random Fill: +/- 0.1
Class 5: -0.0 to +0.1 feet

*Clay Thicknesses less than 5.0 feet are from existing points constructed higher than elevation 990. Rather than excavate good clay, an As-built elevation was used.

Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
1	2,030,801.62	862,404.33	995	FIN2	862,404.32	2,030,801.64	994.98	862,404.34	2,030,801.60	995.68		
2	2,030,801.28	862,396.31	995	FIN1	862,396.27	2,030,801.24	995.06	862,396.29	2,030,801.25	996.22		8
3	2,030,833.00	862,405.56	995	SG3/FIN2	862,405.59	2,030,833.06	994.97	862,405.64	2,030,833.08	995.47		
4	2,030,832.84	862,401.80	992.5	SG2	862,401.85	2,030,832.86	992.37					
5	2,030,832.66	862,397.54	995	FIN1				862,397.60	2,030,832.69	995.16		
6	2,030,832.50	862,393.78	992.5	SG1	862,393.74	2,030,832.49	992.38	862,393.74	2,030,832.52	993.86	2.78	8.0
7	2,030,863.12	862,406.74	995	SG3/FIN2	862,406.74	2,030,863.01	995.05	862,406.76	2,030,863.09	995.06		
8	2,030,863.41	862,399.32	990	SG2	862,399.26	2,030,863.47	989.99					
9	2,030,863.43	862,398.75	995	FIN1				862,398.77	2,030,863.48	995.10		
10	2,030,863.73	862,391.25	990	SG1	862,391.23	2,030,863.80	989.95	862,391.22	2,030,863.76	990.53	5.15	8.0
11	2,030,900.38	862,408.20	995	SG3/FIN2	862,408.16	2,030,900.39	994.98	862,408.17	2,030,900.34	995.14		
12	2,030,900.68	862,400.71	990	SG2	862,400.74	2,030,900.63	990.06					
13	2,030,900.70	862,400.21	995	FIN1				862,400.23	2,030,900.75	995.07		
14	2,030,900.99	862,392.71	990	SG1	862,392.82	2,030,901.01	989.81	862,392.64	2,030,900.99	990.10	5.26	7.9
15	2,030,937.60	862,409.66	995	SG3/FIN2	862,409.63	2,030,937.55	994.86	862,409.64	2,030,937.57	995.05		
16	2,030,937.89	862,402.17	990	SG2	862,402.26	2,030,937.93	990.01					
17	2,030,937.91	862,401.67	995	FIN1				862,401.68	2,030,937.91	995.06		
18	2,030,938.25	862,394.17	990	SG1	862,394.21	2,030,938.29	989.82	862,394.14	2,030,938.32	990.11	5.24	8.0
19	2,030,987.38	862,412.25	995	SG3/FIN2	862,412.26	2,030,987.35	994.90	862,412.28	2,030,987.39	995.01		
20	2,030,987.77	862,404.76	990	SG2	862,404.82	2,030,987.76	989.79					
21	2,030,987.80	862,404.26	995	FIN1				862,404.30	2,030,987.77	995.04		
22	2,030,988.19	862,396.77	990	SG1	862,396.82	2,030,988.13	989.91	862,396.75	2,030,988.24	990.04	5.12	8.0
23	2,031,037.32	862,414.84	995	SG3/FIN2	862,414.87	2,031,037.32	994.91	862,414.87	2,031,037.34	995.04		
24	2,031,037.70	862,407.35	990	SG2	862,407.40	2,031,037.74	990.05					
25	2,031,037.73	862,406.85	995	FIN1				862,406.85	2,031,037.72	995.10		
26	2,031,038.12	862,399.36	990	SG1	862,399.29	2,031,038.16	989.92	862,399.28	2,031,038.17	990.03	5.18	8.0
27	2,031,087.25	862,417.43	995	SG3/FIN2	862,417.45	2,031,087.28	995.02	862,417.47	2,031,087.23	995.08		
28	2,031,087.64	862,409.94	990	SG2	862,409.97	2,031,087.65	990.31					
29	2,031,087.66	862,409.44	995	FIN1				862,409.39	2,031,087.69	995.03		
30	2,031,088.05	862,401.95	990	SG1	862,401.95	2,031,088.03	990.03	862,401.93	2,031,088.05	990.09	5.00	8.1
31	2,031,137.18	862,420.02	995	SG3/FIN2	862,420.05	2,031,137.24	994.92	862,420.09	2,031,137.19	995.02		
32	2,031,137.57	862,412.53	990	SG2	862,412.48	2,031,137.62	989.90					
33	2,031,137.60	862,412.04	995	FIN1				862,412.09	2,031,137.61	995.10		
34	2,031,137.99	862,404.55	990	SG1	862,404.49	2,031,137.98	989.93	862,404.53	2,031,137.95	990.06	5.17	8.0

Note: Clay widths less than 8 feet were caused by the registered surveyor incorrectly recording the clay breakline at locations FIN1. All clay was constructed 8 feet or thicker.

*Clay Thicknesses less than 5.0 feet are from existing points constructed higher than elevation 990. Rather than excavate good clay, an As-built elevation was used.

Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
35	2,031,187.11	862,422.62	995	SG3/FIN2	862,423.22	2,031,187.09	994.92	862,422.56	2,031,187.14	995.06		
36	2,031,187.50	862,415.13	990	SG2	862,415.13	2,031,187.52	989.80					
37	2,031,187.53	862,414.63	995	FIN1				862,414.64	2,031,187.49	995.10		
38	2,031,187.92	862,407.14	990	SG1	862,407.09	2,031,187.92	989.92	862,407.09	2,031,187.87	990.03	5.18	8.6
39	2,031,237.05	862,425.21	995	SG3/FIN2	862,425.14	2,031,237.05	994.96	862,425.22	2,031,237.07	995.02		
40	2,031,237.44	862,417.72	990	SG2	862,417.71	2,031,237.46	989.97					
41	2,031,237.46	862,417.22	995	FIN1				862,417.26	2,031,237.40	995.02		
42	2,031,237.85	862,409.73	990	SG1	862,409.72	2,031,237.82	989.92	862,409.70	2,031,237.82	990.04	5.10	7.9
43	2,031,286.98	862,427.80	995	SG3/FIN2	862,427.82	2,031,286.93	994.95	862,427.73	2,031,286.97	995.08		
44	2,031,287.37	862,420.31	990	SG2	862,420.36	2,031,287.38	989.78					
45	2,031,287.39	862,419.81	995	FIN1				862,419.84	2,031,287.41	995.01		
46	2,031,287.78	862,412.32	990	SG1	862,412.34	2,031,287.84	990.00	862,412.26	2,031,287.75	990.05	5.02	8.0
47	2,031,336.91	862,430.40	995	SG3/FIN2	862,430.40	2,031,336.95	994.92	862,430.38	2,031,336.90	995.02		
48	2,031,337.30	862,422.91	990	SG2	862,422.94	2,031,337.31	990.12					
49	2,031,337.33	862,422.41	995	FIN1				862,422.35	2,031,337.40	995.03		
50	2,031,337.72	862,414.92	990	SG1	862,414.93	2,031,337.69	990.03	862,414.87	2,031,337.74	990.02	5.00	8.1
51	2,031,386.85	862,432.99	995	SG3/FIN2	862,432.96	2,031,386.87	994.92	862,433.01	2,031,386.85	995.02		
52	2,031,387.23	862,425.50	990	SG2	862,425.56	2,031,387.27	990.19					
53	2,031,387.26	862,425.00	995	FIN1				862,424.99	2,031,387.28	995.05		
54	2,031,387.65	862,417.51	990	SG1	862,417.45	2,031,387.65	989.95	862,417.49	2,031,387.71	990.03	5.10	8.0
55	2,031,436.78	862,435.58	995	SG3/FIN2	862,435.58	2,031,436.74	994.95	862,435.64	2,031,436.86	995.13		
56	2,031,437.17	862,428.09	990	SG2	862,428.15	2,031,437.19	989.74					
57	2,031,437.19	862,427.59	995	FIN1				862,427.60	2,031,437.10	995.02		
58	2,031,437.58	862,420.10	990	SG1	862,420.14	2,031,437.51	989.94	862,420.09	2,031,437.63	990.12	5.08	8.0
59	2,031,486.71	862,438.17	995	SG3/FIN2	862,438.16	2,031,486.71	994.93	862,438.20	2,031,486.72	995.17		
60	2,031,487.10	862,430.68	990	SG2	862,430.71	2,031,487.14	990.08					
61	2,031,487.13	862,430.18	995	FIN1				862,430.21	2,031,487.16	995.03		
62	2,031,487.51	862,422.69	990	SG1	862,422.76	2,031,487.49	989.92	862,422.66	2,031,487.47	990.13	5.11	8.0
63	2,031,536.64	862,440.77	995	SG3/FIN2	862,440.78	2,031,536.65	994.92	862,440.77	2,031,536.64	995.02		
64	2,031,537.03	862,433.28	990	SG2	862,433.31	2,031,537.03	990.04					
65	2,031,537.06	862,432.78	995	FIN1				862,432.80	2,031,537.05	995.02		
66	2,031,537.45	862,425.29	990	SG1	862,425.28	2,031,537.45	989.86	862,425.26	2,031,537.47	990.13	5.17	8.0
67	2,031,586.58	862,443.36	995	SG3/FIN2	862,443.35	2,031,586.56	994.90	862,443.36	2,031,586.58	995.03		
68	2,031,586.96	862,435.87	990	SG2	862,435.88	2,031,586.96	990.06					
69	2,031,586.99	862,435.37	995	FIN1				862,435.36	2,031,586.98	995.03		
70	2,031,587.38	862,427.88	990	SG1	862,427.85	2,031,587.37	989.94	862,427.87	2,031,587.42	990.10	5.10	8.0

Note: Clay widths less than 8 feet were caused by the registered surveyor incorrectly recording the clay breakline at locations FIN1. All clay was constructed 8 feet or thicker.

*Clay Thicknesses less than 5.0 feet are from existing points constructed higher than elevation 990. Rather than excavate good clay, an As-built elevation was used.

Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
71	2,031,636.51	862,445.95	995	SG3/FIN2	862,445.92	2,031,636.47	994.96	862,445.94	2,031,636.60	995.15		
72	2,031,636.90	862,438.46	990	SG2	862,438.52	2,031,636.85	989.95					
73	2,031,636.92	862,437.96	995	FIN1				862,438.00	2,031,636.94	995.03		
74	2,031,637.31	862,430.47	990	SG1	862,430.51	2,031,637.29	989.72	862,430.40	2,031,637.35	990.04	5.31	7.9
75	2,031,686.44	862,448.54	995	SG3/FIN2	862,448.57	2,031,686.44	994.99	862,448.53	2,031,686.42	995.09		
76	2,031,686.83	862,441.05	990	SG2	862,441.10	2,031,686.80	989.77					
77	2,031,686.86	862,440.56	995	FIN1				862,440.55	2,031,686.92	995.08		
78	2,031,687.25	862,433.07	990	SG1	862,433.04	2,031,687.21	989.73	862,433.05	2,031,687.29	990.16	5.35	8.0
79	2,031,736.37	862,451.14	995	SG3/FIN2	862,451.18	2,031,736.43	995.02	862,451.12	2,031,736.37	995.06		
80	2,031,736.76	862,443.65	990	SG2	862,443.68	2,031,736.78	990.03					
81	2,031,736.79	862,443.15	995	FIN1				862,443.17	2,031,736.80	995.03		
82	2,031,737.18	862,435.66	990	SG1	862,435.63	2,031,737.22	989.95	862,435.62	2,031,737.22	990.09	5.08	8.0
83	2,031,786.31	862,453.73	995	SG3/FIN2	862,453.70	2,031,786.33	995.06	862,453.72	2,031,786.28	995.03		
84	2,031,786.70	862,446.24	990	SG2	862,446.22	2,031,786.73	990.16					
85	2,031,786.72	862,445.74	995	FIN1				862,445.74	2,031,786.74	995.01		
86	2,031,787.11	862,438.25	990	SG1	862,438.23	2,031,787.06	990.03	862,438.18	2,031,787.17	990.03	4.98	8.0
87	2,031,836.24	862,456.32	995	SG3/FIN2	862,456.34	2,031,836.21	994.91	862,456.33	2,031,836.22	995.04		
88	2,031,836.63	862,448.83	990	SG2	862,448.87	2,031,836.59	990.03					
89	2,031,836.65	862,448.33	995	FIN1				862,448.40	2,031,836.62	995.13		
90	2,031,837.04	862,440.84	990	SG1	862,440.85	2,031,837.09	989.96	862,440.86	2,031,837.10	990.17	5.17	8.0
91	2,031,886.17	862,458.92	995	SG3/FIN2	862,458.95	2,031,886.23	995.02	862,458.92	2,031,886.14	995.00		
92	2,031,886.56	862,451.43	990	SG2	862,451.44	2,031,886.58	990.16					
93	2,031,886.59	862,450.93	995	FIN1				862,451.00	2,031,886.63	995.05		
94	2,031,886.98	862,443.44	990	SG1	862,443.41	2,031,886.98	990.03	862,442.03	2,031,887.03	990.14	5.02	8.0
95	2,031,904.40	862,459.86	995	SG3/FIN2	862,460.24	2,031,903.20	994.96	862,459.89	2,031,904.37	995.10		
96	2,031,907.66	862,452.52	990	SG2	862,452.52	2,031,907.67	990.15					
97	2,031,907.88	862,452.03	995	FIN1				862,452.06	2,031,907.89	995.19		
98	2,031,911.15	862,444.69	990	SG1	862,444.70	2,031,911.12	989.94	862,444.62	2,031,911.21	990.49	5.25	9.4
99	2,031,932.35	862,487.81	995	SG3/FIN2	862,487.83	2,031,932.33	994.92	862,487.79	2,031,932.32	995.02		
100	2,031,937.73	862,482.59	990	SG2	862,482.61	2,031,937.70	989.86					
101	2,031,938.09	862,482.24	995	FIN1				862,482.28	2,031,938.08	995.04		
102	2,031,943.47	862,477.02	990	SG1	862,476.96	2,031,943.51	990.02	862,476.05	2,031,943.52	990.85	5.02	8.0
103	2,031,967.71	862,523.17	995	SG3/FIN2	862,523.18	2,031,967.71	994.94	862,523.23	2,031,967.65	995.15		
104	2,031,973.09	862,517.95	990	SG2	862,517.96	2,031,973.05	990.00					
105	2,031,973.45	862,517.60	995	FIN1				862,517.64	2,031,973.46	995.12		
106	2,031,978.83	862,512.38	990	SG1	862,512.36	2,031,978.90	989.92	862,510.92	2,031,978.88	991.10	5.21	8.0

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Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
107	2,031,993.60	862,549.06	995	SG3/FIN2	862,549.08	2,031,992.46	994.91	862,549.07	2,031,993.58	995.19		
108	2,032,001.10	862,545.96	990	SG2	862,545.98	2,032,001.03	990.19					
109	2,032,001.60	862,545.75	995	FIN1				862,545.79	2,032,001.59	995.06		
110	2,032,009.10	862,542.64	990	SG1	862,542.63	2,032,009.14	990.15	862,542.64	2,032,009.15	991.22	4.91	9.7
111	2,031,993.60	862,592.64	995	SG3/FIN2	862,592.67	2,031,992.98	994.98	862,592.69	2,031,993.54	995.03		
112	2,032,001.10	862,592.64	990	SG2	862,592.64	2,032,001.07	990.01					
113	2,032,001.60	862,592.64	995	FIN1				862,592.67	2,032,001.60	995.16		
114	2,032,009.10	862,592.64	990	SG1	862,592.63	2,032,009.16	989.85	862,592.66	2,032,010.82	991.38	5.31	8.6
115	2,031,993.60	862,642.64	995	SG3/FIN2	862,642.64	2,031,993.57	994.91	862,642.65	2,031,993.61	995.03		
116	2,032,001.10	862,642.64	990	SG2	862,642.59	2,032,001.07	990.14					
117	2,032,001.60	862,642.64	995	FIN1				862,642.66	2,032,001.65	995.08		
118	2,032,009.10	862,642.64	990	SG1	862,642.64	2,032,009.11	990.14	862,642.66	2,032,012.31	991.19	4.94	8.1
119	2,031,993.60	862,692.64	995	SG3/FIN2	862,692.57	2,031,993.55	994.96	862,692.65	2,031,993.55	995.00		
120	2,032,001.10	862,692.64	990	SG2	862,692.62	2,032,001.10	990.00					
121	2,032,001.60	862,692.64	995	FIN1				862,692.73	2,032,001.60	995.09		
122	2,032,009.10	862,692.64	990	SG1	862,692.49	2,032,008.98	989.52	862,692.65	2,032,011.81	990.78	5.57	8.1
123	2,031,993.60	862,742.64	995	SG3/FIN2	862,742.67	2,031,993.50	994.92	862,742.61	2,031,993.51	995.00		
124	2,032,001.10	862,742.64	990	SG2	862,742.63	2,032,001.06	990.12					
125	2,032,001.60	862,742.64	995	FIN1				862,742.60	2,032,001.64	995.03		
126	2,032,009.10	862,742.64	990	SG1	862,742.63	2,032,009.18	989.96	862,742.62	2,032,010.34	991.68	5.07	8.1
127	2,031,993.60	862,792.64	995	SG3/FIN2	862,792.72	2,031,993.63	995.00	862,792.65	2,031,993.54	995.05		
128	2,032,001.10	862,792.64	990	SG2	862,792.68	2,032,001.09	990.12					
129	2,032,001.60	862,792.64	995	FIN1				862,792.61	2,032,001.66	995.12		
130	2,032,009.10	862,792.64	990	SG1	862,792.67	2,032,009.11	989.94	862,792.68	2,032,010.64	991.32	5.18	8.0
131	2,031,993.60	862,842.64	995	SG3/FIN2	862,842.66	2,031,993.61	994.94	862,842.66	2,031,993.59	995.03		
132	2,032,001.10	862,842.64	990	SG2	862,842.64	2,032,001.07	990.11					
133	2,032,001.60	862,842.64	995	FIN1				862,842.67	2,032,001.68	995.04		
134	2,032,009.10	862,842.64	990	SG1	862,842.57	2,032,009.16	989.98	862,842.68	2,032,010.13	991.51	5.06	8.1
135	2,031,993.60	862,892.64	995	SG3/FIN2	862,892.62	2,031,993.58	994.98	862,892.66	2,031,993.53	995.13		
136	2,032,001.10	862,892.64	990	SG2	862,892.62	2,032,001.08	990.01					
137	2,032,001.60	862,892.64	995	FIN1				862,892.70	2,032,001.66	995.09		
138	2,032,009.10	862,892.64	990	SG1	862,892.69	2,032,009.12	990.10	862,892.64	2,032,011.42	990.79	4.99	8.1
139	2,031,993.60	862,942.64	995	SG3/FIN2	862,942.72	2,031,993.67	994.95	862,942.61	2,031,993.58	995.03		
140	2,032,001.10	862,942.64	990	SG2	862,942.66	2,032,001.05	989.83					
141	2,032,001.60	862,942.64	995	FIN1				862,942.69	2,032,001.56	995.01		
142	2,032,009.10	862,942.64	990	SG1	862,942.66	2,032,009.15	989.94	862,942.61	2,032,009.08	990.08	5.08	7.9

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Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
143	2,031,993.60	862,992.64	995	SG3/FIN2	862,992.66	2,031,993.65	995.06	862,992.63	2,031,993.55	995.00		
144	2,032,001.10	862,992.64	990	SG2	862,992.61	2,032,001.08	990.04					
145	2,032,001.60	862,992.64	995	FIN1				862,992.65	2,032,001.65	995.04		
146	2,032,009.10	862,992.64	990	SG1	862,992.65	2,032,009.14	990.00	862,992.65	2,032,009.16	990.15	5.04	8.0
147	2,031,993.60	863,042.64	995	SG3/FIN2	863,042.63	2,031,993.55	995.03	863,042.63	2,031,993.58	995.10		
148	2,032,001.10	863,042.64	990	SG2	863,042.58	2,032,001.03	990.14					
149	2,032,001.60	863,042.64	995	FIN1				863,042.71	2,032,001.63	995.02		
150	2,032,009.10	863,042.64	990	SG1	863,042.63	2,032,009.16	990.03	863,042.61	2,032,009.12	990.20	5.00	8.1
151	2,031,993.60	863,092.64	995	SG3/FIN2	863,092.65	2,031,993.54	994.96	863,092.69	2,031,993.57	995.12		
152	2,032,001.10	863,092.64	990	SG2	863,092.59	2,032,001.12	990.12					
153	2,032,001.60	863,092.64	995	FIN1				863,092.66	2,032,001.58	995.13		
154	2,032,009.10	863,092.64	990	SG1	863,092.55	2,032,009.15	990.11	863,092.64	2,032,009.15	990.04	5.02	8.0
155	2,031,993.60	863,142.64	995	SG3/FIN2	863,142.63	2,031,993.67	994.92	863,142.69	2,031,993.55	995.16		
156	2,032,001.10	863,142.64	990	SG2	863,142.73	2,032,001.13	990.07					
157	2,032,001.60	863,142.64	995	FIN1				863,142.76	2,032,001.62	995.09		
158	2,032,009.10	863,142.64	990	SG1	863,142.59	2,032,009.17	989.93	863,142.62	2,032,009.14	990.07	5.16	7.9
159	2,031,993.60	863,192.64	995	SG3/FIN2	863,192.60	2,031,993.46	994.92	863,192.60	2,031,993.56	995.03		
160	2,032,001.10	863,192.64	990	SG2	863,192.65	2,032,001.04	990.25					
161	2,032,001.60	863,192.64	995	FIN1				863,192.70	2,032,001.57	995.01		
162	2,032,009.10	863,192.64	990	SG1	863,192.56	2,032,009.19	990.10	863,192.67	2,032,009.18	990.14	4.91	8.1
163	2,031,993.60	863,242.64	995	SG3/FIN2	863,242.62	2,031,993.55	995.00	863,242.59	2,031,993.59	995.05		
164	2,032,001.10	863,242.64	990	SG2	863,242.62	2,032,001.16	990.29					
165	2,032,001.60	863,242.64	995	FIN1				863,242.57	2,032,001.63	995.03		
166	2,032,009.10	863,242.64	990	SG1	863,242.67	2,032,009.11	990.21	863,242.62	2,032,009.17	990.20	4.83	8.1
167	2,031,993.60	863,292.64	995	SG3/FIN2	863,292.66	2,031,993.53	994.90	863,292.62	2,031,993.53	995.18		
168	2,032,001.10	863,292.64	990	SG2	863,292.70	2,032,001.13	990.22					
169	2,032,001.60	863,292.64	995	FIN1				863,292.70	2,032,001.58	995.03		
170	2,032,009.10	863,292.64	990	SG1	863,292.65	2,032,009.16	990.17	863,292.63	2,032,009.12	990.19	4.86	8.1
171	2,031,993.60	863,342.64	995	SG3/FIN2	863,342.68	2,031,993.31	994.97	863,342.65	2,031,993.56	995.08		
172	2,032,001.10	863,342.64	990	SG2	863,342.63	2,032,001.08	990.22					
173	2,032,001.60	863,342.64	995	FIN1				863,342.60	2,032,001.63	995.10		
174	2,032,009.10	863,342.64	990	SG1	863,342.72	2,032,009.18	989.84	863,342.70	2,032,009.16	990.17	5.26	8.3
175	2,031,993.60	863,392.64	995	SG3/FIN2	863,392.64	2,031,993.60	994.94	863,392.68	2,031,993.57	995.04		
176	2,032,001.10	863,392.64	990	SG2	863,392.54	2,032,001.17	990.19					
177	2,032,001.60	863,392.64	995	FIN1				863,392.69	2,032,001.64	995.03		
178	2,032,009.10	863,392.64	990	SG1	863,392.71	2,032,009.22	990.12	863,392.64	2,032,009.13	990.20	4.91	8.0

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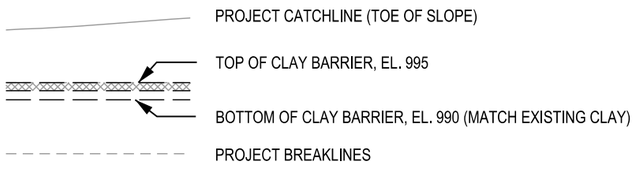
Pond 3S Clay Barrier Verification

Verification Point No.	Easting (Design)	Northing (Design)	Elevation (Design)	Location Description	As-built Subgrade Survey			As-Built Final Survey			Clay Thickness (5' MIN) (FIN1-SG1 or SG2)	Clay Width (8' MIN) (FIN1 - SG3)
					Northing	Easting	Elevation	Northing	Easting	Elevation		
179	2,031,993.60	863,442.64	995	SG3/FIN2	863,442.68	2,031,993.14	994.88	863,442.67	2,031,993.54	995.05		
180	2,032,001.10	863,442.64	990	SG2	863,442.62	2,032,001.07	990.19					
181	2,032,001.60	863,442.64	995	FIN1				863,442.67	2,032,001.64	995.01		
182	2,032,009.10	863,442.64	990	SG1	863,442.61	2,032,009.07	990.07	863,442.68	2,032,009.12	990.07	4.95	8.5
183	2,031,993.60	863,492.64	995	SG3/FIN2	863,492.59	2,031,993.24	994.96	863,492.59	2,031,993.56	995.01		
184	2,032,001.10	863,492.64	990	SG2	863,492.68	2,032,001.14	990.28					
185	2,032,001.60	863,492.64	995	FIN1				863,492.62	2,032,001.63	995.00		
186	2,032,009.10	863,492.64	990	SG1	863,492.64	2,032,009.07	990.07	863,492.62	2,032,009.12	990.13	4.94	8.4
187	2,031,993.60	863,542.64	995	SG3/FIN2	863,542.62	2,031,992.91	994.90	863,542.67	2,031,993.59	995.04		
188	2,032,001.10	863,542.64	990	SG2	863,542.67	2,031,999.88	991.00					
189	2,032,001.60	863,542.64	995	FIN1				863,542.74	2,032,001.54	995.04		
190	2,032,009.10	863,542.64	990	SG1	863,542.69	2,032,009.11	991.02	863,542.62	2,032,009.16	990.64	4.02	8.6
191	2,031,993.60	863,559.26	995	SG3/FIN2	863,559.24	2,031,992.46	995.06	863,559.18	2,031,993.56	995.13		
192	2,032,001.10	863,559.26	990	SG2	863,559.30	2,032,000.31	990.67					
193	2,032,001.60	863,559.26	995	FIN1				863,559.26	2,032,001.63	995.00		
194	2,032,009.10	863,559.26	990	SG1	863,559.28	2,032,009.16	990.60	863,559.25	2,032,009.16	990.66	4.40	9.2
195	2,031,993.60	863,589.58	995	SG3/FIN2	863,589.60	2,031,993.05	995.08	863,589.57	2,031,993.57	995.18		
196	2,031,997.38	863,589.81	992.4806	SG2	863,589.79	2,031,997.33	992.40					
197	2,032,001.60	863,590.06	995	FIN1				863,590.04	2,032,001.62	995.02		
198	2,032,005.35	863,590.29	992.5	SG1	863,590.25	2,032,005.39	992.42	863,590.31	2,032,005.71	992.54	2.60	8.6
199	2,031,993.60	863,620.83	995	FIN2	863,620.96	2,031,993.67	995.00	863,620.86	2,031,993.59	996.06		
200	2,032,001.60	863,621.31	995	FIN1	863,621.32	2,032,001.65	994.92	863,621.33	2,032,001.65	996.17		

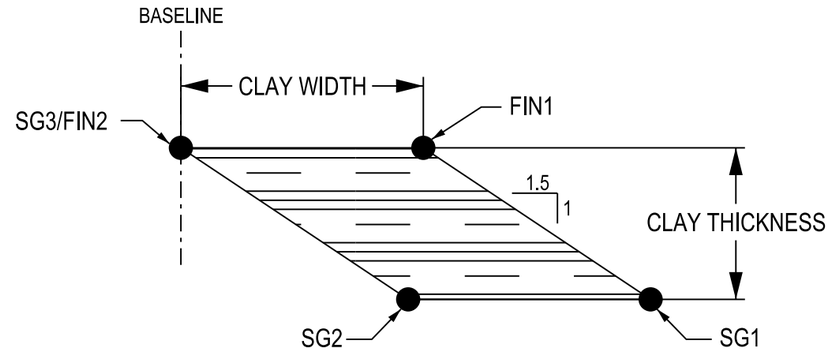
Note: Clay widths less than 8 feet were caused by the registered surveyor incorrectly recording the clay breakline at locations FIN1. All clay was constructed 8 feet or thicker.

Survey Verification Drawings

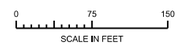


SOUTH EMBANKMENT VERIFICATION POINTS
SEE SECTION 2

EAST EMBANKMENT VERFICATION POINTS
SEE SECTION 2



SECTION: CLAY BARRIER SURVEY VERIFICATION (2/1)



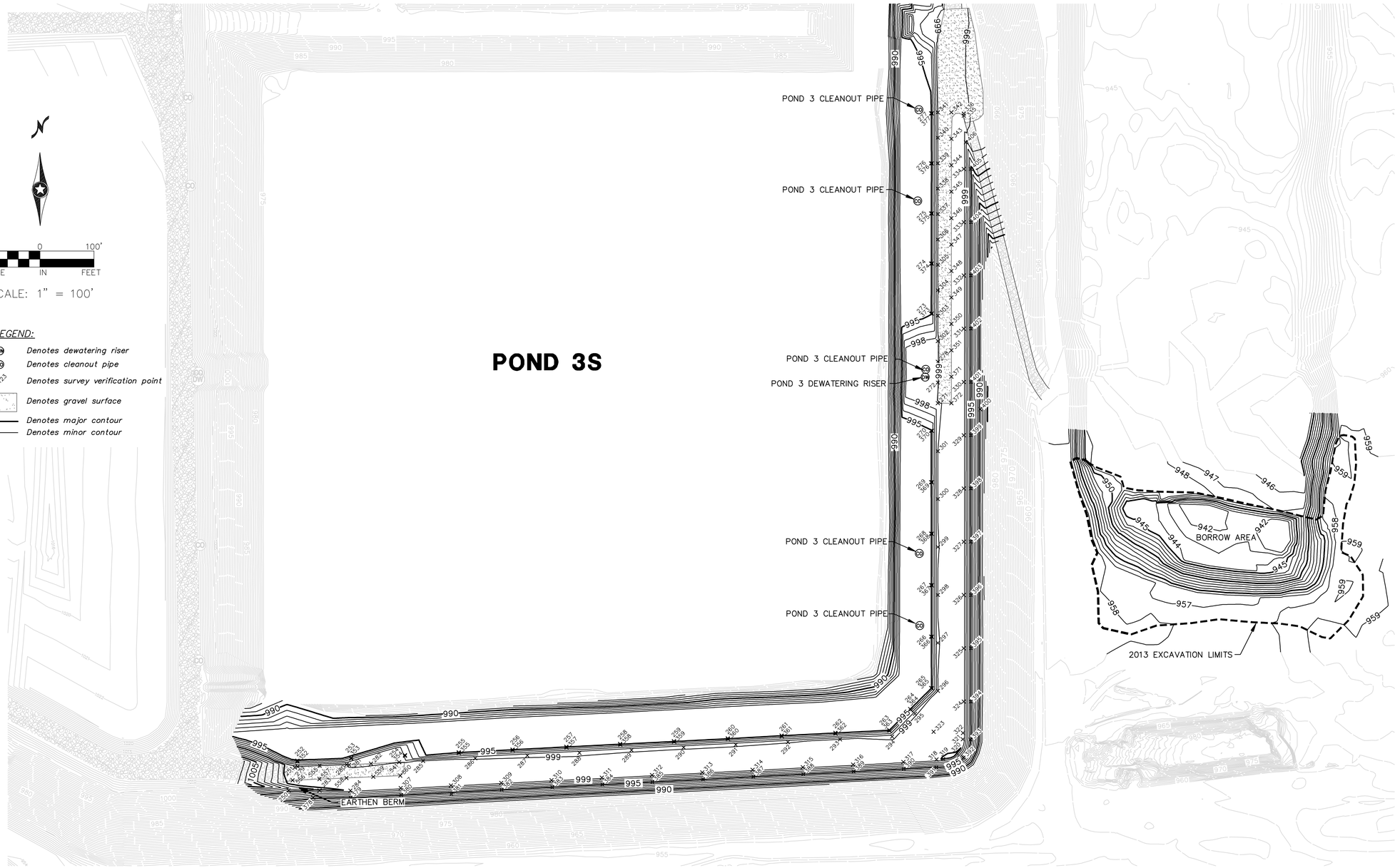
NOTE: REFER TO APPENDIX E FOR AS-BUILT CLAY BARRIER VERIFCATION POINT TABULATION

Carlson McCain
5300 Highway 12
Maple Plain, MN 55359
ph 952-346-3900

CLAY BARRIER VERIFICATION SURVEY POINT NUMBERS

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertucel Extension\Survey\2013 Asbuilt Top of Clay.dgn

AS-BUILT SURVEY
2013 POND 3 SOUTH VERTICAL EXPANSION
SHERCO GENERATING PLANT BECKER, MN



REV NO.	DATE	DESCRIPTION

DATE: _____
DESIGN BY: _____
DRAWN BY: CAW
CHECKED BY: LAB
DWG FILE: FNL ASBLT
FILE NO.: 12-0097.01

I hereby certify that this survey, plan, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Land Surveyor under the laws of the State of Minnesota.

Signed: Craig Wensmann
CRAIG WENSMANN
Date: 9-18-13 Reg. No. 47466

BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
CIVIL ENGINEERING
MAPPING
13076 FIRST STREET, BECKER, MN 55308-9322
TEL: 763-262-8822 FAX: 763-262-8844

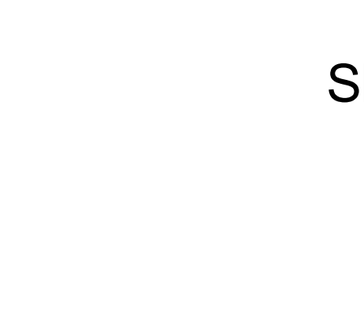
VEIT & COMPANY, INC.
SHERCO PLANT
POND 3S VERT. EXPANSION
BECKER, MN

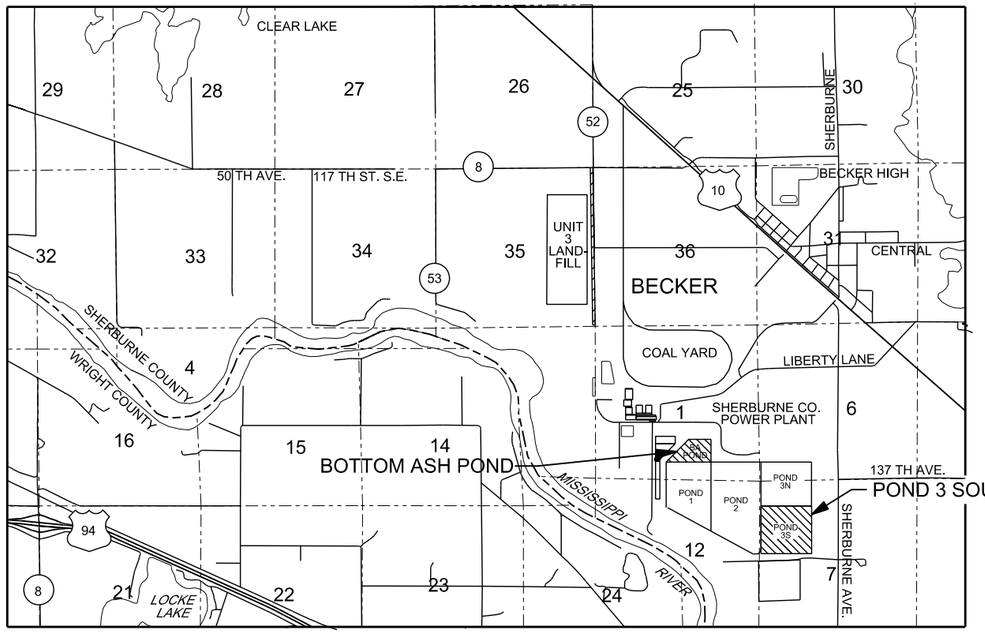
SHEET NO.
1
1

Record Drawings

RECORD DRAWINGS
SHERBURNE COUNTY (SHERCO) GENERATING PLANT
2013 ASH CONSTRUCTION PROJECTS

NPDES PERMIT No. 0002186
BECKER, MINNESOTA
NORTHERN STATES POWER COMPANY
dba XCEL ENERGY, INC.





SITE LOCATION MAP

SHEET	DRAWING TITLE
	GENERAL
G1	INDEX SHEET
G2	PLANT LAYOUT AND PROJECT AREAS
G3	POND PROJECTS LAYOUT
	BOTTOM ASH POND EXCAVATION
BA1	PRE-CONSTRUCTION CONDITIONS (APPROXIMATE)
BA2	BASE GRADES AND EXCAVATION LIMITS
BA3	BOTTOM ASH DEPOSITION CHANNEL EXISTING (APPROXIMATE)
BA4	DEPOSITION CHANNEL SECTION
	POND 3 NORTH
3N1	BOTTOM ASH BENCH AS-BUILT PLAN AND SECTION
	POND 3S VERTICAL EXPANSION
P1	PRE-CONSTRUCTION CONDITIONS
P2	CLAY BARRIER AND BOTTOM ASH GRADING PLAN
P3	FINISHED GRADING PLAN
P3A	AS-BUILT FINISHED GRADING PLAN
P4	RESTORATION PLAN
P5	EMBANKMENT SECTION AND CLAY BARRIER DETAILS
P6	RAMP AND PIPE EXTENSION SECTIONS

NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	ISSUED FOR BIDDING		3/1/2013	DCF	XCEL	DJR
0	ISSUED FOR CONSTRUCTION		4/18/2013	DCF	XCEL	DJR
▲	RECORD DRAWINGS		10/29/2013	DCF	XCEL	DJR

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FIRST NAME: DANIEL J. RIGGS
SIGNATURE:
DATE: 10/29/2013 LICENSE# 49559

Xcel Energy®
NORTHERN STATES POWER COMPANY
SHERCO GENERATING PLANT
BECKER, MINNESOTA

DWN: DCF	DATE: 10/29/13	CHK:	DATE:
ENG: DJR	DATE: 10/29/13	CHK:	DATE:
PM:	DATE:	PROJ. NO: SHC12280	
APVD:	DATE:	SCALE: SEE DRAWING	

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ENGINEERING & CONSTRUCTION

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2013 ASH CONSTRUCTION PROJECTS

INDEX SHEET

G1 REV ▲

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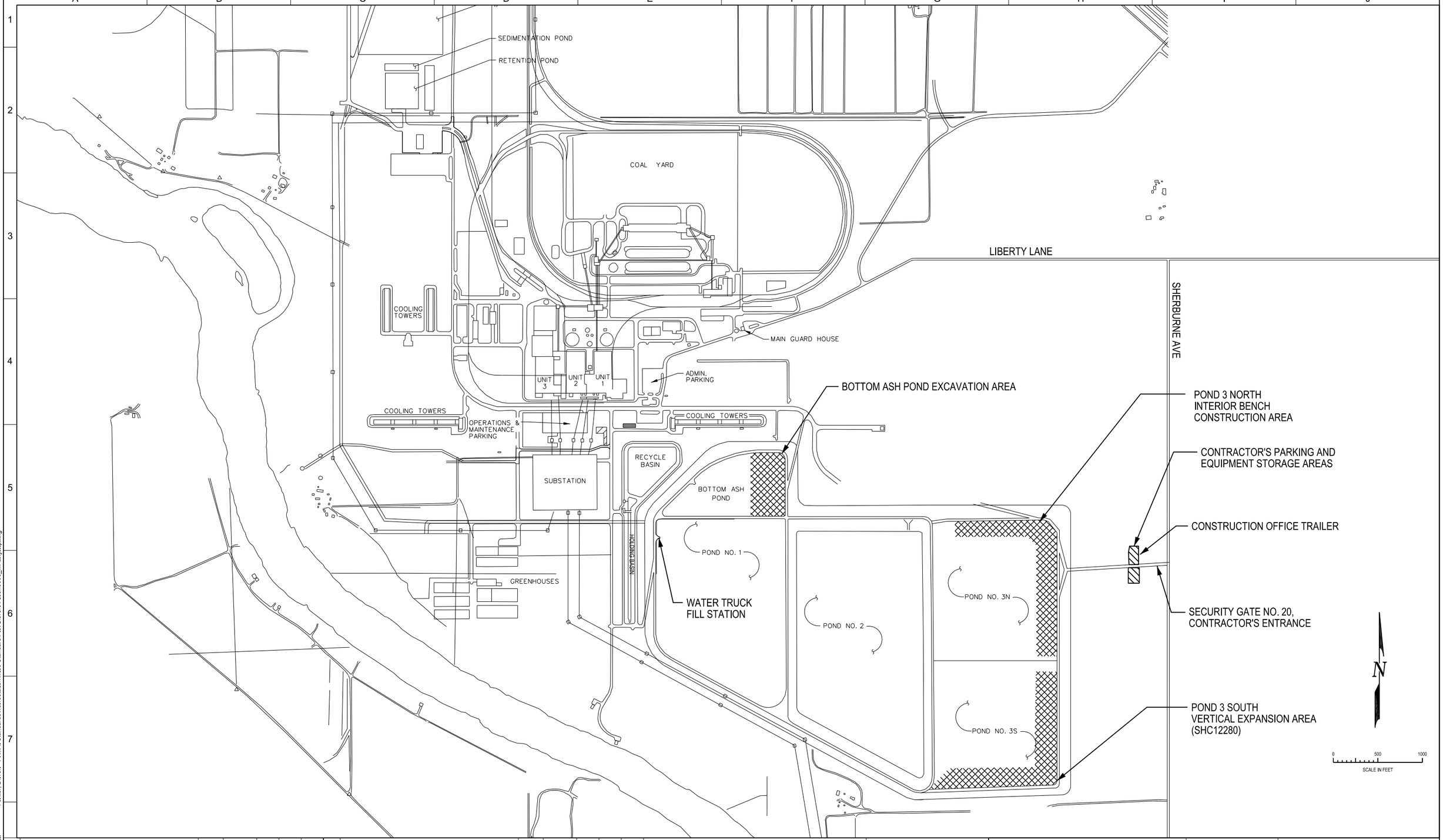

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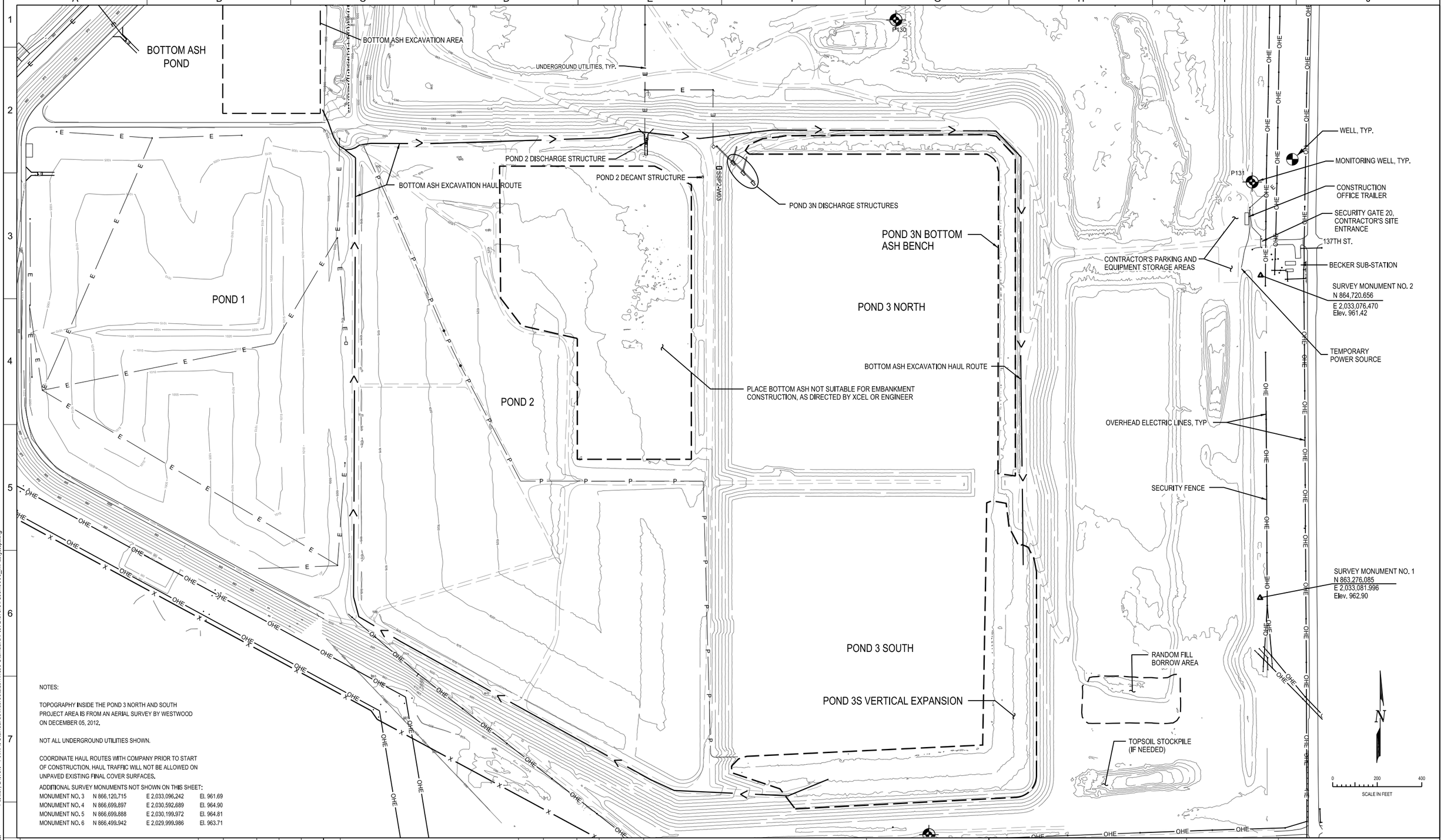
ENGINEERING & CONSTRUCTION

2013 ASH CONSTRUCTION PROJECTS

PLANT LAYOUT AND PROJECT AREAS

G2 ▲



NOTES:

TOPOGRAPHY INSIDE THE POND 3 NORTH AND SOUTH PROJECT AREA IS FROM AN AERIAL SURVEY BY WESTWOOD ON DECEMBER 05, 2012.

NOT ALL UNDERGROUND UTILITIES SHOWN.

COORDINATE HAUL ROUTES WITH COMPANY PRIOR TO START OF CONSTRUCTION. HAUL TRAFFIC WILL NOT BE ALLOWED ON UNPAVED EXISTING FINAL COVER SURFACES.

ADDITIONAL SURVEY MONUMENTS NOT SHOWN ON THIS SHEET:

MONUMENT NO. 3	N 866,120.715	E 2,033,096.242	El. 961.69
MONUMENT NO. 4	N 866,699.897	E 2,030,592.689	El. 964.90
MONUMENT NO. 5	N 866,699.888	E 2,030,199.972	El. 964.81
MONUMENT NO. 6	N 866,499.942	E 2,029,999.986	El. 963.71

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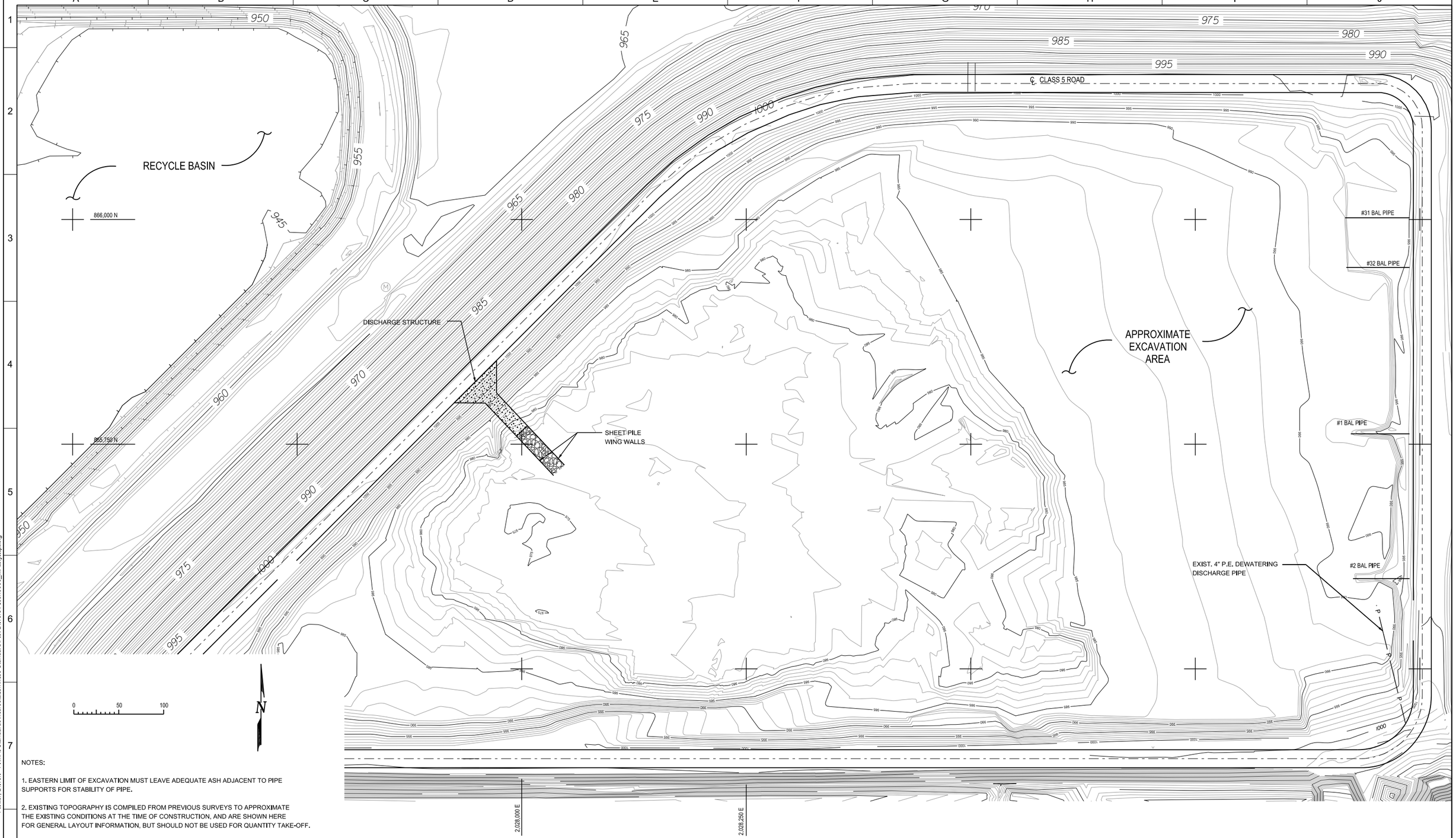
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

2013 ASH CONSTRUCTION PROJECTS

POND PROJECTS LAYOUT

G3

REV ▲



NOTES:

1. EASTERN LIMIT OF EXCAVATION MUST LEAVE ADEQUATE ASH ADJACENT TO PIPE SUPPORTS FOR STABILITY OF PIPE.

2. EXISTING TOPOGRAPHY IS COMPILED FROM PREVIOUS SURVEYS TO APPROXIMATE THE EXISTING CONDITIONS AT THE TIME OF CONSTRUCTION, AND ARE SHOWN HERE FOR GENERAL LAYOUT INFORMATION, BUT SHOULD NOT BE USED FOR QUANTITY TAKE-OFF.

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▲	RECORD DRAWINGS		10/29/2013	DCF	XCEL	DJR

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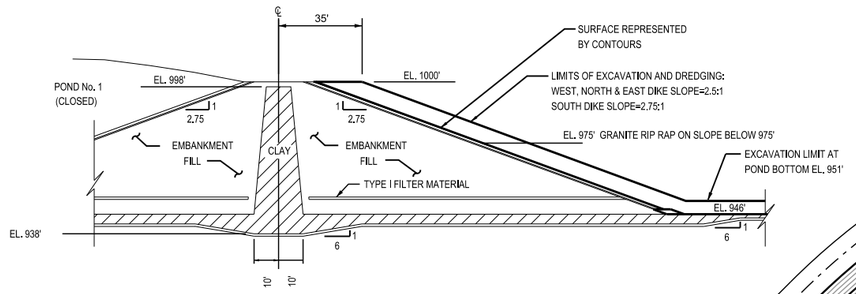
2013 ASH CONSTRUCTION PROJECTS
BOTTOM ASH POND EXCAVATION
PRE-CONSTRUCTION CONDITIONS (APPROXIMATE)

BA1 REV ▲



TYPICAL DIKE CROSS SECTION
(SOUTH DIKE LOOKING WEST)

NOTES:

1. CONTRACTOR SHALL NOT EXCAVATE BELOW LIMITS OF EXCAVATION.

2. EASTERN LIMIT OF EXCAVATION MUST LEAVE ADEQUATE ASH ADJACENT TO PIPE SUPPORTS FOR STABILITY OF PIPE.

0 50 100
SCALE IN FEET

N

N 866,150.00
E 2,028,270.00

℄ CLASS 5 ROAD

N 866,150.00
E 2,029,010.00

#31 BAL PIPE

#32 BAL PIPE

#1 BAL PIPE

#2 BAL PIPE

DISCHARGE STRUCTURE

WINGWALLS

APPROXIMATE
EXCAVATION
AREA

NOTE:

CONTOURS REPRESENT THE POND BOTTOM AND SIDE SLOPE SURFACES. ASH SHALL NOT BE EXCAVATED WITHIN 5 FEET OF THIS SURFACE (MEASURED PERPENDICULAR TO THE SURFACE) AS SHOWN IN THE TYPICAL SECTION AT THE UPPER LEFT OF THIS SHEET.

N 865,400.00
E 2,027,520.00

N 865,400.00
E 2,029,010.00

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2013 ASH CONSTRUCTION PROJECTS
BOTTOM ASH POND EXCAVATION

BASE GRADES AND EXCAVATION LIMITS

BA2

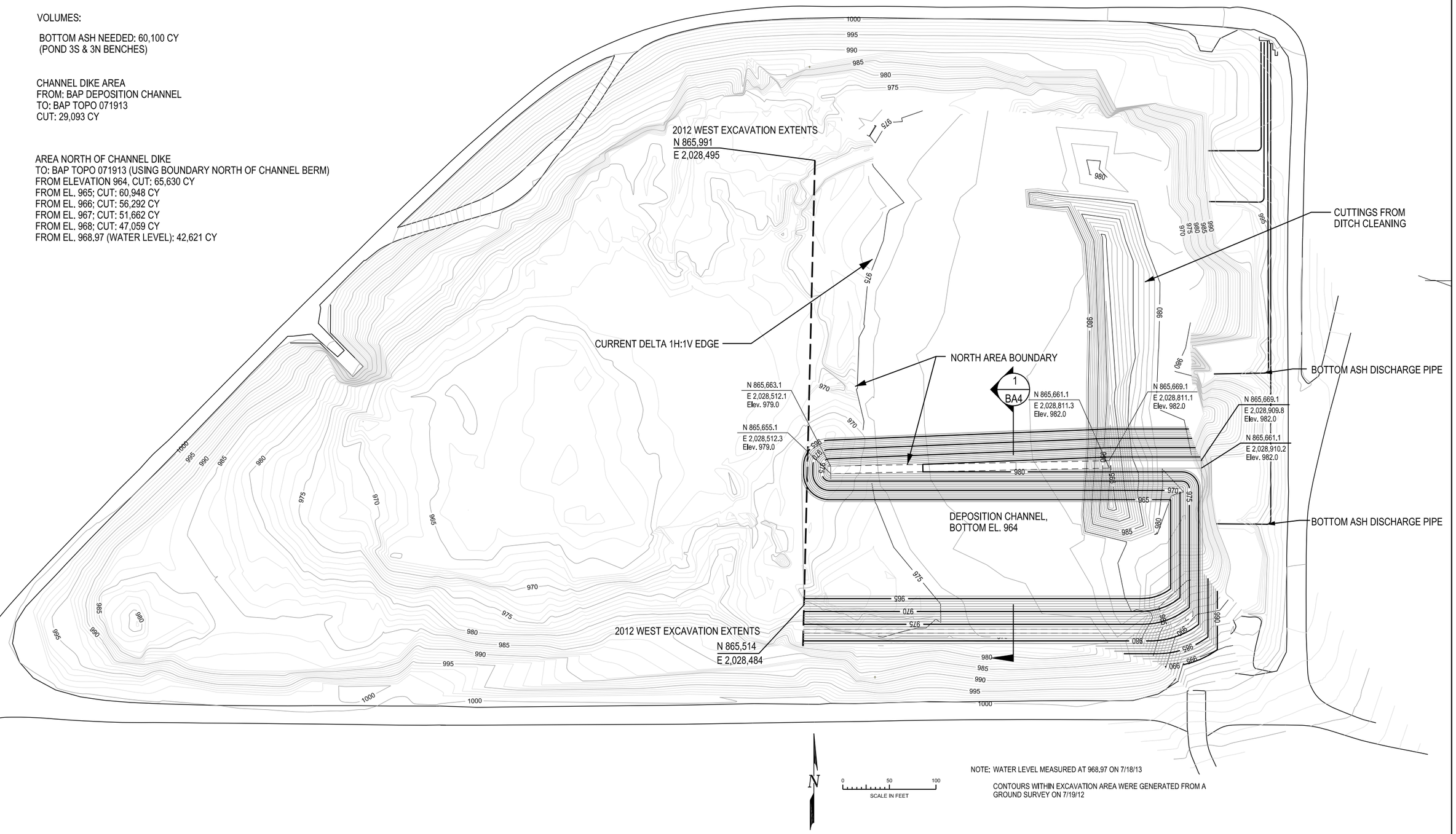
REV ▲

VOLUMES:

BOTTOM ASH NEEDED: 60,100 CY
(POND 3S & 3N BENCHES)

CHANNEL DIKE AREA
FROM: BAP DEPOSITION CHANNEL
TO: BAP TOPO 071913
CUT: 29,093 CY

AREA NORTH OF CHANNEL DIKE
TO: BAP TOPO 071913 (USING BOUNDARY NORTH OF CHANNEL BERM)
FROM ELEVATION 964, CUT: 65,630 CY
FROM EL. 965; CUT: 60,948 CY
FROM EL. 966; CUT: 56,292 CY
FROM EL. 967; CUT: 51,662 CY
FROM EL. 968; CUT: 47,059 CY
FROM EL. 968.97 (WATER LEVEL): 42,621 CY



NOTE: WATER LEVEL MEASURED AT 968.97 ON 7/18/13

CONTOURS WITHIN EXCAVATION AREA WERE GENERATED FROM A GROUND SURVEY ON 7/19/12

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▲	RECORD DRAWINGS		10/29/2013	DCF	XCEL	DJR

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BECKER, MINNESOTA

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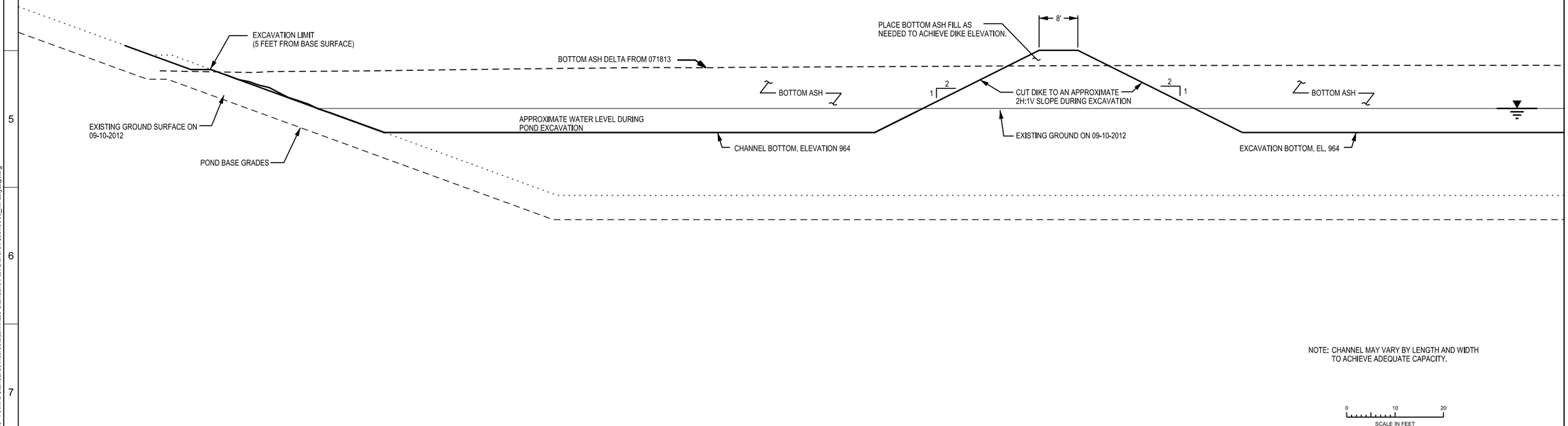
ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

2013 ASH CONSTRUCTION PROJECTS

BOTTOM ASH
DEPOSITION CHANNEL
EXISTING (APPROXIMATE)

BA3

REV ▲



NOTE: CHANNEL MAY VARY BY LENGTH AND WIDTH
TO ACHIEVE ADEQUATE CAPACITY.

0 10 20
SCALE IN FEET

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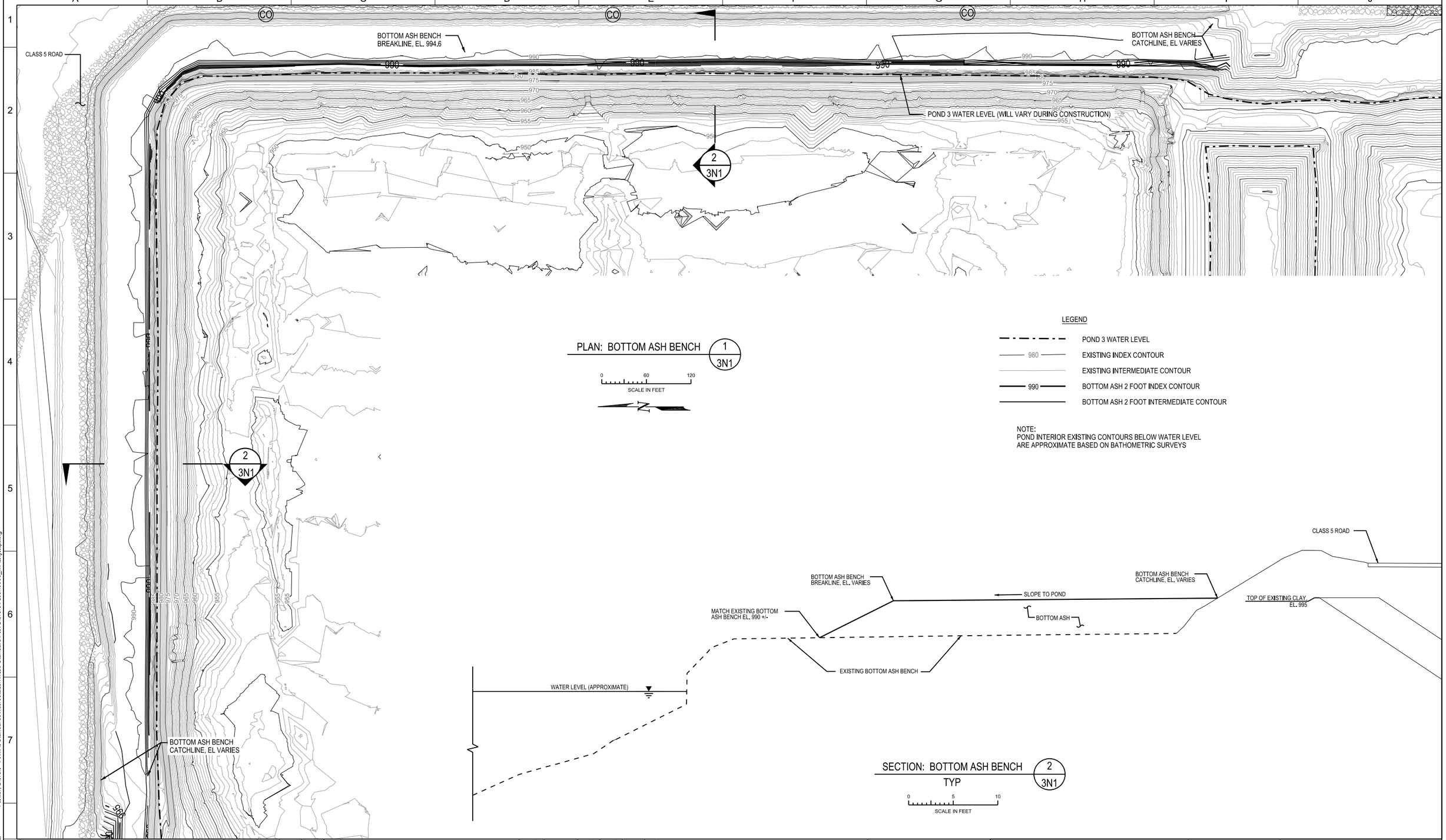
2013 ASH CONSTRUCTION PROJECTS

DEPOSITION CHANNEL SECTION

BA4

REV ▲



PLAN: BOTTOM ASH BENCH 1 / 3N1

0 60 120
SCALE IN FEET

LEGEND

- POND 3 WATER LEVEL
- 980 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- 990 BOTTOM ASH 2 FOOT INDEX CONTOUR
- BOTTOM ASH 2 FOOT INTERMEDIATE CONTOUR

NOTE:
POND INTERIOR EXISTING CONTOURS BELOW WATER LEVEL
ARE APPROXIMATE BASED ON BATHOMETRIC SURVEYS

SECTION: BOTTOM ASH BENCH TYP 2 / 3N1

0 5 10
SCALE IN FEET

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SIGNATURE:
DATE: 10/29/2013 LICENSE# 49559

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NORTHERN STATES POWER COMPANY
SHERCO GENERATING PLANT
BECKER, MINNESOTA

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PM:	DATE:	PROJ. NO: SHC12280	
APVD:	DATE:	SCALE: SEE DRAWING	

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2013 ASH CONSTRUCTION PROJECTS
POND 3 NORTH
INTERIOR BENCH AS-BUILT PLAN AND SECTION

3N1 REV ▲

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Drawings\Record\2013 Pond 3S Const_3N1_RD.dgn
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Plotted: 12/20/2013 2:45:54 PM

POND 3S

PROTECT EXISTING POND COMPOSITE BASE LINER IN TRANSITION, SEE 3/P5

STRIP EXISTING CLASS 5 AGGREGATE WITHIN PROJECT BASELINE

POND 3 WATER LEVEL (WILL VARY DURING CONSTRUCTION)

EXISTING DEWATERING RISER

POND 3S SCRUBBER SOLIDS DISCHARGE

PROTECT EXISTING POND COMPOSITE BASE LINER IN TRANSITION, SEE 3/P5

STRIP EXISTING CLASS 5 AGGREGATE WITHIN PROJECT BASELINE

TOP OF EXISTING CLAY BARRIER, EL. 990

EXISTING CLEANOUT

SOIL BORING B-683

SOIL BORING P-70

SOIL BORING B-688

SOIL BORING B-620

POND 3S CONSTRUCTION BORROW AREA

TOPSOIL STOCKPILE

SOIL BORING B-472

N

0 100 200
SCALE IN FEET

- EXISTING CLEANOUT PIPE
- EXISTING DEWATERING RISER
- 990 EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- BL 18+00 PROJECT BASELINE AND STATIONING
- EXISTING CLAY BARRIER
- MEQB MINNESOTA ENVIRONMENTAL QUALITY BORDER (STORMWATER BOUNDARY)

NOTE: CORRESPONDING SOIL BORINGS LOGS ARE INCLUDED IN THE BID DOCUMENTS.

EXCAVATED ROCK UNSUITABLE FOR EMBANKMENT CONSTRUCTION (LARGER THAN 12 INCHES) SHALL BE REMOVED FROM THE SITE AND SHALL BECOME PROPERTY OF THE CONTRACTOR

NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	ISSUED FOR BIDDING		3/1/2013	DCF	XCEL	DJR
0	ISSUED FOR CONSTRUCTION		4/18/2013	DCF	XCEL	DJR
▲	RECORD DRAWINGS		10/29/2013	DCF	XCEL	DJR

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2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION
PRE-CONSTRUCTION CONDITIONS

P1 REV ▲

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Drawings\Record\2013 Pond 3S Const_P1_RD.dgn
Plotter, Driver: P:\MAI Standards\Microstation\Mec Standard\Plot Drivers\Ricoh6000_MAIstyle.pltcfg
Plotted: 12/20/2013 2:47:54 PM

SALVAGE TOPSOIL UNDER PROPOSED BOTTOM ASH BENCH

CLAY BARRIER TRANSITION, SEE 3/P5

CLEANOUT EXTENSION, TYP 2/P6

BASELINE END, STA 23+02
N: 863,620.83
E: 2,031,993.60
Elev. 995.00

1.5H:1V CLAY BARRIER EXTERIOR SLOPE

BOTTOM ASH BENCH BREAKLINE, EL. 994.3

MATCH EXISTING BENCH, EL. 990 +/-

TOP OF CLAY BARRIER, EL. 995

8'

SLOPE

20+00

1/P6

DETAIL: CLAY BARRIER AND BOTTOM ASH GRADING PLAN 1/P2
TYP

0 25 50
SCALE IN FEET

EMBANKMENT, TYP 1/P5

SLOPE

1/P5

CLAY BARRIER TRANSITION, SEE 3/P5

SALVAGE TOPSOIL UNDER PROPOSED BOTTOM ASH BENCH

BASELINE BEGIN, STA 0+00
N: 862,404.33
E: 2,030,801.62
Elev. 995.00

CONTRACTOR SHALL EXCAVATE DOWN TO THE DESIGNED BORROW GRADES AND PROGRESS SOUTH AS NEEDED TO CONSTRUCT FINISHED GRADE

BORROW BRKLN
N: 862,900.39
E: 2,032,328.02
Elev. 942.00

BORROW BRKLN
N: 862,906.39
E: 2,032,440.80
Elev. 944.00

BORROW BRKLN
N: 862,894.39
E: 2,032,662.52
Elev. 940.00

3H:1V

BORROW BRKLN
N: 862,759.40
E: 2,032,328.02
Elev. 942.00

BORROW BRKLN
N: 862,753.40
E: 2,032,440.80
Elev. 944.00

BORROW BRKLN
N: 862,765.40
E: 2,032,662.52
Elev. 940.00

STRIP TOPSOIL WITHIN BORROW AREA EXCAVATION LIMITS AND PLACE IN TOPSOIL STOCKPILE

RESTORE ALL DISTURBED BORROW AREA SLOPES TO A 3H:1V

TOPSOIL STOCKPILE

MEQB

N

0 100 200
SCALE IN FEET

CO EXISTING/PROPOSED CLEANOUT PIPE

DW EXISTING/PROPOSED DEWATERING RISER

990 EXISTING INDEX CONTOUR

EXISTING INTERMEDIATE CONTOUR

BL 18+00 PROJECT BASELINE AND STATIONING

GRADE BREAKLINE

GRADE CATCHLINE

PROPOSED CLAY BARRIER

980 PROPOSED INDEX CONTOUR (10' ON 100'/" SCALE, 5' ON 25'/" SCALE)

PROPOSED INTERMEDIATE CONTOUR (2' ON 100'/" SCALE, 1' ON 25'/" SCALE)

MEQB MINNESOTA ENVIRONMENTAL QUALITY BORDER (STORMWATER BOUNDARY)

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Drawings\Record\2013 Pond 3S Const_P2_RD.dgn
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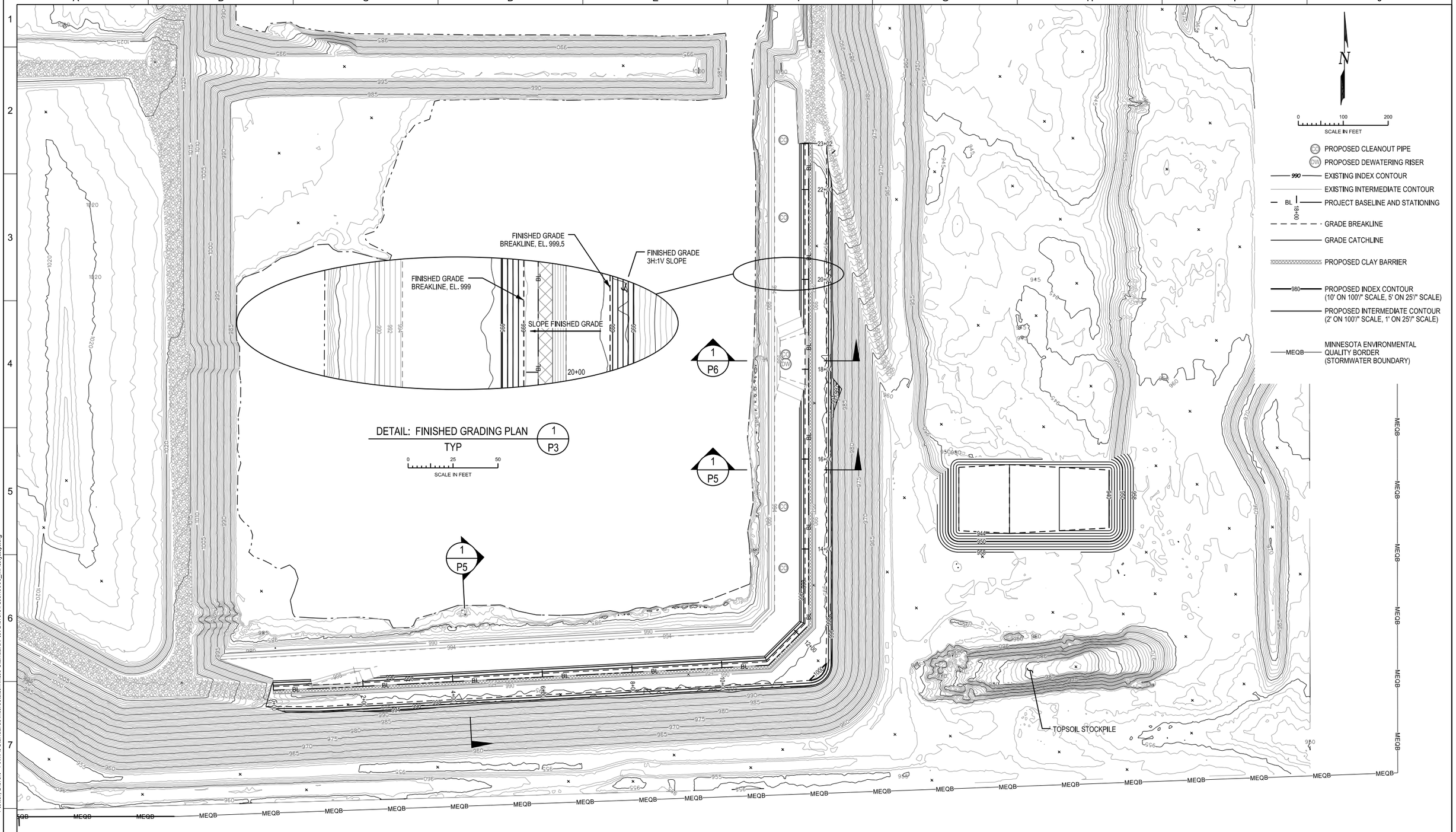
2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION
CLAY BARRIER AND BOTTOM ASH GRADING PLAN

P2 REV ▲



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NO	REVISION	ZONE	DATE	BY	CHK	ENG
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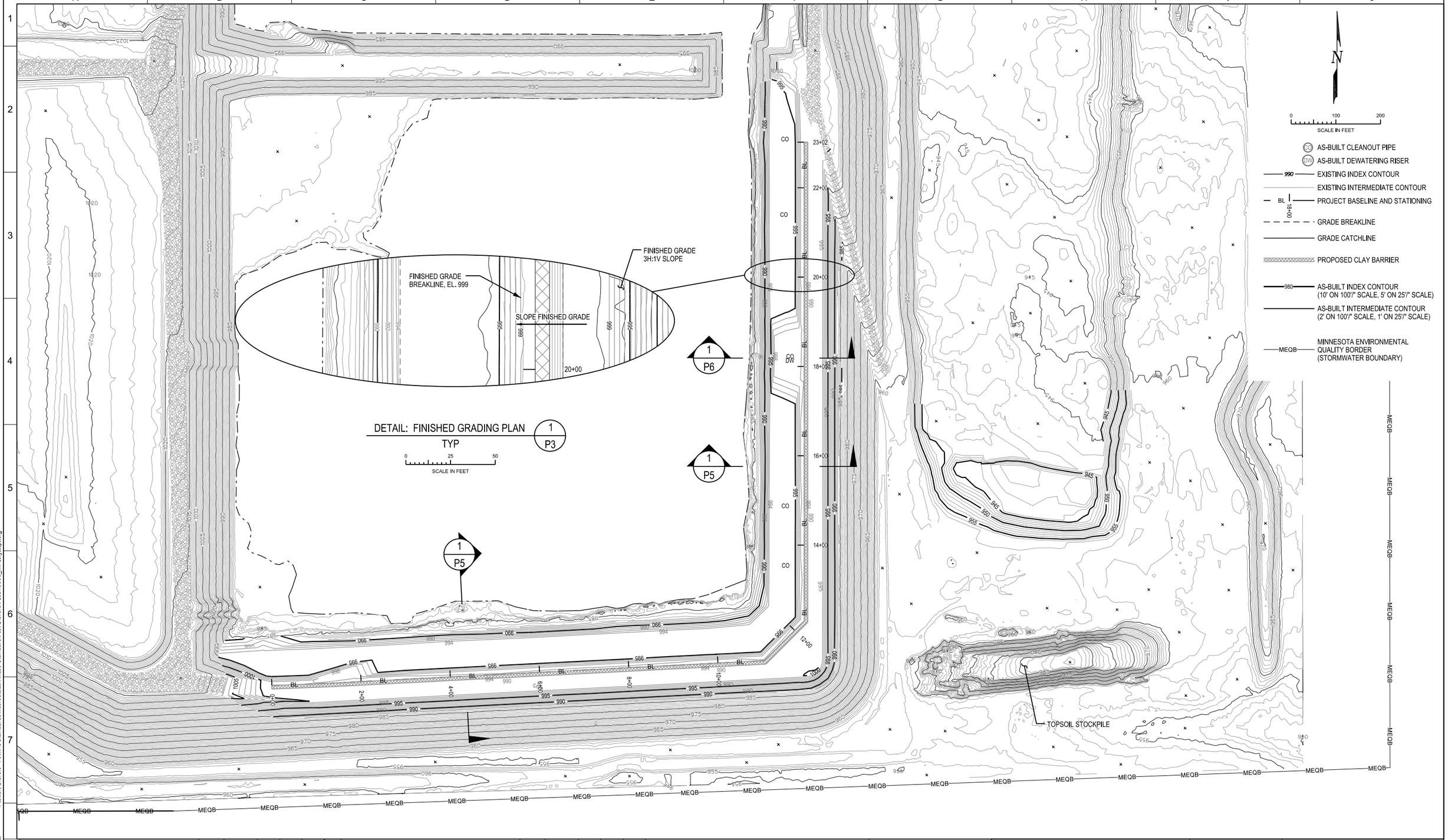
2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION

FINISHED GRADING PLAN

P3 REV ▲



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NO	REVISION	ZONE	DATE	BY	CHK	ENG
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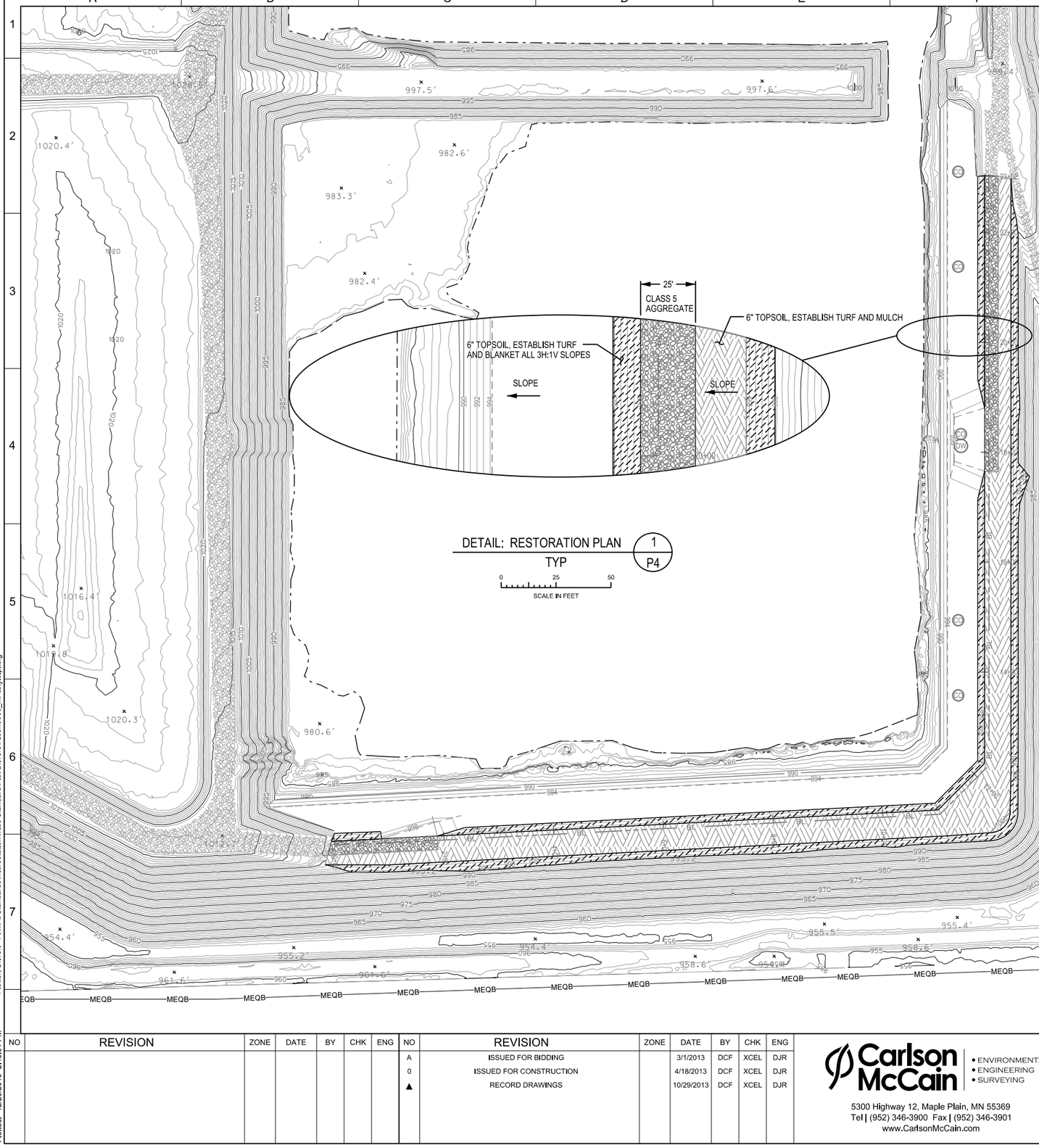
2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION

FINISHED GRADING PLAN

P3A

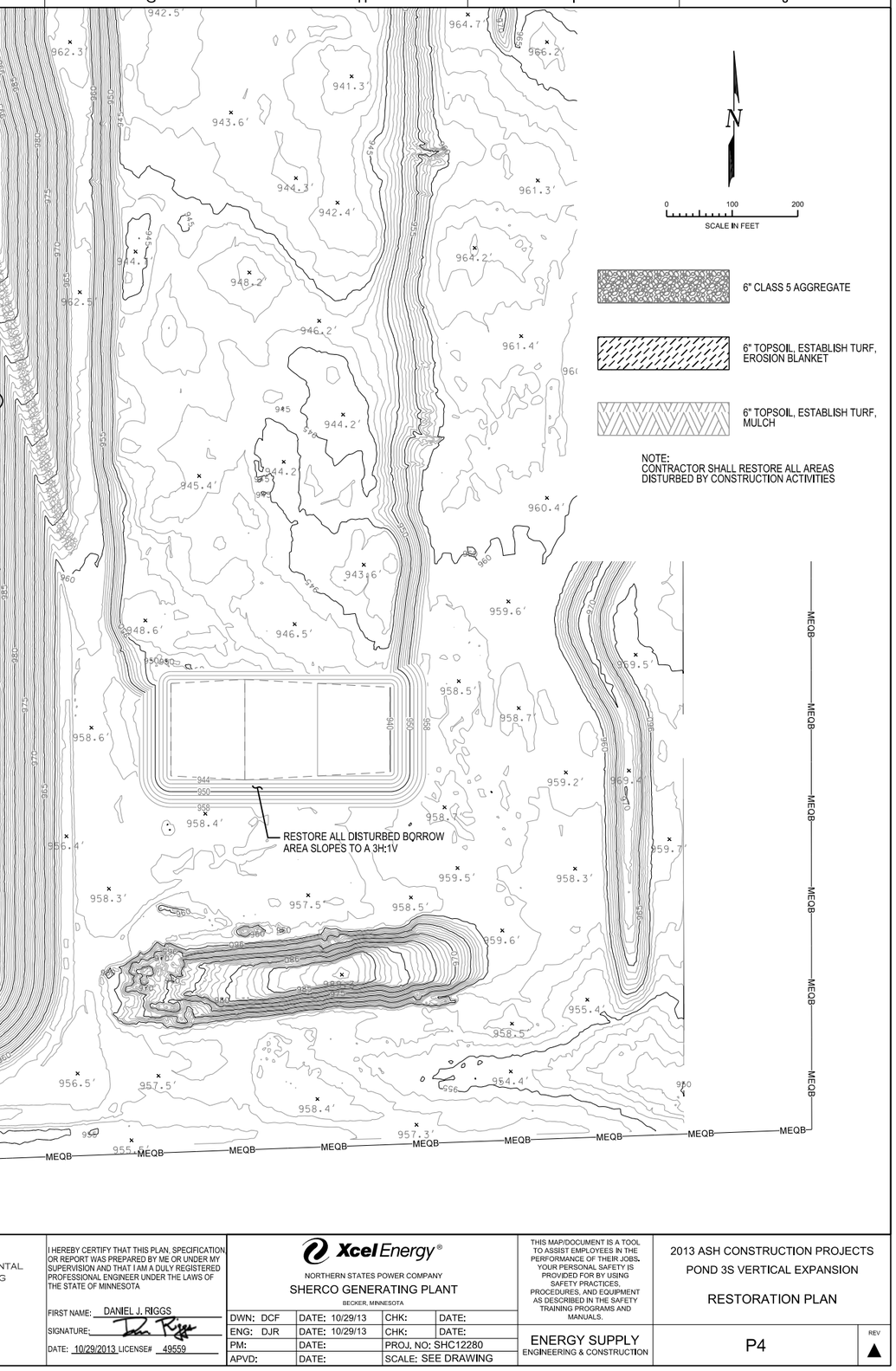
REV ▲



DETAIL: RESTORATION PLAN (1 / P4)

TYP

SCALE IN FEET: 0, 25, 50



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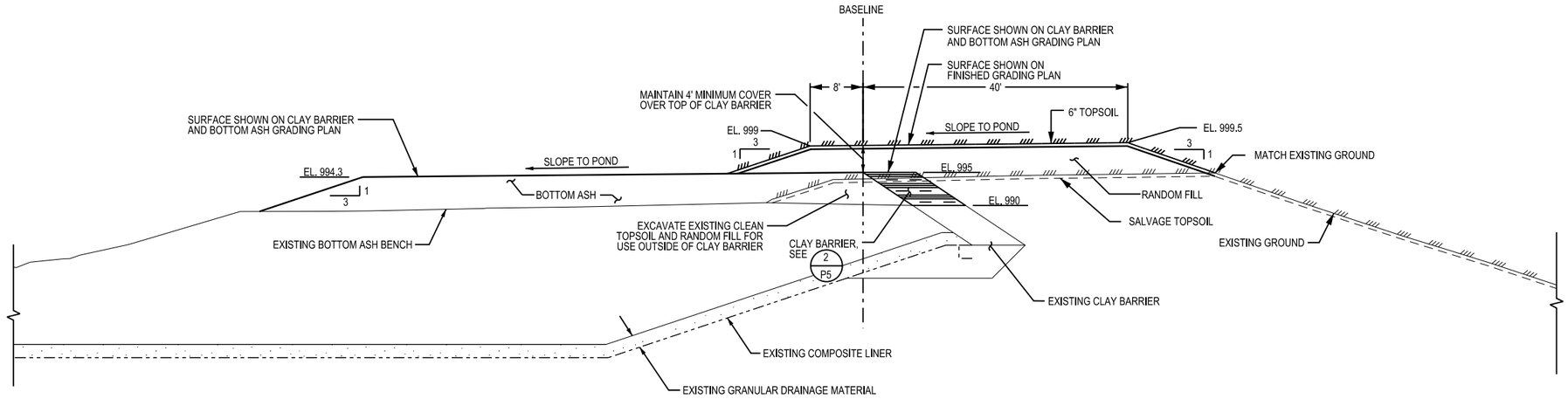
2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION

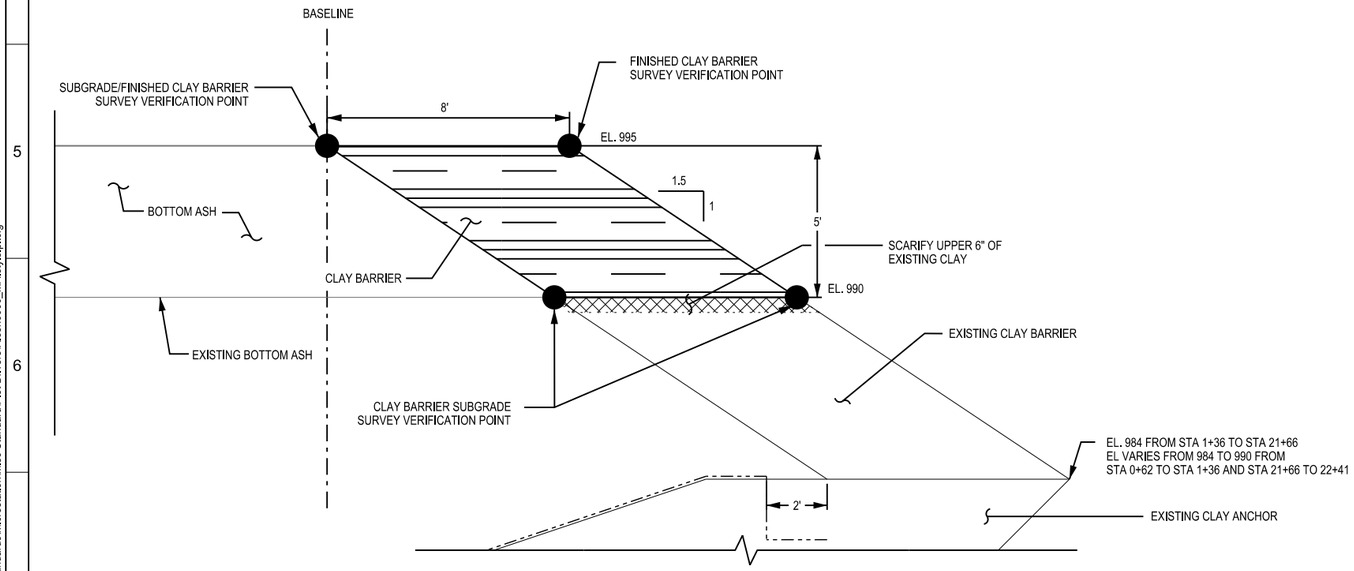
RESTORATION PLAN

P4 ▲ REV



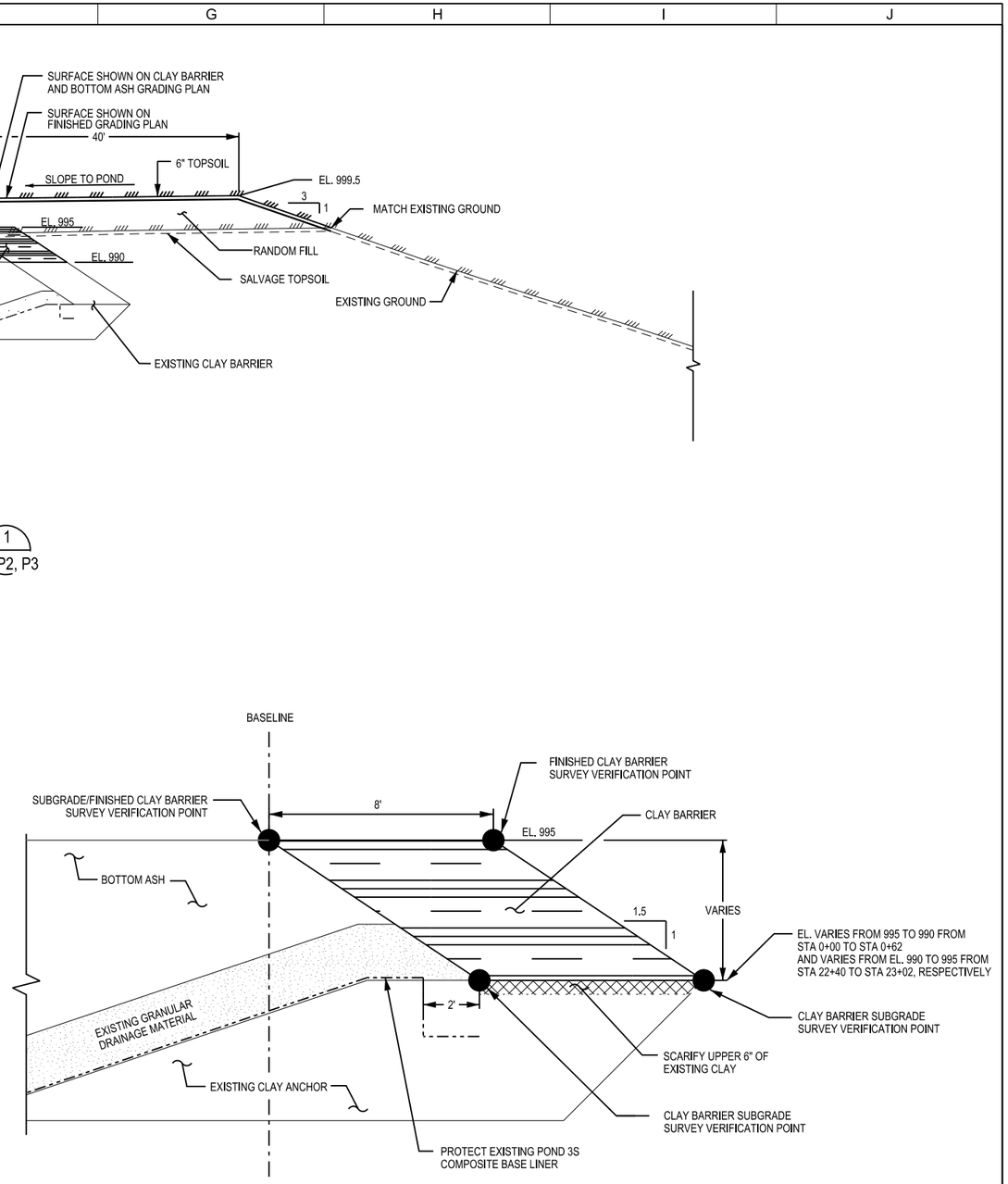
SECTION: EMBANKMENT 1 / TYP / P2, P3

0 10 20
SCALE IN FEET



DETAIL: CLAY BARRIER 2 / STA 0+62 TO STA 22+40 / P5,P6

0 2.5 5
SCALE IN FEET



DETAIL: CLAY BARRIER TRANSITION 3 / STA 0+00 TO STA 0+62 & STA 22+40 TO STA 23+02 / P1,P2

0 2.5 5
SCALE IN FEET

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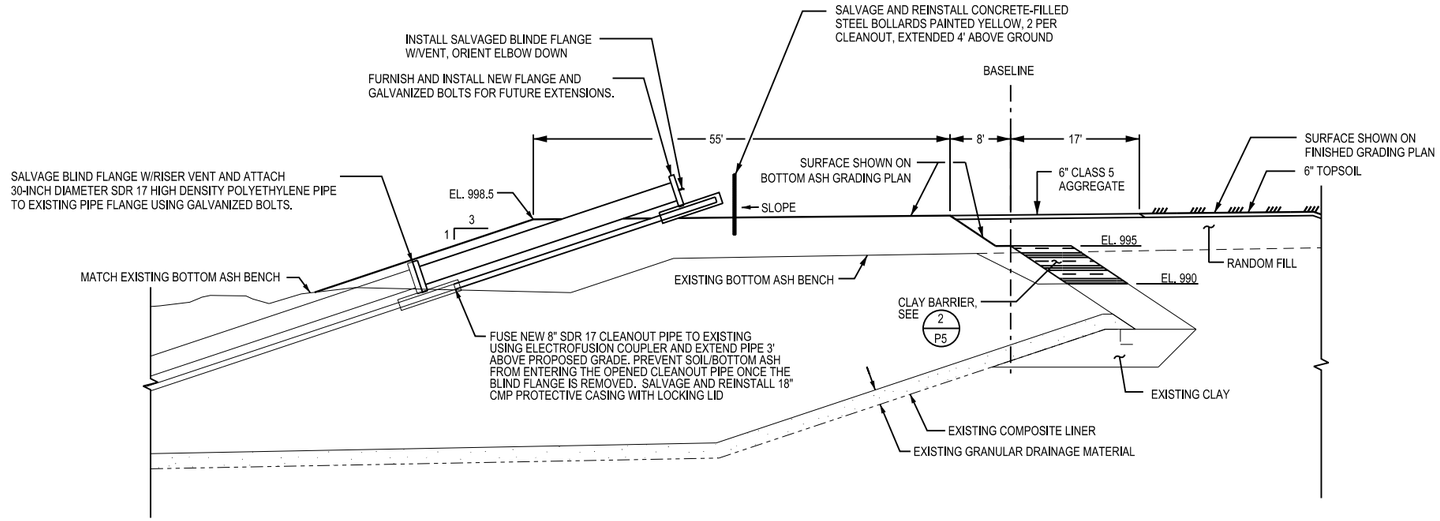
2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION
EMBANKMENT SECTION AND CLAY BARRIER DETAILS

P5

REV ▲

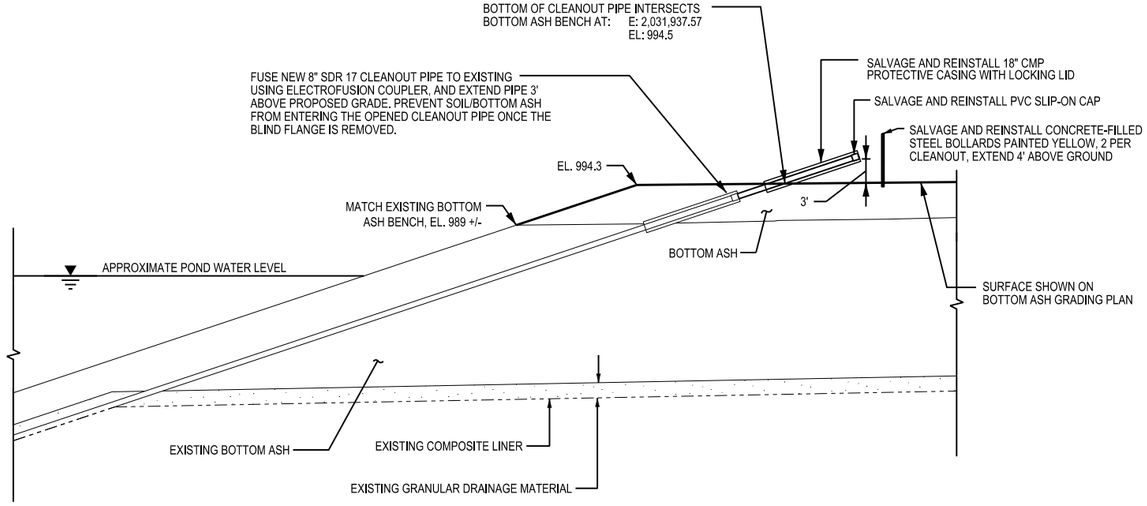


SECTION: BOTTOM ASH RAMP AND DEWATERING RISER AND CLEANOUT EXTENSION (1 / P2,P3)

STA 18+33

0 10 20

SCALE IN FEET



SECTION: EAST EMBANKMENT CLEANOUT EXTENSION (2 / P2)

STA 13+58, STA 14+94, STA 21+38, & STA 23+02

0 10 20

SCALE IN FEET

File: P:\Projects\XCEL\3404-04 Pond 3S\2013 Pond Vertical Extension\Drawings\Record\2013 Pond 3S Const_P6_RD.dgn
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2013 ASH CONSTRUCTION PROJECTS
POND 3S VERTICAL EXPANSION
RAMP AND PIPE EXTENSION SECTIONS

P6

REV ▲