CONSTRUCTION CERTIFICATION REPORT
POND 3 2015 VERTICAL EXPANSION

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

Prepared for:

Xcel Energy, Inc.

December 4th, 2015

Prepared By:

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Sherburne County (Sherco) Generating Plant
Northern States Power Company
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Becker, Minnesota

Prepared For
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October 2015

Prepared by: Carlson McCain

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CONSTRUCTION CERTIFICATION REPORT
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SECTION 1.0 – CERTIFICATION

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

Date: Dec 7th 2015 License No. 49559

SECTION 2.0 - INTRODUCTION

The purpose of this report is to present information associated with the construction of the Pond 3 2015 Vertical Expansion at the Sherburne County Generating Plant (Sherco). Project activities began in June, 2015 and were completed in October 2015. As-built Record Drawings are included in Appendix A and photographs of construction activities are included in Appendix B. The Sherco project number assigned to this work was SHC-11352.

The Pond 3 2015 Vertical Expansion project consisted of raising the clay barrier 6-feet from an existing elevation of 998 to 1004. The primary construction activities consisted of stripping the existing road material (class 5), topsoil, and subgrade material to the top of the existing clay barrier, placing the bottom ash interior embankment, and installing 6-feet of clay (8-feet wide), subgrade material (common fill), class 5 road material, topsoil, and establishing turf. The dewatering system cleanouts located along the east side of Pond 3 were extended. The two dewatering manholes located on the north side of Pond 3 were also raised as part of the construction project.

The project was constructed in accordance with the 2015 Sherco Pond 3 Extension Project Technical Specifications, dated April 27, 2015 and the Sherburne County (Sherco) Generating Plant, 2015 Pond 3 Vertical Expansion Construction Drawings, dated April 16, 2015. Both documents were prepared by Carlson McCain. Deviations from the Technical Specifications are noted on the enclosed Record Drawings and/or described in this report.

Carlson McCain provided on-site construction quality assurance (CQA) management from August 3, 2015 through October 14, 2015. Information associated with activities completed after October 14, 2014 were provided by the general contractor and/or Xcel personnel. Activities completed without on-site CQA included class 5 installation, topsoil installation, turf establishment, and the construction of the Pond 3 clean-out extensions. Construction observation consisted of observing and recording activities of the general contractor and subcontractors, answering questions and interpreting information contained in the drawings and specifications, and assisting testing and quality control activities.

The following companies provided services to complete the project:

Company	**Activity or Products**
Xcel Energy	Owner/Project Management
Carlson McCain, Inc. (Carlson McCain)	Design/Construction Management – CQA
Veit & Company Inc. (Veit)	General Contractor & Earthwork Installation
Bogart, Pederson and Associates, Inc.	Survey Verification (Subcontractor to Veit)
Terra Services	Turf Establishment (Subcontractor to Veit)
Soil Engineering Testing	Laboratory Soil Testing (Subcontractor to Veit)
Thul Specialty Contracting	Manhole Studliner Welding and Testing (Sub to Veit)
American Engineering Testing, Inc.	Soil Testing (Subcontractor to Veit)

SECTION 3.0 – CONSTRUCTION ACTIVITIES

The following sections provide the general description of materials, construction methods, and quality control measures used to complete the project. For additional project details and information see the referenced Technical Specification Documents.

The primary construction activities consisted of stripping the existing road material (class 5), topsoil, and subgrade material to the top of the existing clay barrier, then installing 6-feet of clay (8-feet wide), subgrade material (common fill), class 5 road material, topsoil, and establishing turf. The dewatering system cleanouts located along the east side of Pond 3 were extended. The two dewatering manholes located on the north side of Pond 3 were also extended.

3.1 Surveying

Bogart, Pederson and Associates, Inc., was retained by the general contractor to provide surveying services for the project. The primary activities included completing survey activities associated with verifying the proper material thicknesses and elevations of the clay barrier, common fill, class 5, and topsoil, and providing an as-built survey drawing. Survey grid point locations were furnished or approved by Carlson McCain prior to initiating surveying activities. The survey activities were completed using 50 foot grid point locations for the clay, common fill, and class 5 and 100 foot grid point locations for the topsoil.

The survey verification data and as-built survey drawing are included in Appendix C.

3.2 Topsoil, Class 5, and Common Fill Stripping

The existing topsoil, class 5, and common fill within the construction area was stripped by a dozer utilizing GPS and/or excavator utilizing GPS. The topsoil was placed along the outer edges of the construction area adjacent to the area it was removed. The class 5 road material was excavated and stockpiled in the lay down area near the Pond 3 construction trailer. The common fill was placed along the Pond 3 interior benches adjacent to the area that it was removed. All stripped material was re-used as part of the construction project.

3.3 Bottom Ash

Approximately 44,300 cubic yards of bottom ash was used construct the Pond 3 interior benches. The ash was graded into place by a dozer utilizing GPS. The material was graded into approximately 12-inch loose lifts and compacted with a smooth-drum vibratory roller prior to placement of additional fill material. To ensure proper compaction of the bottom ash, sixteen (16) in-place field density tests using a nuclear density meter were completed on the compacted bottom ash. The density tests were completed at a minimum frequency of one test per 3,000 cubic yards. The density tests were compared to the standard proctor results to determine if the field density met the 95 percent compaction criteria. All density tests passed the minimum specified compaction of 95 percent. Table 4 presents the sample/test

information such as sample no., date, location, elevation, and results. Appendix E contains the test/sample laboratory reports. All sample analyses (proctor) and in-place density testing were performed by American Engineering Testing, Inc.

An elevation verification survey was completed to ensure the fill met the minimum elevation tolerance of +/-0.1 foot. The results of the survey are included in Appendix C. Results of the survey indicate that the elevation tolerance was met at all bottom ash grid point locations

3.4 Clay Barrier

Approximately 9,400 cubic yards of clay (in-place volume) was used to complete the clay barrier vertical expansion project. The in-place volume was determined by multiplying the clay barrier square footage by the expansion height (6-feet) and converting to cubic yards. The clay came from a pre-qualified off-site source (pit) located in Wright County, Minnesota and was hauled to the construction area and placed on the clay barrier over a 3 week period utilizing ten (10) to twenty (20) belly-dump semis.

The placed clay was connected to the top of the existing clay barrier at an elevation of 998 by scarifying and moistening the top of the existing clay barrier prior to placing the first lift of clay. Following placement, a dozer utilizing GPS spread the clay into 9-inch loose lifts approximately 13-feet wide (for semi travel) along the clay barrier alignment. The loose lifts were then compacted with a vibratory sheepsfoot roller. Each lift was maintained in a rough and moistened condition to promote bonding between lifts and provide uniformity throughout the clay barrier. Once the barrier was approximately 4-feet thick (vertically), the GPS excavator shaped the exterior of the clay barrier by pulling up the extra clay along the outside 1.5 horizontal to 1 vertical slope and placing it on the top in six (6) inch lifts to a final height elevation of 1004 and width of 8-feet. A vibratory sheepsfoot roller followed behind to compact each clay lift pulled up by the excavator. The top of the clay barrier was compacted with a smooth-drum roller to provide a smooth finish surface.

3.4.1 Clay Material Testing

3.4.1.1 Pre-Qualification Testing

To ensure the source area clay met the required project specifications, two (2) source area samples were collected from the proposed clay source pit. Each sample was collected by excavating down with an excavator approximately 10

feet and collecting multiple grab samples at various elevations and combining them into one (1) composite sample for analyses. One (1) composite sample was collected from a test pit excavated at the estimated north end of the clay source area and one (1) composite sample was collected from a test pit excavated at the estimated south end of the source area. The samples were analyzed for permeability, USCS classification, percent passing #200 sieve, and atterberg limits. The permeability samples were tested at 97 percent standard proctor density and at or above optimum moisture. Both samples met the minimum project specifications except for the percent passing the #200 sieve. The project specifications required the percent passing #200 sieve to be a minimum of 50 percent, however CL-2 only had 46.4 percent passing. Given the relatively close margin of non-compliance, and that the results of the recompacted permeability ranged from 6.0 to 8.2 x 10^{-9} cm/sec (well under the maximum permeability of 1 x 10^{-7} cm/sec), the test results were deemed acceptable by Xcel and Carlson McCain and the clay source was approved for use.

Table 1 presents the clay source pre-qualification sample/test information such as sample ID., date, location, project requirements, and results and Appendix D contains the test/sample laboratory reports. The samples were collected by Veit personnel under observation of Carlson McCain and were analyzed by Soil Engineering Testing Inc.

3.4.1.2 In-Place Density & Moisture Testing

To ensure proper soil compaction and moisture content was achieved, in-place density and moisture tests using a nuclear density meter were completed on the placed clay at a minimum frequency of one test per 200 cubic yards. The project specifications called for 95 percent of standard proctor density, however, clay from this borrow source has been used in the past and produced much lower permeabilities with a 97 percent compaction. The density tests were compared to the standard proctor results to determine if the field density met the design compaction criteria of 97 percent compaction at 0 – 5 percent above optimum moisture content. There were two (2) proctor samples analyzed from the clay source material collected from the pre-qualification clay testing, and five (5) proctor samples analyzed from the in-place clay delivered on site.

During the in-place density and moisture testing, the nuclear meter indicated moisture was too low. Veit then moistened the clay, used a disc plow to mix the clay together, compacted, and then re-tested using the density meter. Again, the meter indicated moisture was too low even though Veit and Carlson McCain staff both agreed the clay was clearly at or above optimum moisture. AET then grabbed a sample from the clay that was tested and brought it to the laboratory to be analyzed for moisture. The laboratory results confirmed what was observed in the field, that the clay

was too wet (higher that 5% of optimum moisture). With this information, project staff got together to discuss the accuracy of the nuclear density gauge on this clay. AET said that the moisture content determined by the gauge can be up to 2.5% off of the laboratory value, however, the in-place wet density is much more accurate. Project staff then determined the most accurate way to determine in-place moisture would be to collect a sample at each test location to be analyzed for laboratory moisture. Once this procedure was implemented, Veit had less trouble achieving passing in-place density and moisture results. AET provided a summary letter to explain why the gauge can be off 2.5% and why a previous project with the same clay source and same soil testing sub-contractor could vary. This letter and the field density reports with the corrected laboratory moisture content can be found in Appendix D.

In total, Eighty-three (83) in-place field density tests were collected from the clay placed on the barrier. In general, there were four (4) tests performed on each 6-inch lift of compacted clay. Twenty-four (24) retests were needed to achieve passing results at all test locations. Figure 1 depicts the location of the in-place field density/moisture tests. All in-place tests passed the density and moisture requirements of the project.

Table 2 presents the in-place density and moisture sample/test information such as sample no., date, location, elevation, project requirements and results, Figure 1 shows the location of the density and moisture tests, and Appendix D contains the test/sample laboratory reports. All in-place density testing was performed by American Engineering Testing, Inc.

3.4.1.3 In-Place Permeability

To ensure the placed clay met the in-place permeability requirements, four (4) thin-wall tube samples were collected and analyzed. Figure 1 depicts the location of the thin-wall samples. The samples were collected by pushing a standard thin-wall tube (18 inches long x 3 inches diameter) into the compacted clay material with a skid loader bucket and removing the thin-wall tube with the skid loader bucket. The thin-wall tube was positioned in a vertical alignment during installation and extracted by a chain attached to the bucket. The samples were extracted at the laboratory and analyzed for permeability. All samples met the minimum project specifications. Table 3 presents the in-place permeability sample/test information such as sample ID., date, location, project requirements, and results and Appendix D contains the test/sample laboratory reports. The samples were collected by Carlson McCain, Inc. and were analyzed by Soil Engineering Testing Inc.

3.4.2 Verification Survey

The top of the existing clay barrier was exposed and surveyed to establish subgrade elevations. Once the clay barrier was installed, it was surveyed again to ensure the clay barrier met the project specifications for elevation (1004) and minimum width (8-feet). Results of the survey indicate that the clay barrier was constructed in accordance with the required project specifications.

The results of the survey and as-built survey drawing are included in Appendix C.

3.5 Common Fill

The road subgrade was re-constructed using the salvaged fill material and an additional source of common fill following installation of the clay barrier. The additional common fill came from the common fill borrow area located east of Pond 3N and was hauled to the construction area with off-road trucks. The additional required volume of common fill was estimated at 56,500 cubic yards. The additional volume was calculated by determining the total volume of common fill required for the project and subtracting the volume of the initially stripped material. The location of the borrow area is referenced on the Record Drawings included in Appendix A.

The salvaged common fill and the additional common fill were graded into place by a dozer utilizing GPS. The material was graded into approximately 12-inch loose lifts and compacted with a smooth-drum vibratory roller prior to placement of additional fill material.

To ensure proper soil compaction of the common fill, nineteen (19) in-place field density tests using a nuclear density meter were completed on the compacted common fill material. The density tests were completed at a minimum frequency of one test per 3,000 cubic yards. The density tests were compared to the standard proctor results to determine if the field density met the 95 percent compaction criteria. All density tests passed the minimum specified compaction of 95 percent. Table 5 presents the sample/test information such as sample no., date, location, elevation, and results and Appendix F contains the test/sample laboratory reports. All sample analyses (proctor) and in-place density testing were performed by American Engineering Testing, Inc.

An elevation verification survey was completed to ensure the common fill met the minimum elevation tolerance of +/-0.1 foot. The results of the survey are included in Appendix C. Results of the survey indicate that the elevation tolerance was met at all common fill grid point locations.

3.6 Class 5

Class 5 aggregate was placed as road surface material over the common fill material. Approximately 2,700 cubic yards (in-place volume) of class 5 was used to construct the roads. The in-place volume was determined by multiplying the estimated square footage of the road surface by the thickness of class 5 (6-inches) and converting to cubic yards. All class 5 was salvaged from the initial stripping process and no addition class 5 was required.

The class 5 was hauled to the construction area with dump trucks, graded into place by a dozer utilizing GPS to a depth of approximately 6-inches and compacted with a vibratory smooth-drum roller. No material and/or density tests were collected from the class 5 as they were not required as part of the project specifications.

A thickness verification survey was completed to ensure the placed class 5 met the minimum tolerance of 6-inches +0.0 – 0.1 foot (6.0 – 7.2 inches). Results of the survey indicate that the class 5 thickness ranged from 6.0 to 7.1 inches and the thickness tolerance was met at all class 5 grid point locations. The results of the survey are included in Appendix C.

3.7 Topsoil

Topsoil was placed along the road edges, embankments/slope areas, and all disturbed areas following installation of the common fill and class 5. The topsoil came from two sources, material salvaged during the beginning of the project and from a topsoil stockpile. The amount excavated from the stockpile was estimated at 650 cubic yards (hauled volume). This estimated volume was determined by multiplying the number of trucks by the estimated haul volume of each truck. The topsoil was hauled from the stockpile, located east Pond 3, to the project area with dump trucks. The location of the east topsoil stockpile is referenced on the Record Drawings included in Appendix A.

The topsoil was graded by a dozer utilizing GPS to a depth of approximately 6-inches and/or to the design finished grade elevations.

No topsoil samples were collected nor analyzed for nutrient content or fertilizer recommendations. The on-site topsoil has been sampled multiple times during previous construction projects and the most recent sampling results (summer 2014) were provided to the general contractor for nutrient content and fertilizer recommendations.

A thickness verification survey was completed to ensure the placed topsoil met the minimum tolerance of 6-inches +0.0 – 0.1 foot (6.0 – 7.2 inches). Results of the survey indicate that the topsoil thickness ranged from 6.0 to 7.0 inches and the thickness tolerance was met at all topsoil grid point locations. The results of the survey are included in Appendix C.

3.8 Turf Establishment

All topsoil and disturbed areas were seeded, fertilized and either mulched or covered with erosion control blankets. Drawing P4 of the Record Drawings included in Appendix A illustrates the areas that were seeded/fertilized and either mulched and disc anchored or covered with erosion control blankets. Terra Services completed the turf establishment activities.

The disturbed areas were dragged with a steel mechanical drag and seeded and fertilized all at the same time by using a 3-pt pendulum spreader attached to a tractor. The seeded areas where then mulched and disc anchored using a custom built large steel disc. The erosion control blankets were placed by a skid loader with a draw bar that unrolled the 16-foot wide blankets as the machine moved forward. The blankets were stapled in-place as they were being installed.

A copy of the seed mix tag, fertilizer tag, and erosion control blanket specification sheet used on the project are included in Appendix G.

3.9 Dewatering System Cleanout Extensions

As part of the vertical expansion project the existing cleanout pipes located along the east side of Pond 3 were extended and raised to provide future access. Each cleanout was extended approximately 10-feet using an 8-inch SDR 17 solid wall polyethylene pipe, and fused to the existing 8-inch SDR 17 cleanout pipe with an electrofusion coupling. The existing corrugated metal protective casings were salvaged and reinstalled on the extended cleanouts. Additional details associated with the cleanout extensions are illustrated on the Record Drawings included in Appendix A.

3.10 Dewatering Manhole Extensions

As part of the vertical expansion project the two existing dewatering manholes in the northwest and northeast corner of Pond 3 were raised. The northwest manhole was raised from an elevation of 1000.6 to an elevation of 1006. The northeast manhole was raised from an elevation of 997 to an elevation of 1006. The new manhole sections have an 80-mil HDPE stud liner cast into the interior wall. A cap strip of 80-mil HDPE liner was welded on the interior of the

manhole sections to connect the existing 80-mil liners to the new ones. All HDPE welds were spark tested. No leaks were found. Each manhole contains one (1) 8" HDPE cleanout riser. These cleanouts were extended to be within 1' of the manhole top slap. Electrofusion couplers were used to connect the new pipe sections to the existing. The manhole details are illustrated on the Record Drawings in Appendix A.

SECTION 4.0 - CONCLUSION

Construction of the Pond 3 2015 Vertical Expansion Project has been completed in accordance with the goals and objectives of the construction activities presented within the referenced Technical Specification Documents and in compliance with the requirements contained in NPDES Permit No. 0002186.

SECTION 5.0 - REFERENCES

2015 Sherco Ash Construction Project Technical Specification, prepared by Carlson McCain dated April 27, 2015

2015 Ash Construction Project Drawings, prepared by Carlson McCain dated April 16, 2015

Tables

TABLE 1
SAMPLE/TEST INFORMATION – CLAY (SOURCE AREA PRE-QUALIFICATION)
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE ID	SAMPLE COLLECTION DATE	LAB PERMEABILITY @ 97% PROCTOR DRY DENSITY W/MOISTURE CONTENT @ 0-5% WET OF OPTIMUM (MAX $1x10^{-7}$ CM/SEC)	USCS CLASSIFICATION (SC/CL/CH)	% PASSING #200 SIEVE (MIN 50%)	ATTERBERG LIMITS		TEST RESULT (PASS/FAIL)
					LIQUID LIMIT (25% OR GREATER)	PLASTICITY INDEX (12% OR GREATER)	
CL-1 (Source)	6/23/2015	6.0 x 10-9 cm/sec	CL	50.2	31.5	18.8	Pass
CL-2 (Source)	6/23/2015	8.2 x 10-9 cm/sec	SC	46.4	29.4	16.4	Pass

Notes:

1. Required samples 1/5000 cu. yds. : Project est. @ 9355 cu. yds. = 2 samples
2. CL-1 tested at 96% compaction
3. CL-2 accepted despite low amount Passing #200 Sieve, because of passing permeability
4. See lab reports in Appendix D for additional information

TABLE 2
SAMPLE/TEST INFORMATION – CLAY (IN-PLACE DENSITY AND MOISTURE)
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE NO.	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TEST LOCATION			NUCLEAR IN-PLACE DRY DENSITY (PCF)	IN-PLACE LAB MOISTURE (%)	SOIL PROCTOR ID	PROCTOR MAX DRY DENSITY (PCF)	PROCTOR OPTIMUM MOISTURE (%)	RELATIVE COMPACTION (%)	TEST RESULT (PASS/FAIL)	# OF PASSING TESTS	COMMENTS
		NORTHING	EASTING	GROUND ELEVATION									
CL-1	6/23/2015	---	---	---	---	---	---	117.8	13.1	---	---	---	Clay Source Prequalification Proctor (tested by SET)
CL-2	6/23/2015	---	---	---	---	---	---	118.5	12.9	---	---	---	Clay Source Prequalification Proctor (tested by SET)
CL-3	8/26/2015	---	---	---	---	---	---	119.0	13.4	---	---	---	Proctor from Clay Delivered to site (tested by SET)
CL-4	8/26/2015	---	---	---	---	---	---	117.6	13.7	---	---	---	Proctor from Clay Delivered to site (tested by SET)
AET-CL1	8/26/2015	---	---	---	---	---	---	115.8	12.9	---	---	---	Proctor from Clay Delivered to site (tested by AET)
AET-CL2	8/26/2015	---	---	---	---	---	---	118.0	12.8	---	---	---	Proctor from Clay Delivered to site (tested by AET)
AET-CL3	8/26/2015	---	---	---	---	---	---	118.6	12.8	---	---	---	Proctor from Clay Delivered to site (tested by AET)
CL1	8/24/2015	862405.0	2030833.9	998.4	114.1	14.2	CL-1	117.8	13.1	96.9	Pass*	1	*Relative Compaction rounded up to 97.0%
CL2	8/24/2015	862410.2	2030833.9	999.5	112.8	16.1	CL-1	117.8	13.1	95.8	Fail	1	
CL3	8/24/2015	862407.0	2030910.8	999.5	117.6	13.2	CL-1	117.8	13.1	99.8	Pass	2	
CL4	8/24/2015	862413.9	2031025.0	1000.2	118.9	12.9	CL-2	118.5	12.9	100.3	Pass	3	
CL5	8/24/2015	862421.7	2031148.6	1000.1	116.9	12.2	CL-1	117.8	13.1	99.2	Fail	3	
CL6	8/24/2015	862460.9	2031874.3	999.0	114.0	15.6	CL-1	117.8	13.1	96.8	Fail	3	
CL7	8/24/2015	862460.9	2031874.3	999.0	114.6	15.8	CL-1	117.8	13.1	97.3	Pass	4	Retest CL6
CL8	8/25/2015	862421.7	2031148.6	1000.1	119.8	12.3	CL-1	117.8	13.1	101.7	Fail	4	Retest CL5
CL9	8/25/2015	862460.0	2031774.0	1000.0	116.3	12.8	CL-1	117.8	13.1	98.7	Fail	4	
CL10	8/25/2015	862460.0	2031774.0	1000.0	116.9	12.5	CL-1	117.8	13.1	99.2	Fail	4	Retest CL9
CL11	8/25/2015	862418.9	2031001.3	1000.5	116.2	13.7	CL-1	117.8	13.1	98.6	Pass	5	
CL12	8/25/2015	862422.7	2031099.0	1001.5	108.8	18.2	CL-1	117.8	13.1	92.4	Fail	5	
CL13	8/25/2015	862449.3	2031669.3	1001.1	119.3	13.5	CL-2	118.5	12.9	100.7	Pass	6	
CL14	8/26/2015	863600.0	2031990.8	998.5	116.2	16.0	AET-CL1	115.8	12.9	100.3	Pass	7	
CL15	8/26/2015	862422.7	2031099.0	1001.5	113.4	16.6	CL-1	117.8	13.1	96.3	Fail	7	Retest CL12
CL16	8/26/2015	863600.0	2031990.8	998.5	118.5	13.0	AET-CL1	115.8	12.9	102.3	Pass	8	Retest CL14
CL17	8/26/2015	862460.0	2031774.0	1000.0	115.1	14.5	CL-1	117.8	13.1	97.7	Pass	9	Retest CL9, CL10
CL18	8/26/2015	862421.7	2031148.6	1000.1	117.9	12.1	CL-1	117.8	13.1	100.1	Fail	9	Retest CL5, CL8
CL19	8/26/2015	862421.7	2031148.6	1000.1	116.1	14.0	CL-1	117.8	13.1	98.6	Pass	10	Retest CL5, CL8, CL18
CL20	8/26/2015	862410.2	2030923.3	999.5	117.0	13.3	CL-1	117.8	13.1	99.3	Pass	11	Retest CL2
CL21	8/26/2015	862632.4	2031991.2	999.0	116.6	14.7	AET-CL2	118.0	12.8	98.8	Pass	12	
CL22	8/26/2015	862701.4	2031993.9	999.5	117.9	15.8	AET-CL3	118.6	12.8	99.4	Pass	13	
CL23	8/26/2015	862689.9	2031991.9	999.5	119.6	13.9	AET-CL3	118.6	12.8	100.8	Pass	14	
CL24	8/26/2015	863495.5	2031988.8	1000.0	119.7	14.3	AET-CL3	118.6	12.8	100.9	Pass	15	
CL25	8/27/2015	863392.5	2031987.4	1000.5	120.2	13.2	AET-CL3	118.6	12.8	101.3	Pass	16	
CL26	8/27/2015	862423.7	2031102.8	1001.5	112.9	16.5	CL-1	117.8	13.1	95.8	Fail	16	
CL27	8/27/2015	863302.8	2031991.3	1001.0	114.9	14.4	CL-1	117.8	13.1	97.5	Pass	17	
CL28	8/27/2015	863169.5	2031986.8	1001.5	119.4	13.0	AET-CL2	118.0	12.8	101.2	Pass	18	

TABLE 2 CONT.
SAMPLE/TEST INFORMATION – CLAY (IN-PLACE DENSITY AND MOISTURE)
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE NO.	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TEST LOCATION			NUCLEAR IN-PLACE DRY DENSITY (PCF)	IN-PLACE LAB MOISTURE (%)	SOIL PROCTOR ID	PROCTOR MAX DRY DENSITY (PCF)	PROCTOR OPTIMUM MOISTURE (%)	RELATIVE COMPACTION (%)	TEST RESULT (PASS/FAIL)	# OF PASSING TESTS	COMMENTS
		NORTHING	EASTING	GROUND ELEVATION									
CL29	8/27/2015	863097.1	2031988.1	1002.0	118.4	13.4	CL-3	119.0	13.4	99.5	Pass	19	
CL30	8/27/2015	864060.2	2031993.8	998.5	122.0	12.3	CL-3	119.0	13.4	102.5	Fail	19	
CL31	8/28/2015	864060.2	2031993.8	998.5	117.0	15.2	CL-3	119.0	13.4	98.3	Pass	20	Retest CL30
CL32	8/28/2015	864155.5	2031989.4	999.0	116.8	14.8	CL-2	118.5	12.9	98.6	Pass	21	
CL33	8/28/2015	863947.2	2031990.3	999.5	115.2	16.2	CL-2	118.5	12.9	97.2	Pass	22	
CL34	8/28/2015	864249.2	2031988.1	1000.0	114.5	14.1	CL-3	119.0	13.4	96.2	Fail	22	
CL35	8/28/2015	864246.2	2031988.1	1000.0	118.8	13.7	CL-3	119.0	13.4	99.8	Pass	23	Retest CL34
CL36	8/31/2015	864436.1	2031991.0	1000.0	109.6	17.5	CL-1	117.8	13.1	93.0	Fail	23	
CL37	8/31/2015	862422.7	2031099.0	1001.5	118.6	14.0	CL-4	117.6	13.7	100.9	Pass	24	Retest CL12, CL15
CL38	8/31/2015	862423.7	2031102.8	1001.5	116.4	15.8	CL-4	117.6	13.7	99.0	Pass	25	Retest CL26
CL39	9/1/2015	864436.1	2031991.0	1000.0	111.5	16.3	CL-1	117.8	13.1	94.7	Fail	25	Retest CL 36
CL40	9/1/2015	864436.1	2031991.0	1000.0	110.3	17.4	CL-1	117.8	13.1	93.6	Fail	25	Retest CL36,CL39
CL41	9/1/2015	865360.0	2031300.2	998.5	114.9	16.8	CL-4	117.6	13.7	97.7	Pass	26	
CL42	9/1/2015	864436.1	2031991.0	1000.0	111.0	16.9	CL-1	117.8	13.1	94.2	Fail	26	Retest CL36,CL39, CL40
CL43	9/2/2015	862431.8	2031206.7	1002.5	113.8	16.1	CL-4	117.6	13.7	96.8	Fail	26	
CL44	9/2/2015	862448.8	2031576.6	1002.0	114.7	16.7	CL-4	117.6	13.7	97.5	Pass	27	
CL45	9/2/2015	862446.2	2031474.7	1003.0	116.5	15.7	CL-4	117.6	13.7	99.1	Pass	28	
CL46	9/2/2015	862431.8	2031206.7	1002.5	115.3	15.3	CL-4	117.6	13.7	98.0	Pass	29	Retest CL43
CL47	9/2/2015	862431.8	2031206.7	1002.5	115.0	15.1	CL-4	117.6	13.7	97.8	Pass	30	Retest CL43, CL46
CL48	9/2/2015	862436.0	2031259.0	1002.5	117.8	15.0	CL-4	117.6	13.7	100.2	Pass	31	
CL49	9/2/2015	862428.6	2031151.3	1002.5	118.7	14.6	CL-4	117.6	13.7	100.9	Pass	32	
CL50	9/3/2015	862426.7	2031143.6	1001.5	113.3	16.9	CL-4	117.6	13.7	96.3	Pass**	33	**Test approved by Xcel
CL51	9/3/2015	862423.2	2031049.0	1001.5	119.5	13.8	CL-4	117.6	13.7	101.6	Pass	34	
CL52	9/3/2015	862423.2	2031049.0	1001.5	115.6	15.4	CL-4	117.6	13.7	98.3	Pass	35	
CL53	9/3/2015	862436.9	2031303.8	1003.5	115.1	15.1	CL-4	117.6	13.7	97.9	Pass	36	
CL54	9/3/2015	862454.1	2031581.1	1004.0	114.7	16.0	CL-4	117.6	13.7	97.5	Pass	37	
CL55	9/4/2015	864436.1	2031991.0	1000.0	112.6	16.5	CL-1	117.8	13.1	95.6	Fail	37	Retest CL36,CL39, CL40, CL42
CL56	9/4/2015	863012.6	2031986.9	1002.5	120.5	14.5	CL-3	119.0	13.4	101.3	Pass	38	
CL57	9/4/2015	863624.3	2031984.0	1003.0	119.4	12.5	CL-4	117.6	13.7	101.5	Fail	38	
CL58	9/8/2015	863624.3	2031986.9	1003.0	115.2	15.5	CL-4	117.6	13.7	98.0	Pass	39	Retest CL57
CL59	9/8/2015	864436.1	2031991.0	1000.0	113.6	15.9	CL-1	117.8	13.1	96.4	Fail	39	Retest CL36,CL39, CL40, CL42, CL55
CL60	9/8/2015	865357.1	2031398.0	999.0	115.5	15.9	CL-3	119.0	13.4	97.1	Pass	40	
CL61	9/8/2015	865357.2	2031198.1	999.5	117.6	15.1	CL-3	119.0	13.4	98.8	Pass	41	
CL62	9/8/2015	865360.0	2031503.0	1000.0	114.3	15.6	CL-4	117.6	13.7	97.2	Pass	42	
CL63	9/8/2015	862895.0	2031983.1	1003.5	120.2	14.4	CL-3	119.0	13.4	101.0	Pass	43	
CL64	9/8/2015	865354.0	2031110.6	1000.5	115.0	15.7	CL-4	117.6	13.7	97.8	Pass	44	
CL65	9/8/2015	864436.1	2031991.0	1000.0	114.8	16.5	CL-4	117.6	13.7	97.6	Pass	45	Retest CL36,CL39, CL40, CL42, CL55, CL59

TABLE 2 CONT.

SAMPLE/TEST INFORMATION – CLAY (IN-PLACE DENSITY AND MOISTURE)

POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE NO.	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TEST LOCATION			NUCLEAR IN-PLACE DRY DENSITY (PCF)	IN-PLACE LAB MOISTURE (%)	SOIL PROCTOR ID	PROCTOR MAX DRY DENSITY (PCF)	PROCTOR OPTIMUM MOISTURE (%)	RELATIVE COMPACTION (%)	TEST RESULT (PASS/FAIL)	# OF PASSING TESTS	COMMENTS
		NORTHING	EASTING	GROUND ELEVATION									
CL66	9/9/2015	865358.2	2031609.0	1001.0	114.2	15.8	CL-4	117.6	13.7	97.1	Pass	46	
CL67	9/9/2015	865353.0	2031001.9	1001.5	113.1	15.9	AET-CL1	115.8	12.9	97.7	Pass	47	
CL68	9/10/2015	865353.0	2031001.9	1001.5	116.3	16.2	CL-3	119.0	13.4	97.7	Pass	48	Retest CL67
CL69	9/11/2015	865149.0	2031989.6	1000.5	116.1	15.8	CL-3	119.0	13.4	97.6	Pass	49	
CL70	9/11/2015	865046.9	2031987.9	1001.0	118.6	15.0	CL-3	119.0	13.4	99.7	Pass	50	
CL71	9/11/2015	864943.8	2031990.0	1001.5	116.8	15.1	CL-3	119.0	13.4	98.2	Pass	51	
CL72	9/11/2015	864552.4	2031988.3	1002.0	116.2	16.4	CL-3	119.0	13.4	97.6	Pass	52	
CL73	9/11/2015	863381.0	2031982.7	1004.0	120.5	13.7	CL-3	119.0	13.4	101.3	Pass	53	
CL74	9/11/2015	864850.7	2031987.9	1002.5	116.8	15.2	CL-3	119.0	13.4	98.2	Pass	54	
CL75	9/14/2015	864673.2	2031982.8	1003.5	114.2	15.1	CL-4	117.6	13.7	97.1	Pass	55	
CL76	9/14/2015	865106.5	2031986.2	1003.0	118.5	14.3	CL-3	119.0	13.4	99.6	Pass	56	
CL77	9/14/2015	865355.7	2031742.3	1002.0	121.2	13.5	CL-3	119.0	13.4	101.8	Pass	57	
CL78	9/14/2015	865107.8	2031985.0	1003.0	117.2	16.0	CL-3	119.0	13.4	98.5	Pass	58	Retest CL76
CL79	9/15/2015	864499.9	2031981.5	1004.0	116.8	15.5	CL-3	119.0	13.4	98.2	Pass	59	
CL80	9/15/2015	865355.6	2031851.9	1002.5	117.0	15.0	CL-3	119.0	13.4	98.3	Pass	60	
CL81	9/15/2015	865349.8	2031633.9	1003.5	116.6	15.4	CL-3	119.0	13.4	98.0	Pass	61	
CL82	9/16/2015	865352.9	2031386.6	1003.0	115.8	14.2	CL-3	119.0	13.4	97.3	Pass	62	
CL83	9/21/2015	865353.0	2030795.4	1004.0	119.8	15.7	CL-3	119.0	13.4	100.7	Pass	63	

Notes:

1. Required samples 1/200 cu. yds. : Project est. @ 9355 cu. yds. = minimum 47 tests
2. Clay compacted to 97% to ensure in-place permeability of 1 x 10-7 cm/sec was met
3. GPS coordinates obtained from GPS rover provided by Xcel
4. In-place density tests obtained from Troxler 3440 Density Gauge at a probe depth of 6 inches
5. See lab reports in Appendix D for additional information

TABLE 3
SAMPLE/TEST INFORMATION – CLAY (IN-PLACE PERMEABILITY TESTING)
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION/TEST LOCATION			MIN. IN-PLACE PERMEABILITY @ 97% PROCTOR DRY DENSITY W/MOISTURE CONTENT @ 0-5% WET OF OPTIMUM (MAX $1x10^{-7}$ CM/SEC)	USCS CLASSIFICATION (SC/CL/CH)	TEST RESULT (PASS/FAIL)
		NORTHING	EASTING	GROUND ELEVATION			
TW-1	8/26/2015	862440.80	2031481.60	1001.42	1.3×10^{-8} cm/sec	CL	Pass
TW-2	8/28/2015	864113.13	2031991.66	999.34	1.1×10^{-8} cm/sec	CL	Pass
TW-3	9/10/2015	865357.25	2031319.72	1001.98	1.4×10^{-8} cm/sec	CL	Pass
TW-4	9/15/2015	864499.90	2031981.50	1004.00	2.5×10^{-8} cm/sec	CL	Pass

Notes:

1. GPS coordinates obtained from GPS rover provided by Xcel
2. Test locations shown on Figure 1
3. See lab reports in Appendix D for additional information

TABLE 4
SAMPLE/TEST INFORMATION – BOTTOM ASH
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE NO.	SAMPLE COLL. DATE	SAMPLE COLLECTION TEST LOCATION			NUCLEAR IN-PLACE DRY DENSITY (PCF)	NUCLEAR IN-PLACE MOISTURE (%)	SOIL PROCTOR ID	PROCTOR MAX DRY DENSITY (PCF)	PROCTOR OPTIMUM MOISTURE (%)	REL. COMP. (%)	TEST RESULT (PASS/FAIL)	# OF PASSING TESTS
		NORTHING	EASTING	GROUND ELEVATION								
BAP-1	6/25/2015	Sample collected from Bottom Ash Pond			---	---	---	79.5	36.2	---	---	---
BAP-2	6/25/2015	Sample collected from Bottom Ash Pond			---	---	---	73.0	39.5	---	---	---
BAP-3	7/8/2015	Sample collected from Bottom Ash Pond			---	---	---	86.6	29.2	---	---	---
BAP-4	7/24/2015	Sample collected from Bottom Ash Pond			---	---	---	76.2	37.0	---	---	---
BA1	7/8/2015	865342.2	2031647.9	999.2	89.9	8.9	BAP-3	86.6	29.2	103.8	Pass	1
BA2	7/8/2015	864322.3	2031965.7	999.1	90.0	21.0	BAP-3	86.6	29.2	103.9	Pass	2
BA3	7/24/2015	865318.0	2031097.0	1000.0	77.5	20.0	BAP-4	76.2	37.0	101.7	Pass	3
BA4	7/24/2015	865322.0	2031339.0	1000.0	79.1	17.0	BAP-4	76.2	37.0	103.8	Pass	4
BA5	7/24/2015	865021.0	2031960.0	1001.5	85.2	25.0	BAP-3	86.6	29.2	98.4	Pass	5
BA6	8/4/2015	865320.5	3031545.9	1001.2	88.3	10.0	BAP-3	86.6	29.2	102.0	Pass	6
BA7	8/4/2015	864327.5	2031963.0	1002.4	78.0	18.0	BAP-4	76.2	37.0	102.4	Pass	7
BA8	8/4/2015	863010.8	2031938.0	1001.2	82.4	10.0	BAP-1	79.5	36.2	103.6	Pass	8
BA9	8/4/2015	862508.3	2031643.1	998.5	90.3	13.0	BAP-3	86.6	29.2	104.3	Pass	9
BA10	8/4/2015	863235.6	2031949.0	1002.2	78.5	15.0	BAP-1	79.5	36.2	98.7	Pass	10
BA11	8/4/2015	862451.4	2030859.0	1000.5	74.7	16.0	BAP-4	76.2	37.0	98.0	Pass	11
BA12	8/6/2015	864975.9	2031969.7	1003.9	75.6	16.0	BAP-1	79.5	36.2	95.1	Pass	12
BA13	8/6/2015	865324.2	2031761.2	1002.5	80.8	18.0	BAP-1	79.5	36.2	101.6	Pass	13
BA14	8/11/2015	862489.2	2031450.3	1001.0	87.8	20.0	BAP-3	86.6	29.2	101.4	Pass	14
BA15	8/11/2015	862427.1	2031450.3	1001.0	78.8	21.0	BAP-1	79.5	36.2	99.1	Pass	15
BA16	8/25/2015	862430.5	2031036.4	1003.8	77.2	21.4	BAP-1	79.5	36.2	97.1	Pass	16

Notes:

1. BAP refers to Bottom Ash Proctor Sample obtained from Bottom Ash Pond
2. BA refers to in-place nuclear density test on placed bottom ash material
3. Required samples 1/3000 cu. yds. : Project est. @ 44276 cu. yds. = minimum 15 tests
4. Minimum specified bottom ash relative compaction = 95.0%
5. GPS coordinates obtained from GPS rover provided by Xcel
6. In-place density & moisture tests obtained from Troxler 3440 Density Gauge at a probe depth of 12 inches
7. See lab reports in Appendix E for additional information

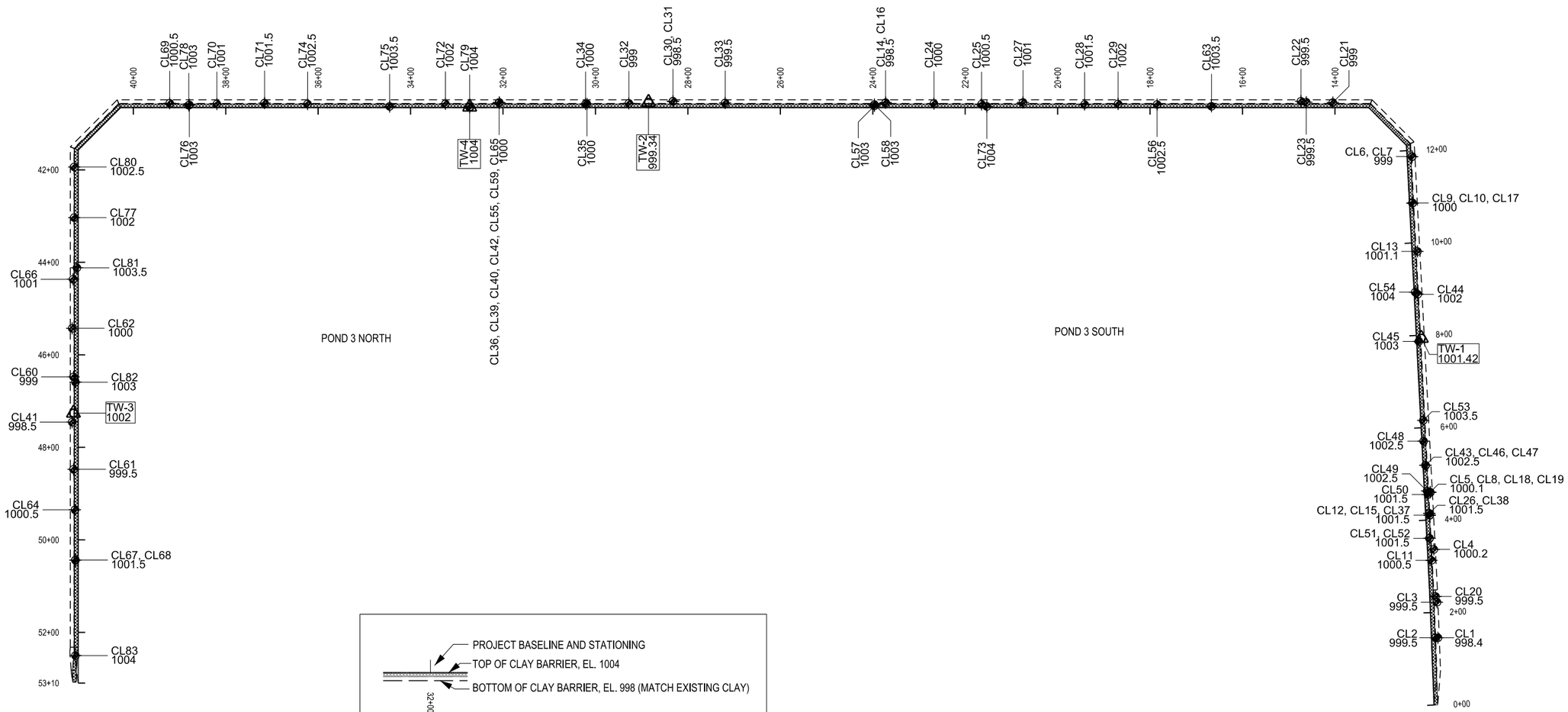
TABLE 5
SAMPLE/TEST INFORMATION – COMMON FILL
POND 3 2015 VERTICAL EXPANSION PROJECT

SAMPLE NO.	SAMPLE COLL. DATE	SAMPLE COLLECTION TEST LOCATION			NUCLEAR IN-PLACE DRY DENSITY (PCF)	NUCLEAR IN-PLACE MOISTURE (%)	SOIL PROCTOR ID	PROCTOR MAX DRY DENSITY (PCF)	PROCTOR OPTIMUM MOISTURE (%)	REL. COMP. (%)	TEST RESULT (PASS/FAIL)	# OF PASSING TESTS
		NORTHING	EASTING	GROUND ELEV.								
CFP-1	6/25/2015	Sample collected from Borrow Source			---	---	---	112.7	13.8	---	---	---
CFP-2	6/25/2015	Sample collected from Borrow Source			---	---	---	114.7	15.0	---	---	---
CFP-3	9/29/2014	Sample collected from Borrow Source			---	---	---	119.7	11.0	---	---	---
CF1	9/21/2015	862427.4	2030963.4	1005.0	117.4	4.4	CFP-3	119.7	11.0	98.1	Pass	1
CF2	9/22/2015	862906.7	2032018.0	1000.0	119.0	3.1	CFP-3	119.7	11.0	99.4	Pass	2
CF3	9/22/2015	865350.0	2030857.4	1005.0	120.9	3.8	CFP-3	119.7	11.0	101.0	Pass	3
CF4	9/24/2015	862410.3	2031027.0	1002.8	115.0	5.1	CFP-3	119.7	11.0	96.1	Pass	4
CF5	9/24/2015	863423.4	2032009.4	1003.0	116.3	4.4	CFP-3	119.7	11.0	97.2	Pass	5
CF6	9/24/2015	862463.2	2031988.6	1002.2	110.3	6.6	CFP-1	112.7	13.8	97.9	Pass	6
CF7	9/25/2015	864622.3	2032000.0	1002.1	113.1	5.8	CFP-2	114.7	15.0	98.6	Pass	7
CF8	9/29/2015	865377.1	2031051.4	1004.0	114.9	3.3	CFP-3	119.7	11.0	96.0	Pass	8
CF9	9/29/2015	862400.7	2030984.1	1006.0	114.6	4.0	CFP-2	114.7	15.0	99.9	Pass	9
CF10	9/29/2015	863363.2	2032006.0	1006.0	112.9	5.9	CFP-2	114.7	15.0	98.4	Pass	10
CF11	9/29/2015	864871.8	2031998.0	1004.0	116.3	3.4	CFP-3	119.7	11.0	97.2	Pass	11
CF12	9/29/2015	865400.6	2032019.5	1002.0	119.8	3.8	CFP-3	119.7	11.0	100.1	Pass	12
CF13	9/30/2015	863514.9	2031990.9	1007.4	114.3	5.1	CFP-3	119.7	11.0	95.5	Pass	13
CF14	9/30/2015	864528.1	2031993.4	1005.2	117.7	3.8	CFP-3	119.7	11.0	98.3	Pass	14
CF15	10/1/2015	862442.6	2031433.2	1007.4	117.6	3.1	CFP-3	119.7	11.0	98.2	Pass	15
CF16	10/1/2015	865366.3	2030767.6	1004.8	120.7	3.0	CFP-3	119.7	11.0	100.8	Pass	16
CF17	10/1/2015	865387.3	2031839.0	1006.1	116.7	4.1	CFP-3	119.7	11.0	97.5	Pass	17
CF18	10/5/2015	864293.9	2031986.6	1007.3	118.5	3.5	CFP-3	119.7	11.0	99.0	Pass	18
CF19	10/5/2015	Pond 3S East Dike		1007.3	120.1	3.7	CFP-3	119.7	11.0	100.3	Pass	19

Notes:

1. CFP refers to Common Fill Proctor Sample obtained from Borrow Source
2. CF refers to in-place nuclear density test on placed common fill material
3. Required samples 1/3000 cu. yds. : Project est. @ 56500 cu. yds. = minimum 19 tests
4. Minimum specified common fill relative compaction = 95.0%
5. Proctor CFP-3 used from project in 2014
6. GPS coordinates obtained from GPS rover provided by Xcel
7. In-place density & moisture tests obtained from Troxler 3440 Density Gauge at a probe depth of 12 inches
8. See lab reports in Appendix F for additional information

Figures



NOTE: REFER TO APPENDIX D FOR COMPLETE TESTING DATA

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FIGURE 1

POND 3 CLAY IN-PLACE DENSITY/MOISTURE AND PERMEABILITY TEST LOCATIONS

11/18/15

P:\Projects\XCEL\3404-04 Pond 3S\2015 Pond 3 Vertical Expansion\Cert Report\Figures\2015 Pond 3 Clay Test Locations.dgn 11/18/2015

Appendix A - Record Drawings

RECORD DRAWINGS
POND 3 2015 VERTICAL EXPANSION

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

Prepared for:

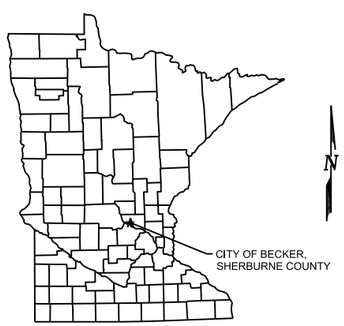
Xcel Energy, Inc.

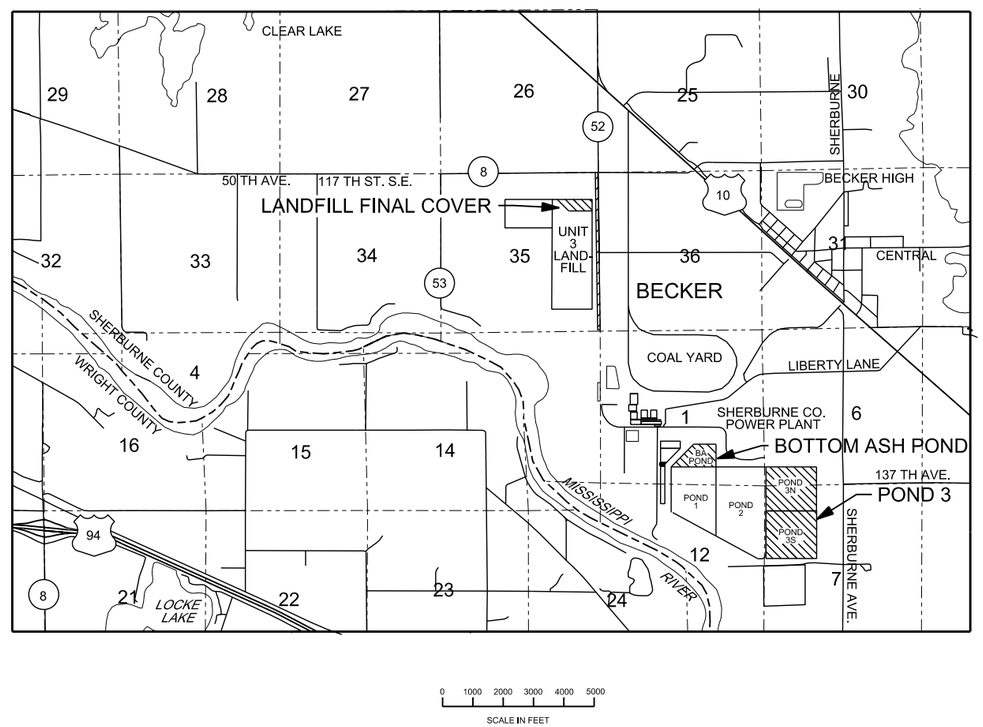
December 4th, 2015

Prepared By:

RECORD DRAWINGS
SHERBURNE COUNTY (SHERCO) GENERATING PLANT
2015 ASH CONSTRUCTION PROJECTS

POND PROJECT NO: SHC11352
& PERMIT: NPDES No. 0002186
UNIT 3 LANDFILL PROJECT NO: SHC11370
& PERMIT: MPCA No. SW-293
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 LAYOUT AND PROJECT AREAS
	BOTTOM ASH POND EXCAVATION
BA1	EXISTING CONDITIONS
BA2	BASE GRADES AND EXCAVATION LIMITS
BA3	EXCAVATED GRADES
	POND 3 VERTICAL EXPANSION
P1	EXISTING CONDITIONS
P2	CLAY BARRIER GRADING PLAN
P2A	NORTHWEST CORNER CLAY BARRIER
P3	AS-BUILT FINISHED GRADING PLAN
P4	RESTORATION PLAN
P5	EMBANKMENT SECTIONS
P6	CLAY BARRIER AND CLEANOUT EXTENSION SECTIONS
P7	DEWATERING RISER AND CLEANOUT EXTENSION SECTIONS
P8	DEWATERING MANHOLE EXTENSION SECTIONS

NOT INCLUDED IN THIS DRAWING SET

	UNIT 3 FINAL COVER
LF1	EXISTING CONDITIONS AND PROJECT LAYOUT
LF2	GEOMEMBRANE GRADING PLAN
LF3	FINAL COVER GRADING PLAN
LF4	FINAL COVER SECTIONS
LF5	FINAL COVER TOE AND MANHOLE OUTLET SECTIONS

NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	ISSUED FOR BIDDING		3/13/2015	DJR	XCEL	DJR
0	ISSUED FOR CONSTRUCTION		4/16/2015	DJR	XCEL	DJR
1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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FIRST NAME: DANIEL J. RIGGS
SIGNATURE:
DATE: 10/30/2015 LICENSE# 49559

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

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ENERGY SUPPLY
ENGINEERING & CONSTRUCTION

2015 ASH CONSTRUCTION PROJECTS

INDEX SHEET

G1

REV ▲

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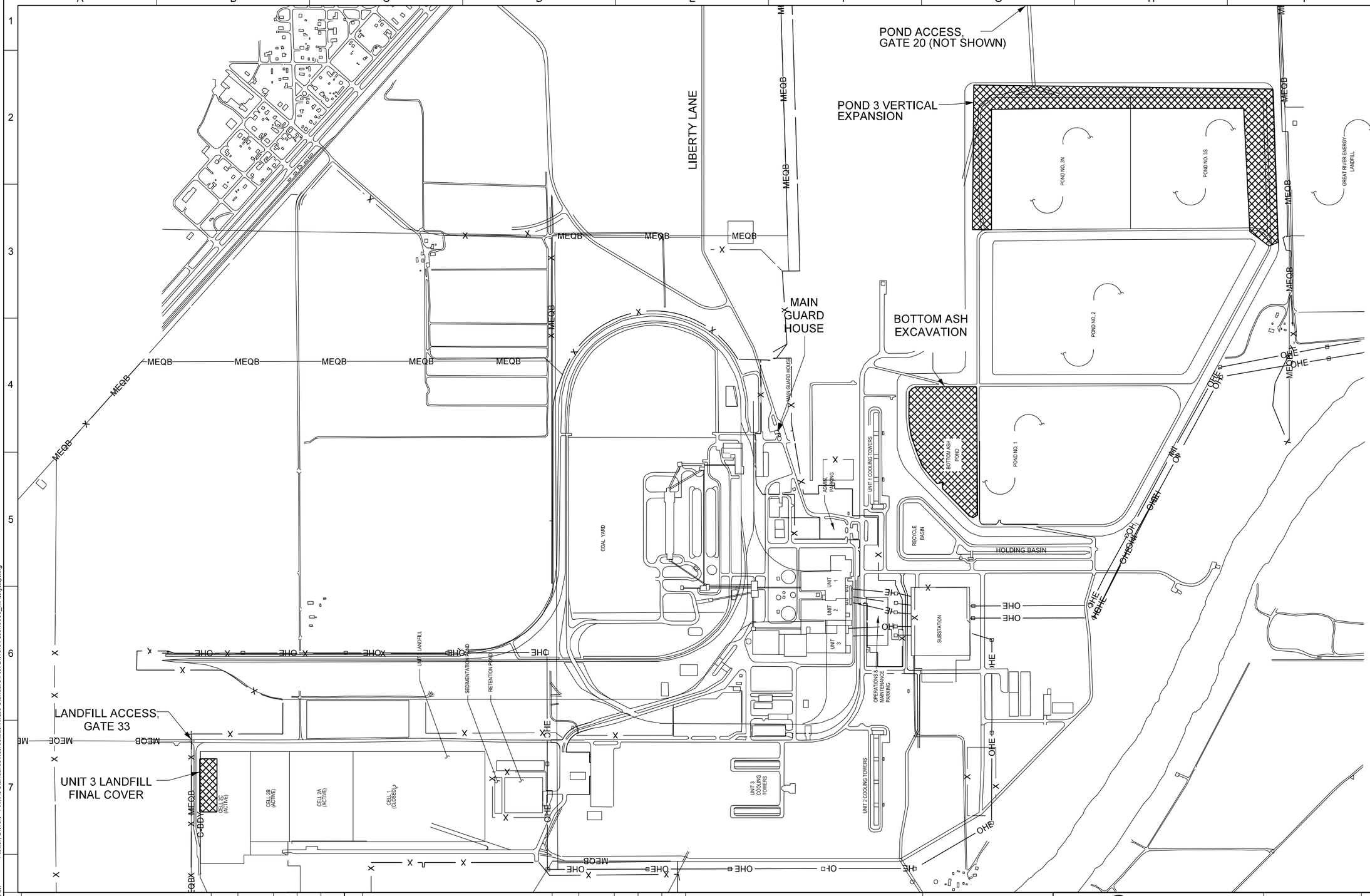

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0	ISSUED FOR CONSTRUCTION		4/16/2015	DJR	XCEL	DJR
1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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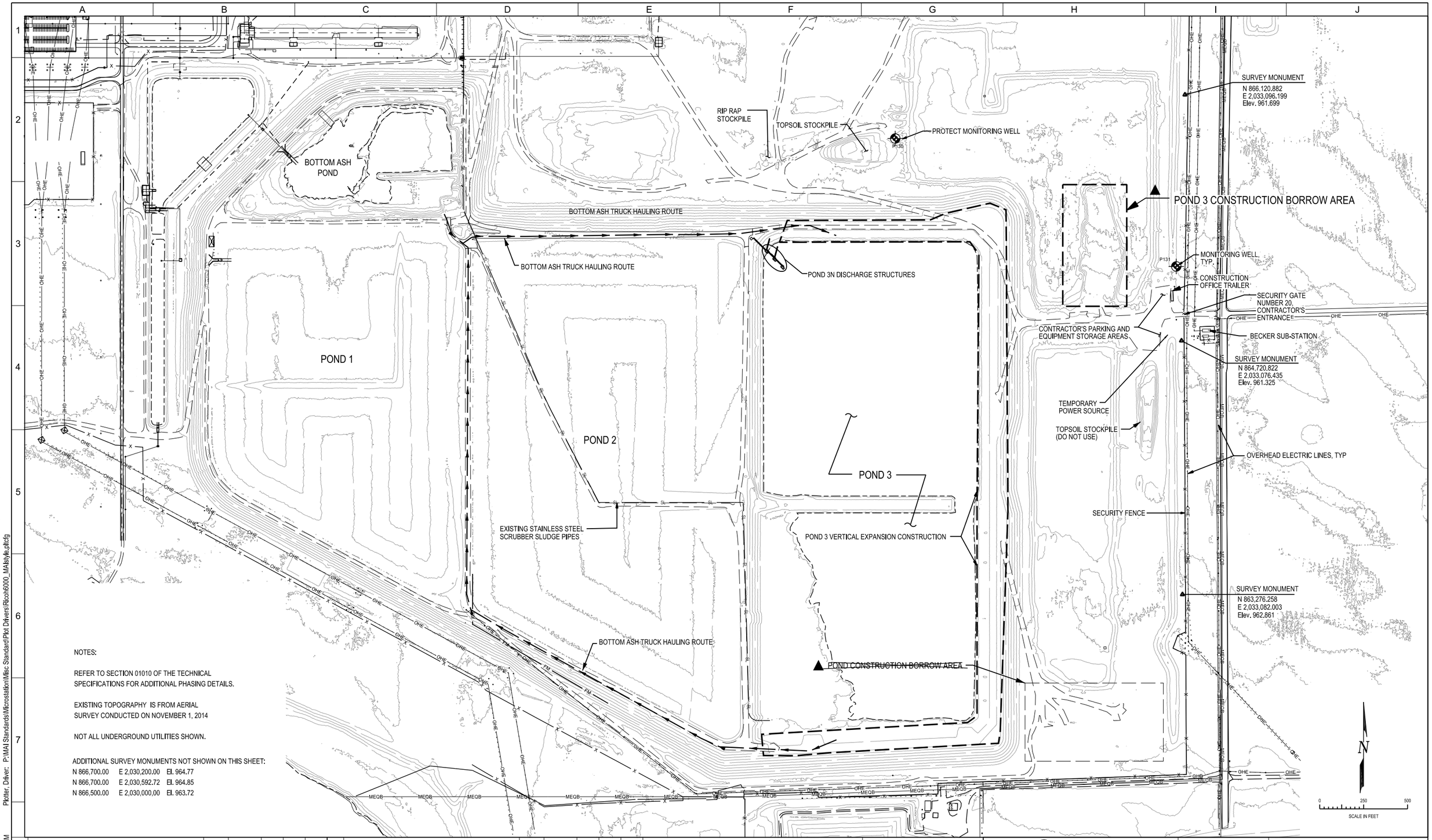
2015 ASH CONSTRUCTION PROJECTS

PLANT LAYOUT AND PROJECT AREAS

G2

REV ▲



NOTES:

REFER TO SECTION 01010 OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL PHASING DETAILS.

EXISTING TOPOGRAPHY IS FROM AERIAL SURVEY CONDUCTED ON NOVEMBER 1, 2014

NOT ALL UNDERGROUND UTILITIES SHOWN.

ADDITIONAL SURVEY MONUMENTS NOT SHOWN ON THIS SHEET:

N 866,700.00	E 2,030,200.00	El. 964.77
N 866,700.00	E 2,030,592.72	El. 964.85
N 866,500.00	E 2,030,000,00	El. 963.72

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POND LAYOUT AND PROJECT AREAS

G3

REV ▲

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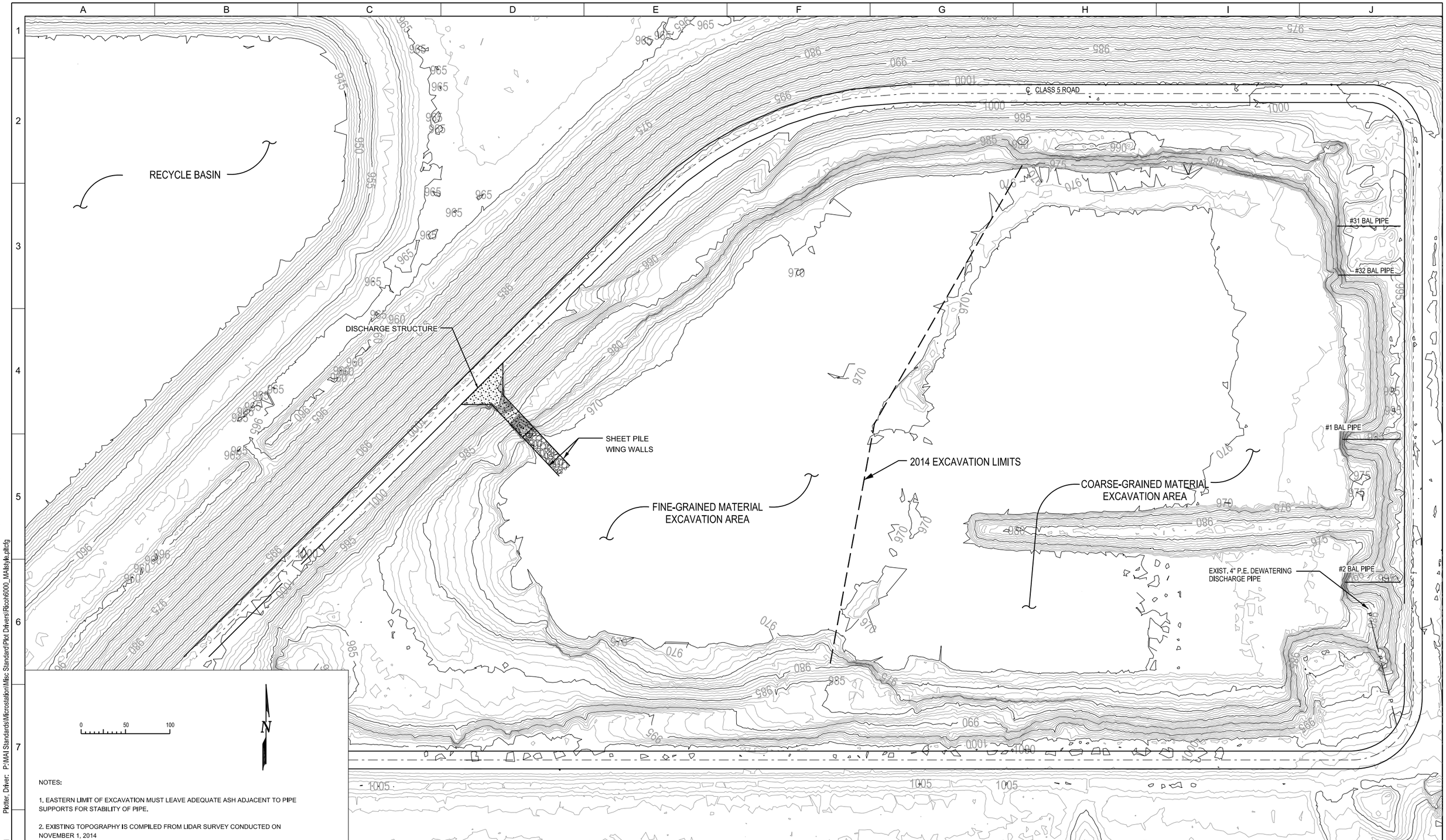

NOTES:

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

2. EXISTING TOPOGRAPHY IS COMPILED FROM LIDAR SURVEY CONDUCTED ON NOVEMBER 1, 2014

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1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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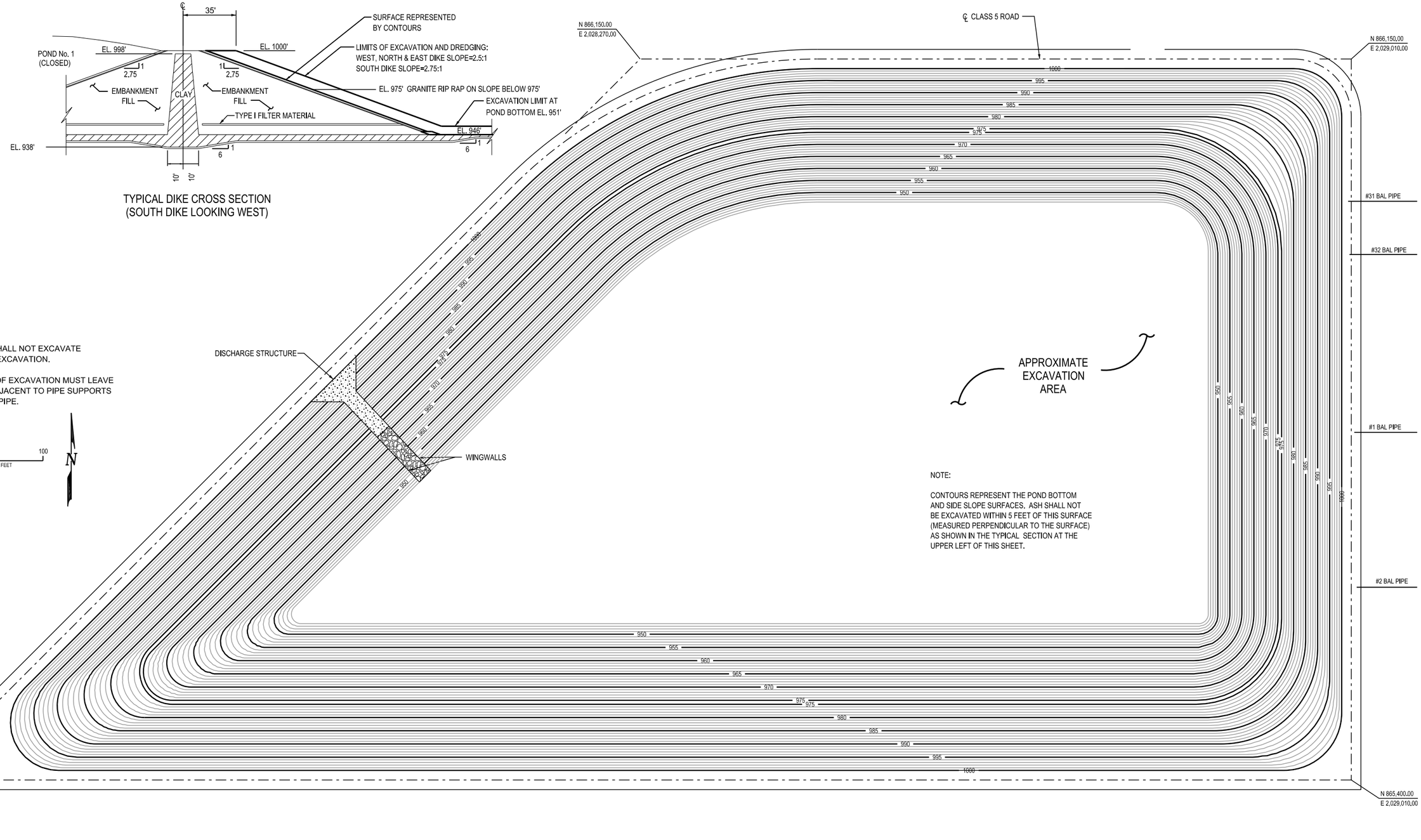
BOTTOM ASH POND EXCAVATION

EXISTING CONDITIONS

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

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.

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1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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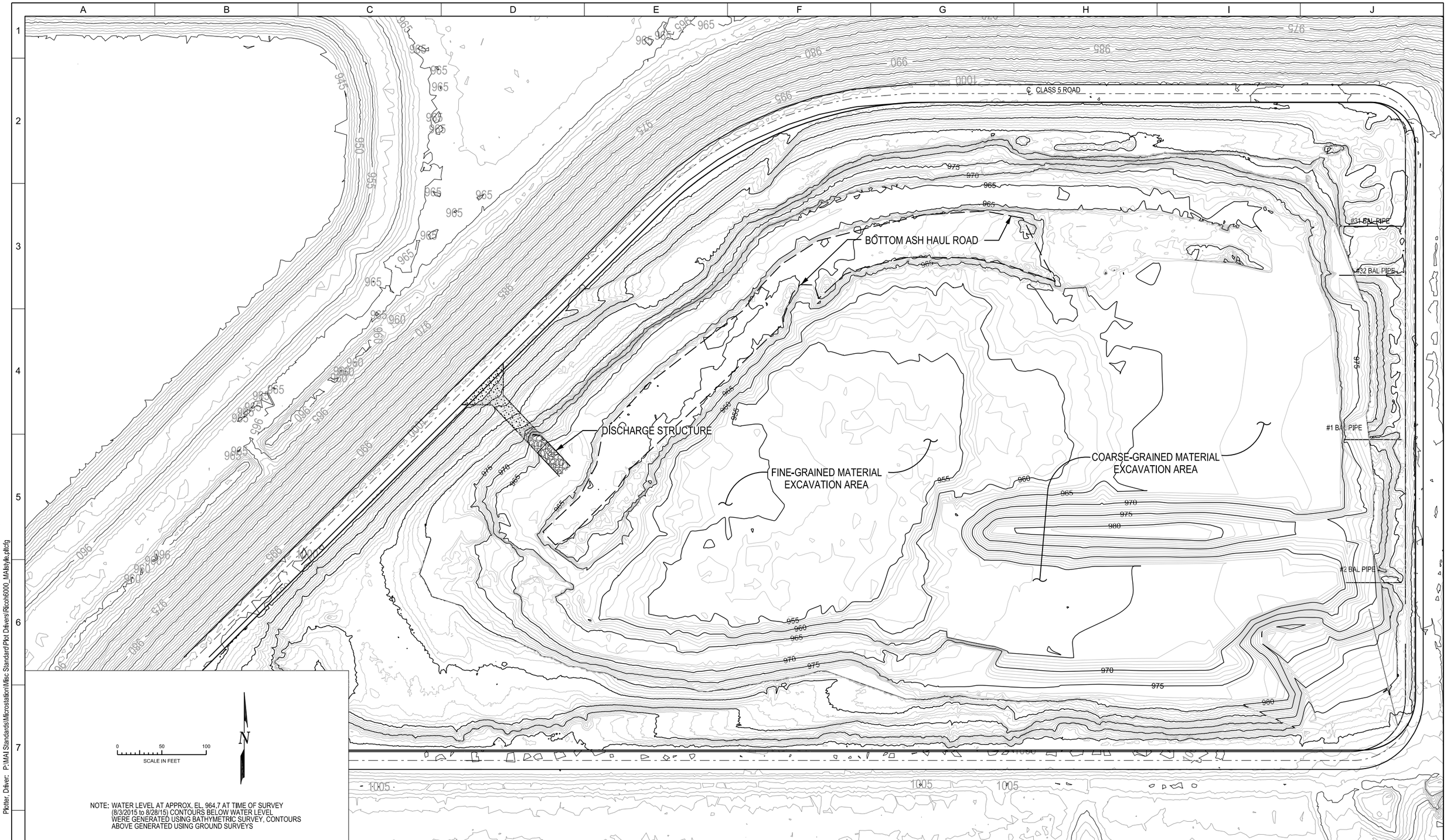
2015 ASH CONSTRUCTION PROJECTS
BOTTOM ASH POND EXCAVATION

BASE GRADES AND EXCAVATION LIMITS

BA2

REV ▲



NOTE: WATER LEVEL AT APPROX. EL. 964.7 AT TIME OF SURVEY (8/3/2015 to 8/28/15) CONTOURS BELOW WATER LEVEL WERE GENERATED USING BATHYMETRIC SURVEY, CONTOURS ABOVE GENERATED USING GROUND SURVEYS

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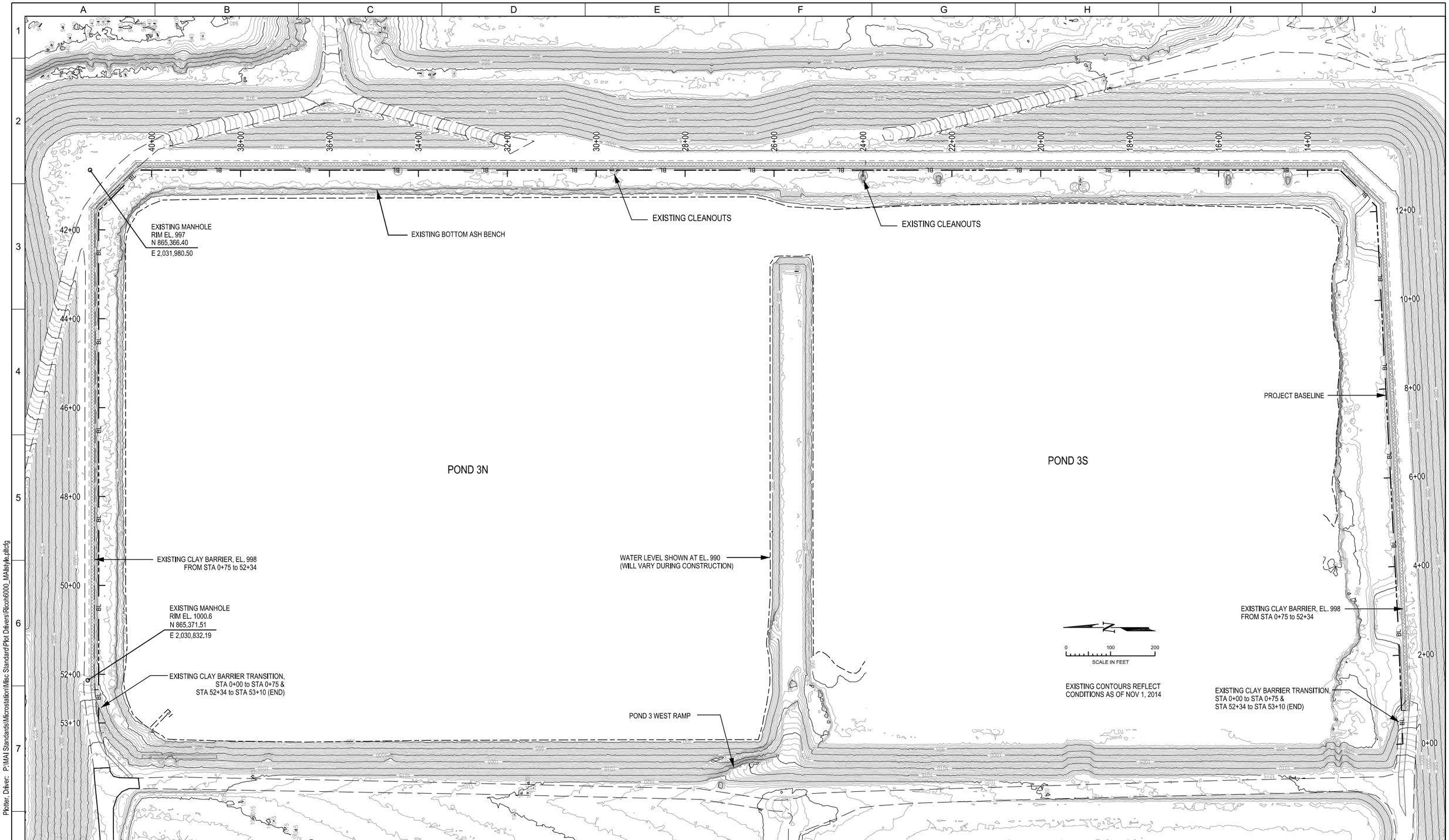
2015 ASH CONSTRUCTION PROJECTS
BOTTOM ASH POND EXCAVATION

EXCAVATED GRADES

BA3

REV ▲



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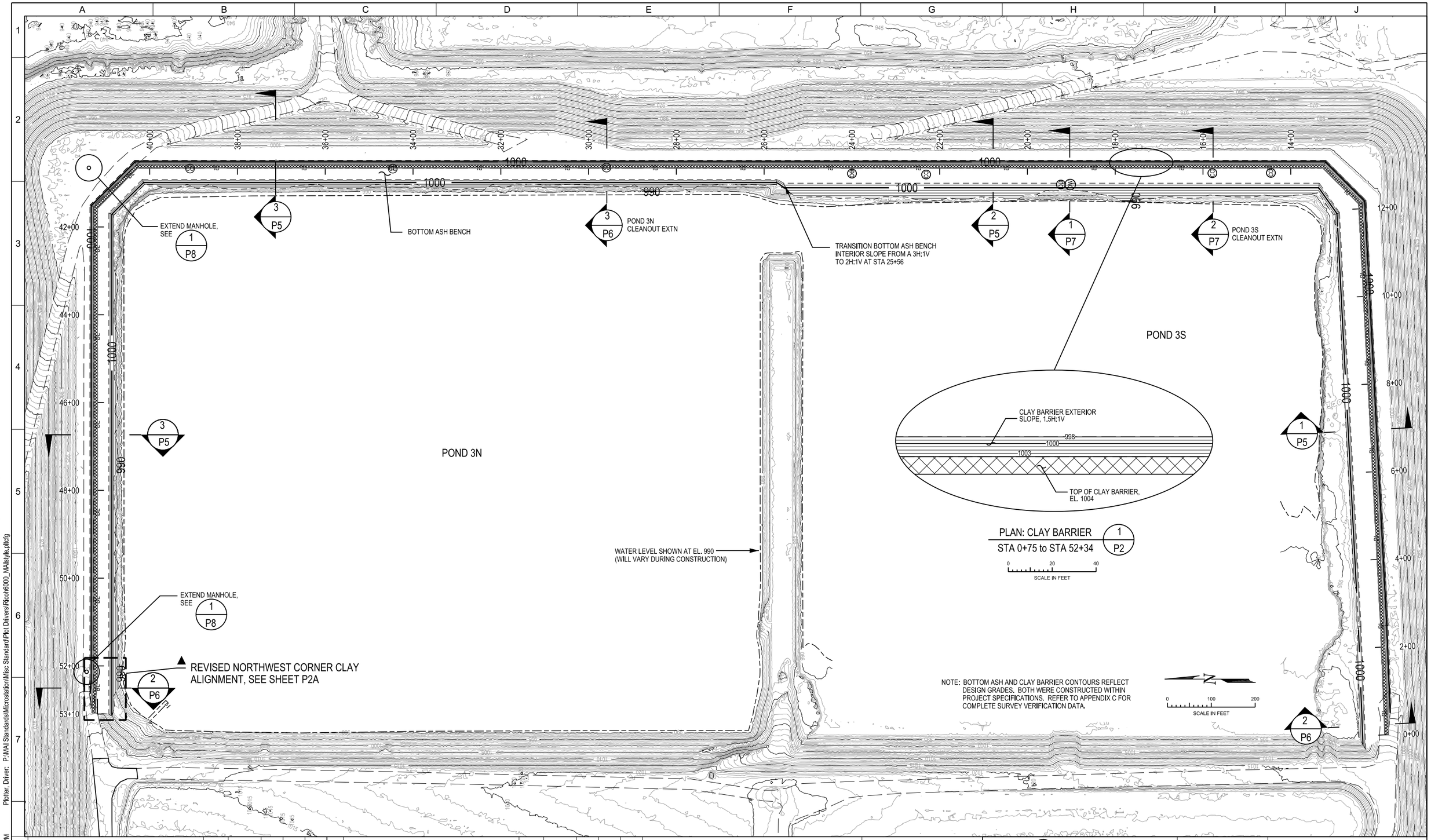
2015 ASH CONSTRUCTION PROJECTS
POND 3 VERTICAL EXPANSION

EXISTING CONDITIONS

P1

REV ▲



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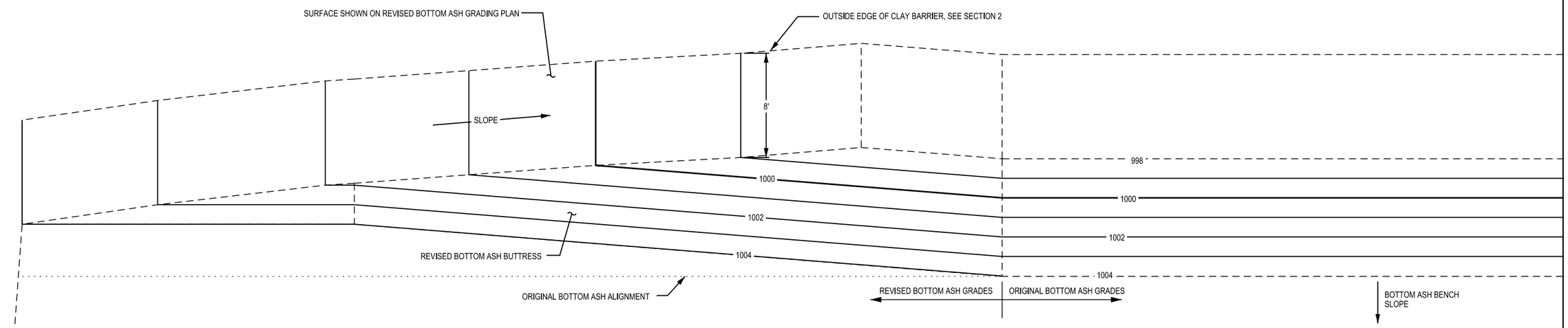
POND 3 VERTICAL EXPANSION

CLAY BARRIER GRADING PLAN

P2

REV ▲



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REVISED BOTTOM ASH GRADES — 1
NORTHWEST CORNER: STA 52+32.2 to 53+10 — 2A

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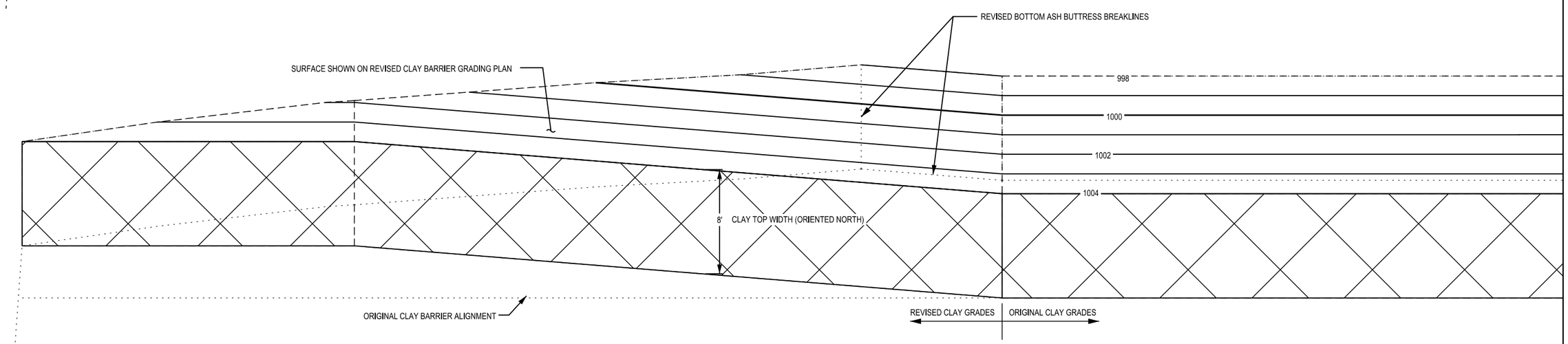
SCALE IN FEET



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REVISED CLAY GRADES — 2
NORTHWEST CORNER: STA 52+32.2 to 53+10 — 2A

0 4 8
SCALE IN FEET

NOTE: THE CLAY BARRIER IN THE NORTHWEST CORNER WAS REALIGNED TO ACCOUNT FOR THE EXISTING COMPOSITE BASE LINER (WHICH WAS CONSTRUCTED FARTHER NORTH THAN DESIGNED). A MINIMUM OF 8 FT OF CLAY-TO-CLAY CONTACT BETWEEN THE EXISTING CLAY AND THE PROPOSED CLAY BARRIER WAS MAINTAINED ALONG THE ENTIRE REVISED AREA.

BOTTOM ASH AND CLAY BARRIER CONTOURS REFLECT DESIGN GRADES. BOTH WERE CONSTRUCTED TO PROJECT SPECIFICATIONS. REFER TO APPENDIX C FOR COMPLETE SURVEY VERIFICATION DATA.

NO	REVISION	ZONE	DATE	BY	CHK	ENG

NO	REVISION	ZONE	DATE	BY	CHK	ENG
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POND 3 VERTICAL EXPANSION
NORTHWEST CORNER CLAY BARRIER

P2A

REV ▲

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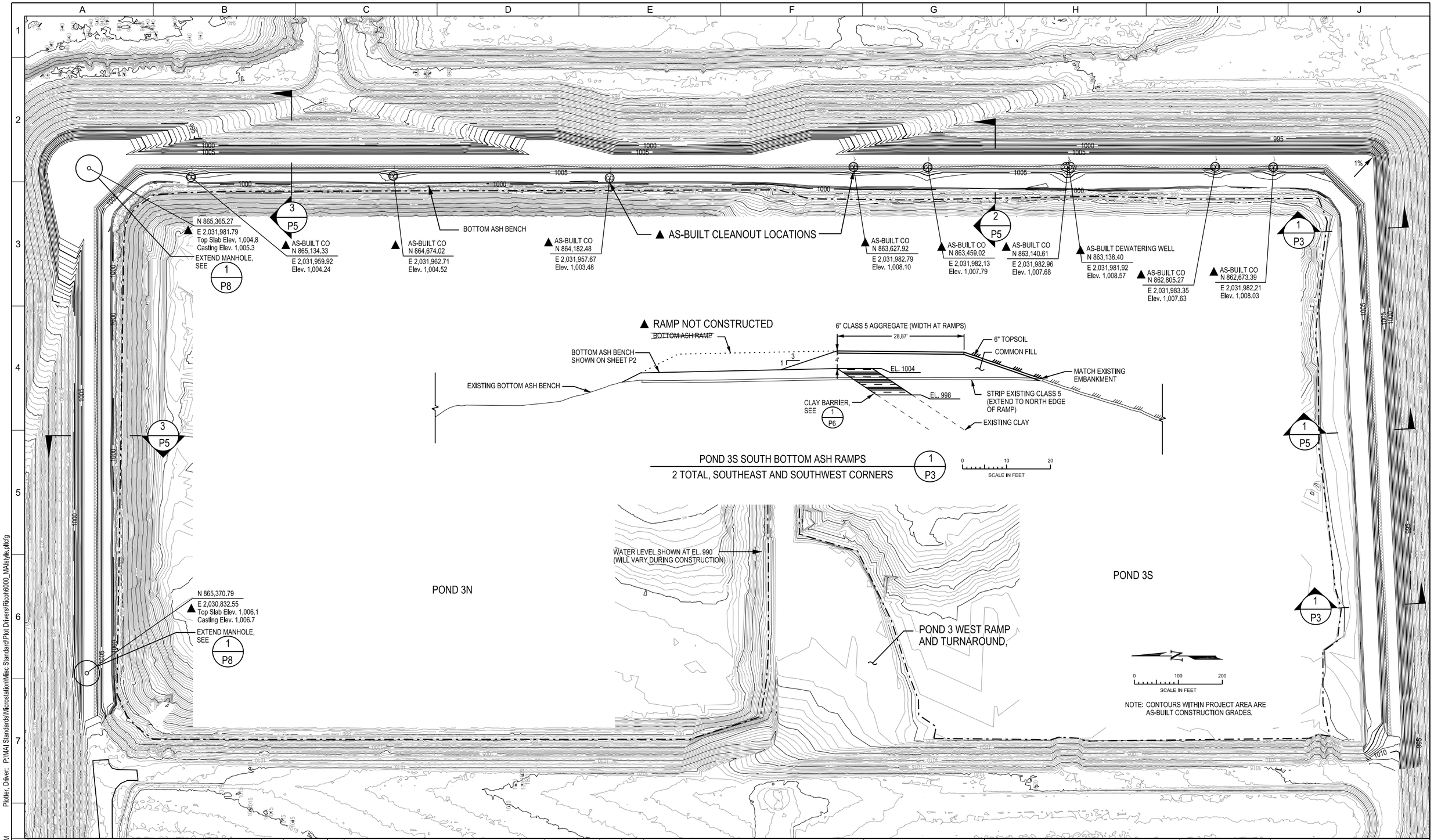

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1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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SIGNATURE:
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APVD:	DATE:	SCALE: SEE DRAWING	

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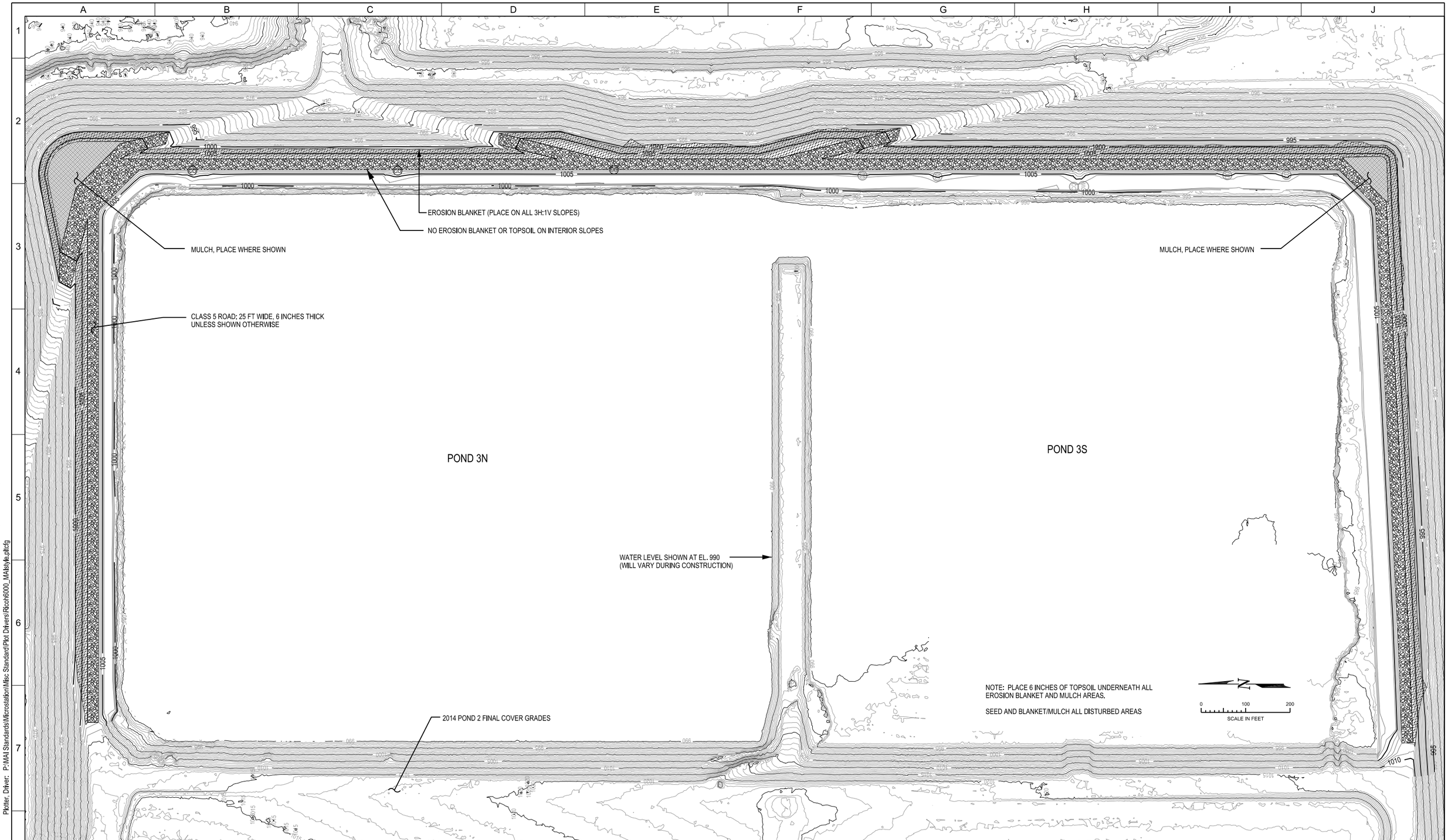
2015 ASH CONSTRUCTION PROJECTS
POND 3 VERTICAL EXPANSION

AS-BUILT FINISHED GRADING PLAN

P3

REV ▲



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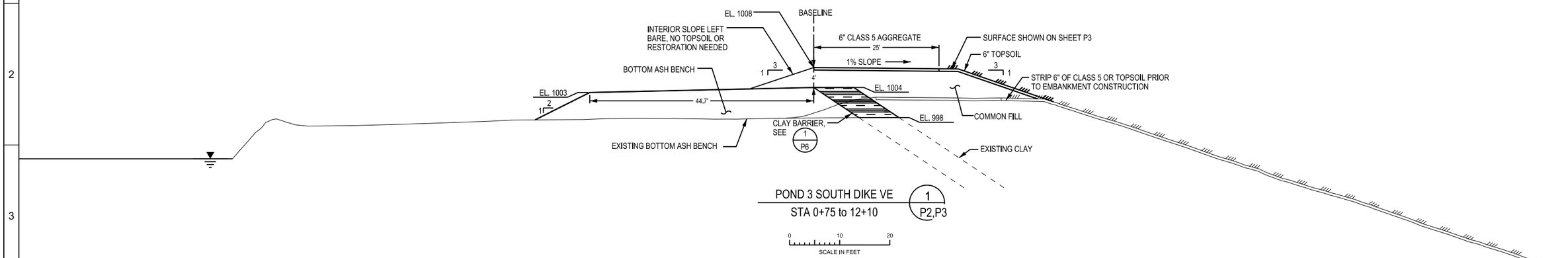
POND 3 VERTICAL EXPANSION

RESTORATION PLAN

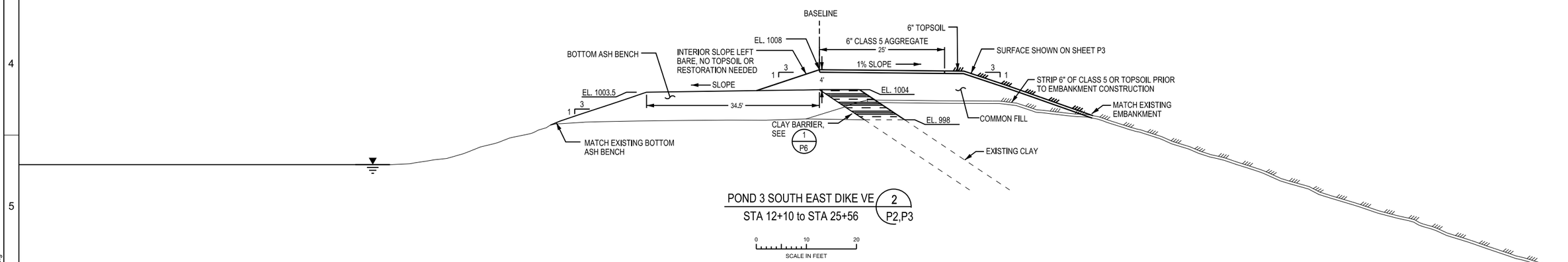
P4

REV ▲



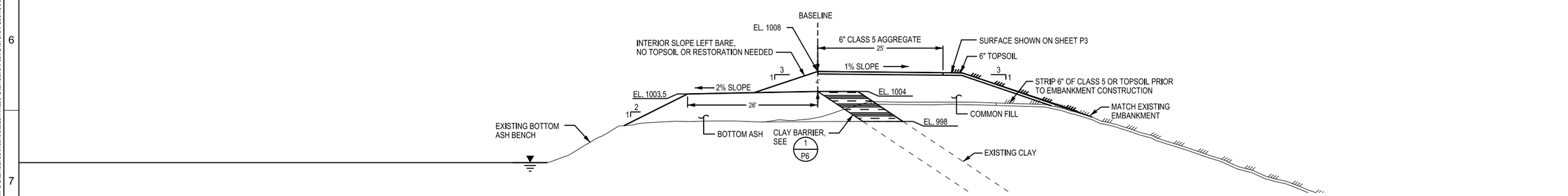
POND 3 SOUTH DIKE VE (1 / P2,P3)
STA 0+75 to 12+10

0 10 20
SCALE IN FEET



POND 3 SOUTH EAST DIKE VE (2 / P2,P3)
STA 12+10 to STA 25+56

0 10 20
SCALE IN FEET



POND 3 NORTH VE (3 / P2,P3)
STA 25+56 to STA 52+34

0 10 20
SCALE IN FEET

NOTE: STATIONING ON EACH SECTION REFLECTS THE FINAL GRADE. CLAY BARRIER CONNECTION MAY VARY. REFER TO SHEET P6 FOR CLAY CONNECTION DETAILS.

NO	REVISION	ZONE	DATE	BY	CHK	ENG

NO	REVISION	ZONE	DATE	BY	CHK	ENG
A	ISSUED FOR BIDDING		3/13/2015	DJR	XCEL	DJR
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▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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EMBANKMENT SECTIONS

P5

REV ▲

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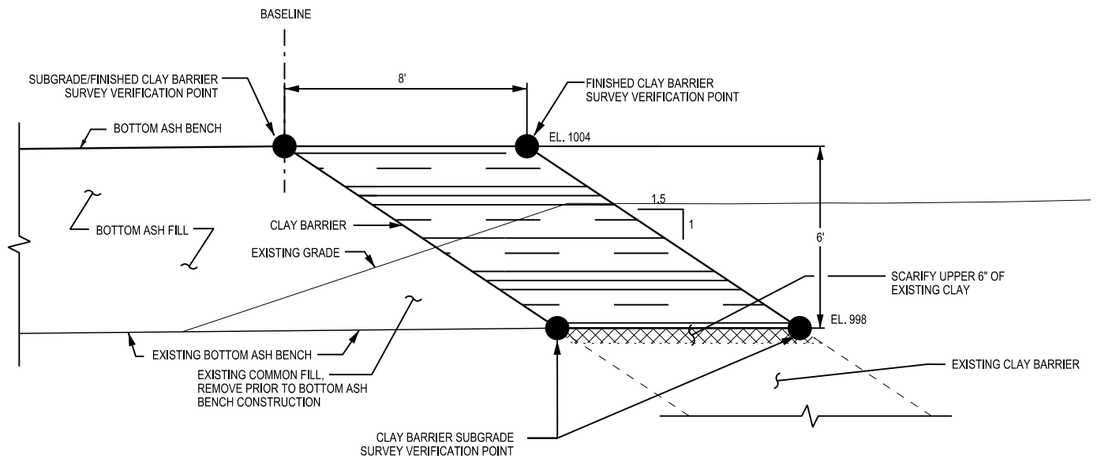
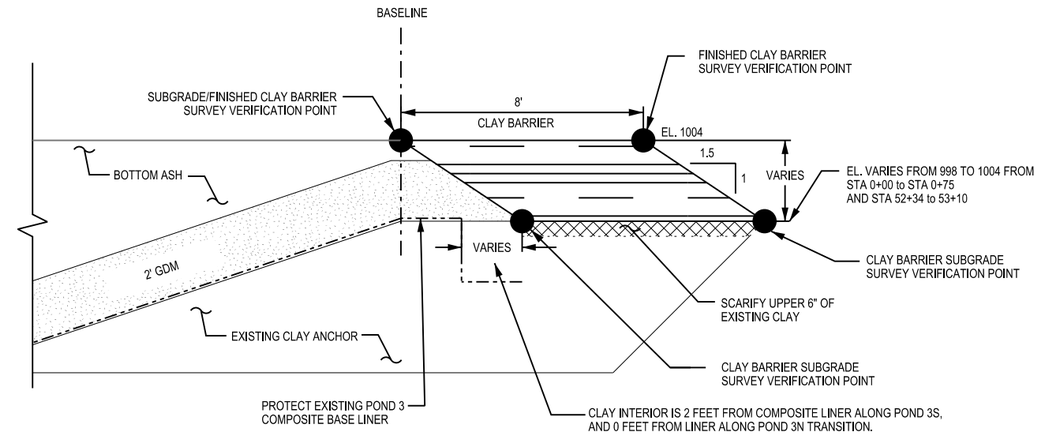


CLAY BARRIER (1) TYP P3,P5,P6,P7

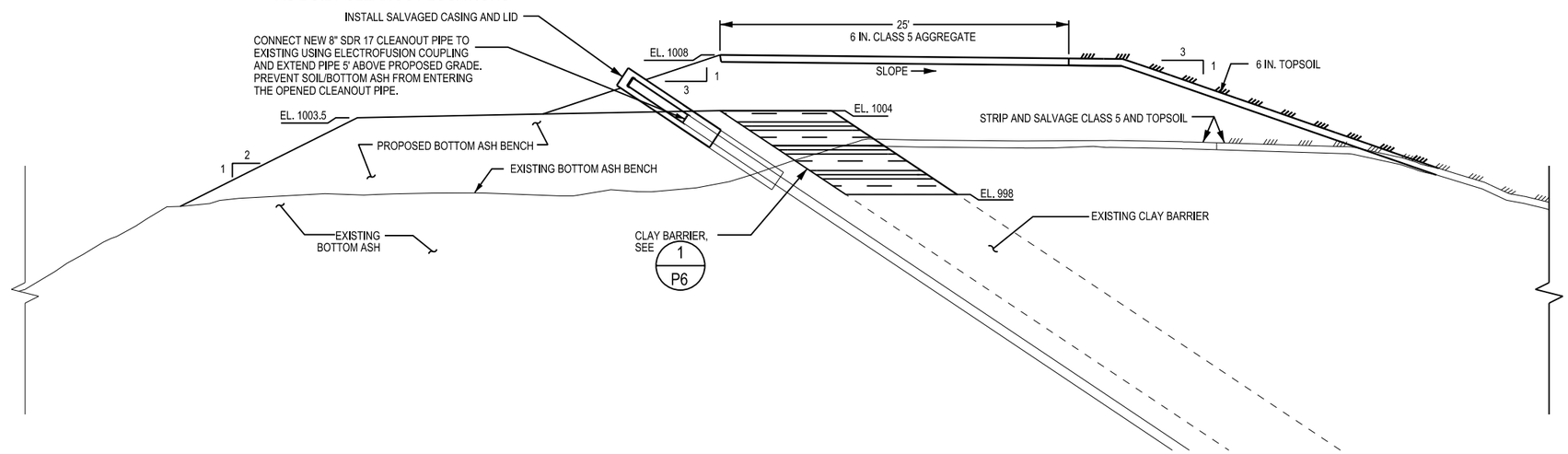
0 2.5 5
SCALE IN FEET



CLAY BARRIER TRANSITION (2) STA 0+00 to 0+75 AND STA 52+34 to 53+10 P2

0 2.5 5
SCALE IN FEET

SEE P3 AND SURVEY TABULATION FOR ▲ AS-BUILT CLEANOUT LOCATIONS



POND 3N CLEANOUT EXTENSION (3) 3 TOTAL P2,P3

0 5 10
SCALE IN FEET

NO	REVISION	ZONE	DATE	BY	CHK	ENG

NO	REVISION	ZONE	DATE	BY	CHK	ENG
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▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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POND 3 VERTICAL EXPANSION
CLAY BARRIER AND CLEANOUT EXTENSION SECTIONS

P6

REV ▲

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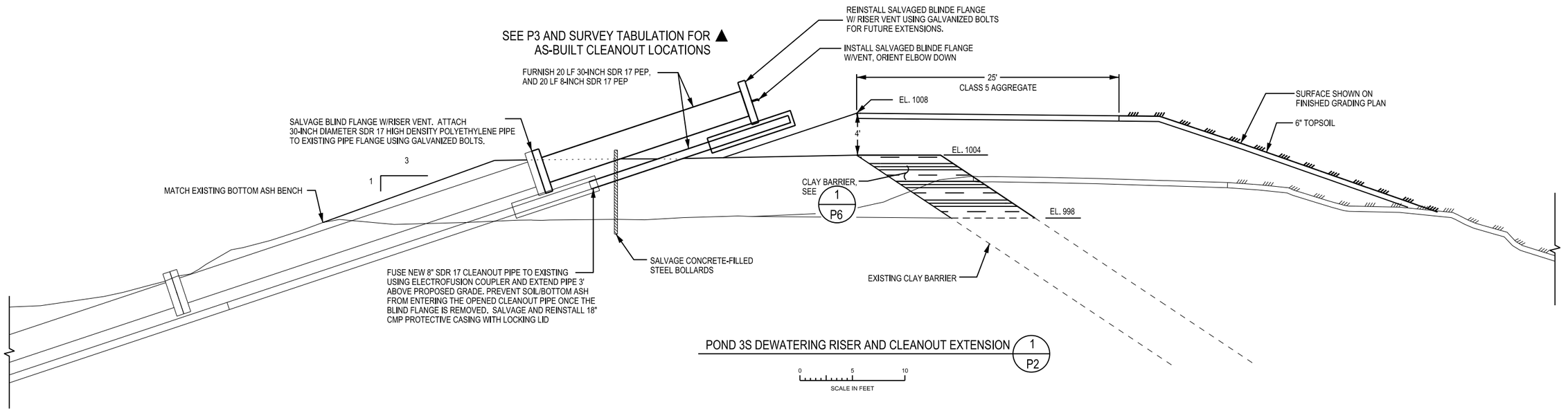
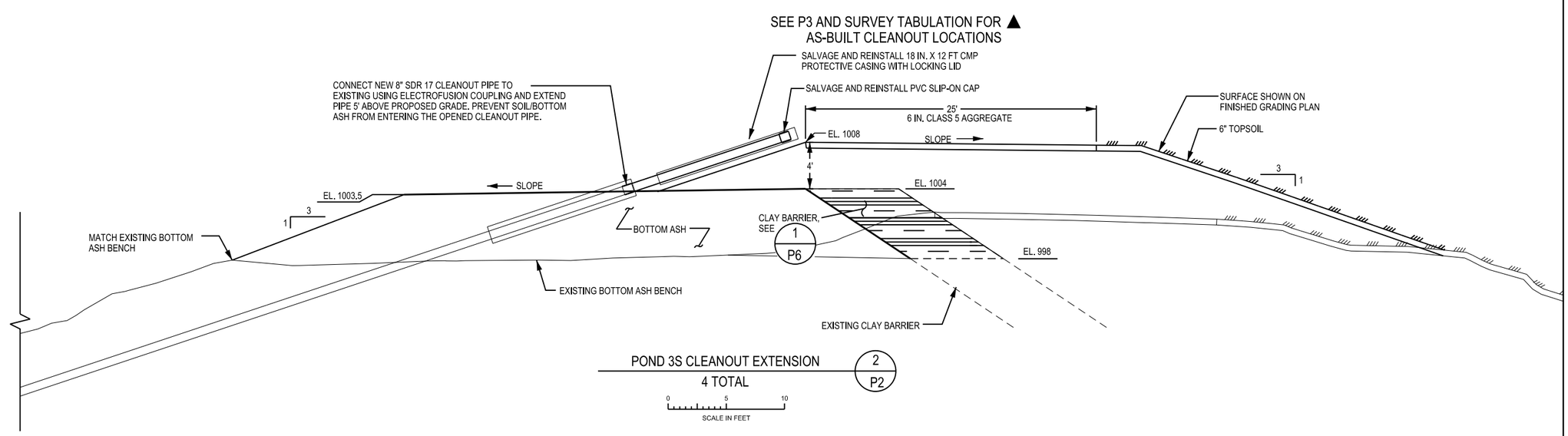


POND 3S DEWATERING RISER AND CLEANOUT EXTENSION 1 / P2



POND 3S CLEANOUT EXTENSION 2 / P2
4 TOTAL

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1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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POND 3 VERTICAL EXPANSION
DEWATERING RISER AND CLEANOUT EXTENSION SECTIONS

P7

REV ▲

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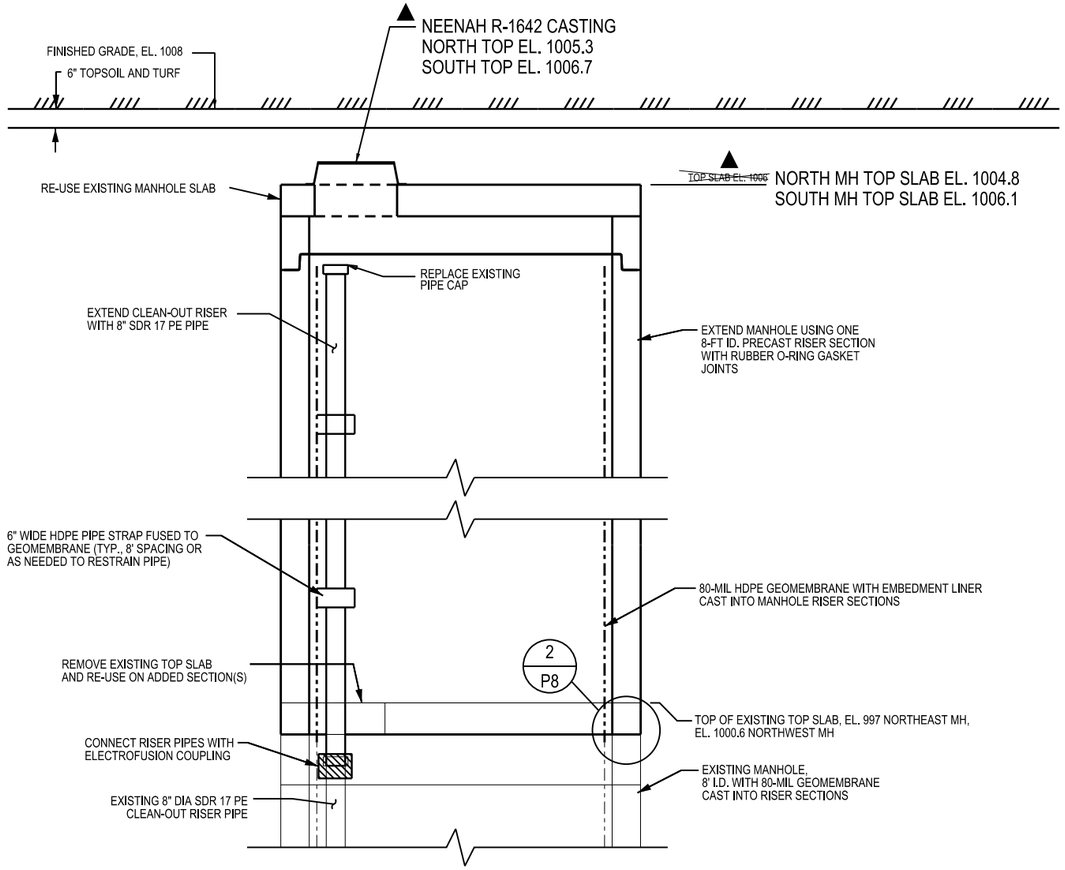

NOTES:
1. MANHOLE WILL CONTAIN POND WATER DURING CONSTRUCTION.
2. GEOMEMBRANE BETWEEN BARREL SECTIONS SHALL BE CONNECTED IN ACCORDANCE WITH MANUFACTURERS RECOMENDATIONS AND AS REQUIRED BY TECHNICAL SPECIFICATIONS.
3. GEOMEMBRANE SEAMS SHALL BE LEAK TESTED AS REQUIRED BY TECHNICAL SPECIFICATIONS.
4. MANHOLE EXTENSION SHALL CONSIST OF ONE RISER SECTION.

SECTION: DEWATERING MANHOLE EXTENSION (1 / P3)

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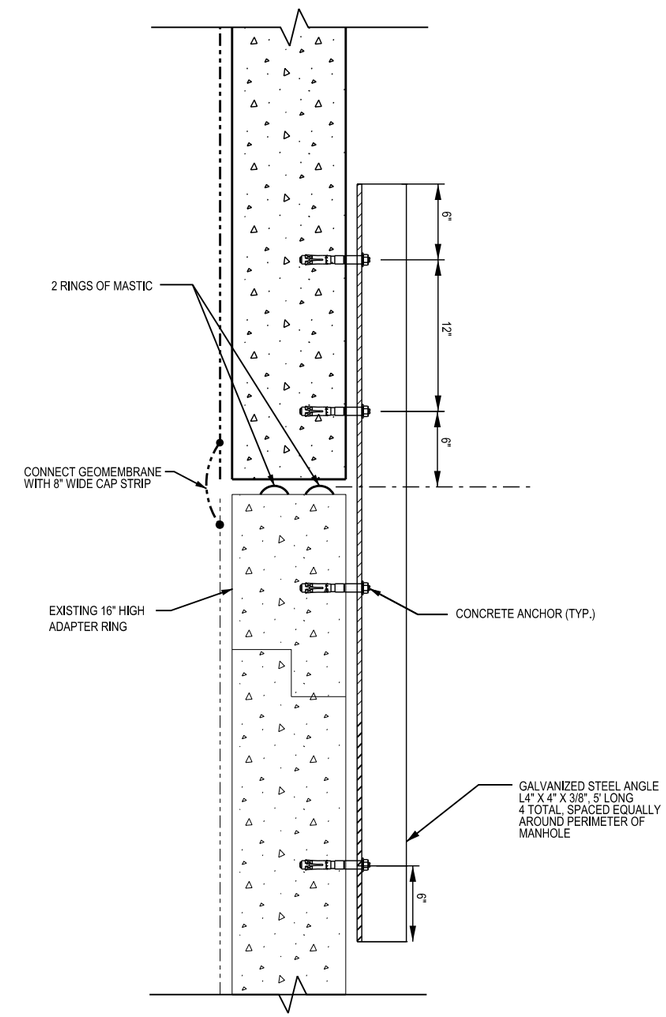
SCALE IN FEET



DETAIL: CONNECTION TO EXISTING MANHOLE (2 / P8)

0 0.5 1.0
SCALE IN FEET

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1	CONSTRUCTION REVISION - POND 3 NW CLAY		9/16/2015	DJR	XCEL	DJR
▲	RECORD DRAWINGS		10/30/2015	DJR	XCEL	DJR

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POND 3 VERTICAL EXPANSION
DEWATERING MANHOLE EXTENSION SECTIONS

P8

REV ▲

Appendix B - Construction Photographs

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 1 8/5/15	Off-road truck placing bottom ash on interior embankment, dozer spreading the material.

Photo 2 8/5/15	Excavating and loading bottom ash from the Bottom Ash Pond.

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 3 8/13/15	Bottom Ash Pond following excavation and addition of stop log(s).

Photo 4 8/17/15	Exposing existing clay – South Berm Section – Looking East

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 5 8/17/15	Shaping clay subgrade sideslopes to 1.5(H):1(V) – South Berm Section – Looking West

Photo 6 8/24/15	GPS dozer spreading clay – South Berm Section – Looking West

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 7 8/24/15	Disc anchor reworking clay.

Photo 8 8/24/15	Steel drum roller rolling clay for the end of the day.

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 9 8/26/15	Sheepsfoot vibratory roller compacting clay – East Berm Section – Looking North

Photo 10 8/26/15	Clay thin-wall sample collection.

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 11 8/31/15	Watering clay – East Berm Section – Looking North

Photo 12 9/1/15	Removing rocks larger than 3 inches – North Berm Section – Looking West

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 13 9/3/15	Shaping 1.5(H):1(V) outer slope of clay – South Berm Section – Looking West

Photo 14 9/11/15	In-Place clay density testing.

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 15 9/21/15	Positioning manhole extension. Two rings of mastic placed around top of existing structure.

Photo 16 9/21/15	Placed manhole extension with bolted reinforcement and cement mortar around joint.

Pond 3 2015 Vertical Expansion
Construction Photographs

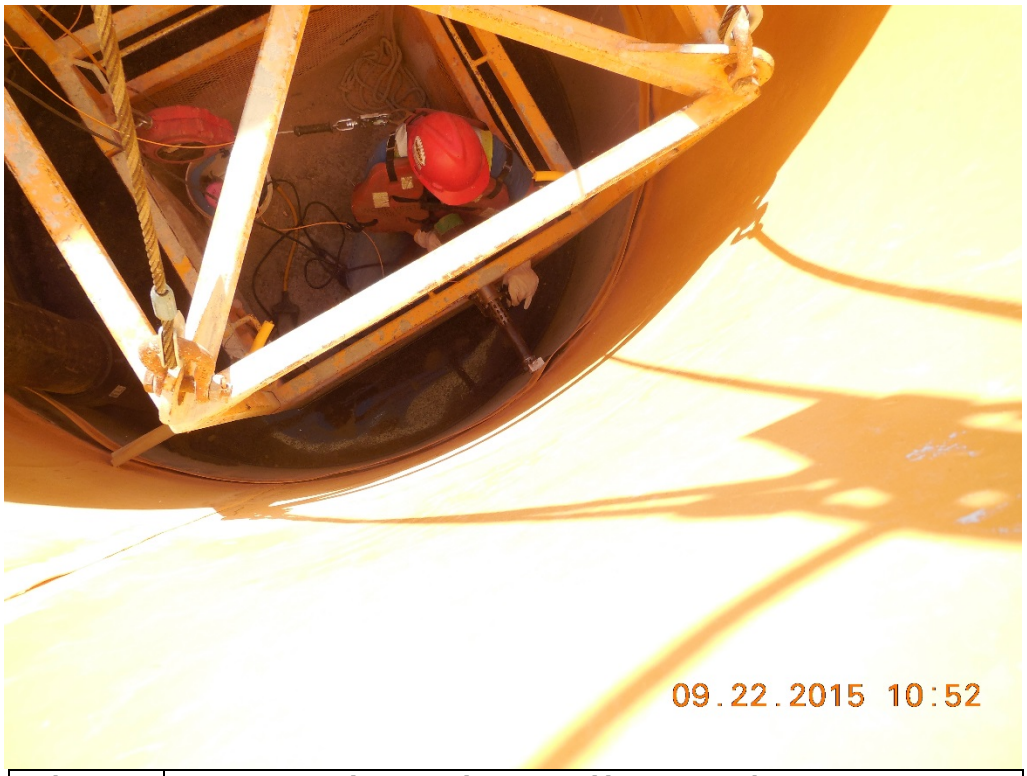


Photo 17 9/22/15	Fusing cast-in-place 80-mil HDPE stud liner geomembrane to existing geomembrane in manhole structure.

Photo 18 9/25/15	Off-road haul truck placing common fill and GPS dozer grading the material – East Berm Section – Looking South

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 19 10/6/15	Extending 30” HDPE dewatering riser.

Photo 20 10/7/15	Electrofusing extension to existing 8” HDPE cleanout riser.

Pond 3 2015 Vertical Expansion
Construction Photographs

Photo 21 10/8/15	Compacting and smooth grading common fill to final grade.

Photo 22 10/19/15	Erosion control blanket installed on finished grade – Northeast corner – Looking South

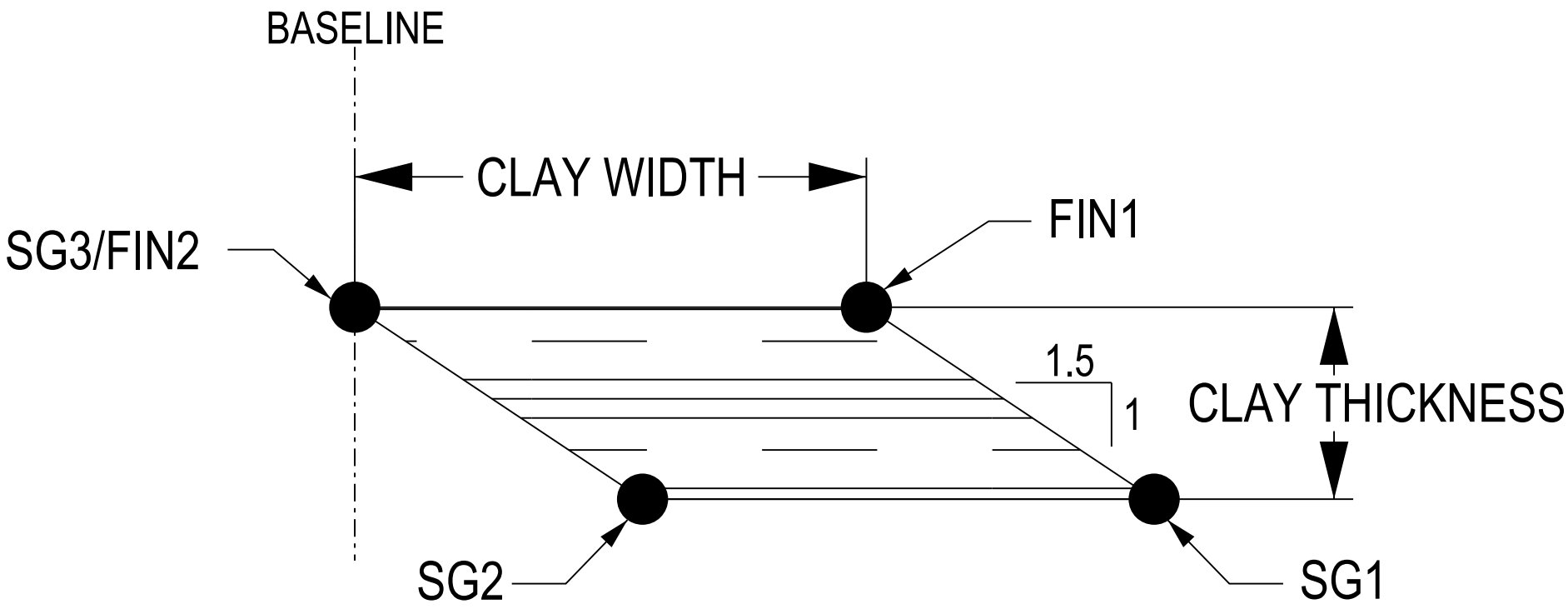
Appendix C - Survey Verification Data

Clay Survey Verification Data
Finished Grade Survey Verification Data
Survey Verification Drawings

Clay Survey Verification Data

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

POINT LOCATIONS TYPICAL SECTION



POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
1	862405.41	2030688.87	1004.0	FIN1	862405.39	2030688.92	1004.30	
2	862413.40	2030688.55	1004.0	FIN2	862413.45	2030688.53	1004.18	8.08
3	862401.34	2030739.07	1000.0	SG1	862401.29	2030739.03	1000.43	
4	862407.37	2030738.83	1004.0	FIN1	862407.35	2030738.82	1004.15	
5	862409.38	2030738.75	1000.0	SG2	862409.39	2030738.75	1000.05	
6	862415.36	2030738.52	1004.0	SG3/FIN2	862415.40	2030738.50	1004.29	8.06
7	862399.34	2030763.81	998.0	SG1	862399.30	2030763.83	998.55	
8	862408.33	2030763.45	1004.0	FIN1	862408.31	2030763.54	1004.08	
9	862407.34	2030763.49	998.0	SG2	862407.36	2030763.49	998.23	
10	862416.33	2030763.14	1004.0	SG3/FIN2	862416.37	2030763.14	1004.12	8.06
11	862401.30	2030813.77	998.0	SG1	862401.26	2030813.79	998.24	
12	862410.29	2030813.42	1004.0	FIN1	862410.28	2030813.40	1004.07	
13	862409.30	2030813.45	998.0	SG2	862409.32	2030813.40	998.01	
14	862418.29	2030813.10	1004.0	SG3/FIN2	862418.33	2030813.09	1004.08	8.06
15	862403.26	2030863.73	998.0	SG1	862403.21	2030863.73	998.32	
16	862412.25	2030863.38	1004.0	FIN1	862412.25	2030863.38	1004.03	
17	862411.25	2030863.42	998.0	SG2	862411.27	2030863.38	998.25	
18	862420.25	2030863.06	1004.0	SG3/FIN2	862420.29	2030863.02	1004.19	8.05
19	862405.22	2030913.69	998.0	SG1	862405.17	2030913.71	998.31	
20	862414.21	2030913.34	1004.0	FIN1	862414.21	2030913.34	1004.09	
21	862413.21	2030913.38	998.0	SG2	862413.23	2030913.38	998.13	
22	862422.21	2030913.02	1004.0	SG3/FIN2	862422.25	2030913.09	1004.02	8.04

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
23	862407.51	2030963.64	998.0	SG1	862407.47	2030963.62	998.35	
24	862416.50	2030963.17	1004.0	FIN1	862416.49	2030963.17	1004.08	
25	862415.50	2030963.22	998.0	SG2	862415.52	2030963.27	998.09	
26	862424.49	2030962.76	1004.0	SG3/FIN2	862424.52	2030962.73	1004.14	8.04
27	862410.10	2031013.57	998.0	SG1	862410.06	2031013.58	998.16	
28	862419.09	2031013.10	1004.0	FIN1	862419.09	2031013.11	1004.08	
29	862418.09	2031013.16	998.0	SG2	862418.10	2031013.17	998.19	
30	862427.08	2031012.69	1004.0	SG3/FIN2	862427.10	2031012.69	1004.02	8.03
31	862412.69	2031063.50	998.0	SG1	862412.65	2031063.55	998.34	
32	862421.68	2031063.04	1004.0	FIN1	862421.67	2031063.01	1004.07	
33	862420.68	2031063.09	998.0	SG2	862420.69	2031063.07	998.20	
34	862429.67	2031062.62	1004.0	SG3/FIN2	862429.69	2031062.65	1004.11	8.03
35	862415.29	2031113.44	998.0	SG1	862415.25	2031113.37	998.45	
36	862424.27	2031112.97	1004.0	FIN1	862424.26	2031112.97	1004.03	
37	862423.28	2031113.02	998.0	SG2	862423.29	2031112.99	998.30	
38	862432.26	2031112.55	1004.0	SG3/FIN2	862432.28	2031112.49	1004.01	8.04
39	862417.88	2031163.37	998.0	SG1	862417.85	2031163.37	998.57	
40	862426.87	2031162.90	1004.0	FIN1	862426.85	2031162.94	1004.05	
41	862425.87	2031162.95	998.0	SG2	862425.88	2031162.96	998.07	
42	862434.86	2031162.49	1004.0	SG3/FIN2	862434.88	2031162.45	1004.17	8.05

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
43	862420.47	2031213.30	998.0	SG1	862420.42	2031213.27	998.04	
44	862429.46	2031212.83	1004.0	FIN1	862429.45	2031212.92	1004.11	
45	862428.46	2031212.89	998.0	SG2	862428.48	2031212.88	997.96	
46	862437.45	2031212.42	1004.0	SG3/FIN2	862437.47	2031212.41	1004.05	8.03
47	862423.06	2031263.23	998.0	SG1	862423.03	2031263.23	998.41	
48	862432.05	2031262.77	1004.0	FIN1	862432.05	2031262.82	1004.02	
49	862431.05	2031262.82	998.0	SG2	862431.06	2031262.79	997.74	
50	862440.04	2031262.35	1004.0	SG3/FIN2	862440.06	2031262.40	1004.01	8.03
51	862425.66	2031313.17	998.0	SG1	862425.62	2031313.12	998.21	
52	862434.65	2031312.70	1004.0	FIN1	862434.62	2031312.64	1004.10	
53	862433.65	2031312.75	998.0	SG2	862433.67	2031312.79	998.23	
54	862442.63	2031312.29	1004.0	SG3/FIN2	862442.65	2031312.27	1004.02	8.04
55	862428.25	2031363.10	998.0	SG1	862428.18	2031363.10	998.15	
56	862437.24	2031362.63	1004.0	FIN1	862437.23	2031362.62	1004.02	
57	862436.24	2031362.68	998.0	SG2	862436.26	2031362.63	998.08	
58	862445.23	2031362.22	1004.0	SG3/FIN2	862445.25	2031362.22	1004.01	8.03
59	862430.84	2031413.03	998.0	SG1	862430.80	2031413.00	998.14	
60	862439.83	2031412.57	1004.0	FIN1	862439.82	2031412.60	1004.02	
61	862438.83	2031412.62	998.0	SG2	862438.83	2031412.64	998.18	
62	862447.82	2031412.15	1004.0	SG3/FIN2	862447.87	2031412.18	1004.08	8.06

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
63	862433.44	2031462.97	998.0	SG1	862433.37	2031462.96	998.14	
64	862442.42	2031462.50	1004.0	FIN1	862442.39	2031462.50	1004.00	
65	862441.43	2031462.55	998.0	SG2	862441.45	2031462.52	998.17	
66	862450.41	2031462.08	1004.0	SG3/FIN2	862450.43	2031462.13	1004.00	8.05
67	862436.03	2031512.90	998.0	SG1	862435.98	2031512.89	998.31	
68	862445.02	2031512.43	1004.0	FIN1	862444.99	2031512.43	1004.01	
69	862444.02	2031512.48	998.0	SG2	862444.03	2031512.47	998.07	
70	862453.01	2031512.02	1004.0	SG3/FIN2	862453.03	2031511.95	1004.09	8.06
71	862438.62	2031562.83	998.0	SG1	862438.57	2031562.86	998.25	
72	862447.61	2031562.36	1004.0	FIN1	862447.58	2031562.34	1004.01	
73	862446.61	2031562.42	998.0	SG2	862446.65	2031562.44	997.96	
74	862455.60	2031561.95	1004.0	SG3/FIN2	862455.66	2031561.95	1004.04	8.09
75	862441.21	2031612.76	998.0	SG1	862441.16	2031612.80	998.22	
76	862450.20	2031612.30	1004.0	FIN1	862450.19	2031612.27	1004.04	
77	862449.20	2031612.35	998.0	SG2	862449.27	2031612.35	998.03	
78	862458.19	2031611.88	1004.0	SG3/FIN2	862458.24	2031611.87	1004.05	8.06
79	862443.81	2031662.70	998.0	SG1	862443.74	2031662.69	998.46	
80	862452.79	2031662.23	1004.0	FIN1	862452.79	2031662.16	1004.01	
81	862451.80	2031662.28	998.0	SG2	862451.83	2031662.29	998.09	
82	862460.78	2031661.81	1004.0	SG3/FIN2	862460.79	2031661.83	1004.06	8.01

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
83	862446.40	2031712.63	998.0	SG1	862446.31	2031712.67	998.50	
84	862455.39	2031712.16	1004.0	FIN1	862455.37	2031712.13	1004.02	
85	862454.39	2031712.21	998.0	SG2	862454.40	2031712.15	998.13	
86	862463.38	2031711.75	1004.0	SG3/FIN2	862463.40	2031711.74	1004.01	8.04
87	862448.99	2031762.56	998.0	SG1	862448.89	2031762.54	998.42	
88	862457.98	2031762.09	1004.0	FIN1	862457.97	2031762.10	1004.01	
89	862456.98	2031762.15	998.0	SG2	862457.00	2031762.18	997.96	
90	862465.97	2031761.68	1004.0	SG3/FIN2	862466.00	2031761.69	1004.01	8.03
91	862451.59	2031812.49	998.0	SG1	862451.55	2031812.50	998.34	
92	862460.57	2031812.03	1004.0	FIN1	862460.54	2031812.03	1004.05	
93	862459.57	2031812.08	998.0	SG2	862459.59	2031812.04	998.15	
94	862468.56	2031811.61	1004.0	SG3/FIN2	862468.59	2031811.60	1004.10	8.06
95	862454.18	2031862.43	998.0	SG1	862454.13	2031862.44	998.60	
96	862463.17	2031861.96	1004.0	FIN1	862463.16	2031861.93	1004.10	
97	862462.17	2031862.01	998.0	SG2	862462.19	2031861.98	998.14	
98	862471.16	2031861.55	1004.0	SG3/FIN2	862471.18	2031861.49	1004.07	8.03
99	862456.44	2031905.92	998.0	SG1	862456.41	2031905.95	998.55	
100	862465.25	2031902.00	1004.0	FIN1	862465.27	2031901.98	1004.02	
101	862464.27	2031902.44	998.0	SG2	862464.28	2031902.41	998.04	
102	862473.08	2031898.52	1004.0	SG3/FIN2	862473.10	2031898.48	1004.25	8.58

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
103	862491.79	2031941.28	998.0	SG1	862491.76	2031941.31	998.05	
104	862498.16	2031934.91	1004.0	FIN1	862498.18	2031934.89	1004.11	
105	862497.45	2031935.62	998.0	SG2	862497.47	2031935.59	998.33	
106	862503.81	2031929.26	1004.0	SG3/FIN2	862503.87	2031929.23	1004.19	8.02
107	862527.15	2031976.63	998.0	SG1	862527.13	2031976.66	998.12	
108	862533.51	2031970.27	1004.0	FIN1	862533.53	2031970.26	1004.10	
109	862532.80	2031970.98	998.0	SG2	862532.83	2031970.93	998.34	
110	862539.17	2031964.61	1004.0	SG3/FIN2	862539.21	2031964.56	1004.25	8.05
111	862547.61	2031997.10	998.0	SG1	862547.58	2031997.14	998.46	
112	862551.34	2031988.10	1004.0	FIN1	862551.39	2031988.04	1004.00	
113	862550.93	2031989.10	998.0	SG2	862550.95	2031989.08	998.07	
114	862554.66	2031980.10	1004.0	SG3/FIN2	862554.71	2031980.04	1004.19	8.67
115	862597.61	2031997.10	998.0	SG1	862597.65	2031997.12	998.03	
116	862597.61	2031988.10	1004.0	FIN1	862597.63	2031988.09	1004.01	
117	862597.61	2031989.10	998.0	SG2	862597.66	2031989.09	998.34	
118	862597.61	2031980.10	1004.0	SG3/FIN2	862597.63	2031980.05	1004.05	8.04
119	862647.61	2031997.10	998.0	SG1	862647.62	2031997.12	998.07	
120	862647.61	2031988.10	1004.0	FIN1	862647.61	2031988.09	1004.06	
121	862647.61	2031989.10	998.0	SG2	862647.61	2031989.07	998.40	
122	862647.61	2031980.10	1004.0	SG3/FIN2	862647.63	2031980.04	1004.17	8.04

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
123	862697.61	2031997.10	998.0	SG1	862697.63	2031997.12	998.14	
124	862697.61	2031988.10	1004.0	FIN1	862697.59	2031988.08	1004.09	
125	862697.61	2031989.10	998.0	SG2	862697.64	2031989.09	998.33	
126	862697.61	2031980.10	1004.0	SG3/FIN2	862697.62	2031980.06	1004.02	8.02
127	862747.61	2031997.10	998.0	SG1	862747.62	2031997.13	998.11	
128	862747.61	2031988.10	1004.0	FIN1	862747.61	2031988.09	1004.10	
129	862747.61	2031989.10	998.0	SG2	862747.54	2031989.09	998.31	
130	862747.61	2031980.10	1004.0	SG3/FIN2	862747.63	2031980.07	1004.20	8.02
131	862797.61	2031997.10	998.0	SG1	862797.62	2031997.13	998.29	
132	862797.61	2031988.10	1004.0	FIN1	862797.59	2031988.08	1004.11	
133	862797.61	2031989.10	998.0	SG2	862797.61	2031989.07	998.13	
134	862797.61	2031980.10	1004.0	SG3/FIN2	862797.62	2031980.04	1004.13	8.04
135	862847.61	2031997.10	998.0	SG1	862847.65	2031997.11	998.23	
136	862847.61	2031988.10	1004.0	FIN1	862847.65	2031988.09	1004.19	
137	862847.61	2031989.10	998.0	SG2	862847.56	2031989.08	998.13	
138	862847.61	2031980.10	1004.0	SG3/FIN2	862847.62	2031980.04	1004.20	8.04
139	862897.61	2031997.10	998.0	SG1	862897.62	2031997.14	998.08	
140	862897.61	2031988.10	1004.0	FIN1	862897.63	2031988.09	1004.24	
141	862897.61	2031989.10	998.0	SG2	862897.56	2031989.12	997.87	
142	862897.61	2031980.10	1004.0	SG3/FIN2	862897.64	2031980.05	1004.22	8.04

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
143	862947.61	2031997.10	998.0	SG1	862947.63	2031997.13	998.36	
144	862947.61	2031988.10	1004.0	FIN1	862947.59	2031988.08	1004.22	
145	862947.61	2031989.10	998.0	SG2	862947.59	2031989.07	998.03	
146	862947.61	2031980.10	1004.0	SG3/FIN2	862947.62	2031980.06	1004.15	8.02
147	862997.61	2031997.10	998.0	SG1	862997.58	2031997.12	998.52	
148	862997.61	2031988.10	1004.0	FIN1	862997.62	2031988.08	1004.22	
149	862997.61	2031989.10	998.0	SG2	862997.60	2031989.09	998.14	
150	862997.61	2031980.10	1004.0	SG3/FIN2	862997.61	2031980.05	1004.12	8.04
151	863047.61	2031997.10	998.0	SG1	863047.62	2031997.11	998.74	
152	863047.61	2031988.10	1004.0	FIN1	863047.61	2031988.10	1004.07	
153	863047.61	2031989.10	998.0	SG2	863047.58	2031989.06	998.39	
154	863047.61	2031980.10	1004.0	SG3/FIN2	863047.60	2031980.06	1004.07	8.04
155	863097.61	2031997.10	998.0	SG1	863097.59	2031997.13	998.86	
156	863097.61	2031988.10	1004.0	FIN1	863097.62	2031988.09	1004.19	
157	863097.61	2031989.10	998.0	SG2	863097.63	2031989.09	998.40	
158	863097.61	2031980.10	1004.0	SG3/FIN2	863097.61	2031980.05	1004.21	8.03
159	863147.61	2031997.10	998.0	SG1	863147.58	2031997.12	998.55	
160	863147.61	2031988.10	1004.0	FIN1	863147.62	2031988.08	1004.11	
161	863147.61	2031989.10	998.0	SG2	863147.57	2031989.06	998.32	
162	863147.61	2031980.10	1004.0	SG3/FIN2	863147.61	2031980.05	1004.08	8.03

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
163	863197.61	2031997.10	998.0	SG1	863197.62	2031997.14	998.40	
164	863197.61	2031988.10	1004.0	FIN1	863197.62	2031988.07	1004.06	
165	863197.61	2031989.10	998.0	SG2	863197.56	2031989.07	998.51	
166	863197.61	2031980.10	1004.0	SG3/FIN2	863197.62	2031980.04	1004.13	8.03
167	863247.61	2031997.10	998.0	SG1	863247.62	2031997.11	998.27	
168	863247.61	2031988.10	1004.0	FIN1	863247.55	2031988.08	1004.20	
169	863247.61	2031989.10	998.0	SG2	863247.60	2031989.08	998.26	
170	863247.61	2031980.10	1004.0	SG3/FIN2	863247.61	2031980.05	1004.12	8.03
171	863297.61	2031997.10	998.0	SG1	863297.61	2031997.15	998.27	
172	863297.61	2031988.10	1004.0	FIN1	863297.59	2031988.08	1004.15	
173	863297.61	2031989.10	998.0	SG2	863297.67	2031989.08	998.34	
174	863297.61	2031980.10	1004.0	SG3/FIN2	863297.59	2031980.06	1004.19	8.02
175	863347.61	2031997.10	998.0	SG1	863347.62	2031997.12	998.04	
176	863347.61	2031988.10	1004.0	FIN1	863347.57	2031988.10	1004.07	
177	863347.61	2031989.10	998.0	SG2	863347.59	2031989.08	998.30	
178	863347.61	2031980.10	1004.0	SG3/FIN2	863347.59	2031980.06	1004.13	8.04
179	863397.61	2031997.10	998.0	SG1	863397.63	2031997.12	998.08	
180	863397.61	2031988.10	1004.0	FIN1	863397.60	2031988.08	1004.05	
181	863397.61	2031989.10	998.0	SG2	863397.61	2031989.07	998.56	
182	863397.61	2031980.10	1004.0	SG3/FIN2	863397.58	2031980.06	1004.15	8.02

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CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
183	863447.61	2031997.10	998.0	SG1	863447.60	2031997.13	998.14	
184	863447.61	2031988.10	1004.0	FIN1	863447.64	2031988.08	1004.04	
185	863447.61	2031989.10	998.0	SG2	863447.64	2031989.07	998.39	
186	863447.61	2031980.10	1004.0	SG3/FIN2	863447.62	2031980.05	1004.20	8.03
187	863497.61	2031997.10	998.0	SG1	863497.61	2031997.14	998.10	
188	863497.61	2031988.10	1004.0	FIN1	863497.60	2031988.09	1004.06	
189	863497.61	2031989.10	998.0	SG2	863497.59	2031989.10	998.28	
190	863497.61	2031980.10	1004.0	SG3/FIN2	863497.62	2031980.05	1004.17	8.04
191	863547.61	2031997.10	998.0	SG1	863547.60	2031997.14	998.07	
192	863547.61	2031988.10	1004.0	FIN1	863547.61	2031988.09	1004.02	
193	863547.61	2031989.10	998.0	SG2	863547.60	2031989.09	998.29	
194	863547.61	2031980.10	1004.0	SG3/FIN2	863547.64	2031980.04	1004.10	8.04
195	863597.61	2031997.10	998.0	SG1	863597.60	2031997.14	998.22	
196	863597.61	2031988.10	1004.0	FIN1	863597.58	2031988.08	1004.06	
197	863597.61	2031989.10	998.0	SG2	863597.58	2031989.08	998.11	
198	863597.61	2031980.10	1004.0	SG3/FIN2	863597.63	2031980.06	1004.09	8.03
199	863647.61	2031997.10	998.0	SG1	863647.58	2031997.13	998.22	
200	863647.61	2031988.10	1004.0	FIN1	863647.61	2031988.07	1004.11	
201	863647.61	2031989.10	998.0	SG2	863647.67	2031989.09	998.49	
202	863647.61	2031980.10	1004.0	SG3/FIN2	863647.61	2031980.06	1004.11	8.01

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CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
203	863697.64	2031997.10	998.0	SG1	863697.64	2031997.12	998.26	
204	863697.64	2031988.10	1004.0	FIN1	863697.63	2031988.08	1004.06	
205	863697.64	2031989.10	998.0	SG2	863697.62	2031989.09	998.13	
206	863697.65	2031980.10	1004.0	SG3/FIN2	863697.63	2031980.05	1004.03	8.03
207	863747.61	2031997.10	998.0	SG1	863747.61	2031997.14	998.36	
208	863747.61	2031988.10	1004.0	FIN1	863747.60	2031988.08	1004.12	
209	863747.61	2031989.10	998.0	SG2	863747.59	2031989.08	997.97	
210	863747.61	2031980.10	1004.0	SG3/FIN2	863747.60	2031980.06	1004.12	8.02
211	863797.61	2031997.10	998.0	SG1	863797.63	2031997.13	998.30	
212	863797.61	2031988.10	1004.0	FIN1	863797.60	2031988.08	1004.03	
213	863797.61	2031989.10	998.0	SG2	863797.58	2031989.08	998.58	
214	863797.61	2031980.10	1004.0	SG3/FIN2	863797.61	2031980.03	1004.02	8.05
215	863847.61	2031997.10	998.0	SG1	863847.57	2031997.11	998.54	
216	863847.61	2031988.10	1004.0	FIN1	863847.63	2031988.08	1004.08	
217	863847.61	2031989.10	998.0	SG2	863847.62	2031989.07	998.30	
218	863847.61	2031980.10	1004.0	SG3/FIN2	863847.59	2031980.06	1004.09	8.02
219	863897.61	2031997.10	998.0	SG1	863897.62	2031997.14	998.38	
220	863897.61	2031988.10	1004.0	FIN1	863897.61	2031988.08	1004.07	
221	863897.61	2031989.10	998.0	SG2	863897.57	2031989.10	998.43	
222	863897.61	2031980.10	1004.0	SG3/FIN2	863897.63	2031980.03	1004.06	8.05

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
223	863947.61	2031997.10	998.0	SG1	863947.64	2031997.13	998.13	
224	863947.61	2031988.10	1004.0	FIN1	863947.59	2031988.07	1004.21	
225	863947.61	2031989.10	998.0	SG2	863947.63	2031989.08	998.53	
226	863947.61	2031980.10	1004.0	SG3/FIN2	863947.60	2031980.05	1004.25	8.02
227	863997.61	2031997.10	998.0	SG1	863997.64	2031997.15	998.11	
228	863997.61	2031988.10	1004.0	FIN1	863997.63	2031988.08	1004.23	
229	863997.61	2031989.10	998.0	SG2	863997.61	2031989.09	998.35	
230	863997.61	2031980.10	1004.0	SG3/FIN2	863997.60	2031980.05	1004.13	8.03
231	864047.61	2031997.10	998.0	SG1	864047.62	2031997.14	998.06	
232	864047.61	2031988.10	1004.0	FIN1	864047.62	2031988.09	1004.14	
233	864047.61	2031989.10	998.0	SG2	864047.57	2031989.09	998.55	
234	864047.61	2031980.10	1004.0	SG3/FIN2	864047.61	2031980.06	1004.12	8.03
235	864097.61	2031997.10	998.0	SG1	864097.61	2031997.14	998.13	
236	864097.61	2031988.10	1004.0	FIN1	864097.63	2031988.09	1004.30	
237	864097.61	2031989.10	998.0	SG2	864097.62	2031989.07	998.58	
238	864097.61	2031980.10	1004.0	SG3/FIN2	864097.60	2031980.07	1004.13	8.03
239	864147.61	2031997.10	998.0	SG1	864147.62	2031997.14	998.01	
240	864147.61	2031988.10	1004.0	FIN1	864147.58	2031988.09	1004.07	
241	864147.61	2031989.10	998.0	SG2	864147.66	2031989.07	998.52	
242	864147.61	2031980.10	1004.0	SG3/FIN2	864147.60	2031980.05	1004.26	8.04

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
243	864197.61	2031997.10	998.0	SG1	864197.63	2031997.14	998.11	
244	864197.61	2031988.10	1004.0	FIN1	864197.60	2031988.09	1004.08	
245	864197.61	2031989.10	998.0	SG2	864197.63	2031989.07	998.27	
246	864197.61	2031980.10	1004.0	SG3/FIN2	864197.59	2031980.06	1004.18	8.03
247	864247.61	2031997.10	998.0	SG1	864247.60	2031997.12	998.34	
248	864247.61	2031988.10	1004.0	FIN1	864247.60	2031988.09	1004.11	
249	864247.61	2031989.10	998.0	SG2	864247.64	2031989.09	998.19	
250	864247.61	2031980.10	1004.0	SG3/FIN2	864247.61	2031980.05	1004.05	8.04
251	864297.61	2031997.10	998.0	SG1	864297.64	2031997.16	998.27	
252	864297.61	2031988.10	1004.0	FIN1	864297.60	2031988.07	1004.10	
253	864297.61	2031989.10	998.0	SG2	864297.63	2031989.08	998.24	
254	864297.61	2031980.10	1004.0	SG3/FIN2	864297.64	2031980.05	1004.02	8.02
255	864347.61	2031997.10	998.0	SG1	864347.60	2031997.14	998.21	
256	864347.61	2031988.10	1004.0	FIN1	864347.58	2031988.09	1004.11	
257	864347.61	2031989.10	998.0	SG2	864347.64	2031989.09	998.44	
258	864347.61	2031980.10	1004.0	SG3/FIN2	864347.58	2031980.03	1004.04	8.06
259	864397.61	2031997.10	998.0	SG1	864397.60	2031997.12	998.06	
260	864397.61	2031988.10	1004.0	FIN1	864397.63	2031988.07	1004.01	
261	864397.61	2031989.10	998.0	SG2	864397.62	2031989.09	998.28	
262	864397.61	2031980.10	1004.0	SG3/FIN2	864397.61	2031980.04	1004.03	8.03

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
263	864447.61	2031997.10	998.0	SG1	864447.63	2031997.14	998.06	
264	864447.61	2031988.10	1004.0	FIN1	864447.60	2031988.09	1004.01	
265	864447.61	2031989.10	998.0	SG2	864447.67	2031989.08	998.05	
266	864447.61	2031980.10	1004.0	SG3/FIN2	864447.59	2031980.05	1004.05	8.04
267	864497.61	2031997.10	998.0	SG1	864497.60	2031997.15	998.16	
268	864497.61	2031988.10	1004.0	FIN1	864497.67	2031988.09	1004.02	
269	864497.61	2031989.10	998.0	SG2	864497.61	2031989.09	998.05	
270	864497.61	2031980.10	1004.0	SG3/FIN2	864497.60	2031980.05	1004.04	8.04
271	864547.61	2031997.10	998.0	SG1	864547.62	2031997.15	998.12	
272	864547.61	2031988.10	1004.0	FIN1	864547.62	2031988.09	1004.03	
273	864547.61	2031989.10	998.0	SG2	864547.64	2031989.08	998.55	
274	864547.61	2031980.10	1004.0	SG3/FIN2	864547.63	2031980.04	1004.03	8.05
275	864597.61	2031997.10	998.0	SG1	864597.62	2031997.13	998.15	
276	864597.61	2031988.10	1004.0	FIN1	864597.59	2031988.08	1004.08	
277	864597.61	2031989.10	998.0	SG2	864597.62	2031989.07	998.31	
278	864597.61	2031980.10	1004.0	SG3/FIN2	864597.61	2031980.06	1004.10	8.02
279	864647.61	2031997.10	998.0	SG1	864647.62	2031997.14	998.14	
280	864647.61	2031988.10	1004.0	FIN1	864647.62	2031988.08	1004.10	
281	864647.61	2031989.10	998.0	SG2	864647.58	2031989.08	998.32	
282	864647.61	2031980.10	1004.0	SG3/FIN2	864647.62	2031980.04	1004.06	8.04

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
283	864697.61	2031997.10	998.0	SG1	864697.63	2031997.14	998.09	
284	864697.61	2031988.10	1004.0	FIN1	864697.60	2031988.08	1004.03	
285	864697.61	2031989.10	998.0	SG2	864697.65	2031989.08	998.42	
286	864697.61	2031980.10	1004.0	SG3/FIN2	864697.63	2031980.06	1004.01	8.03
287	864747.61	2031997.10	998.0	SG1	864747.62	2031997.15	998.14	
288	864747.61	2031988.10	1004.0	FIN1	864747.58	2031988.08	1004.03	
289	864747.61	2031989.10	998.0	SG2	864747.68	2031989.07	998.53	
290	864747.61	2031980.10	1004.0	SG3/FIN2	864747.62	2031980.05	1004.02	8.03
291	864797.61	2031997.10	998.0	SG1	864797.60	2031997.13	998.11	
292	864797.61	2031988.10	1004.0	FIN1	864797.59	2031988.09	1004.02	
293	864797.61	2031989.10	998.0	SG2	864797.67	2031989.10	998.43	
294	864797.61	2031980.10	1004.0	SG3/FIN2	864797.61	2031980.06	1004.04	8.03
295	864847.61	2031997.10	998.0	SG1	864847.62	2031997.12	998.09	
296	864847.61	2031988.10	1004.0	FIN1	864847.60	2031988.09	1004.03	
297	864847.61	2031989.10	998.0	SG2	864847.58	2031989.07	998.48	
298	864847.61	2031980.10	1004.0	SG3/FIN2	864847.57	2031980.06	1004.08	8.03
299	864897.61	2031997.10	998.0	SG1	864897.62	2031997.13	998.02	
300	864897.61	2031988.10	1004.0	FIN1	864897.57	2031988.09	1004.04	
301	864897.61	2031989.10	998.0	SG2	864897.65	2031989.07	998.15	
302	864897.61	2031980.10	1004.0	SG3/FIN2	864897.60	2031980.06	1004.16	8.03

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
303	864947.61	2031997.10	998.0	SG1	864947.63	2031997.12	998.09	
304	864947.61	2031988.10	1004.0	FIN1	864947.61	2031988.09	1004.07	
305	864947.61	2031989.10	998.0	SG2	864947.64	2031989.09	998.16	
306	864947.61	2031980.10	1004.0	SG3/FIN2	864947.61	2031980.03	1004.09	8.05
307	864997.61	2031997.10	998.0	SG1	864997.60	2031997.16	998.27	
308	864997.61	2031988.10	1004.0	FIN1	864997.60	2031988.09	1004.01	
309	864997.61	2031989.10	998.0	SG2	864997.63	2031989.07	998.47	
310	864997.61	2031980.10	1004.0	SG3/FIN2	864997.61	2031980.06	1004.00	8.04
311	865047.61	2031997.10	998.0	SG1	865047.60	2031997.13	998.18	
312	865047.61	2031988.10	1004.0	FIN1	865047.59	2031988.09	1004.09	
313	865047.61	2031989.10	998.0	SG2	865047.60	2031989.08	998.55	
314	865047.61	2031980.10	1004.0	SG3/FIN2	865047.59	2031980.05	1004.09	8.04
315	865097.61	2031997.10	998.0	SG1	865097.61	2031997.15	998.28	
316	865097.61	2031988.10	1004.0	FIN1	865097.59	2031988.08	1004.07	
317	865097.61	2031989.10	998.0	SG2	865097.65	2031989.08	998.57	
318	865097.61	2031980.10	1004.0	SG3/FIN2	865097.61	2031980.06	1004.13	8.03
319	865147.61	2031997.10	998.0	SG1	865147.65	2031997.14	998.30	
320	865147.61	2031988.10	1004.0	FIN1	865147.59	2031988.07	1004.10	
321	865147.61	2031989.10	998.0	SG2	865147.62	2031989.08	998.44	
322	865147.61	2031980.10	1004.0	SG3/FIN2	865147.62	2031980.06	1004.05	8.02

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
323	865197.61	2031997.10	998.0	SG1	865197.64	2031997.14	998.21	
324	865197.61	2031988.10	1004.0	FIN1	865197.63	2031988.08	1004.02	
325	865197.61	2031989.10	998.0	SG2	865197.57	2031989.10	998.15	
326	865197.61	2031980.10	1004.0	SG3/FIN2	865197.61	2031980.06	1004.06	8.02
327	865247.61	2031997.10	998.0	SG1	865247.63	2031997.15	998.13	
328	865247.61	2031988.10	1004.0	FIN1	865247.61	2031988.09	1004.06	
329	865247.61	2031989.10	998.0	SG2	865247.60	2031989.09	997.97	
330	865247.61	2031980.10	1004.0	SG3/FIN2	865247.62	2031980.06	1004.02	8.03
331	865262.49	2031997.10	998.0	SG1	865262.53	2031997.14	998.02	
332	865258.76	2031988.10	1004.0	FIN1	865258.73	2031988.08	1004.06	
333	865259.17	2031989.10	998.0	SG2	865259.14	2031989.07	998.01	
334	865255.45	2031980.10	1004.0	SG3/FIN2	865255.40	2031980.05	1004.01	8.70
335	865297.84	2031961.74	998.0	SG1	865297.87	2031961.79	998.20	
336	865291.48	2031955.38	1004.0	FIN1	865291.46	2031955.37	1004.09	
337	865292.19	2031956.09	998.0	SG2	865292.16	2031956.06	997.79	
338	865285.82	2031949.72	1004.0	SG3/FIN2	865285.77	2031949.66	1004.26	8.06
339	865333.20	2031926.39	998.0	SG1	865333.23	2031926.44	998.07	
340	865326.84	2031920.02	1004.0	FIN1	865326.82	2031920.01	1004.03	
341	865327.54	2031920.73	998.0	SG2	865327.53	2031920.71	998.40	
342	865321.18	2031914.37	1004.0	SG3/FIN2	865321.12	2031914.31	1004.18	8.07

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
343	865364.10	2031895.49	998.0	SG1	865364.12	2031895.51	998.41	
344	865355.10	2031891.76	1004.0	FIN1	865355.08	2031891.74	1004.03	
345	865356.10	2031892.17	998.0	SG2	865356.07	2031892.15	997.93	
346	865347.10	2031888.45	1004.0	SG3/FIN2	865347.03	2031888.40	1004.01	8.72
347	865364.10	2031845.49	998.0	SG1	865364.14	2031845.47	998.19	
348	865355.10	2031845.49	1004.0	FIN1	865355.09	2031845.48	1004.17	
349	865356.10	2031845.49	998.0	SG2	865356.09	2031845.46	998.14	
350	865347.10	2031845.49	1004.0	SG3/FIN2	865347.05	2031845.49	1004.12	8.05
351	865364.10	2031795.49	998.0	SG1	865364.14	2031795.51	998.15	
352	865355.10	2031795.49	1004.0	FIN1	865355.09	2031795.49	1004.20	
353	865356.10	2031795.49	998.0	SG2	865356.09	2031795.47	998.25	
354	865347.10	2031795.49	1004.0	SG3/FIN2	865347.07	2031795.48	1004.02	8.02
355	865364.10	2031745.49	998.0	SG1	865364.13	2031745.50	998.51	
356	865355.10	2031745.49	1004.0	FIN1	865355.09	2031745.49	1004.17	
357	865356.10	2031745.49	998.0	SG2	865356.09	2031745.48	998.07	
358	865347.10	2031745.49	1004.0	SG3/FIN2	865347.08	2031745.50	1004.25	8.01
359	865364.11	2031695.49	998.0	SG1	865364.15	2031695.45	998.23	
360	865355.10	2031695.49	1004.0	FIN1	865355.08	2031695.51	1004.01	
361	865356.11	2031695.49	998.0	SG2	865356.08	2031695.45	998.09	
362	865347.10	2031695.49	1004.0	SG3/FIN2	865347.03	2031695.48	1004.13	8.05

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
363	865364.11	2031645.49	998.0	SG1	865364.17	2031645.48	998.14	
364	865355.10	2031645.49	1004.0	FIN1	865355.08	2031645.49	1004.09	
365	865356.11	2031645.49	998.0	SG2	865356.09	2031645.49	998.33	
366	865347.10	2031645.49	1004.0	SG3/FIN2	865347.06	2031645.50	1004.17	8.02
367	865364.11	2031595.49	998.0	SG1	865364.17	2031595.47	998.29	
368	865355.10	2031595.49	1004.0	FIN1	865355.08	2031595.50	1004.11	
369	865356.11	2031595.49	998.0	SG2	865356.10	2031595.47	998.22	
370	865347.10	2031595.49	1004.0	SG3/FIN2	865347.04	2031595.50	1004.12	8.04
371	865364.11	2031545.49	998.0	SG1	865364.17	2031545.48	998.21	
372	865355.10	2031545.49	1004.0	FIN1	865355.08	2031545.49	1004.04	
373	865356.11	2031545.49	998.0	SG2	865356.09	2031545.52	998.36	
374	865347.10	2031545.49	1004.0	SG3/FIN2	865347.04	2031545.49	1004.12	8.04
375	865364.11	2031495.49	998.0	SG1	865364.14	2031495.51	998.28	
376	865355.10	2031495.49	1004.0	FIN1	865355.08	2031495.49	1004.17	
377	865356.11	2031495.49	998.0	SG2	865356.08	2031495.46	998.01	
378	865347.10	2031495.49	1004.0	SG3/FIN2	865347.05	2031495.50	1004.20	8.03
379	865364.11	2031445.49	998.0	SG1	865364.15	2031445.49	998.13	
380	865355.10	2031445.49	1004.0	FIN1	865355.09	2031445.53	1004.01	
381	865356.11	2031445.49	998.0	SG2	865356.11	2031445.51	998.16	
382	865347.10	2031445.49	1004.0	SG3/FIN2	865347.06	2031445.52	1004.09	8.03

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
383	865364.11	2031395.49	998.0	SG1	865364.14	2031395.48	998.03	
384	865355.10	2031395.49	1004.0	FIN1	865355.09	2031395.46	1004.02	
385	865356.11	2031395.49	998.0	SG2	865356.10	2031395.51	998.13	
386	865347.10	2031395.49	1004.0	SG3/FIN2	865347.07	2031395.50	1004.23	8.02
387	865364.12	2031345.49	998.0	SG1	865364.16	2031345.47	998.32	
388	865355.10	2031345.49	1004.0	FIN1	865355.08	2031345.50	1004.13	
389	865356.12	2031345.49	998.0	SG2	865356.10	2031345.49	998.42	
390	865347.10	2031345.49	1004.0	SG3/FIN2	865347.06	2031345.48	1004.20	8.02
391	865364.12	2031295.49	998.0	SG1	865364.16	2031295.48	998.14	
392	865355.10	2031295.49	1004.0	FIN1	865355.11	2031295.50	1004.05	
393	865356.12	2031295.49	998.0	SG2	865356.11	2031295.52	998.28	
394	865347.10	2031295.49	1004.0	SG3/FIN2	865347.04	2031295.52	1004.02	8.07
395	865364.12	2031245.49	998.0	SG1	865364.16	2031245.47	998.24	
396	865355.10	2031245.49	1004.0	FIN1	865355.12	2031245.46	1004.10	
397	865356.12	2031245.49	998.0	SG2	865356.10	2031245.49	998.00	
398	865347.10	2031245.49	1004.0	SG3/FIN2	865347.06	2031245.45	1004.06	8.06
399	865364.12	2031195.49	998.0	SG1	865364.13	2031195.52	998.19	
400	865355.10	2031195.49	1004.0	FIN1	865355.13	2031195.48	1004.12	
401	865356.12	2031195.49	998.0	SG2	865356.10	2031195.53	998.26	
402	865347.10	2031195.49	1004.0	SG3/FIN2	865347.03	2031195.52	1004.29	8.11

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
403	865364.12	2031145.49	998.0	SG1	865364.16	2031145.50	998.18	
404	865355.10	2031145.49	1004.0	FIN1	865355.12	2031145.50	1004.12	
405	865356.12	2031145.49	998.0	SG2	865356.12	2031145.48	998.18	
406	865347.10	2031145.49	1004.0	SG3/FIN2	865347.02	2031145.48	1004.21	8.10
407	865364.12	2031095.49	998.0	SG1	865364.17	2031095.49	998.09	
408	865355.10	2031095.49	1004.0	FIN1	865355.13	2031095.52	1004.17	
409	865356.12	2031095.49	998.0	SG2	865356.11	2031095.52	998.52	
410	865347.10	2031095.49	1004.0	SG3/FIN2	865347.03	2031095.49	1004.12	8.11
411	865364.12	2031045.49	998.0	SG1	865364.13	2031045.47	998.03	
412	865355.10	2031045.49	1004.0	FIN1	865355.13	2031045.49	1004.11	
413	865356.12	2031045.49	998.0	SG2	865356.12	2031045.51	998.11	
414	865347.10	2031045.49	1004.0	SG3/FIN2	865347.03	2031045.46	1004.10	8.10
415	865364.12	2030995.49	998.0	SG1	865364.17	2030995.45	998.05	
416	865355.10	2030995.49	1004.0	FIN1	865355.13	2030995.48	1004.12	
417	865356.12	2030995.49	998.0	SG2	865356.11	2030995.50	998.55	
418	865347.10	2030995.49	1004.0	SG3/FIN2	865347.04	2030995.48	1004.27	8.10
419	865364.13	2030945.49	998.0	SG1	865364.18	2030945.53	998.25	
420	865355.10	2030945.49	1004.0	FIN1	865355.12	2030945.52	1004.07	
421	865356.13	2030945.49	998.0	SG2	865356.11	2030945.50	998.12	
422	865347.10	2030945.49	1004.0	SG3/FIN2	865347.04	2030945.52	1004.22	8.08

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
423	865364.13	2030895.49	998.0	SG1	865364.18	2030895.47	998.21	
424	865355.10	2030895.49	1004.0	FIN1	865355.12	2030895.50	1004.18	
425	865356.13	2030895.49	998.0	SG2	865356.11	2030895.48	998.07	
426	865347.10	2030895.49	1004.0	SG3/FIN2	865347.05	2030895.50	1004.09	8.07
427	865364.13	2030845.49	998.0	SG1	865364.14	2030845.52	998.19	
428	865355.10	2030845.49	1004.0	FIN1	865355.13	2030845.46	1004.19	
429	865356.13	2030845.49	998.0	SG2	865356.11	2030845.50	997.82	
430	865347.10	2030845.49	1004.0	SG3/FIN2	865347.03	2030845.49	1004.77	8.10
431*	865364.13	2030809.99	998.0	SG1	*	*	*	
432*	865355.10	2030810.47	1004.0	FIN1	*	*	*	
433*	865356.13	2030810.47	998.0	SG2	*	*	*	
434*	865347.10	2030810.47	1004.0	SG3/FIN2	*	*	*	
435*	865361.19	2030785.91	1000.0	SG1	*	*	*	
436*	865355.10	2030786.65	1004.0	FIN1	*	*	*	
437*	865353.25	2030786.88	1000.0	SG2	*	*	*	
438*	865347.10	2030787.63	1004.0	SG3/FIN2	*	*	*	
439*	865355.10	2030736.11	1004.0	FIN1	*	*	*	
440*	865347.10	2030736.11	1004.0	FIN2	*	*	*	

*Verification Point Location adjusted, verification information found on Sheet 23

POND 3 2015 VERTICAL EXPANSION
CLAY BARRIER SURVEY VERIFICATION

Verification Point No.	Northing (Design)	Easting (Design)	Elevation (Design)	Location Description	Northing (As-built)	Easting (As-built)	Elevation (As-built)	Clay Width (8' MIN)
431	865364.13	2030813.50	998.0	SG1	865364.17	2030813.48	998.49	
432	865355.10	2030813.50	1004.0	FIN1	865355.13	2030813.51	1004.25	
433	865356.13	2030813.50	998.0	SG2	865356.13	2030813.50	998.03	
434	865347.10	2030813.50	1004.0	SG3/FIN2	865347.03	2030813.49	1004.66	8.10
435	865362.25	2030763.80	1001.9	SG1	865362.28	2030763.75	1002.30	
436	865359.10	2030763.80	1004.0	FIN1	865359.13	2030763.81	1004.37	
437	865354.25	2030763.80	1001.9	SG2	865354.24	2030763.79	1001.52	
438	865351.10	2030763.80	1004.0	SG3/FIN2	865351.06	2030763.80	1004.70	8.07
439	865359.10	2030738.32	1004.0	FIN1	865359.10	2030738.34	1004.74	
440	865351.10	2030738.32	1004.0	FIN2	865351.08	2030738.35	1005.38	8.02

Finished Grade Survey Verification Data

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4001	862413.45	2030689.81	1008.00	862413.55	2030689.80	1007.49	-0.51	862413.48	2030689.84	1008.01	0.52	0.01
4002	862388.47	2030690.79	1007.75	862388.43	2030690.83	1007.22	-0.53	862388.37	2030690.77	1007.82	0.60	0.07
4003	862427.53	2030720.42	1003.70	862427.47	2030720.47	1003.76	0.06	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4004	862371.74	2030785.37	1002.00	862375.08	2030785.35	1002.59	0.59	862375.08	2030785.35	1003.27	0.69	1.27
4005	862388.29	2030784.72	1007.71	862388.27	2030784.70	1007.15	-0.56	862388.27	2030784.70	1007.71	0.56	0.00
4006	862392.15	2030784.57	1007.75	862392.11	2030784.56	1007.24	-0.51	862392.06	2030784.57	1007.78	0.54	0.03
4007	862417.13	2030783.59	1008.00	862417.15	2030783.59	1007.48	-0.52	862417.12	2030783.57	1008.04	0.56	0.04
4008	862429.98	2030783.08	1003.75	862430.01	2030783.13	1003.81	0.06	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4009	862433.66	2030876.87	1003.75	862433.68	2030876.84	1003.82	0.07	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4010	862420.81	2030877.37	1008.00	862420.84	2030877.36	1007.46	-0.54	862420.80	2030877.42	1008.03	0.57	0.03
4011	862395.83	2030878.35	1007.75	862395.79	2030878.34	1007.24	-0.51	862395.70	2030878.36	1007.79	0.55	0.04
4012	862391.96	2030878.50	1007.71	862391.93	2030878.54	1007.19	-0.52	862391.91	2030878.52	1007.74	0.55	0.03
4013	862375.41	2030879.15	1002.00	862375.33	2030879.19	1001.46	-0.54	862375.42	2030879.17	1002.06	0.60	0.06
4014	862379.52	2030972.92	1002.00	862379.52	2030972.96	1001.45	-0.55	862379.58	2030973.03	1001.95	0.50	-0.05
4015	862396.07	2030972.27	1007.72	862396.01	2030972.34	1007.21	-0.51	862396.08	2030972.26	1007.77	0.56	0.06
4016	862399.94	2030972.11	1007.75	862399.89	2030972.09	1007.23	-0.52	862399.83	2030972.08	1007.80	0.56	0.04
4017	862424.92	2030971.13	1008.00	862424.95	2030971.12	1007.48	-0.52	862424.92	2030971.11	1008.05	0.56	0.04
4018	862437.77	2030970.63	1003.75	862437.69	2030970.67	1003.78	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4019	862442.64	2031064.37	1003.75	862442.66	2031064.38	1003.77	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4020	862429.79	2031064.87	1008.00	862429.81	2031064.84	1007.48	-0.52	862429.83	2031064.90	1008.02	0.54	0.02
4021	862404.80	2031065.85	1007.75	862404.77	2031065.86	1007.23	-0.52	862404.71	2031065.88	1007.81	0.58	0.06
4022	862400.94	2031066.00	1007.71	862400.87	2031065.94	1007.13	-0.58	862400.92	2031066.01	1007.79	0.66	0.08
4023	862384.39	2031066.65	1002.00	862384.43	2031066.60	1001.49	-0.51	862384.52	2031066.64	1002.02	0.54	0.02
4024	862389.26	2031160.39	1002.00	862389.23	2031160.43	1001.48	-0.52	862389.20	2031160.41	1002.09	0.60	0.09
4025	862405.81	2031159.74	1007.71	862405.78	2031159.73	1007.19	-0.52	862405.85	2031159.73	1007.73	0.54	0.02
4026	862409.67	2031159.59	1007.75	862409.62	2031159.62	1007.22	-0.53	862409.55	2031159.57	1007.82	0.61	0.07
4027	862434.65	2031158.61	1008.00	862434.69	2031158.60	1007.47	-0.53	862434.68	2031158.58	1008.00	0.53	0.00
4028	862447.51	2031158.18	1003.75	862447.52	2031158.20	1003.75	0.00	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4029	862452.38	2031251.84	1003.75	862452.35	2031251.85	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4030	862439.52	2031252.34	1008.00	862439.57	2031252.30	1007.48	-0.52	862439.54	2031252.34	1008.04	0.56	0.04
4031	862414.54	2031253.32	1007.75	862414.51	2031253.34	1007.23	-0.52	862414.43	2031253.32	1007.80	0.57	0.05
4032	862410.68	2031253.47	1007.71	862410.64	2031253.48	1007.16	-0.55	862410.69	2031253.48	1007.77	0.61	0.06
4033	862394.12	2031254.12	1002.00	862394.07	2031254.07	1001.44	-0.56	862394.04	2031254.05	1002.11	0.66	0.11
4034	862398.99	2031347.86	1002.00	862398.91	2031347.88	1001.49	-0.51	862398.80	2031347.91	1002.01	0.52	0.01
4035	862415.54	2031347.21	1007.71	862415.60	2031347.26	1007.13	-0.58	862415.52	2031347.14	1007.80	0.67	0.09
4036	862419.41	2031347.06	1007.75	862419.39	2031346.99	1007.24	-0.51	862419.32	2031347.06	1007.78	0.54	0.03
4037	862444.39	2031346.08	1008.00	862444.41	2031346.07	1007.47	-0.53	862444.44	2031346.08	1008.05	0.59	0.05

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4038	862457.24	2031345.57	1003.75	862457.21	2031345.52	1003.80	0.05	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4039	862462.11	2031439.31	1003.75	862462.10	2031439.38	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4040	862449.26	2031439.81	1008.00	862449.29	2031439.81	1007.47	-0.53	862449.23	2031439.83	1008.02	0.55	0.02
4041	862424.27	2031440.79	1007.75	862424.24	2031440.77	1007.23	-0.52	862424.17	2031440.75	1007.76	0.53	0.01
4042	862420.41	2031440.94	1007.71	862420.36	2031440.90	1007.18	-0.53	862420.40	2031440.90	1007.75	0.58	0.04
4043	862403.86	2031441.59	1002.00	862403.82	2031441.63	1001.48	-0.52	862403.84	2031441.62	1001.99	0.51	-0.01
4044	862408.73	2031535.33	1002.00	862408.73	2031535.31	1001.47	-0.53	862408.74	2031535.29	1002.04	0.57	0.04
4045	862425.28	2031534.68	1007.71	862425.31	2031534.76	1007.12	-0.59	862425.29	2031534.66	1007.75	0.63	0.04
4046	862429.14	2031534.53	1007.75	862429.11	2031534.54	1007.22	-0.53	862429.06	2031534.54	1007.80	0.57	0.05
4047	862454.12	2031533.55	1008.00	862454.15	2031533.52	1007.44	-0.56	862454.10	2031533.53	1008.04	0.60	0.04
4048	862466.98	2031533.04	1003.75	862467.03	2031533.00	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4049	862471.85	2031626.78	1003.75	862471.76	2031626.83	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4050	862458.99	2031627.28	1008.00	862459.03	2031627.29	1007.43	-0.57	862459.02	2031627.24	1008.03	0.60	0.03
4051	862434.01	2031628.26	1007.75	862433.97	2031628.29	1007.22	-0.53	862433.90	2031628.25	1007.81	0.59	0.06
4052	862430.15	2031628.41	1007.71	862430.19	2031628.47	1007.21	-0.50	862430.13	2031628.44	1007.71	0.51	0.00
4053	862413.59	2031629.06	1002.00	862413.57	2031629.09	1001.49	-0.51	862413.56	2031629.12	1002.12	0.63	0.12
4054	862418.46	2031722.80	1002.00	862418.40	2031722.81	1001.47	-0.53	862418.47	2031722.78	1002.00	0.53	0.00
4055	862435.01	2031722.15	1007.71	862434.99	2031722.12	1007.19	-0.52	862434.99	2031722.13	1007.75	0.55	0.04
4056	862438.88	2031722.00	1007.75	862438.84	2031722.01	1007.23	-0.52	862438.77	2031722.06	1007.79	0.56	0.04
4057	862463.86	2031721.02	1008.00	862463.88	2031721.00	1007.49	-0.51	862463.86	2031720.97	1008.02	0.53	0.02
4058	862476.71	2031720.51	1003.75	862476.75	2031720.47	1003.75	0.00	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4059	862481.58	2031814.25	1003.75	862481.50	2031814.34	1003.75	0.00	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4060	862468.73	2031814.75	1008.00	862468.77	2031814.72	1007.48	-0.52	862468.77	2031814.78	1008.07	0.59	0.07
4061	862443.74	2031815.73	1007.75	862443.71	2031815.72	1007.24	-0.51	862443.66	2031815.75	1007.81	0.57	0.06
4062	862439.88	2031815.88	1007.71	862439.85	2031815.97	1007.16	-0.55	862439.82	2031815.91	1007.79	0.63	0.08
4063	862417.53	2031816.76	1000.00	862417.58	2031816.79	999.48	-0.52	862417.65	2031816.74	1000.00	0.52	0.00
4064	862422.48	2031912.02	1000.00	862422.52	2031912.07	999.45	-0.55	862422.50	2031912.04	999.97	0.51	-0.03
4065	862444.82	2031911.09	1007.71	862444.77	2031911.13	1007.17	-0.54	862444.78	2031911.12	1007.79	0.62	0.08
4066	862448.61	2031909.41	1007.75	862448.58	2031909.46	1007.24	-0.51	862448.52	2031909.34	1007.78	0.54	0.03
4067	862473.08	2031898.52	1008.00	862473.13	2031898.47	1007.47	-0.53	862473.12	2031898.49	1008.04	0.58	0.04
4068	862485.66	2031892.82	1003.75	862485.61	2031892.79	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4069	862522.71	2031930.20	1003.75	862522.65	2031930.23	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4070	862513.87	2031939.31	1008.00	862513.91	2031939.30	1007.44	-0.56	862513.84	2031939.23	1008.05	0.61	0.05
4071	862496.45	2031957.25	1007.75	862496.41	2031957.28	1007.22	-0.53	862496.36	2031957.26	1007.79	0.57	0.04
4072	862493.76	2031960.03	1007.71	862493.75	2031960.04	1007.20	-0.51	862493.75	2031960.00	1007.74	0.54	0.03
4073	862447.51	2031996.86	1007.12	862447.47	2031996.94	1006.62	-0.51	862447.44	2031996.79	1007.16	0.54	0.03
4074	862426.90	2031998.33	1000.00	862426.96	2031998.36	999.47	-0.53	862426.90	2031998.24	1000.09	0.62	0.09
4075	862438.92	2032022.68	1000.00	862438.90	2032022.67	999.50	-0.50	862438.95	2032022.68	1000.06	0.56	0.06

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4076	862452.05	2032006.70	1007.13	862451.98	2032006.73	1006.60	-0.53	862451.93	2032006.80	1007.11	0.51	-0.02
4077	862462.12	2032010.71	1007.13	862462.14	2032010.70	1006.55	-0.58	862462.13	2032010.85	1007.16	0.60	0.03
4078	862461.41	2032031.36	1000.00	862461.42	2032031.35	999.50	-0.50	862461.50	2032031.36	1000.02	0.52	0.02
4079	862542.90	2032031.46	1000.00	862542.89	2032031.39	999.44	-0.56	862542.85	2032031.39	1000.09	0.64	0.09
4080	862542.70	2032008.97	1007.71	862542.72	2032008.93	1007.18	-0.53	862542.69	2032009.01	1007.72	0.54	0.01
4081	862544.30	2032005.10	1007.75	862544.25	2032005.12	1007.22	-0.53	862544.20	2032005.17	1007.76	0.54	0.01
4082	862554.66	2031980.10	1008.00	862554.70	2031980.06	1007.48	-0.52	862554.72	2031980.03	1008.02	0.53	0.02
4083	862559.63	2031967.55	1003.75	862559.69	2031967.59	1003.78	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4084	862642.67	2031967.55	1003.75	862642.66	2031967.52	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4085	862642.67	2031980.10	1008.00	862642.62	2031980.06	1007.47	-0.53	862642.73	2031980.06	1008.05	0.58	0.05
4086	862642.67	2032005.10	1007.75	862642.67	2032005.13	1007.24	-0.51	862642.67	2032005.23	1007.84	0.60	0.09
4087	862642.67	2032008.97	1007.71	862642.64	2032009.00	1007.17	-0.54	862642.68	2032008.96	1007.73	0.57	0.02
4088	862642.67	2032031.39	1000.00	862642.70	2032031.36	999.47	-0.53	862642.67	2032031.36	1000.04	0.57	0.04
4089	862741.05	2032031.37	1000.00	862741.06	2032031.43	999.45	-0.55	862740.98	2032031.57	1000.14	0.69	0.14
4090	862741.05	2032008.97	1007.71	862741.08	2032008.97	1007.15	-0.56	862741.02	2032008.91	1007.73	0.58	0.02
4091	862741.05	2032005.10	1007.75	862741.03	2032005.11	1007.25	-0.50	862741.07	2032005.22	1007.81	0.57	0.07
4092	862741.05	2031980.10	1008.00	862741.03	2031980.05	1007.49	-0.51	862741.03	2031980.07	1008.00	0.52	0.00
4093	862741.05	2031967.55	1003.75	862741.07	2031967.51	1003.82	0.07	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4094	862839.42	2031967.55	1003.75	862839.45	2031967.59	1003.80	0.05	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4095	862839.42	2031980.10	1008.00	862839.41	2031980.07	1007.48	-0.52	862839.46	2031980.03	1008.04	0.56	0.04
4096	862839.42	2032005.10	1007.75	862839.38	2032005.13	1007.21	-0.54	862839.41	2032005.21	1007.84	0.63	0.09
4097	862839.42	2032008.97	1007.71	862839.48	2032008.95	1007.20	-0.51	862839.44	2032008.87	1007.73	0.54	0.02
4098	862839.42	2032031.38	1000.00	862839.46	2032031.42	999.49	-0.51	862839.47	2032031.40	1000.23	0.74	0.23
4099	862937.79	2032031.38	1000.00	862937.73	2032031.45	999.46	-0.54	862937.88	2032031.45	999.96	0.50	-0.04
4100	862937.79	2032008.97	1007.71	862937.77	2032008.99	1007.20	-0.51	862937.82	2032008.97	1007.74	0.54	0.03
4101	862937.79	2032005.10	1007.75	862937.74	2032005.13	1007.23	-0.52	862937.79	2032005.21	1007.80	0.57	0.05
4102	862937.79	2031980.10	1008.00	862937.81	2031980.07	1007.48	-0.52	862937.84	2031980.08	1008.02	0.54	0.02
4103	862937.79	2031967.55	1003.75	862937.83	2031967.61	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4104	863036.17	2031967.51	1003.75	863036.12	2031967.50	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4105	863036.17	2031980.10	1008.00	863036.15	2031980.06	1007.49	-0.51	863036.19	2031980.09	1008.08	0.59	0.08
4106	863036.17	2032005.10	1007.75	863036.12	2032005.13	1007.21	-0.54	863036.20	2032005.19	1007.78	0.58	0.03
4107	863036.17	2032008.97	1007.71	863036.18	2032008.94	1007.18	-0.53	863036.10	2032008.96	1007.72	0.54	0.01
4108	863036.17	2032031.37	1000.00	863036.15	2032031.45	999.49	-0.51	863036.15	2032031.45	1000.15	0.66	0.15
4109	863134.54	2032031.37	1000.00	863134.54	2032031.33	999.49	-0.51	863134.47	2032031.39	1000.08	0.60	0.08
4110	863134.54	2032008.97	1007.71	863134.51	2032008.99	1007.19	-0.52	863134.53	2032008.99	1007.74	0.55	0.03
4111	863134.54	2032005.10	1007.75	863134.54	2032005.14	1007.22	-0.53	863134.51	2032005.20	1007.79	0.57	0.04
4112	863134.54	2031980.10	1008.00	863134.52	2031980.07	1007.47	-0.53	863134.57	2031980.08	1008.06	0.60	0.06
4113	863134.54	2031967.40	1003.75	863134.50	2031967.37	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4114	863232.91	2031967.36	1003.75	863232.93	2031967.40	1003.82	0.07	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4115	863232.91	2031980.10	1008.00	863232.90	2031980.07	1007.49	-0.51	863232.97	2031980.09	1008.04	0.55	0.04
4116	863232.91	2032005.10	1007.75	863232.95	2032005.14	1007.23	-0.52	863232.92	2032005.21	1007.77	0.55	0.02
4117	863232.91	2032008.97	1007.71	863232.93	2032008.92	1007.20	-0.51	863232.96	2032008.95	1007.76	0.56	0.05
4118	863232.91	2032031.37	1000.00	863232.96	2032031.30	999.50	-0.50	863232.99	2032031.33	1000.01	0.52	0.01
4119	863331.29	2032031.37	1000.00	863331.31	2032031.37	999.43	-0.57	863331.21	2032031.37	999.95	0.52	-0.05
4120	863331.29	2032008.97	1007.71	863331.29	2032008.93	1007.21	-0.50	863331.25	2032008.94	1007.72	0.51	0.01
4121	863331.29	2032005.10	1007.75	863331.27	2032005.12	1007.23	-0.52	863331.33	2032005.21	1007.78	0.55	0.03
4122	863331.29	2031980.10	1008.00	863331.31	2031980.07	1007.49	-0.51	863331.33	2031980.02	1008.07	0.58	0.07
4123	863331.29	2031967.36	1003.75	863331.24	2031967.35	1003.79	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4124	863429.66	2031967.36	1003.75	863429.69	2031967.37	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4125	863429.66	2031980.10	1008.00	863429.61	2031980.08	1007.47	-0.53	863429.66	2031980.10	1008.03	0.56	0.03
4126	863429.66	2032005.10	1007.75	863429.64	2032005.13	1007.24	-0.51	863429.63	2032005.18	1007.80	0.56	0.05
4127	863429.66	2032008.97	1007.71	863429.60	2032008.94	1007.15	-0.56	863429.64	2032008.94	1007.72	0.57	0.01
4128	863429.66	2032031.38	1000.00	863429.62	2032031.34	999.50	-0.50	863429.62	2032031.32	1000.03	0.53	0.03
4129	863528.03	2032031.38	1000.00	863528.02	2032031.37	999.46	-0.54	863528.08	2032031.36	1000.00	0.54	0.00
4130	863528.03	2032008.97	1007.71	863527.98	2032008.94	1007.21	-0.50	863528.05	2032009.02	1007.72	0.51	0.01
4131	863528.03	2032005.10	1007.75	863528.02	2032005.11	1007.18	-0.57	863528.05	2032005.16	1007.76	0.58	0.01
4132	863528.03	2031980.10	1008.00	863527.99	2031980.06	1007.46	-0.54	863528.09	2031980.08	1008.02	0.56	0.02
4133	863528.03	2031967.36	1003.75	863528.01	2031967.36	1003.82	0.07	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4134	863626.40	2031967.36	1003.75	863626.41	2031967.38	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4135	863626.40	2031980.10	1008.00	863626.35	2031980.08	1007.50	-0.50	863626.49	2031980.04	1008.04	0.54	0.04
4136	863626.40	2032005.10	1007.75	863626.41	2032005.16	1007.21	-0.54	863626.36	2032005.17	1007.80	0.59	0.05
4137	863626.40	2032008.97	1007.71	863626.35	2032008.94	1007.20	-0.51	863626.43	2032008.97	1007.74	0.54	0.03
4138	863626.14	2032022.20	1003.30	863626.13	2032022.14	1002.77	-0.53	863626.19	2032022.13	1003.36	0.59	0.06
4139	863613.17	2032031.41	1004.00	863613.16	2032031.38	1003.50	-0.50	863613.20	2032031.40	1004.01	0.51	0.01
4140	863572.61	2032035.44	998.89	863572.62	2032035.44	998.41	-0.47	863572.65	2032035.39	998.93	0.51	0.04
4141	863549.72	2032047.10	998.77	863549.69	2032047.04	998.22	-0.55	863549.66	2032047.06	998.78	0.56	0.01
4142	863542.32	2032074.68	997.17	863542.33	2032074.70	996.66	-0.51	863542.27	2032074.73	997.20	0.55	0.03
4143	863625.24	2032054.18	1004.00	863625.20	2032054.22	1003.49	-0.51	863625.28	2032054.25	1004.02	0.53	0.02
4144	863624.07	2032065.68	1000.00	863624.03	2032065.68	999.48	-0.52	863624.07	2032065.64	1000.04	0.56	0.04
4145	863726.60	2032066.20	1000.00	863726.54	2032066.15	999.48	-0.52	863726.53	2032066.12	999.98	0.50	-0.02
4146	863723.23	2032044.30	1007.36	863723.23	2032044.27	1006.84	-0.52	863723.22	2032044.23	1007.37	0.53	0.01
4147	863666.01	2032044.10	1007.36	863666.04	2032044.05	1006.84	-0.52	863666.09	2032044.17	1007.39	0.55	0.03
4148	863656.79	2032020.62	1007.60	863656.70	2032020.55	1007.07	-0.53	863656.72	2032020.58	1007.62	0.55	0.03
4149	863679.68	2032008.97	1007.71	863679.67	2032008.97	1007.19	-0.52	863679.65	2032008.94	1007.79	0.61	0.08
4150	863719.58	2032005.10	1007.75	863719.59	2032005.09	1007.19	-0.56	863719.64	2032005.12	1007.77	0.57	0.02
4151	863724.78	2032029.57	1007.50	863724.79	2032029.60	1006.95	-0.56	863724.76	2032029.63	1007.53	0.58	0.03

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4152	863724.78	2031980.10	1008.00	863724.81	2031980.08	1007.42	-0.58	863724.81	2031980.06	1008.03	0.62	0.03
4153	863724.78	2031967.36	1003.75	863724.78	2031967.33	1003.78	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4154	863823.75	2031967.36	1003.75	863823.73	2031967.42	1003.85	0.10	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4155	863823.75	2031980.10	1008.00	863823.71	2031980.07	1007.43	-0.57	863823.74	2031980.06	1008.00	0.57	0.00
4156	863823.75	2032005.10	1007.75	863823.74	2032005.12	1007.24	-0.51	863823.67	2032005.14	1007.77	0.53	0.02
4157	863792.47	2032026.63	1007.54	863792.42	2032026.57	1006.96	-0.57	863792.49	2032026.57	1007.54	0.57	0.00
4158	863797.77	2032048.25	1000.00	863797.80	2032048.20	999.49	-0.51	863797.86	2032048.26	1000.00	0.51	0.00
4159	863864.54	2032032.10	1000.00	863864.51	2032032.06	999.48	-0.52	863864.46	2032032.04	1000.01	0.53	0.01
4160	863861.72	2032008.97	1007.71	863861.75	2032008.99	1007.14	-0.57	863861.70	2032008.91	1007.71	0.57	0.00
4161	863921.52	2032031.76	1000.00	863921.57	2032031.75	999.48	-0.52	863921.53	2032031.77	1000.10	0.62	0.10
4162	863921.52	2032008.97	1007.71	863921.55	2032008.90	1007.19	-0.52	863921.50	2032009.00	1007.74	0.55	0.03
4163	863921.52	2032005.10	1007.75	863921.48	2032005.14	1007.23	-0.52	863921.53	2032005.21	1007.78	0.55	0.03
4164	863921.52	2031980.10	1008.00	863921.53	2031980.07	1007.42	-0.58	863921.58	2031980.05	1008.07	0.65	0.07
4165	863921.52	2031967.36	1003.75	863921.49	2031967.41	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4166	864019.90	2031967.36	1003.75	864019.94	2031967.37	1003.80	0.05	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4167	864019.90	2031980.10	1008.00	864019.87	2031980.07	1007.46	-0.54	864019.95	2031980.07	1008.03	0.57	0.03
4168	864019.90	2032005.10	1007.75	864019.87	2032005.11	1007.23	-0.52	864019.95	2032005.21	1007.77	0.54	0.02
4169	864019.90	2032008.97	1007.71	864019.87	2032008.95	1007.21	-0.51	864019.96	2032009.01	1007.79	0.58	0.08
4170	864019.90	2032031.76	1000.00	864019.93	2032028.64	999.83	-0.17	864019.97	2032028.63	1000.54	0.71	0.54
4171	864118.27	2032031.76	1000.00	864118.24	2032031.79	999.43	-0.58	864118.25	2032031.73	999.95	0.52	-0.05
4172	864118.27	2032008.97	1007.71	864118.29	2032008.92	1007.21	-0.50	864118.27	2032009.00	1007.75	0.54	0.04
4173	864118.27	2032005.10	1007.75	864118.25	2032005.14	1007.23	-0.52	864118.29	2032005.05	1007.77	0.54	0.02
4174	864118.27	2031980.10	1008.00	864118.25	2031980.07	1007.50	-0.50	864118.24	2031980.07	1008.01	0.51	0.01
4175	864118.27	2031967.36	1003.75	864118.24	2031967.39	1003.77	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4176	864172.49	2032008.97	1007.71	864172.46	2032009.04	1007.19	-0.52	864172.47	2032008.93	1007.74	0.54	0.02
4177	864170.40	2032026.10	1002.00	864170.36	2032026.13	1001.48	-0.52	864170.34	2032026.05	1002.00	0.52	0.00
4178	864216.64	2032037.29	1002.00	864216.64	2032037.28	1001.42	-0.59	864216.69	2032037.29	1001.97	0.56	-0.03
4179	864216.64	2032020.23	1007.60	864216.64	2032020.23	1007.02	-0.58	864216.65	2032020.27	1007.61	0.59	0.01
4180	864216.64	2032006.63	1007.73	864216.61	2032006.66	1007.22	-0.51	864216.62	2032006.70	1007.76	0.53	0.02
4181	864210.46	2032005.10	1007.75	864210.41	2032005.13	1007.20	-0.55	864210.50	2032005.18	1007.77	0.57	0.02
4182	864216.64	2031980.10	1008.00	864216.60	2031980.07	1007.47	-0.53	864216.66	2031980.09	1008.02	0.55	0.01
4183	864216.64	2031967.36	1003.75	864216.66	2031967.38	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4184	864314.63	2031967.36	1003.75	864314.61	2031967.36	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4185	864314.63	2031980.10	1008.00	864314.61	2031980.07	1007.48	-0.52	864314.64	2031980.05	1008.08	0.60	0.08
4186	864314.63	2032005.10	1007.75	864314.63	2032005.11	1007.25	-0.50	864314.60	2032005.15	1007.76	0.51	0.01
4187	864311.71	2032030.13	1007.50	864311.67	2032030.16	1006.99	-0.51	864311.61	2032030.19	1007.51	0.51	0.01
4188	864310.20	2032044.10	1007.36	864310.15	2032044.05	1006.82	-0.54	864310.19	2032044.14	1007.39	0.57	0.03
4189	864307.52	2032066.18	1000.00	864307.53	2032061.31	1001.06	1.06	864307.53	2032061.26	1001.61	0.55	1.61

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4190	864376.36	2032065.44	1000.25	864376.31	2032065.49	999.74	-0.50	864376.27	2032065.42	1000.26	0.52	0.01
4191	864368.21	2032044.10	1007.36	864368.15	2032044.14	1006.79	-0.58	864368.25	2032044.18	1007.37	0.58	0.01
4192	864377.42	2032020.62	1007.60	864377.35	2032020.57	1007.08	-0.52	864377.40	2032020.59	1007.63	0.55	0.04
4193	864354.53	2032008.97	1007.71	864354.53	2032008.99	1007.19	-0.52	864354.57	2032008.94	1007.76	0.56	0.04
4194	864399.57	2032020.10	1004.00	864399.55	2032020.10	1003.48	-0.52	864399.51	2032020.05	1004.07	0.59	0.07
4195	864425.30	2032026.46	1001.88	864425.30	2032026.40	1001.46	-0.42	864425.26	2032026.55	1001.97	0.51	0.09
4196	864446.77	2032037.77	1001.88	864446.73	2032037.71	1001.35	-0.53	864446.75	2032037.76	1001.88	0.53	0.00
4197	864445.38	2032063.18	1001.00	864445.33	2032063.24	1000.42	-0.58	864445.38	2032063.23	1001.01	0.59	0.01
4198	864413.39	2032008.97	1007.71	864413.41	2032008.96	1007.17	-0.55	864413.40	2032008.99	1007.79	0.62	0.08
4199	864413.39	2032005.10	1007.75	864413.42	2032005.12	1007.16	-0.59	864413.32	2032005.15	1007.79	0.62	0.04
4200	864413.39	2031980.10	1008.00	864413.42	2031980.07	1007.45	-0.55	864413.41	2031980.05	1008.01	0.56	0.01
4201	864413.00	2031967.36	1003.75	864412.90	2031967.40	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4202	864511.76	2031967.36	1003.75	864511.73	2031967.44	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4203	864511.76	2031980.10	1008.00	864511.75	2031980.07	1007.48	-0.52	864511.75	2031980.04	1008.04	0.56	0.04
4204	864511.76	2032005.10	1007.75	864511.71	2032005.12	1007.24	-0.50	864511.75	2032005.22	1007.83	0.58	0.08
4205	864511.76	2032008.97	1007.71	864511.75	2032008.99	1007.16	-0.56	864511.75	2032008.95	1007.81	0.65	0.10
4206	864511.76	2032025.59	1002.00	864511.72	2032025.54	1001.43	-0.57	864511.64	2032025.45	1001.94	0.51	-0.06
4207	864610.13	2032025.56	1002.00	864610.14	2032025.59	1001.52	-0.48	864610.05	2032025.48	1002.20	0.68	0.20
4208	864610.13	2032008.97	1007.71	864610.13	2032008.97	1007.19	-0.52	864610.12	2032008.91	1007.77	0.58	0.06
4209	864610.13	2032005.10	1007.75	864610.09	2032005.15	1007.23	-0.51	864610.15	2032005.19	1007.79	0.55	0.04
4210	864610.13	2031980.10	1008.00	864610.08	2031980.06	1007.47	-0.53	864610.16	2031980.09	1008.03	0.56	0.03
4211	864610.13	2031967.36	1003.75	864610.08	2031967.43	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4212	864708.51	2031967.36	1003.75	864708.47	2031967.40	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4213	864708.51	2031980.10	1008.00	864708.47	2031980.07	1007.48	-0.52	864708.57	2031980.02	1008.04	0.56	0.04
4214	864708.51	2032005.10	1007.75	864708.51	2032005.14	1007.24	-0.51	864708.52	2032005.20	1007.76	0.53	0.02
4215	864708.51	2032008.97	1007.71	864708.47	2032008.96	1007.17	-0.54	864708.53	2032008.96	1007.75	0.58	0.04
4216	864708.51	2032025.57	1002.00	864708.45	2032025.59	1001.45	-0.55	864708.40	2032025.61	1002.19	0.74	0.19
4217	864806.67	2032025.58	1002.00	864806.67	2032025.62	1001.48	-0.52	864806.63	2032025.72	1002.17	0.69	0.17
4218	864806.88	2032008.97	1007.71	864806.92	2032008.95	1007.19	-0.52	864806.93	2032008.98	1007.76	0.56	0.05
4219	864806.88	2032005.10	1007.75	864806.90	2032005.11	1007.19	-0.56	864806.88	2032005.22	1007.80	0.61	0.05
4220	864806.88	2031980.10	1008.00	864806.92	2031980.07	1007.48	-0.52	864806.87	2031980.02	1008.03	0.55	0.02
4221	864806.88	2031967.36	1003.75	864806.87	2031967.43	1003.79	0.04	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4222	864905.25	2031967.36	1003.75	864905.29	2031967.41	1003.77	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4223	864905.25	2031980.10	1008.00	864905.31	2031980.07	1007.46	-0.54	864905.24	2031980.08	1008.03	0.57	0.03
4224	864905.25	2032005.10	1007.75	864905.23	2032005.13	1007.23	-0.52	864905.22	2032005.19	1007.76	0.53	0.01
4225	864905.25	2032008.97	1007.71	864905.30	2032008.93	1007.20	-0.52	864905.21	2032008.98	1007.76	0.56	0.05
4226	864905.25	2032025.58	1002.00	864905.27	2032025.56	1001.48	-0.52	864905.31	2032025.53	1002.22	0.73	0.22
4227	865003.63	2032025.58	1002.00	865003.56	2032025.66	1001.47	-0.53	865003.55	2032025.70	1002.19	0.72	0.19

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4228	865003.63	2032008.97	1007.71	865003.63	2032009.01	1007.16	-0.55	865003.59	2032008.94	1007.74	0.58	0.03
4229	865003.63	2032005.10	1007.75	865003.63	2032005.14	1007.21	-0.54	865003.60	2032005.22	1007.77	0.56	0.02
4230	865003.63	2031980.10	1008.00	865003.58	2031980.07	1007.44	-0.57	865003.63	2031980.03	1008.03	0.59	0.03
4231	865003.63	2031967.36	1003.75	865003.55	2031967.33	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4232	865102.00	2031967.36	1003.75	865102.05	2031967.42	1003.84	0.09	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4233	865102.00	2031980.10	1008.00	865102.01	2031980.07	1007.44	-0.56	865102.05	2031980.04	1008.04	0.60	0.04
4234	865102.00	2032005.10	1007.75	865102.04	2032005.12	1007.18	-0.57	865101.99	2032005.19	1007.82	0.65	0.07
4235	865102.00	2032008.97	1007.71	865101.96	2032008.92	1007.20	-0.51	865101.94	2032008.98	1007.72	0.53	0.01
4236	865102.00	2032025.58	1002.00	865102.06	2032025.54	1001.46	-0.54	865102.07	2032025.54	1002.29	0.83	0.29
4237	865200.37	2032025.60	1002.00	865200.32	2032025.64	1001.57	-0.43	865200.31	2032025.60	1002.07	0.51	0.07
4238	865200.37	2032008.97	1007.71	865200.33	2032009.00	1007.18	-0.53	865200.39	2032008.90	1007.77	0.59	0.06
4239	865200.37	2032005.10	1007.75	865200.35	2032005.11	1007.17	-0.58	865200.30	2032005.19	1007.77	0.60	0.02
4240	865200.37	2031980.10	1008.00	865200.34	2031980.05	1007.49	-0.51	865200.29	2031980.06	1008.02	0.53	0.02
4241	865200.37	2031967.36	1003.75	865200.44	2031967.36	1003.81	0.06	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4242	865250.17	2031967.36	1003.76	865250.17	2031967.43	1004.11	0.36	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4243	865255.45	2031980.10	1008.00	865255.40	2031980.05	1007.46	-0.54	865255.38	2031980.02	1008.03	0.57	0.03
4244	865298.75	2032005.10	1007.70	865298.75	2032005.10	1007.18	-0.53	865298.73	2032005.07	1007.72	0.54	0.02
4245	865269.93	2032020.27	1007.71	865269.87	2032020.28	1007.20	-0.51	865269.93	2032020.26	1007.72	0.52	0.01
4246	865270.64	2032014.10	1006.00	865270.61	2032014.13	1005.48	-0.52	865270.67	2032014.15	1006.07	0.59	0.07
4247	865217.63	2032027.20	1001.42	865217.59	2032027.24	1000.92	-0.51	865217.69	2032027.13	1001.44	0.53	0.02
4248	865196.16	2032038.51	1001.63	865196.15	2032038.48	1001.12	-0.51	865196.11	2032038.47	1001.67	0.54	0.03
4249	865188.43	2032066.18	1000.00	865188.38	2032066.20	999.55	-0.45	865188.31	2032066.24	1000.06	0.51	0.06
4250	865276.93	2032044.30	1007.29	865276.88	2032044.35	1006.72	-0.58	865276.96	2032044.37	1007.35	0.64	0.06
4251	865298.75	2032038.90	1007.36	865298.78	2032038.94	1006.85	-0.50	865298.80	2032038.97	1007.41	0.56	0.06
4252	865287.47	2032066.18	1000.00	865287.41	2032060.61	1001.19	1.19	865287.38	2032060.58	1001.74	0.55	1.74
4253	865386.51	2032066.18	1000.00	865386.45	2032060.04	1001.43	1.43	865386.43	2032060.11	1002.01	0.58	2.01
4254	865386.39	2032044.30	1007.29	865386.40	2032044.31	1006.74	-0.55	865386.45	2032044.27	1007.30	0.56	0.00
4255	865422.44	2032035.15	1007.25	865422.39	2032035.16	1006.66	-0.59	865422.43	2032035.14	1007.26	0.61	0.01
4256	865428.00	2032056.75	1000.00	865428.06	2032054.04	1000.17	0.17	865428.10	2032054.04	1000.75	0.57	0.75
4257	865470.57	2032016.11	1000.00	865467.88	2032016.03	1000.50	0.50	865467.96	2032016.08	1001.00	0.50	1.00
4258	865451.84	2032006.34	1007.11	865451.83	2032006.35	1006.59	-0.52	865451.81	2032006.39	1007.11	0.52	0.00
4259	865460.43	2031955.34	1006.87	865460.44	2031955.38	1006.33	-0.53	865460.46	2031955.29	1006.88	0.55	0.01
4260	865480.63	2031951.28	1000.00	865474.57	2031951.25	1000.98	0.98	865474.49	2031951.29	1001.53	0.54	1.52
4261	865467.65	2031886.60	1000.00	865465.70	2031886.59	999.99	-0.01	865465.76	2031886.60	1000.49	0.51	0.49
4262	865447.40	2031892.42	1007.00	865447.37	2031892.44	1006.47	-0.53	865447.39	2031892.44	1007.07	0.61	0.08
4263	865433.40	2031824.81	1007.14	865433.44	2031824.80	1006.60	-0.54	865433.36	2031824.85	1007.16	0.56	0.02
4264	865434.19	2031793.75	1004.84	865434.14	2031793.79	1004.32	-0.53	865434.23	2031793.77	1004.87	0.56	0.03
4265	865451.76	2031807.49	1000.00	865447.79	2031807.49	1000.70	0.70	865447.83	2031807.51	1001.24	0.54	1.24

Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4266	865435.84	2031728.15	1000.00	865435.88	2031728.13	999.49	-0.51	865435.87	2031728.20	1000.02	0.53	0.02
4267	865410.41	2031714.67	1000.00	865410.36	2031714.72	999.57	-0.43	865410.29	2031714.65	1000.09	0.51	0.09
4268	865399.10	2031736.13	1000.00	865399.07	2031736.14	999.52	-0.48	865399.09	2031736.10	1000.08	0.57	0.08
4269	865395.41	2031775.33	1005.00	865395.39	2031775.40	1004.43	-0.57	865395.32	2031775.41	1005.05	0.62	0.05
4270	865389.79	2031773.83	1003.11	865389.78	2031773.83	1002.61	-0.50	865389.78	2031773.76	1003.18	0.58	0.08
4271	865387.63	2031806.83	1007.60	865387.59	2031806.78	1007.09	-0.51	865387.58	2031806.80	1007.62	0.53	0.03
4272	865375.97	2031829.72	1007.71	865375.98	2031829.76	1007.18	-0.53	865375.95	2031829.74	1007.75	0.58	0.04
4273	865372.10	2031869.63	1007.77	865372.13	2031869.60	1007.26	-0.51	865372.11	2031869.61	1007.81	0.55	0.04
4274	865415.78	2031868.19	1007.29	865415.80	2031868.15	1006.77	-0.53	865415.87	2031868.27	1007.31	0.55	0.02
4275	865398.15	2031939.50	1007.44	865398.18	2031939.55	1006.88	-0.56	865398.19	2031939.56	1007.46	0.57	0.01
4276	865348.45	2031989.20	1007.40	865348.47	2031989.23	1006.90	-0.50	865348.49	2031989.28	1007.48	0.58	0.08
4277	865301.27	2031934.27	1008.00	865301.24	2031934.26	1007.48	-0.52	865301.19	2031934.20	1008.05	0.58	0.05
4278	865292.87	2031924.67	1003.75	865292.91	2031924.66	1003.98	0.23	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4279	865334.37	2031883.17	1003.76	865334.40	2031883.20	1004.22	0.46	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4280	865347.10	2031888.45	1008.00	865347.03	2031888.42	1007.47	-0.53	865347.01	2031888.40	1008.02	0.55	0.02
4281	865334.37	2031792.42	1003.75	865334.43	2031792.36	1003.78	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4282	865347.10	2031792.42	1008.00	865347.09	2031792.50	1007.47	-0.53	865347.05	2031792.45	1008.01	0.54	0.01
4283	865372.10	2031792.42	1007.75	865372.13	2031792.41	1007.22	-0.53	865372.19	2031792.43	1007.80	0.59	0.05
4284	865375.97	2031792.42	1007.71	865375.93	2031792.49	1007.15	-0.56	865375.90	2031792.43	1007.74	0.59	0.03
4285	865399.10	2031696.39	1000.00	865393.18	2031696.35	1001.31	1.31	865393.15	2031696.43	1001.85	0.54	1.85
4286	865375.97	2031696.39	1007.71	865375.95	2031696.34	1007.14	-0.57	865375.90	2031696.35	1007.71	0.58	0.00
4287	865372.10	2031696.39	1007.75	865372.12	2031696.40	1007.24	-0.51	865372.18	2031696.38	1007.81	0.58	0.06
4288	865347.10	2031696.39	1008.00	865347.04	2031696.41	1007.50	-0.50	865347.00	2031696.45	1008.02	0.53	0.02
4289	865334.38	2031696.39	1003.75	865334.39	2031696.32	1003.81	0.06	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4290	865334.38	2031600.36	1003.75	865334.43	2031600.40	1003.78	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4291	865347.10	2031600.36	1008.00	865347.03	2031600.35	1007.47	-0.53	865347.01	2031600.35	1008.04	0.58	0.04
4292	865372.10	2031600.36	1007.75	865372.14	2031600.40	1007.24	-0.51	865372.11	2031600.35	1007.84	0.59	0.09
4293	865375.97	2031600.36	1007.71	865375.92	2031600.33	1007.14	-0.57	865375.90	2031600.35	1007.75	0.61	0.04
4294	865399.10	2031600.36	1000.00	865390.64	2031600.34	1001.97	1.97	865390.70	2031600.35	1002.52	0.55	2.52
4295	865399.10	2031504.34	1000.00	865392.93	2031504.25	1001.50	1.50	865393.00	2031504.20	1002.01	0.51	2.01
4296	865375.97	2031504.34	1007.71	865375.92	2031504.34	1007.14	-0.57	865375.91	2031504.39	1007.76	0.62	0.04
4297	865372.10	2031504.34	1007.75	865372.13	2031504.37	1007.21	-0.54	865372.14	2031504.28	1007.78	0.57	0.03
4298	865347.10	2031504.34	1008.00	865347.06	2031504.31	1007.49	-0.51	865347.04	2031504.34	1008.02	0.53	0.02
4299	865334.39	2031504.34	1003.75	865334.45	2031504.38	1003.81	0.05	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4300	865334.39	2031408.31	1003.75	865334.36	2031408.35	1003.75	0.00	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4301	865347.10	2031408.31	1008.00	865347.03	2031408.32	1007.46	-0.54	865347.03	2031408.32	1008.04	0.58	0.04
4302	865372.10	2031408.31	1007.75	865372.13	2031408.30	1007.21	-0.54	865372.16	2031408.28	1007.80	0.58	0.05
4303	865375.97	2031408.31	1007.71	865375.93	2031408.37	1007.17	-0.54	865375.92	2031408.23	1007.75	0.57	0.03

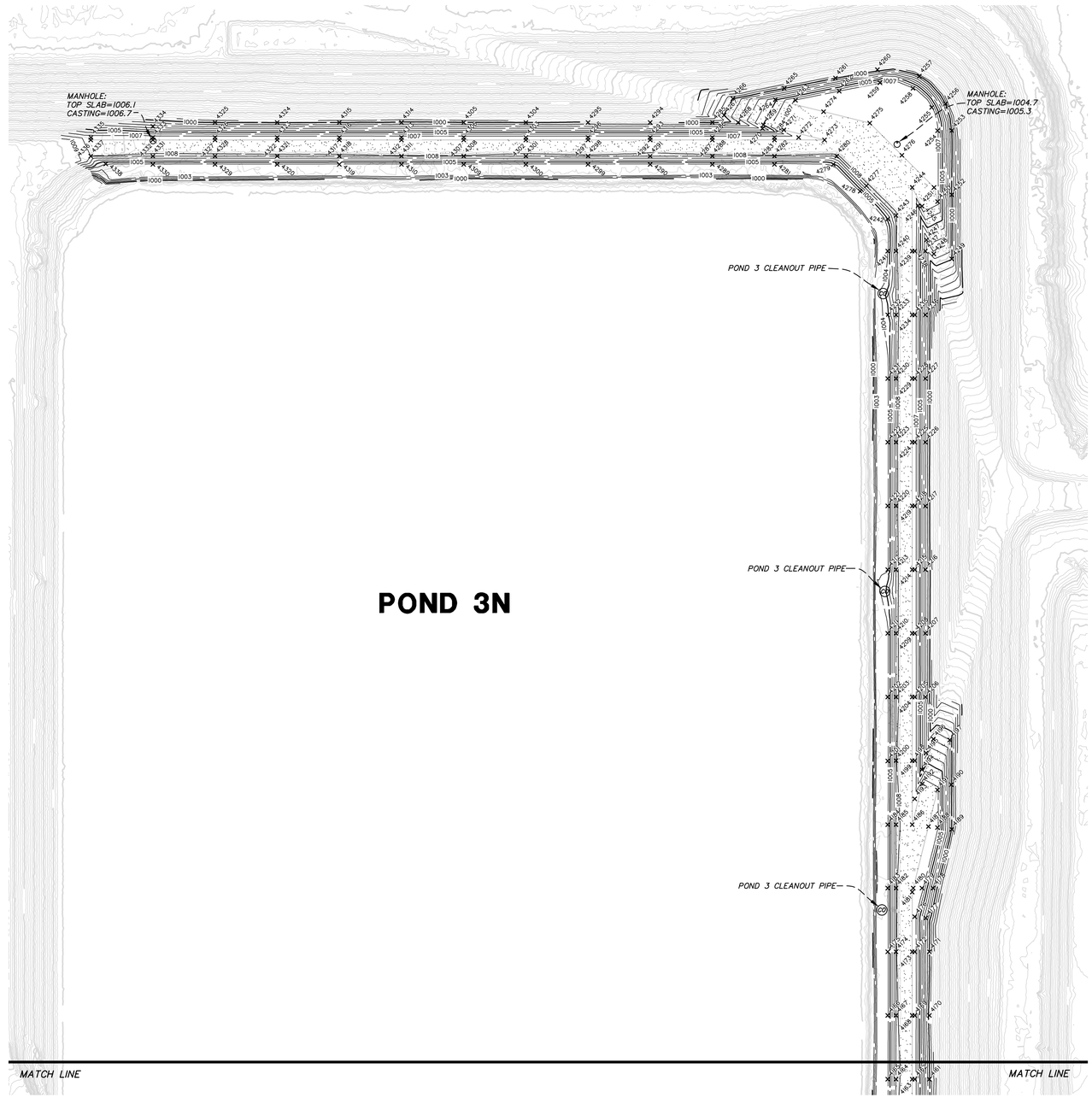
Point No.	Northing (Design F/G)	Easting (Design F/G)	Elevation (Design F/G)	Northing (As-built S/G)	Easting (As-built S/G)	Elevation (As-built S/G)	Elevation Difference (As Built S/G - Design F/G)	Northing (As-built F/G)	Easting (As-built F/G)	Elevation (As-built F/G)	Elevation Difference (As-Built F/G - As-Built S/G)	Elevation Difference (As-Built F/G - Design F/G)
4304	865399.10	2031408.31	1000.00	865392.93	2031408.27	1001.54	1.54	865392.87	2031408.20	1002.11	0.57	2.11
4305	865399.10	2031312.28	1000.00	865392.89	2031312.30	1001.53	1.53	865392.86	2031312.25	1002.06	0.54	2.06
4306	865375.97	2031312.28	1007.71	865376.02	2031312.22	1007.18	-0.53	865375.93	2031312.26	1007.71	0.53	0.00
4307	865372.10	2031312.28	1007.75	865372.13	2031312.27	1007.22	-0.53	865372.15	2031312.27	1007.76	0.53	0.01
4308	865347.10	2031312.28	1008.00	865347.03	2031312.23	1007.47	-0.53	865347.04	2031312.30	1008.01	0.54	0.01
4309	865334.40	2031312.28	1003.75	865334.48	2031312.28	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4310	865334.40	2031216.25	1003.75	865334.44	2031216.20	1003.77	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4311	865347.10	2031216.25	1008.00	865347.02	2031216.24	1007.46	-0.54	865347.07	2031216.21	1008.01	0.55	0.01
4312	865372.10	2031216.25	1007.75	865372.14	2031216.24	1007.21	-0.54	865372.16	2031216.29	1007.77	0.56	0.02
4313	865375.97	2031216.25	1007.71	865375.94	2031216.29	1007.20	-0.51	865375.89	2031216.19	1007.74	0.54	0.03
4314	865399.10	2031216.25	1000.00	865392.96	2031216.27	1001.53	1.53	865392.90	2031216.28	1002.03	0.50	2.03
4315	865399.10	2031120.22	1000.00	865394.51	2031120.15	1000.88	0.88	865394.44	2031120.18	1001.40	0.52	1.40
4316	865375.97	2031120.22	1007.71	865375.89	2031120.20	1007.21	-0.50	865375.99	2031120.16	1007.73	0.53	0.02
4317	865372.10	2031120.22	1007.75	865372.14	2031120.19	1007.22	-0.53	865372.15	2031120.20	1007.79	0.57	0.04
4318	865347.10	2031120.22	1008.00	865347.04	2031120.21	1007.48	-0.52	865347.07	2031120.16	1008.03	0.55	0.02
4319	865334.40	2031120.22	1003.75	865334.36	2031120.23	1003.77	0.02	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4320	865334.40	2031024.20	1003.75	865334.35	2031024.22	1003.83	0.08	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4321	865347.10	2031024.20	1008.00	865347.05	2031024.19	1007.46	-0.54	865347.05	2031024.27	1008.03	0.57	0.03
4322	865372.10	2031024.20	1007.75	865372.11	2031024.18	1007.25	-0.50	865372.11	2031024.20	1007.77	0.52	0.02
4323	865375.97	2031024.20	1007.71	865375.94	2031024.17	1007.17	-0.54	865375.91	2031024.12	1007.73	0.55	0.02
4324	865399.10	2031024.20	1000.00	865394.31	2031024.23	1001.03	1.03	865394.23	2031024.16	1001.58	0.55	1.58
4325	865399.10	2030928.17	1000.00	865395.05	2030928.22	1000.67	0.67	865395.10	2030928.27	1001.20	0.52	1.20
4326	865375.97	2030928.17	1007.71	865375.97	2030928.23	1007.14	-0.58	865375.93	2030928.22	1007.74	0.60	0.03
4327	865372.10	2030928.17	1007.75	865372.13	2030928.17	1007.19	-0.56	865372.15	2030928.16	1007.77	0.59	0.02
4328	865347.10	2030928.17	1008.00	865347.03	2030928.18	1007.47	-0.53	865347.07	2030928.16	1008.04	0.57	0.04
4329	865334.40	2030928.17	1003.75	865334.39	2030928.09	1003.79	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4330	865334.40	2030832.14	1003.75	865334.41	2030832.07	1003.76	0.01	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe
4331	865347.10	2030832.14	1008.00	865347.02	2030832.17	1007.48	-0.52	865347.04	2030832.12	1008.04	0.57	0.04
4332	865372.10	2030832.14	1007.75	865372.13	2030832.18	1007.22	-0.53	865372.13	2030832.14	1007.78	0.55	0.02
4333	865375.97	2030832.14	1007.71	865375.92	2030832.19	1007.14	-0.57	865375.94	2030832.17	1007.74	0.61	0.03
4334	865393.10	2030832.14	1002.00	865390.88	2030832.18	1002.04	0.04	865390.93	2030832.24	1002.92	0.88	0.92
4335	865375.97	2030736.52	1007.71	865375.93	2030736.46	1007.13	-0.58	865375.92	2030736.46	1007.75	0.62	0.04
4336	865372.10	2030736.11	1007.75	865372.12	2030736.14	1007.22	-0.53	865372.07	2030736.17	1007.83	0.61	0.08
4337	865347.10	2030736.11	1008.00	865347.06	2030736.10	1007.48	-0.52	865347.01	2030736.12	1008.00	0.52	0.00
4338	865335.10	2030759.28	1004.00	865335.03	2030759.32	1004.03	0.03	Inside Toe	Inside Toe	Inside Toe	Inside Toe	Inside Toe

Survey Verification Drawings

AS-BUILT SURVEY

2015 POND 3 VERTICAL EXPANSION

SHERCO GENERATING PLANT BECKER, MN



N

100 0 100
SCALE IN FEET

SCALE: 1" = 100'

LEGEND:

- DW Denotes dewatering riser
- CO Denotes cleanout pipe
- +4023 Denotes survey verification point
- Denotes Class 5 surface
- Denotes as-built major contour
- Denotes as-built minor contour

NOTES:

1. Existing contour data from November 2014 LiDAR flyover. Supplied by Carlson McCain, Inc.
2. As-built data for the two manholes in the north haul road was supplied by Veit & Company, Inc. Bogart, Pederson & Associates did not have the opportunity to field verify this data.

REV NO.	DATE	DESCRIPTION

DATE: 10/14/15
DESIGN BY: ____
DRAWN BY: DJ
CHECKED BY: CW
DWG FILE: Pond3Asbuilt
FILE NO.: 15-0132.00

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 A. Wensmann
Date: 10/30/15 Reg. No. 47466

BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
CIVIL ENGINEERING
MAPPING
13076 FIRST STREET BECKER, MN 55308-4322
TEL: 763-262-0822 FAX: 763-262-8844

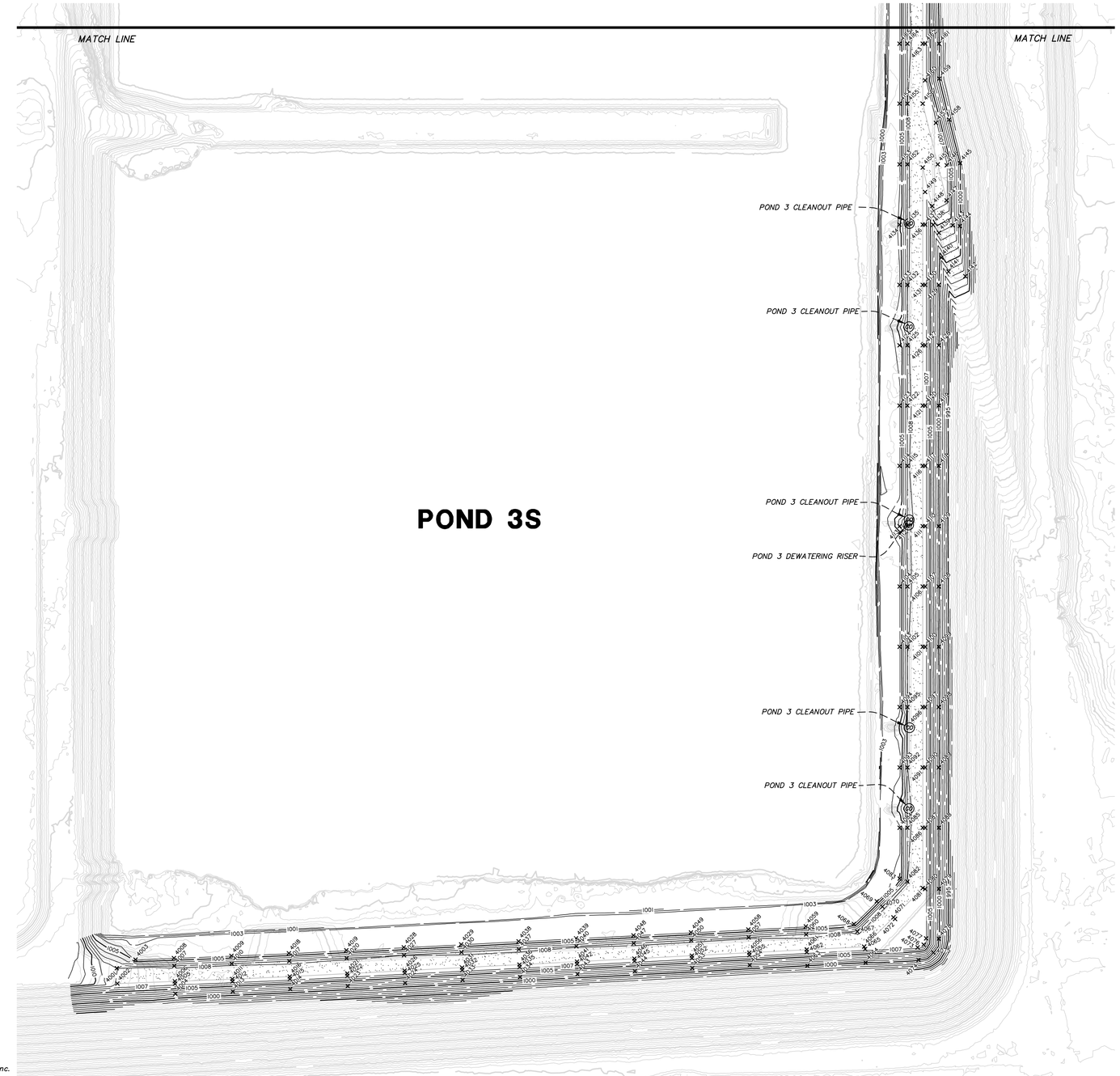
VEIT & COMPANY, INC.
SHERCO PLANT
POND 3 VERT. EXPANSION
BECKER, MN

SHEET NO.
—
2

AS-BUILT SURVEY

2015 POND 3 VERTICAL EXPANSION

SHERCO GENERATING PLANT BECKER, MN



100 0 100
SCALE IN FEET

SCALE: 1" = 100'

LEGEND:

- Denotes dewatering riser
- Denotes cleanout pipe
- Denotes survey verification point
- Denotes Class 5 surface
- Denotes as-built major contour
- Denotes as-built minor contour

Existing contour data from November 2014 LiDAR flyover. Supplied by Carlson McCain, Inc.

REV NO.	DATE	DESCRIPTION

DATE: 10/14/15
DESIGN BY: ____
DRAWN BY: DJ
CHECKED BY: CW
DWG FILE: Pond3Asbuilt
FILE NO.: 15-0132.00

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 A. Wensmann
Date: 10/30/15 Reg. No. 47466

BOGART, PEDERSON & ASSOCIATES, INC.
LAND SURVEYING
CIVIL ENGINEERING
MAPPING
13079 7TH ST. BECKER, MN 55308-9322
TEL: 763-262-0822 FAX: 763-262-0844

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

SHEET NO. 2 / 2

Appendix D - Clay Test Reports

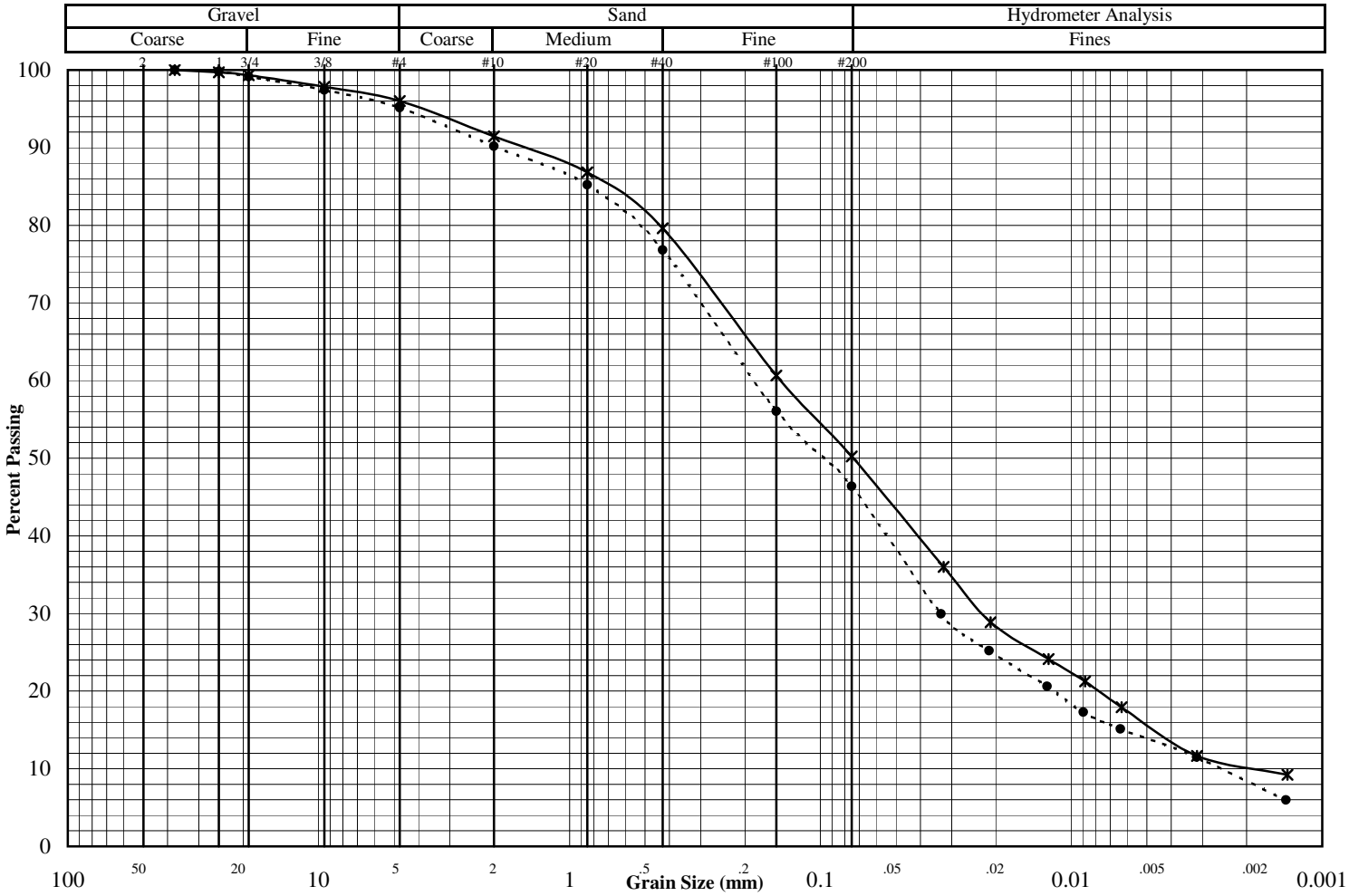
Clay Source Prequalification Test Reports
Clay In-Place Standard Proctor Test Reports
Clay In-Place Density Test Reports
Clay In-Place Permeability Test Reports
American Engineering Testing Clay Testing Response Letter

Clay Source Prequalification Test Reports

Grain Size Distribution ASTM D422

		Job No. :	**9903**
Project:	Xcel -Sherco	Test Date:	6/26/15
Reported To:	Veit & Company, Inc.	Report Date:	6/30/15

	Date Sampled	Sample No.	Depth (ft)	Sample Type	Soil Classification
∗	6/23/2015	CL1		Bag	Sandy Lean Clay w/ a trace of gravel (CL)
●	6/23/2015	CL2		Bag	Clayey Sand w/ a little gravel (SC)
◇					



Other Tests	∗	●	◇
Liquid Limit	31.5	29.4	
Plastic Limit	12.7	13.0	
Plasticity Index	18.8	16.4	
Water Content	15.6	14.4	
Dry Density (pcf)			
Specific Gravity	2.68*	2.68*	
Porosity			
Organic Content			
pH			
Shrinkage Limit			
Penetrometer			
Qu (psf)			

(* = assumed)

Percent Passing	∗	●	◇
Mass (g)	15267.0	14206.0	
2"			
1.5"	100.0	100.0	
1"	99.7	99.8	
3/4"	99.3	99.2	
3/8"	97.8	97.4	
#4	96.0	95.1	
#10	91.5	90.2	
#20	86.8	85.2	
#40	79.6	76.8	
#100	60.7	56.0	
#200	50.2	46.4	

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

Remarks:

2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

Grain Size Distribution ASTM D422

Job No. : **9903**

Project:	Xcel -Sherco	Test Date:	6/26/15
Reported To:	Veit & Company, Inc.	Report Date:	6/30/15

	Date Sampled	Sample No.	Depth (ft)	Sample Type	Soil Classification
Spec 1	6/23/2015	CL1		Bag	Sandy Lean Clay w/ a trace of gravel (CL)
Spec 2	6/23/2015	CL2		Bag	Clayey Sand w/ a little gravel (SC)
Spec 3					

Sieve Data

Specimen 1		Specimen 2		Specimen 3	
Sieve	% Passing	Sieve	% Passing	Sieve	% Passing
2"		2"		2"	
1.5"	100.0	1.5"	100.0	1.5"	
1"	99.7	1"	99.8	1"	
3/4"	99.3	3/4"	99.2	3/4"	
3/8"	97.8	3/8"	97.4	3/8"	
#4	96.0	#4	95.1	#4	
#10	91.5	#10	90.2	#10	
#20	86.8	#20	85.2	#20	
#40	79.6	#40	76.8	#40	
#100	60.7	#100	56.0	#100	
#200	50.2	#200	46.4	#200	

Hydrometer Data

Specimen 1		Specimen 2		Specimen 3	
Diameter (mm)	% Passing	Diameter	% Passing	Diameter	% Passing
0.032	36.0	0.033	29.9		
0.021	28.9	0.021	25.2		
0.012	24.1	0.013	20.6		
0.009	21.2	0.009	17.3		
0.006	17.9	0.006	15.1		
0.003	11.7	0.003	11.5		
0.001	9.2	0.001	6.0		

Remarks

Specimen 1	Specimen 2	Specimen 3

2401 West 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, MN 55423

Moisture Density Curve ASTM: D698, Method B

Project: **Xcel -Sherco** Date: **6/30/15**

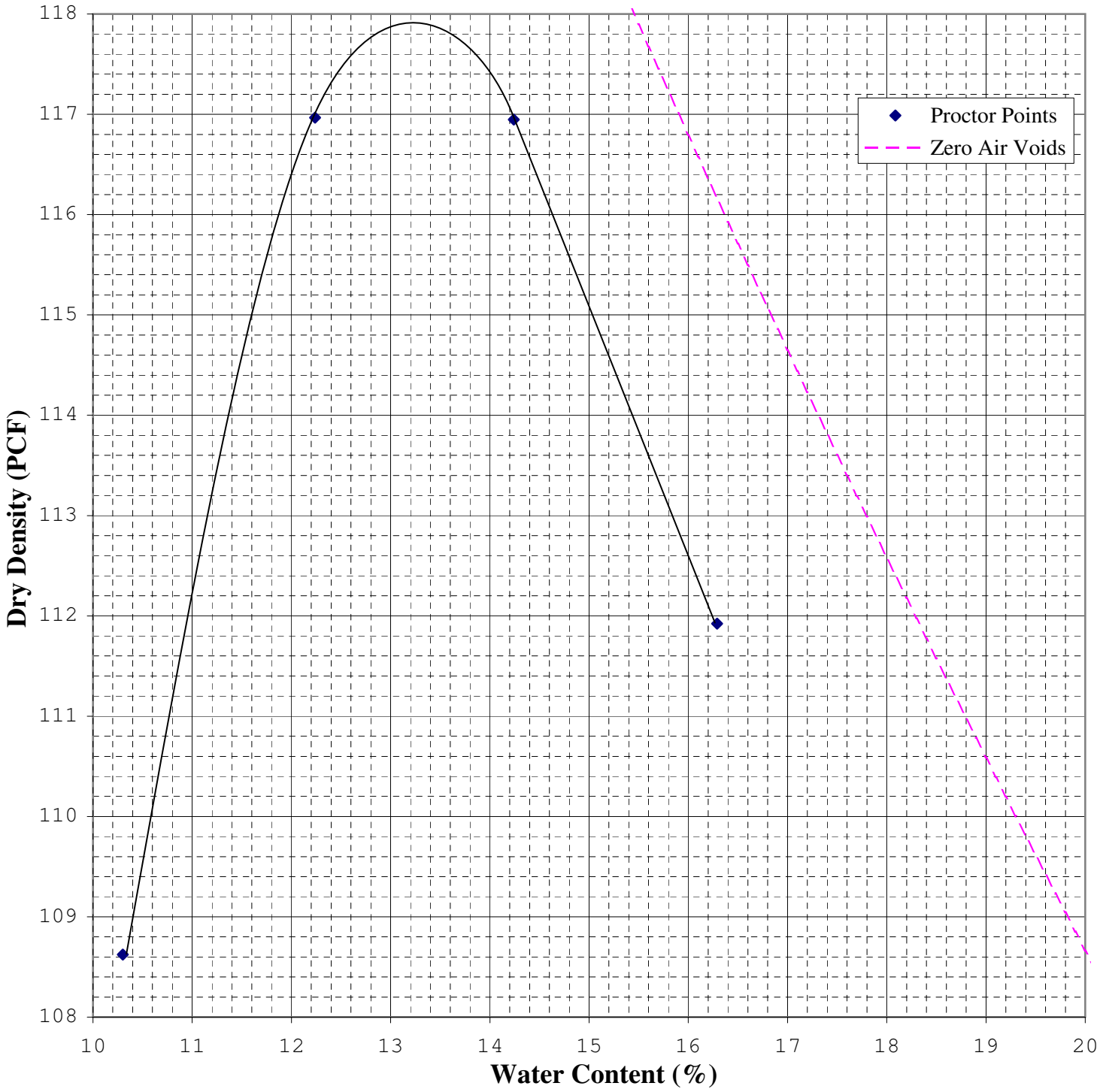
Client: **Veit & Company, Inc.** Job No. **9903**

Boring No. Sample: **CL1** Depth(ft): Location:

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

As Received W.C. (%): **15.6** ◆ LL: **31.5** △ PL: **12.7** PI: **18.8** Specific Gravity: **2.67** ◆ *Assumed △

Maximum Dry Density (pcf): **117.8** Opt. Water Content (%): **13.1**



2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

SET-R18a

Moisture Density Curve ASTM: D698, Method B

Project: **Xcel -Sherco** Date: **6/30/15**

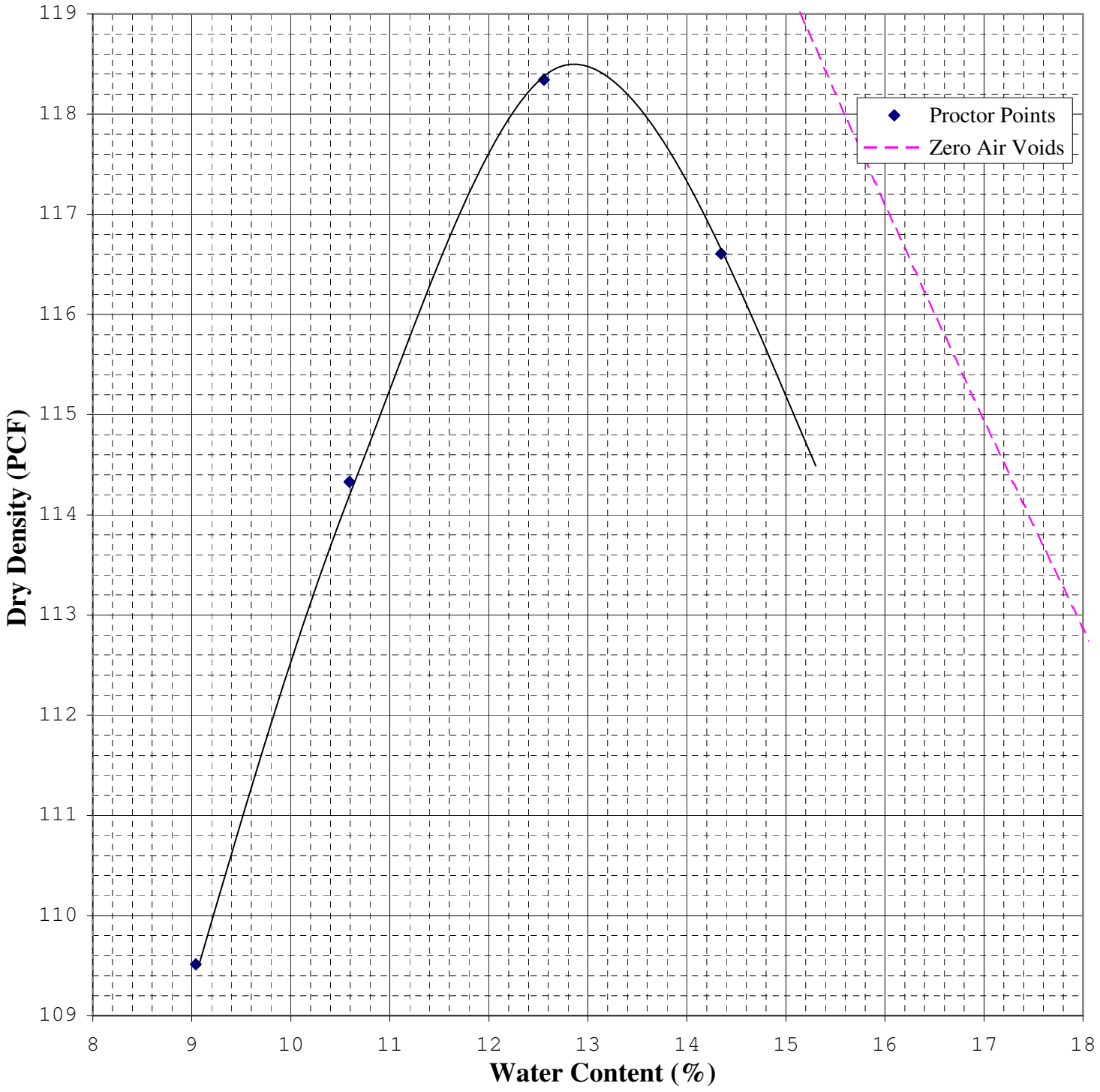
Client: **Veit & Company, Inc.** Job No. **9903**

Boring No. Sample: **CL2** Depth(ft): Location:

Soil Type: **Clayey Sand w/ a little gravel (SC)**

As Received W.C. (%): **14.4** ◆ LL: **29.4** △ PL: **13.0** PI: **16.4** Specific Gravity: **2.68** ◆ *Assumed △

Maximum Dry Density (pcf): **118.5** Opt. Water Content (%): **12.9**



2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

SET-R18a

Hydraulic Conductivity Test Data ASTM D5084

Project: Xcel -Sherco Date: 7/14/2015

Reported To: Veit & Company, Inc. Job No.: 9903

Boring No.:							
Sample No.:	CL1	CL2					
Date Sampled:	6/23/2015	6/23/2015					
Location:							
Sample Type:	Bag	Bag					
Soil Type:	Sandy Lean Clay w/ a trace of gravel (CL)	Clayey Sand w/ a little gravel (SC)					
Atterberg Limits							
LL	31.5	29.4					
PL	12.7	13.0					
PI	18.8	16.4					
Permeability Test	Reconstituted	Reconstituted					
Before Test Conditions: Saturation %:							
Porosity:							
Ht. (in):	3.00	3.00					
Dia. (in):	2.85	2.85					
Dry Density (pcf):	113.1	115.2					
Water Content:	15.9%	14.4%					
Test Type:	Falling	Falling					
Max Head (ft.):	5.0	5.0					
Confining press. (Effective-psi):	2.0	2.0					
Trial No.:	12-16	12-16					
Water Temp °C:	22.0	22.0					
% Compaction	96.0%	97.2%					
% Saturation (After Test)	95.1%	95.1%					
Coefficient of Permeability							
K @ 20 °C (cm/sec)	**6.0×10^{-9}**	**8.2×10^{-9}**					
K @ 20 °C (ft/min)	**1.2×10^{-8}**	**1.6×10^{-8}**					
Notes:	***Unable to achieve % Compaction at requested moisture for sample CL1						

Clay In-Place Standard Proctor Test Reports

Moisture Density Curve ASTM: D698, Method B

Project: **Xcel -Sherco** Date: **8/26/15**

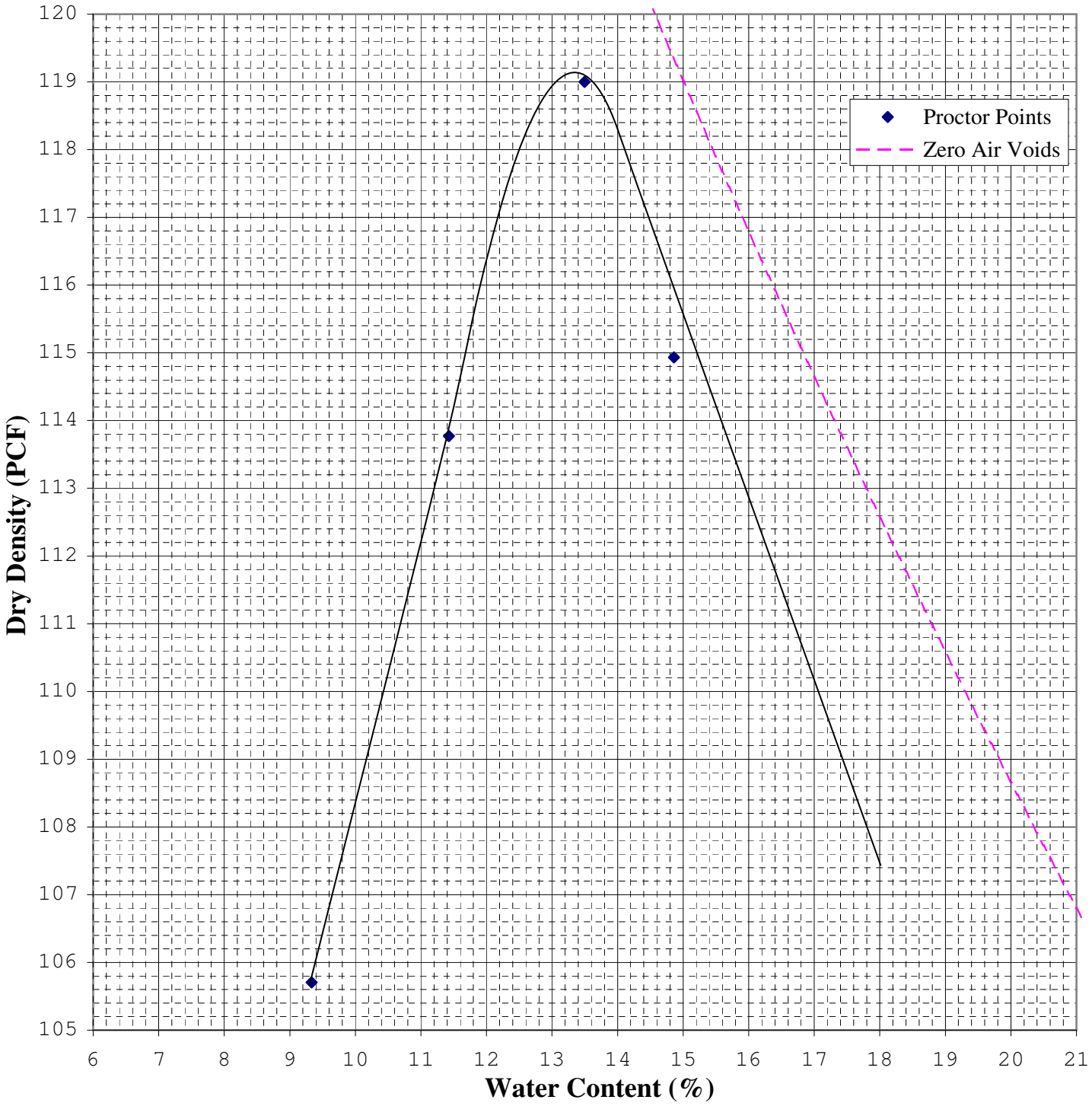
Client: **Veit & Company, Inc.** Job No. **9903**

Boring No. Sample: **CL-3** Depth(ft): Location:

Soil Type: **Sandy Lean Clay with a little gravel, gray (CL)**

As Received W.C. (%): **16.4** LL: **32.2** PL: **12.8** PI: **19.4** Specific Gravity: **2.67** *Assumed

Maximum Dry Density (pcf): **119.0** Opt. Water Content (%): **13.4**



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Richfield, Minnesota 55423-2031

SET-R18a

Moisture Density Curve ASTM: D698, Method B

Project: **Xcel -Sherco** Date: **8/26/15**

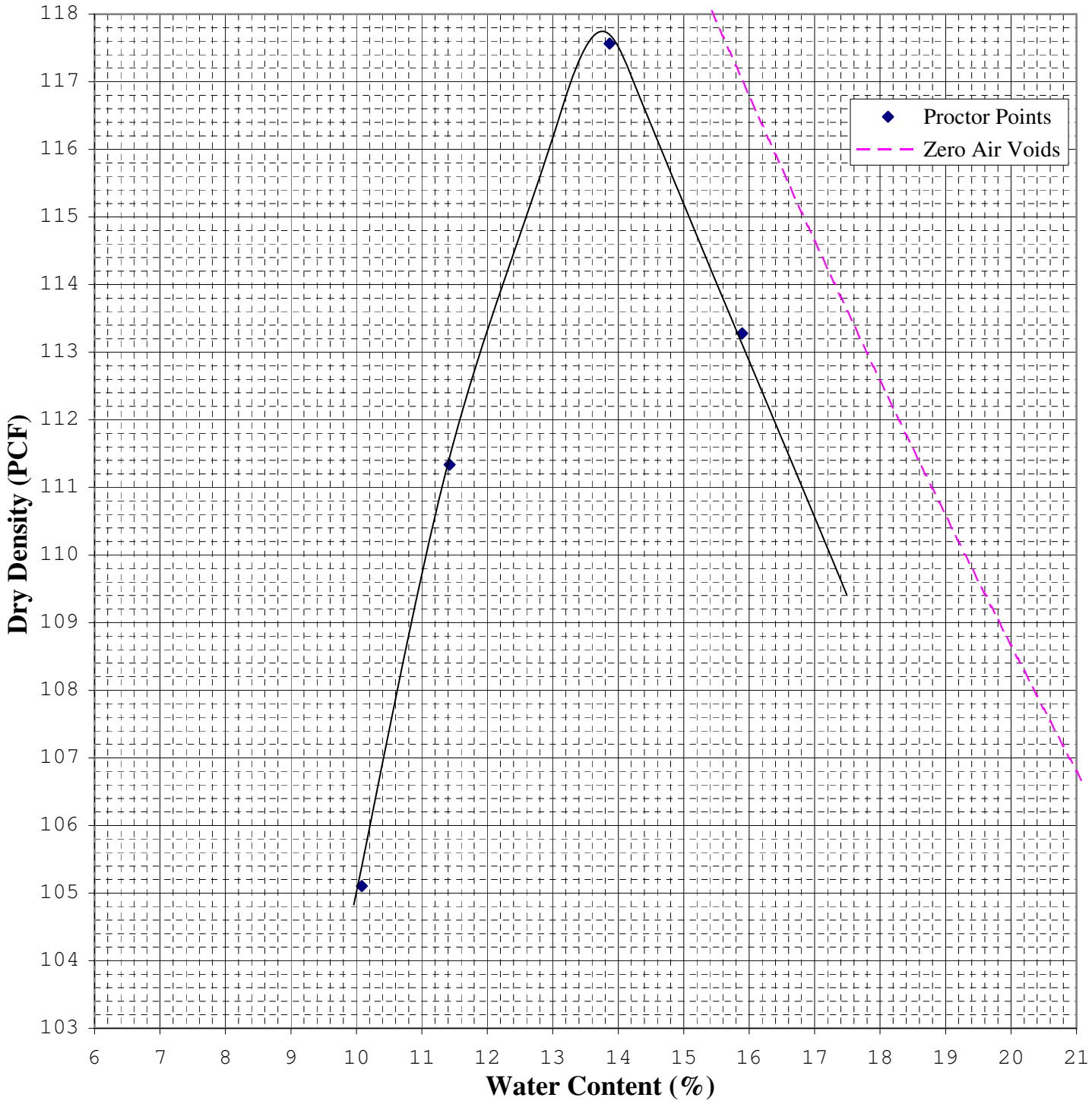
Client: **Veit & Company, Inc.** Job No. **9903**

Boring No. Sample: **CL-4** Depth(ft): Location:

Soil Type: **Sandy Lean Clay with a little gravel, brown and gray (CL)**

As Received W.C. (%): **15.8** LL: PL: PI: Specific Gravity: **2.67** *Assumed

Maximum Dry Density (pcf): **117.6** Opt. Water Content (%): **13.7**



2401 W 66th Street

SOIL ENGINEERING TESTING, INC.

Richfield, Minnesota 55423-2031

SET-R18a

American Engineering Testing, Inc.
Saint Paul | Albertville
550 Cleveland Ave N | 5548 Barthel Ind Dr, Ste 500
St. Paul, MN 55114 | Albertville, MN 55301
(651)659-9001 | (763)428-5573
Toll Free:(800)972-6364
www.amengtest.com

Proctor Report

Report No: PTR:26-00938-W15-S1
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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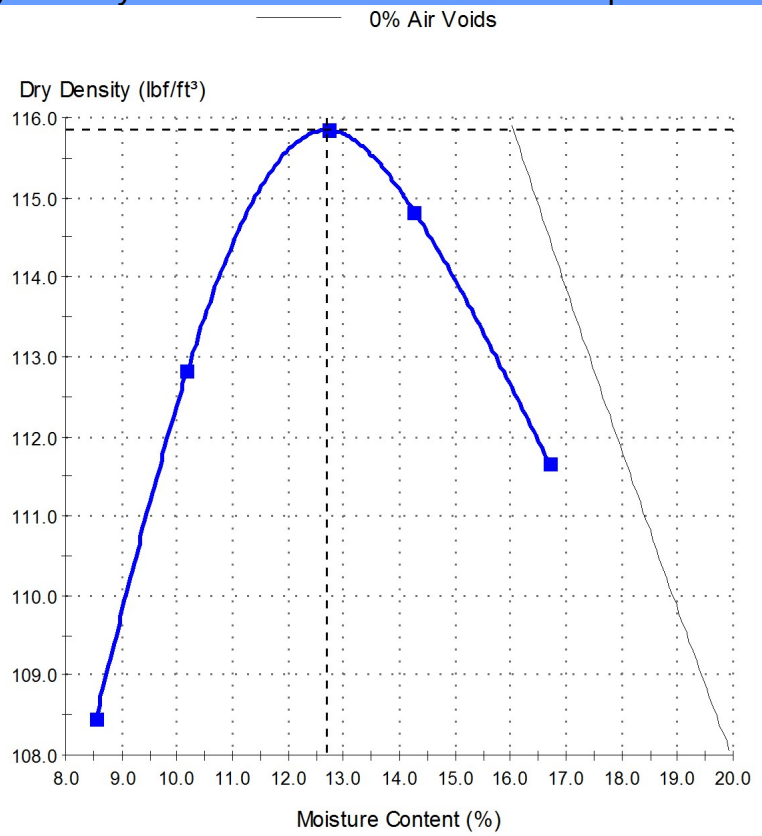
Kristine M Bordak

Date of Issue: 8/31/2015
Reviewed By: KRISTINE BORDAK
Sr. Geotechnical Lab Tech -MNDOT #15736

Sample Details

Sample ID:	26-00938-W15-S1	Date Sampled:	8/26/2015
Sampling Method:	Sampled By American Eng & Testing		
Source:	OFF SITE FILL		
Material:	Clayey Sand, a little gravel, brown & gray (SC)		
Specification:			
Location:	863600.0 N, 2031990.8 E		
Tested By:	KRISTINE BORDAK	Date Tested:	8/27/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	115.8
Optimum Moisture Content (%):	12.7
Method:	A
Preparation Method:	Moist
Received Moisture Content (%):	15
Specific Gravity (Fines):	2.65
Retained Sieve No 4 (4.75mm) (%):	12
Passing Sieve No 4 (4.75mm) (%):	88

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	115.8
Corrected Optimum Moisture Content (%):	12.9

Comments

Proctor: AET - CL1
Jar #291
Intended Use: Pond Embankment Fill

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Toll Free:(800)972-6364
www.amengtest.com

Proctor Report

Report No: PTR:26-00938-W15-S2
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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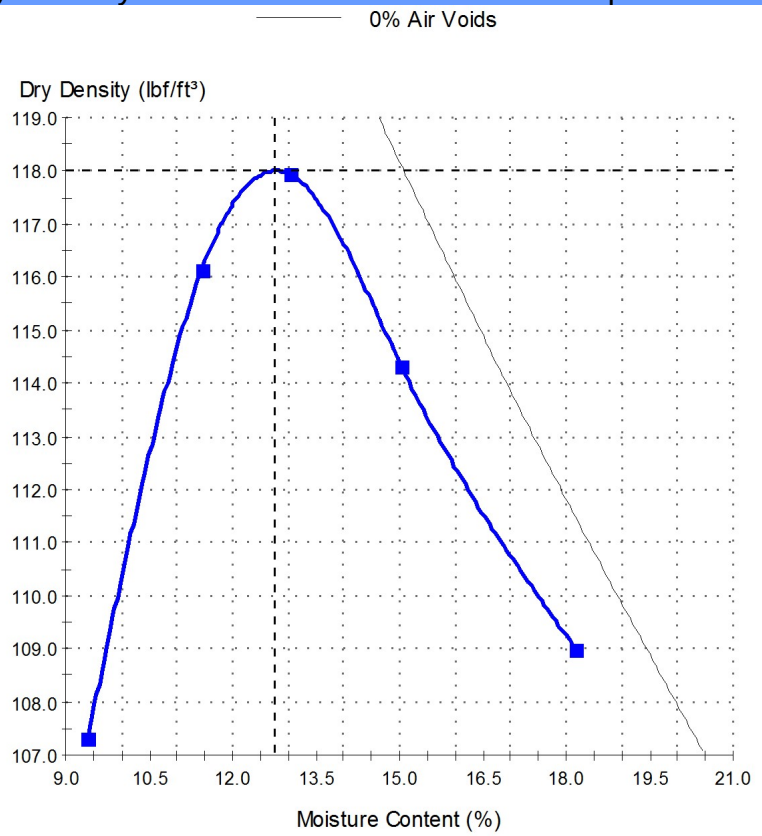
Kristine M Bordak

Date of Issue: 8/28/2015
Reviewed By: KRISTINE BORDAK
Sr. Geotechnical Lab Tech -MNDOT #15736

Sample Details

Sample ID:	26-00938-W15-S2	Date Sampled:	8/26/2015
Sampling Method:	Sampled By American Eng & Testing		
Source:	OFF SITE FILL		
Material:	Sandy Lean Clay, a little gravel, brown & gray (CL)		
Specification:			
Location:	862632.4 N, 2031991.2 E		
Tested By:	KRISTINE BORDAK	Date Tested:	8/27/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	118.0
Optimum Moisture Content (%):	12.8
Method:	A
Preparation Method:	Moist
Received Moisture Content (%):	16
Specific Gravity (Fines):	2.65
Retained Sieve No 4 (4.75mm) (%):	2
Passing Sieve No 4 (4.75mm) (%):	98

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	118.0
Corrected Optimum Moisture Content (%):	12.8

Comments

Proctor: AET - CL2
Jar #645
Intended: Pond Embankment Fill

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Toll Free:(800)972-6364
www.amengtest.com

Proctor Report

Report No: PTR:26-00938-W15-S3
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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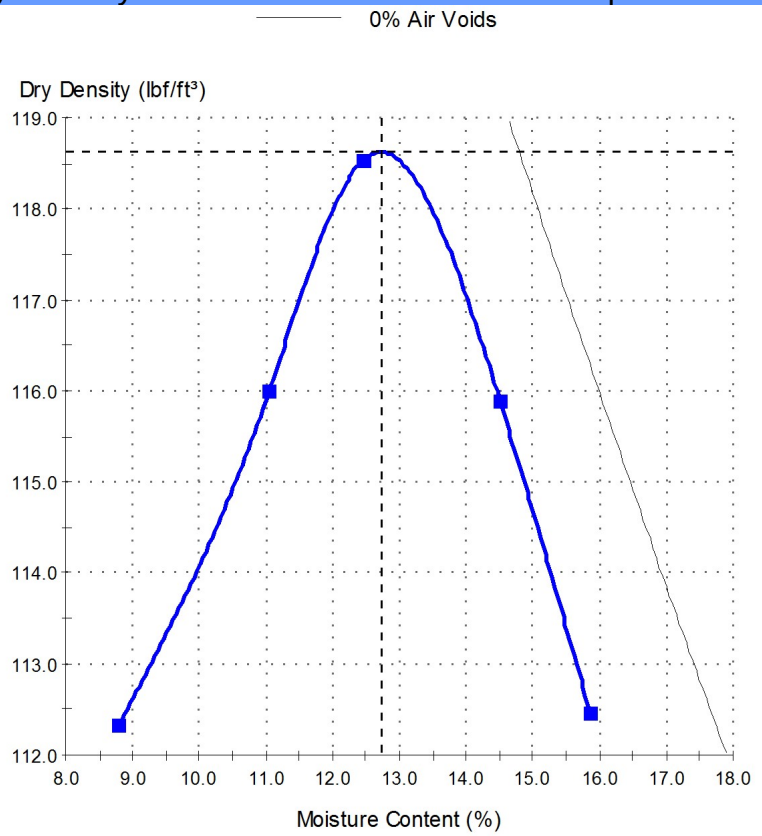
Kristine M Bordak

Date of Issue: 8/28/2015
Reviewed By: KRISTINE BORDAK
Sr. Geotechnical Lab Tech -MNDOT #15736

Sample Details

Sample ID:	26-00938-W15-S3	Date Sampled:	8/26/2015
Sampling Method:	Sampled By American Eng & Testing		
Source:	OFF SITE FILL		
Material:	Sandy Lean Clay, a little gravel, brown & gray (CL)		
Specification:			
Location:	862689.9 N, 2031993.9 E		
Tested By:	KRISTINE BORDAK	Date Tested:	8/27/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	118.6
Optimum Moisture Content (%):	12.7
Method:	A
Preparation Method:	Moist
Received Moisture Content (%):	13
Specific Gravity (Fines):	2.65
Retained Sieve No 4 (4.75mm) (%):	7
Passing Sieve No 4 (4.75mm) (%):	93

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	118.6
Corrected Optimum Moisture Content (%):	12.8

Comments

Proctor: AET - CL3
Jar #437
Intended Use: Pond Liner Fill

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Clay In-Place Density Test Reports

American Engineering Testing, Inc.
Saint Paul | Albertville
550 Cleveland Ave N | 5548 Barthel Ind Dr, Ste 500
St. Paul, MN 55114 | Albertville, MN 55301
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Toll Free:(800)972-6364
www.amengtest.com

Field Density Test Report

Report No: ND:26-00938-W7
Issue No: 1

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/28/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/24/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3430	**Standard Count: Density:**	2031
Serial Number:	26419	**Standard Count: Moisture:**	711

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S2 (SO)	Clayey Sand, a little gravel, brown (SC)	ASTM D 698 (A)	118.5	12.9

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 1	26-00938-W11-S1	6	130.3	14.2	+1.1	114.1	**96.9**	≥97	D
2	CL 2	26-00938-W11-S1	6	131.0	16.1	+3.0	112.8	**95.8**	≥97	D
3	CL 3	26-00938-W11-S1	6	133.1	13.2	+0.1	117.6	**99.8**	≥97	OK
4	CL 4	26-00938-W11-S2	6	134.2	12.9	+0.0	118.9	**100.3**	≥97	OK
5	CL 5	26-00938-W11-S1	6	131.2	12.2	-0.9	116.9	**99.3**	≥97	OK
6	CL 6	26-00938-W11-S1	6	131.8	15.6	+2.5	114.0	**96.8**	≥97	D
7	CL 7	26-00938-W11-S1	6	132.7	15.8	+2.7	114.6	**97.3**	≥97	OK

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 1	862405.0 N, 2030833.9E	998.4'	Elevation
2	CL 2	862410.2 N, 2030833.9 E	999.5'	Elevation
3	CL 3	862407 N, 2030910.8 E	999.5'	Elevation
4	CL 4	862413.9 N, 2031025.0 E	1000.2'	Elevation
5	CL 5	862421.7 N, 2031148.6 E	1000.1'	Elevation
6	CL 6	862460.9 N, 2031874.3 E	999.0'	Elevation
7	CL 7	862460.9 N, 2031874.3 E, Retest of CL 6.	999.0'	Elevation

Comments

(SO) = Sampled By Others
Density test number CL-5 failed to meet the moisture specification of 0 to +5% of optimum moisture content.

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W9
Issue No: 2

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 11/18/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/25/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2020
Serial Number:	26419	Standard Count: Moisture:	719

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W2-S3	Bottom Ash	ASTM D 698 (A)	79.5	36.2
26-00938-W11-S2 (SO)	Clayey Sand, a little gravel, brown (SC)	ASTM D 698 (A)	118.5	12.9

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 8	26-00938-W11-S1	6	134.5	12.3	-0.8	119.8	101.7	≥97	OK
2	CL 9	26-00938-W11-S1	6	131.2	12.8	-0.3	116.3	98.7	≥97	OK
3	CL 10	26-00938-W11-S1	6	131.5	12.5	-0.6	116.9	99.2	≥97	OK
4	CL 11	26-00938-W11-S1	6	132.1	13.7	+0.6	116.2	98.7	≥97	OK
~~5~~	~~BA 16~~	~~26-00938-W2-S3~~	~~12~~	~~93.7~~	~~21.4~~	~~-14.8~~	~~77.2~~	~~97.1~~	~~≥95~~	~~OK~~
6	CL 12	26-00938-W11-S1	6	128.6	18.2	+5.1	108.8	92.4	≥97	D
7	CL 13	26-00938-W11-S2	6	135.4	13.5	+0.6	119.3	100.7	≥97	OK

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 8	862421.7 N, 2031148.6 E, Retest of CL 5., Elev: 1000.1	1000.1'	Elevation
2	CL 9	862460.0 N, 2031774.0 E, Elev: 1000.0	1000.0'	Elevation
3	CL 10	862460.0 N, 2031774.0, Retest of CL 9, Elev: 1000.0	1000.0'	Elevation
4	CL 11	862418.9 N, 2031001.3 E, Elev: 1000.5	1000.5'	Elevation
~~5~~	~~BA 16~~	~~862430.5 N, 2031036.4 E, Elev: 1003.8~~	~~1003.8'~~	~~Elevation~~
6	CL 12	862422.7 N, 2031099.0 E, Elev: 1001.5	1001.5'	Elevation
7	CL 13	862449.3 N, 2031669.3 E, Elev: 1001.1	1001.1'	Elevation

Comments

(SO) = Sampled By Others
Density test number CL-8, CL-9 and CL-10 failed to meet the moisture specification of 0 to +5% of optimum moisture content.

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W13
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/31/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/26/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3430	**Standard Count: Density:**	2039
Serial Number:	26419	**Standard Count: Moisture:**	713

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W15-S1	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	115.8	12.9
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W15-S2	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	118.0	12.8
26-00938-W15-S3	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	118.6	12.8

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 14	26-00938-W15-S1	6	134.8	16.0	+3.1	116.2	**100.3**	≥97	OK
2	CL 15	26-00938-W11-S1		132.2	16.6	+3.5	113.4	**96.3**	≥97	D
3	CL 16	26-00938-W15-S1		133.9	13.0	+0.1	118.5	**102.3**	≥97	OK
4	CL 17	26-00938-W11-S1		131.8	14.5	+1.4	115.1	**97.7**	≥97	OK
5	CL 18	26-00938-W11-S1		132.2	12.1	-1.0	117.9	**100.1**	≥97	OK
6	CL 19	26-00938-W11-S1		132.4	14.0	+0.9	116.1	**98.6**	≥97	OK
7	CL 20	26-00938-W11-S1		132.6	13.3	+0.2	117.0	**99.4**	≥97	OK
8	CL 21	26-00938-W15-S2		133.7	14.7	+1.9	116.6	**98.8**	≥97	OK
9	CL 22	26-00938-W15-S3		136.5	15.8	+3.0	117.9	**99.4**	≥97	OK
10	CL 23	26-00938-W15-S3		136.2	13.9	+1.1	119.6	**100.8**	≥97	OK
11	CL 24	26-00938-W15-S3		136.8	14.3	+1.5	119.7	**100.9**	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 14	863600.0 N, 2031990.8 E, Elev: 998.5	998.5'	Elevation
2	CL 15	862422.7 N, 2031099.0 E, Retest of CL 12, Elev: 1001.5	1001.5'	Elevation
3	CL 16	863600.0 N, 2031990.8 E, Retest of CL 14, Elev: 998.5	998.5'	Elevation
4	CL 17	862460.0 N, 2031774.0 E, Retest of CL 10, Elev: 1000.0	1000.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W13
Issue No: 1

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/31/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
5	CL 18	862421.7 N, 2031148.6 E, Retest of CL 8, Elev: 1000.1	1000.1'	Elevation
6	CL 19	862421.7 N, 2031148.6 E, Retest of CL 18, Elev: 1000.1	1000.1'	Elevation
7	CL 20	862410.2 N, 2030923.3 E, Retest of CL 2, Elev: 999.5	999.5'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
8	CL 21	862632.4 N, 2031991.2 E, Elev: 999.0	999.0'	Elevation
9	CL 22	862701.4 N, 3031993.9 E, Elev: 999.5	999.5'	Elevation
10	CL 23	862689.9 N, 2031991.9 E, Elev: 999.5	999.5'	Elevation
11	CL 24	863495.5 N, 2031988.8 E, Elev: 1000.0	1000.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density

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Field Density Test Report

Report No: ND:26-00938-W10
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/31/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/27/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3430	**Standard Count: Density:**	2031
Serial Number:	26419	**Standard Count: Moisture:**	700

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W15-S3	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	118.6	12.8
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 25	26-00938-W15-S3		136.1	13.2	+0.4	120.2	**101.4**	≥97	OK
2	CL 26	26-00938-W11-S1		131.5	16.5	+3.4	112.9	**95.8**	≥97	D
3	CL 27	26-00938-W11-S1		131.4	14.4	+1.3	114.9	**97.5**	≥97	OK
4	CL 28	26-00938-W11-S3		134.9	13.0	-0.4	119.4	**100.3**	≥97	OK
5	CL 29	26-00938-W11-S3		134.3	13.4	+0.0	118.4	**99.5**	≥97	OK
6	CL 30	26-00938-W11-S3		137.0	12.3	-1.1	122.0	**102.5**	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 25	863392.5 N, 2031987.4 E, Elev: 1000.5	1000.5'	Elevation

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
2	CL 26	862423.7 N, 2031102.8 E, Elev: 1001.5	1001.5'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
3	CL 27	863302.8 N, 2031991.3 E, Elev: 1001.0	1001.0'	Elevation
4	CL 28	863169.5 N, 2031986.8 E, Elev: 1001.5	1001.5'	Elevation
5	CL 29	863097.1 N, 2031988.1 E, Elev: 1002.0	1002.0'	Elevation
6	CL 30	864060.2 N, 2031993.8 E, Elev: 998.5	998.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W14
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/31/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/28/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3430	**Standard Count: Density:**	2032
Serial Number:	26419	**Standard Count: Moisture:**	712

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4
26-00938-W11-S2 (SO)	Clayey Sand, a little gravel, brown (SC)	ASTM D 698 (A)	118.5	12.9

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 31	26-00938-W11-S3	6	134.8	15.2	+1.8	117.0	**98.3**	≥97	OK
2	CL 32	26-00938-W11-S2		134.1	14.8	+1.9	116.8	**98.6**	≥97	OK
3	CL 33	26-00938-W11-S2		133.9	16.2	+3.3	115.2	**97.2**	≥97	OK
4	CL 34	26-00938-W11-S3		130.6	14.1	+0.7	114.5	**96.2**	≥97	D
5	CL 35	26-00938-W11-S3		135.1	13.7	+0.3	118.8	**99.8**	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 31	864060.2 N, 2031993.8 E, Retest of CL 30, Elev: 998.5	998.5'	Elevation
2	CL 32	864155.5 N, 2031989.4 E, Elev: 999.0	999.0'	Elevation
3	CL 33	863947.2 N, 2031990.3 E, Elev: 999.5	999.5'	Elevation
4	CL 34	864246.2 N, 2031988.1 E, Elev: 1000.0	1000.0'	Elevation
5	CL 35	864246.2 N, 2031988.1 E, Retest of CL 34, Elev: 1000.0	1000.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W16
Issue No: 2

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 10/27/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/31/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2046
Serial Number:	26419	Standard Count: Moisture:	717

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 36	26-00938-W11-S1	6	128.8	17.5	+4.4	109.6	93.1	≥97	D
2	CL 37	26-00938-W11-S4	6	135.2	14.0	+0.3	118.6	100.8	≥97	OK
3	CL 38	26-00938-W11-S4		134.8	15.8	+2.1	116.4	99.0	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 36	864436.1 N, 2031991.0 E, Elev: 1000.0	1000.0'	Elevation

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
2	CL 37	862422.7 N, 2031099.0 E, Retest of CL 15, Elev: 1001.5	1001.5'	Elevation
3	CL 38	862423.7 N, 2031102.8 E, Retest of CL 26, Elev: 1001.5	1001.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W17
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/3/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/1/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2029
Serial Number:	26419	Standard Count: Moisture:	708

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 39	26-00938-W11-S1		129.7	16.3	+3.2	111.5	94.7	≥97	D
2	CL 40	26-00938-W11-S1		129.5	17.4	+4.3	110.3	93.7	≥97	D
3	CL 41	26-00938-W11-S4		134.2	16.8	+3.1	114.9	97.7	≥97	OK
4	CL 42	26-00938-W11-S1		129.8	16.9	+3.8	111.0	94.3	≥97	D

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 39	864436.1 N, 2031991.0 E, Retest of CL 36, Elev: 1000.0	1000.0'	Elevation
2	CL 40	864436.1 N, 2031991.0 E, Retest of CL 39, Elev: 1000.0	1000.0'	Elevation

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
3	CL 41	865360.0 N, 2031300.2 E, Elev: 998.5	998.5'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
4	CL 42	864436.1 N, 2031991.0 E, Retest of CL 40, Elev: 1000.0	1000.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W18
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/3/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/2/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2026
Serial Number:	26419	Standard Count: Moisture:	705

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 43	26-00938-W11-S4		132.1	16.1	+2.4	113.8	96.8	≥97	D
2	CL 44	26-00938-W11-S4		133.8	16.7	+3.0	114.7	97.5	≥97	OK
3	CL 45	26-00938-W11-S4		134.8	15.7	+2.0	116.5	99.1	≥97	OK
4	CL 46	26-00938-W11-S4		132.9	15.3	+1.6	115.3	98.0	≥97	OK
5	CL 47	26-00938-W11-S4		132.4	15.1	+1.4	115.0	97.8	≥97	OK
6	CL 48	26-00938-W11-S4		135.5	15.0	+1.3	117.8	100.2	≥97	OK
7	CL 49	26-00938-W11-S4		136.0	14.6	+0.9	118.7	100.9	≥97	OK

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 43	862431.8 N, 2031206.7 E, Elev: 1002.5	1002.5'	Elevation
2	CL 44	862448.8 N, 2031576.6 E, Elev: 1002.0	1002.0'	Elevation
3	CL 45	862446.2 N, 2031474.7 E, Elev: 1003.0	1003.0'	Elevation
4	CL 46	862431.8 N, 2031206.7 E, Retest of CL 43, Elev: 1002.5	1002.5'	Elevation
5	CL 47	862431.8 N, 2031206.7 E, Retest of CL 46, Elev: 1002.5	1002.5'	Elevation
6	CL 48	862436.0 N, 2031259.0 E, Elev: 1002.5	1002.5'	Elevation
7	CL 49	862428.6 N, 2031151.3 E, Elev: 1002.5	1002.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W19
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/3/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	OOS - CPN	Test Mode:	Direct Transmission
Model Number:	MC-3	Standard Count: Density:	2453
Serial Number:	M310500279	Standard Count: Moisture:	713

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 50	26-00938-W11-S4	6	132.5	16.9	+3.2	113.3	96.4	≥97	D
2	CL 51	26-00938-W11-S4		136.0	13.8	+0.1	119.5	101.6	≥97	OK
3	CL 52	26-00938-W11-S4		133.4	15.4	+1.7	115.6	98.3	≥97	OK
4	CL 53	26-00938-W11-S4		132.5	15.1	+1.4	115.1	97.9	≥97	OK
5	CL 54	26-00938-W11-S4		133.0	16.0	+2.3	114.7	97.5	≥97	OK

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 50	862426.7 N, 2031143.6 E, *Test did not meet project specifications for maximum dry density. Travis with Xcel approved the 96.4% compaction., Elev: 1001.5	1001.5'	Elevation
2	CL 51	862423.2 N, 2031049.0 E, Elev: 1001.5	1001.5'	Elevation
3	CL 52	862423.2 N, 2031049.0 E, Retest of CL 51, Elev: 1001.5	1001.5'	Elevation
4	CL 53	862436.9 N, 2031303.8 E, Elev: 1003.5	1003.5'	Elevation
5	CL 54	862454.1 N, 2031581.1 E, Elev: 1004.0	1004.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
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OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W20
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/4/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2042
Serial Number:	26419	Standard Count: Moisture:	714

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 55	26-00938-W11-S1	6	131.2	16.5	+3.4	112.6	95.6	≥97	D
2	CL 56	26-00938-W11-S3		138.0	14.5	+1.1	120.5	101.3	≥97	OK
3	CL 57	26-00938-W11-S4		134.3	12.5	-1.2	119.4	101.5	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 55	864436.1 N, 2031991.0 E, Retest of 42, Elev: 1000.0	1000.0'	Elevation
2	CL 56	863012.6 N, 2031986.9 E, Elev: 1002.5	1002.5'	Elevation
3	CL 57	863624.3 N, 2031984.0 E, Elev: 1003.0	1003.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

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D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W21
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/8/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2028
Serial Number:	26419	Standard Count: Moisture:	707

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 58	26-00938-W11-S4	6	133.1	15.5	+1.8	115.2	98.0	≥97	OK
2	CL 59	26-00938-W11-S1		131.7	15.9	+2.8	113.6	96.5	≥97	D
3	CL 60	26-00938-W11-S3		133.9	15.9	+2.5	115.5	97.1	≥97	OK
4	CL 61	26-00938-W11-S3		135.4	15.1	+1.7	117.6	98.9	≥97	OK
5	CL 62	26-00938-W11-S4		132.1	15.6	+1.9	114.3	97.2	≥97	OK
6	CL 63	26-00938-W11-S3		137.5	14.4	+1.0	120.2	101.0	≥97	OK
7	CL 64	26-00938-W11-S4		133.0	15.7	+2.0	115.0	97.7	≥97	OK
8	CL 65	26-00938-W11-S4		133.6	16.5	+2.8	114.7	97.5	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 58	863624.3 N, 2031986.9 E, Retest of CL 57, Elev: 1003.0	1003.0'	Elevation
2	CL 59	864436.1 N, 2031991.0 E, Retest of CL 55, Elev: 1000.0	1000.0'	Elevation

General Location: 865357.1 N, 2031398.0 E

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
3	CL 60	Elev: 999.0	999.0'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
4	CL 61	865357.2 N, 2031198.1 E, Elev: 999.5	999.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
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OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W21
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Location

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
5	CL 62	865360.0 N, 2031503.0 E, Elev: 1000.0	1000.0'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
6	CL 63	862895.0 N, 2031983.1 E, Elev: 1003.5	1003.5'	Elevation

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
7	CL 64	865354.0 N, 2031110.6 E, Elev: 1000.5	1000.5'	Elevation

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
8	CL 65	864436.1 N, 2031991.0 E, Retest of CL 59, Elev: 1000.0	1000.0'	Elevation

Comments

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Legend

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MDD = Maximum Dry Density

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Field Density Test Report

Report No: ND:26-00938-W22
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/9/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2029
Serial Number:	26419	Standard Count: Moisture:	704

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7
26-00938-W15-S1	Clayey Sand, a little gravel, brown & gray (SC)	ASTM D 698 (A)	115.8	12.9

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 66	26-00938-W11-S4	6	132.3	15.8	+2.1	114.2	97.2	≥97	OK
2	CL 67	26-00938-W15-S1		131.1	15.9	+3.0	113.1	97.7	≥97	OK

Location

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 66	865358.2 N, 2031609.0 E, Elev: 1001.0	1001.0'	Elevation
2	CL 67	865353.0 N, 2031001.9 E, Elev: 1001.5	1001.5'	Elevation

Comments

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Legend

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OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W24
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/10/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2030
Serial Number:	26419	Standard Count: Moisture:	702

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 68	26-00938-W11-S3	6	135.1	16.2	+2.8	116.3	97.7	≥97	OK

Location

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 68	865353.0 N, 2031001.9 E, Retest of CL 67, Elev: 1001.5	1001.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

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MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W25
Issue No: 2

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/24/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/11/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2028
Serial Number:	26419	Standard Count: Moisture:	712

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 69	26-00938-W11-S3	6	134.4	15.8	+2.4	116.1	97.5	≥97	OK
2	CL 70	26-00938-W11-S3		136.4	15.0	+1.6	118.6	99.7	≥97	OK
3	CL 71	26-00938-W11-S3		134.4	15.1	+1.7	116.8	98.1	≥97	OK
4	CL 72	26-00938-W11-S3		135.3	16.4	+3.0	116.2	97.7	≥97	OK
5	CL 73	26-00938-W11-S3		137.0	13.7	+0.3	120.5	101.2	≥97	OK
6	CL 74	26-00938-W11-S3		134.6	15.2	+1.8	116.8	98.2	≥97	OK

Location

General Location: Pond 3 East Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 69	865149.0 N, 2031989.6 E, Elev: 1000.5	1000.5'	Elevation
2	CL 70	865046.9 N, 2031987.9 E, Elev: 1001.0	1001.0'	Elevation
3	CL 71	864943.8 N, 2031990.0 E, Elev: 1001.5	1001.5'	Elevation
4	CL 72	864552.4 N, 2031988.3.E, Elev: 1002.0	1002.0'	Elevation
5	CL 73	863381.0 N, 2031982.7 E, Elev: 1004.0	1004.0'	Elevation
6	CL 74	864850.7 N, 2031987.9 E, Elev: 1002.5	1002.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W26
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/14/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GENE ERZAR		
Date Tested:	9/14/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2028
Serial Number:	26419	Standard Count: Moisture:	712

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S4 (SO)	Sandy Lean Clay, a little gravel, brown & gray (CL)	ASTM D 698 (A)	117.6	13.7
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL-75	26-00938-W11-S4	6	131.4	15.1	+1.4	114.2	97.1	≥97	OK
2	CL-76	26-00938-W11-S3	6	135.4	14.3	+0.9	118.5	99.5	≥97	OK
3	CL-77	26-00938-W11-S3	6	137.6	13.5	+0.1	121.2	101.9	≥97	OK
4	CL-78	26-00938-W11-S3	6	135.9	16.0	+2.6	117.2	98.4	≥97	OK

Location

General Location: Pond 3 clay barrier

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL-75	N=864673.16, E=2031982.75	1003.5'	Elevation
2	CL-76	N=865106.46, E=2031986.23	1003.0'	Elevation
3	CL-77	N=865355.65, E=2031742.31	1002.0'	Elevation
4	CL-78	N=865107.81, E=2031985.03, Retest of CL-76	1003.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W27
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/16/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By: GENE ERZAR
Date Tested: 9/15/2015
Field Methods: ASTM D 6938
Gauge Type:
Test Mode: Direct Transmission
Model Number:
Standard Count: Density:
Serial Number:
Standard Count: Moisture:

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL-79	26-00938-W11-S3	6	134.9	15.5	+2.1	116.8	98.1	≥97	OK
2	CL-80	26-00938-W11-S3	6	134.6	15.0	+1.6	117.0	98.4	≥97	OK
3	CL-81	26-00938-W11-S3		134.6	15.4	+2.0	116.6	98.0	≥97	OK

Location

General Location: Pond 3 clay barrier

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL-79	N=864499.9, E=2031981.5	1004.0'	Elevation
2	CL-80	N=865355.6, E=2031851.9	1002.5'	Elevation
3	CL-81	N=865349.8, E=2031633.9, Elev: 1003.5	1003.5'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W28
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/16/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	OOS - CPN	Test Mode:	Direct Transmission
Model Number:	MC-3	Standard Count: Density:	2461
Serial Number:	M310500279	Standard Count: Moisture:	714

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 82	26-00938-W11-S3		132.3	14.2	+0.8	115.8	97.3	≥97	OK

Location

General Location: Pond 3 Clay Barrier

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 82	N = 865352.9, E = 2031386.6, Elev: 1003.0	1003.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W29
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/21/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2460
Serial Number:	36458	Standard Count: Moisture:	707

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 83	26-00938-W11-S3		138.6	15.7	+2.3	119.8	100.7	≥97	OK
~~2~~	~~CF 1~~	~~26-00938-W31-S1~~	~~6~~	~~122.6~~	~~4.4~~	~~-6.6~~	~~117.4~~	~~98.1~~	~~≥95~~	~~OK~~

Location

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 83	865353.0 N, 2030795.4 E, Elev: 1004.0	1004.0'	Elevation

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
~~2~~	~~CF 1~~	~~862427.4 N, 2030963.4 E, Elev: 1005.0~~	~~1005.0'~~	~~Elevation~~

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Clay In-Place Permeability Test Reports

Hydraulic Conductivity Test Data ASTM D5084

Project: Xcel -Sherco Date: 9/29/2015

Reported To: Veit & Company, Inc. Job No.: 9903

Boring No.:							
Sample No.:	TW-1	TW-2	TW-3	TW-4			
Depth (ft):							
Location:							
Sample Type:	3T	3T	3T	3T			
Soil Type:	Sandy Lean Clay w/ a trace of gravel (CL)	Sandy Lean Clay w/ a little gravel (CL)	Sandy Lean Clay w/ a little gravel (CL)	Sandy Lean Clay w/ a little gravel (CL)			
Atterberg Limits							
LL							
PL							
PI							
Permeability Test	Intact	Intact	Intact	Intact			
Before Test Conditions: Saturation %:							
Porosity:							
Ht. (in):	2.71	2.72	2.75	2.73			
Dia. (in):	2.89	2.87	2.88	2.88			
Dry Density (pcf):	115.4	118.3	115.8	118.3			
Water Content:	16.3%	15.1%	16.0%	14.8%			
Test Type:	Falling Head	Falling Head	Falling Head	Falling Head			
Max Head (ft.):	5.0	5.0	5.0	5.0			
Confining press. (Effective-psi):	2.0	2.0	2.0	2.0			
Trial No.:	9-13	8-12	6-10	8-12			
Water Temp ℃:	22.0	22.0	22.0	22.0			
% Compaction							
% Saturation (After Test)	96.1%	95.4%	95.5%	96.0%			
Coefficient of Permeability							
K @ 20 ℃ (cm/sec)	**1.3×10^{-8}**	**1.1×10^{-8}**	**1.4×10^{-8}**	**2.5×10^{-8}**			
K @ 20 ℃ (ft/min)	**2.6×10^{-8}**	**2.2×10^{-8}**	**2.8×10^{-8}**	**4.9×10^{-8}**			
Notes:							

2401 W 66th Street
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Richfield, Minnesota 55423-2031

American Engineering Testing Clay Testing Response Letter

AMERICAN ENGINEERING TESTING, INC.

CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

November 4, 2015

To: Dan Riggs,
Carlson McCain, Inc.
3890 Pheasant Ridge Drive – Suite 100
Blaine, Minnesota 55449

Re: Response to our October 13, 2015 phone conversation regarding our compaction tests at the Xcel-Sherco Plant, Becker, Minnesota (Clay Barrier for Pond #3)
AET Project No. 26-00938

cc: Mitch Sumstad – Veit USA

Dan,
This letter presents a summary of our responses to a number of questions presented in two e-mails from Mitch Sumstad to us and our recent phone conversation with you noted above. The questions you and Mitch had overlapped into different aspects of the Sherco work. I have combined the questions into a few main questions while still providing information that pertains to all.

Gauge Accuracy: *Why isn't the nuclear density gauge providing accurate moisture content test results onsite?*

I'd start answering that question by defining an accurate moisture test result. An accurate moisture test result would be derived from obtaining a sample of the soil being tested and oven drying the sample in our laboratory following proper ASTM procedures. Simply stated, a laboratory moisture content test is an "accurate" test result.

A Troxler Model 3430 Nuclear Density Gauge was used at this site. The nuclear gauges do not always provide accurate moisture content test results. Certain chemical compositions (hydrogen is one) and characteristics of the soils can affect moisture accuracy. Troxler states in their manuals that the moisture content reading could differ by ± 2.5% as compared to laboratory moisture or even successive readings with a gauge in similar soils. More details and further information is available at their website – www.troxlerlabs.com

Gauge Calibration *What does annual calibration provide?*

Our gauges are calibrated and standardized in a number of different manners. Our gauges are Factory calibrated annually by Troxler or separate entities that are certified by Troxler and/or by

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accredited laboratories. Briefly, it is calibrated by testing on a number of different blocks of material that have density within ranges normally found in soils. This tells us if the gauge is

operating within specifications provided by the manufacturer (Troxler). AET also has the equipment needed to validate the gauges readings should we suspect a gauge is not performing satisfactorily and/or to Troxler specifications. The gauges are also standardized daily to check for possible drift outside an average of previous daily standardizations.

AET has used nuclear gauges for as long as they have been available. We have and still do perform comparison testing using sand/cone density test methods. We have found that the gauge moisture content readings do often differ from the lab moisture test results (the accurate test result method mentioned earlier). We have also determined the gauge wet density results to be comparable to sand/cone wet density results, especially in clay soils.

Adjustments *Can you explain the reasoning behind the adjustments to the test results at this project?*

The project moisture specifications stated that the moisture content of the fill shall be at or between Optimum Moisture Content and 5% over Optimum Moisture Content.

Initially our gauge readings had indicated a number of the moisture content test results below project specification using Standard Proctor Tests (tests that determine Maximum Dry Density and Optimum Moisture Content) performed by SET. Within a day or two of the beginning of the project, after performing Proctor Tests ourselves on a number of samples collected, we were able to evaluate the gauge test results and then immediately started collecting samples onsite and performing lab moisture content tests. The lab moisture content test results were meeting project specifications. The lab moisture contents were reported.

Since the lab moisture contents were slightly higher, we adjusted the nuclear gauge dry density readings to arrive at a more accurate dry density using the following formula:

Adjusted Field Dry Density = (Gauge Wet Density) / [1 + (Lab Moisture Content as a %/100)]

This was done using the gauge wet density of which, as stated earlier, experience tells us they are comparable to a sand/cone wet density. The dry density is used to calculate a percent compaction, as follows :

Field Dry Density / Proctor Maximum Dry Density = Percent Compaction

This provides a slightly different but more accurate Percent Compaction. The Adjusted Field Dry Density/Percent Compaction was reported.

Other Options *Are there other options that can be used to determine in-place density and if so, why haven't they been selected?*

Sand cone tests could be performed; however, the RFP requested nuclear gauge testing. Sand cone density testing does take longer to get the results. This increases earthwork equipment standby time to have personnel run the test as compared to a nuclear density test. We elected to use the wet densities from the nuclear gauge, which are quite accurate, and use the laboratory moisture content test results (also most accurate), in order to give accurate results in a timely manner and reduce the delay time for results.

Clay Source: *This clay source has been used numerous times without issues. What has changed to bring out these issues?*

It appears that the clay source might be at a slightly lower moisture in 2015. This could be a seasonal moisture variation or a material variation. Many of the gauge readings were below the low end of the tolerance for moisture (failing). The laboratory moisture tests showed acceptable results.

2014 Sherco Test Results: *How do we know that previous test results were accurate from past clay installation projects?*

We reviewed the results of our work on the 2014 Sherco project, which indicated the moisture contents from the nuclear gauge met the moisture specification. All the nuclear gauge moisture test results were in an approximate middle range between the upper and lower limits of the moisture spec., of optimum moisture to 5% over optimum moisture. Approximate middle range being about 2.5% above the lower limit (Optimum Moisture) and about 2.5% below the upper limit (5% above the Optimum Moisture). Given the Troxler manual information stated earlier, "Troxler states in their manuals that the moisture content reading could differ by ± 2.5%", we were not concerned that the moisture gauge readings taken during the 2014 Sherco work were not within moisture specification limits.

2015 Sherco Test Results and AET Opinion: *Does AET believe the material is within specification?*

2015 Sherco Test Results
As mentioned above, all of the laboratory moisture tests showed acceptable results. Several "retests" were performed, as requested by Carlson McCain and Veit field personnel, prior to the availability of the lab moisture results.

A number of tests did not meet the specified compaction level (Percent Compaction) with the initial compactive effort. The areas of those tests were re-worked, re-compacted and retested as follows:

- Test No. CL 2 - - - Retest CL 20
- Test No. CL 6 - - - Retest CL 7
- Test No. CL 12 & Retest No. CL 15 - - - Retest CL 37*
- Test No. CL 26 - - - Retest CL 38
- Test No. CL 34 - - - Retest CL 35
- Test No. CL 36 - - - Retest CL 65

Test No. CL 36 was retested a number of times (CL 39, CL 40, CL 42, CL 55, and CL 59) until passing test CL 65 was taken.

- Test No. CL 50 - - - Test Result of 96.4% compaction was provided to Travis with Xcel Energy on Sept. 3, 2015. Travis told AET that the result is acceptable. No retests taken.

* Please refer to the attached re-issue of our 9/3/15 report which was initially issued without an assigned number for CL 37.

AET Opinion
Based on the results of the field density tests and the laboratory moisture results, it is our opinion that the clay soils placed to date satisfy the project specifications for percent compaction and for percent moisture (with the exception of Test No. CL 50), at the times, locations and elevations we tested. These test results can be taken to be "representative" of the fill placed.

SIGNATURES

Report Prepared By:

American Engineering Testing, Inc.

Gene Erzar
Engineering Assistant

Report Reviewed By:

American Engineering Testing, Inc.

(FOR TPV)

Thomas P. Venema, PE
Principal Engineer/Vice President
MN License No.13922

Appendix E - Bottom Ash Fill Test Reports

Bottom Ash Fill Proctor Test Reports
Bottom Ash Fill In-Place Density Test Reports

Bottom Ash Fill Proctor Test Reports

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Proctor Report

Report No: PTR:26-00938-W2-S3
Issue No: 2

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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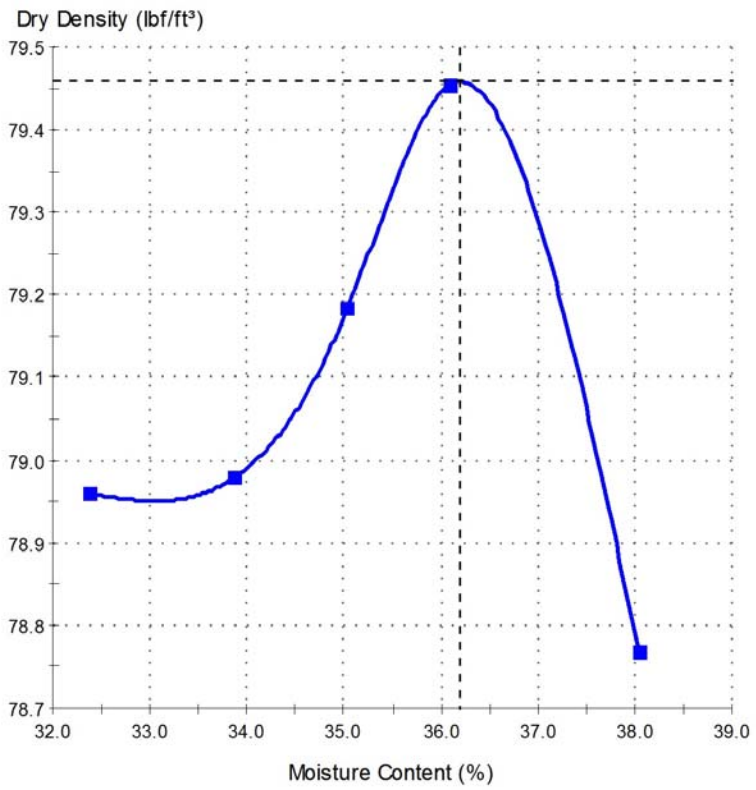
Date of Issue: 7/13/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Sample Details

Sample ID:	26-00938-W2-S3	**Date Sampled:**	6/25/2015
Sampling Method:	Sampled By Contractor		
Source:	On-Site Fill		
Material:	Bottom Ash		
Specification:	N/A		
Location:	On Site		
Tested By:	KRISTINE BORDAK	**Date Tested:**	6/29/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**79.5**
Optimum Moisture Content (%):	**36.2**
Method:	A
Preparation Method:	Dry
Received Moisture Content (%):	16
Retained Sieve No 4 (4.75mm) (%):	13
Passing Sieve No 4 (4.75mm) (%):	87

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**79.5**
Corrected Optimum Moisture Content (%):	**36.2**

Comments

Proctor: BAP-1
Jar: #345
Intended Use: Pond 3 Fill

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Proctor Report

Report No: PTR:26-00938-W2-S4
Issue No: 2

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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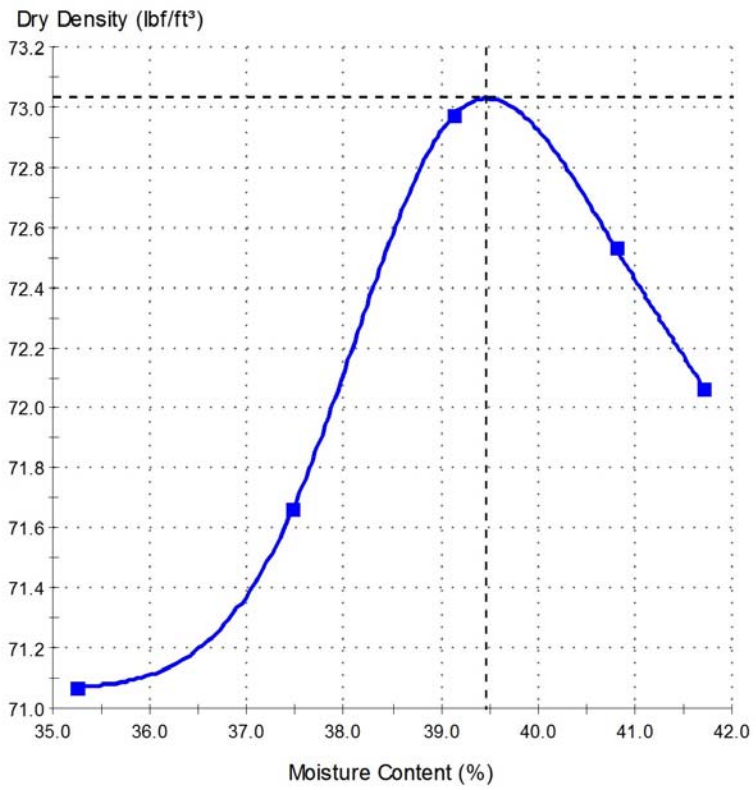
Date of Issue: 7/13/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Sample Details

Sample ID:	26-00938-W2-S4	**Date Sampled:**	6/25/2015
Sampling Method:	Sampled By Contractor		
Source:	On-Site Fill		
Material:	Bottom Ash		
Specification:	N/A		
Location:	On Site		
Tested By:	KRISTINE BORDAK	**Date Tested:**	6/29/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**73.0**
Optimum Moisture Content (%):	**39.5**
Method:	A
Preparation Method:	Dry
Received Moisture Content (%):	8
Retained Sieve No 4 (4.75mm) (%):	2
Passing Sieve No 4 (4.75mm) (%):	98

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**73.0**
Corrected Optimum Moisture Content (%):	**39.5**

Comments

Proctor: BAP-2
Jar: #427
Intended Use: Pond 3 Fill

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Proctor Report

Report No: PTR:26-00938-W2-S5
Issue No: 2

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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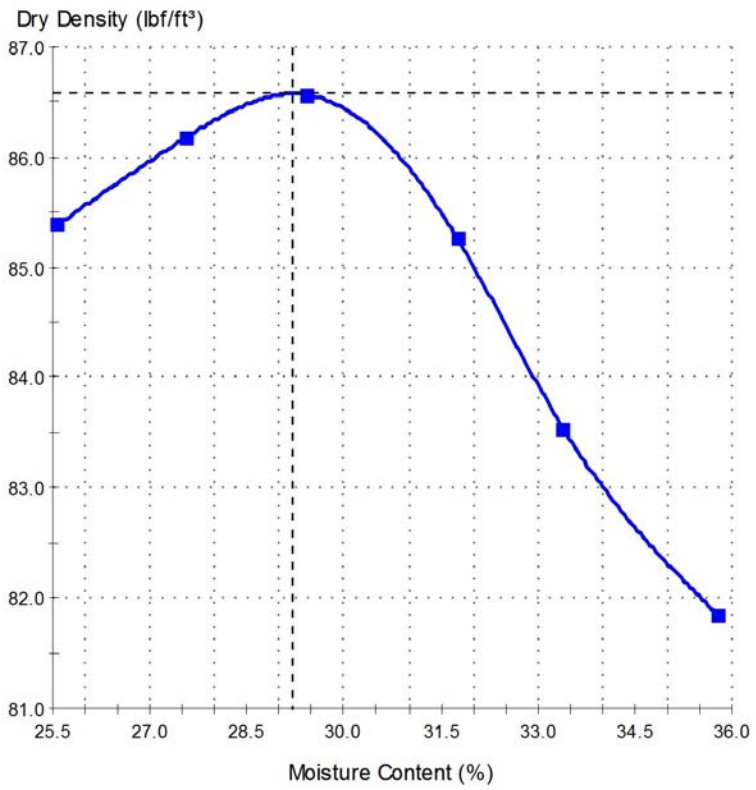
Date of Issue: 7/13/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Sample Details

Sample ID:	26-00938-W2-S5	**Date Sampled:**	7/8/2015
Sampling Method:	Sampled By Contractor		
Source:	On-Site Fill		
Material:	Bottom Ash		
Specification:	N/A		
Location:	N3643222.2, E2051965.7		
Tested By:	KRISTINE BORDAK	**Date Tested:**	7/10/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**86.6**
Optimum Moisture Content (%):	**29.2**
Method:	B
Preparation Method:	Dry
Retained Sieve 3/8" (9.5mm) (%):	7
Passing Sieve 3/8" (9.5mm) (%):	93

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**86.6**
Corrected Optimum Moisture Content (%):	**29.2**

Comments

Proctor: BAP-3
Jar: #141
Intended Use: Bottom Ash Fill

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Proctor Report

Report No: PTR:26-00938-W2-S6
Issue No: 1

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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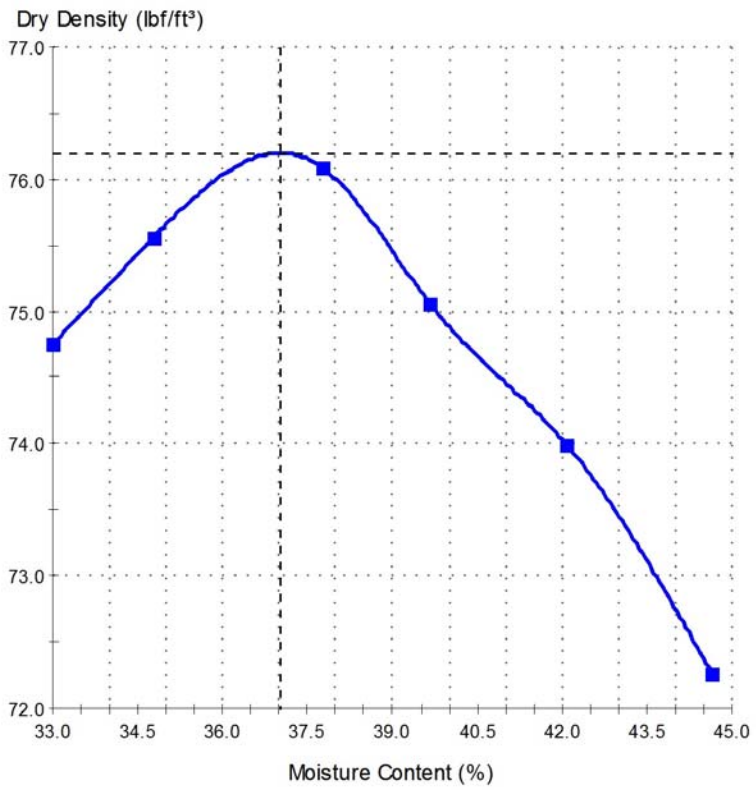
Kristine M Bordak

Date of Issue: 7/29/2015
Reviewed By: KRISTINE BORDAK
Sr. Geotechnical Lab Tech -MNDOT #15736

Sample Details

Sample ID:	26-00938-W2-S6	**Date Sampled:**	7/24/2015
Sampling Method:	Sampled By American Eng & Testing		
Source:	On-Site Fill		
Material:	Bottom Ash		
Specification:	N/A		
Location:	BA4 Location		
Tested By:	KRISTINE BORDAK	**Date Tested:**	7/28/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**76.2**
Optimum Moisture Content (%):	**37.0**
Method:	A
Preparation Method:	Dry
Retained Sieve No 4 (4.75mm) (%):	10
Passing Sieve No 4 (4.75mm) (%):	90

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**76.2**
Corrected Optimum Moisture Content (%):	**37.0**

Comments

Proctor #BAP4
Jar # 294
Intended Use: Pond 3 Backfill

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Bottom Ash Fill In-Place Density Test Reports

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Field Density Test Report

Report No: ND:26-00938-W3
Issue No: 1

Client: VEIT & COMPANY INC. **CC:**

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 7/29/2015
Reviewed By: JAMES MILLER
Senior Engineering Assistant

Testing Details

Tested By:	ALEX STERGER		
Date Tested:	7/8/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3440	**Standard Count: Density:**	714
Serial Number:	33384	**Standard Count: Moisture:**	2505

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S5	Bottom Ash	ASTM D 698 (B)	86.6	29.2

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	BA1	26-00938-W2-S5	12	97.9	8.9	-20.3	89.9	**103.8**	≥95	OK
2	BA2	26-00938-W2-S5	12	108.9	21.0	-8.2	90.0	**103.9**	≥95	OK

Location

General Location: Pond 3

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	BA1	N 865342.2 E 2031647.9, Elev: 999.2	999.2'	Elevation
2	BA2	N 8643222.3 E 2031965.7, Elev: 999.1	999.1'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W4
Issue No: 1

Client: VEIT & COMPANY INC. **CC:**

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 7/29/2015
Reviewed By: JAMES MILLER
Senior Engineering Assistant

Testing Details

Tested By:	ALEX STERGER		
Date Tested:	7/24/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	**Test Mode:**	Direct Transmission
Model Number:	3440	**Standard Count: Density:**	713
Serial Number:	33384	**Standard Count: Moisture:**	2543

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S6	Bottom Ash	ASTM D 698 (A)	76.2	37.0
26-00938-W2-S5	Bottom Ash	ASTM D 698 (B)	86.6	29.2

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	BA3	26-00938-W2-S6	12	93.0	20.0	-17.0	77.5	**101.7**	≥95	OK
2	BA4	26-00938-W2-S6	N/A	92.5	17.0	-20.0	79.1	**103.8**	≥95	OK
3	BA5	26-00938-W2-S5	N/A	106.5	25.0	-4.2	85.2	**98.4**	≥95	OK

Location

General Location: Pond 3

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	BA3	N 865318 E2031097, Elev: 1000.0	1000.0'	Elevation
2	BA4	N 865322 E 2031339, Elev: 1000.0	1000.0'	Elevation
3	BA5	N 865021 E 2031960, Elev: 1001.5	1001.5'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W5
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/12/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	ALEX STERGER		
Date Tested:	8/4/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	714
Serial Number:	33384	Standard Count: Moisture:	2543

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S5	Bottom Ash	ASTM D 698 (B)	86.6	29.2
26-00938-W2-S6	Bottom Ash	ASTM D 698 (A)	76.2	37.0
26-00938-W2-S3	Bottom Ash	ASTM D 698 (A)	79.5	36.2

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	BA6	26-00938-W2-S5	12	97.1	10.0	-19.2	88.3	101.9	≥95	OK
2	BA7	26-00938-W2-S6	12	92.0	18.0	-19.0	78.0	102.3	≥95	OK
3	BA8	26-00938-W2-S3	12	90.6	10.0	-26.2	82.4	103.6	≥95	OK
4	BA9	26-00938-W2-S5	12	102.0	13.0	-16.2	90.3	104.2	≥95	OK
5	BA10	26-00938-W2-S3	12	90.3	15.0	-21.2	78.5	98.8	≥95	OK
6	BA11	26-00938-W2-S6	12	86.6	16.0	-21.0	74.7	98.0	≥95	OK

Location

General Location: Pond 3

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	BA6	N 865320.5 E 3031545.9, Elev: 1001.2	1001.2'	Elevation
2	BA7	N 864327.5 E 2031963.0, Elev: 1002.4	1002.4'	Elevation
3	BA8	N 863010.8 E 2031938, Elev: 1001.2	1001.2'	Elevation
4	BA9	N 862508.3 E 2031643.1	998.5'	Elevation
5	BA10	N 863235.6 E 203194.9, Elev: 1002.2	1002.2'	Elevation
6	BA11	N 862451.4 E 2030859.0, Elev: 1000.5	1000.5'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W8
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/26/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	ALEX STERGER		
Date Tested:	8/6/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	714
Serial Number:	33384	Standard Count: Moisture:	2532

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S3	Bottom Ash	ASTM D 698 (A)	79.5	36.2

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	BA12	26-00938-W2-S3		87.7	16.0	-20.2	75.6	95.1	≥95	OK
2	BA13	26-00938-W2-S3		95.3	18.0	-18.2	80.8	101.6	≥95	OK

Location

General Location: Pond 3

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	BA12	N 864975.9 E 2031969.7, Elev: 1003.9	1003.9'	Elevation
2	BA13	N 865324.2 E 2031761.2, Elev: 1002.5	1002.5'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W6
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 8/25/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	ALEX STERGER		
Date Tested:	8/11/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	714
Serial Number:	33384	Standard Count: Moisture:	2543

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S5	Bottom Ash	ASTM D 698 (B)	86.6	29.2
26-00938-W2-S3	Bottom Ash	ASTM D 698 (A)	79.5	36.2

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	BA14	26-00938-W2-S5	12	105.3	20.0	-9.2	87.8	101.3	≥95	OK
2	BA15	26-00938-W2-S3	12	95.3	21.0	-15.2	78.8	99.1	≥95	OK

Location

General Location: Pond 3

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	BA14	N 862489.2 E 2031450.3, Elev: 1001.0	1001.0'	Elevation
2	BA15	N 862427.1 E 2030867.3, Elev: 1002.7	1002.7'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W9
Issue No: 2

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 11/18/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	8/25/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3430 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3430	Standard Count: Density:	2020
Serial Number:	26419	Standard Count: Moisture:	719

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S1 (SO)	Sandy Lean Clay, a little gravel, brown (CL)	ASTM D 698 (A)	117.8	13.1
26-00938-W2-S3	Bottom Ash	ASTM D 698 (A)	79.5	36.2
26-00938-W11-S2 (SO)	Clayey Sand, a little gravel, brown (SC)	ASTM D 698 (A)	118.5	12.9

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CL 8	26-00938-W11-S1	6	134.5	12.3	-0.8	119.8	101.7	≥97	OK
2	CL 9	26-00938-W11-S1	6	131.2	12.8	-0.3	116.3	98.7	≥97	OK
3	CL 10	26-00938-W11-S1	6	131.5	12.5	-0.6	116.9	99.2	≥97	OK
4	CL 11	26-00938-W11-S1	6	132.1	13.7	+0.6	116.2	98.7	≥97	OK
5	BA 16	26-00938-W2-S3	12	93.7	21.4	-14.8	77.2	97.1	≥95	OK
6	CL 12	26-00938-W11-S1	6	128.6	18.2	+5.1	108.8	92.4	≥97	D
7	CL 13	26-00938-W11-S2	6	135.4	13.5	+0.6	119.3	100.7	≥97	OK

Location

General Location: Pond 3 South Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CL 8	862421.7 N, 2031148.6 E, Retest of CL 5., Elev: 1000.1	1000.1'	Elevation
2	CL 9	862460.0 N, 2031774.0 E, Elev: 1000.0	1000.0'	Elevation
3	CL 10	862460.0 N, 2031774.0, Retest of CL 9, Elev: 1000.0	1000.0'	Elevation
4	CL 11	862418.9 N, 2031001.3 E, Elev: 1000.5	1000.5'	Elevation
5	BA 16	862430.5 N, 2031036.4 E, Elev: 1003.8	1003.8'	Elevation
6	CL 12	862422.7 N, 2031099.0 E, Elev: 1001.5	1001.5'	Elevation
7	CL 13	862449.3 N, 2031669.3 E, Elev: 1001.1	1001.1'	Elevation

Comments

(SO) = Sampled By Others
Density test number CL-8, CL-9 and CL-10 failed to meet the moisture specification of 0 to +5% of optimum moisture content.

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
D = Density Results do not Meet Specification
OK = All Results Meet Specification

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Appendix F - Common Fill Test Reports

Common Fill Source Proctor Test Reports
Common Fill In-Place Density Test Reports

Common Fill Source Proctor Test Reports

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Proctor Report

Report No: PTR:26-00938-W2-S1
Issue No: 2

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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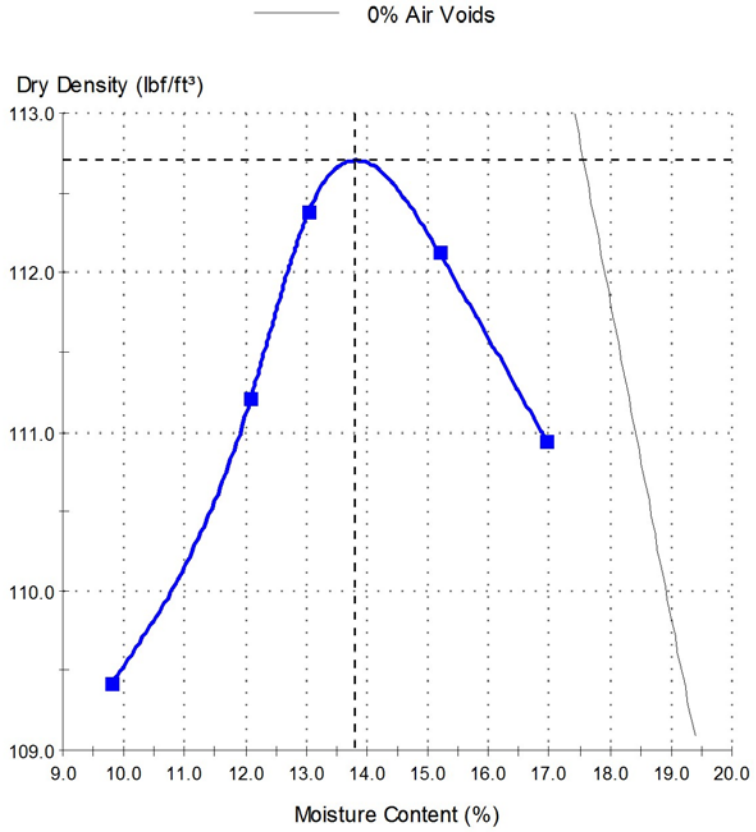
Date of Issue: 7/13/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Sample Details

Sample ID:	26-00938-W2-S1	**Date Sampled:**	6/25/2015
Sampling Method:	Sampled By Contractor		
Source:	On-Site Fill		
Material:	Sand, a little gravel, fine to medium grained, brown (SP)		
Specification:	N/A		
Location:	On Site		
Tested By:	KRISTINE BORDAK	**Date Tested:**	6/29/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**112.7**
Optimum Moisture Content (%):	**13.8**
Method:	A
Preparation Method:	Dry
Received Moisture Content (%):	1
Specific Gravity (Fines):	2.65
Retained Sieve No 4 (4.75mm) (%):	3
Passing Sieve No 4 (4.75mm) (%):	97

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**112.7**
Corrected Optimum Moisture Content (%):	**13.8**

Comments

Proctor CFP-1
Jar # 163
Intended Use: Controlled Fill

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Proctor Report

Report No: PTR:26-00938-W2-S2
Issue No: 2

Client: VEIT & COMPANY INC.

CC: Dan Riggs
Gary Gilbert
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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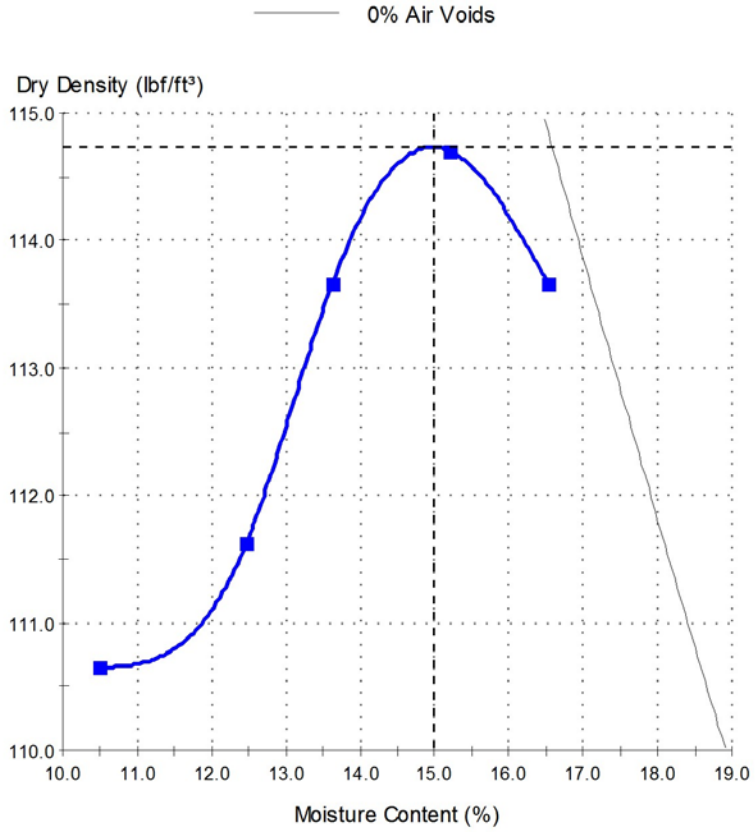
Date of Issue: 7/13/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Sample Details

Sample ID:	26-00938-W2-S2	**Date Sampled:**	6/25/2015
Sampling Method:	Sampled By Contractor		
Source:	On-Site Fill		
Material:	Sand, a little gravel, fine to medium grained, brown (SP)		
Specification:	N/A		
Location:	On Site		
Tested By:	KRISTINE BORDAK	**Date Tested:**	6/26/2015

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	**114.7**
Optimum Moisture Content (%):	**15.0**
Method:	A
Preparation Method:	Dry
Received Moisture Content (%):	2
Specific Gravity (Fines):	2.65
Retained Sieve No 4 (4.75mm) (%):	9
Passing Sieve No 4 (4.75mm) (%):	91

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	**114.7**
Corrected Optimum Moisture Content (%):	**15.0**

Comments

Proctor #CFP-2
Jar #697
Intended Use: Controlled Fill

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Proctor Report

Report No: PTR:26-00938-W31-S1
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Gary Gilbert, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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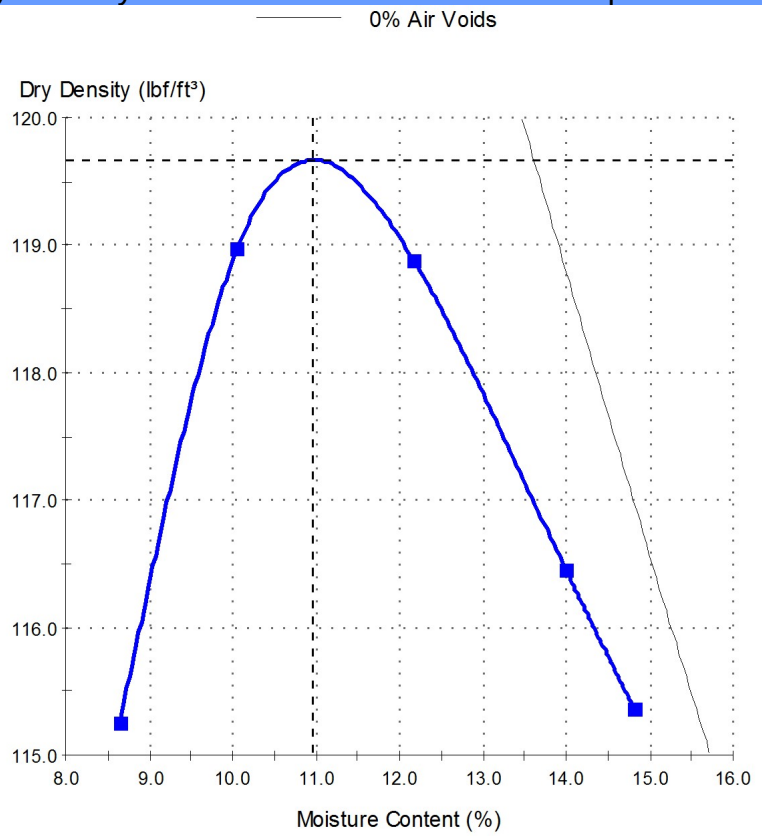
Kristine M Bordak

Date of Issue: 9/25/2015
Reviewed By: KRISTINE BORDAK
Sr. Geotechnical Lab Tech -MNDOT #15736

Sample Details

Sample ID:	26-00938-W31-S1	Date Sampled:	9/29/2014
Sampling Method:	Sampled By American Eng & Testing		
Source:	On-Site Fill		
Material:	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)		
Specification:			
Location:	Control Borrow Area West of Trailer		
Tested By:	KRISTINE BORDAK	Date Tested:	9/30/2014

Dry Density - Moisture Content Relationship



Test Results

ASTM D 698 - 2012

Maximum Dry Density (lbf/ft³):	119.7
Optimum Moisture Content (%):	11.0
Method:	A
Preparation Method:	Dry
Specific Gravity (Fines):	2.60
Retained Sieve No 4 (4.75mm) (%):	9
Passing Sieve No 4 (4.75mm) (%):	91

ASTM D 4718

Corrected Maximum Dry Density (lbf/ft³):	119.7
Corrected Optimum Moisture Content (%):	11.0

Comments

This Proctor was sampled on September 29, 2014 and imported from Project #26-00822-W4-S4 (Proctor #RFP1-AET 2) (CFP-3)

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Common Fill In-place Density Test Reports

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Field Density Test Report

Report No: ND:26-00938-W29
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/21/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2460
Serial Number:	36458	Standard Count: Moisture:	707

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W11-S3 (SO)	Sandy Lean Clay, a little gravel, gray (CL)	ASTM D 698 (A)	119.0	13.4
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
~~1~~	~~CL 83~~	~~26-00938-W11-S3~~		~~138.6~~	~~15.7~~	~~+2.3~~	~~119.8~~	~~100.7~~	~~≥97~~	~~OK~~
2	CF 1	26-00938-W31-S1	6	122.6	4.4	-6.6	117.4	98.1	≥95	OK

Location

General Location: Pond 3 North Side Embankment

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
~~1~~	~~CL 83~~	~~865353.0 N, 2030795.4 E, Elev: 1004.0~~	~~1004.0'~~	~~Elevation~~

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
2	CF 1	862427.4 N, 2030963.4 E, Elev: 1005.0	1005.0'	Elevation

Comments

(SO) = Sampled By Others

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W30
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/22/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2481
Serial Number:	36458	Standard Count: Moisture:	710

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 2	26-00938-W31-S1	12	122.7	3.1	-7.9	119.0	99.5	≥95	OK
2	CF 3	26-00938-W31-S1		125.5	3.8	-7.2	120.9	101.0	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 2	N = 862906.7, E = 2032018.0, Elev: 1000.1	1000.1'	Elevation
2	CF 3	N = 865350.0, E = 2030857.4, Elev: 1005.0	1005.0'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W32
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs
Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/24/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2451
Serial Number:	36458	Standard Count: Moisture:	705

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0
26-00938-W2-S1	Sand, a little gravel, fine to medium grained, brown (SP)	ASTM D 698 (A)	112.7	13.8

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 4	26-00938-W31-S1	12	120.9	5.1	-5.9	115.0	96.1	≥95	OK
2	CF 5	26-00938-W31-S1		121.4	4.4	-6.6	116.3	97.1	≥95	OK
3	CF 6	26-00938-W2-S1		117.6	6.6	-7.2	110.3	97.9	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 4	862410.3 N, 2031027.0 E, Elev: 1002.8	1002.8'	Elevation
2	CF 5	863423.4 N, 2032009.4 E, Elev: 1003.0	1003.0'	Elevation
3	CF 6	862463.2 N, 2031988.6 E, Elev: 1002.2	1002.2'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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www.amengtest.com

Field Density Test Report

Report No: ND:26-00938-W33
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 9/28/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/25/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2462
Serial Number:	36458	Standard Count: Moisture:	712

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W2-S2	Sand, a little gravel, fine to medium grained, brown (SP)	ASTM D 698 (A)	114.7	15.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 7	26-00938-W2-S2	12	119.7	5.8	-9.2	113.1	98.6	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 7	864622.3 N, 2032000.0 E, Elev: 1002.1	1002.1'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
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OK = All Results Meet Specification

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Field Density Test Report

Report No: ND:26-00938-W34
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 10/5/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/29/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2463
Serial Number:	36458	Standard Count: Moisture:	703

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0
26-00938-W2-S2	Sand, a little gravel, fine to medium grained, brown (SP)	ASTM D 698 (A)	114.7	15.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 8	26-00938-W31-S1	12	118.7	3.3	-7.7	114.9	96.0	≥95	OK
2	CF 9	26-00938-W2-S2		119.2	4.0	-11.0	114.6	99.9	≥95	OK
3	CF 10	26-00938-W2-S2		119.6	5.9	-9.1	112.9	98.4	≥95	OK
4	CF 11	26-00938-W31-S1		120.3	3.4	-7.6	116.3	97.2	≥95	OK
5	CF 12	26-00938-W31-S1		124.4	3.8	-7.2	119.8	100.1	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 8	865377.1 N, 2031051.4 E, Elev: 1004.0	1004.0'	Elevation
2	CF 9	862400.7 N, 2030984.1 E, Elev: 1006.0	1006.0'	Elevation
3	CF 10	863363.2 N 2032006.0 E, Elev: 1006.0	1006.0'	Elevation
4	CF 11	864871.8 N, 2031998.0 E, Elev: 1004.0	1004.0'	Elevation
5	CF 12	865400.6 N, 2032019.5 E, Elev: 1002.0	1002.0'	Elevation

Comments

Legend

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MDD = Maximum Dry Density
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Field Density Test Report

Report No: ND:26-00938-W35
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 10/5/2015
Reviewed By: GENE ERZAR, Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	9/30/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2465
Serial Number:	36458	Standard Count: Moisture:	713

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 13	26-00938-W31-S1	12	120.1	5.1	-5.9	114.3	95.5	≥95	OK
2	CF 14	26-00938-W31-S1		122.2	3.8	-7.2	117.7	98.4	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 13	863514.9 N, 2031990.9 E, Elev: 1007.4	1007.4'	Elevation
2	CF 14	864528.1 N, 2031993.4 E, Elev: 1005.2	1005.2'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
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Field Density Test Report

Report No: ND:26-00938-W36
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 10/5/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	10/1/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2465
Serial Number:	36458	Standard Count: Moisture:	713

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 15	26-00938-W31-S1	12	121.2	3.1	-7.9	117.6	98.2	≥95	OK
2	CF 16	26-00938-W31-S1		124.3	3.0	-8.0	120.7	100.8	≥95	OK
3	CF 17	26-00938-W31-S1		121.5	4.1	-6.9	116.7	97.5	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 15	862442.6 N, 2031433.2 E, Elev: 1007.4	1007.4'	Elevation
2	CF 16	865366.3 N, 2030767.6 E, Elev: 1004.8	1004.8'	Elevation
3	CF 17	865387.3 N, 2031839.7 E, Elev: 1006.1	1006.1'	Elevation

Comments

Legend

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Field Density Test Report

Report No: ND:26-00938-W37
Issue No: 1

Client: VEIT & COMPANY INC.
CC: Dan Riggs, Mitch Sumstad

Project: 26-00938
2015 Sherco Ash Construction Project

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Date of Issue: 10/5/2015
Reviewed By: GENE ERZAR
Engineering Assistant

Testing Details

Tested By:	GARRETT DEICK		
Date Tested:	10/5/2015		
Field Methods:	ASTM D 6938		
Gauge Type:	Troxler 3440 (Nuclear Density Gauge)	Test Mode:	Direct Transmission
Model Number:	3440	Standard Count: Density:	2471
Serial Number:	36458	Standard Count: Moisture:	707

Proctor Information

Sample ID	Material	Method	MDD (lb/ft³)	OMC (%)
26-00938-W31-S1	Sand w/ Silt, a little gravel, fine to medium grained, brown (SP-SM)	ASTM D 698 (A)	119.7	11.0

Test Results

Test No.	Field Sample ID	Proctor Sample ID	Probe Depth (in.)	Wet Density (lb/ft³)	Moisture Content (%)	OMC Var	Dry Density (lb/ft³)	Comp (%)	Comp Spec	Results
1	CF 18	26-00938-W31-S1	12	122.6	3.5	-7.5	118.5	99.0	≥95	OK
2	CF 19	26-00938-W31-S1		124.5	3.7	-7.3	120.1	100.3	≥95	OK

Location

General Location: Pond 3 Random Fill

Test No.	Field Sample ID	Location	Test Elev/Depth	Material/Layer
1	CF 18	864293.9 N, 2031986.6 E, Elev: 1007.3	1007.3'	Elevation
2	CF 19	1007.1, Elev: 1007.3	1007.3'	Elevation

Comments

Legend

OMC = Optimum Moisture Content
MDD = Maximum Dry Density
OK = All Results Meet Specification

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Appendix G - Turf Establishment Information

Fertilizer Tag and Seed Mix Tag
Erosion Control Blanket Spec. Sheet

Fertilizer Tag and Seed Mix Tag

Net Weight 50 lb. / 22.68 kg.

FMX TURF

6-24-24

Guaranteed Analysis

Total Nitrogen(N).....6%
6% Ammoniacal Nitrogen
Available Pophosphate(P_2O_5).....24%
SolublePotash(K_2O).....24%

Plant Nutrients Derived From

Diammonium Phosphate, and Muriate of Potash

Directions for Use

6-24-24 can be applied at anytime during the growing season except when the weather is extremely hot. Applying 4.65lbs per 1000 sq. ft will provide 50lbs of P and 50lbs. K per acre.

Fertilizer may cause irritation of eyes nose,throat and skin. In case of contact with skin or eyes,flush with plenty of water. For eyes get medical attention.

Manufacturer and Guarantor

Farmers Mill & Elevator Inc.

D/B/A FMX Turf

27920 Danville Ave. Castle Rock,MN 55010 1-800-645-5648

Approved Seed Vendor

The supplier warrants at the time of shipment that the seed contained in this package meets current requirements as specified in the Minnesota Department of Transportation Technical Memorandums, Special Provisions and Standard Specifications for Construction.

VERIFICATION:
Minnesota Crop Improvement Association verifies that the seed supplier has been approved to supply seed for Minnesota Department of Transportation projects.

NOTICE TO BUYER:
EXCLUSION OF WARRANTIES AND LIMITATIONS OF DAMAGES
The foregoing verification is in lieu of all other warranties, expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. There are not warranties which extend beyond the description on the face hereof. In no case shall Minnesota Crop Improvement Association be liable for any actual, special, incidental or consequential damages for any cause, including breach of contract, breach of warranty, negligence, or any other legal theory, with respect to the sale of this product.

№ 59315

MCIA™ MINNESOTA CROP IMPROVEMENT ASSOCIATION

1900 Hendon Ave
St. Paul, MN 55108

MN 25-121 AGASSIZ SEED 3660 KENNEBEC DR EAGAN MN LOT 315096

KIND	PURITY	GERM	HS	TOTALGERM	ORIGIN
SMOOTH BROME*	12.07%	91%		91%	KS
SLENDER WHEATGRASS*	3.14%	97%		97%	CAN
HARD FESCUE*	6.88%	80%		80%	OR
PERENNIAL RYEGRASS*	22.07%	82%		82%	NZ
PARK KY BLUEGRASS	26.04%	87%		87%	MN
SHEEPS FESCUE*	12.64%	92%		92%	OR
SWITCHGRASS*	2.43%	20%	75%	95%	CAN
LITTLE BLUESTEM*	1.99%	25%	70%	95%	MN
SNAKE RIVER SAND DROPSEED	2.44%	94%		94%	WA
MN PURPLE PRAIRIE CLOVER	.81%	33%	65%	98%	MN
RED CLOVER*	7.33%	85%	05%	90%	MN

CROP 0.01% INERT 1.97 WEEDS 0.12% NOXIOUS 0.00% *DENOTE
VARITY NOT STATED TEST 8/14 NET WT 50LBS TOTAL PLS WT 41.91LBS
THIS BAG WILL SEED 29,928SQFT @ 61PLS LB PER ACRE
APPLY AT 72.78 BULK LBS

WARRANTY: Seller warrants to the purchaser that the seeds described on the tag are sold within recognized tolerances. Seller gives no further warranties of the seed, express or implied, of merchantability or fitness for any particular purpose, nor any other warranty against loss of yield or for any reason or cause, including environmental conditions. The parties agree the buyer's sole and exclusive remedy against Seller is the purchase price of the seed, and that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any incidental or consequential loss) shall be available to the purchaser. The parties further agree the purchaser may return seed within fifteen (15) days after purchase for refund of the purchase price and, unless this seed is returned within (15) days, the purchaser accepts these terms

Erosion Control Blanket Spec. Sheet

Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

Material and Performance Specification
S150 Erosion Control Blanket

Description

The short-term double net erosion control blanket shall be a machine-produced mat of 100% agricultural straw with a functional longevity of up to 12 months. (NOTE: functional longevity may vary depending upon climatic conditions, soil, geographical location, and elevation). The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top and bottom sides with a lightweight photodegradable polypropylene netting having an approximate 0.50 x 0.50 (1.27 x 1.27 cm) mesh. The blanket shall be sewn together on 1.50 inch (3.81 cm) centers with degradable thread. The blanket shall be manufactured with a colored thread stitched along both outer edges (approximately 2-5 inches [5-12.5 cm] from the edge) as an overlap guide for adjacent mats.

The S150 shall meet Type 2.D specification requirements established by the Erosion Control Technology Council (ECTC) and Federal Highway Administration's (FHWA) *FP-03 Section 713.17*

Index Property	Test Method	Typical
Thickness	ASTM D6525	0.36 in (9.14 mm)
Resiliency	ECTC Guidelines	80.5%
Water Absorbency	ASTM D1117	514%
Mass/Unit Area	ASTM 6475	10.52 oz/yd^2 (357.7 g/m^2)
Swell	ECTC Guidelines	15%
Smolder Resistance	ECTC Guidelines	Yes
Stiffness	ASTM D1388	6.06 oz-in
Light Penetration	ECTC Guidelines	9.8%
Tensile Strength –MD	ASTM D6818	169.2 lbs/ft (2.51 kN/m)
Elongation – MD	ASTM D6818	17.2%
Tensile Strength – TD	ASTM D6818	164.4 lbs/ft (2.44 kN/m)
Elongation – TD	ASTM D6818	33.1%

Material Content		
Matrix	100% Straw Fiber	0.5 lbs/yd^2 (0.27 kg/m^2)
Netting	Top and Bottom Nets, lightweight photodegradable	1.5 lb/1000 ft^2 (0.73 kg/100 m^2) approx. weight
Thread	degradable	

Maximum Permissible Shear Stress	
Unvegetated Shear Stress	1.75 lbs/ft^2 (84 Pa)
Unvegetated Velocity	6.00 ft/s (1.83 m/s)

Standard Roll Sizes			
Width	6.67 ft (2.03 m)	8.0 ft (2.4 m)	16.0 ft (4.87 m)
Length	108 ft (32.92 m)	112 ft (34.14 m)	108 ft (32.92 m)
Weight ± 10%	40 lbs (18.14 kg)	50 lbs (22.68 kg)	96 lbs (43.54 kg)
Area	80 yd^2 (66.9 m^2)	100 yd^2 (83.61 m^2)	192 yd^2 (165.5 m^2)

Slope Design Data: C Factors			
	Slope Gradients (S)		
Slope Length (L)	≤ 3:1	3:1 – 2:1	≥ 2:1
≤ 20 ft (6 m)	0.004	0.106	NA
20-50 ft	0.062	0.118	NA
≥ 50 ft (15.2 m)	0.12	0.180	NA

Roughness Coefficients- Unveg.	
Flow Depth	Manning's n
≤ 0.50 ft (0.15 m)	0.055
0.50 – 2.0 ft	0.055 – 0.021
≥ 2.0 ft (0.60 m)	0.021

Bench Scale Testing (NTPEP)		
Test Method	**Parameters**	**Results**
ECTC 2 Rainfall	50 mm (2 in)/hr-30 min 100mm (4 in)/hr-30 min 150 mm (6 in)/hr-30 min	SLR** = 8.04 SLR** = 10.46 SLR** = 13.67
ECTC 3 Shear Res.	Shear at 0.50 inch soil loss	2.1lbs/ft^2
ECTC 4 Germination	Top Soil, Fescue, 21 day incubation	484% improvement of biomass

* Bench Scale tests should not be used for design purposes
** Soil Loss Ratio = Soil Loss Bare Soil/Soil Loss with RECP

Proud Participant of:

Tensar International Corporation warrants that at the time of delivery the product furnished hereunder shall conform to the specification stated herein. Any other warranty including merchantability and fitness for a particular purpose, are hereby executed. If the product does not meet specifications on this page and Tensar is notified prior to installation, Tensar will replace the product at no cost to the customer. **This product specification supersedes all prior specifications for the product described above is and is not applicable to any products shipped prior to January 1,**