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Mud Management**

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Engineering Certification Report

Sundance West Mud Management Facility and Liner System

Prepared for Sundance Services, Inc.

April 27, 2020



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Table of Contents

Section	Page
1. Introduction	1
1.1 Project Overview	2
1.2 Report Organization	4
1.3 Qualifications of Professional Engineer Licensed in New Mexico	4
2. Mud management Construction	4
2.1 Summary	4
2.2 Subgrade Preparation	5
2.2.1 Clearing, Grubbing and Mass Excavation	5
2.2.2 Coordinate System	6
2.2.3 Subgrade Compaction	6
2.2.4 Subgrade Acceptance	7
2.3 Geosynthetic Clay Liner	7
2.3.1 Manufacturing Quality Control and Manufacturing Quality Assurance	8
2.3.2 Conformance Testing	8
2.3.3 Geosynthetic Clay Liner Installation	8
2.3.4 Geosynthetic Clay Liner Deployment Records	9
2.4 Flexible Membrane Liner	9
2.4.1 Manufacturing Quality Control and Manufacturing Quality Assurance	10
2.4.2 Conformance Testing	10
2.4.3 Flexible Membrane Liner Installation	11
2.4.4 Trial Welds	11
2.4.5 Construction Quality Assurance	12
2.4.6 Non-Destructive Seam Testing	12
2.4.7 Destructive Seam Testing	12
2.4.8 Liner Deployment Records	13
2.4.9 Archived Samples	13
2.5 Geocomposite	13
2.5.1 Manufacturing Quality Control and Manufacturing Quality Assurance	13
2.5.2 Geocomposite Liner Installation	14
2.5.3 Construction Quality Assurance	15
2.5.4 Liner Deployment Records	15
2.6 Leachate Collection System	15
2.7 Protective Soil Layer	16
2.8 Tank Battery and Installation	18
3. Certification Statement	19



List of Figures

Figure

- 1 Subgrade Density Measurement Locations
- 2 Protective Soil Layer Density Measurement Locations

List of Tables

Table

Page

- | | |
|---|----|
| 1 Grain Size Analyses Results for Protective Soil Layer Material..... | 16 |
|---|----|

List of Appendices

Appendix

- A Drawings
- B Daily Field Reports and Photographs
- C Subgrade Material Testing
- D GCL Certifications
- E Daily Subgrade Acceptance Forms
- F Panel Deployment and Seaming
- G FML Certifications
- H Leachate System Certifications
- I Protective Soil Layer Material Testing
- J Concrete Placement and Testing Results



Engineering Certification Report

Sundance West Mud Management Facility and Liner System

1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this certification report for the Sundance West Mud Management Facility and Liner System (the facility) on behalf of Sundance Services, Inc. (SDW) to provide documentation of inspection and testing during liner, leachate collection system, and concrete construction. The report has been prepared for submittal to the New Mexico Energy, Minerals and Natural Resources Oil Conservation Division (OCD) to document that construction of the mud management component of the commercial surface waste management facility for oil field waste is in conformance with the approved quality control (QC) plan and applicable regulations (19.15.36 NMAC).

Onyx Construction Company, Inc. (Onyx) of Midland, Texas was awarded the construction contract for the project. Maverick Engineering was contracted as the principal engineer. On Site Structural Engineering of Odessa, Texas was contracted as the structural engineer and was responsible for all rebar and concrete design.

As the general contractor, Onyx performed earthwork in spring 2019 for construction of the facility. Other site work associated with the facility included installation of leachate collection piping and collection sumps, and grading of protective soil layer (PSL). Falcon Environmental Liner Systems, Inc. (Falcon) was subcontracted by Onyx to install the geosynthetic clay liner (GCL), high-density polyethylene (HDPE) flexible membrane liner (FML), and geonet under each of the facilities. MHAT, LLC (MHAT) was subcontracted to provide rebar and concrete installation. Blakely Construction, Inc. (Blakely) was responsible for the tank and associated plumbing installation. Beyond Engineering (Beyond) was contracted by Onyx to perform as-needed subgrade density measurements, as well as concrete air, slump, air content, and break testing.

DBS&A was on-site to observe, inspect, and record liner and concrete installation procedures. In this certification report, the term Engineer refers to the DBS&A quality assurance (QA)



certifying engineer and field staff acting under his direct supervision. The term Contractor refers to the QC representative and QC personnel, all of whom are representatives of the Contractor.

1.1 Project Overview

The Sundance West Mud Management Facility is located at 42 Sundance Lane, Eunice, New Mexico 88231. Construction activities were completed from February 2019 through December 2019. DBS&A performed on-site construction observation and construction quality assurance (CQA) activities. The primary construction and CQA activities for the mud management facility included the following:

- Liner subgrade preparation
 - Monitoring of surface conditions
 - Horizontal and vertical survey control
 - Soil suitability testing
 - Compaction of subgrade materials
- GCL source control and installation
 - GCL source control
 - GCL installation
 - Seaming/overlapping procedures
- HDPE FML source control and installation
 - FML source control
 - FML installation
 - Seam testing
- Geonet source control and installation
 - Geonet source control
 - Geonet installation



- Leachate collection and removal system installation
 - Line and grade control
 - Materials verification
- Liner PSL placement
 - Soils suitability testing
 - PSL thickness survey
- Rebar and concrete installation
- Processing tank and pump installation

The purpose of the CQA work was to document that construction activities performed at the facility comply with the QC plan and regulatory requirements. Engineering design plans, technical specifications, field observations, and tests were used to provide quantitative criteria with which to evaluate the final installation. The Engineer was responsible for a variety of CQA activities, including the following:

- Reviewing survey results to confirm compliance with design grades and elevations
- Measuring subgrade densities
- Observing liner installation procedures
- Observing liner material seaming and testing procedures
- Observing leachate collection system and PSL installation
- Reviewing documentation, including laboratory and field test results
- Observing concrete placement and slump testing
- Observing installation of tanks and operational components
- Providing this engineering certification of completed construction



1.2 Report Organization

This certification report describes the CQA activities and procedures performed during the construction of the Sundance West Mud Management Facility. The appendices to this report provide appropriate construction documentation. Project drawings are provided in Appendix A. Daily field reports and photographs are provided in Appendix B. Subgrade material testing and testing of the protective soil layer are included in Appendices C and I. Liner material and deployment data are included in Appendices D through H. Concrete placement and testing data are included in Appendix J.

1.3 Qualifications of Professional Engineer Licensed in New Mexico

DBS&A's QA certifying engineer is Gundar Peterson, P.E., who is a licensed professional engineer in the State of New Mexico.

2. Mud Management Construction

2.1 Summary

The Sundance West Mud Management Facility and Liner System was constructed immediately adjacent to the previously constructed evaporation ponds. The total project area is approximately 5.8 acres and consists of five distinct components.

- *Area A, Mud dry out facility:* The mud dry out facility is a 400-foot by 450-foot concrete pad used for separation of liquids from received muds.
- *Area B, Mud jet out facility:* Consists of two 160-foot by 110-foot concrete pads sloped toward a central flume to facilitate collection of fluids from vehicle jet out.
- *Area C, Sump A:* 100-foot by 100-foot central concrete pad with a 17.6-foot concrete wall. Fluids from Areas A and B collect in the central sump and are pumped up to the processing facility in Area D. The Area C sump has a service ramp to allow equipment access for removal of solids.



- *Area D, Oil/water process:* Consists of a 200-foot by 60-foot double-lined tank battery area with bermed containment.

Mass excavation, fine grading of the subgrade, stormwater berm construction, leachate collection system piping, and placement of the PSL was conducted by Onyx. Falcon installed the GCL, FML, and geonet. MHAT was contracted to perform the rebar and concrete pours. Blakely performed tank and plumbing installation. CQA activities and laboratory soil testing were conducted by DBS&A.

Onyx crews began excavation activities in February 2019. These activities included removing and stockpiling existing borrow material placed on location from the excavation/construction of the neighboring evaporation ponds. Facilities were graded and compacted to the specifications of the grading plan in Appendix A. GCL and FML installation activities were performed on the Area A, B, and C facilities from May 7 to June 13, 2019. Liner operations were resumed in Area D on August 22 and 23 after backfilling was completed along the south end of the Area C sump wall. Construction of the leachate collection system including collection piping and geocomposite; it was performed continuously as each lined section was completed and approved by the Contractor and Engineer. Onyx placed PSL on top of the liner system in preparation for concrete placement. MHAT crews worked behind Onyx to tie rebar and place concrete from June 20 through November 19, 2019. Tank installation was conducted in Area D from August to November 2019.

2.2 Subgrade Preparation

The following subsections describe the activities performed during subgrade preparation, observation, and CQA testing. The subgrade finished grades and elevations conform to the approved permit drawings and QC plan.

2.2.1 Clearing, Grubbing and Mass Excavation

Sundance West began clearing, grubbing, and excavation of the mud management facility in 2017 in conjunction with the excavation performed for the adjacent evaporation ponds, which were completed in 2018. Mass excavation of the facility resumed in February 2019 and was



completed by September 2019. During this time frame, Onyx stockpiled, reworked, graded, and compacted excavated material to construct the subgrade for the mud management facility.

2.2.2 Coordinate System

Onyx contracted Maverick (the design engineer) to conduct surveys of each of the major facilities, including Areas A, B, and C, throughout excavation. Survey data were provided from subgrade construction staking and completion and are included in Appendix A. Surveys on the liner after installation and on the PSL before concrete was placed were conducted as needed by Onyx. Final surveys are provided in the construction drawings in Appendix A.

The locations of facility corners were staked out and marked as to be readily discernible by the Contractor and Engineer. This staking system consisted of stakes and flagging projecting the limits of the Area A, B, C, and D facilities. The construction limits of each facility were staked out by Onyx and Maverick and surveyed using an on-site total station based on design drawings and the needs of SDW.

2.2.3 Subgrade Compaction

The existing topography was contoured by Onyx to the subgrade elevations shown on the drawings (Appendix A). The upper 6 inches of subgrade were then scarified, compacted to a minimum 90 percent of the maximum dry density as determined by standard proctor (ASTM D698), and brought to the finished grade.

Field density testing was performed using a Troxler[®] 3440 Moisture-Density Gauge at a minimum frequency of four tests per acre per 6-inch lift for confirmation of subgrade density. Onyx contracted Beyond to provide as-needed baseline density measurements throughout construction to guide in compaction or to confirm compaction after repairs were made during rain events. Appendix C3 provides Beyond's density measurement reports from February through May 2019. DBS&A was also on-site during each phase of construction to conduct density measurements. The facility required a minimum of 22 tests for the ±5.8-acre footprint. An average density of 117.3 pounds per cubic foot (lb/ft³) was used as the reference standard proctor value.



DBS&A visited the site five times to view subgrade compaction of Areas B and C during grading, and took initial density readings on March 27 and 28, April 2 and 25, and May 1, 2019. On May 6, 2019, 17 density tests were conducted to confirm that dry density was 90 percent of the average proctor or higher before giving approval for liner installation; a grid was established before measuring to ensure adequate coverage. DBS&A measured preliminary subgrade compaction of Area A on May 1, 2019. On May 24, 2019, 16 density tests were conducted before liner installation approval. DBS&A returned on August 22, 2019 to conduct 4 density measurements in Area D. Density tests were also conducted at the anchor trenches around the perimeter of each facility.

The anchor trench density tests consisted of six locations extending the length of the anchor trench. A total of 118 density tests were conducted, including the preliminary subgrade measurements, the pre-construction density confirmation measurements, and the density testing along the anchor trenches; all met or exceeded the required specification of 90 percent of the reference standard proctor. Test locations are provided on Figure 1; measurement results are reported in Appendix C2.

2.2.4 Subgrade Acceptance

Subgrade was inspected upon completion in multiple stages. Upon completion of subgrade construction, each component of the mud management system was surveyed by Maverick (Appendix A, Sheet C210). The topography of the subgrade was then verified and approved by the Engineer prior to liner deployment. Sheets C126 and C210 of the drawings (Appendix A) provide the subgrade as-built grades and elevations.

2.3 Geosynthetic Clay Liner

Approximately 303,308 square feet of BentoLiner NWL GCL was used in the construction of the lined mud management facility. This material is a nonwoven, needle-punched, scrim-reinforced composite GCL material manufactured by GSE Lining Technology, Inc. of Houston, Texas.



2.3.1 Manufacturing Quality Control and Manufacturing Quality Assurance

Prior to delivery of the GCL, copies of the manufacturer's QA/QC test results and certifications were provided to and reviewed by the Engineer. The Engineer determined that the materials met or exceeded the minimum properties specified for all GCL used for the project. Manufacturer's QA/QC test results and certifications are provided in Appendix D1. During offloading of the GCL, the Engineer verified the GCL roll numbers against the GCL inventory control log (Appendix D2). The documentation provided by the manufacturer included the following:

- Daily production certification
- GCL property specifications
- Roll allocation lists
- GCL QC test results
- Bentonite clay certifications
- Raw material test results

2.3.2 Conformance Testing

With the Engineer's approval, conformance samples were collected from random rolls of GCL at the manufacturer's production facilities prior to shipment to the construction site. TRI Environmental, Inc. (TRI) of Austin, Texas was employed for independent laboratory testing. Conformance samples were collected at a frequency of at least one per 100,000 square feet of GCL. Approximately 303,000 square feet of GCL was installed, requiring three conformance samples. TRI analyzed six conformance samples for mass per unit area (ASTM 5993), Bentonite - Swell Index (ASTM D5890) and Bentonite - Fluid Loss (ASTM D5891). Based on the independent laboratory results, the Engineer approved the delivered GCL for installation. The results of the laboratory testing are provided in Appendix D3.

2.3.3 Geosynthetic Clay Liner Installation

Prior to the start of daily installation activities, the Engineer, Contractor, and Owner inspected the site and confirmed that the subgrade surface was free of stones greater than ½ inch in any dimension, organic matter, surface irregularities, protrusions, loose or uncompacted areas, and



abrupt changes in grade that could damage the liner system. Daily subgrade acceptance forms are provided in Appendix E.

Deployment of the panels was accomplished using a rough terrain forklift, pull-line, pull vehicle, and manual labor. As each roll was deployed, the label was first recorded by the Contractor, and then removed and submitted to the Engineer for documentation in the GCL deployment log (Appendix F1). Material placed was inspected by the Engineer for damage due to handling or installation. The Engineer observed that GCL field seams were oriented parallel to the line of maximum slope, that the number of field seams in corners and irregular shaped areas were minimized, and that no horizontal seams were within 5 feet of the toe of slope.

After each roll had been deployed, adjoining rolls were positioned with a 6-inch minimum longitudinal overlap on the floor and the portions of the sideslopes covered with the PSL. End of roll seams were positioned with a minimum 12-inch overlap on the floor and 24-inch overlap on the portions of the sideslopes covered with PSL. Powdered bentonite was applied between panels at each seam. The panels were permanently anchored by trenches filled with soil and compacted at the top of the slope. Damaged portions of GCL were repaired using a GCL patch that provided a minimum 12-inch overlap on all sides of the defect, with powdered bentonite applied to the seams.

2.3.4 Geosynthetic Clay Liner Deployment Records

Documentation of the GCL deployment and CQA review of each panel was required prior to approval and acceptance. The GCL installation was not accepted until the deployment records and manufacturer's certification reports were submitted to and approved by the Engineer.

2.4 Flexible Membrane Liner

An FML was placed on top of the GCL. The FML consisted of approximately 383,000 square feet of 60-mil single-side-textured HDPE liner. Liner materials were manufactured by GSE Lining Technology, Inc. of Houston, Texas. The FML was delivered to the site in rolls that were 22.5 feet wide by 540 feet long, and was stored in a staging area adjacent to the Area C sump.



2.4.1 Manufacturing Quality Control and Manufacturing Quality Assurance

Prior to delivery of the FML, copies of the manufacturer's and resin supplier's QC test results and certifications were submitted to the Engineer for review and approval. Based on the manufacturer's submitted certifications and test results, the FML was approved for delivery to the site. Manufacturer's quality test results and certifications are provided in Appendix G1. During offloading of the FML, the Engineer verified the FML roll numbers against the geomembrane inventory control log (Appendix G2). The documentation provided by the manufacturer included the following:

- Thickness, ASTM D5994
- Asperity height, ASTM D7466
- Density, ASTM D1505
- Tensile properties, ASTM D6693
- Tear resistance, ASTM D1004
- Carbon black content, ASTM D4218
- Carbon dispersion, ASTM D5596

2.4.2 Conformance Testing

With the Engineer's approval, conformance samples were collected in accordance with ASTM D4354 from random FML rolls at the manufacturer's production facilities prior to shipment to the construction site. TRI was employed for independent laboratory testing. Conformance samples were collected at a frequency of at least one per 100,000 square feet of each type of liner to confirm that the FML delivered to the site conformed to the minimum technical specifications required. A total of five conformance samples were collected and tested. Based on the independent laboratory results, the Engineer approved the delivered FML for installation. The results of the laboratory conformance testing are presented in Appendix G3. Conformance testing for the FML included the following:

- Thickness, ASTM D5994
- Asperity height, ASTM D7466
- Density, ASTM D1505



- Tensile properties, ASTM D6693
- Tear resistance, ASTM D1004
- Carbon black content, ASTM D4218
- Carbon dispersion, ASTM D5596

2.4.3 Flexible Membrane Liner Installation

Deployment of the FML panels was accomplished using a rough terrain forklift, pull-line and pull vehicle, and manual labor. Upon FML deployment, the Contractor and Engineer recorded the roll number, panel number, and location on the geomembrane deployment log (Appendix F2). The FML panel layout with the seam, repair, and test locations is provided in Appendix F7.

After each FML panel had been placed, adjoining panels were positioned with a 4- to 6-inch overlap required for hot-wedge fusion welding. The panels were permanently anchored in trenches filled and compacted with soil at the top of the slope. The textured FML was installed with a minimum 10-foot run-out from the toe of sideslope onto the cell floor. The Engineer observed placement activities to verify that the deployment and seaming procedures were performed in accordance with project specifications, including subgrade inspection, seam cleaning, and precautions against potential liner damage. The Engineer observed that all FML field seams were oriented parallel to the line of maximum slope, and that the number of field seams in corners and irregular shaped areas was minimized.

2.4.4 Trial Welds

Each of the fusion and extrusion welders were required to perform trial welds prior to the start of each welding period and after down periods greater than one hour in length. Trial welds were performed on excess liner material and cut into 1-inch coupons. The coupons were tested in the field using a tensiometer. Fusion welds were tested for peel and shear strength to check for machine failures or welder errors. Fusion weld tests were considered passing when both the peel and shear measurements exceeded 98 pounds per inch (lb/in) and 121 lb/in, respectively. Trial weld testing was performed in the presence of the Engineer. Additionally, the Contractor tested 1-inch coupons of extrusion welds for inside peel and shear strength; measurements exceeded 98 lb/in and 121 lb/in, respectively. Trial weld documentation is provided in



Appendix F3. The Engineer's written authorization is found on the daily subgrade acceptance forms in Appendix E.

2.4.5 Construction Quality Assurance

The Engineer and Contractor visually inspected all material for manufacturing and installation defects. The primary seaming method used for joining FML panels was an automated double-track fusion welder. Extrusion welding was used for patches, repairs, intersections of fusion seams, and seam reconstruction. Monitoring of the seaming methods consisted of periodic visual observation of the seaming process, visual examination of the completed seam, and verification that the seam was welded for its entire length. Seaming imperfections were marked and subsequently repaired in accordance with the project QC plan. Geomembrane repair logs are provided in Appendix F5. Repair locations are noted on the FML panel layout drawing in Appendix F7.

2.4.6 Non-Destructive Seam Testing

Integrity of seams, repairs, and patches was non-destructively tested by the Contractor in accordance with ASTM D5641 and D5820 using air pressure. For double-tracked fusion welds, seams were isolated and pressurized to ± 30 pounds per square inch (psi) and observed for a decrease in pressure for a period of 5 minutes. Extrusion welds were applied in areas of destructive seam tests and in select locations where T-seams were present or repairs were required. To test the extrusion welds, a soap solution was applied and a clear vacuum box was placed on top to allow crews to find leaks. Field testing was performed by the Contractor in the presence of the Engineer. The results of non-destructive seam testing are provided in Appendix F4. All welds passed non-destructive tests and no repairs were required.

2.4.7 Destructive Seam Testing

In accordance with the project specifications, a minimum of 1 destructive test for every 500 linear feet of welded seam or as the Engineer directed was performed on the FML. A total of 34 tests were conducted during installation of each area in accordance with the QC plan. Each destructive test sample was divided into three segments: (1) a segment tested in the field for peel and shear strength by the installer, (2) a segment shipped to TRI for laboratory testing, and (3) a segment retained by the Engineer and delivered to the Owner to be archived at the



site. All of the 34 destructive tests passed field and laboratory testing. Results of the field and laboratory destructive tests are provided in Appendices F3 and F6, respectively.

2.4.8 Liner Deployment Records

Documentation for liner deployment and testing of each area was required prior to liner approval and acceptance. Each submittal for the lined area included the following:

- Geomembrane deployment log (Appendix F2)
- Start-up weld test and geomembrane destructive test log (Appendix F3)
- Geomembrane seam and pressure test log (Appendix F4)
- Geomembrane laboratory destructive test results (Appendix F6)

The FML installation was accepted after these data were submitted to, reviewed by, and approved by the Engineer. The as-built FML panel layout for the mud management facility is provided Appendix F7.

2.4.9 Archived Samples

As required by the project specifications, 34 destructive test samples of the seams were obtained. These samples were then cut into three sections, as described in Section 2.4.7. The Owner's archived samples are retained at the DBS&A offices.

2.5 Geocomposite

A layer of 200-mil geocomposite was placed on top of the FML. The geocomposite consisted of approximately 370,000 square feet of GSE FabriNet 200-mil geocomposite. Liner materials were manufactured by GSE Lining Technology, Inc. of Houston, Texas. The geocomposite was delivered to the site in rolls that were 14.75 feet wide by 300 feet long, and was stored in a staging area adjacent to the Area C sump.

2.5.1 Manufacturing Quality Control and Manufacturing Quality Assurance

Prior to delivery of the geocomposite, copies of the manufacturer's and resin supplier's QC test results and certifications were submitted to the Engineer for review and approval. Based on the



manufacturer's submitted certifications and test results, the geocomposite was approved for delivery to the site. Manufacturer's quality test results and certifications are provided in Appendix G4. During offloading of the geocomposite, the Engineer verified the geocomposite roll numbers against the geomembrane inventory control log (Appendix G5). The documentation provided by the manufacturer included the following:

- Thickness, ASTM D5199
- Tensile properties, ASTM D4632
- Density, ASTM D1505
- Carbon black content, ASTM D4218
- Ply Adhesion Average, ASTM D7005

2.5.2 Geocomposite Liner Installation

Deployment of the geocomposite panels was accomplished using a rough terrain forklift, pull-line and pull vehicle, and manual labor. Upon geocomposite deployment, the Contractor and Engineer recorded the roll number, panel number, and location on the geomembrane deployment log (Appendix F8). After each geocomposite panel had been placed, adjoining panels were positioned alongside one another and fastened together using zip-ties provided by the manufacturer. The upper geosynthetic fabric layer was seamed together using a combination heat gun tacking and fusion track welds operating at low temperatures. The panels were permanently anchored in trenches filled and compacted with soil at the top of the slope. The geocomposite was installed with a minimum 10-foot run-out from the toe of sideslope onto the cell floor. The Engineer observed placement activities to verify that the deployment and seaming procedures were performed in accordance with project specifications, including subgrade inspection, seam cleaning, and precautions against potential liner damage. The Engineer observed that all geocomposite field seams were oriented parallel to the line of maximum slope, and that the number of field seams in corners and irregular shaped areas was minimized.



2.5.3 Construction Quality Assurance

The Engineer and Contractor visually inspected all material for manufacturing and installation defects. The primary seaming method used for joining geocomposite panels was the use of evenly spaced zip-ties tying the geonet layers together; the attached geosynthetic fabric layer was tacked together using a heat gun and seamed together using a fusion track weld at low temperature. Heat guns were used to weld patches, and for repairs, intersections of fusion seams, and seam reconstruction. Monitoring of the seaming methods consisted of periodic visual observation of the seaming process, visual examination of the completed seam, and verification that the seam was welded for its entire length. Seaming imperfections were marked and subsequently repaired in accordance with the project QC plan.

2.5.4 Liner Deployment Records

Documentation for liner deployment and observation of each area was required prior to liner approval and acceptance. Documentation included the geocomposite deployment log (Appendix F8). The geocomposite installation was accepted after these data were submitted to, reviewed by, and approved by the Engineer and Contractor.

2.6 Leachate Collection System

A leachate collection system was installed along the downgradient perimeter of Areas A, B, and C. The collection system consists of a 6-inch SDR 11 perforated HDPE pipe, surrounded by select aggregate. The select aggregate consists of washed gravel with gradation varying from 1 inch to 1½ inches in diameter. The perforated pipe and selected aggregated were wrapped with a 10-ounce per square yard (oz/yd²) non-woven geotextile. The leachate collection systems drain with a minimum 2 percent slope to the collection sumps. Appendix H provides the select aggregate testing results and material certifications used for construction of the leachate collection system. The centerline and slope of the leachate collection pipe and elevations of bottom of the leachate collection sump and the top of the temporary riser were surveyed and are included as part of the final drawing in Appendix A. Approximately 40,000 square feet of 10-oz/yd² geotextile fabric was installed in the leachate collection trenches. The Engineer reviewed the certifications and compared them to the technical specifications for geotextile fabric. The geotextile meets all technical specification requirements.



Leachate collection is facilitated in multiple locations along the east and west edges of Area A, the south edge of Area B, the southwest corner of Area C, and the west edge of Area D. Collection sumps are composed of 12-inch-diameter HDPE pipe covered by an HDPE cap.

2.7 Protective Soil Layer

Upon completion of the geomembrane liner installation and after confirmation that all repairs were adequately addressed, the cell floor and leachate collection system were covered with a minimum 2-foot thickness of the approved PSL. Material for the PSL was obtained from previously excavated material stockpiled adjacent to Area A. This material was determined to be free of particles greater than 1 inch in size, as well as organic matter.

A total of 6 samples were analyzed for grain size and hydraulic conductivity from the designated borrow source. The test results indicate that the PSL material meets the physical properties required by the QC plan and the applicable 19.15.36 NMAC standards. The test results are summarized in Table 1 and detailed in Appendix I.

Table 1. Grain Size Analyses Results for Protective Soil Layer Material

Specification	Protective Soil Layer (Average)
100% passing the 1-inch sieve	100%
≤5% by weight passing the No. 200 sieve	18.8%
Uniformity coefficient (C_u) < 6.0	51.3 ^a
Permeability (K_{sat}) ≥ 3.1×10^{-3} cm/s	2.2×10^{-3} cm/s

^a The particle size analysis was extrapolated for sample SDW-04 to allow estimation of D_{10} and to facilitate calculation of C_u .

The Engineer observed that the methods and material for PSL placement did not impact the previously installed liner system. The Contractor used a combination of 2-foot traffic cones and as-needed survey as a guide to ensure adequate thickness of PSL. The thickness of the PSL was variable and was based on the requirements of the grading plan for concrete placement; thicknesses ranged from 3 feet under the sump in Area C to more than 8 feet in Area A.



The existing topography was contoured by Onyx to the subgrade elevations shown on the drawings (Appendix A). The upper 6 inches of PSL was compacted to a minimum 90 percent of the maximum dry density as determined by standard proctor (ASTM D698), and was brought to the finished grade for concrete installation.

Field density testing was performed using a Troxler® 3440 Moisture-Density Gauge at a minimum frequency of 4 tests per acre per 6-inch lift for confirmation of PSL density. Onyx contracted Beyond to provide as-needed baseline density measurements throughout construction to guide in compaction or to confirm compaction after repairs were made during rain events. Appendix I2 contains copies of Beyond's density measurement reports from June 21 through October 31, 2019. DBS&A was also on-site during each phase of construction to conduct density measurements. The facility required a minimum of 22 tests for the ±5.8-acre footprint. An average density of 117.3 lb/ft³ was used as the reference standard proctor value.

DBS&A visited the site five times to view subgrade compaction of Areas B and C during grading and took initial density readings on June 11 through 18, 2019. On June 20, 2019, 38 density tests were conducted in Areas B and C; a grid was established before measuring to ensure adequate coverage. DBS&A performed 26 PSL compaction measurements before each concrete pour event in Area A. Measurements occurred on August 24, September 17, and November 5, 2019. The standard proctor results used for the average reference value are provided in Appendix I1a and I1b.

2.8 Concrete

Construction of the facility required the construction of concrete slabs and walls for the unloading areas (Area B, East and West), the mud dry out (Area A), and the sump (Area C). Before pouring concrete, the surface was prepared, footings were excavated, steel reinforcement was installed, and grades were established in accordance with the engineering specifications. Where needed, forms were set. Onyx had overall responsibility for completion of the project in accordance with the approved engineering specifications and drawings.



Concrete for this project was obtained from the PB Materials Eunice plant located less than 1 mile northeast of the facility. Two mixes were used for this project: a 3,000 psi mix for walls in the Area C sump and a 5,000 psi mix for the slabs and flumes. The approved formulas for these mixes are provided in Appendix J1.

DBS&A personnel were present to document the field testing and pouring of concrete for the major portions of the project, including the slabs in Area A, Area B East and West, and Area C, and the walls and counterforks in Area C. During each of these pours, DBS&A personnel completed the Concrete Receiving Form (Appendix J2). The form documents the volume of cement delivered to the site, the results of field testing by Beyond, and the time elapsed from the departure of the cement truck from the PB Materials plant to the end of discharge at the site. In most cases, the elapsed time was much less than 1 hour and often less than one-half hour.

MHAT was selected to construct the concrete portions of the facility. MHAT personnel excavated footings, installed reinforcement and forms, established grades, and poured and finished concrete in accordance with the engineering specifications.

Onyx contracted with Beyond to provide a geotechnical engineer to perform field testing of the concrete prior to emplacement. The Beyond engineer also collected samples for analyses performed at the Beyond laboratory in Midland, Texas.

The Onyx field supervisor worked with the Beyond field engineer to determine whether the concrete being delivered to the site was acceptable for the intended use. The decision whether to accept or reject the cement as delivered was ultimately made by Onyx and/or MHAT. In some cases, water was added to wet the mix or "Slump Buster" was added to increase the viscosity of the mix. Field and laboratory concrete test results performed by Beyond are provided in Appendix J3.

2.9 Tank Battery and Installation

The facility functions by processing fluid through a series of tanks installed in the Area D tank battery, which consists of a double-lined HDPE pad with compacted PSL covered with 1-inch



gravel with a bermed enclosure. The tanks include three 750-barrel (bbl) sludge tanks, two 1,000-bbl gun barrel tanks, five 750-bbl water tanks, and four 750-bbl oil tanks. The tanks were placed on a series of polyurethane tank pads. Onyx had overall responsibility for the completion of the project in accordance with the approved engineering specifications and drawings. Tanks for this project were obtained from Long Industries, Inc. located in Buffalo, Texas. Tank installation was performed by Blakely. Complete tank specifications and design information are included in Appendix A.

DBS&A personnel were present to observe and document the placement and installation of the PSL and the tank placement and layout, as well as to observe pressure testing of valves and seals. Photographic documentation of the installation is included in Appendix B2.

3. Certification Statement

This construction certification report for the Sundance West Mud Management Facility in Eunice, New Mexico was prepared by me and staff under my direct supervision. I certify that, to the best of my knowledge, the information contained in this report is accurate and the construction complies with the approved QC plan for Sundance West Mud Management Facility and 19.15.36 NMAC. I am a registered professional engineer in the State of New Mexico.

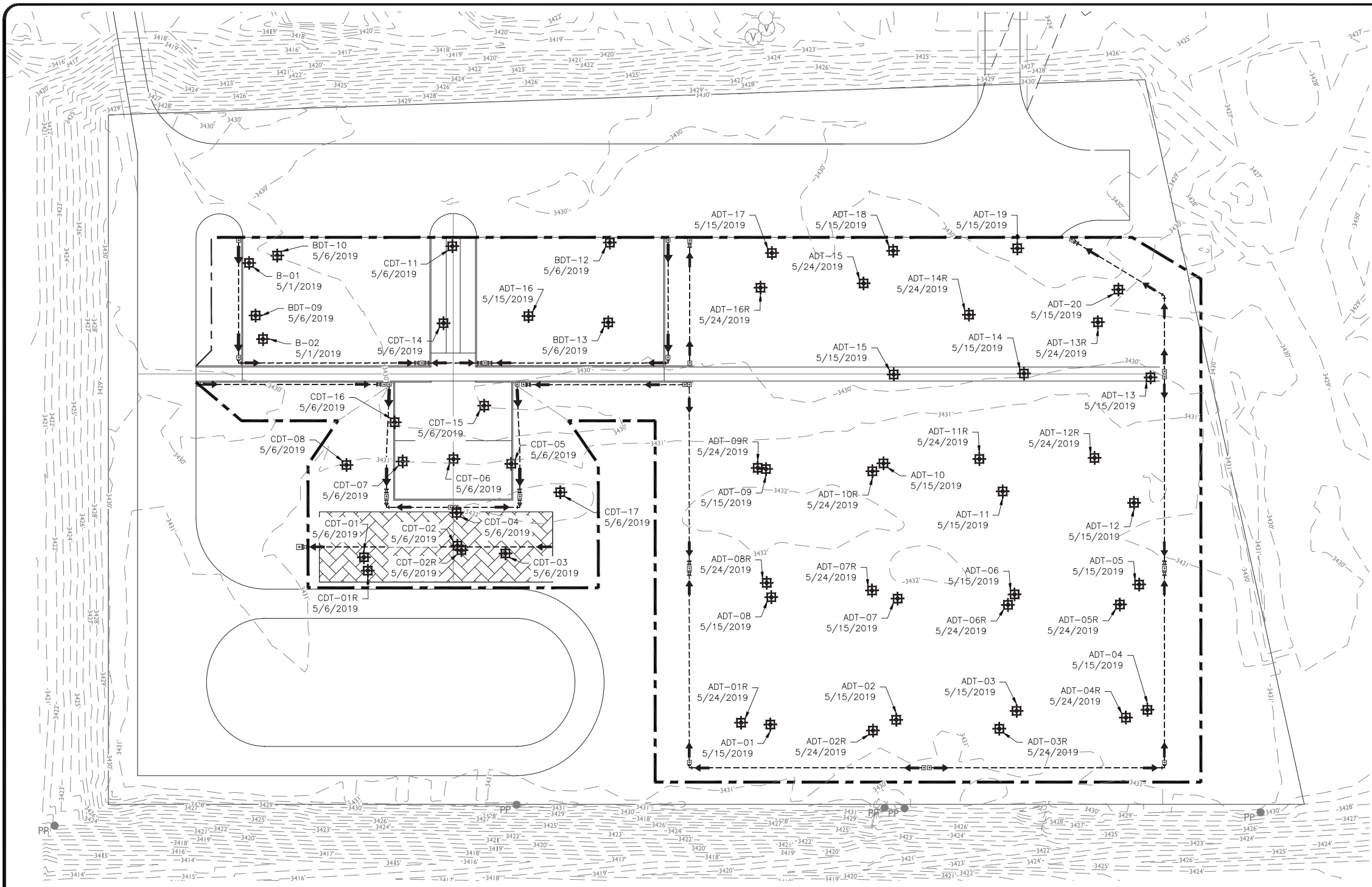
Gundar Peterson, P.E. No. 16038
Vice President/Senior Engineer
Daniel B. Stephens & Associates, Inc.



6/22/2020

Figures

S:\PROJECTS\DB18.1209_SUNDANCE_WEST\CAD\PRODUCTION\DENSITY TESTS - LOCATIONS AND RESULTS.DWG March 26, 2020 - 2:14 PM BY: THOMAS, RYAN



- Explanation**
- Facility boundary (approximately)
 - Leachate collection line
 - DM-1 Density test designation

Sources: BEARINGS, DISTANCES AND COORDINATES SHOWN ARE RELATIVE TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM, EASTERN NM ZONE, NAD 1983. ELEVATIONS ARE BASED ON GPS OBSERVATIONS CONFORMING TO NAVD 1988.

BENCHMARK #1: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528287.14
E: 923512.21
ELEVATION: 3419.93

BENCHMARK #2: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528219.01
E: 923115.46
ELEVATION: 3417.56

BENCHMARK #3: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528377.14
E: 924178.11
ELEVATION: 3428.01

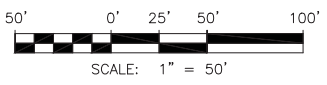
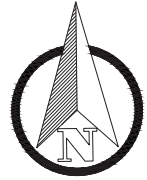
BENCHMARK #4: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 527185.90
E: 924477.06
ELEVATION: 3428.43

SURVEY PERFORMED BY MARK R. WATSON, RPLS, CONTACT CROSS TEXAS LAND SERVICES, INC. FOR ADDITIONAL BENCHMARKS OR CONTROL STAKING 877-347-6883

Notes: 1. REFERENCE STANDARD PROCTOR VALUE, 118.3 PCF.

RECORD DRAWING

THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE ENGINEER HAS NOT VERIFIED THE ACCURACY AND/OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS THAT MAY HAVE BEEN INCORPORATED AS A RESULT OF ERRONEOUS INFORMATION PROVIDED BY OTHERS.



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DATE OF ISSUE: 3//2020
DESIGNED BY: --
DRAWN BY: RT
CHECKED BY: MCZ
APPROVED BY: GDP



DBS&A
Daniel B. Stephens & Associates, Inc

SUNDANCE WEST
42 SUNDANCE LANE
EUNICE, NM 88231

SUNDANCE WEST
MUD-MANAGEMENT FACILITY

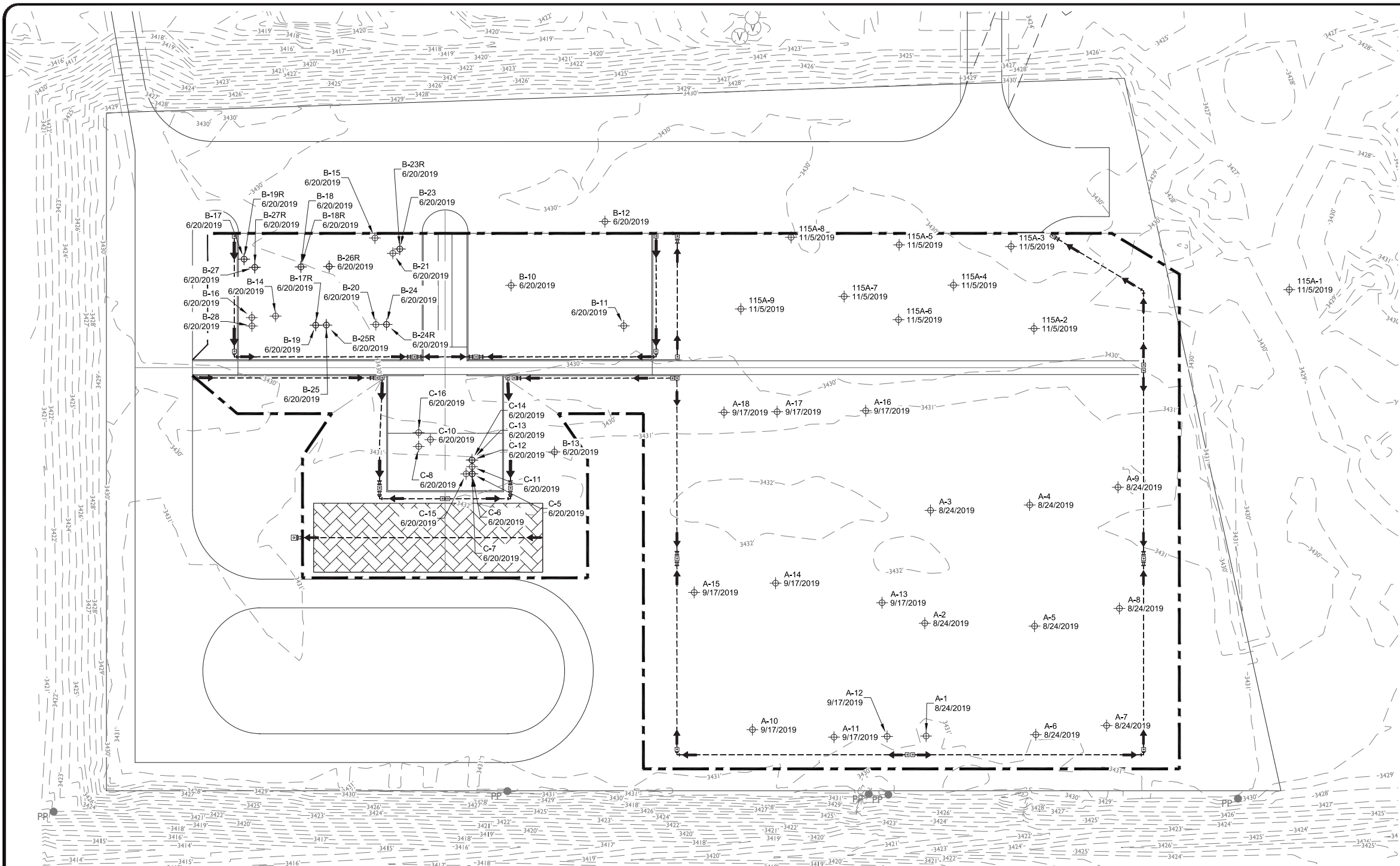
SUBGRADE DENSITY MEASUREMENT LOCATIONS

SHEET 1 OF 1
DWG NO. 1

JOB NO.
DB18.1209

Figure 1

S:\PROJECTS\DB18.1209_SUNDANCE_WEST\CAD\PRODUCTION\FSL4.DWG March 26, 2020 - 2:14 PM BY: THOMAS, RYAN



- Explanation**
- Facility boundary (approximately)
 - Leachate collection line
 - Subgrade designation

Sources: BEARINGS, DISTANCES AND COORDINATES SHOWN ARE RELATIVE TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM, EASTERN NM ZONE, NAD 1983. ELEVATIONS ARE BASED ON GPS OBSERVATIONS CONFORMING TO NAVD 1988.

BENCHMARK #1: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528287.14
E: 923512.21
ELEVATION: 3419.93

BENCHMARK #2: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528219.01
E: 923115.46
ELEVATION: 3417.56

BENCHMARK #3: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 528377.14
E: 924178.11
ELEVATION: 3428.01

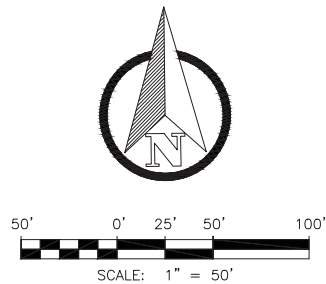
BENCHMARK #4: 1/2" IRON ROD W/ ORANGE CAP, CTLS
N: 527185.90
E: 924477.06
ELEVATION: 3428.43

SURVEY PERFORMED BY MARK R. WATSON, RPLS, CONTACT CROSS TEXAS LAND SERVICES, INC. FOR ADDITIONAL BENCHMARKS OR CONTROL STAKING 877-347-6883

- Notes:** 1. REFERENCE STANDARD PROCTOR VALUE, 118.3 PCF.
2. SUBGRADE FIG- "REFERENCE STANDARD PROCTOR VALUE - 117.3 PCF (POUND-FORCE PER CUBIC FOOT)
3. PSL FIG - "REFERENCE STANDARD PROCTOR VALUE - 115.1 (AREA A) AND 117.3 PCF (POUND-FORCE PER CUBIC FOOT)

RECORD DRAWING

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EUNICE, NM 88231

SUNDANCE WEST
MUD-MANAGEMENT FACILITY

PROTECTIVE SOIL LAYER DENSITY
MEASUREMENT LOCATIONS

SHEET 1 OF 1
DWG NO. 2

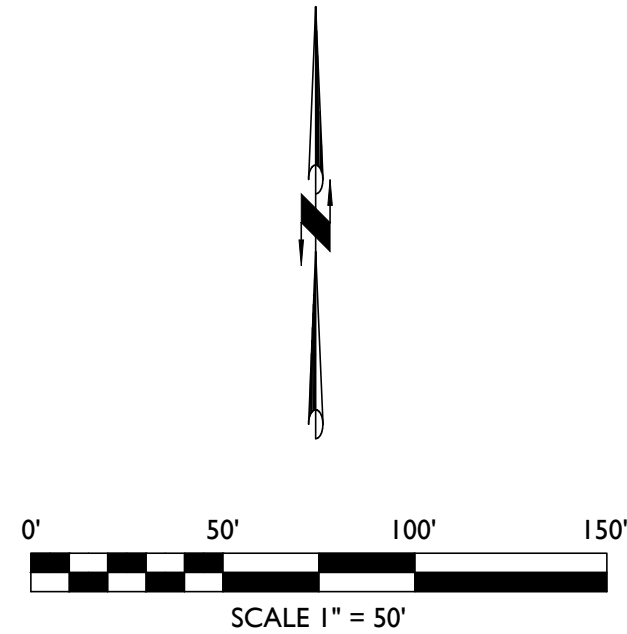
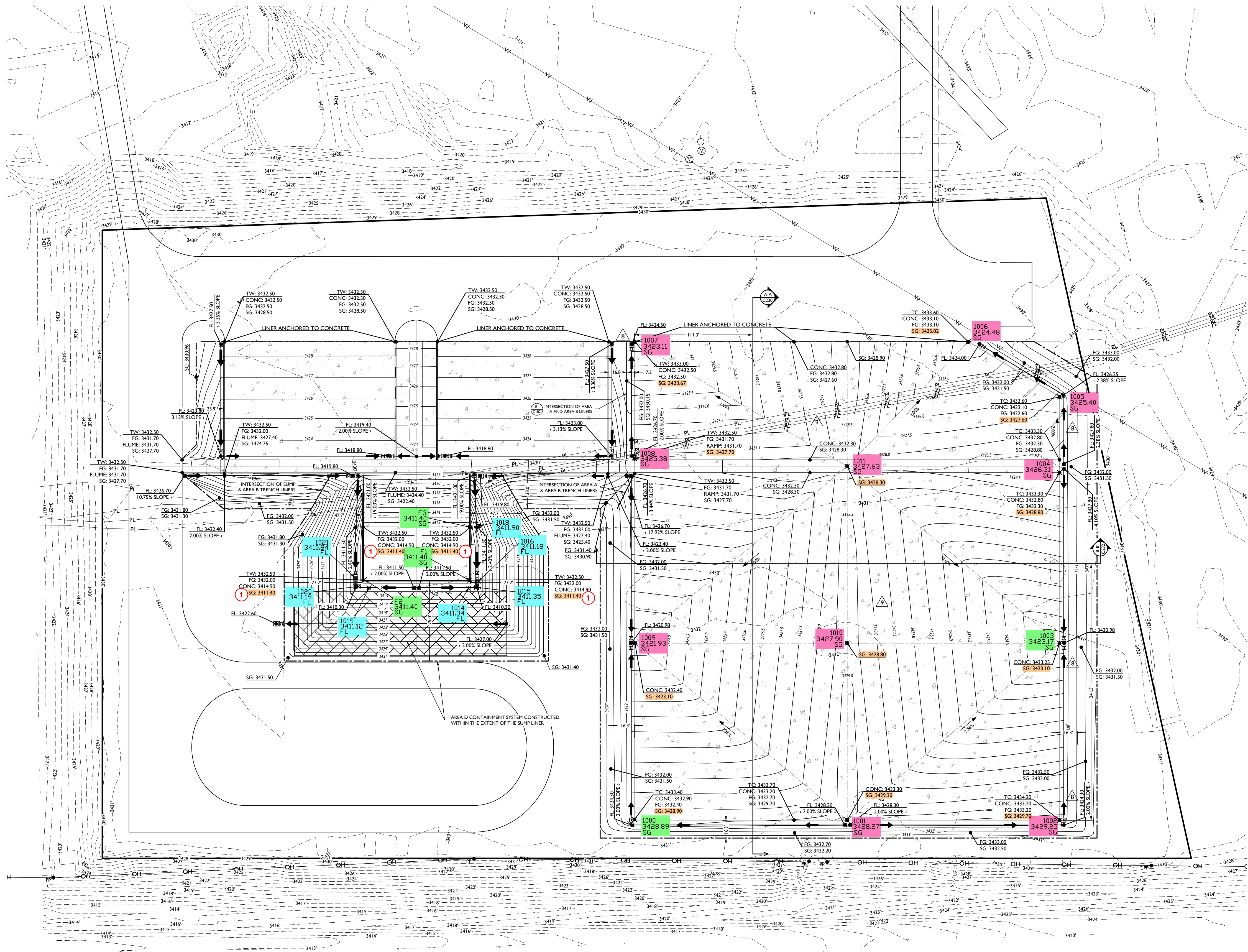
JOB NO.
DB18.1209

Figure 2

Appendix A

Drawings

Survey Drawings



LEGEND

- DENOTES BENCH MARK
- DENOTES EXISTING FIRE HYDRANT
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING WATER VALVE
- DENOTES EXISTING OVERHEAD ELECTRIC LINE
- DENOTES EXISTING UNDERGROUND CABLE LINE
- DENOTES EXISTING WATER LINE
- DENOTES EXISTING UNDERGROUND PIPELINE
- DENOTES EXISTING CONTOUR
- DENOTES PROPOSED FLUME/DRAIN
- DENOTES PROPOSED SITE ROAD
- DENOTES OUTSIDE EXTENT OF LINER SYSTEM, SEE DETAIL B / C186
-
- TC TOP OF CURB ELEVATION
- CONC CONCRETE ELEVATION
- FG FINISH GRADE ELEVATION
- DL DRAIN LINE ELEVATION
- FL FLOW LINE ELEVATION - LEACHATE COLLECTION SYSTEM
- TW TOP OF WALL ELEVATION
- TP TOP OF PAD ELEVATION
- EX EXISTING ELEVATION
- EP EDGE OF PAVEMENT ELEVATION
- SG TOP OF SUB-GRADE ELEVATION
- LEACHATE DETECTION SAMPLING & OBSERVATION POINT, SEE C122A FOR LAYOUT & C154 FOR DETAILS

① NOTE: 4" AGGREGATE FILL IS PART OF 24" (2-FT) SUBGRADE FILL UNDER CONCRETE

NOTE: EXISTING BERM AND STORMWATER CHANNEL TO THE SOUTH OF THE MUD MANAGEMENT AREA REMAINS IN PLACE AND IS FUNCTIONAL.

OUTER BOUNDARY OF LINER SYSTEM IS AT THE OUTSIDE EDGE OF ANCHOR SYSTEM.

FOR PLACEMENT, LINER ELEVATION IS APPROXIMATELY 0.02-FT ABOVE TOP OF SUB-GRADE ELEVATION.

- 1006 3424.48 SG DENOTES SURVEYED POINTS FOR SUBGRADE ELEVATIONS - UNDER-EXCAVATED LOCATIONS (TOO SHALLOW)
- 1006 3424.48 SG DENOTES SURVEYED POINTS FOR SUBGRADE ELEVATIONS - OVER-EXCAVATED LOCATIONS (TOO DEEP)
- 1006 3424.48 SG DENOTES SURVEYED POINTS FOR SUBGRADE ELEVATIONS - LOCATIONS EXCAVATED TO WITHIN 1% OF SPECIFIED DESIGN DEPTH
- 1020 3411.19 FL DENOTES SURVEYED POINTS FOR FLOWLINE ELEVATIONS



DATE	03/25/19			
APPL	RET	RET	RET	
BY	LEW	LEW		
REVISIONS	REVISE LEACHATE SAMP & OBS. POINTS, FL SLOPES, FLOW DIRECTION ARROWS, AREA A LINER LAYOUT, REVISE SUB-GRADE CONTOURS AS PER AREA A LINER LAYOUT REVISIONS			
8	RET	RET	DATE: 04/18/2019	JOB: 180156
9	RET			

SUB-GRADE GRADING PLAN

ONYX CONTRACTORS

SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

PRELIMINARY REVIEW:

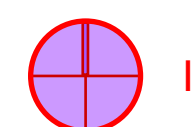
THESE PLANS ARE RELEASED UNDER THE SEAL OF ANDREW M. HICKS, P.E. #20604 AND MAVERICK ENGINEERING ON THIS DAY 04/18/19, FOR THE PURPOSES OF INTERIM PRELIMINARY REVIEW. THEY SHALL NOT BE USED FOR THE PURPOSES OF CONSTRUCTION.



- NOTE: EXISTING BERM AND STORMWATER CHANNEL TO THE SOUTH OF THE MUD MANAGEMENT AREA REMAINS IN PLACE AND IS FUNCTIONAL.

OUTER BOUNDARY OF LINER SYSTEM IS AT THE OUTSIDE
EDGE OF ANCHOR SYSTEM.

FOR PLACEMENT, LINER ELEVATION IS APPROXIMATELY
0.02-FT ABOVE TOP OF SUB-GRADE ELEVATION.



Interior of Structure or Side Slope



F:\2018\180156-Onyx-Sundance West\PDF's\Construction Staking\19.05.31 Con Stake 180156 C220A SUBGRADE GRADING PLAN.pdf

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Δ	REVISED	BY	APPR.	DATE
8	REVISE LEACHATE SAMPL. & OBS. POINTS, FL SLOPES, FLOW DIRECTION/ARROWS, AREA A LINER LAYOUT	LBW	RET	03/25/19
9	REVISE SUB-GRADE CONTOURS AS PER AREA A LINER LAYOUT REVISIONS	LBW	RET	03/29/19
<div> <div>DRAWN BY:</div> <div>LBW</div> </div> <div> <div>CHECKED BY:</div> <div>RET</div> </div> <div> <div>APPROVED BY:</div> <div>RET</div> </div> <div> <div>DATE:</div> <div>05/23/2019</div> </div> <div> <div>JOB:</div> <div>180156</div> </div>				

SUB-GRADE GRADING PLAN

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

**PRELIMINARY
REVIEW:**

THESE PLANS ARE RELEASED UNDER THE SEAL OF ANDREW L. MELLEN, P.E. #106572 AND MAVERICK ENGINEERING (FIRM # F-15089) ON THIS DAY 05/23/19, FOR THE PURPOSES OF INTERIM/PRELIMINARY REVIEW. THEY SHALL NOT BE USED FOR THE PURPOSES OF CONSTRUCTION.

SHEET **C220A** OF 22

As-Built Drawings

ENGINEER'S GENERAL NOTES:

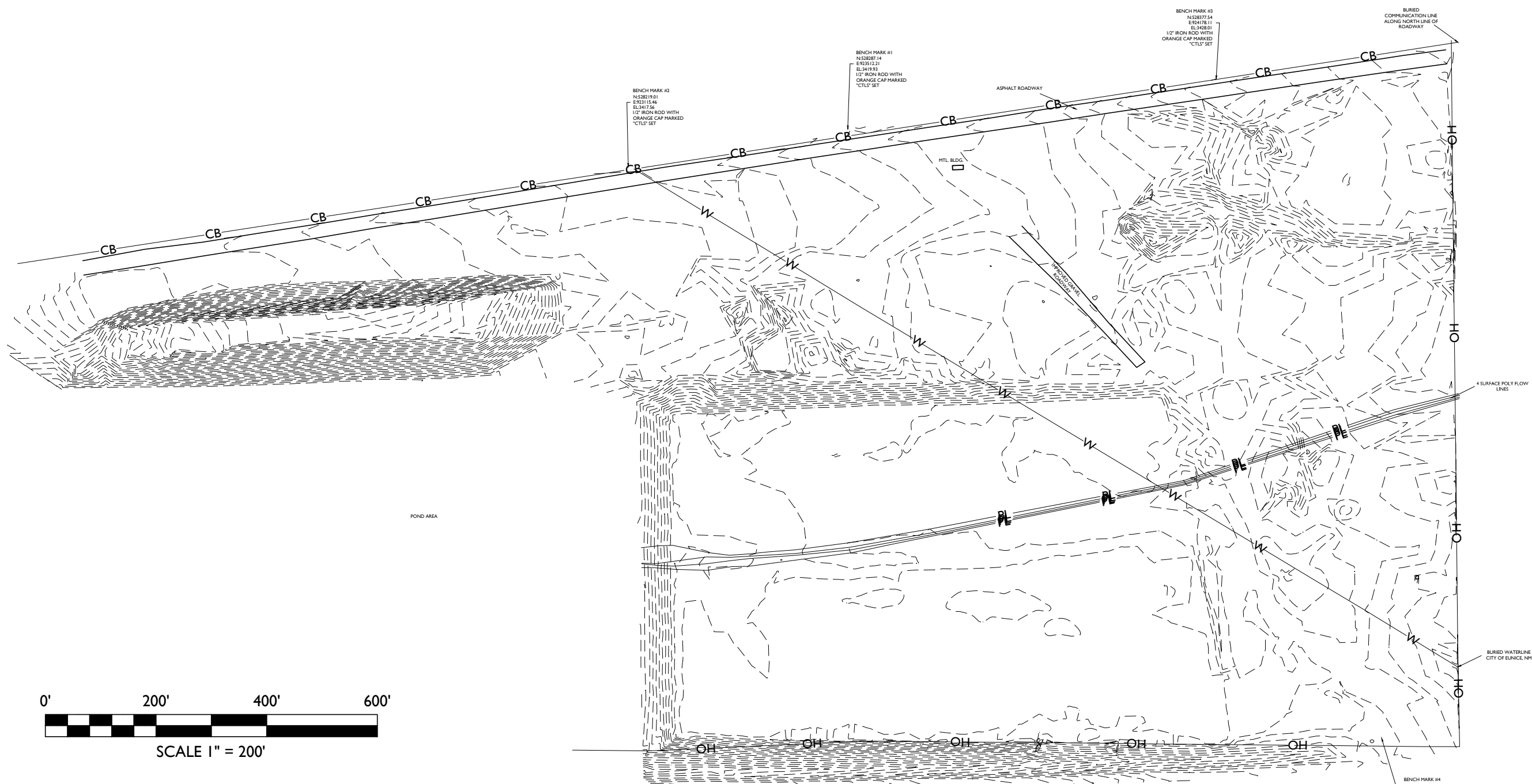
1. THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS THE APPROVAL BLOCK HAS BEEN SIGNED BY THE APPROPRIATE AGENCIES. ALL WORK IS TO CONFORM TO THE CURRENT STANDARD SPECIFICATIONS, DETAILS AND SUPPLEMENTAL INFORMATION OF SAID AGENCY.
2. A THOROUGH ATTEMPT HAS BEEN MADE TO SHOW THE LOCATIONS OF ALL UNDERGROUND OBSTRUCTIONS AND UTILITY LINES IN THE WORK AREA. HOWEVER, THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO OBSTRUCTIONS AND UTILITY LINES ENCOUNTERED DURING CONSTRUCTION AND IS TO DETERMINE THE EXACT LOCATION OF ALL UTILITIES IN THE AREA.
3. THE ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE. SUCH A GUARANTEE IS NOT POSSIBLE DUE TO THE VARYING FIELD CONDITIONS, CHANGING SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES, AND CONSTRUCTION METHODS THAT ARE BEYOND THE CONTROL OF THE ENGINEER.
4. MAVERICK ENGINEERING MAKES NO REPRESENTATION AS TO THE PRESENCE OF ROCK WITHIN EXCAVATION AREAS. ANY EXCAVATION IS TO BE CONSIDERED UNCLASSIFIED EXCAVATION, AND THE PRESENCE OF ROCK IS ONE OF THE EXISTING CONDITIONS TO BE FULLY INVESTIGATED PRIOR TO BEGINNING THE WORK. NO CLAIM WILL BE MADE AGAINST MAVERICK ENGINEERING OR THE OWNER BASED ON MATERIALS ENCOUNTERED.
5. THE ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS / PROGRAMS UTILIZED IN CONNECTION WITH THE WORK. THE ENGINEER IS NOT RESPONSIBLE IF THE CONTRACTOR FAILS TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
6. OWNER/CONTRACTOR IS RESPONSIBLE FOR SURVEY VERIFICATION OF EXISTING HORIZONTAL AND VERTICAL CONDITIONS PRIOR TO START OF CONSTRUCTION. A DEVIATION IN EXISTING CONDITIONS MUST BE BROUGHT TO THE IMMEDIATE ATTENTION OF MAVERICK ENGINEERING, BEFORE CONSTRUCTION STARTS. MAVERICK ENGINEERING WILL NOT BE RESPONSIBLE FOR REMOVAL, REPLACEMENT, OR OTHER MODIFICATIONS THAT MAY BE REQUIRED AS A RESULT OF EXISTING CONDITIONS NOT PROPERLY VERIFIED AND CONFIRMED. SHOULD AN ERROR BE FOUND IN THE HORIZONTAL & VERTICAL CONDITIONS, MAVERICK ENGINEERING WILL BE NOTIFIED AND CONSTRUCTION WILL NOT PROCEED UNTIL REVISIONS AND/OR MODIFICATIONS HAVE BEEN PREPARED AND SUBMITTED BY MAVERICK ENGINEERING.
7. OWNER/CONTRACTOR IS TO HAVE A PROFESSIONAL LAND SURVEYOR VERIFY FINISHED FLOOR ELEVATIONS PRIOR TO PLACING ANY FORM WORK OR CONCRETE. MAVERICK ENGINEERING WILL NOT BE RESPONSIBLE FOR REMOVAL, REPLACEMENT, OR OTHER MODIFICATIONS THAT MAY BE REQUIRED AS A RESULT OF THE FINISHED FLOOR NOT BEING PROPERLY VERIFIED.
8. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COMPLY WITH EPA'S NPDES REGULATIONS 40-CFR-122, AND 40-CFR-123, AND 40-CFR-124 CONCERNING EROSION AND SEDIMENT CONTROL.
9. AN APPROVED GRADING AND DRAINAGE PLAN IS TO BE MAINTAINED ON SITE AT ALL TIMES. THIS IS TO BE MADE AVAILABLE TO INSPECTORS UPON REQUEST.
10. MAVERICK DOES NOT PROVIDE BUILDING FOUNDATION DESIGNS. REFER TO STRUCTURAL PLANS AND / OR GEOTECHNICAL REPORT FOR MATERIAL AND COMPACTION REQUIREMENTS UNDERNEATH BUILDING SLABS / STRUCTURAL FOUNDATIONS. MAKE NOTE IF SAID PLANS CALL FOR ADDITIONAL MATERIALS OR COMPACTION OR SIDEWALK IMMEDIATELY ADJACENT TO THE STRUCTURE / FOUNDATION.

ONYX CONTRACTORS
SUNDANCE SERVICES, INC.

SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM

42 SUNDANCE LANE, EUNICE, NM 88231
LEA COUNTY, NEW MEXICO

CIVIL CONSTRUCTION PLANS



PROJECT ENGINEER:

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NM 20118
MAVERICK ENGINEERING
1909 WEST WALL STREET, STE. K
MIDLAND, TX 79701
TELEPHONE: (432) 262-0999

STRUCTURAL ENGINEER:

DOUGLAS B. REEVES, P.E.
NM 23052
ON SITE STRUCTURAL ENGINEERING
6309 MECCA
ODESSA, TX 79762
TELEPHONE: (817) 808-3200



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SHEET INDEX CIVIL:

COVER SHEET - LINER OPTION	C100
EXISTING SITE TOPOGRAPHY.....	C110
SWPPP.....	C111
SWPPP DETAILS	C112
SITE LAYOUT DIMENSIONAL	C120
CIVIL SITE PLAN - LINER OPTION	C122B
CIVIL SITE PLAN - LINER EXTENTS	C124A
STRUCTURAL SITE PLAN.....	C126
MUD SITE LAYOUT DIMENSIONAL	C130
MUD OUT WASH OUT SYSTEM	C140
AREA D SECTIONS/DETAILS I	C150
AREA D SECTIONS/DETAILS II	C152
LEACHATE SYSTEM & CLEAN-OUT DETAILS	C154
ACCESS ROAD SECTIONS	C170
LINER CROSS SECTIONS AREA A	C180A
LINER CROSS SECTIONS AREA B	C182A
LINER CROSS SECTIONS AREA B & FLUME	C183
LINER CROSS SECTIONS AREA C	C184
LINER CROSS SECTIONS AREA C & FLUME	C185
LINER & CLEAN OUT SECTIONS/DETAILS	C186
GRADING PLAN	C200A
GRADING PLAN LEACHATE & LINER SYSTEM	C210A
SUB-GRADE GRADING PLAN	C220A
AREA A LINER & FL N-S CROSS SECTION	C230
AREA A LINER & FL W-E CROSS SECTION	C232

SHEET INDEX STRUCTURAL:

GEN. STRUCTURAL NOTES & TYP. DETAILS.....	S-0
FACILITY STRUCTURAL LAYOUT.....	S-1
FACILITY STRUCTURAL LAYOUT.....	S-1.5
SECTIONS AND DETAILS	S-2
SECTIONS AND DETAILS	S-3
SECTIONS AND DETAILS	S-4



VICINITY MAP
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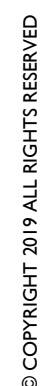
1909 West Wall Street, Suite "K"
Midland, Texas 79701
ENGINEER FIRM #: F15089
SURVEY FIRM #: 10194452
Tel: (432) 262-0999 Fax: (432) 262-0989
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DATE	12/18/18	02/20/19	02/26/19	03/29/19
APPR.	RET	RET	RET	RET
BY	LBW	LBW	LBW	LBW
REVISIONS	3 ADD SHEET C124 TO SET	6 ADD SHEET C210 TO SET	7 ADD SHEET C220 TO SET	9 ADD SHEETS C230 & C232 TO SET
Δ	3	6	7	9
DRAWN BY:	LBW	RET	RET	
CHECKED BY:	RET	RET		
APPROVED BY:	RET			
DATE	04/11/2019			
JOB	180156			

COVER SHEET

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

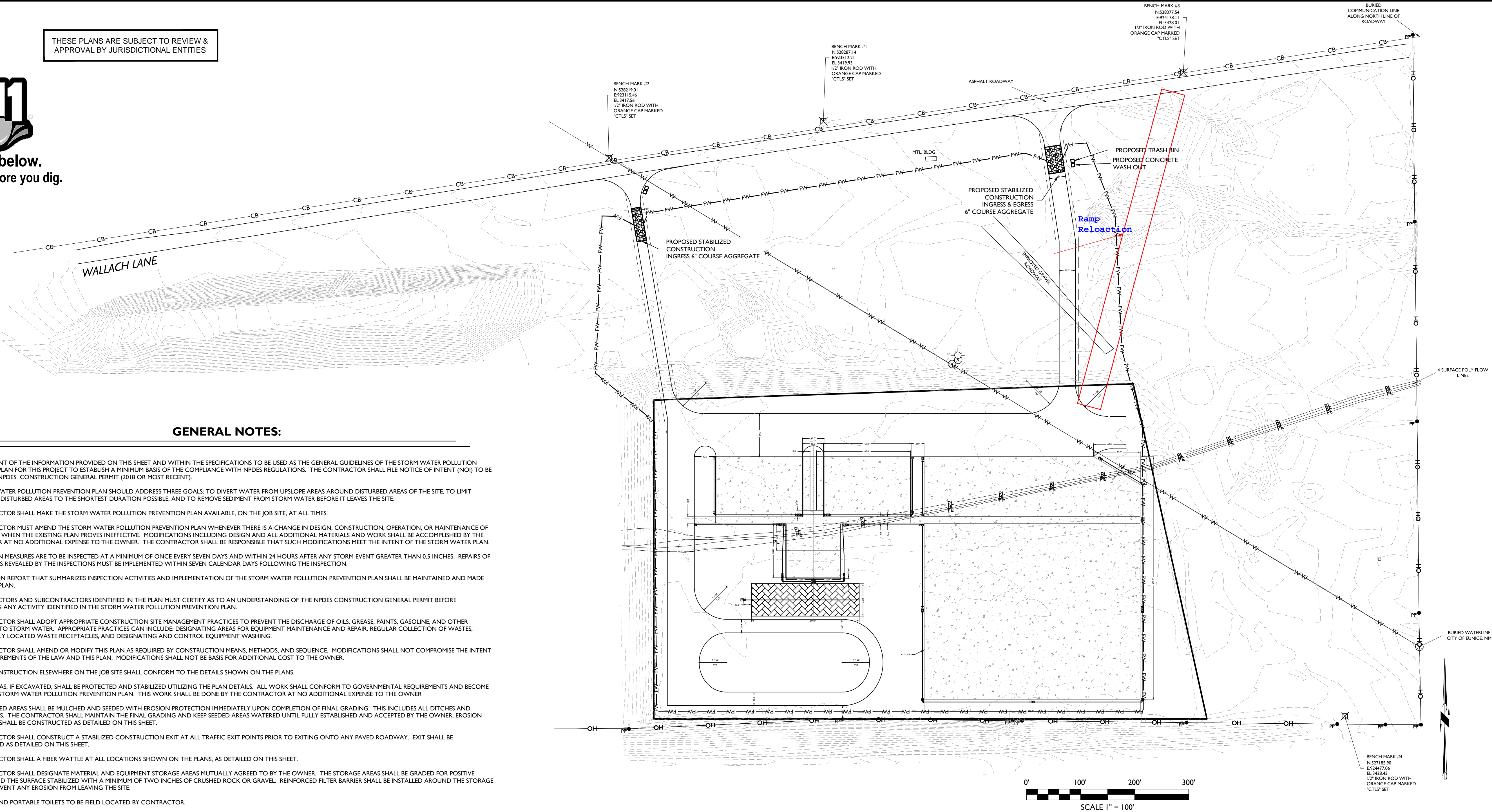






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THESE PLANS ARE SUBJECT TO REVIEW &
APPROVAL BY JURISDICTIONAL ENTITIES



GENERAL NOTES:

- IT IS THE INTENT OF THE INFORMATION PROVIDED ON THIS SHEET AND WITHIN THE SPECIFICATIONS TO BE USED AS THE GENERAL GUIDELINES OF THE STORM WATER POLLUTION PREVENTION PLAN FOR THIS PROJECT TO ESTABLISH A MINIMUM BASIS OF THE COMPLIANCE WITH NPDES REGULATIONS. THE CONTRACTOR SHALL FILE NOTICE OF INTENT (NOI) TO BE COVERED BY NPDES CONSTRUCTION GENERAL PERMIT (2018 OR MOST RECENT).
- THE STORM WATER POLLUTION PREVENTION PLAN SHOULD ADDRESS THREE GOALS: TO DIVERT WATER FROM UPSLOPE AREAS AROUND DISTURBED AREAS OF THE SITE, TO LIMIT EXPOSURE OF DISTURBED AREAS TO THE SHORTEST DURATION POSSIBLE, AND TO REMOVE SEDIMENT FROM STORM WATER BEFORE IT LEAVES THE SITE.
- THE CONTRACTOR SHALL MAKE THE STORM WATER POLLUTION PREVENTION PLAN AVAILABLE, ON THE JOB SITE, AT ALL TIMES.
- THE CONTRACTOR MUST AMEND THE STORM WATER POLLUTION PREVENTION PLAN WHENEVER THERE IS A CHANGE IN DESIGN, CONSTRUCTION, OPERATION, OR MAINTENANCE OF THE PLAN, OR WHEN THE EXISTING PLAN PROVES INEFFECTIVE. MODIFICATIONS INCLUDING DESIGN AND ALL ADDITIONAL MATERIALS AND WORK SHALL BE ACCOMPLISHED BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE THAT SUCH MODIFICATIONS MEET THE INTENT OF THE STORM WATER PLAN.
- STABILIZATION MEASURES ARE TO BE INSPECTED AT A MINIMUM OF ONCE EVERY SEVEN DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES. REPAIRS OF INADEQUACIES REVEALED BY THE INSPECTIONS MUST BE IMPLEMENTED WITHIN SEVEN CALENDAR DAYS FOLLOWING THE INSPECTION.
- AN INSPECTION REPORT THAT SUMMARIZES INSPECTION ACTIVITIES AND IMPLEMENTATION OF THE STORM WATER POLLUTION PREVENTION PLAN SHALL BE MAINTAINED AND MADE PART OF THE PLAN.
- ALL CONTRACTORS AND SUBCONTRACTORS IDENTIFIED IN THE PLAN MUST CERTIFY AS TO AN UNDERSTANDING OF THE NPDES CONSTRUCTION GENERAL PERMIT BEFORE CONDUCTING ANY ACTIVITY IDENTIFIED IN THE STORM WATER POLLUTION PREVENTION PLAN.
- THE CONTRACTOR SHALL ADOPT APPROPRIATE CONSTRUCTION SITE MANAGEMENT PRACTICES TO PREVENT THE DISCHARGE OF OILS, GREASE, PAINTS, GASOLINE, AND OTHER POLLUTANTS TO STORM WATER. APPROPRIATE PRACTICES CAN INCLUDE: DESIGNATING AREAS FOR EQUIPMENT MAINTENANCE AND REPAIR, REGULAR COLLECTION OF WASTES, CONVENIENTLY LOCATED WASTE RECEPTACLES, AND DESIGNATING AND CONTROL EQUIPMENT WASHING.
- THE CONTRACTOR SHALL AMEND OR MODIFY THIS PLAN AS REQUIRED BY CONSTRUCTION MEANS, METHODS, AND SEQUENCE. MODIFICATIONS SHALL NOT COMPROMISE THE INTENT OF THE REQUIREMENTS OF THE LAW AND THIS PLAN. MODIFICATIONS SHALL NOT BE BASIS FOR ADDITIONAL COST TO THE OWNER.
- AREAS OF CONSTRUCTION ELSEWHERE ON THE JOB SITE SHALL CONFORM TO THE DETAILS SHOWN ON THE PLANS.
- BORROW AREAS, IF EXCAVATED, SHALL BE PROTECTED AND STABILIZED UTILIZING THE PLAN DETAILS. ALL WORK SHALL CONFORM TO GOVERNMENTAL REQUIREMENTS AND BECOME PART OF THE STORM WATER POLLUTION PREVENTION PLAN. THIS WORK SHALL BE DONE BY THE CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.
- ALL NON-PAVED AREAS SHALL BE MULCHED AND SEEDED WITH EROSION PROTECTION IMMEDIATELY UPON COMPLETION OF FINAL GRADING. THIS INCLUDES ALL DITCHES AND EMBANKMENTS. THE CONTRACTOR SHALL MAINTAIN THE FINAL GRADING AND KEEP SEEDED AREAS WATERED UNTIL FULLY ESTABLISHED AND ACCEPTED BY THE OWNER; EROSION PROTECTION SHALL BE CONSTRUCTED AS DETAILED ON THIS SHEET.
- THE CONTRACTOR SHALL CONSTRUCT A STABILIZED CONSTRUCTION EXIT AT ALL TRAFFIC EXIT POINTS PRIOR TO EXITING ONTO ANY PAVED ROADWAY. EXIT SHALL BE CONSTRUCTED AS DETAILED ON THIS SHEET.
- THE CONTRACTOR SHALL A FIBER WATTLE AT ALL LOCATIONS SHOWN ON THE PLANS, AS DETAILED ON THIS SHEET.
- THE CONTRACTOR SHALL DESIGNATE MATERIAL AND EQUIPMENT STORAGE AREAS MUTUALLY AGREED TO BY THE OWNER. THE STORAGE AREAS SHALL BE GRADED FOR POSITIVE DRAINAGE AND THE SURFACE STABILIZED WITH A MINIMUM OF TWO INCHES OF CRUSHED ROCK OR GRAVEL. REINFORCED FILTER BARRIER SHALL BE INSTALLED AROUND THE STORAGE AREAS TO PREVENT ANY EROSION FROM LEAVING THE SITE.
- TRASH BINS AND PORTABLE TOILETS TO BE FIELD LOCATED BY CONTRACTOR.

SOIL STABILIZATION NOTES:

- ALL DISTURBED AREAS ARE TO BE SEEDED AT A RATE OF 20 LBS/ACRE FOXTAIL MILLET, 2 LBS/ACRE BUFFALO GRASS, 1 LBS/ACRE LITTLE BLUESTEM, AND 1 LBS/ACRE SIDE OATS GRAMMA, OR OTHER DROUGHT TOLERANT MIXTURE APPROVED BY THE CITY ENGINEER. ALL SEEDED AREAS ARE TO BE FERTILIZED AS SPECIFIED BY THE CITY OF ELUNICE AT TIME OF PLANTING.
- AFTER DESIGNATED AREAS HAVE BEEN COMPLETED TO THE GRADES SHOWN ON THE PLANS, AREAS TO BE SEEDED ARE TO BE CULTIVATED TO A DEPTH OF 4 INCHES, EXCEPT WHERE SEEDING IS TO BE DONE USING A SEED DRILL SUITABLE FOR SEEDING INTO UNTILLED SOIL. THE SEEDBEDS ARE TO BE CULTIVATED SUFFICIENTLY TO REDUCE THE SOIL TO A STATE OF GOOD TILTH WHEN THE SOIL PARTICLES ON THE SURFACE ARE SMALL ENOUGH TO LIE CLOSELY ENOUGH TOGETHER TO PREVENT THE SEED FROM BEING COVERED TOO DEEPLY FOR OPTIMUM GERMINATION. CULTIVATION OF THE SEEDBED WILL NOT BE REQUIRED IN LOOSE SAND WHERE DEPTH OF SAND IS 4 INCHES OR MORE.
- AFTER SEEDING, CHANNEL EMBANKMENTS ARE TO BE LINED WITH A STRAW OR STRAW/COCONUT SOIL RETENTION BLANKET. THE FOLLOWING PRODUCTS, OR AN EQUAL APPROVED BY THE CITY ENGINEER MAY BE USED:
 - ECS S-1 STANDARD STRAW
 - ECS HIGH VELOCITY STRAW
 - LANDLOK BON-TERRA S2, ENS2 OR ENC52
 - NORTH AMERICAN GREEN S75, S75BN, S150, S150BN, OR SC150
 - ALTERNATELY, SOILGUARD BONDED FIBER MATRIX MAY BE USED.
- BLANKETS ARE TO BE PLACED PARALLEL TO THE DIRECTION OF WATER FLOW. BLANKETS ARE TO BE SPREAD EVENLY WITHOUT STRETCHING SO FIBERS ARE IN DIRECT CONTACT WITH THE SOIL.
- THE UPSLOPE END OF EACH BLANKET IS TO BE BURIED AT LEAST 6 INCHES IN A VERTICAL TRENCH WITH THE SOIL PRESSED FIRMLY AGAINST THE EMBEDDED MAT. ADDITIONAL CHECK TRENCHES AT 50 FEET INTERVALS MAY BE DESIRABLE ON STEEP GRADES OR LONG FLOW AREAS.
- STRIP ENDS AND END OVERLAPS ARE TO BE STAPLED WITH NOT MORE THAN 20 INCHES BETWEEN STAPLES. ALL OTHER JOINTS AND EDGES ARE TO BE STAPLED AT 40 INCH INTERVALS.
- STAPLES USED TO ANCHOR BLANKETS ARE TO BE U SHAPED, 11 GAUGE OR HEAVIER STEEL WIRE HAVING A SPAN WIDTH OF 1 INCH AND A LENGTH OF 6 INCHES OR MORE FROM TOP TO BOTTOM AFTER BENDING.
- IF SOILGUARD BONDED FIBER MATRIX IS CHOSEN, INSTALLATION IS TO CONFORM TO MANUFACTURERS RECOMMENDATIONS.
- DISTURBED AREAS OUTSIDE THE CHANNEL ARE TO BE TREATED WITH A HYDRAULICALLY-APPLIED MULCH AT A RATE OF 2,000 LBS/ACRE.

RECEIVING WATERS:

- STORM WATER FROM THE SITE APPEARS TO DRAIN TO THE SOUTH WHERE IT IS COLLECTED INTO A SERIES OF NATURAL PLAYA LAKES.
- WATERS IN THIS AREA DO NOT APPEAR TO BE ON THE OUTSTANDING NATIONAL RESOURCE WATER LIST.

SWPPP DETAILS:

SWPPP DETAILS ARE INCLUDED ON THE NEXT SHEET. PLEASE REFER TO THOSE DETAILS.

NON-CRITICAL HABITAT:

THE USFWS ECOS SYSTEM DOES NOT SHOW THE SITE TO BE WITHIN A CRITICAL HABITAT AREA.

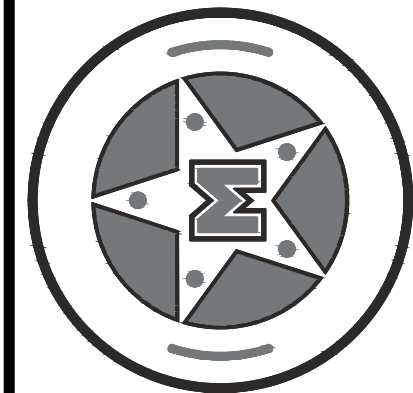
SILT FENCE / FIBER WATTLE:

FIBER WADDLE, SILT FENCE OR APPROVED EQUAL MAY BE USED ALONG THE BORDER OF THE SITE FOR SILTATION CONTROL.

LEGEND

- ⊗ DENOTES BENCH MARK
- ⊙ DENOTES EXISTING FIRE HYDRANT
- ⊕ DENOTES EXISTING POWER POLE
- ⊕ DENOTES EXISTING WATER VALVE
- OH — DENOTES EXISTING OVERHEAD ELECTRIC LINE
- CB — DENOTES EXISTING UNDERGROUND CABLE LINE
- W — DENOTES EXISTING WATER LINE
- PL — DENOTES EXISTING UNDERGROUND PIPELINE
- 2850 --- DENOTES EXISTING CONTOUR
- --- DENOTES PROPOSED FLUME/DRAIN
- FW — FW — DENOTES PROPOSED SITE ROAD
- --- DENOTES PROPOSED SILT FENCE OR FIBER WATTLE
- --- DENOTES PROPOSED CONSTRUCTION ENTRANCE

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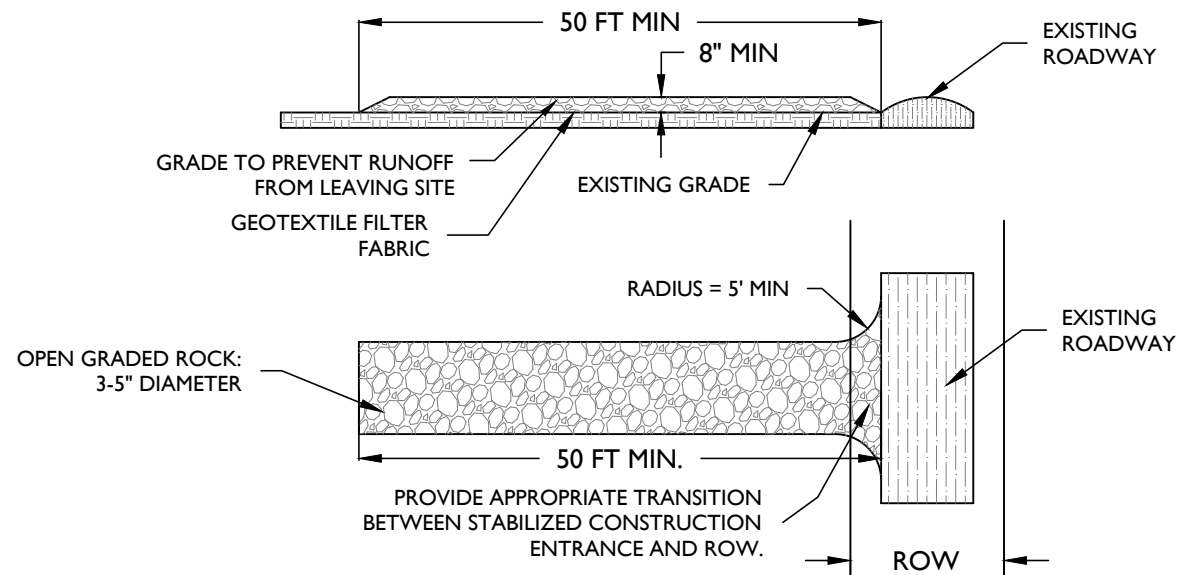
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DATE	04/12/2019				
JOB	180156				

SWPPP
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



F:\2018\180156-ONYX-SUNDANCE WEST\DRAWINGS\LINER OPTION\180156_FINAL_S&S SET\180505 CI12 SWPPP DETAILS.dwg
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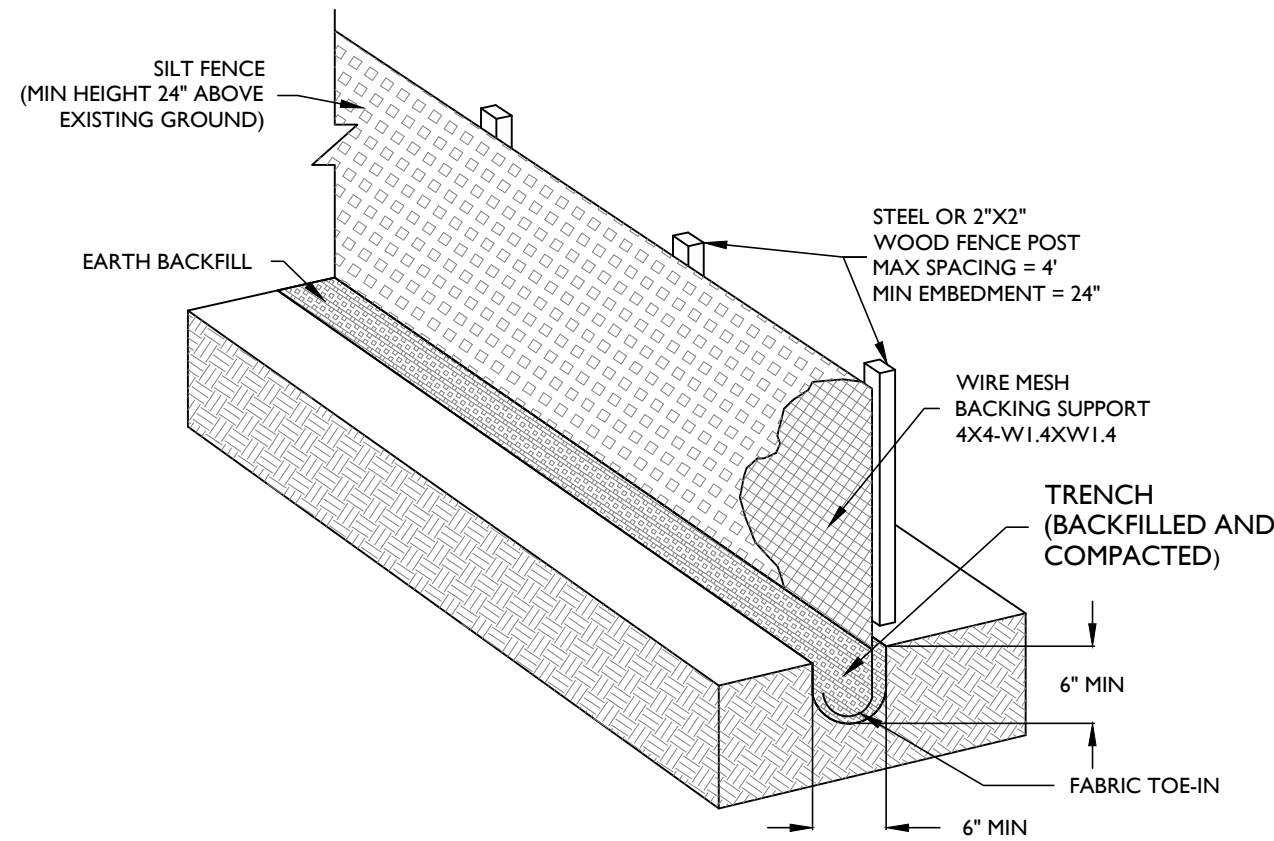


NOTES:

1. LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS, BUT NOT LESS THAN 50 FT.
2. THICKNESS SHALL BE NO LESS THAN 8 INCHES.
3. WIDTH SHALL BE NO LESS THAN FULL WIDTH OF ALL POINTS OF INGRESS OR EGRESS.
4. STABILIZED CONSTRUCTION EXIT TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.

I STABILIZED ENTRANCE DETAIL

N.T.S.

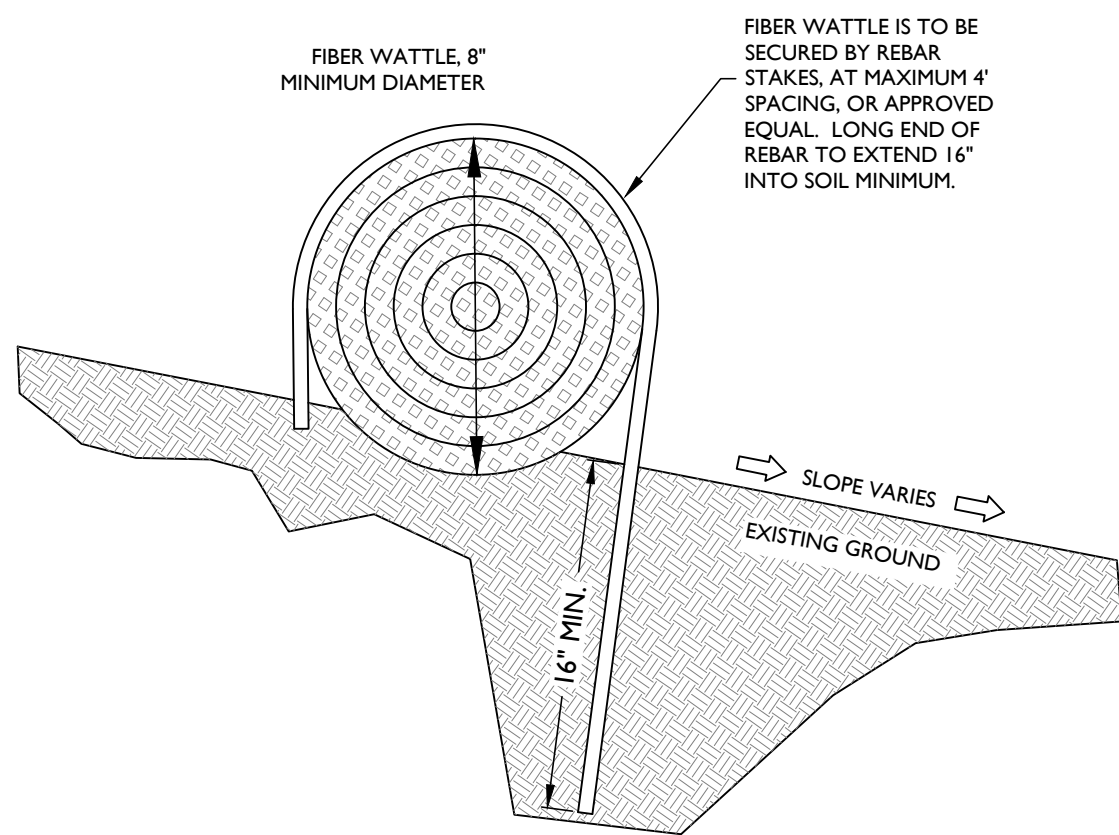


NOTES:

- STEEL OR WOOD POSTS, WHICH SUPPORT THE SILT FENCE, SHALL BE INSTALLED WITH A SLIGHT ANGLE TOWARD THE ANTICIPATED RUNOFF SOURCE. POSTS MUST BE EMBEDDED A MINIMUM OF TWO FEET.
- THE TOE OF THE SILT FENCE SHALL BE TRENCHED IN WITH A SPADE OR MECHANICAL TRENCHER, SO THAT THE DOWNSLOPE FACE OF THE TRENCH IS FLAT AND PERPENDICULAR TO THE LINE OF FLOW. WHERE FENCE CANNOT BE TRENCHED IN (E.G. PAVEMENT), WEIGHT FABRIC FLAP WITH WASHED GRAVEL ON UPHILL SIDE TO PREVENT FLOW UNDER FENCE.
- THE TRENCH MUST BE A MINIMUM OF 6 INCHES DEEP AND 6 INCHES WIDE TO ALLOW FOR THE SILT FENCE FABRIC TO BE LAID IN THE GROUND AND BACKFILLED WITH COMPACTED MATERIAL.
- SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE, WHICH IN TURN ATTACHED TO THE STEEL OR WOOD FENCE POST. THERE SHALL BE A 6-INCH DOUBLE OVERLAP, SECURELY FASTENED WHERE ENDS OF FABRIC MEET.
- SILT FENCE SHALL BE REMOVED WHEN THE SITE IS COMPLETELY STABILIZED SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
- ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES. THE SILT SHALL BE DISPOSED OF ONSITE IN AN APPROVED LOCATION AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.

I SILT FENCE DETAIL

N.T.S.

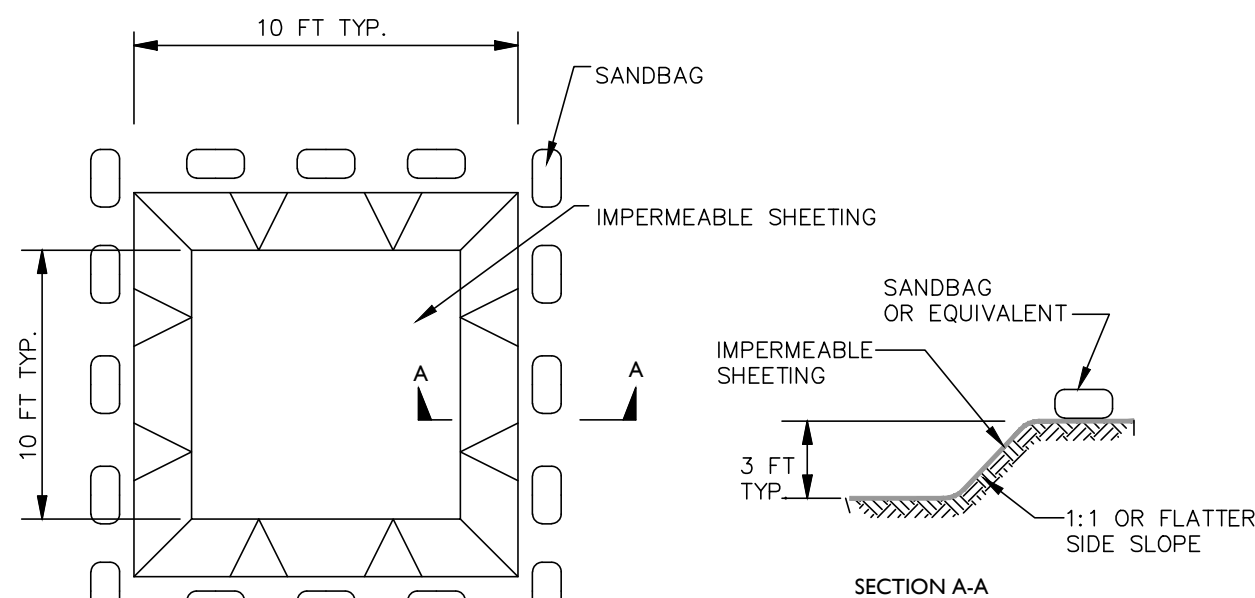


NOTES:

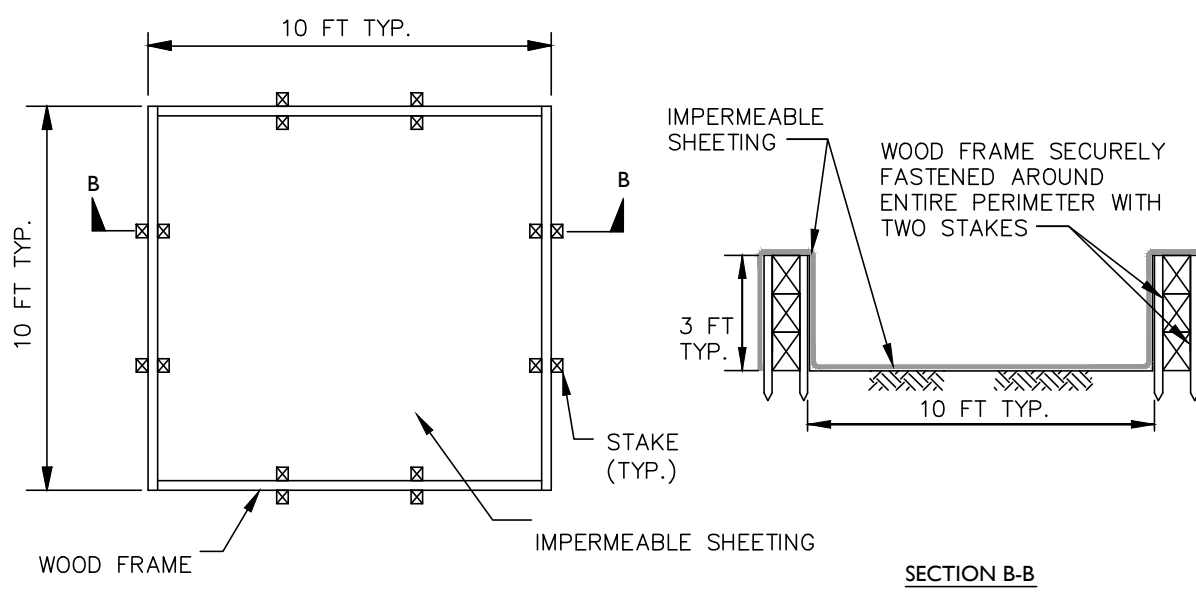
- EROSION CONTROL LOGS ARE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
- BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH IS ONLY REQUIRED WHERE EROSION CONTROL LOGS WILL BE LEFT IN PLACE AS PART OF PERMANENT SOIL STABILIZATION.
- FILTER MATERIAL IS TO BE SUFFICIENT IN VOLUME TO ACHIEVE THE SPECIFIED LOG DIAMETER WITHOUT EXCESSIVE DEFORMATION.
- STAKES IN SOIL ARE TO BE #3 REBAR, 2-4 FEET IN LENGTH AS REQUIRED.
- WHERE LOGS ARE TO BE PLACED ON PAVEMENT, THEY ARE TO BE WEIGHTED DOWN WITH SANDBAGS IN LIEU OF STAKES.
- DO NOT PLACE STAKES THROUGH EROSION CONTROL LOGS.
- TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
- ACCUMULATED SILT IS TO BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES. THE SILT IS TO BE DISPOSED OF ONSITE IN AN APPROVED LOCATION AND IN SUCH A MANNER AS TO NOT CONTRIBUTE TO ADDITIONAL SILTATION.

I EROSION CONTROL LOG DETAIL

N.T.S.



EXCAVATED WASHOUT STRUCTURE



CONCRETE WASHOUT STRUCTURE
N.T.S.

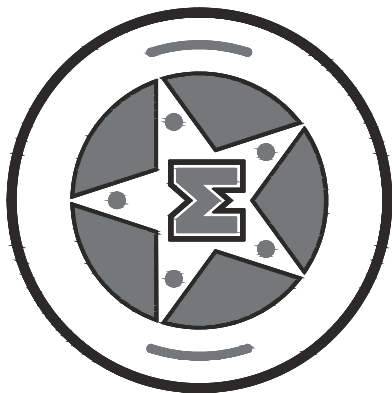
WASHOUT STRUCTURE NOTES:

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 12 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED (E.G., RIPPED OR PUNCTURED). EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET-VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

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DATE:	04/1/2019	JOB:	180156		

SWPPP DETAILS

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

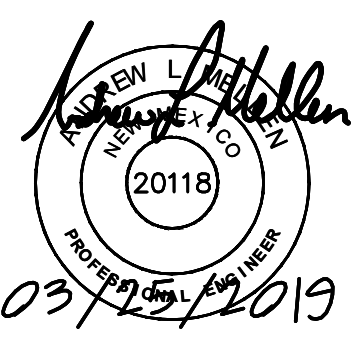
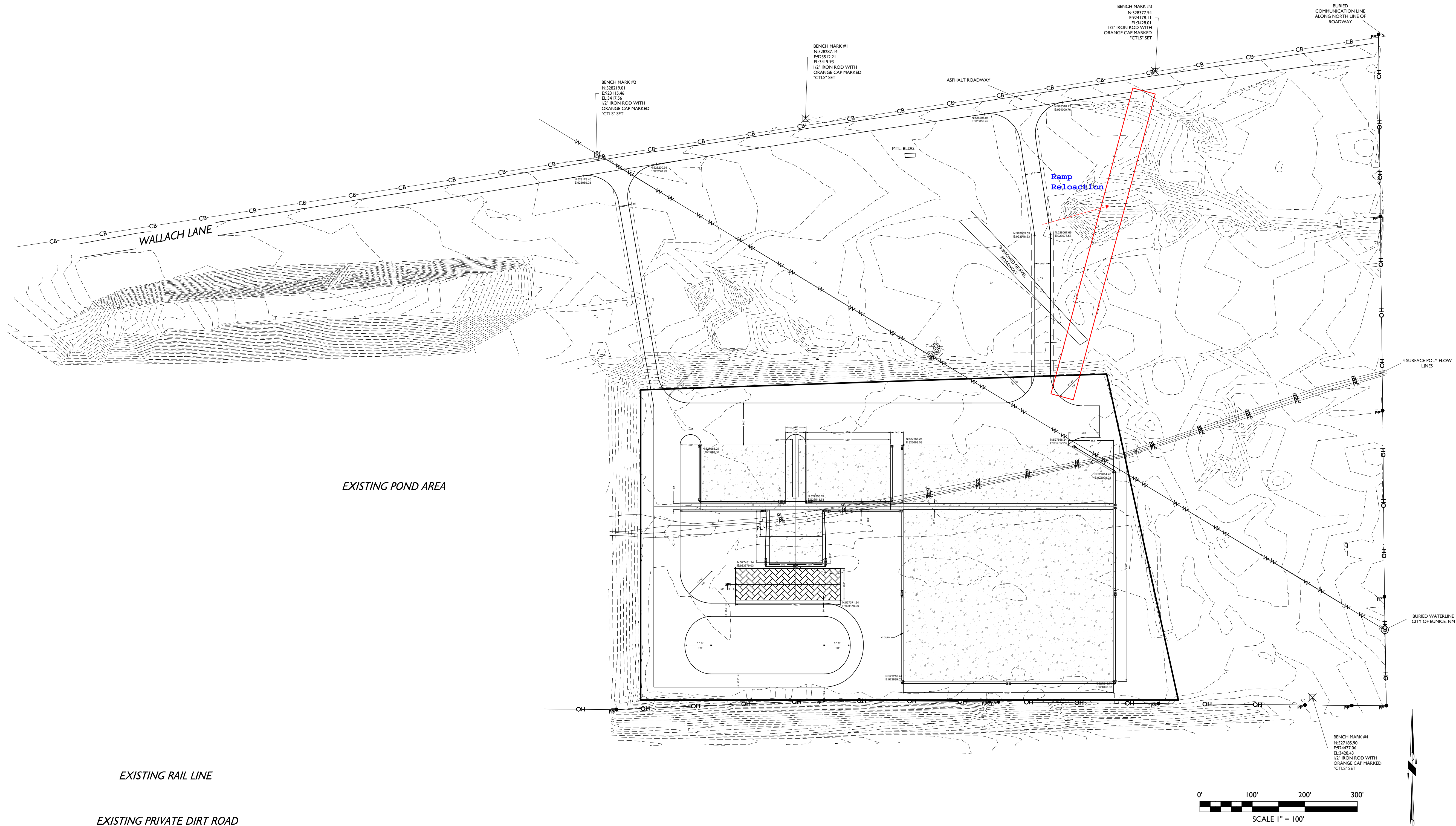


FIG 101180156-ONYX-SUNDANCE WEST-DRAWING-LINER-OPTION1180156 FINAL S&S SET 180555 C120 SITE LAYOUT DIMENSIONAL.DWG
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Know what's below.
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KEY LIST:

- | | |
|---|---|
| A. DRY MUD OUT
300-FT. x 300-FT
CONCRETE | D. OIL / WATER PROCESS
200-FT x 60-FT
HDPE LINER |
| B. MUD OUT / JET OUT
8 VEHICLES
160-FT x 110-FT
CONCRETE | E. BASE ROADWAY
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE |
| C. SUMP
100-FT x 100-FT x 17.6-FT
CONCRETE | F. NATURAL GROUND
PREPARED TO NATURAL GRADE |
| | 1. FLUME ACCESS RAMP
12-FT WIDE CONCRETE |
| | 2. SUMP ACCESS RAMP
12-FT WIDE CONCRETE DRIVE SLAB |

BENCHMARK:

BEARINGS, DISTANCES AND COORDINATES SHOWN ARE RELATIVE TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM, EASTERN NM ZONE, NAD 1983. ELEVATIONS ARE BASED ON GPS OBSERVATIONS CONFORMING TO NAVD 1988.

BENCHMARK #1: 1/2" IRON ROD W/ ORANGE CAP, CTLS N: 528287.14 E: 923512.21 ELEVATION: 3419.93	BENCHMARK #3: 1/2" IRON ROD W/ ORANGE CAP, CTLS N: 528377.14 E: 924178.11 ELEVATION: 3428.01
BENCHMARK #2: 1/2" IRON ROD W/ ORANGE CAP, CTLS N: 528219.01 E: 923115.46 ELEVATION: 3417.56	BENCHMARK #4: 1/2" IRON ROD W/ ORANGE CAP, CTLS N: 527185.90 E: 924477.06 ELEVATION: 3428.43

SURVEY PERFORMED BY MARK R. WATSON, RPLS. CONTACT CROSS TEXAS LAND SERVICES, INC. FOR ADDITIONAL BENCHMARKS OR CONTROL STAKING 877-347-6883

LEGEND

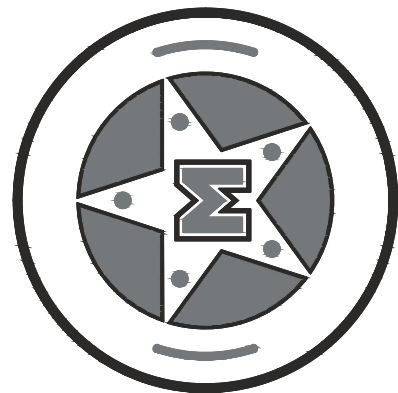
- | | |
|--|---|
| | DENOTES BENCH MARK |
| | DENOTES EXISTING FIRE HYDRANT |
| | DENOTES EXISTING POWER POLE |
| | DENOTES EXISTING WATER VALVE |
| | DENOTES EXISTING OVERHEAD ELECTRIC LINE |
| | DENOTES EXISTING UNDERGROUND CABLE LINE |
| | DENOTES EXISTING WATER LINE |
| | DENOTES EXISTING UNDERGROUND PIPELINE |
| | DENOTES EXISTING CONTOUR |
| | DENOTES PROPOSED FLUME/DRAIN |
| | DENOTES PROPOSED SITE ROAD |

- | | |
|--|----------------------------|
| | DENOTES TRAFFIC FLOW |
| | DENOTES PROCESS WATER FLOW |
| | DENOTES PROPOSED CONCRETE |

AERIAL NOTE:

AERIAL IMAGE IS SHOWN FOR GENERAL ORIENTATION. PLACEMENT OF THE IMAGE IS NOT EXACT, WHERE THERE IS A DISCREPANCY REFER TO THE LINWORK AND POINTS FROM THE ACTUAL SURVEY DRAWING.

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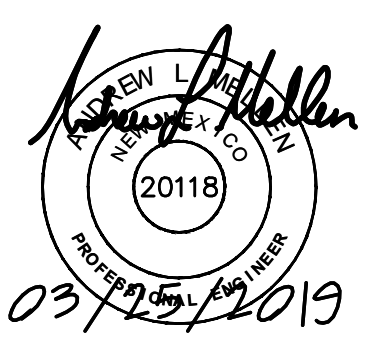


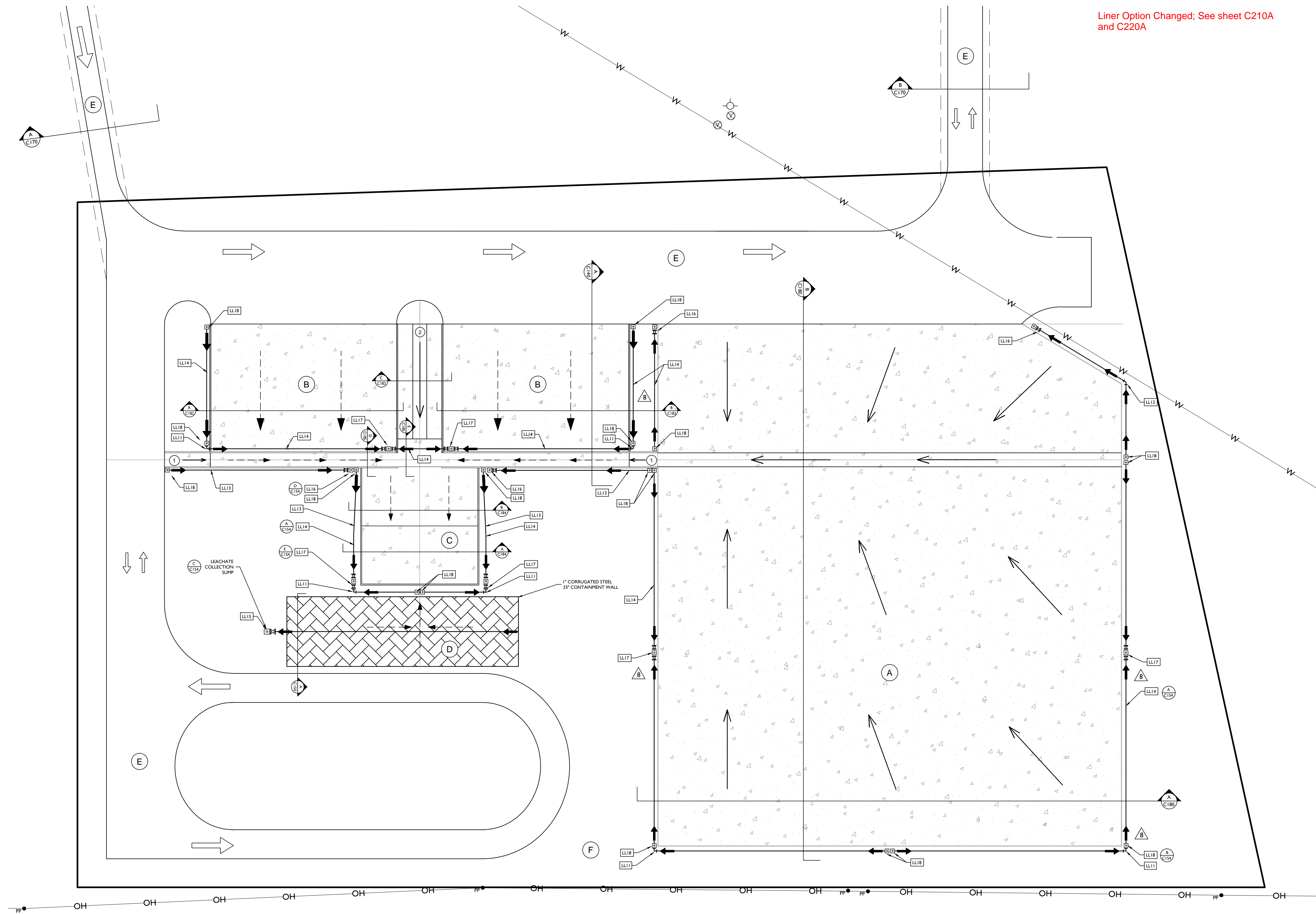
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DATE:	04/11/2019
JOB:	180156

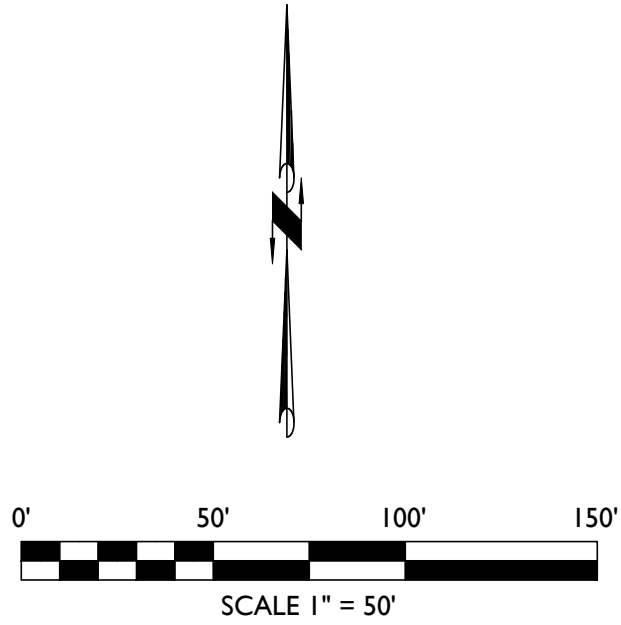
SITE LAYOUT DIMENSIONAL

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO





Liner Option Changed; See sheet C210A and C220A



LEGEND

- DENOTES BENCH MARK
- DENOTES EXISTING FIRE HYDRANT
- DENOTES EXISTING WATER VALVE
- DENOTES EXISTING OVERHEAD ELECTRIC LINE
- DENOTES EXISTING UNDERGROUND CABLE LINE
- DENOTES EXISTING WATER LINE
- DENOTES EXISTING UNDERGROUND PIPELINE
- DENOTES EXISTING PAD, 1000' x 600'
- DENOTES PROPOSED FLUME/DRAIN
- DENOTES PROPOSED LEACHATE PIPE
- DENOTES PROPOSED SITE ROAD
- LEACHATE DETECTION SAMPLING & OBSERVATION POINT. SEE C154 FOR DETAILS
- DENOTES DRAINAGE WATER FLOW IN PROCESS AREA
- DENOTES PROCESS WATER FLOW
- DENOTES LEACHATE DETECTION FLOW IN FRENCH DRAIN
- DENOTES TRAFFIC FLOW
- DENOTES PROPOSED CONCRETE

LEACHATE COLLECTION SYSTEM CONSTRUCTION LEGEND

- LL10 - INSTALL 6" TEE, THREADED; 6" COMPRESSION COUPLINGS, 6" NIPPLES, THREADED x PE; PVC SCH 80
- LL11 - INSTALL 6" 90° BEND, THREADED; 6" COMPRESSION COUPLINGS, 6" NIPPLES, THREADED x PE; PVC SCH 80
- LL12 - INSTALL 6" 45° BEND, THREADED; 6" COMPRESSION COUPLINGS, 6" NIPPLES, THREADED x PE; PVC SCH 80
- LL13 - INSTALL 6" 11.25° BEND, THREADED; 6" COMPRESSION COUPLINGS, 6" NIPPLES, THREADED x PE; PVC SCH 80
- LL14 - INSTALL 6" SDR11 HDPE PIPE, FRENCH DRAIN (PERF. PIPE IN GRAVEL), SEE DETAIL **A / C154**
- LL15 - INSTALL RISER FOR CHECKING LEACHATE LEVEL & SAMPLING, PVC SCH 80, SEE DETAIL **C / C154**
- LL16 - INSTALL RISER WITH TEE FOR CHECKING LEACHATE LEVEL & SAMPLING, PVC SCH 80, SEE DETAIL **D / C154**
- LL17 - INSTALL RISER WITH CROSS and 2-EA. GATE VALVES FOR CHECKING LEACHATE LEVEL & SAMPLING, PVC SCH 80, SEE DETAIL **E / C154**
- LL18 - INSTALL 6" CLEAN-OUT, PVC SCH 80, SEE DETAIL **B / C154**

I. FLUME ACCESS RAMP
12-FT WIDE CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 & S-1

2. SUMP ACCESS RAMP
12-FT WIDE CONCRETE DRIVE SLAB

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 THROUGH S-5

A. DRY MUD OUT
400-FT. x 450-FT CONCRETE

DRIVE SLAB:
6" DEPTH; REINFORCING #4 BAR @ 18" OCEV.

SEE STRUCTURAL SHEET S-1.5

B. MUD OUT / JET OUT
8 VEHICLES PER UNIT
2 EA. 160-FT x 110-FT CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE SHEET C140

SEE STRUCTURAL SHEETS S-0 THROUGH S-5

C. SUMP
100-FT x 100-FT x 17.6-FT CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 THROUGH S-2

D. OIL / WATER PROCESS
200-FT x 60-FT
HDPE LINER
1" CORRUGATED STEEL 33" CONTAINMENT WALL

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE SHEET C150 & C152

E. BASE ROADWAY
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE

SEE SHEET C140 & C162

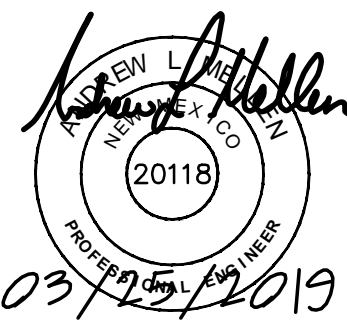
F. NATURAL GROUND
PREPARED TO NATURAL GRADE

CIVIL SITE PLAN - LINER OPTION

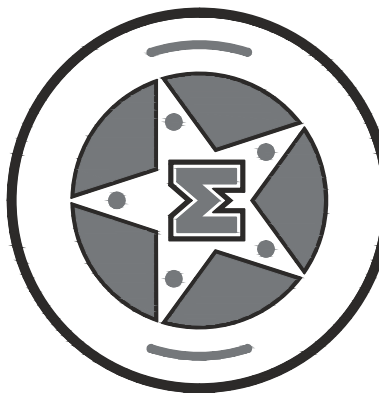
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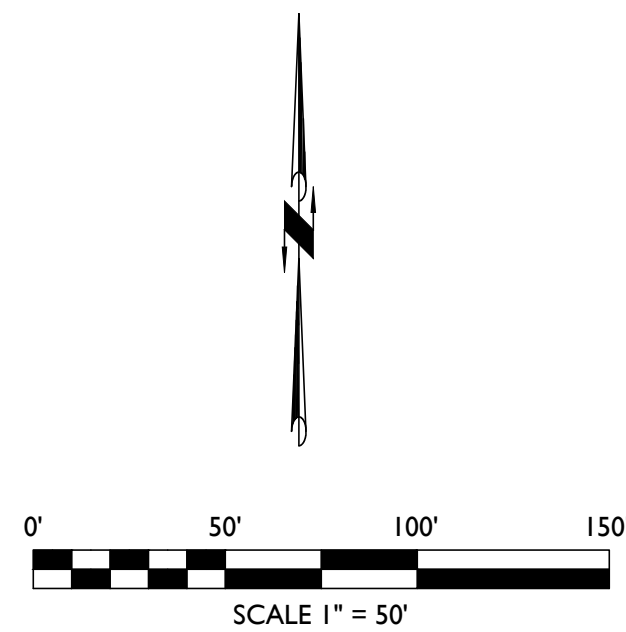
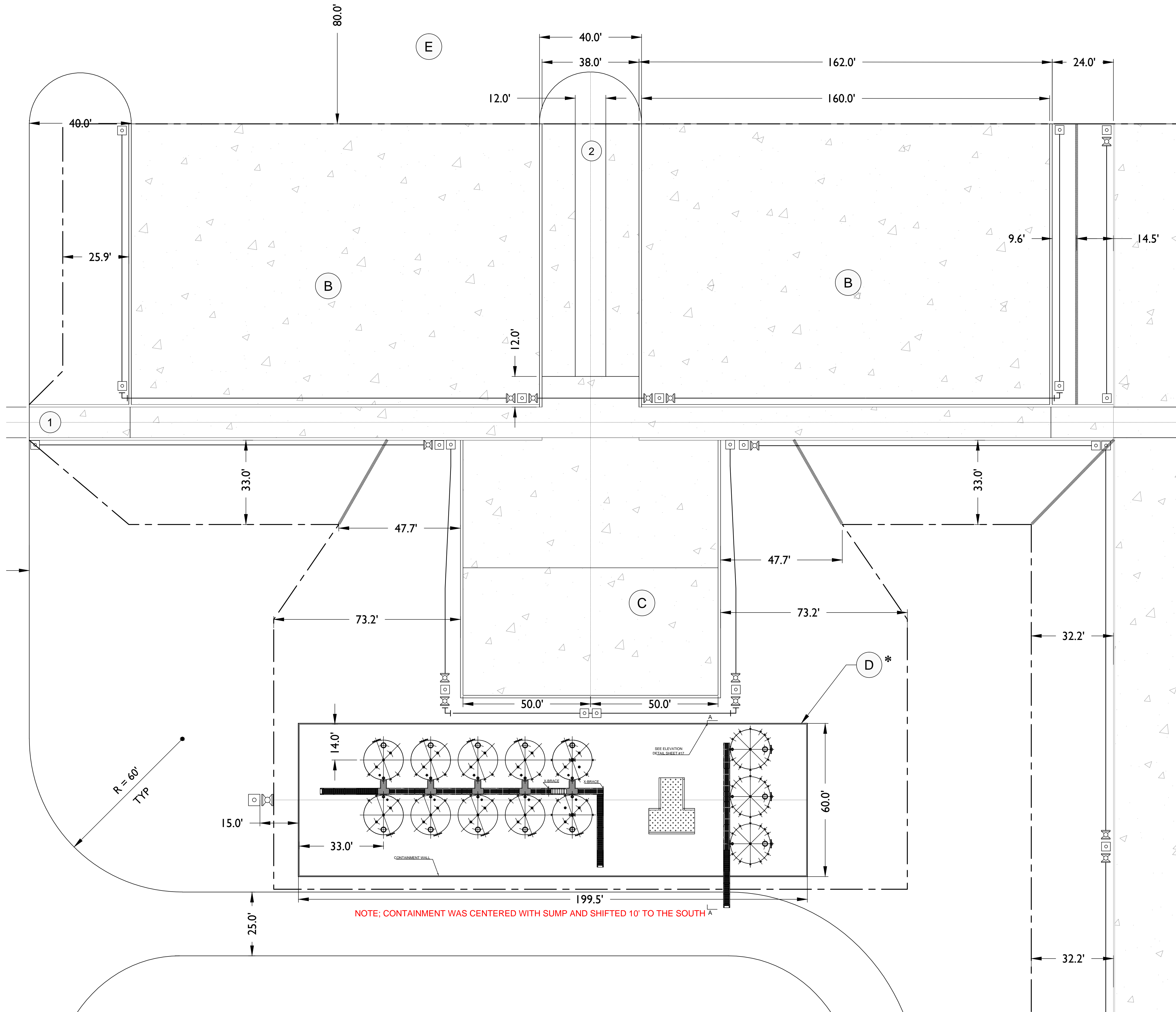
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BY	DATE	REVISIONS	APPROVED
LBW	12/18/18	3 REVISE CLEAN-OUTS AND UPDATE CALLOUTS	LBW
LBW	01/22/19	4 REVISE LEACHATE CONSTRUCTION LEGEND, ADD FLOW DIRECTION ARROWS	LBW
LBW	04/11/2019	5 REVISE LEACHATE CONSTRUCTION LEGEND AND CALLOUTS	LBW
LBW	180156	8 REVISE LEACHATE RAMP, LOSS POINT, FL SLOPE, FLOW DIRECTION ARROWS, AREA A LINER LAYOUT	LBW

F:\2018\180156-ONYX-SUNDANCE WEST\DRAWINGS\AREA D TANKS SHEETS 19.05.23\180156 C154 CIVIL SITE PLAN AREA D.DWG
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LEGEND	
	DENOTES BENCH MARK
	DENOTES EXISTING FIRE HYDRANT
	DENOTES EXISTING POWER POLE
	DENOTES EXISTING WATER VALVE
	DENOTES EXISTING OVERHEAD ELECTRIC LINE
	DENOTES EXISTING UNDERGROUND CABLE LINE
	DENOTES EXISTING WATER LINE
	DENOTES EXISTING UNDERGROUND PIPELINE
	DENOTES EXISTING PAD, 1000' x 600'
	DENOTES PROPOSED FLUME/DRAIN
	DENOTES PROPOSED LEACHATE PIPE
	DENOTES PROPOSED SITE ROAD
	DENOTES OUTSIDE EXTENT OF LINER SYSTEM, SEE DETAIL B / C186
	DENOTES PROPOSED LINER INTERSECTIONS
	LEACHATE DETECTION CLEAN-OUT & OBSERVATION POINT
	DENOTES PROPOSED CONCRETE

1. FLUME ACCESS RAMP
12-FT WIDE CONCRETE
SEE STRUCTURAL SHEET S-0 & S-1

2. SUMP ACCESS RAMP
12-FT WIDE CONCRETE DRIVE SLAB
SEE STRUCTURAL SHEET S-0 THROUGH S-5

A. DRY MUD OUT
400-FT. x 450-FT CONCRETE
SEE SHEET S-1.5

B. MUD OUT / JET OUT
8 VEHICLES PER UNIT
2-EA. 160-FT x 110-FT CONCRETE
SEE SHEET C140
SEE STRUCTURAL SHEET S-0 THROUGH S-5

C. SUMP
100-FT x 100-FT x 17.6-FT CONCRETE
SEE STRUCTURAL SHEET S-0 THROUGH S-2

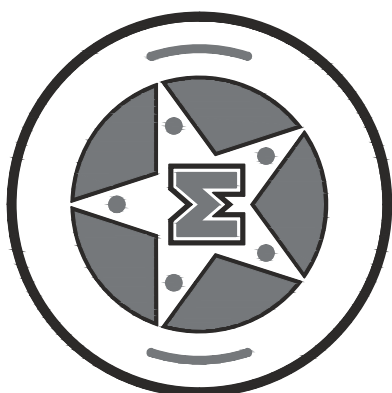
*** D. OIL / WATER PROCESS**
200-FT x 60-FT
HDPE LINER
1" CORRUGATED STEEL 33" CONTAINMENT WALL
SEE SHEET C150 & C152
* SEE SHEETS LONG I - LONG 17 FOR TANK DETAILS

E. BASE ROADWAY
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE
SEE SHEET C140 & C162

F. NATURAL GROUND
PREPARED TO NATURAL GRADE



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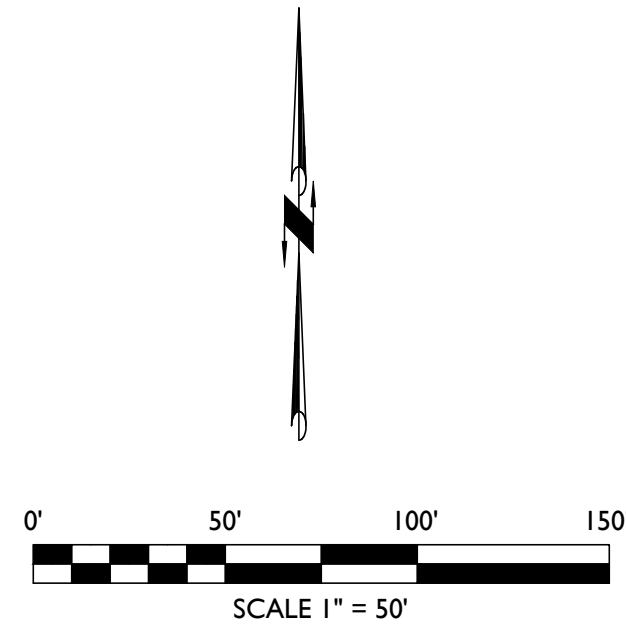
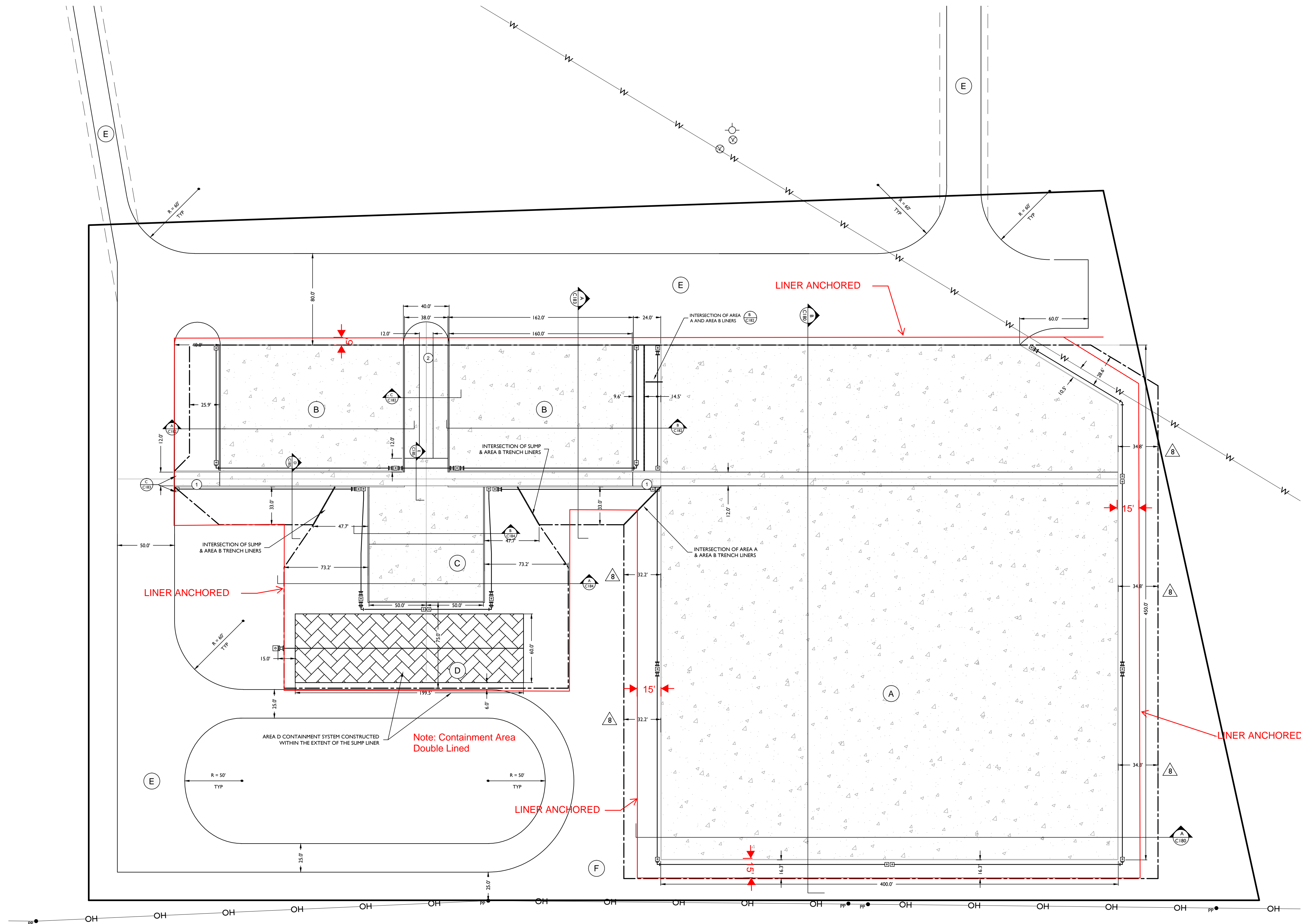
DATE					
APPL.					
BY					
REVISIONS					
Δ					
DRAWN BY:	LEW	CHECKED BY:	RET	APPROVED BY:	RET
DATE:	05/23/2019	JOB:	180156		

CIVIL SITE PLAN - AREA D TANK LAYOUT

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

PRELIMINARY REVIEW:
THESE PLANS ARE RELEASED UNDER THE SEAL OF ANDREW L. MELLEN, P.E. #106572 AND MAVERICK ENGINEERING (FIRM # F-15889) ON THIS DAY 05/23/19, FOR THE PURPOSES OF INTERIM/PRELIMINARY REVIEW. THEY SHALL NOT BE USED FOR THE PURPOSES OF CONSTRUCTION.

F:\2018\180156-ONYX-SUNDANCE WEST\DRAWINGS\LINER\OPTION1\B0156_FINAL.S&S SET\180550-C124A-CIVIL SITE PLAN LINER EXTENTS.DWG
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LEGEND

- DENOTES BENCH MARK
- DENOTES EXISTING FIRE HYDRANT
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING WATER VALVE
- DENOTES EXISTING OVERHEAD ELECTRIC LINE
- DENOTES EXISTING UNDERGROUND CABLE LINE
- DENOTES EXISTING WATER LINE
- DENOTES EXISTING UNDERGROUND PIPELINE
- DENOTES EXISTING PAD, 1000' x 600'
- DENOTES PROPOSED FLUME/DRAIN
- DENOTES PROPOSED LEACHATE PIPE
- DENOTES PROPOSED SITE ROAD
- DENOTES OUTSIDE EXTENT OF LINER SYSTEM, SEE DETAIL B / C186
- DENOTES PROPOSED LINER INTERSECTIONS
- LEACHATE DETECTION CLEAN-OUT & OBSERVATION POINT
- DENOTES PROPOSED CONCRETE

I. FLUME ACCESS RAMP
12-FT WIDE CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 & S-1

2. SUMP ACCESS RAMP
12-FT WIDE CONCRETE DRIVE SLAB

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 THROUGH S-5

A. DRY MUD OUT
400-FT. x 450-FT CONCRETE

DRIVE SLAB:
6" DEPTH; REINFORCING #4 BAR @ 18" OCEW.

SEE STRUCTURAL SHEET S-1.5

B. MUD OUT / JET OUT
8 VEHICLES PER UNIT
2 EA. 160-FT x 110-FT CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE SHEET C140

SEE STRUCTURAL SHEETS S-0 THROUGH S-5

C. SUMP
100-FT x 100-FT x 17.6-FT CONCRETE

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE STRUCTURAL SHEETS S-0 THROUGH S-2

D. OIL / WATER PROCESS
200-FT x 60-FT
HDPE LINER
1" CORRUGATED STEEL 33" CONTAINMENT WALL

SEE STRUCTURAL SITE PLAN, SHEET C126

SEE SHEET C150 & C152

E. BASE ROADWAY
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE

SEE SHEET C140 & C162

F. NATURAL GROUND
PREPARED TO NATURAL GRADE

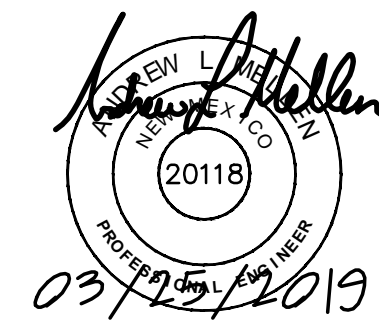
CIVIL SITE PLAN - LINER EXTENTS

ONYX CONTRACTORS

SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



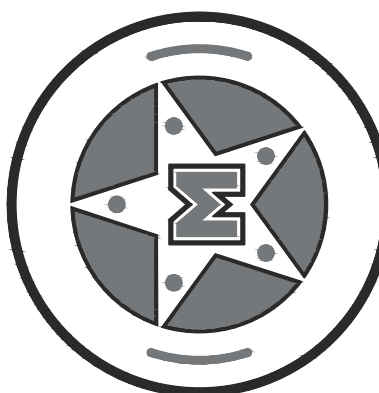
Know what's below.
Call before you dig.



SHEET
C124A
OF 18

M A V E R I C K

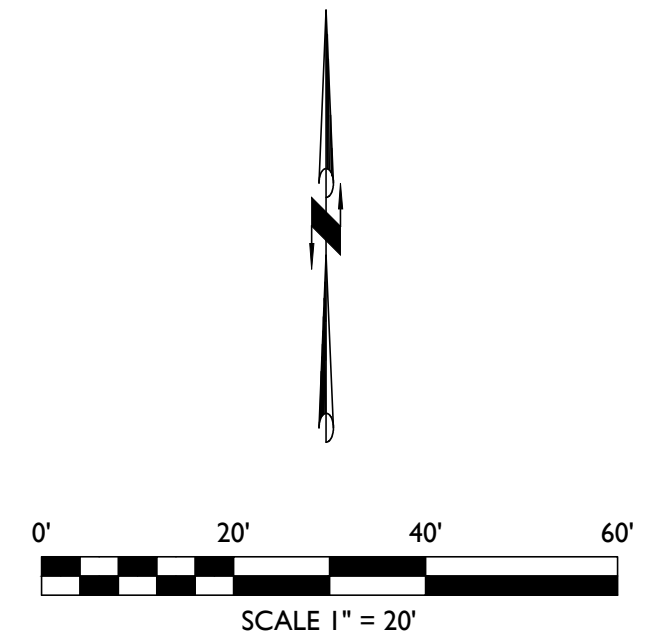
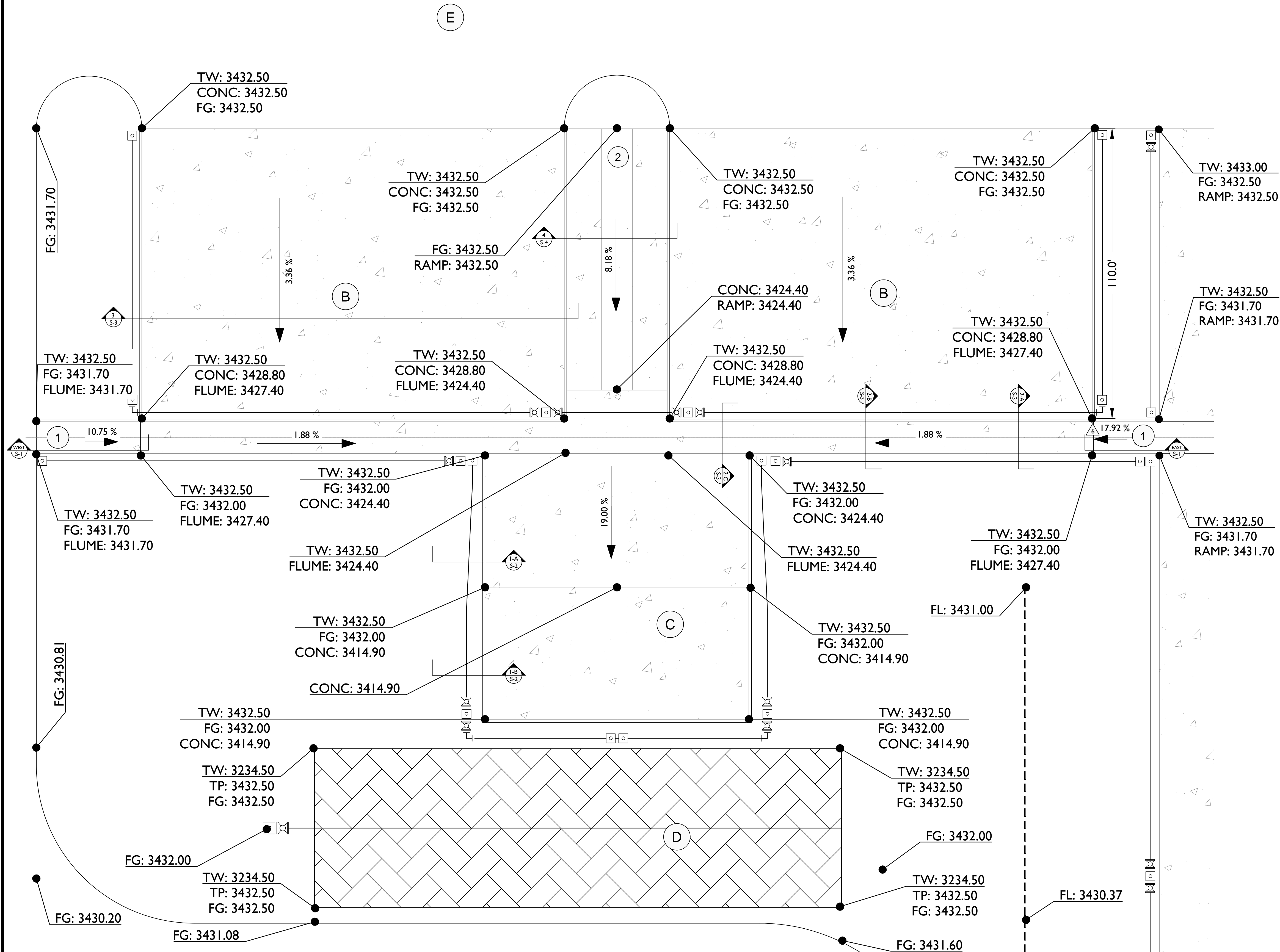
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DATE	03/25/19
APPL.	RET
BY	LBW
REVISIONS	REVISE LINER EXTENTS AROUND AREA A, UPDATES TO LEACHATE LINE VIA REVISIONS TO C122
8	
DRAWN BY:	LBW
CHECKED BY:	RET
APPROVED BY:	RET
DATE:	04/11/2019
JOB:	180156

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F:\2018\180156-ONYS-SUNDANCE WEST\DRAWING\LINER OPTION\180156_FINAL\SSS SET\180505 C126 STRUCTURAL SITE PLAN.DWG



LEGEND

	DENOTES PROPOSED MUD LOADOUT AREA
	DENOTES PROPOSED SUMP
	DENOTES PROPOSED FLUME/DRAIN
	DENOTES PROPOSED SITE ROAD
	DENOTES PROPOSED CONCRETE
TC	TOP OF CURB ELEVATION
CONC	CONCRETE ELEVATION
FG	FINISH GRADE ELEVATION
FL	FLOW LINE ELEVATION
TW	TOP OF WALL ELEVATION
TP	TOP OF PAD ELEVATION
EX	EXISTING ELEVATION
EP	EDGE OF PAVEMENT ELEVATION
	LEACHATE DETECTION SAMPLING & OBSERVATION POINT

- I. FLUME ACCESS RAMP**
12-FT WIDE CONCRETE
SEE STRUCTURAL SHEET S-0 & S-1
- 2. SUMP ACCESS RAMP**
12-FT WIDE CONCRETE DRIVE SLAB
SEE STRUCTURAL SHEET S-0 THROUGH S-5
- A. DRY MUD OUT**
400-FT. x 450-FT CONCRETE
SEE SHEET S-1.5
- B. MUD OUT / JET OUT**
8 VEHICLES PER UNIT
2-EA. 160-FT x 110-FT CONCRETE
SEE SHEET C140
SEE STRUCTURAL SHEET S-0 THROUGH S-5
- C. SUMP**
100-FT x 100-FT x 17.6-FT CONCRETE
SEE STRUCTURAL SHEET S-0 THROUGH S-2
- D. OIL / WATER PROCESS**
200-FT x 60-FT
HDPE LINER
1" CORRUGATED STEEL 33" CONTAINMENT WALL
SEE SHEET C150 & C152
- E. BASE ROADWAY**
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE
SEE SHEET C140 & C162
- F. NATURAL GROUND**
PREPARED TO NATURAL GRADE



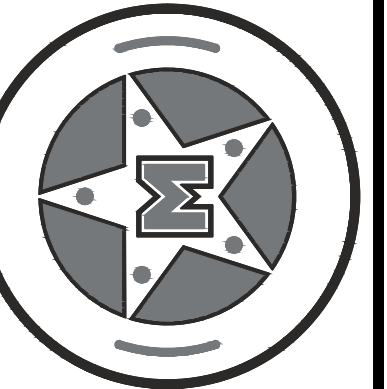
STRUCTURAL SITE PLAN

ONYS CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



SHEET **C126** OF 18

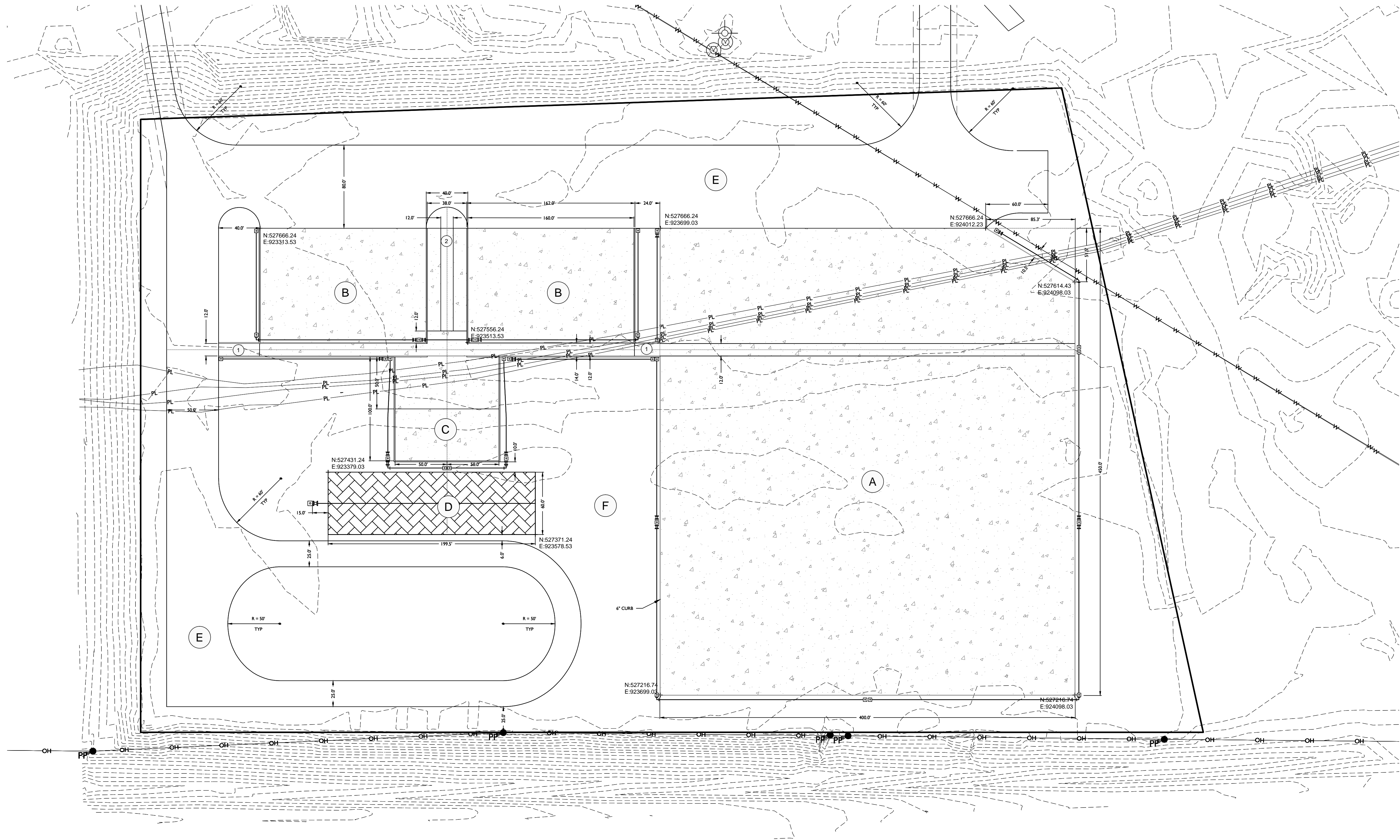
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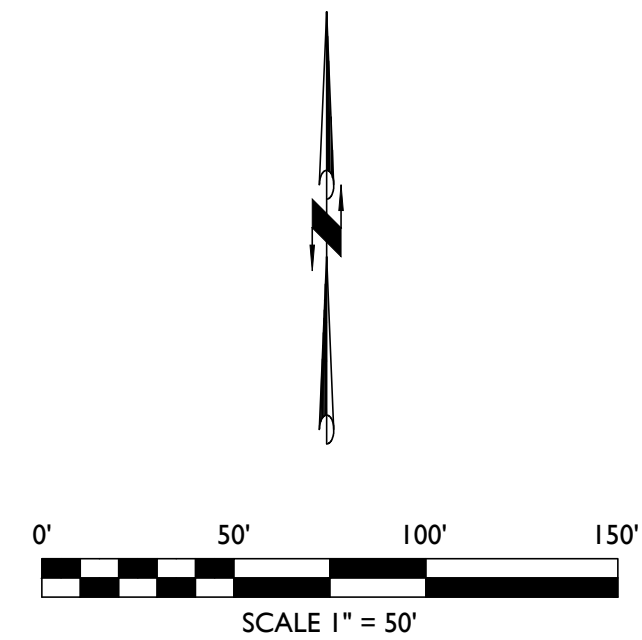


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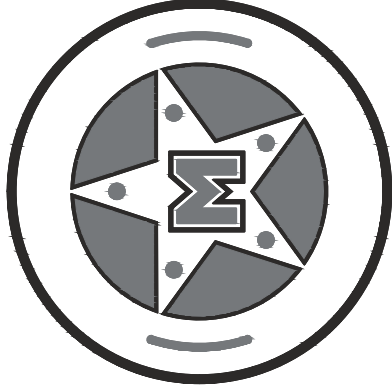
- | | |
|--|--|
| 1. FLUME ACCESS RAMP
12-FT WIDE CONCRETE | C. SUMP
100-FT x 100-FT x 17.6-FT
CONCRETE |
| 2. SUMP ACCESS RAMP
12-FT WIDE CONCRETE DRIVE SLAB | D. OIL / WATER PROCESS
200-FT x 60-FT
HDPE LINER
1" CORRUGATED STEEL 33" CONTAINMENT WALL |
| A. DRY MUD OUT
300-FT. x 300-FT
CONCRETE | E. BASE ROADWAY
8" COMPACTED BASE
12" PREPARED AND COMPACTED SUBGRADE |
| B. MUD OUT / JET OUT
8 VEHICLES PER UNIT
2 EA. 160-FT x 110-FT
CONCRETE | F. NATURAL GROUND
PREPARED TO NATURAL GRADE |

LEGEND

- | | |
|--|---|
| | DENOTES BENCH MARK |
| | DENOTES EXISTING FIRE HYDRANT |
| | DENOTES EXISTING POWER POLE |
| | DENOTES EXISTING WATER VALVE |
| | DENOTES EXISTING OVERHEAD ELECTRIC LINE |
| | DENOTES EXISTING UNDERGROUND CABLE LINE |
| | DENOTES EXISTING WATER LINE |
| | DENOTES EXISTING UNDERGROUND PIPELINE |
| | DENOTES EXISTING CONTOUR |
| | DENOTES PROPOSED FLUME/DRAIN |
| | DENOTES PROPOSED SITE ROAD |
| | DENOTES TRAFFIC FLOW |
| | DENOTES PROCESS WATER FLOW |
| | DENOTES PROPOSED CONCRETE |



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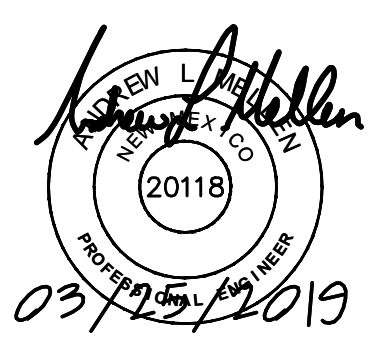


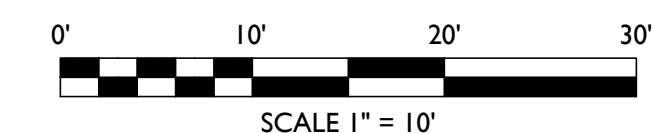
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SURVEY FIRM # 1019452
Tel: (432) 262-0999 Fax: (432) 262-0989
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REVISIONS	BY	DATE
Δ		
DRAWN BY: LEW		
CHECKED BY: RET		
APPROVED BY: RET		
DATE: 04/11/2019		
JOB: 180156		

MUD SITE LAYOUT DIMENSIONAL

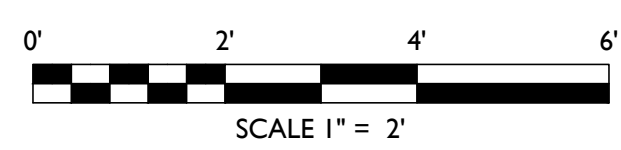
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO







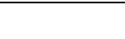
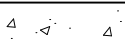

0' 10' 20' 30'

SCALE 1" = 10'



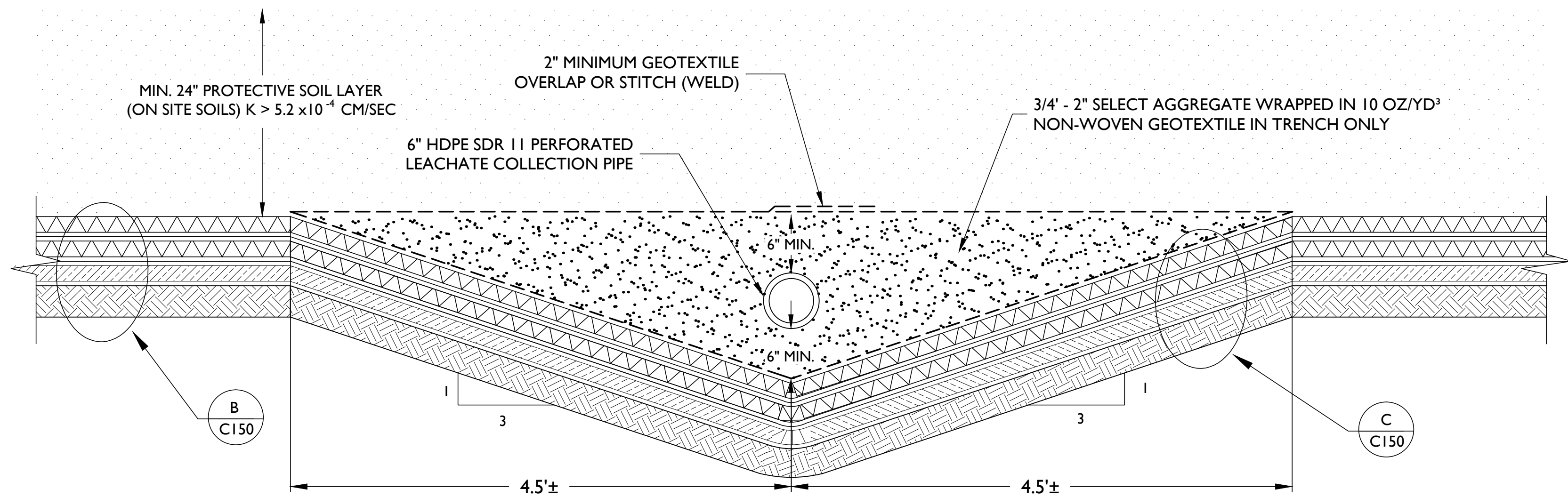
0' 2' 4' 6'

SCALE 1" = 2'

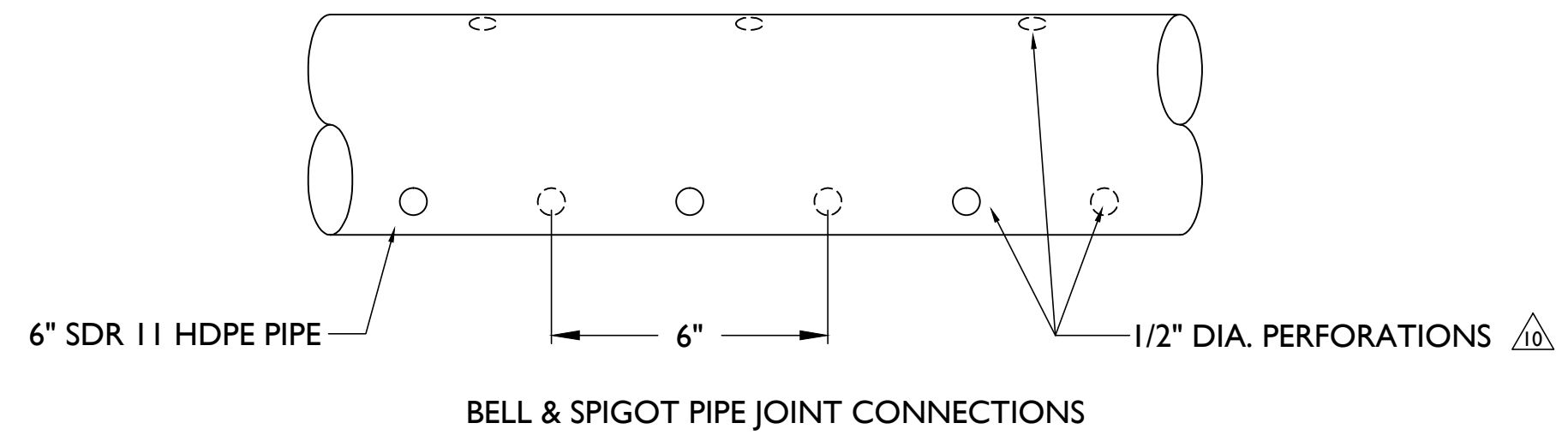
	DENOTES PROPOSED FLUME/DRAIN
	DENOTES PROPOSED CONCRETE ROAD
	DENOTES PROPOSED CONCRETE
	DENOTES PROPOSED REINFORCED CONCRETE
	DENOTES PROPOSED COMPACTED BASE



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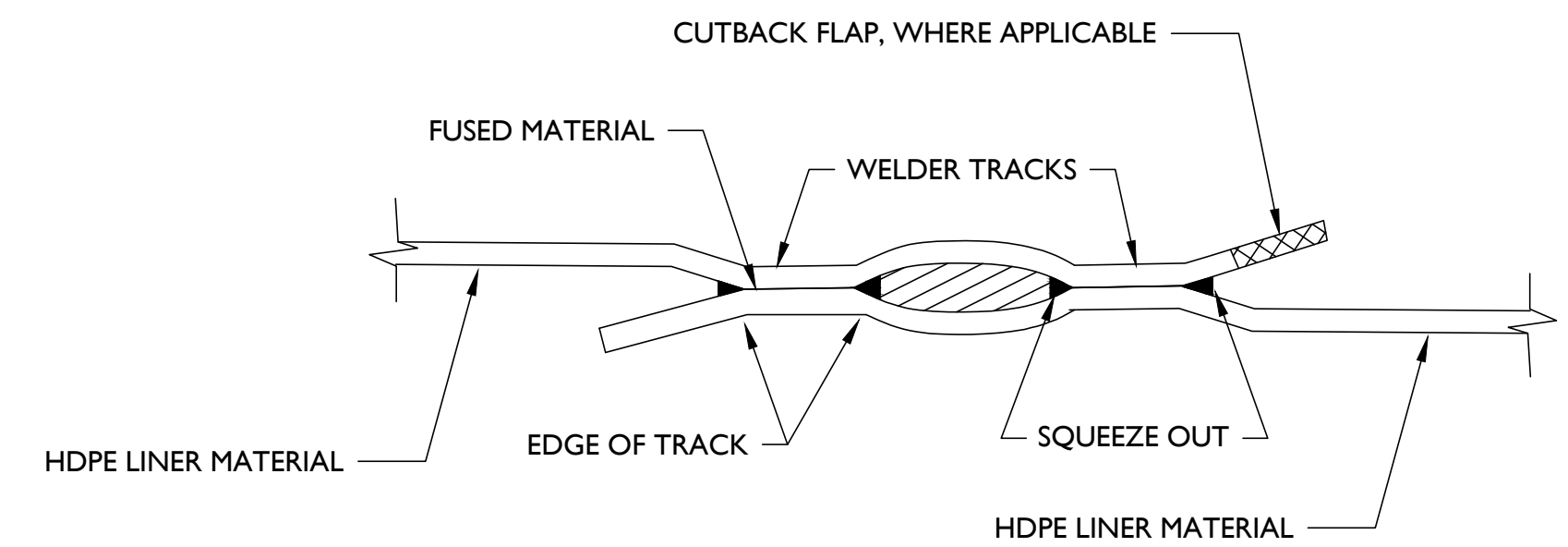
D LEACHATE COLLECTION TRENCH AND PIPE
NOT TO SCALE SECTION VIEW



THE SLOPE OF THE FRENCH DRAINS, DRAINAGE LINES AND LATERALS SHALL BE AT LEAST TWO PERCENT GRADE, I.E., TWO FEET VERTICAL DROP PER 100 HORIZONTAL FEET.

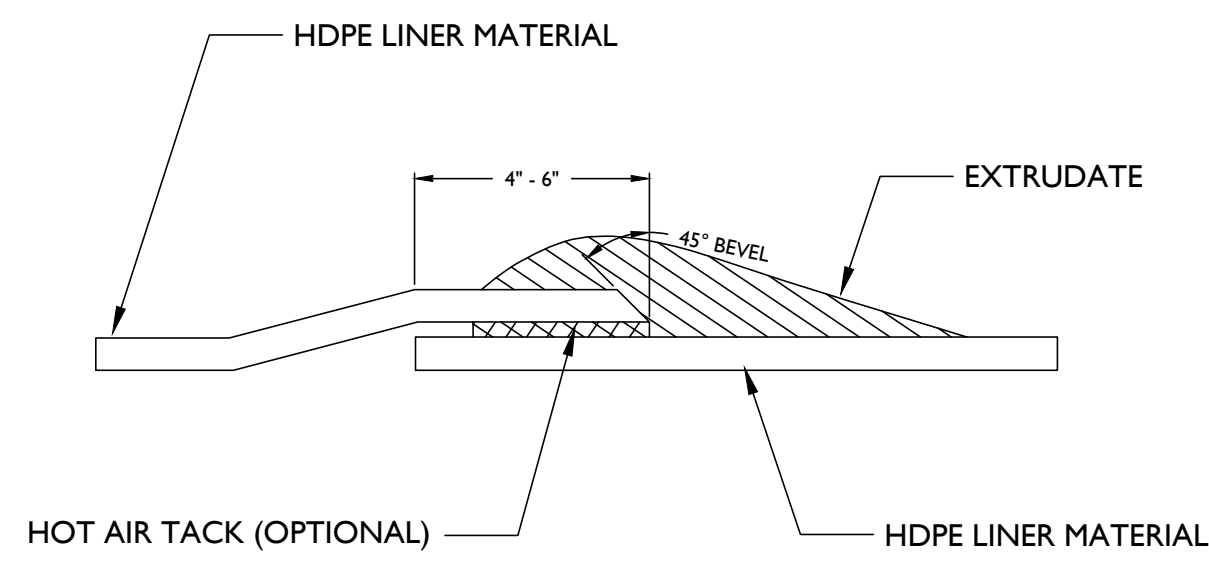
E PERFORATED LEACHATE COLLECTION PIPE
NOT TO SCALE SECTION VIEW

LEGEND			
	DENOTES PROPOSED PIPE		DENOTES EARTHEN SOIL COVER
	DENOTES PROPOSED GEOSYNTHETIC		DENOTES PREPARED SUBGRADE
	DENOTES PROPOSED GEONET LAYER		DENOTES AGGREGATE FILL
	DENOTES PROPOSED HDPE LINER		
	DENOTES PROPOSED GEOTEXTILE		



- NOTES
- BOTH AREAS OF FUSED MATERIAL SHOULD BE VOID OF ANY SEAM LINES
 - EDGE OF TRACKS NOT TO CUT THE LINER
 - AIR CHANNEL SHOULD BE CLEAR
 - BOTH WELDER TRACKS SHALL BE EQUAL WIDTHS
 - SQUEEZE OUT SHOULD BE JUST BARELY VISIBLE IN ALL FOUR LOCATIONS WHEN VIEWED IN THE TEST CROSS SECTION
 - ALL DOUBLE TRACK FUSION WELDS SHALL BE AIR PRESSURE TESTED

F TYP. DOUBLE TRACK FUSION WELD
NOT TO SCALE SECTION VIEW



- NOTES
- ALL EXTRUSION WELDS SHALL BE VACUUM TESTED

G TYP. EXTRUSION WELD
NOT TO SCALE SECTION VIEW

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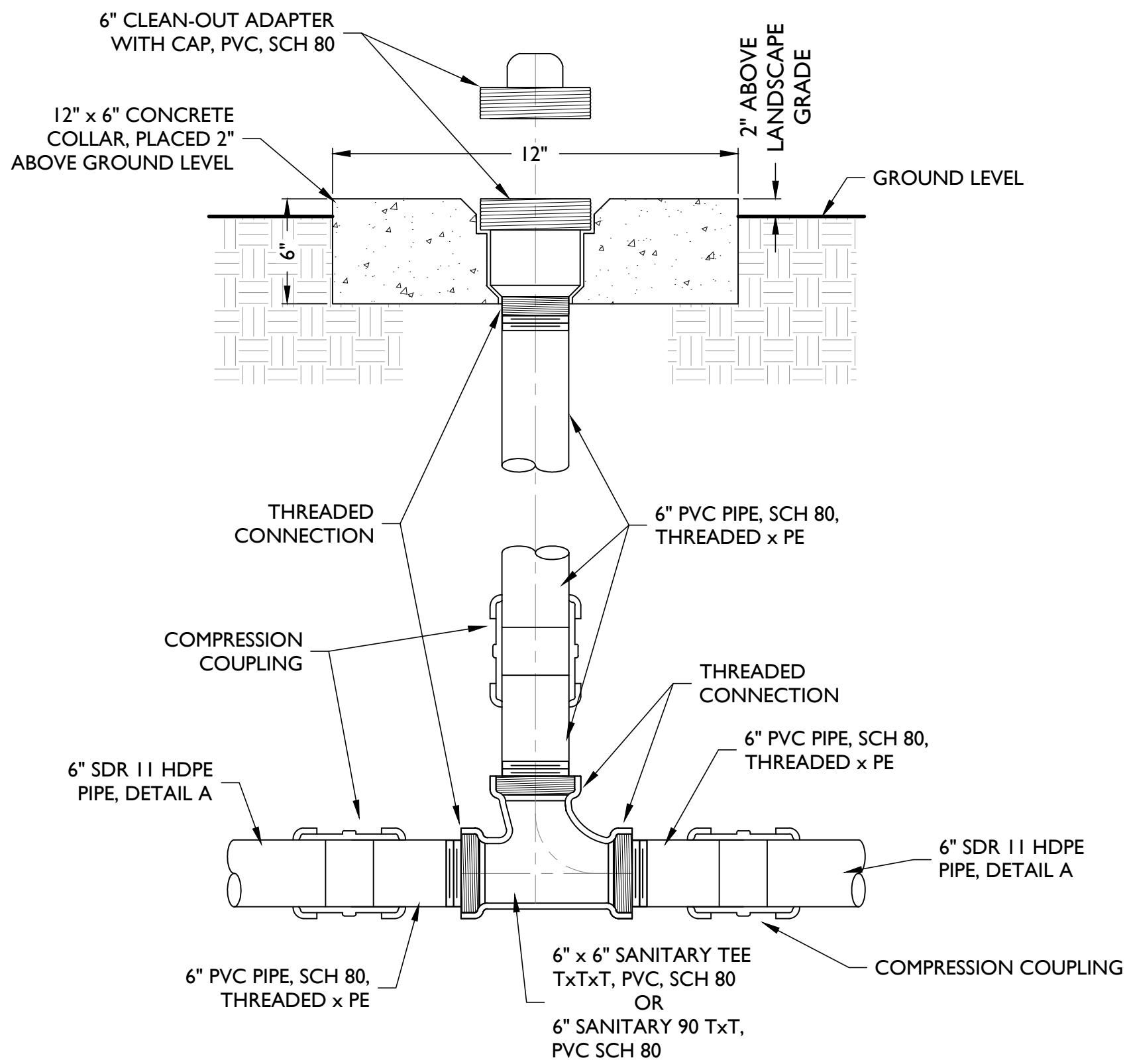
DATE	12/14/18
APPL.	RET
BY	LBW
REVISIONS	2 UPDATE DETAIL D WITH ADDITIONAL DETAIL & CALLOUTS FOR LINER
APPL.	RET
BY	LBW
REVISIONS	3 UPDATE DETAIL D GEOTEXTILE OVERLAP & CALLOUTS
APPL.	RET
BY	LBW
REVISIONS	4 ADD NOTE UNDER PERFORATED PIPE
APPL.	RET
BY	LBW
REVISIONS	10 REVISE DIA. OF PERFORATIONS ON PIPE FROM 1/2" TO 1/2"
APPL.	RET
BY	LBW

SECTIONS AND DETAILS - AREA D
LINER SYSTEM

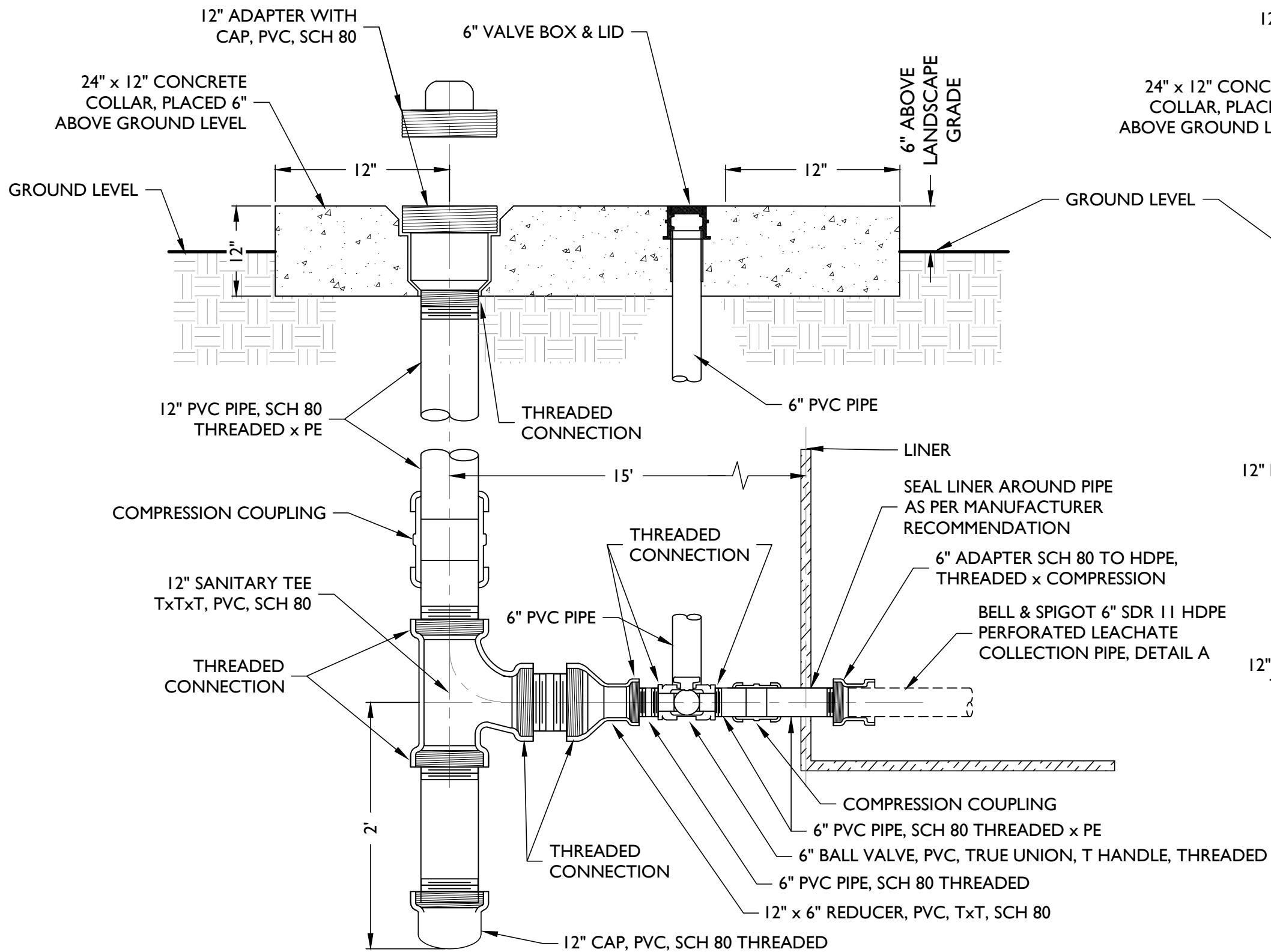
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

SHEET
CI52
OF 18

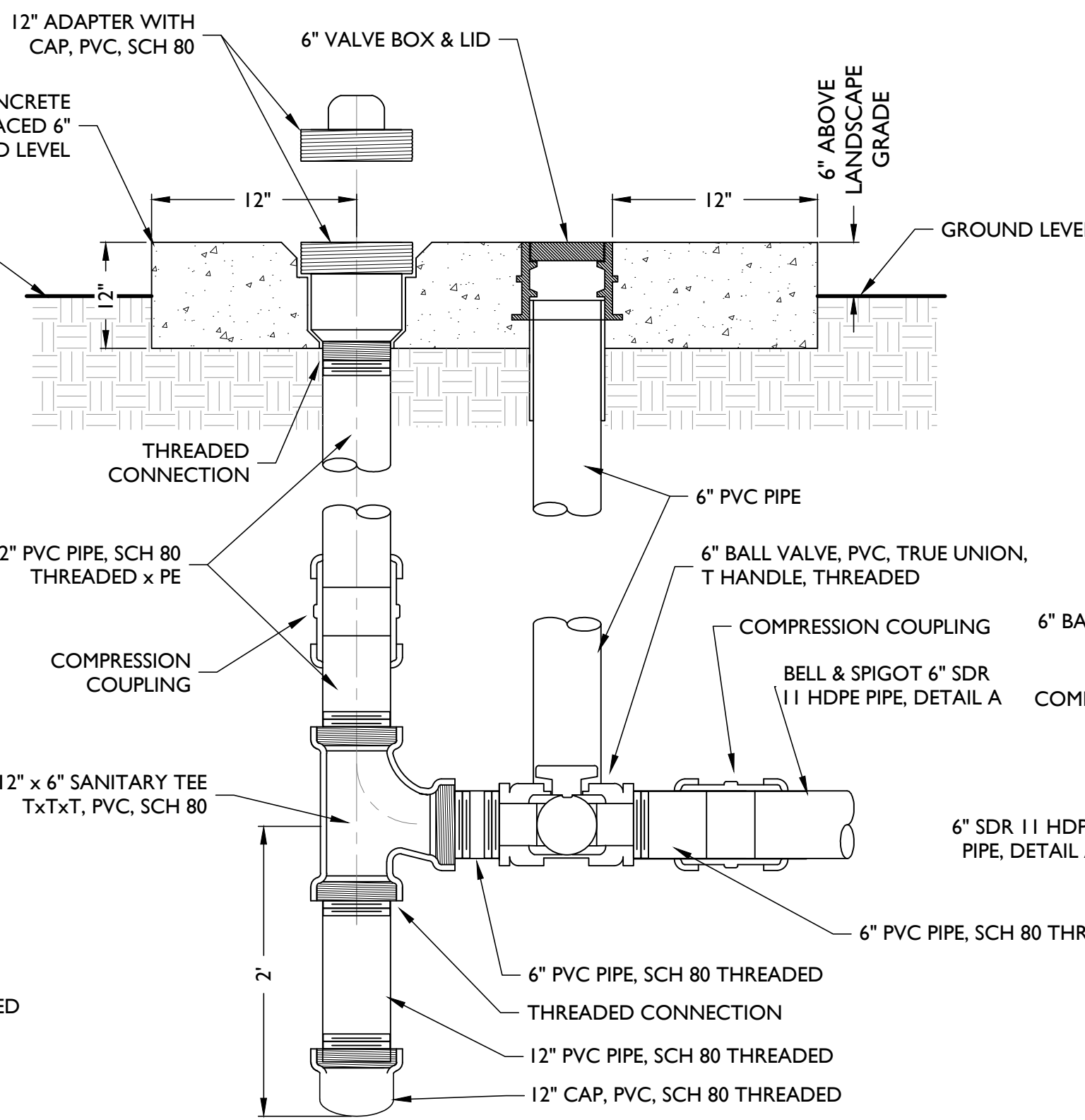
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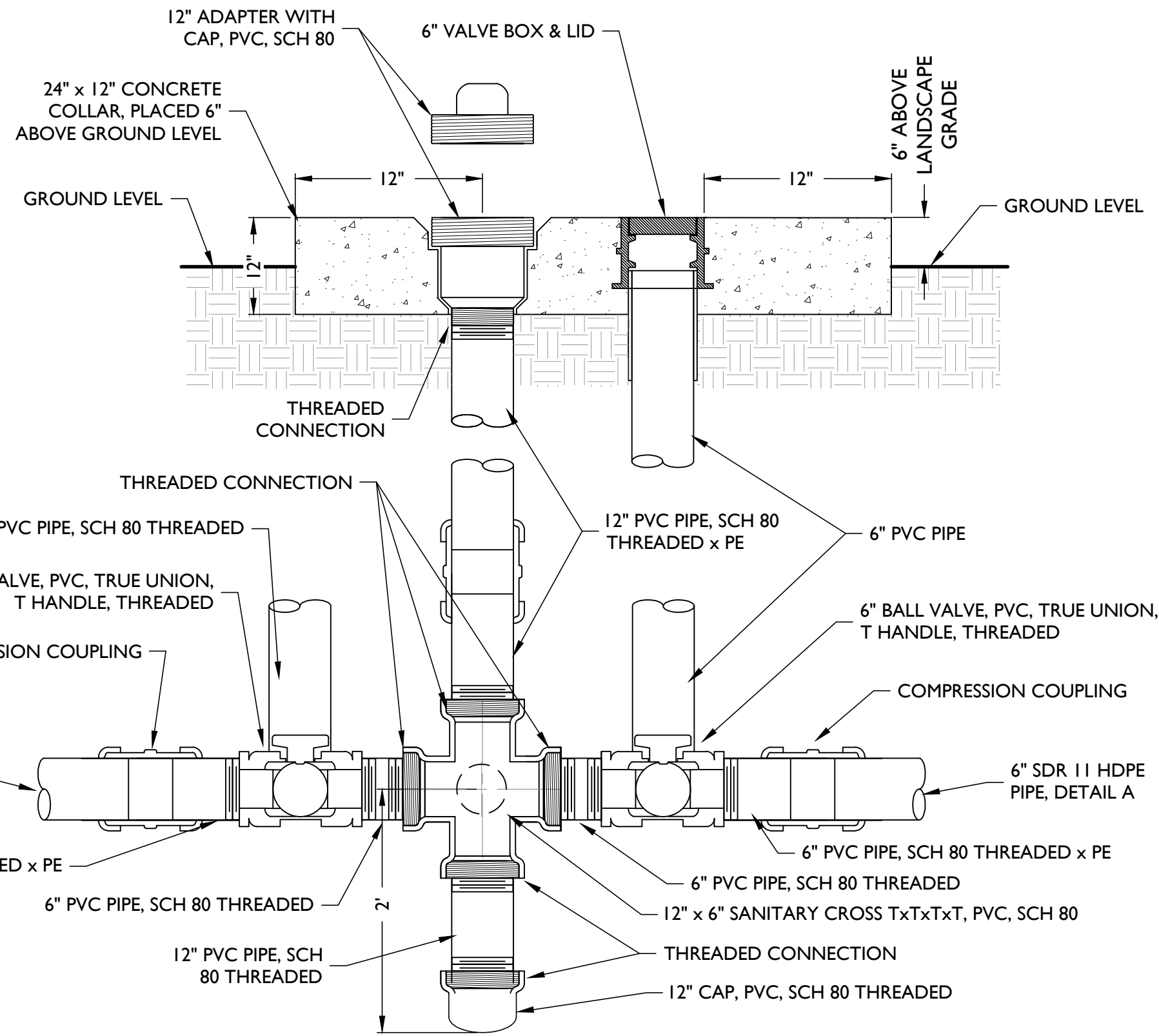
B ONEWAY CLEAN-OUT DETAIL
NOT TO SCALE



C LEACHATE COLLECTION SUMP
NOT TO SCALE

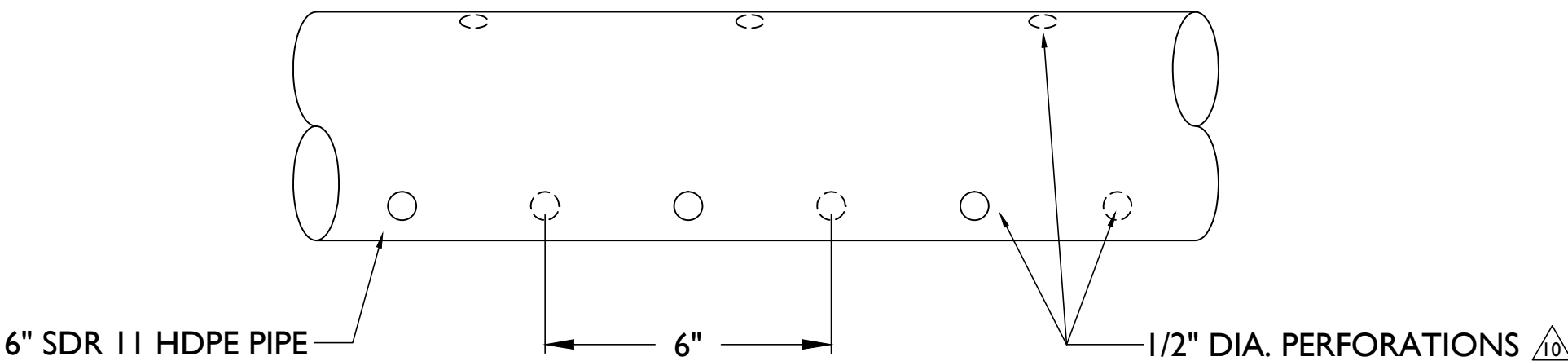


D LEACHATE CLEAN-OUT & OBSERVATION POINT
NOT TO SCALE



E IN-LINE LEACHATE CLEAN-OUT & OBSERVATION POINT
NOT TO SCALE

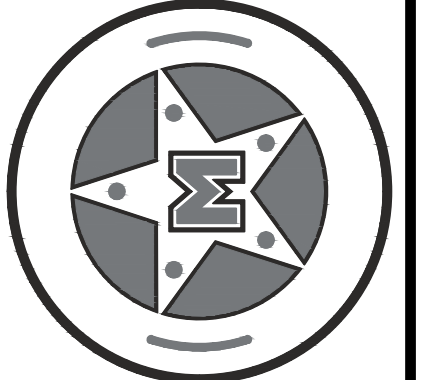
PIPE FITTINGS CONNECTIONS WERE REPLACED BY HDPE FITTINGS AND FUSION



A PERFORATED FRENCH DRAIN COLLECTION PIPE
NOT TO SCALE

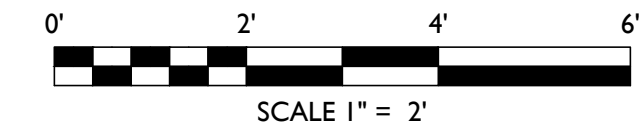
THE SLOPE OF THE FRENCH DRAINS, DRAINAGE LINES AND LATERALS SHALL BE AT LEAST TWO PERCENT GRADE, I.E., TWO FEET VERTICAL DROP PER 100 HORIZONTAL FEET.

LEGEND	
	DENOTES EXISTING GROUND LEVEL
	DENOTES PROPOSED PIPE
	DENOTES PROPOSED ROAD
	DENOTES PROPOSED CONCRETE
	DENOTES EXISTING GROUND LEVEL

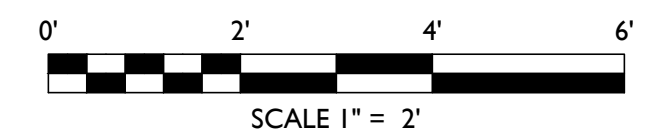


DATE	12/5/18	12/18/18	01/22/19	01/22/19	04/16/19
APPROVED BY	LBW	RET	LBW	RET	LBW
REVISIONS	1 REMOVE DETAIL A - CLEANOUT & PIPE DETAILS	3 REMOVE DETAIL B, ADD DETAIL A	4 ADD NOTE UNDER PERFORATED PIPE, ADD DETAIL B, REVISE COMPRESSION CONNECTIONS TO THREADED	5 ADD BALL VALVE AND REVISE CALLOUTS FOR DETAILS C, D, & E	10 REVISE DIA. OF PERFORATIONS ON PIPE FROM 1/2" TO 1/4"
DRAWN BY	LBW	RET	LBW	RET	LBW
CHECKED BY	RET	RET	LBW	RET	LBW
APPROVED BY	RET	RET	LBW	RET	LBW
DATE	04/11/2019				
JOB	180156				

SECTIONS AND DETAILS - LEACHATE COLLECTION SYSTEM & CLEAN-OUTS
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



B TWO LANE EXIT ROAD
CROSS SECTION OF TYPICAL LAYOUT











DENOTES PROPOSED ROAD COMPACTED BASE





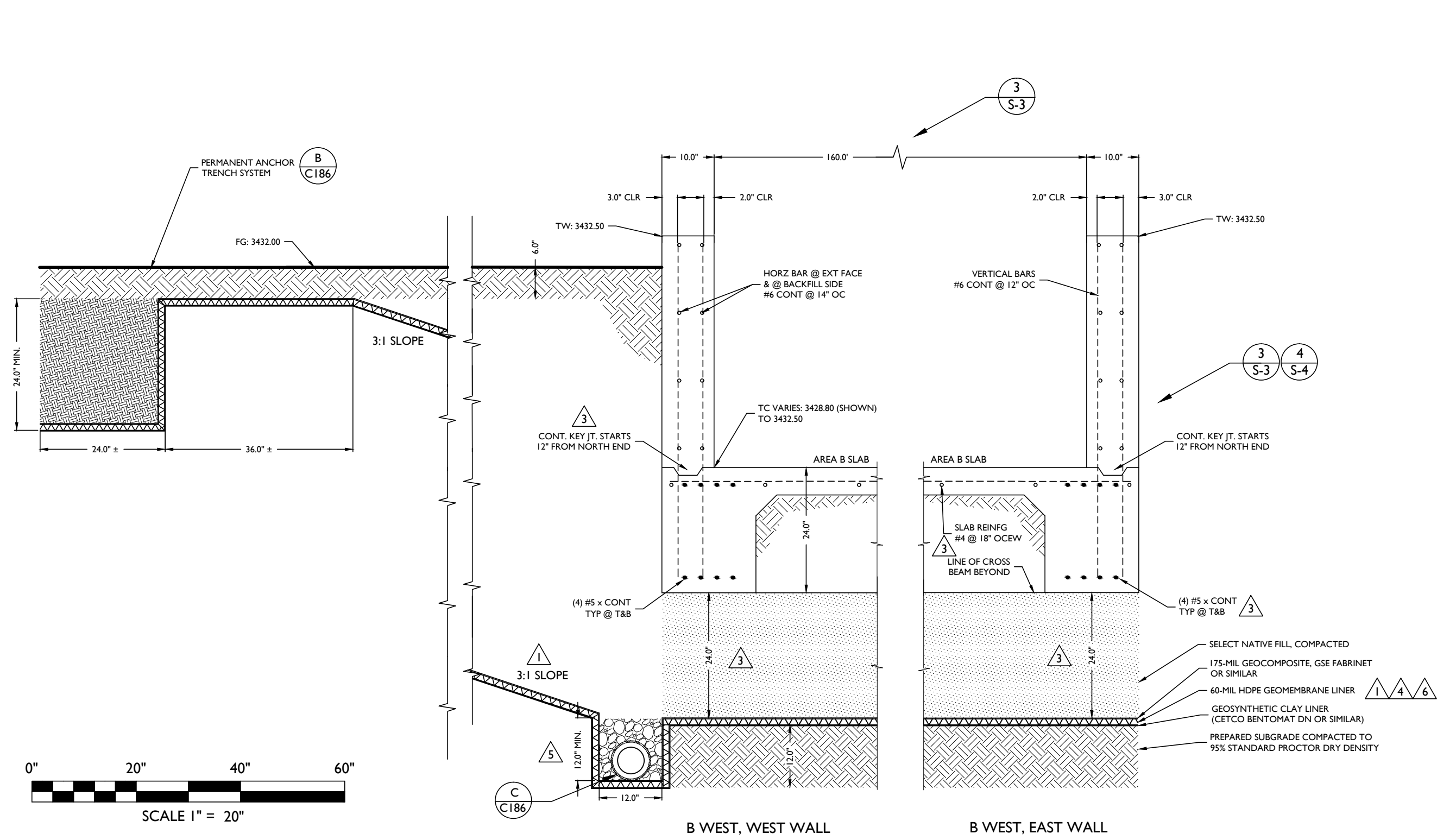
LEGEND

	DENOTES EXISTING GROUND LEVEL		DENOTES EARTHEN SOIL COVER
	DENOTES PROPOSED PIPE		DENOTES PREPARED SUBGRADE
	DENOTES PROPOSED LINER SYSTEM		DENOTES COMPACTED BACKFILL
	DENOTES PROPOSED GEOTEXTILE LINER		DENOTES PROPOSED CONCRETE

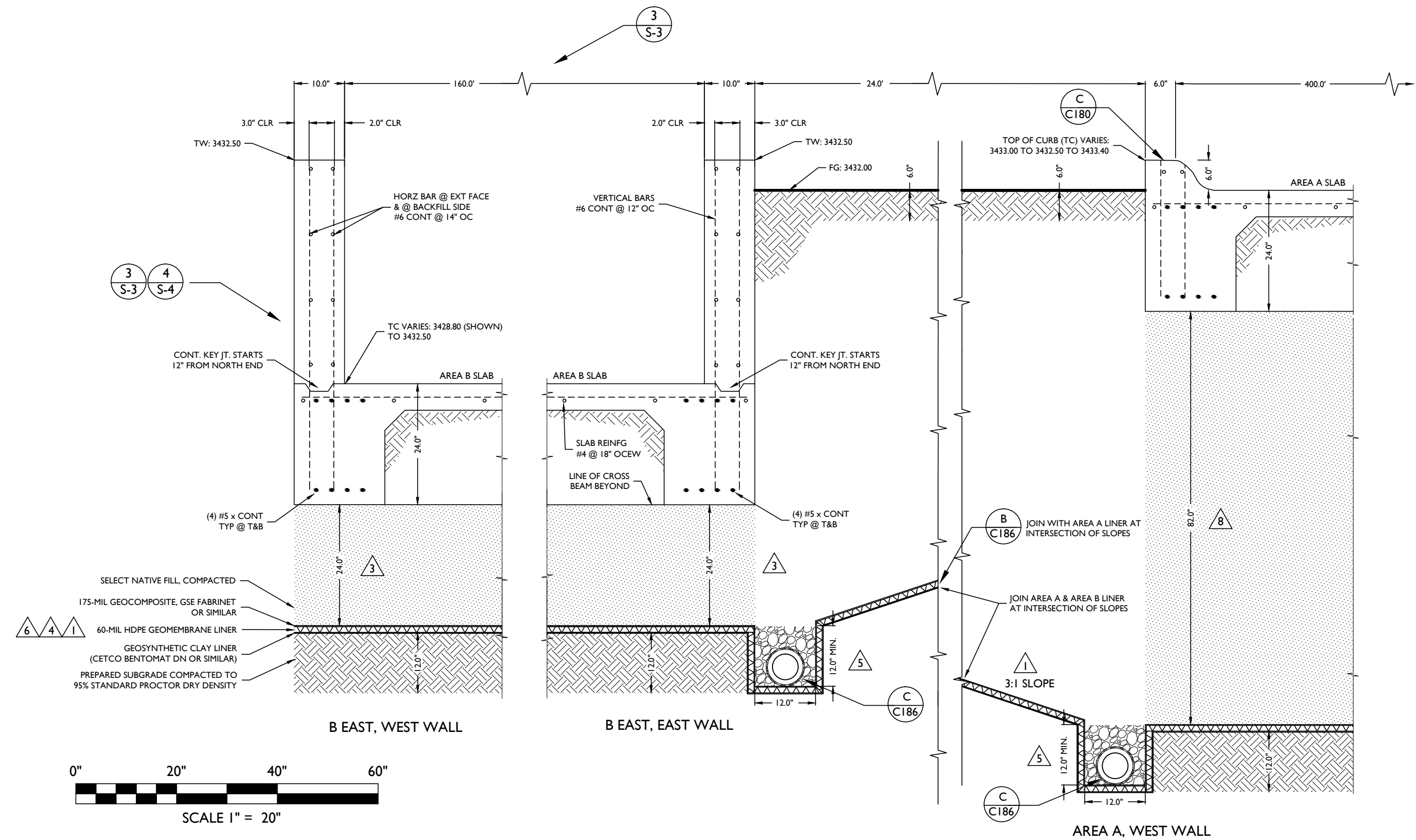
Δ	REVISIONS	BY	APPR.	DATE
1	REVISE LINER SLOPE TO 3:1. UPDATE LINER FROM 60"HL TO 60"HL	LEW	RET	12/05/18
3	REVISE 12"OF BETWEEN CONCRETE AND LINER TO 24"OF AND DETAIL D	LEW	RET	12/08/18
4	REVISE LINER CALLOUT TO DRINK DOUBLE-SIDED TEXTURED	LEW	RET	01/12/19
5	REVISE 13.2" TO 13.7" FOR FLOW LINE TRENCH DEPTH	LEW	RET	02/04/19
6	REVISE LINER FROM 60"HL TO 60"HL & UPDATE LINER CALLOUTS	LEW	RET	02/20/19
8	REVISE 24"OF TO 24"OF MIN FOR DEPTH BETWEEN CONCRETE AND LINER	LEW	RET	03/25/19

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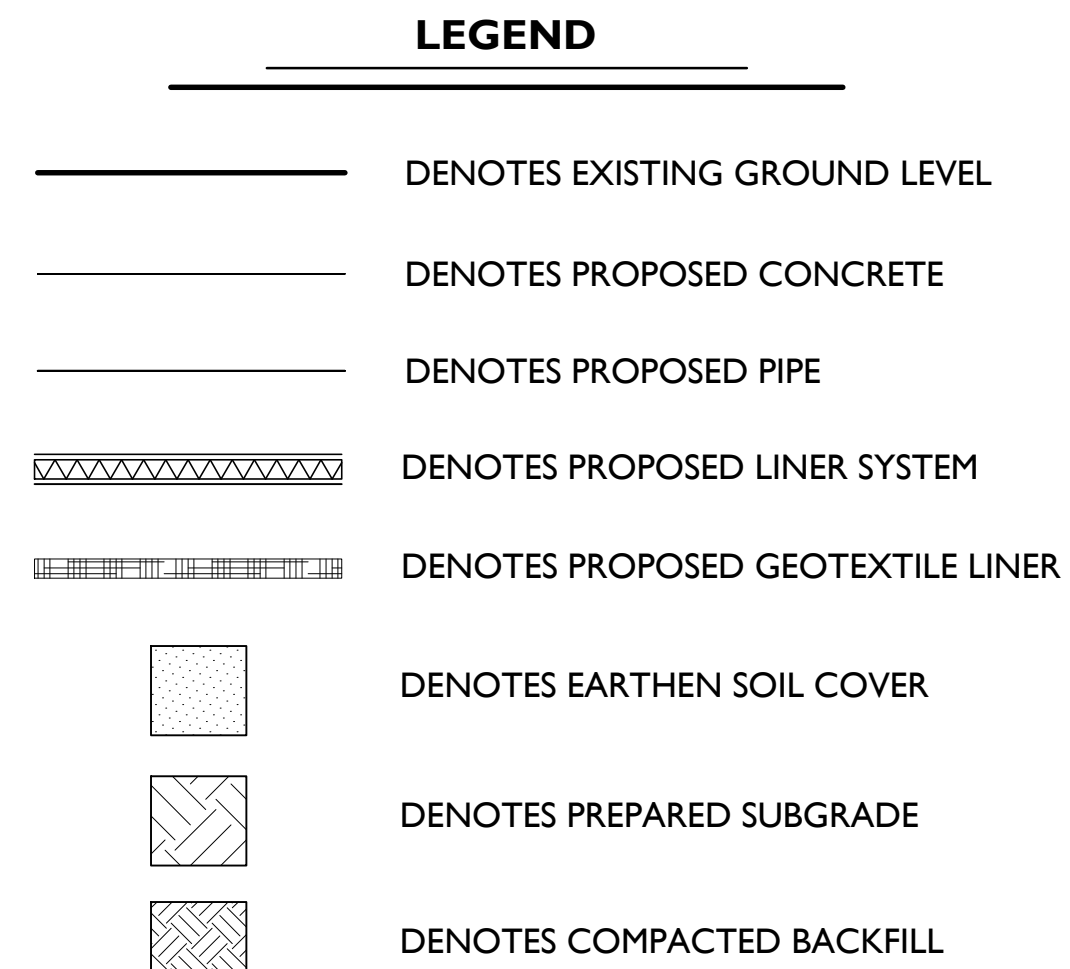
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A FLOOR LINER SYSTEM, AREA B WEST
SECTION VIEW



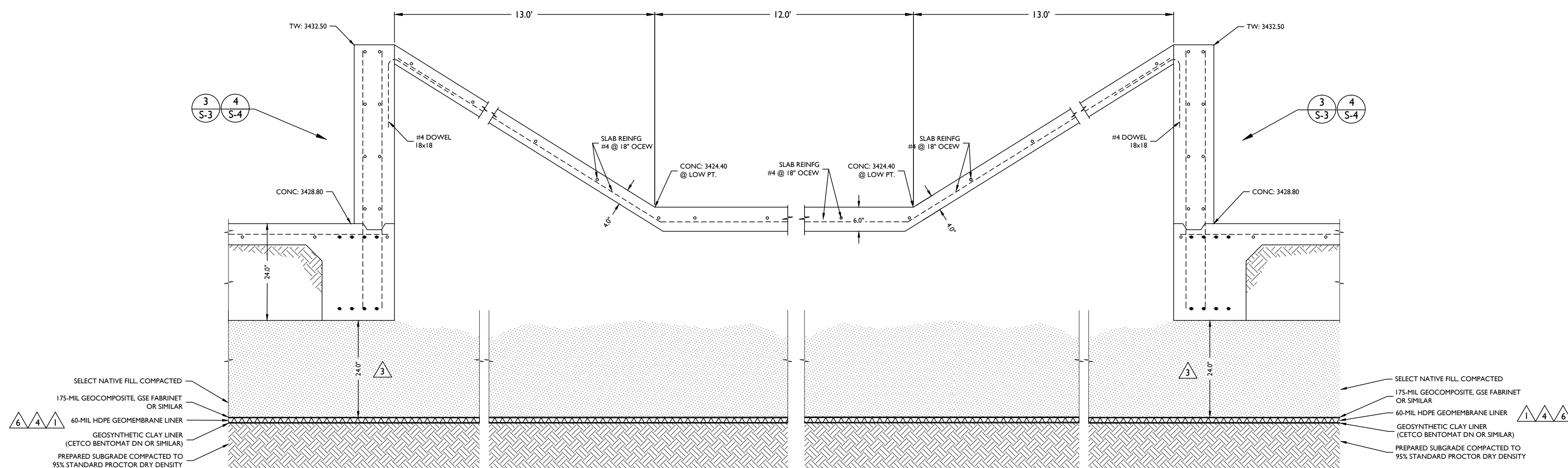
B FLOOR LINER SYSTEM, AREA B EAST TO AREA A, EAST TO WEST
SECTION VIEW



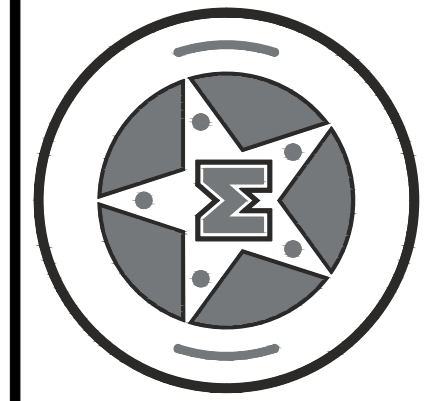
GEOCOMPOSITE NOTES

GEOCOMPOSITE APPLIED TO THE TOP SIDE OF THE LINER SHALL MEET THE SPECIFICATIONS OF THE FOLLOWING OR ENGINEER APPROVED EQUAL:

- A. FABRINET 175-MIL GEOCOMPOSITE (SINGLE SIDED), MANUFACTURED BY GSE ENVIRONMENTAL
- B. ULTRAFLEX FRICTIONFLEX GEOMEMBRANE (SINGLE-SIDED), MANUFACTURED BY GSE ENVIRONMENTAL

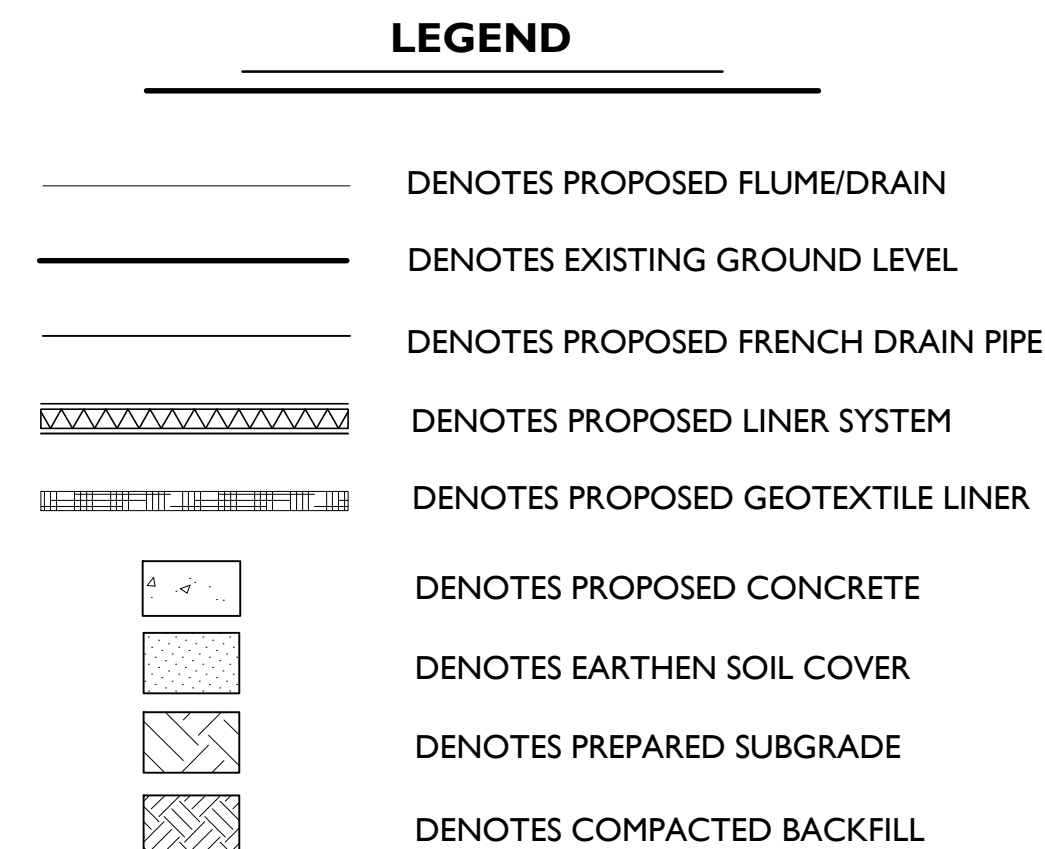


C FLOOR LINER SYSTEM, SUMP ACCESS RAMP
SECTION VIEW



REVISIONS	DATE	BY	APPR.
1	12/05/18	LEW	RET
2	12/18/18	LEW	RET
3	01/22/19	LEW	RET
4	02/06/19	LEW	RET
5	03/20/19	LEW	RET
6	03/25/19	LEW	RET

LINER SYSTEM CROSS SECTIONS - AREA B
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

[illegible]

WEST SIDE RAMP

2A
S-3

S-I

BOSTIK SEALANT

GALVANIZED LINER CLAMP

2" DRILLED AND SET HILTI EMBEDDED SCREW 1-FT O.C.

SLAB REINFG #4 @ 18" OCEV

#3 STIRRUP @ 24" OC

(4) #5 x CONT TYP @ T&B

1.5'

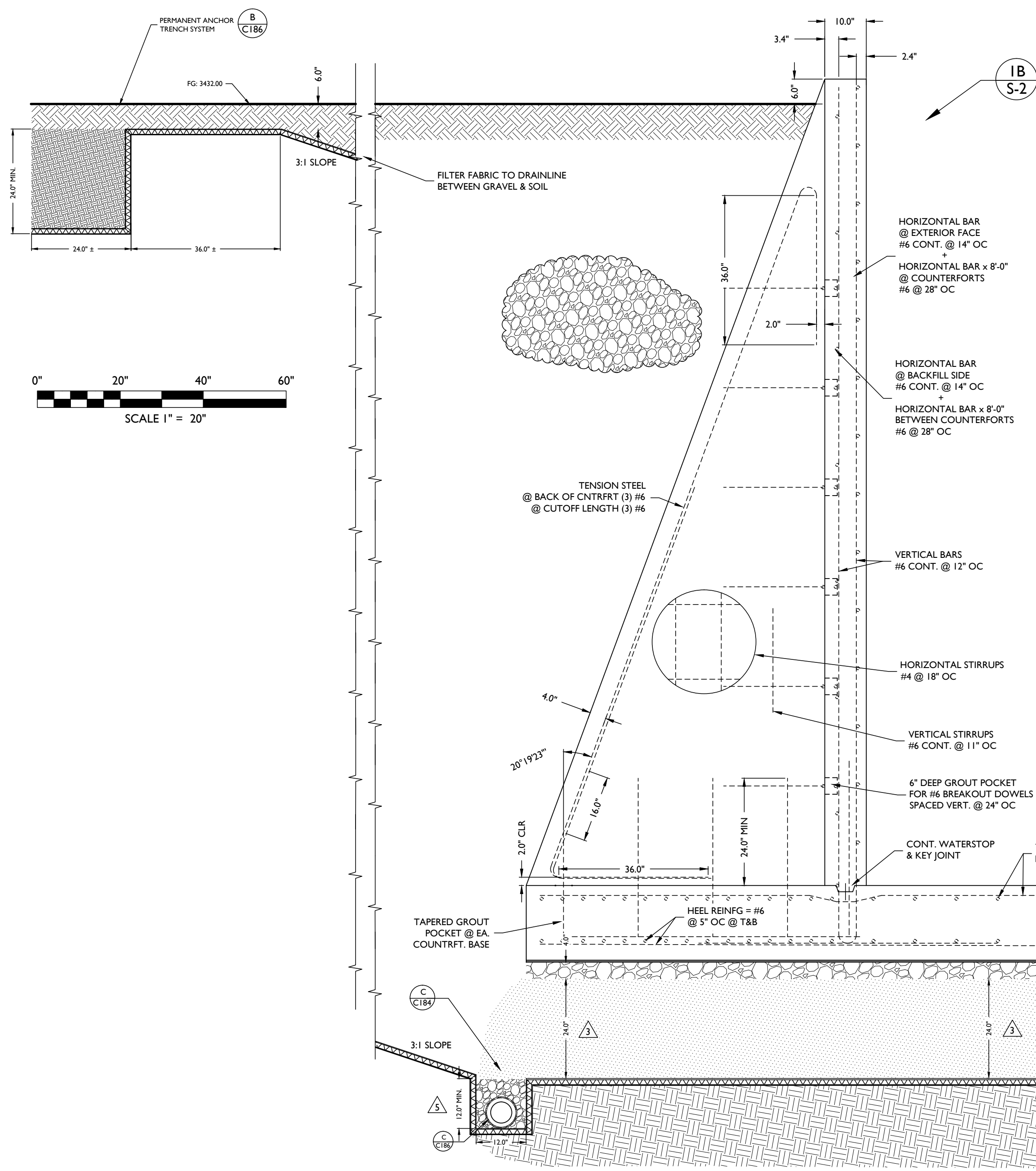
6"

3 **C** **DETAIL LINER FASTENER SYSTEM**
NOT TO SCALE

GEOCOMPOSITE APPLIED TO THE TOP SIDE OF THE LINER SHALL MEET THE SPECIFICATIONS FOR THE FOLLOWING OR ENGINEER APPROVED EQUAL:

- A. FABRINET 175 MIL GEOCOMPOSITE (SINGLE SIDED), MANUFACTURED BY GSE ENVIRONMENTAL
- B. ULTRAFLEX FRICTIONFLEX GEOMEMBRANE (SINGLE-SIDED), MANUFACTURED BY GSE ENVIRONMENTAL

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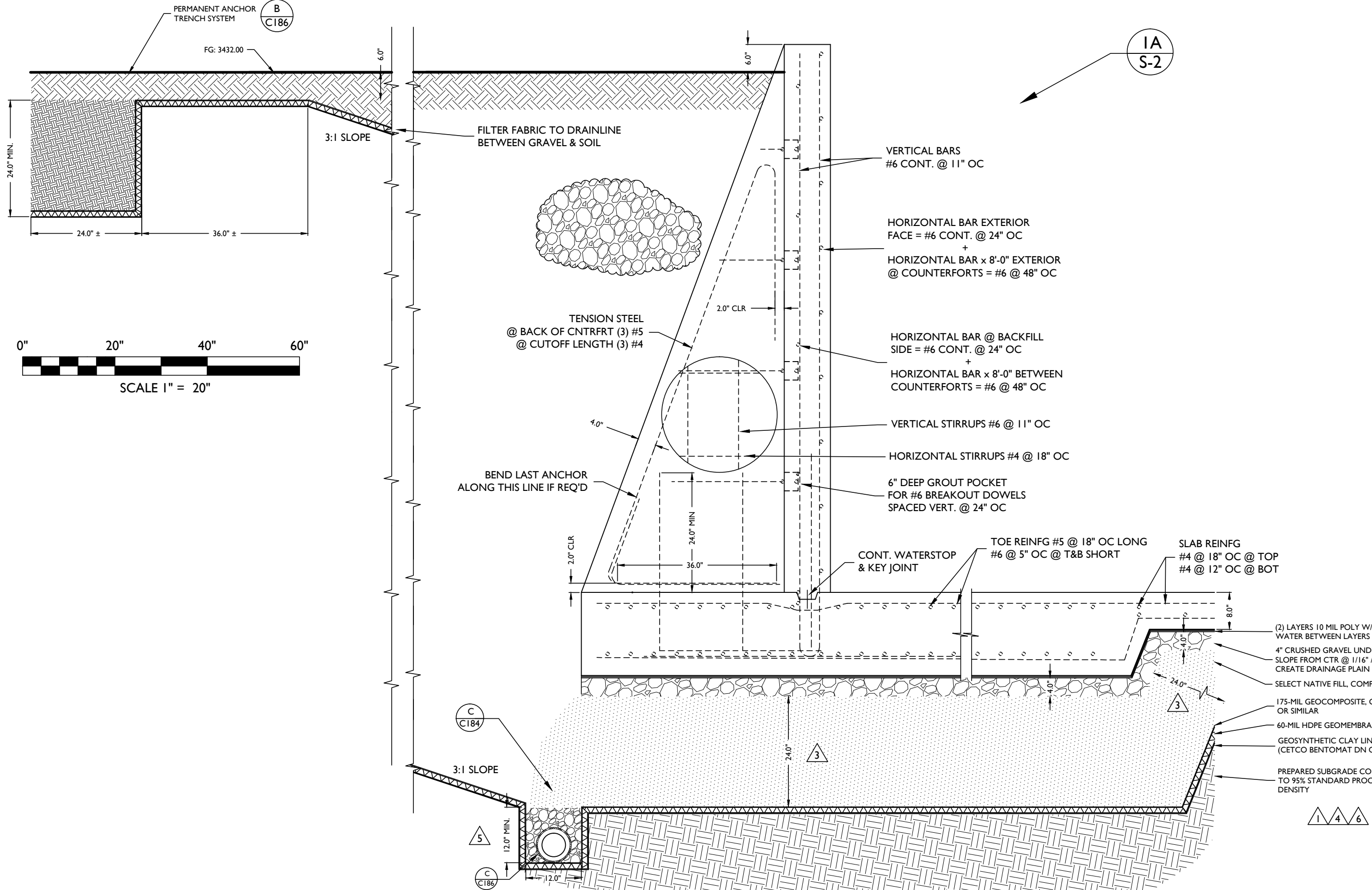
A FLOOR LINER SYSTEM, AREA C SOUTH END
SECTION VIEW

LEGEND

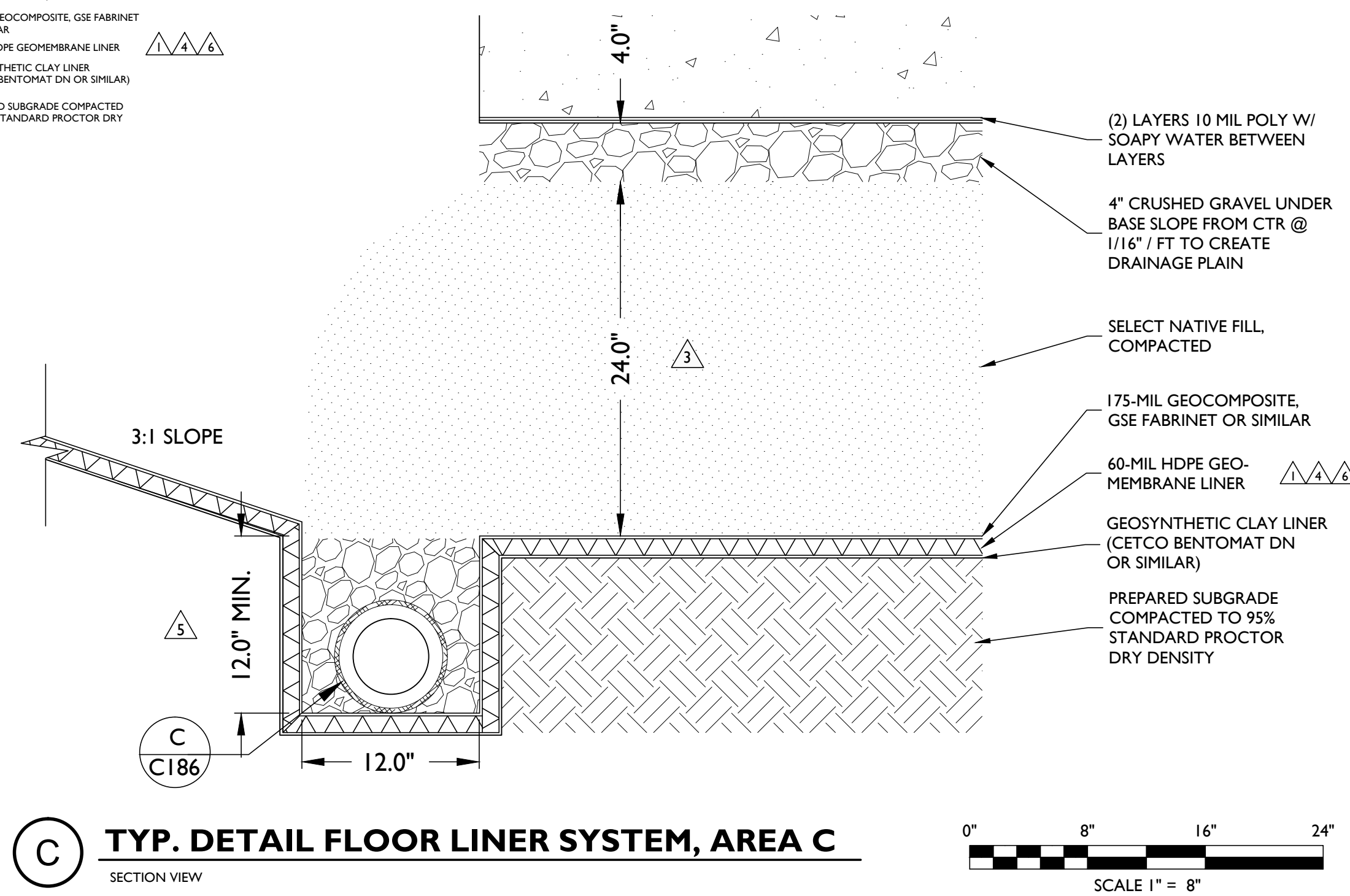
- DENOTES EXISTING GROUND LEVEL
- DENOTES PROPOSED PIPE
- DENOTES PROPOSED GEOTEXTILE LINER
- DENOTES PROPOSED LINER SYSTEM
- DENOTES PROPOSED HDPE LINER
- DENOTES EARTHEN SOIL COVER
- DENOTES PREPARED SUBGRADE
- DENOTES COMPACTED BACKFILL
- DENOTES PROPOSED CONCRETE

GEOCOMPOSITE NOTES

GEOCOMPOSITE APPLIED TO THE TOP SIDE OF THE LINER SHALL MEET THE SPECIFICATIONS OF THE FOLLOWING OR ENGINEER APPROVED EQUAL:
A. FABRINET 175 MIL GEOCOMPOSITE (SINGLE SIDED), MANUFACTURED BY GSE ENVIRONMENTAL
B. ULTRAFLEX FRICTIONFLEX GEOMEMBRANE (SINGLE-SIDED), MANUFACTURED BY GSE ENVIRONMENTAL



B FLOOR LINER SYSTEM, AREA C NORTH END
SECTION VIEW



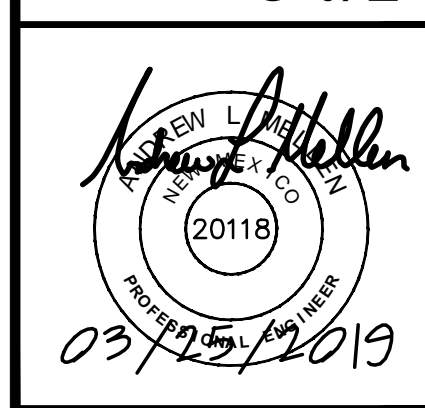
C TYP. DETAIL FLOOR LINER SYSTEM, AREA C
SECTION VIEW



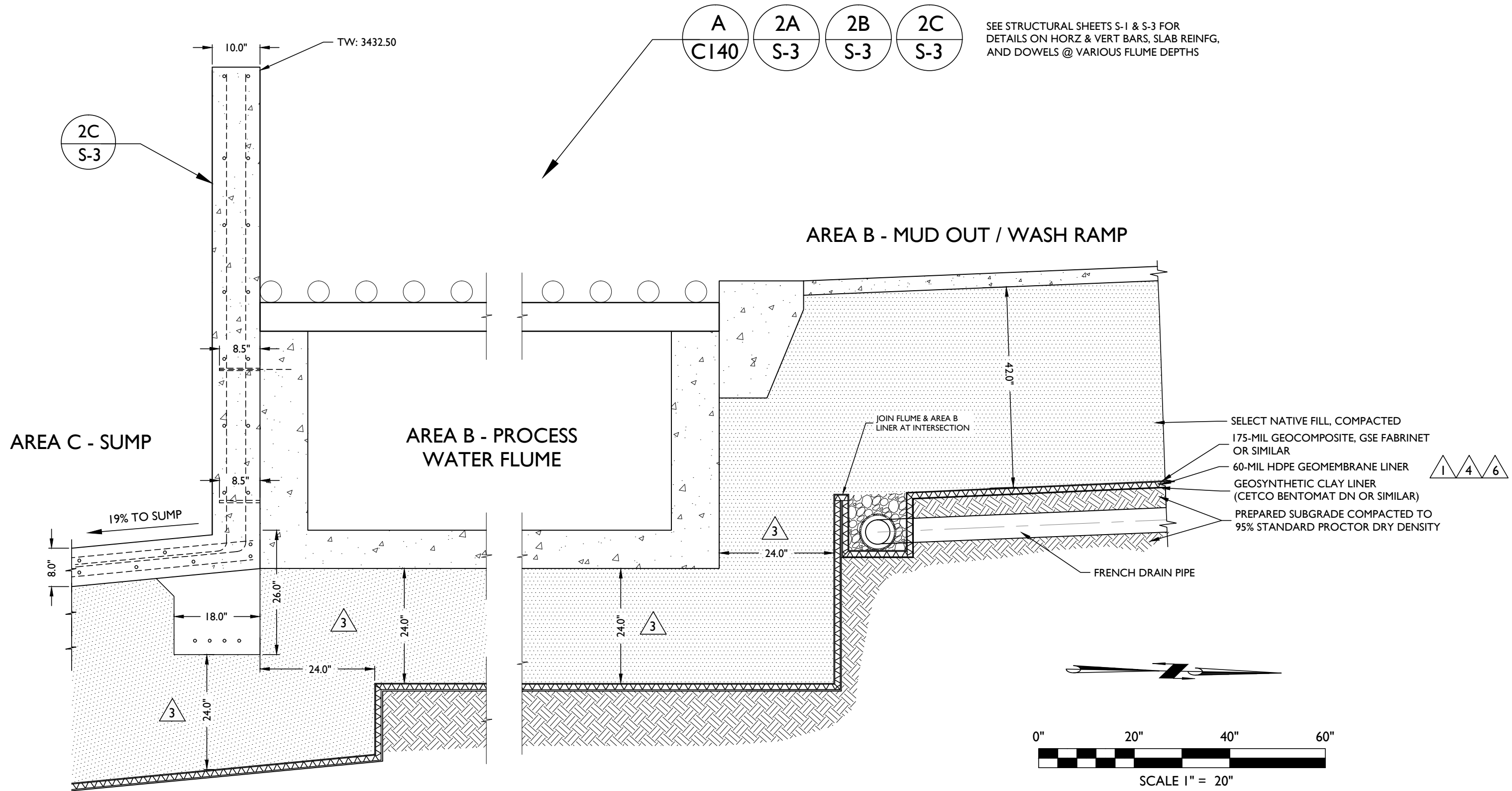
REVISIONS	DATE	BY	APPR.
1	12/05/18	LBW	RET
2	12/18/18	LBW	RET
3	01/22/19	LBW	RET
4	02/06/19	LBW	RET
5	02/20/19	LBW	RET
6	02/20/19	LBW	RET

DRAWN BY:	LBW
CHECKED BY:	RET
APPROVED BY:	RET
DATE:	04/11/2019
JOB:	180156

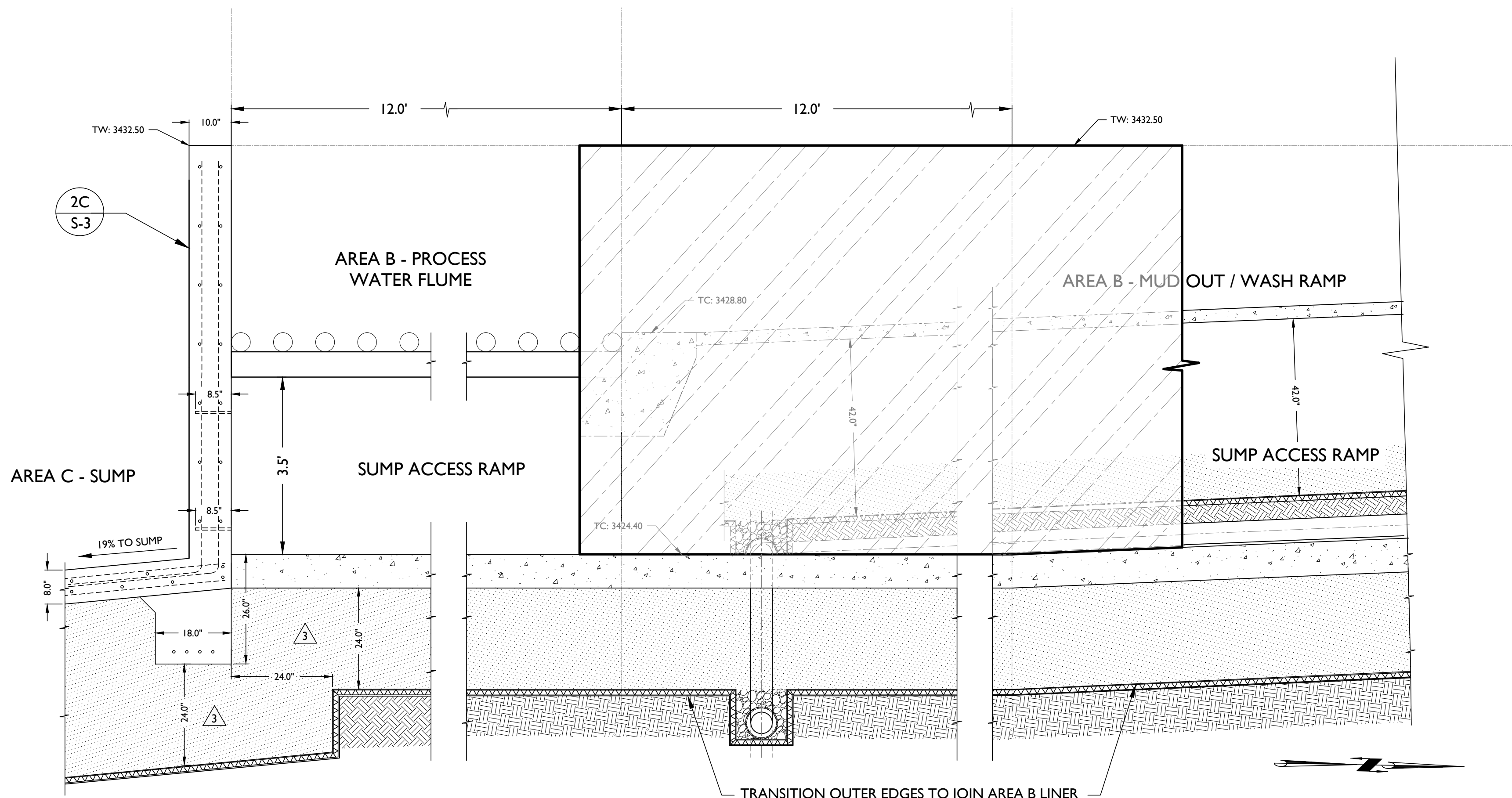
LINER SYSTEM CROSS SECTIONS - AREA C
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



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D **DETAIL LINER TRANSITION AT AREA B & AREA C**
CROSS SECTION OF TYPICAL FLUME & SUMP



E **DETAIL LINER TRANSITION AT SUMP ACCESS RAMP & AREA C**
CROSS SECTION OF TYPICAL FLUME & SUMP

LEGEND

- DENOTES PROPOSED FLUME/DRAIN
- DENOTES EXISTING GROUND LEVEL
- DENOTES PROPOSED FRENCH DRAIN PIPE
- DENOTES PROPOSED LINER SYSTEM
- DENOTES PROPOSED GEOTEXTILE LINER
- DENOTES PROPOSED CONCRETE
- DENOTES EARTHEN SOIL COVER
- DENOTES PREPARED SUBGRADE
- DENOTES COMPACTED BACKFILL

GEOCOMPOSITE NOTES

- GEOCOMPOSITE APPLIED TO THE TOP SIDE OF THE LINER SHALL MEET THE SPECIFICATIONS OF THE FOLLOWING OR ENGINEER APPROVED EQUAL:
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 - B. ULTRAFLEX FRICTIONFLEX GEOMEMBRANE (SINGLE-SIDED), MANUFACTURED BY GSE ENVIRONMENTAL

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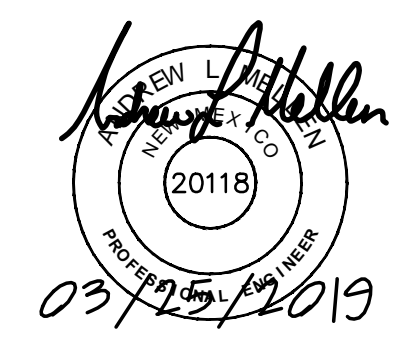
1909 West Wall Street, Suite "K"
Midland, Texas 79701
ENGINEER FIRM # F15089
SURVEY FIRM # 10194452
Tel: (432) 262-0999 Fax: (432) 262-0989
www.Maverick-Eng.com

DATE	12/05/18	12/18/18	01/22/19	02/20/19
APPL.	RET	RET	RET	RET
BY	LBW	LBW	LBW	LBW
REVISIONS	1	3	4	6
Δ	UPDATE LINER FROM 60-MIL TO 40-MIL	REVISE 12.0' BETWEEN CONCRETE AND LINER TO 24.0'	REVISE LINER CALL OUT TO DENOTE DOUBLE-SIDED TEXTURED HDPE	REVISE LINER FROM 40-MIL TO 60-MIL & UPDATE LINER CALL OUTS
DRAWN BY:	LBW			
CHECKED BY:	RET			
APPROVED BY:	RET			
DATE:	04/11/2019			
JOB:	180156			

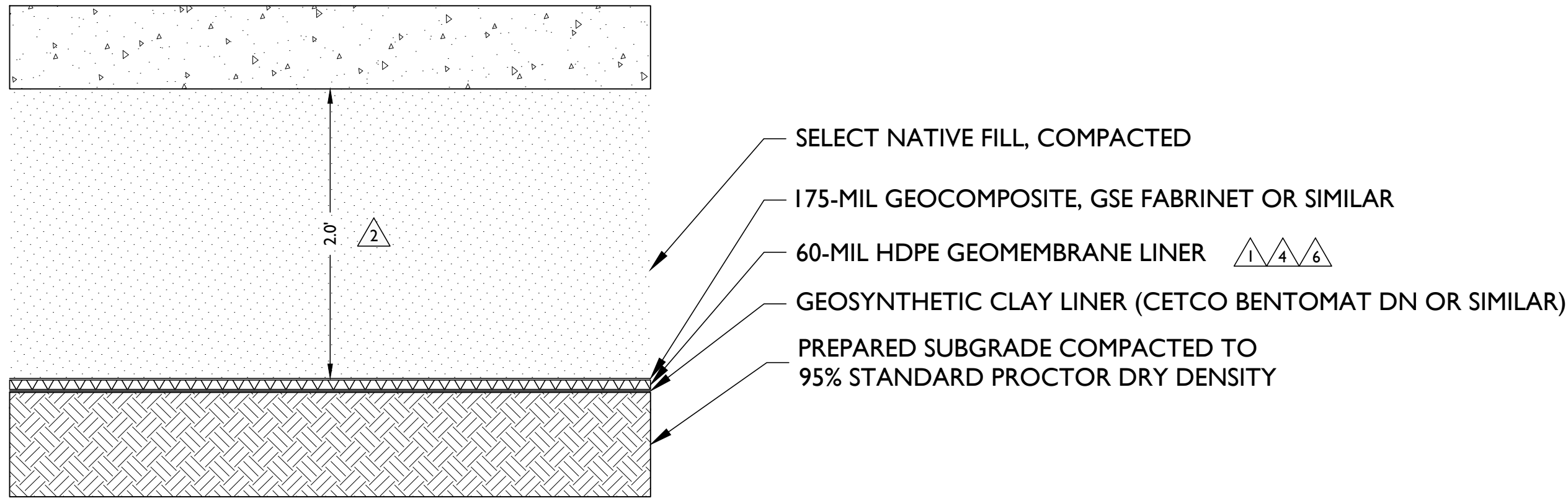
LINER SYSTEM CROSS SECTIONS -
AREA C & FLUME

ONYX CONTRACTORS

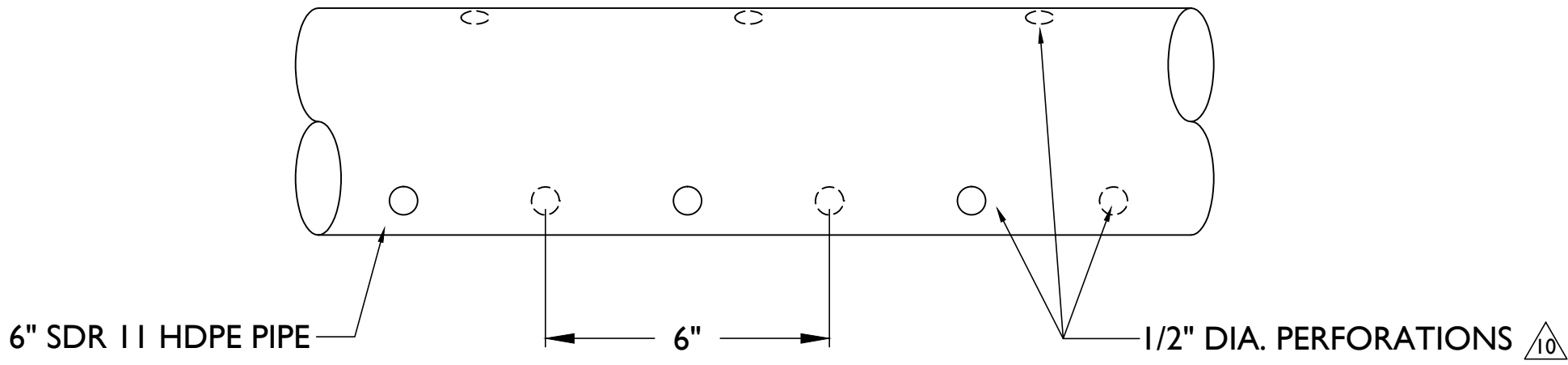
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



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A FLOOR LINER SYSTEM
NOT TO SCALE SECTION VIEW



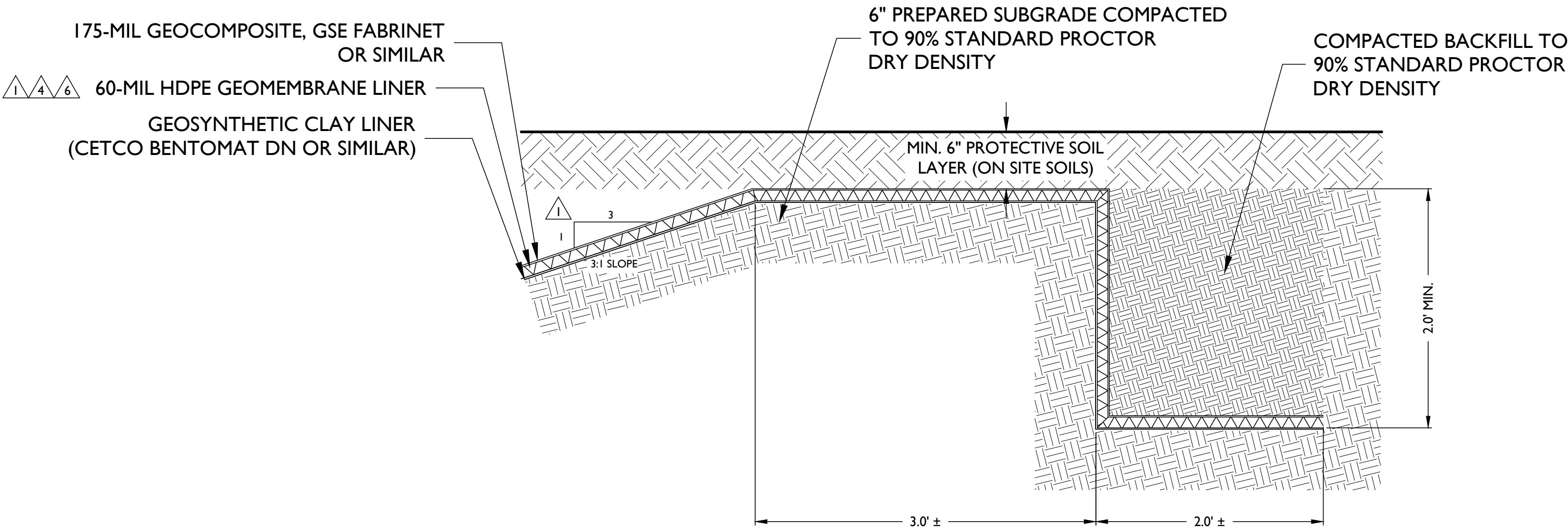
C PERFORATED FRENCH DRAIN COLLECTION PIPE
NOT TO SCALE SECTION VIEW

GEOCOMPOSITE NOTES

GEOCOMPOSITE APPLIED TO THE TOP SIDE OF THE LINER SHALL MEET THE SPECIFICATIONS OF THE FOLLOWING OR ENGINEER APPROVED EQUAL:
A. FABRINET 175 MIL GEOCOMPOSITE (SINGLE SIDED), MANUFACTURED BY GSE ENVIRONMENTAL
B. ULTRAFLEX FRICTIONFLEX GEOMEMBRANE (SINGLE-SIDED), MANUFACTURED BY GSE ENVIRONMENTAL

LEGEND

- DENOTES EXISTING GROUND LEVEL
- DENOTES PROPOSED PIPE
- DENOTES PROPOSED LINER SYSTEM
- DENOTES EARTHEN SOIL COVER
- DENOTES PREPARED SUBGRADE
- DENOTES COMPACTED BACKFILL
- DENOTES PROPOSED CONCRETE



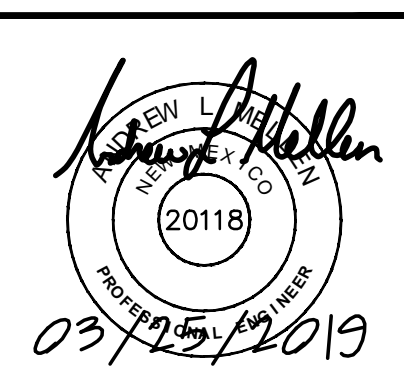
B PERMANENT ANCHOR TRENCH
NOT TO SCALE SECTION VIEW

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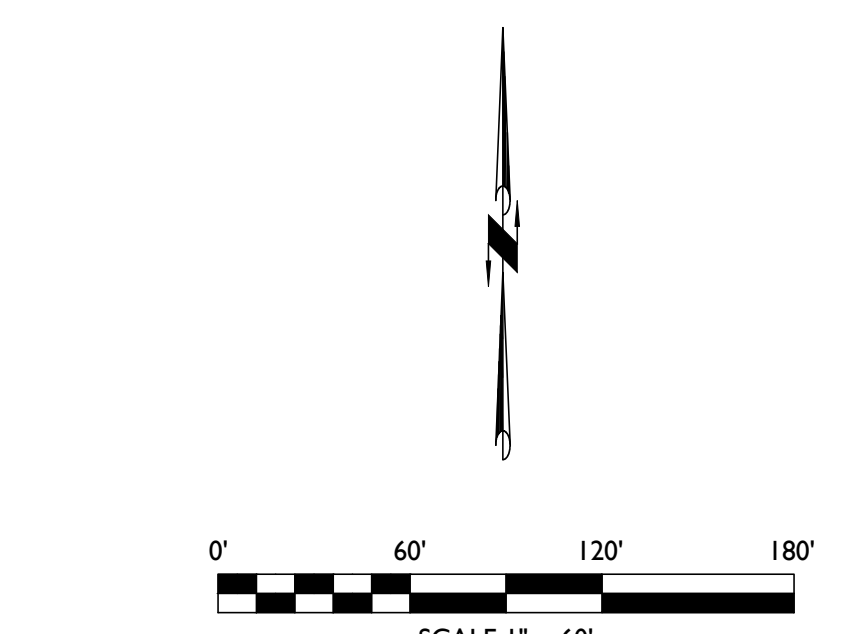
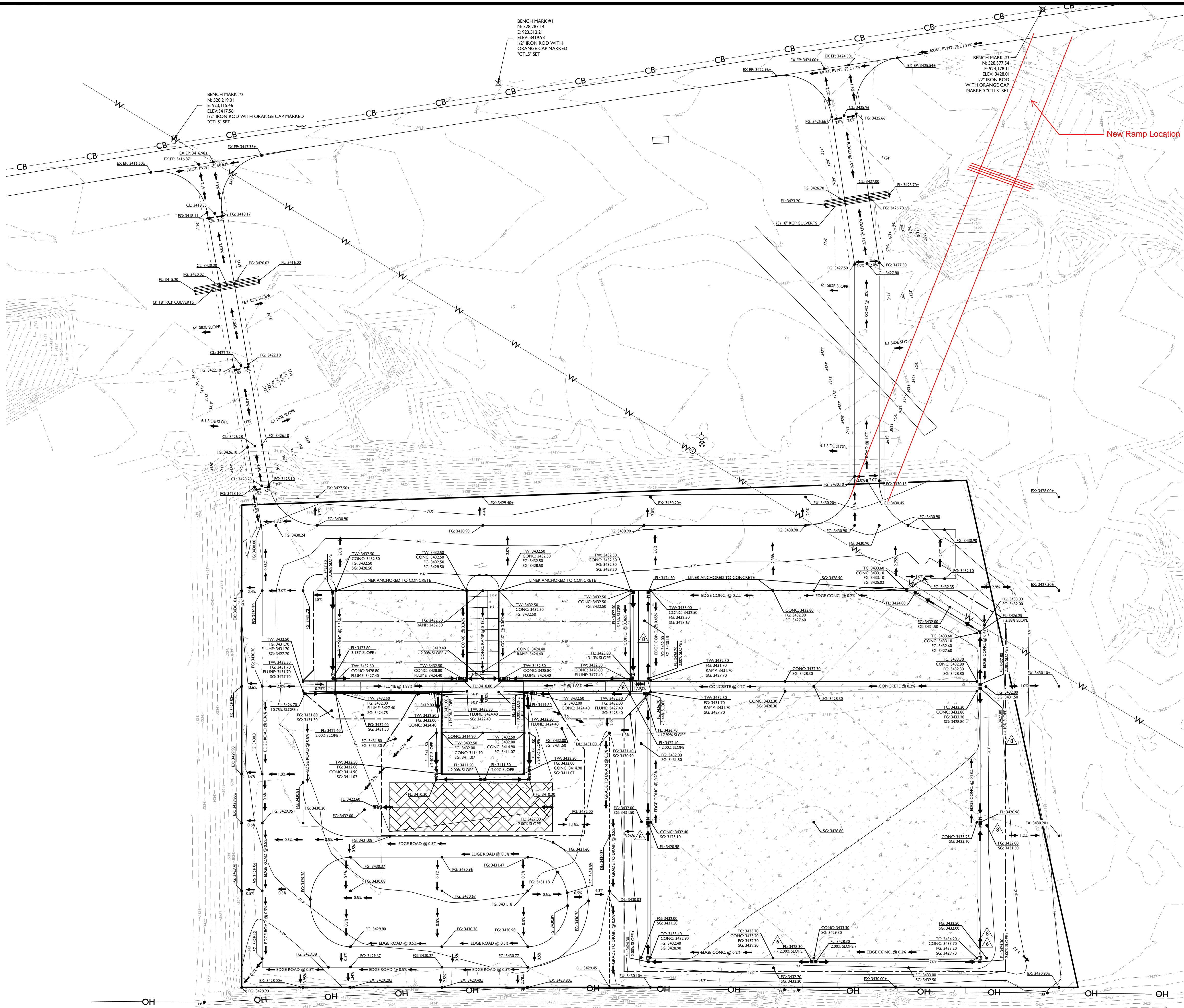
BY	DATE	REVISIONS
LBW	12/8/18	1. UPDATE SLOPE TO 3:1
LBW	12/14/18	2. REVISE DETAIL D COMPRESSION CONNECTIONS TO THROUGH DETAIL D
LBW	12/18/18	3. REVISE 120" BETWEEN CONCRETE AND LINER TO 240" ABOVE DETAIL D
LBW	01/22/19	4. REVISE LINER CALLOUT TO DENOTE DOUBLE LINED TEXTURED HDPE LINER
LBW	02/20/19	6. REVISE LINER FROM 60-MIL TO 60-MIL & UPDATE LINER CALLOUTS
LBW	04/16/19	10. REVISE DIA. OF PERFORATIONS ON PIPE FROM 1/2" TO 1/2"

SECTIONS AND DETAILS - LINER SYSTEM AND CLEAN OUTS
ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



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LEGEND	
	DENOTES BENCH MARK
	DENOTES EXISTING FIRE HYDRANT
	DENOTES EXISTING WATER VALVE
	DENOTES EXISTING OVERHEAD ELECTRIC LINE
	DENOTES EXISTING UNDERGROUND CABLE LINE
	DENOTES EXISTING WATER LINE
	DENOTES EXISTING UNDERGROUND PIPELINE
	DENOTES EXISTING CONTOUR
	DENOTES PROPOSED FLUME/DRAIN
	DENOTES PROPOSED SITE ROAD
	DENOTES OUTSIDE EXTENT OF LINER SYSTEM, SEE DETAIL B / C186
TC	TOP OF CURB ELEVATION
CONC	CONCRETE ELEVATION
FG	FINISH GRADE ELEVATION
DL	DRAIN LINE ELEVATION
FL	FLOW LINE ELEVATION - LEACHATE COLLECTION SYSTEM
TW	TOP OF WALL ELEVATION
TP	TOP OF PAD ELEVATION
EX	EXISTING ELEVATION
EP	EDGE OF PAVEMENT ELEVATION
SG	TOP OF SUB-GRADE ELEVATION
	LEACHATE DETECTION SAMPLING & OBSERVATION POINT. SEE C154

NOTE: EXISTING BERM AND STORMWATER CHANNEL TO THE SOUTH OF THE MUD MANAGEMENT AREA REMAINS IN PLACE AND IS FUNCTIONAL.

OUTER BOUNDARY OF LINER SYSTEM IS AT THE OUTSIDE EDGE OF ANCHOR SYSTEM.

FOR PLACEMENT, LINER ELEVATION IS APPROXIMATELY 0.02 FT ABOVE TOP OF SUB-GRADE ELEVATION.

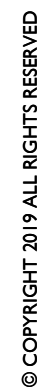
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Midland, Texas 79701
ENGINEER FIRM # F15089
SURVEY FIRM # 10194452
Tel: (432) 262-0999 Fax: (432) 262-0989
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DATE	02/20/19
APPL	RET
BY	LBW
REVISIONS	ADD ARROWS AND SLOPE CALLOUTS FOR FOR FL CORRECT LOPE ON RAMP FROM 10.92% TO 17.92% REVISE LG LINER GRADE TO SG (SUB-GRADE) & UPDATE PLAN NOTES REVISE LEACHATE SANP & OBS. POINTS, FL SLOPES, FLOW DIRECTION ARROWS AREA A LINER LAYOUT
DATE	02/26/19
APPL	RET
BY	LBW
DATE	02/25/19
APPL	RET
BY	LBW

GRADING PLAN - LINER OPTION

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO

2018
03/12/2019
SHEET
C200A OF 18



- NOTE: EXISTING BERM AND STORMWATER CHANNEL TO THE SOUTH OF THE MUD MANAGEMENT AREA REMAINS IN PLACE AND IS FUNCTIONAL.
- OUTER BOUNDARY OF LINER SYSTEM IS AT THE OUTSIDE EDGE OF ANCHOR SYSTEM.
- FOR PLACEMENT, LINER ELEVATION IS APPROXIMATELY 0.07-FT ABOVE TOP OF SUB-GRADE ELVATION

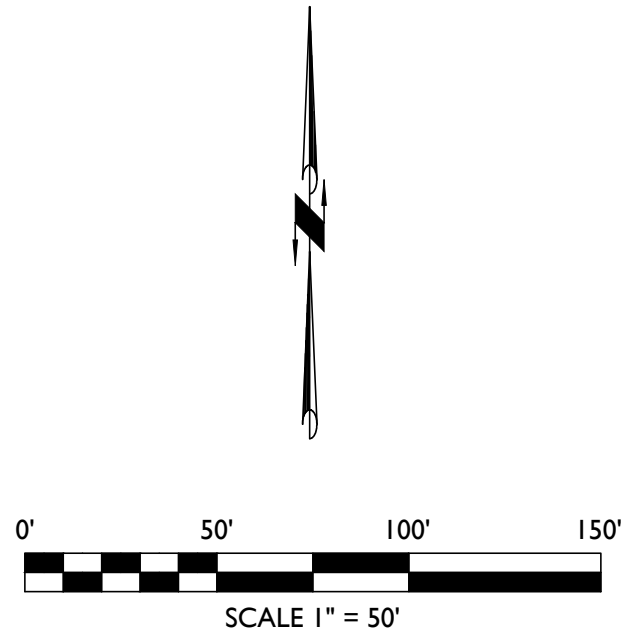
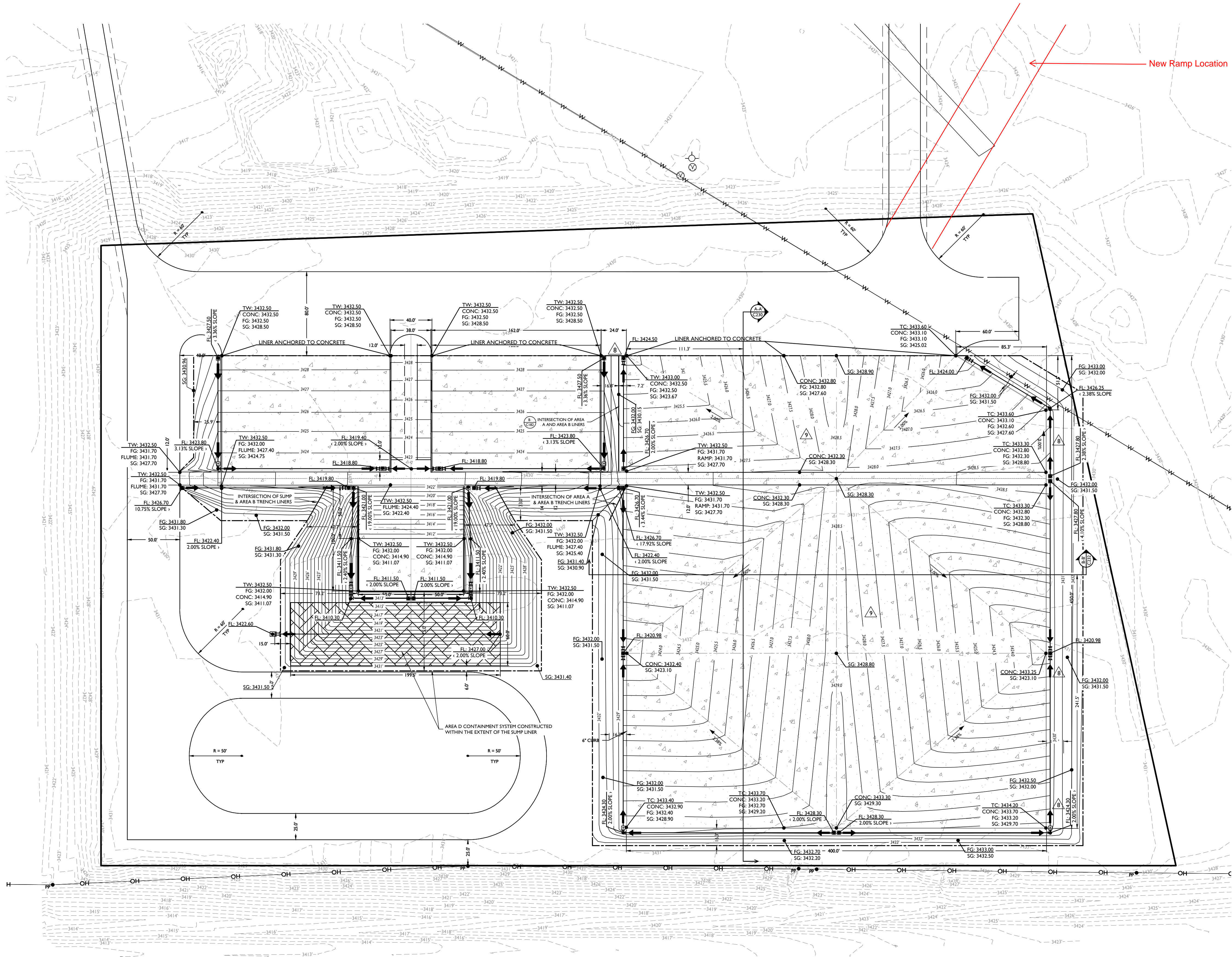
GRADING PLAN - LEACHATE AND LINER SYSTEM

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO



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LEGEND

- DENOTES BENCH MARK
- DENOTES EXISTING FIRE HYDRANT
- DENOTES EXISTING POWER POLE
- DENOTES EXISTING WATER VALVE
- DENOTES EXISTING OVERHEAD ELECTRIC LINE
- DENOTES EXISTING UNDERGROUND CABLE LINE
- DENOTES EXISTING WATER LINE
- DENOTES EXISTING UNDERGROUND PIPELINE
- DENOTES EXISTING CONTOUR
- DENOTES PROPOSED FLUME/DRAIN
- DENOTES PROPOSED SITE ROAD
- DENOTES OUTSIDE EXTENT OF LINER SYSTEM, SEE DETAIL B / C186
-
- TC TOP OF CURB ELEVATION
- CONC CONCRETE ELEVATION
- FG FINISH GRADE ELEVATION
- DL DRAIN LINE ELEVATION
- FL FLOW LINE ELEVATION - LEACHATE COLLECTION SYSTEM
- TW TOP OF WALL ELEVATION
- TP TOP OF PAD ELEVATION
- EX EXISTING ELEVATION
- EP EDGE OF PAVEMENT ELEVATION
- SG TOP OF SUB-GRADE ELEVATION
- LEACHATE DETECTION SAMPLING & OBSERVATION POINT. SEE C122A FOR LAYOUT & C154 FOR DETAILS

NOTE: EXISTING BERM AND STORMWATER CHANNEL TO THE SOUTH OF THE MUD MANAGEMENT AREA REMAINS IN PLACE AND IS FUNCTIONAL.

OUTER BOUNDARY OF LINER SYSTEM IS AT THE OUTSIDE EDGE OF ANCHOR SYSTEM.

FOR PLACEMENT, LINER ELEVATION IS APPROXIMATELY 0.02-FT ABOVE TOP OF SUB-GRADE ELEVATION.

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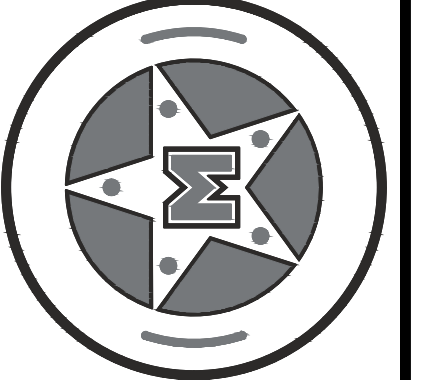
Midland, Texas 79701

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SURVEY FIRM # 10194452

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REVISIONS	DATE	BY	APPR.	RET.	RET.
8	03/25/19	LEW	RET		
9	03/29/19	LEW	RET		

REVISIONS	DATE	BY	APPR.	RET.	RET.
8	03/25/19	LEW	RET		
9	03/29/19	LEW	RET		

SUB-GRADE GRADING PLAN

ONYX CONTRACTORS

SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM

LEA COUNTY, NEW MEXICO

811

Know what's below.
Call before you dig.

APPROVED

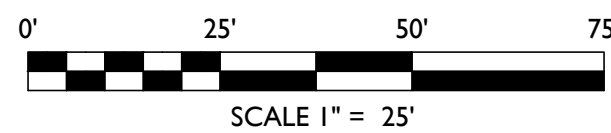
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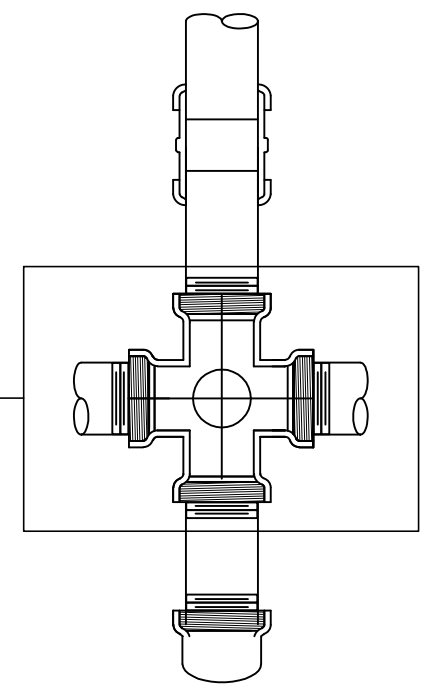
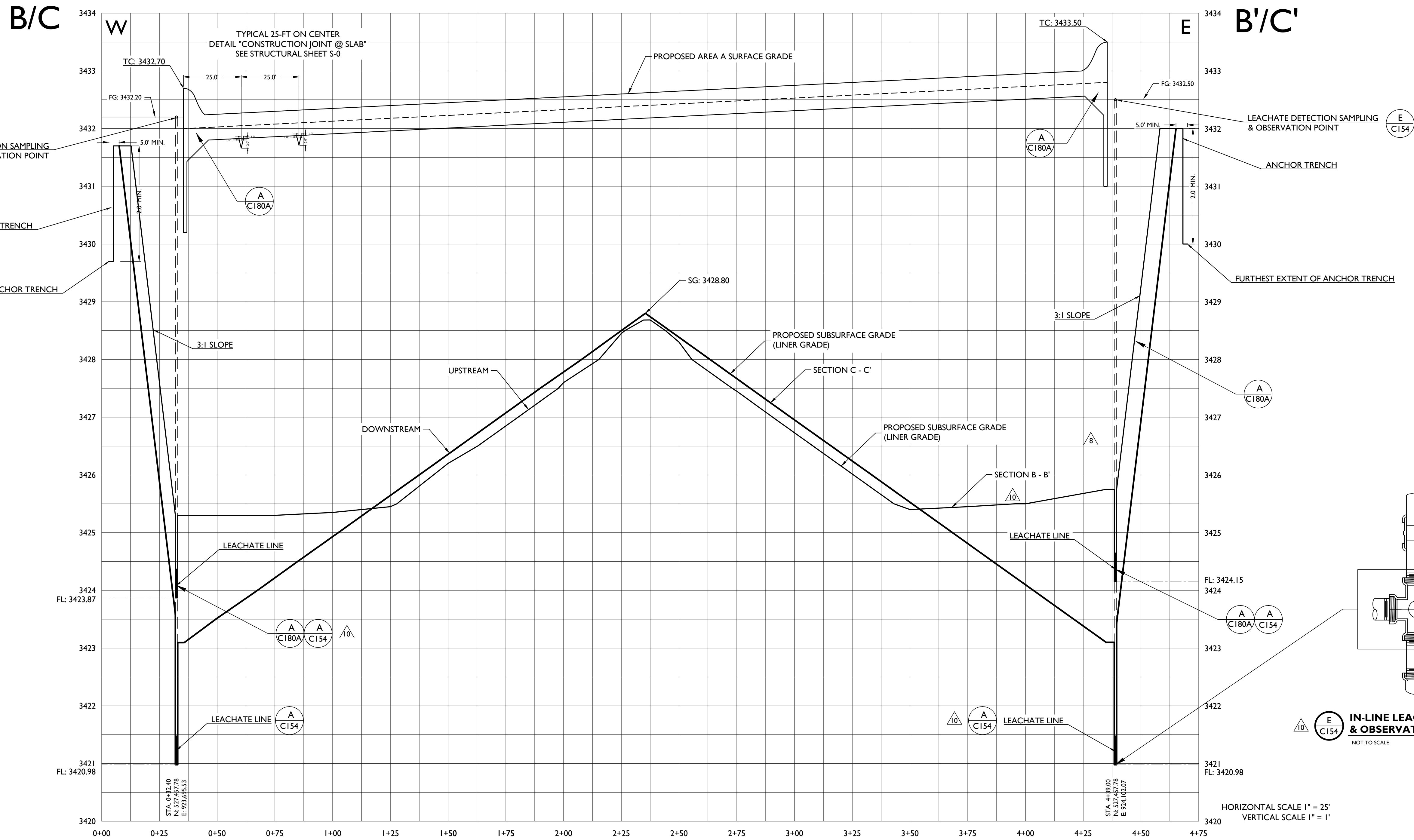
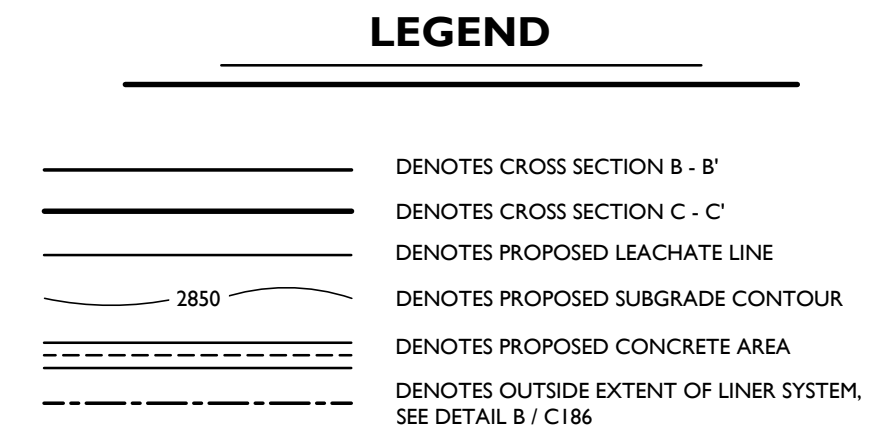
03/29/2019

SHEET

C220A

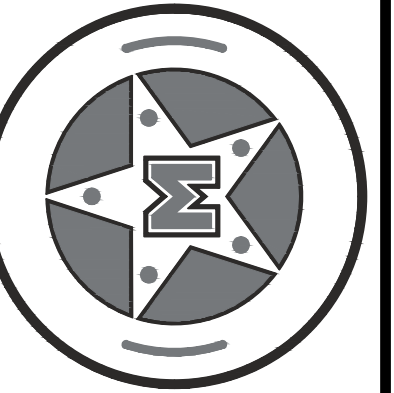
OF 18





  **IN-LINE LEACHATE CLEAN-OUT
& OBSERVATION POINT**

NOT TO SCALE

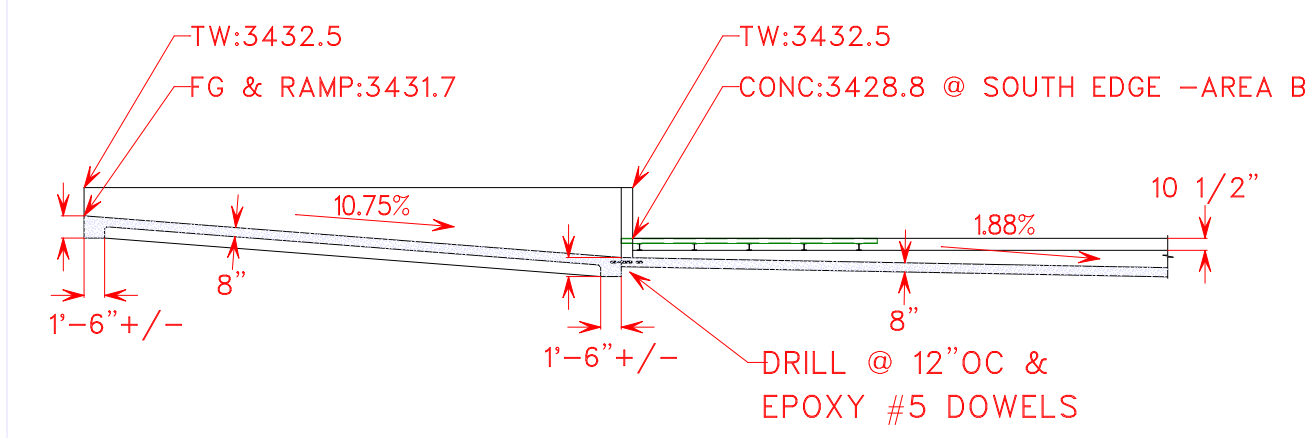
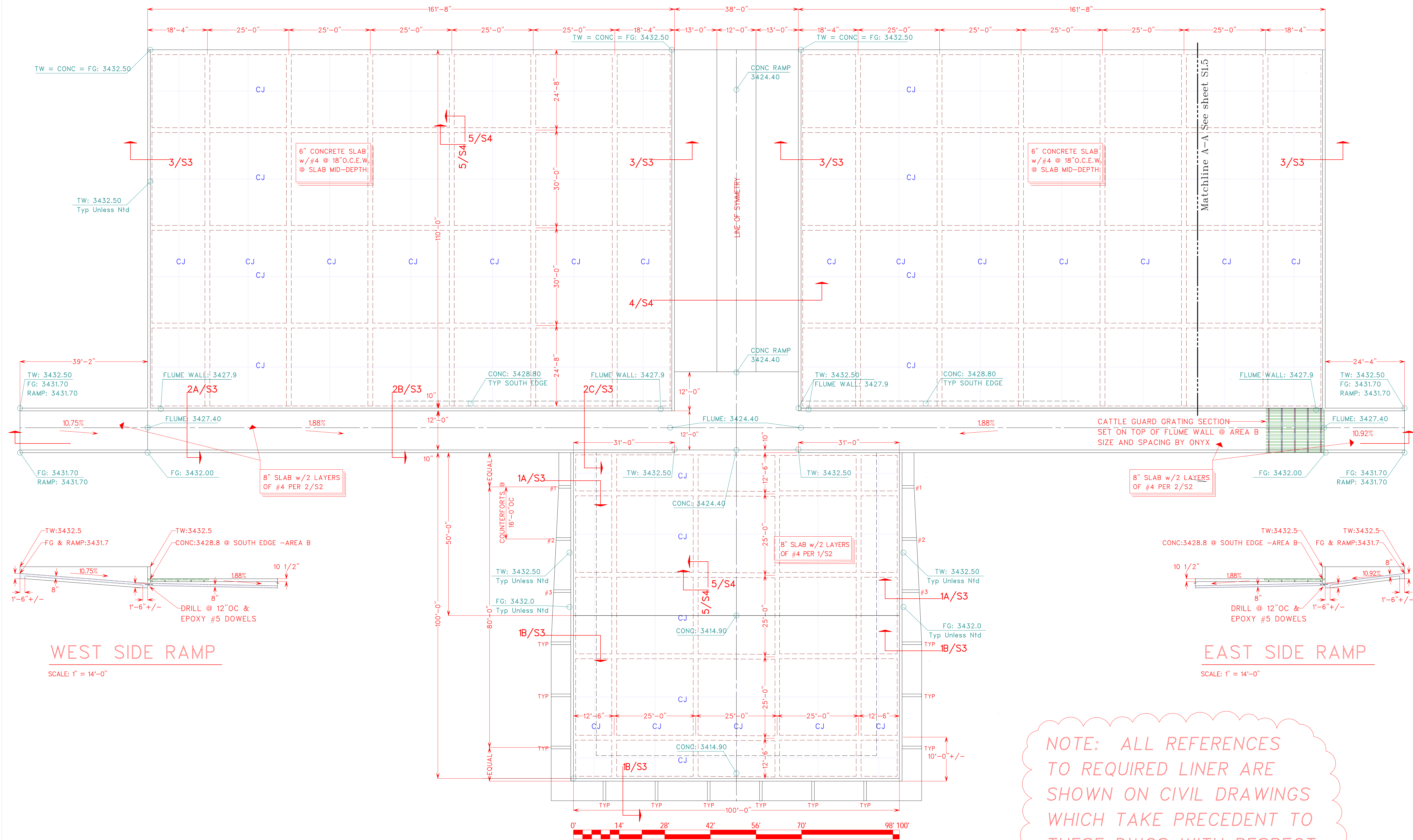


Δ	REVISIONS	BY	APPR.	DATE
10	ADD DOWNSTREAM CROSS SECTION TO EXISTING CROSS SECTION; ADD DETAIL UPDATE CALLOUTS	LBW	RET	04/16/19
		DRAWN BY:	LBW	
		CHECKED BY:	RET	
		APPROVED BY:	RET	
		DATE:	04/17/2019	
		JOB:	180156	

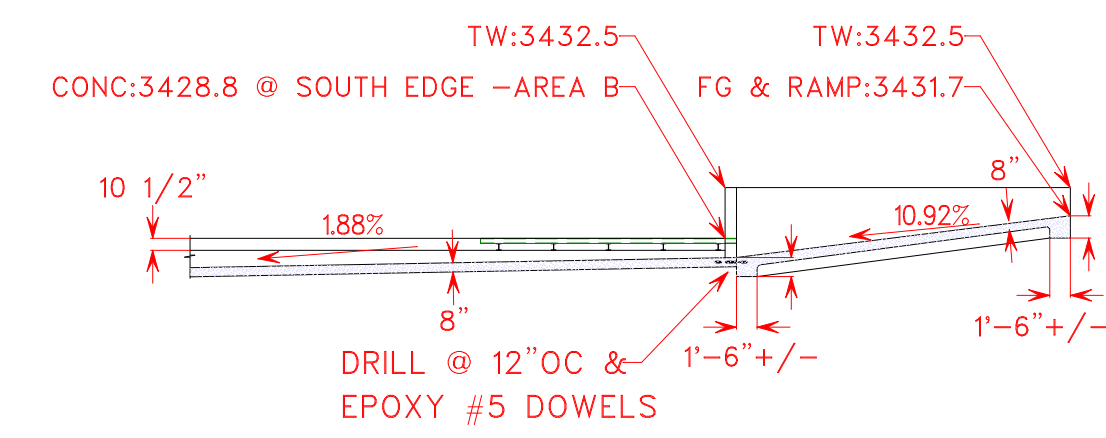
SUB-GRADE CROSS SECTION B - B'

ONYX CONTRACTORS
SUNDANCE WEST MUD MANAGEMENT / LINER SYSTEM
LEA COUNTY, NEW MEXICO





WEST SIDE RAMP
SCALE: 1" = 14'-0"



EAST SIDE RAMP
SCALE: 1" = 14'-0"

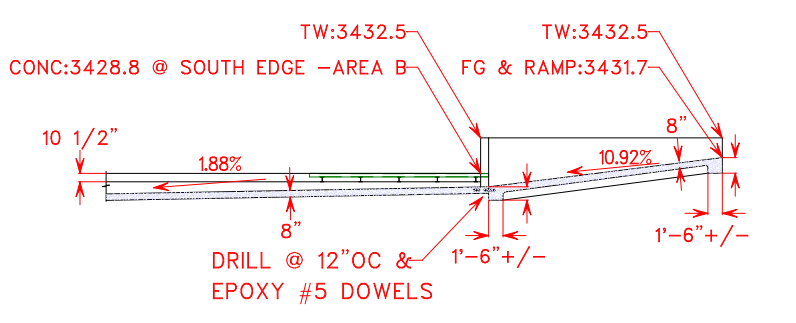
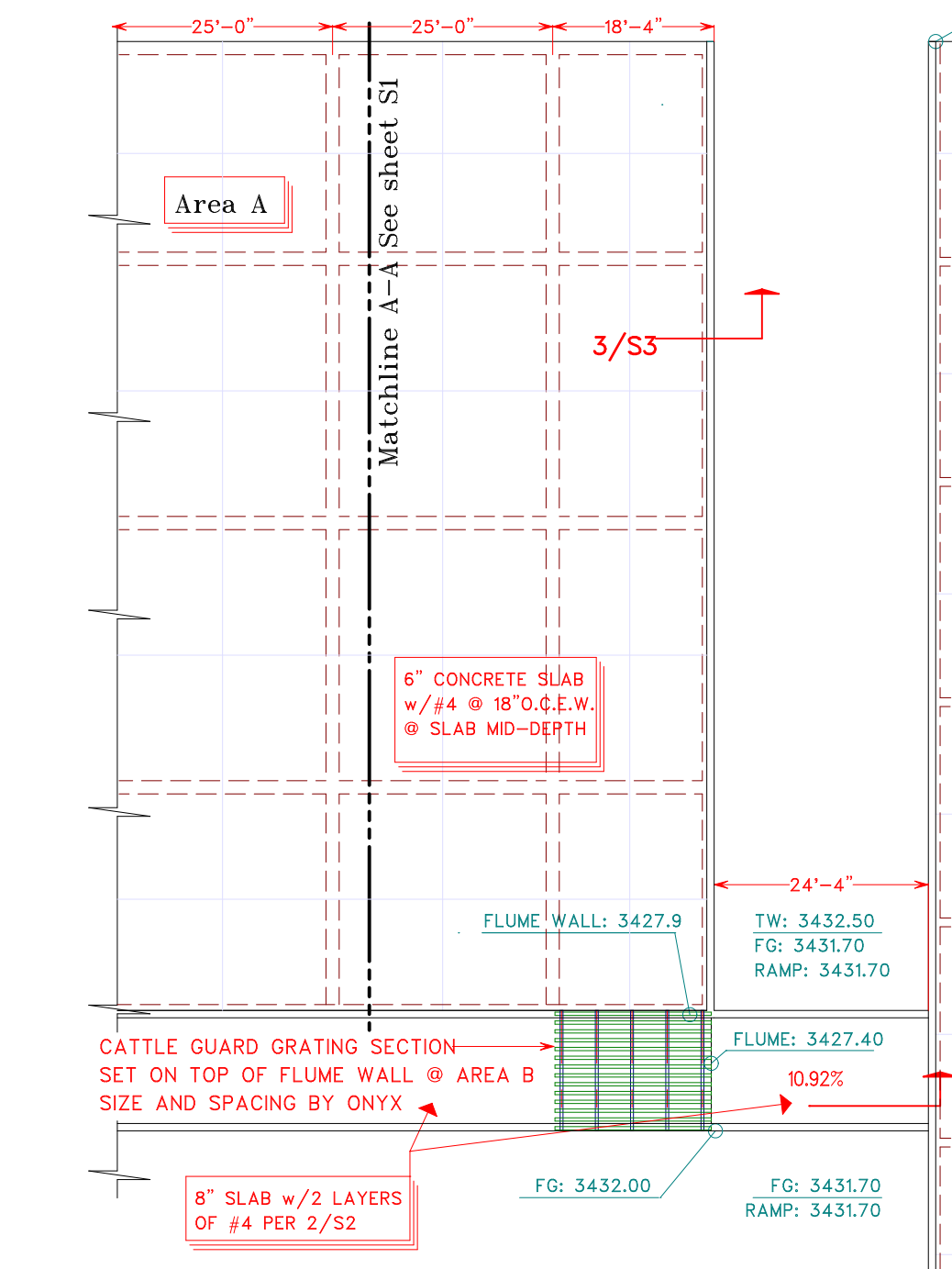
NOTE: ALL REFERENCES TO REQUIRED LINER ARE SHOWN ON CIVIL DRAWINGS WHICH TAKE PRECEDENT TO THESE DWGS WITH RESPECT TO LINER REQUIREMENTS

PLAN @ MUDOUT FACILITY



Sundance Services, Inc.
Sundance West – Mud Load Out
Facility Layout – Eunice, NM

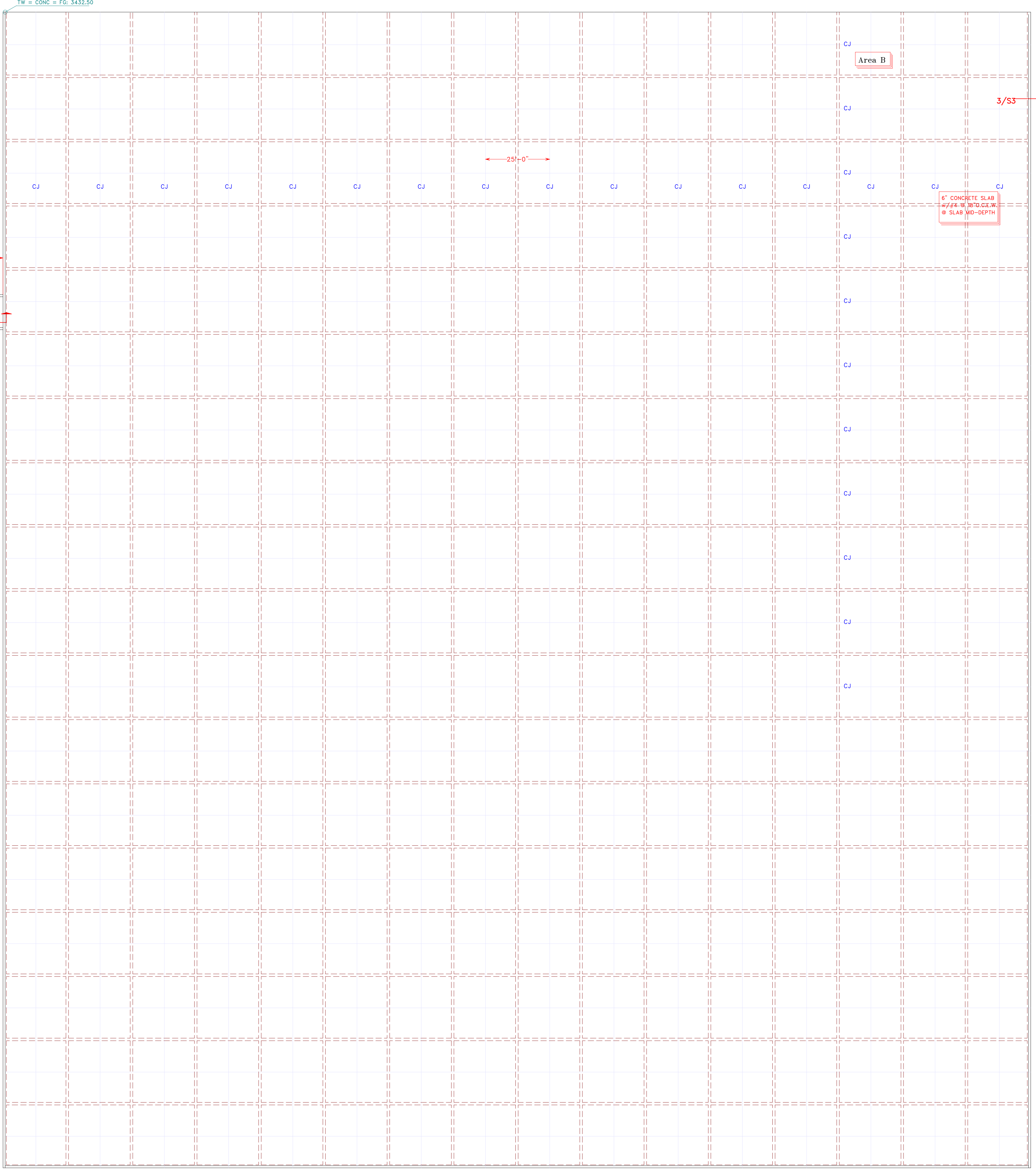
DRAWING TITLE	
FACILITY STRUCTURAL LAYOUT	
REVISIONS	
2-27-19	Δ
5-29-19	Δ
XX/XX/XX	Δ
DATE	9-5-18
DRAWN BY	DBR
CHECKED BY	RBD
SHEET NO.	



EAST SIDE RAMP
SCALE: 1" = 14'-0"

NOTE: ALL REFERENCES TO REQUIRED LINER ARE SHOWN ON CIVIL DRAWINGS WHICH TAKE PRECEDENT TO THESE DWGS WITH RESPECT TO LINER REQUIREMENTS

AREA B SLAB
SCALE: 1" = 12'-0"



OnSite Structural Engineering

Serving the Permian Basin +

Odessa, TX 817*808*3200

doug@onsitestructural.com

DOUGLAS B. REEVES

NEW MEXICO

23053

PROFESSIONAL ENGINEER

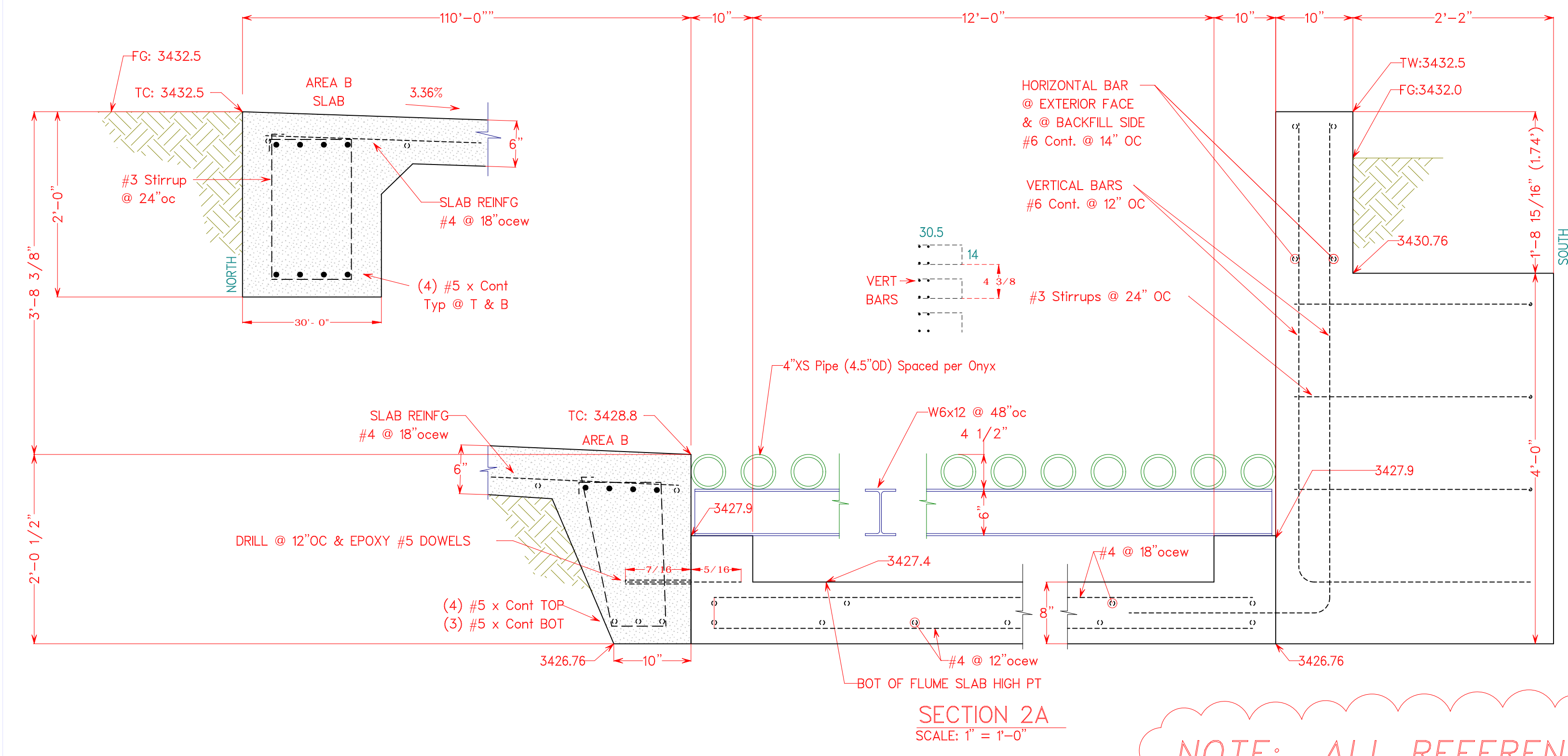
9-5-18

Sundance Services, Inc.

Sundance West – Mud Load Out

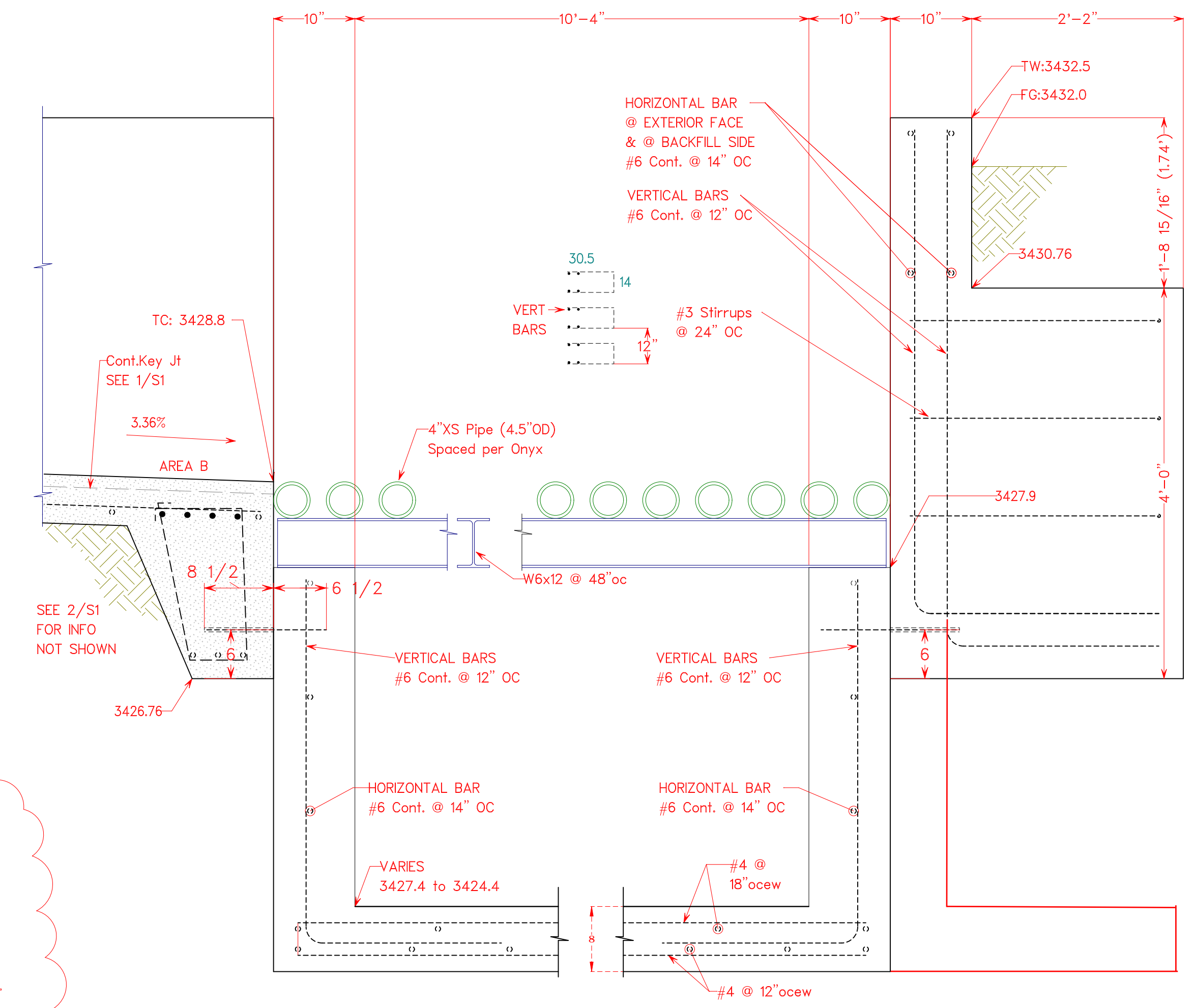
Facility Layout – Eunice, NM

DRAWING TITLE	
FACILITY STRUCTURAL LAYOUT	
REVISIONS	2-27-19
	5-29-19
	XX/XX/XX
DATE	9-5-18
DRAWN BY	DBR
CHECKED BY	RBD
SHEET NO.	

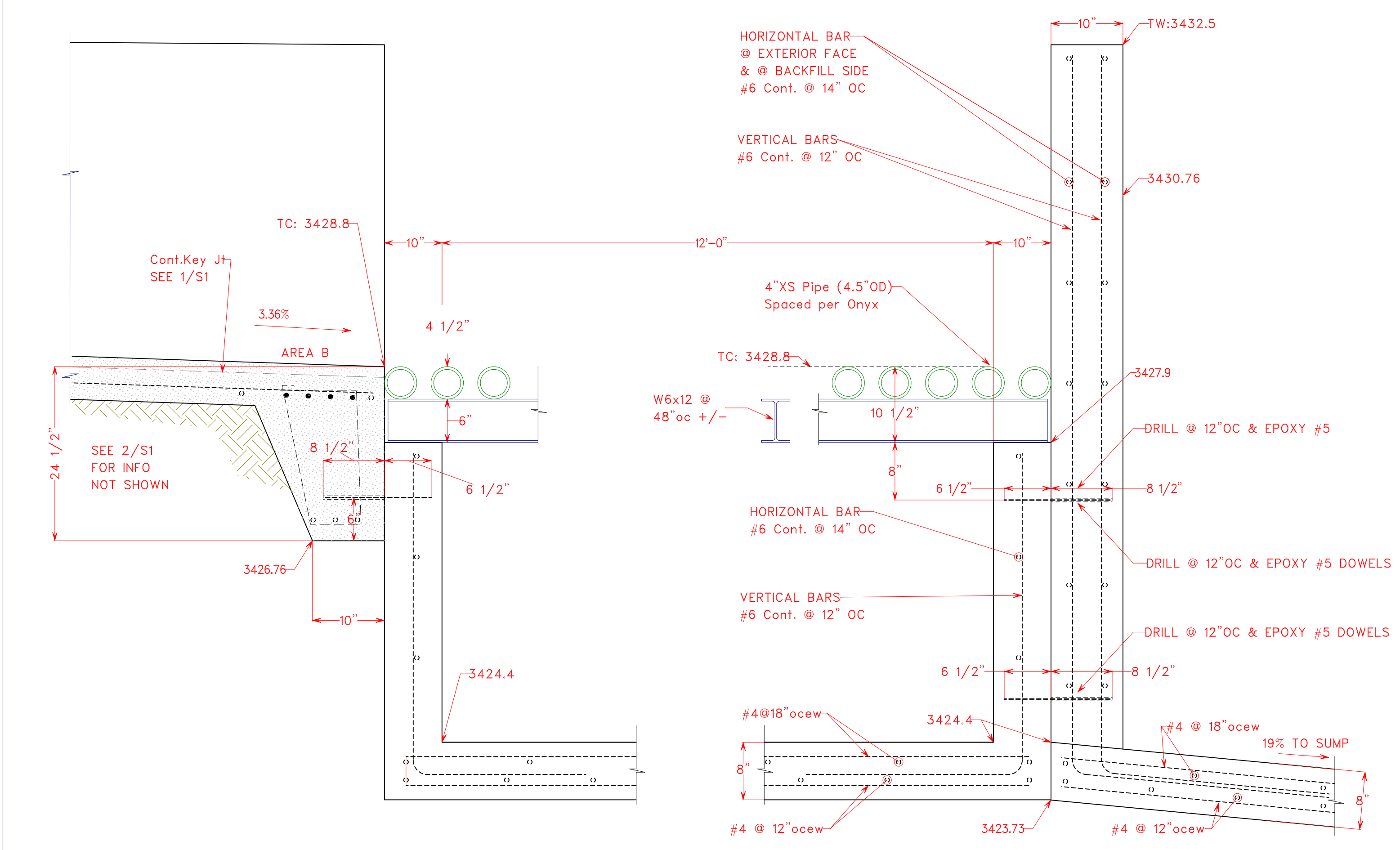


SECTION 2A
SCALE: 1" = 1'-0"

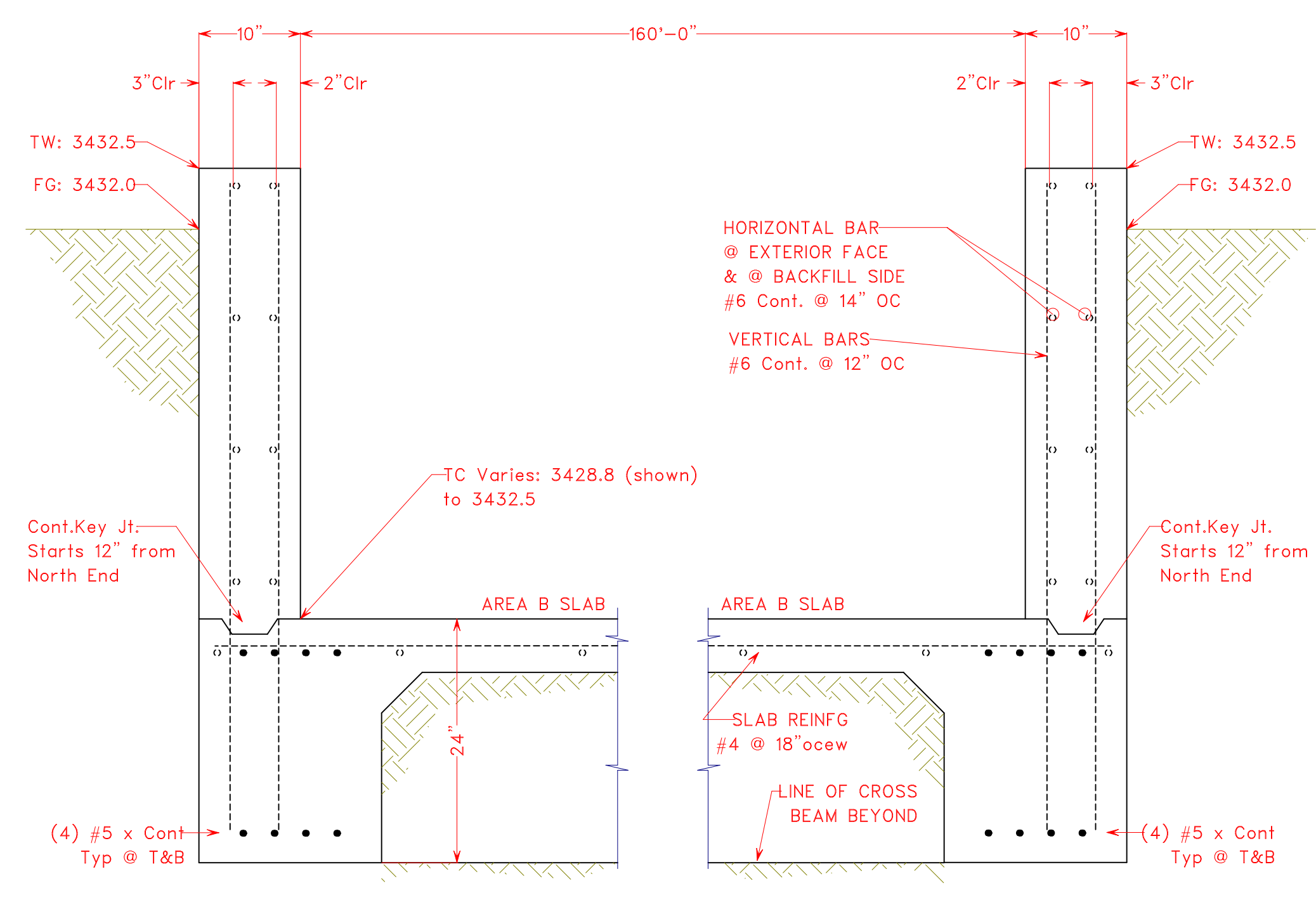
NOTE: ALL REFERENCES
TO REQUIRED LINER ARE
SHOWN ON CIVIL DRAWINGS
WHICH TAKE PRECEDENT TO
THESE DWGS WITH RESPECT
TO LINER REQUIREMENTS



SECTION 2B
SCALE: 1" = 1'-0"



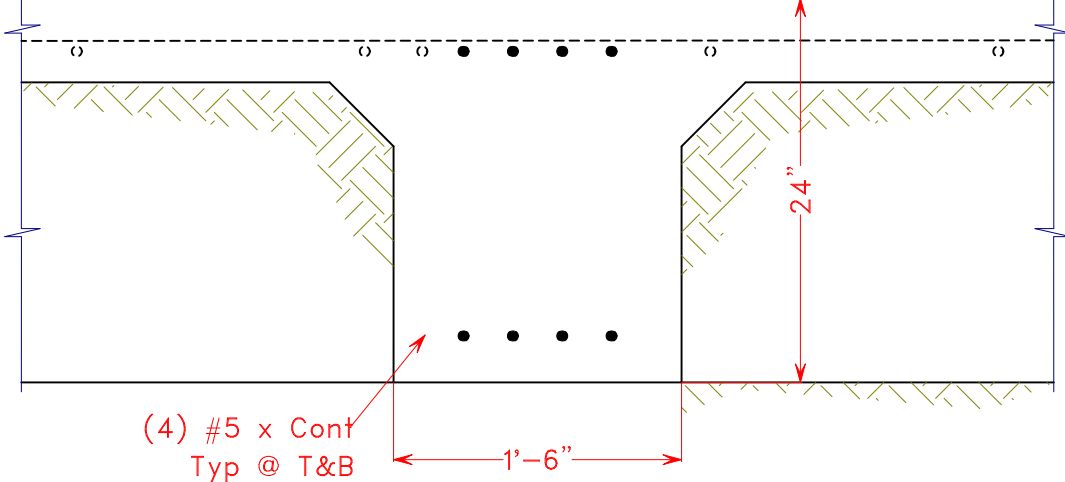
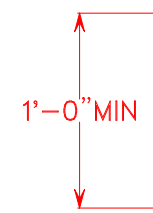
SECTION 2C
SCALE: 1" = 1'-0"



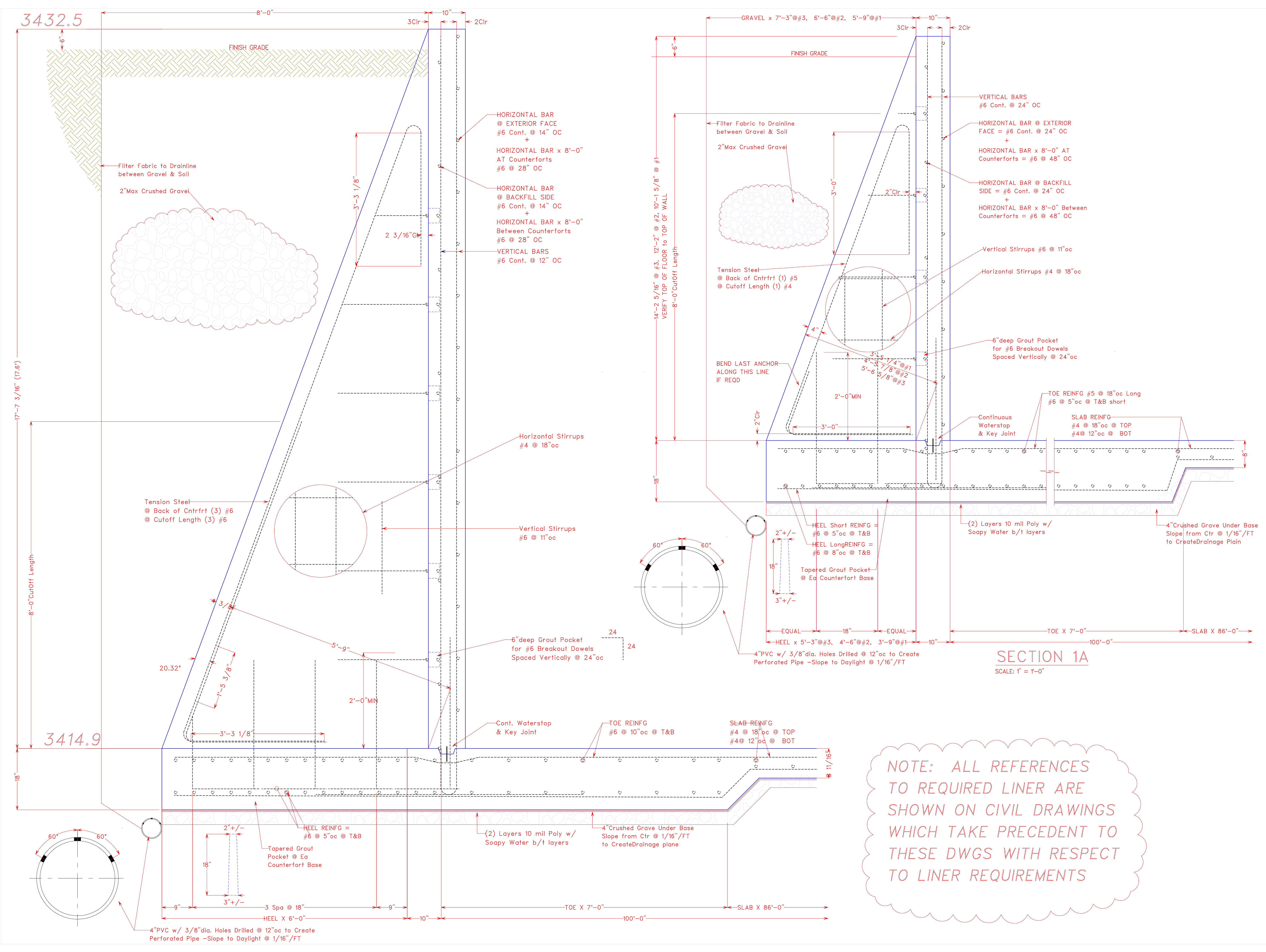
SECTION 3
SCALE: 1" = 1'-0"

DRAWING TITLE	SECTIONS AND DETAILS
REVISIONS	<div>2-27-19</div> <div>5-29-19</div> <div>XX/XX/XX</div>
DATE	9-5-18
DRAWN BY	DBR
CHECKED BY	RBD
SHEET NO.	S-3

NOTE: ALL REFERENCES
TO REQUIRED LINER ARE
SHOWN ON CIVIL DRAWINGS
WHICH TAKE PRECEDENT TO
THESE DWGS WITH RESPECT
TO LINER REQUIREMENTS



SECTION 5



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doug@onsitestructural.com

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NEW MEXICO

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PROFESSIONAL ENGINEER

9-5-18

Sundance Services, Inc.

Sundance West – Mud Load Out

Facility Layout – Eunice, NM

DRAWING TITLE

SECTIONS AND DETAILS

REVISIONS

DATE

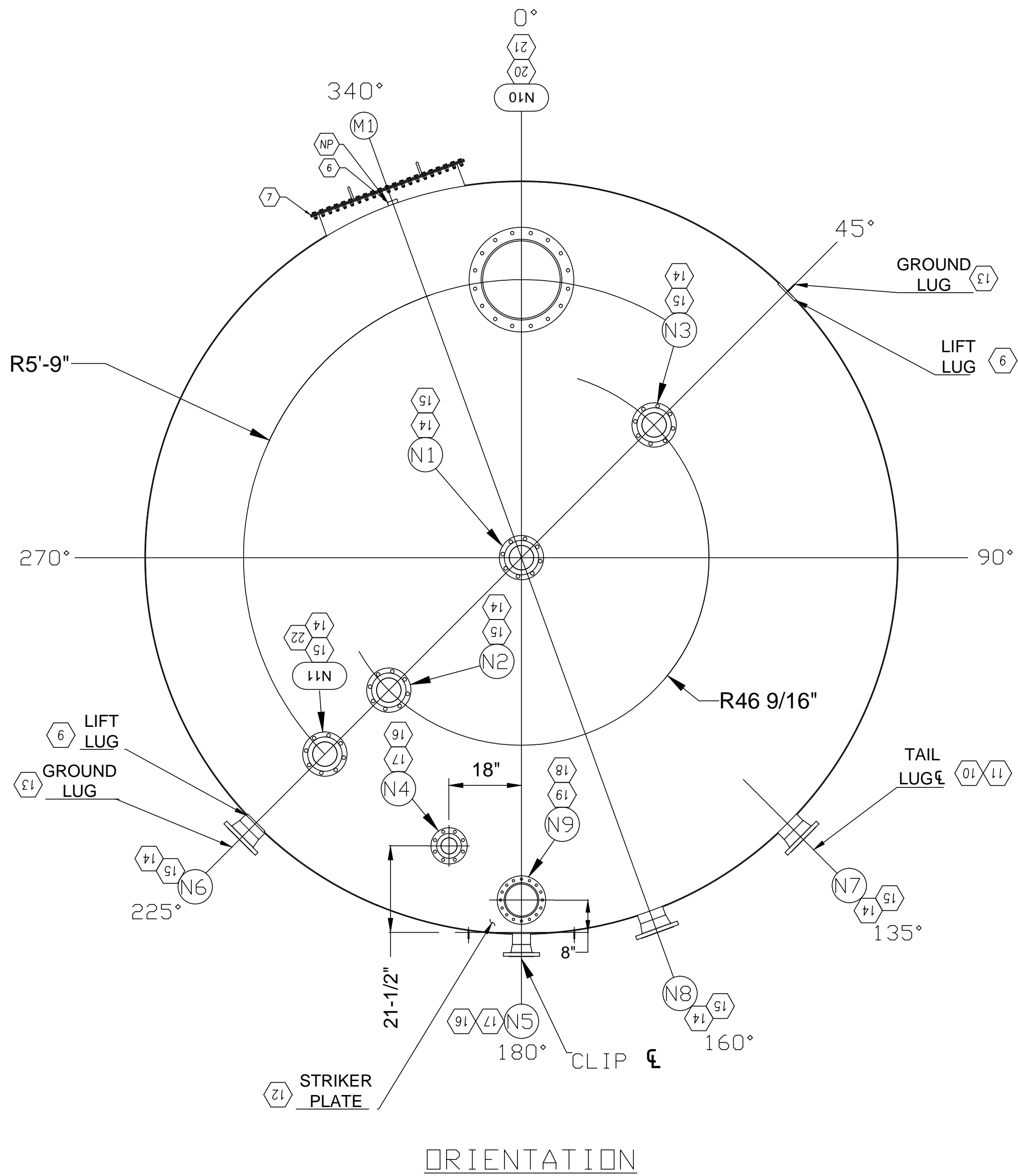
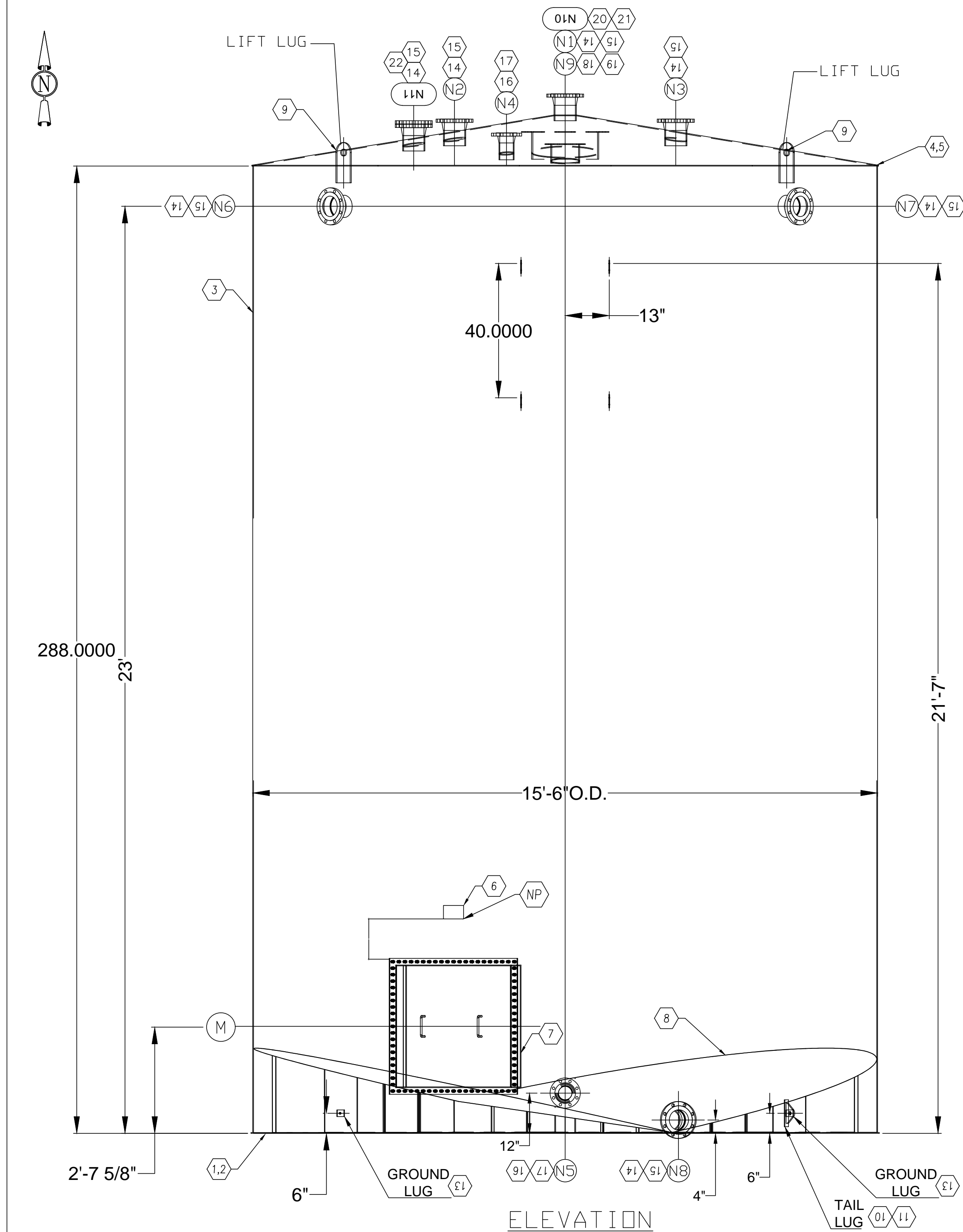
DRAWN BY

CHECKED BY

SHEET NO.

S-2

FILED IN 15 ONYX SUNDANCE WEST DRAWING AREA 0 TANKS SHEETS 19.02.2018 15.01.16 LONG TANK SHEETS.DWG



OIL TANK

QTY. 4

GENERAL NOTES

- 1) ALL BOLT HOLES TO STRADDLE NORMAL TANK CENTERLINES UNLESS SHOWN OTHERWISE.
- 2) NOZZLE PROJECTIONS ARE FROM OUTSIDE OF TANK TO FACE OF FLANGE UNLESS SHOWN OTHERWISE.
- 3) TANK TO BE FREE FROM FOREIGN DEBRIS BEFORE SHIPMENT.
- 4) ALL DIMENSIONS ARE FROM BOTTOM OF TANK.

CODE: API-12F
DESIGN PRESSURE: 8oz.
DESIGN VACUUM: -0.5oz.
DESIGN TEMPERATURE: AMBIENT
OPERATING PRESSURE: ATM
OPERATING VACUUM: ATM
OPERATING TEMPERATURE: AMBIENT
SPECIFIC GRAVITY: 1.0
JOINT EFFICIENCY: 70%
RADIOGRAPHY: NONE
CORROSION ALLOWANCE: 0"
TEST: AIR TEST PER API 12F

MATERIAL

ROOF/SHELL & BOTTOM: A-36
REINFORCEMENTS PADS: A-36
STRUCTURAL SUPPORT: A-36
PIPE: A-53
FLANGES/BLINDS/COUPLINGS & PLUGS: SA-105
BOLTING: ASTM A 307 GRADE A or B
SERVICE GASKETS: 1/8" NEOPRENE
ESTIMATED WEIGHT EMPTY: 23,750 lbs.
CAPACITY: 750 BBL

SURFACE PREP: SSPC-SP-6
INTERIOR PAINT
ENVIROLINE 2405-BOTTOM & 24" UP

SURFACE PREP: SSPC-SP--
EXTERIOR PAINT
LONG INDUSTRIES STANDARD DTM
ENVIRO GREEN SW-4020

M1	1	36" X 36"	API - 12F	4.5"	2"	9, 24	1/4"	1/4"			N/A	N/A	N/A	1 PIECE MANWAY (TOP OF SLOPED FLOOR)	M1
N11	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"	YES	N/A	N/A	SPARE	N11
N10	1	20"	150#	SMF	SCH 40	6"	2"	9, 24	1/4"	1/4"		N/A	N/A	EMERGENCY VENT	N10
N9	1	8"	TH	4oz/-	4oz	5"	2"	9, 24	1/4"	1/4"	YES	78	N/A	THIEF HATCH CONNECTION	N9
N8	1	6"	150#	NPT	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	SLUDGE CLEANOUT	N8
N7	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	OVERFLOW/DISCHARGE	N7
N6	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	OVERFLOW/DISCHARGE	N6
N5	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	OIL OUTLET	N5
N4	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	GUIDED WAVE RADAR	N4
N3	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	ANODE	N3
N2	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	ANODE	N2
N1	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"		N/A	N/A	VENT	N1

MARK	QTY	SIZE	RATING	FACING	NECK	D. S. PROJ	I. S. PROJ	TYPE	A'	B'	REINFORCEMENT PAD	C'	BLIND	NO STUDS	STUD SIZE	SERVICE	MARK
------	-----	------	--------	--------	------	------------	------------	------	----	----	-------------------	----	-------	----------	-----------	---------	------

SCHEDULE OF OPENINGS

MATERIAL THICKNESS

ROOF = 1/4" THK
SHELL = 1/4" THK
BOTTOM = 1/4" THK

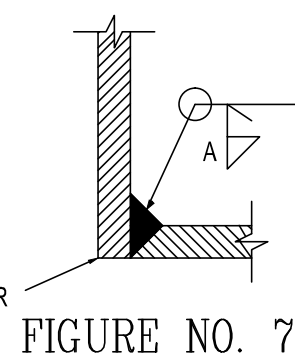


FIGURE NO. 7

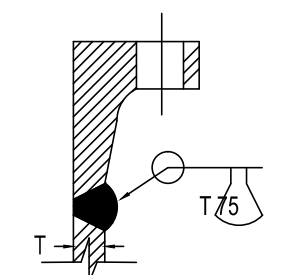


FIGURE NO. 2

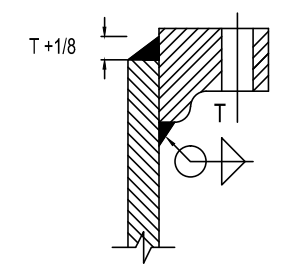


FIGURE NO. 24

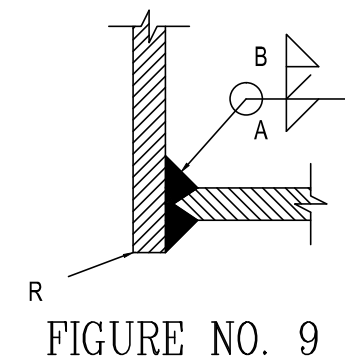


FIGURE NO. 9

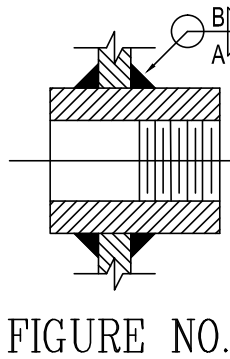


FIGURE NO. 18

4	C. V.	ADDED (N11) CONNECTION	4/22/19
3	M. C.	ADDED EXTERIOR PAINT COLOR	4/3/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	INITIAL	DESCRIPTION	DATE

DRAWN BY:
M. COY
CHECKED BY:
B. MORGAN

LONG INDUSTRIES INC.

LONG INDUSTRIES.
105 FCR 413
BUFFALO Tx 75831
(D) 903-389-3263
(F) 903-389-5505

ONYX CONTRACTORS
15'-6" O. D. x 24'-0" TALL OIL TANK 750BBL

DRAWING NO.
519040-1

P. O. #ONYX 111318

SHEET #
1

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BOM for ONE OIL TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 3 1/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	7	N1,N2,N3, N6,N7,N8,N11	FLANGE, 6" 150# RFWN	SA-105
15	7	N1,N2,N3, N6,N7,N8,N11	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	2	N4,N5	FLANGE, 4" 150# RFWN	SA-105
17	2	N4,N5	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N9	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N9	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N10	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N10	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	1	N11	BLIND, 6" 150# RF	SA-105

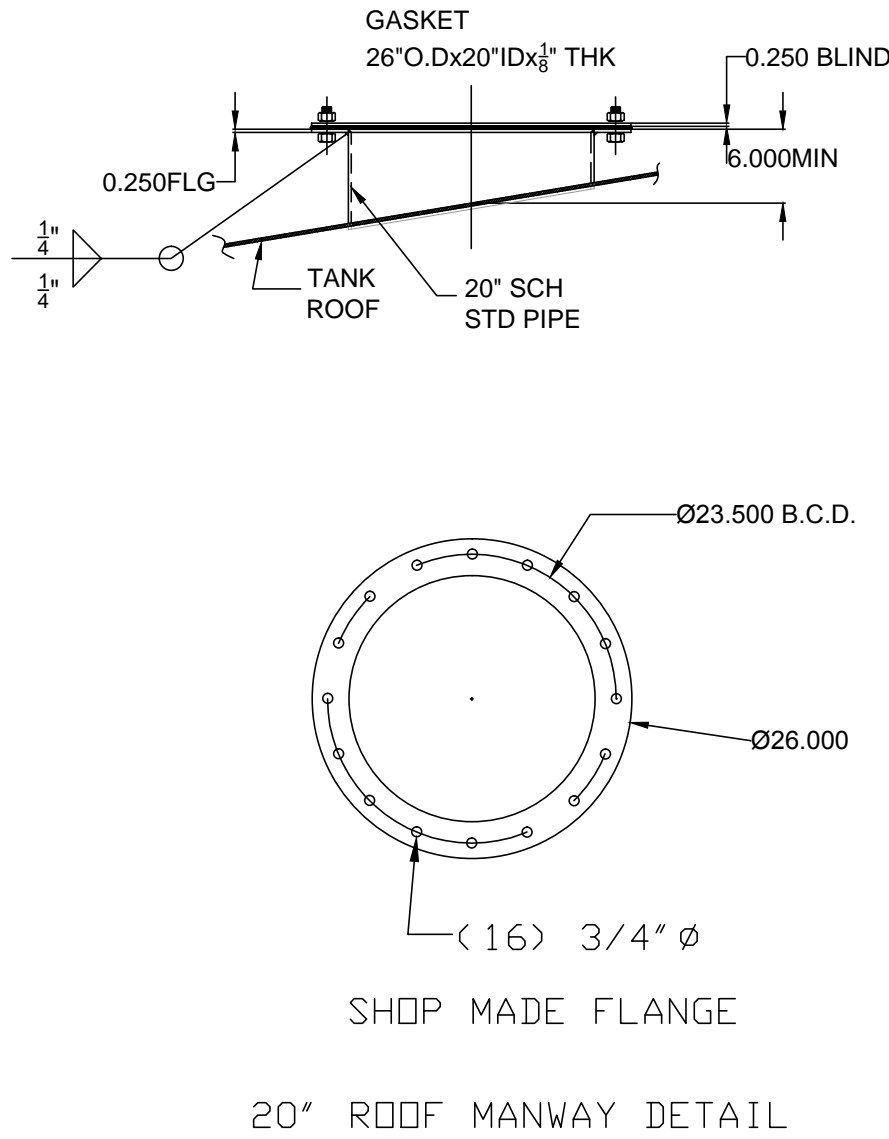
INDUSTRIES INC.

BUFFALO, TX
903-389-3263

MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

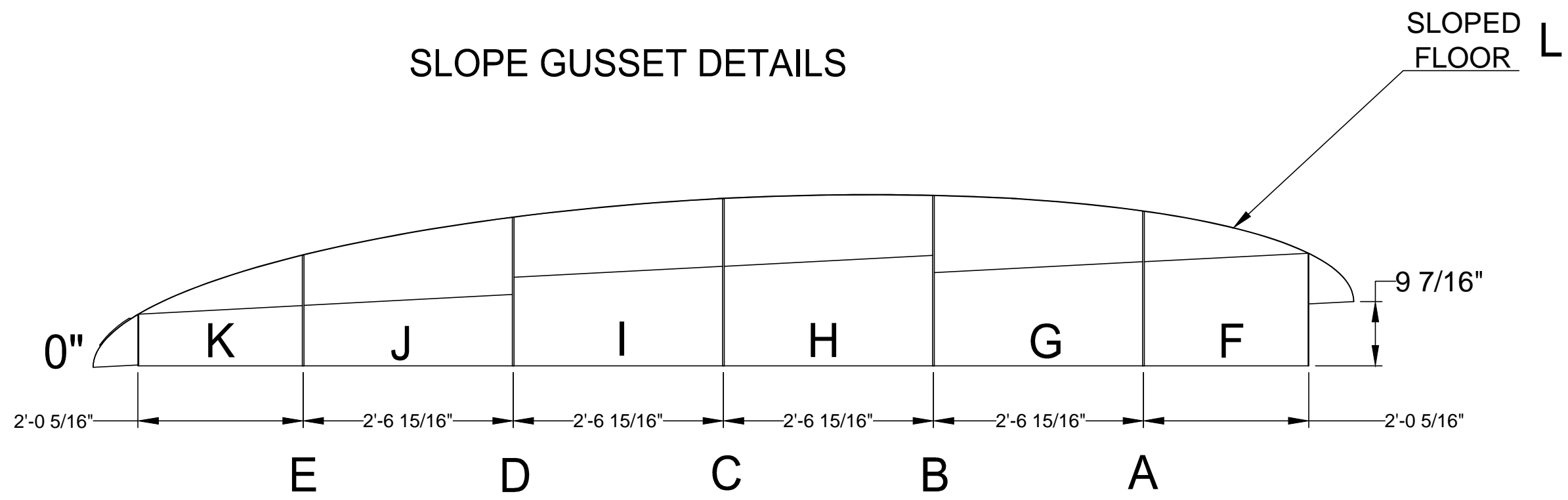
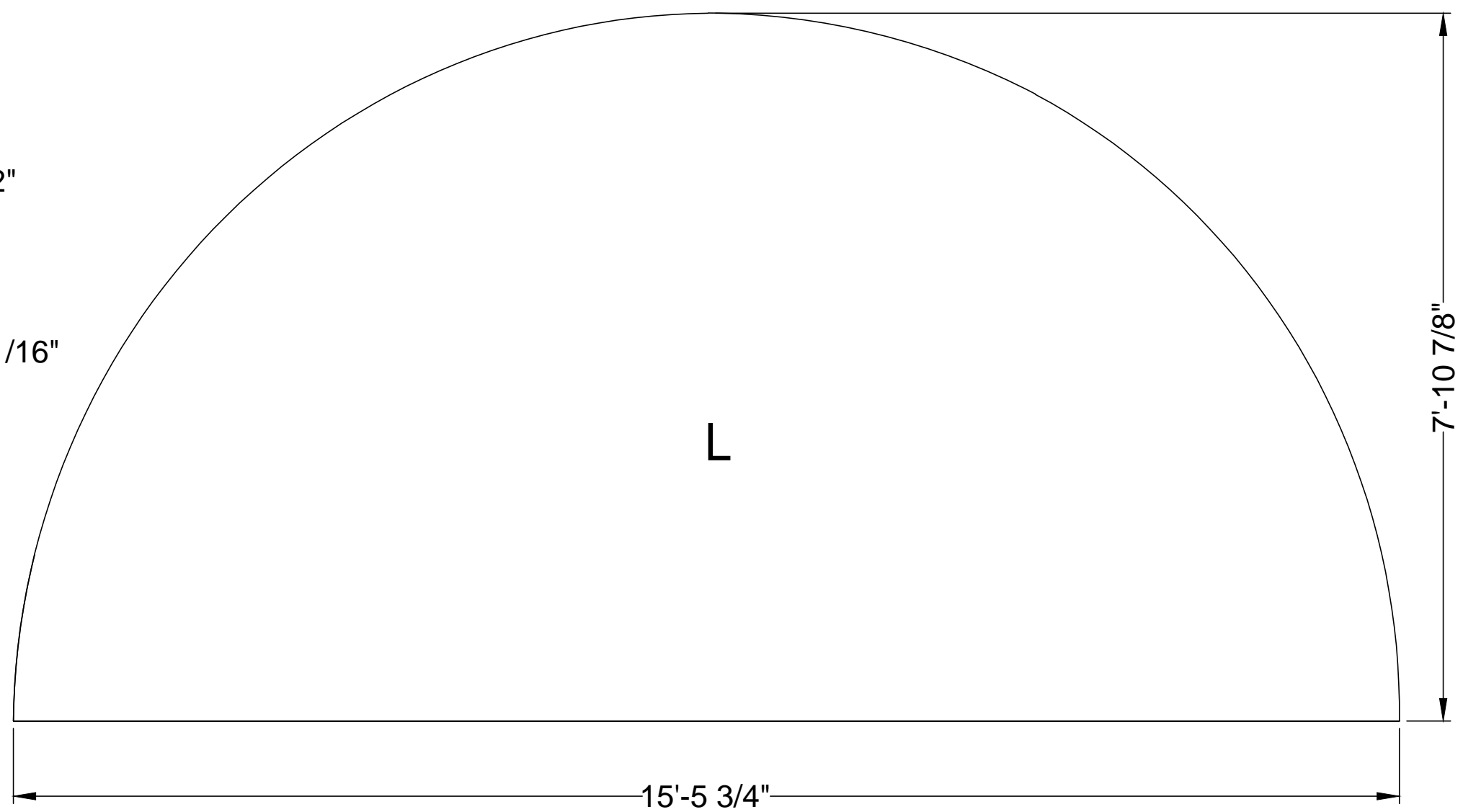
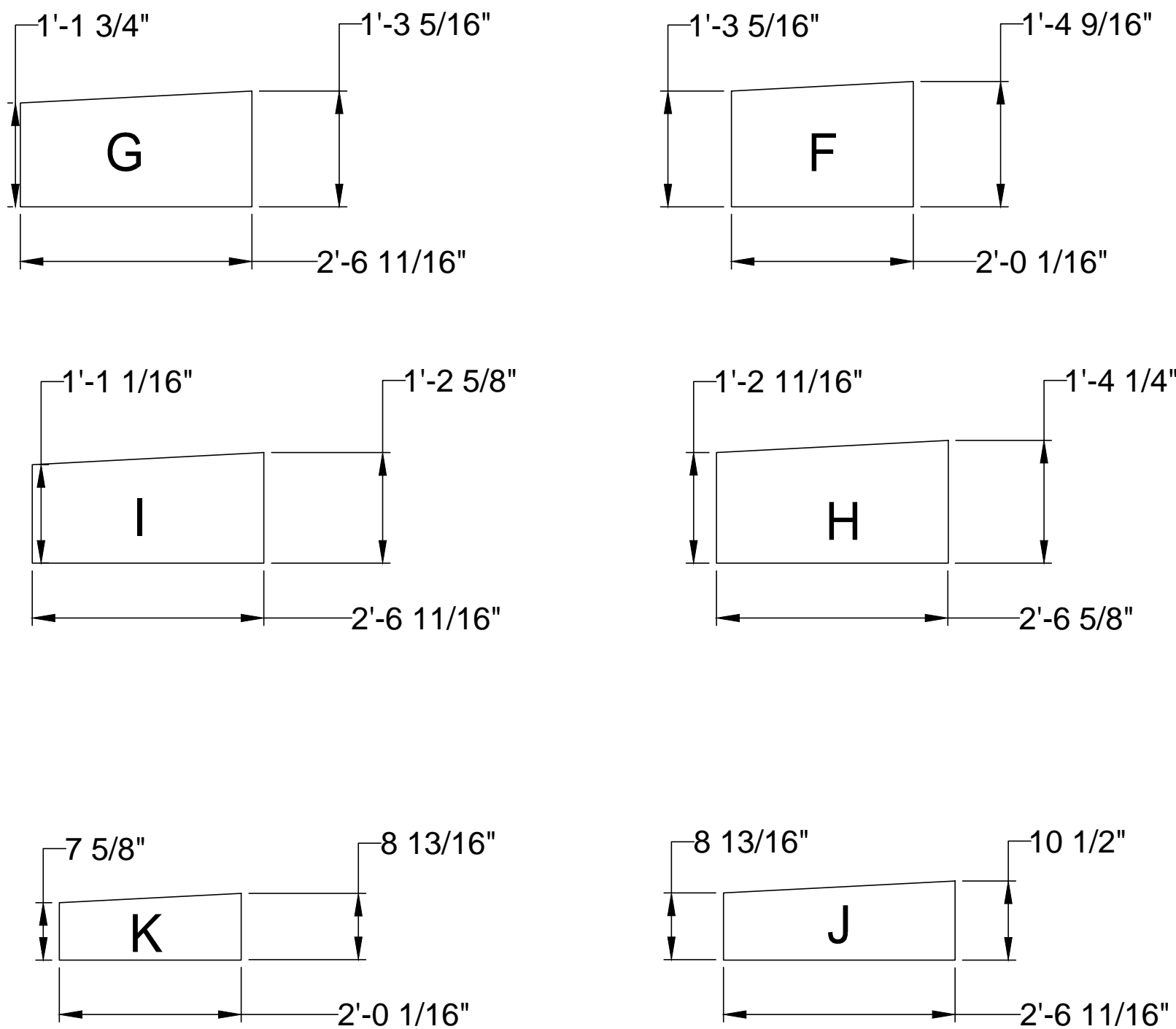
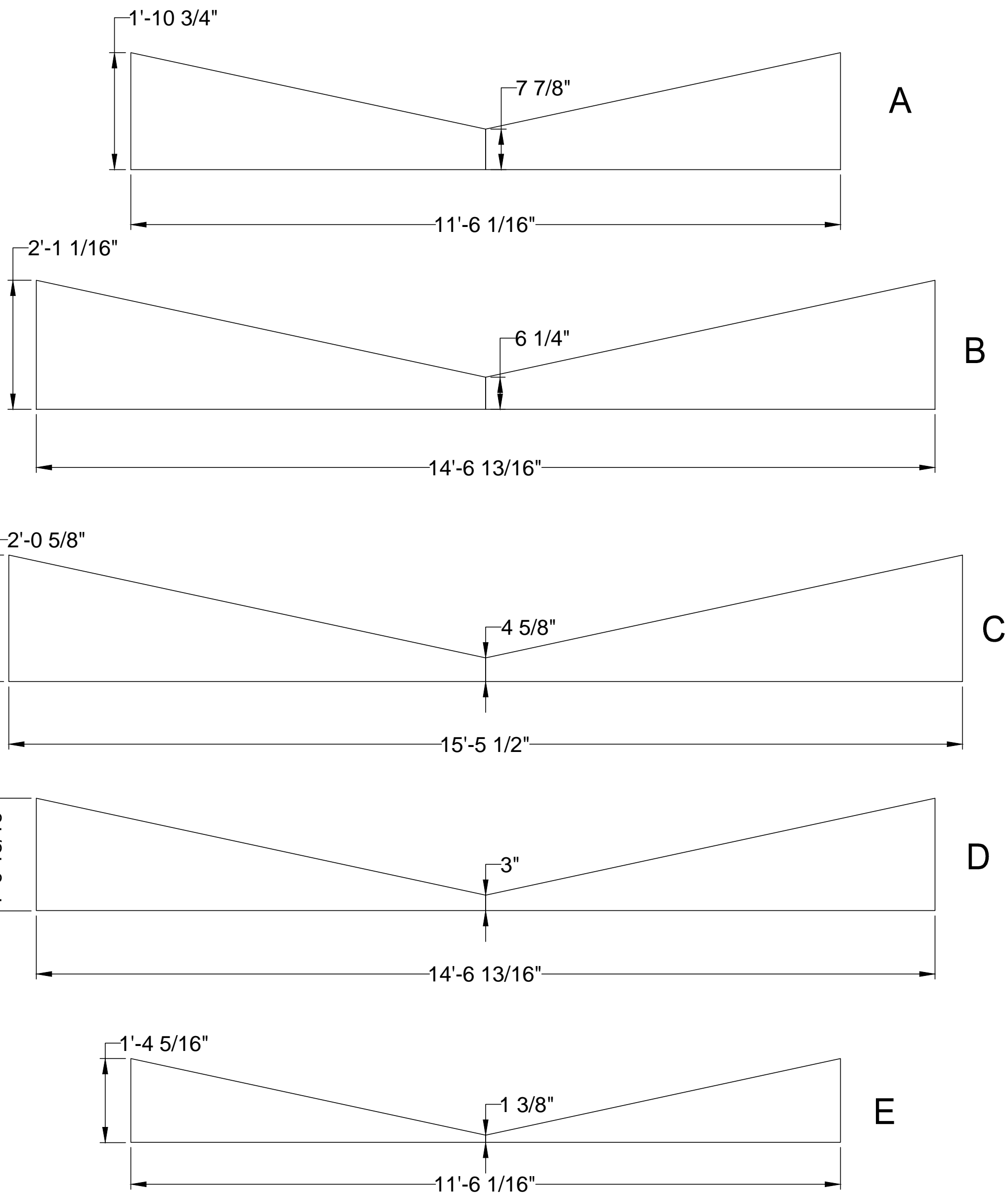
PO# ONYX 111318

MANUFACTURER LONG IND. BUFFALO, TX
SERIAL NUMBER 5-19-040-001
YEAR BUILT 2019
SPEC API 12 F
NOMINAL DIAMETER 15'-6"
NOMINAL HEIGHT 24'-0"
NOMINAL CAPACITY 750 BBL
BOTTOM THICKNESS 1/4"
SHELL THICKNESS 1/4"
DECK THICKNESS 1/4"
DESIGN PRESSURE 8oz.



4	C. V.	REVISED ITEM # 14 & 15 TO QUANTITY OF 7 & ADDED 3 22	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. COY		<div>LONG INDUSTRIES INC.</div>	LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			
		ONYX CONTRACTORS	
		15' -6" O. D. x 24' -0" TALL OIL TANK 750BBL BILL OF MATERIALS, DATA PLATE, 20" MANWAY DETAIL	
		DRAWING NO. 518040-2	
		P. O. # ONYX 111318	SHEET # . 2

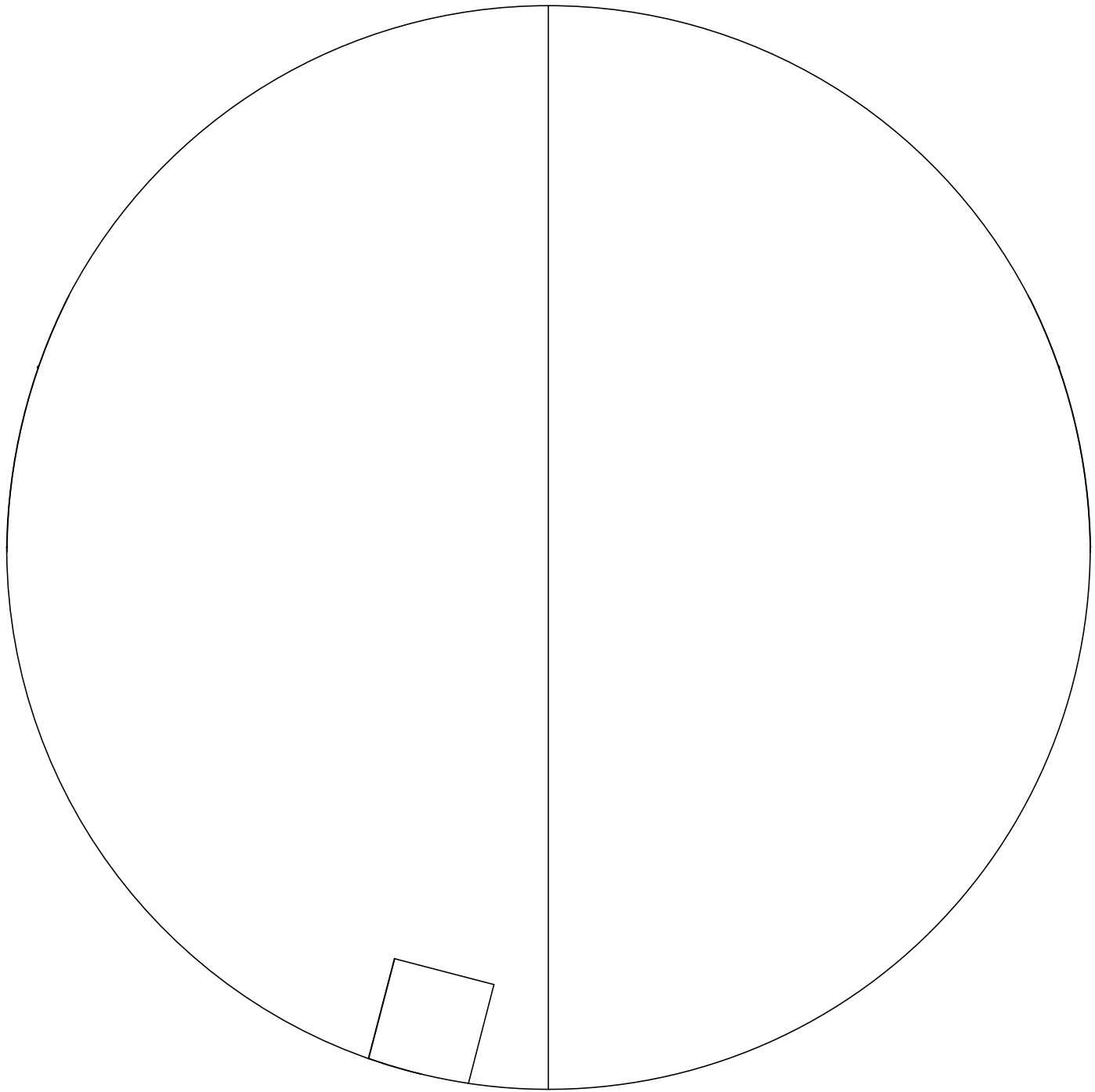
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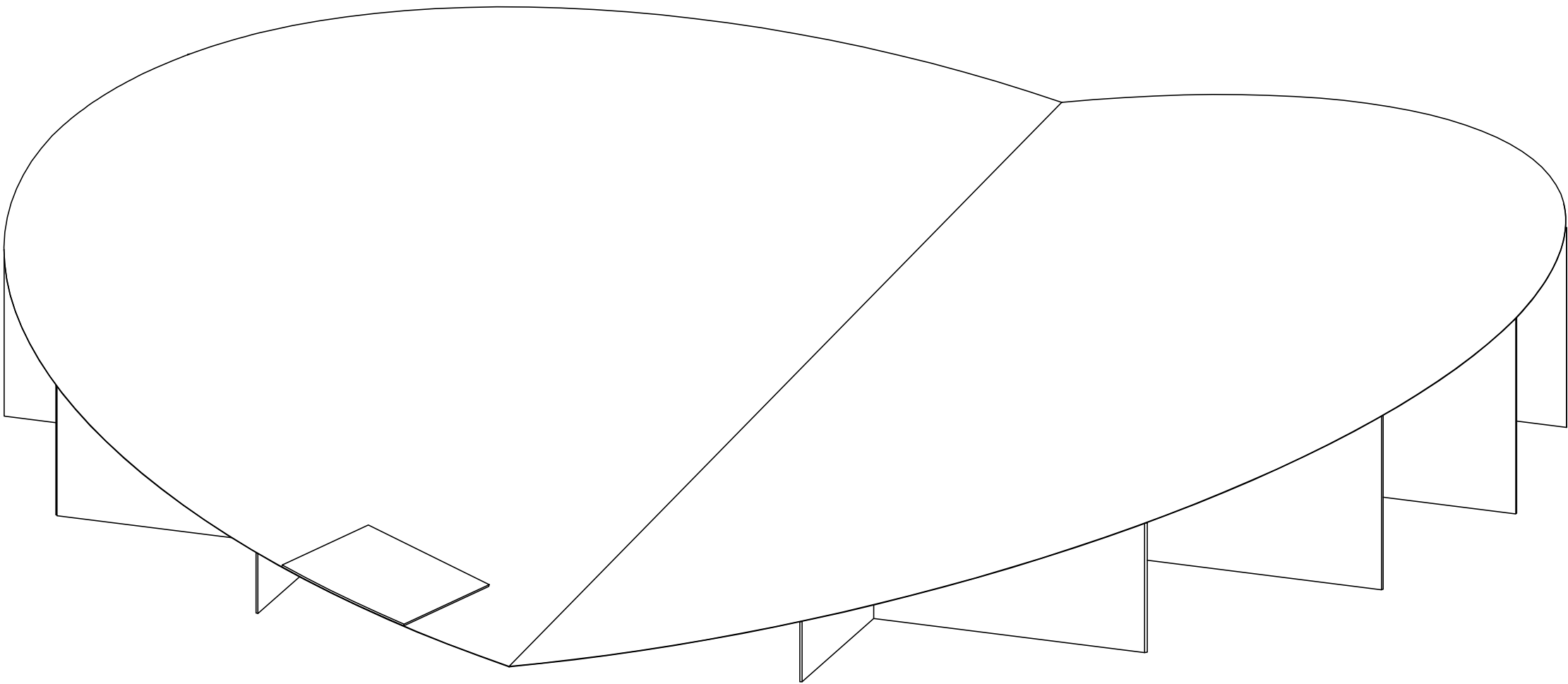
BOM FOR SLOPED BOTTOM				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	1	A	PLATE, 1/4"x 22 3/4"X 138 1/16"	SA-36
2	1	B	PLATE, 1/4"x 25 1/16"X 146 13/16"	SA-36
3	1	C	PLATE, 1/4"x 24 5/8"X 185 1/2"	SA-36
4	1	D	PLATE, 1/4"x 25 1/16"X 146 13/16"	SA-36
5	1	E	PLATE, 1/4"x 22 3/4"X 138 1/16"	SA-36
6	1	F	PLATE, 1/4"x 16 9/16"X 24 1/16"	SA-36
7	1	G	PLATE, 1/4"x 16 9/16"X 24 1/16"	SA-36
8	1	H	PLATE, 1/4"x 16 1/4"X 30 11/16"	SA-36
9	1	I	PLATE, 1/4"x 14 5/8"X 30 11/16"	SA-36
10	1	J	PLATE, 1/4"x 10 1/2"X 30 11/16"	SA-36
11	1	K	PLATE, 1/4"x 8 7/8"X 24 1/16"	SA-36
12	2	L	PLATE, 1/4"x 94 7/8"X 185 3/4"	SA-36

4	C.V.	4/22/19	NO CHANGE THIS SHEET	
3	M.C.	4/4/19	NO CHANGE THIS SHEET	
2	C.V.	3/21/19	NO CHANGE THIS SHEET	
1	M.C.	3/4/19	NO CHANGE THIS SHEET	
0	M.C.	2/13/19	PRELIMINARY DRAWING	
REV	INITIALS	DATE	DESCRIPTION	
DRAWN BY: M. COY			<div><div>LONG INDUSTRIES INC.</div><div>LONG INDUSTRIES. 105 FCR 413 BUFFALO, TX 75831 (O) 903-389-3263 (F) 903-389-5505</div></div>	
			ONYX CONTRACTORS	
			SLOPE FLOOR, GUSSET, & STIFFENER DETAILS	
			DRAWING NO.	
			519040-4	
P.O. #			ONYX 111318	SHEET # 4

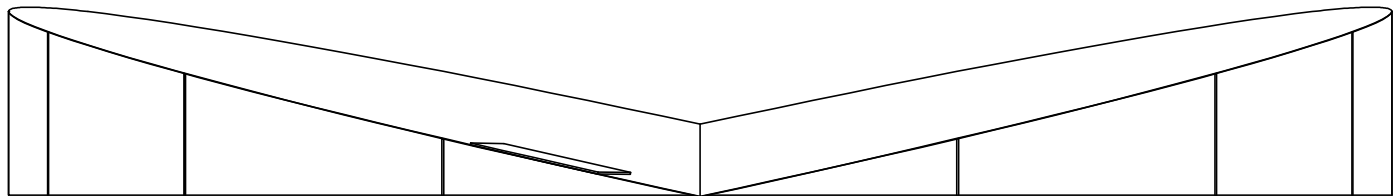
SLOPED FLOOR
TYPICAL ALL TANKS



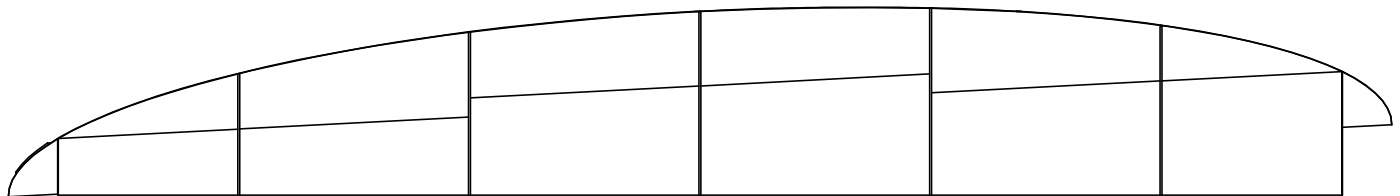
FALSE BOTTOM
TOP VIEW




FALSE BOTTOM
ISO VIEW

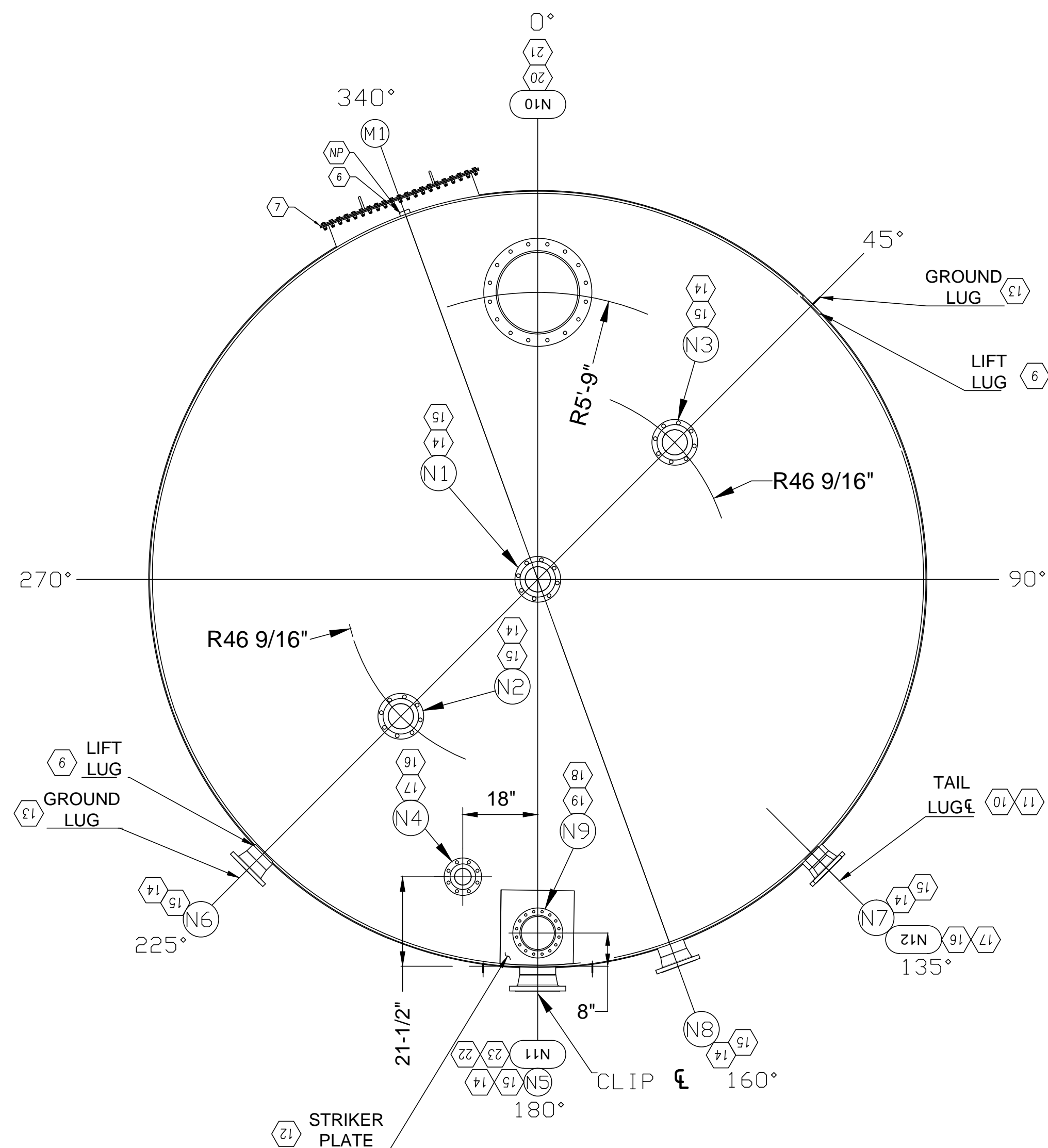
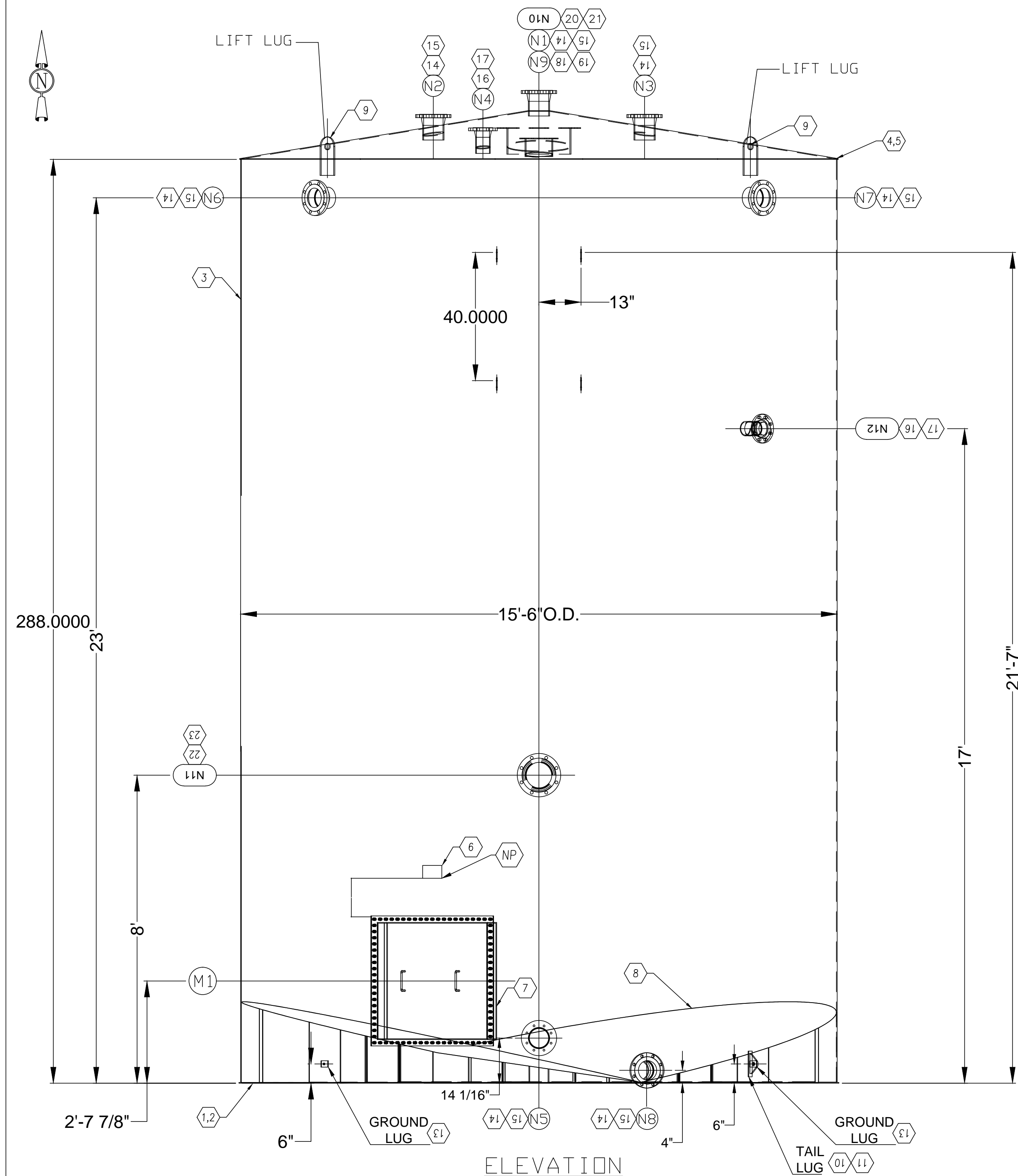


FALSE BOTTOM
FRONT VIEW



FALSE BOTTOM
RIGHT VIEW

4	C.V.	4/22/19	NO CHANGE THIS SHEET	
3	M.C.	4/4/19	NO CHANGE THIS SHEET	
2	C.V.	3/21/19	NO CHANGE THIS SHEET	
1	M.C.	3/4/19	NO CHANGE THIS SHEET	
0	M.C.	2/13/19	PRELIMINARY DRAWING	
REV	INITIALS	DATE	DESCRIPTION	
DRAWN BY: M. COY			LONG INDUSTRIES. 105 FCR 413 BUFFALO, TX 75831 (O) 903-389-3263 (F) 903-389-5505	
CHECKED BY: B. MORGAN				
			ONYX CONTRACTORS SLOPE BOTTOM INFO SHEET	
			DRAWING NO. 519040-5	
		P.O. # ONYX 111318		SHEET # 5



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BOM for ONE WATER TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 3 1/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	8	N1,N2,N3,N5, N6,N7,N8,N13	FLANGE, 6" 150# RFWN	SA-105
15	8	N1,N2,N3,N5,N 6,N7,N8,N13	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	2	N4,N12	FLANGE, 4" 150# RFWN	SA-105
17	2	N4,N12	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N9	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N9	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N10	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N10	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	1	N11	FLANGE, 8" 150# RFWN	SA-105
23	1	N11	PIPE, 8" SCH. 40x 6" LG	SA-106B
24	1	N13	BLIND, 6" 150# RF	SA-105

INDUSTRIES

INC.

BUFFALO, TX
903-389-3263

MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

PO# ONYX 111318

MANUFACTURER LONG IND. BUFFALO, TX

SERIAL NUMBER 5-19-040-002

YEAR BUILT 2019

SPEC API 12 F

NOMINAL DIAMETER 15'-6"

NOMINAL HEIGHT 24'-0"


NOMINAL CAPACITY 750 BBL

BOTTOM THICKNESS 1/4"

SHELL THICKNESS 1/4"

DECK THICKNESS 1/4"

DESIGN PRESSURE 80z.

4	C. V.	REVISED ITEM # 14 & 15 QUANTITY TO 8 & ADDED # 24	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. COY			LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			
		<u>ONYX CONTRACTORS</u>	
		15' -6" O. D. x 24' -0" TALL WATER TANK 750BBL BILL OF MATERIALS, DATA PLATE	
		DRAWING NO. 518040-7A	
		P. O. # ONYX 111318	SHEET # . 7A

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BOM for ONE WATER TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 31/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	7	N1,N2,N3,N5, N6,N7,N8,	FLANGE, 6" 150# RFWN	SA-105
15	7	N1,N2,N3,N5,N 6,N7,N8	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	2	N4,N12	FLANGE, 4" 150# RFWN	SA-105
17	2	N4,N12	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N9	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N9	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N10	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N10	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	1	N11	FLANGE, 8" 150# RFWN	SA-105
23	1	N11	PIPE, 8" SCH. 40x 6" LG	SA-106B

INDUSTRIES


INC.

BUFFALO, TX
903-389-3263

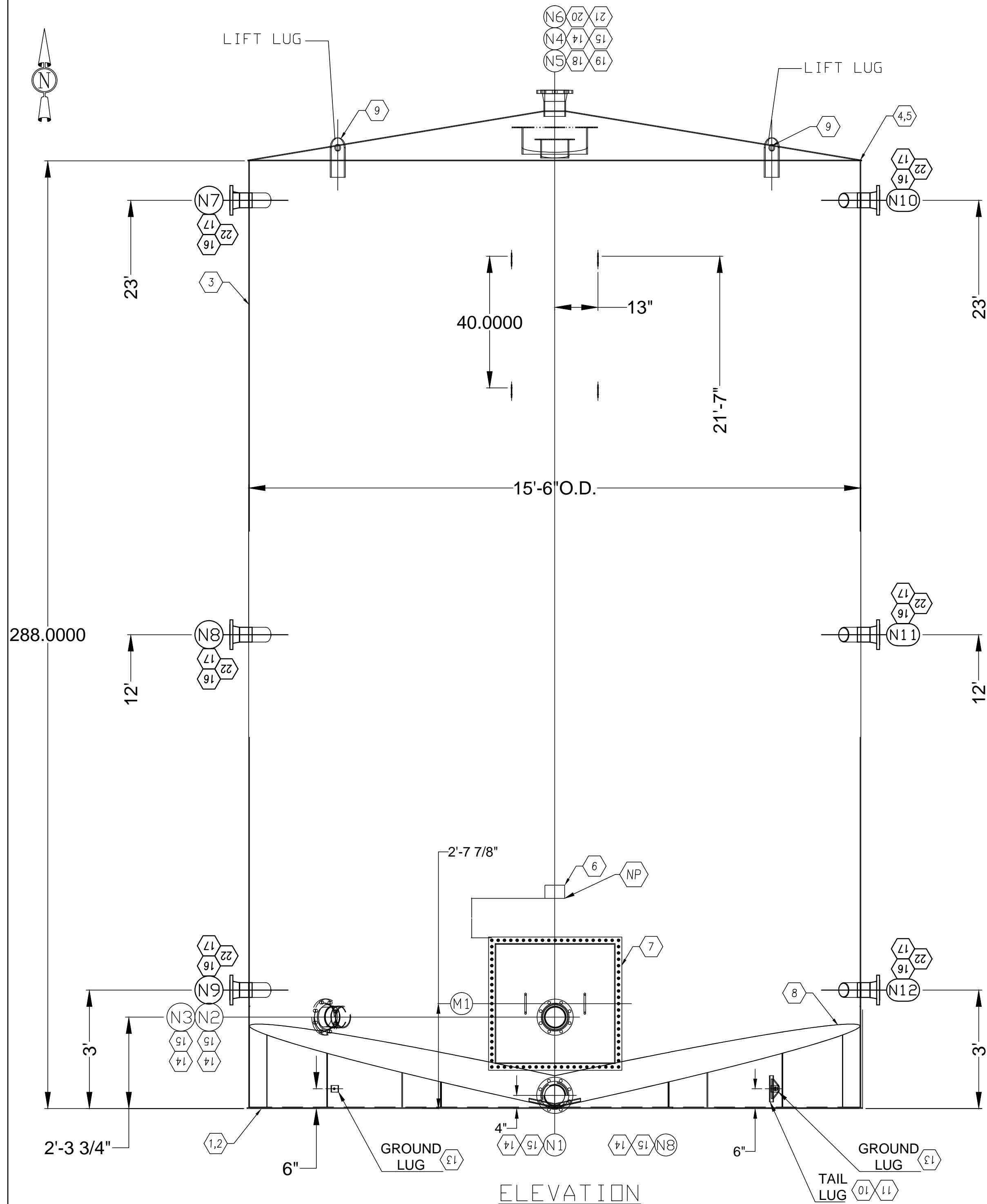
MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

PO# ONYX 111318

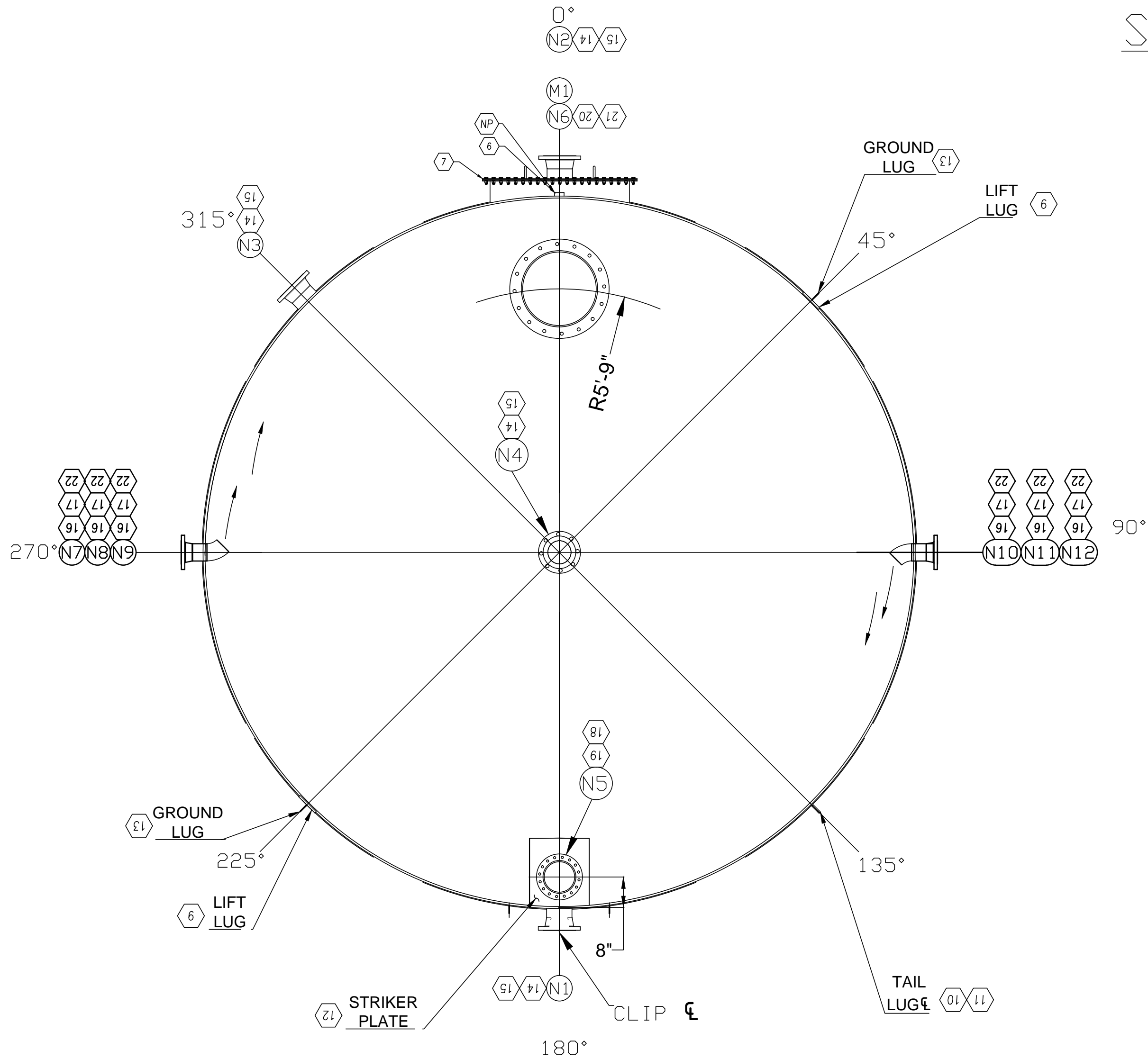
MANUFACTURER LONG IND. BUFFALO, TX
SERIAL NUMBER 5-19-040-002
YEAR BUILT 2019
SPEC API 12 F
NOMINAL DIAMETER 15'-6"
NOMINAL HEIGHT 24'-0"
NOMINAL CAPACITY 750 BBL
BOTTOM THICKNESS 1/4"
SHELL THICKNESS 1/4"
DECK THICKNESS 1/4"
DESIGN PRESSURE 8oz.

4	M. C.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. COY			LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			
		<u>ONYX CONTRACTORS</u> 15' -6" O. D. x 24' -0" TALL WATER TANK 750BBL BILL OF MATERIALS, DATA PLATE	
		DRAWING NO. 518040-7B	
		P. O. # ONYX 111318	
			SHEET # . 7B

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ELEVATION



ORIENTATION

SLUDGE TANK

QTY. 3

GENERAL NOTES

- 1) ALL BOLT HOLES TO STRADDLE NORMAL TANK CENTERLINES UNLESS SHOWN OTHERWISE.
- 2) NOZZLE PROJECTIONS ARE FROM OUTSIDE OF TANK TO FACE OF FLANGE UNLESS SHOWN OTHERWISE.
- 3) TANK TO BE FREE FROM FOREIGN DEBRIS BEFORE SHIPMENT.
- 4) ALL DIMENSION'S ARE FROM BOTTOM OF TANK.

DESIGN CRITERIA

CODE: API-12F
DESIGN PRESSURE: 8oz.
DESIGN VACUUM: -0.5oz.
DESIGN TEMPERATURE: AMBIENT
OPERATING PRESSURE: ATM
OPERATING VACUUM: ATM
OPERATING TEMPERATURE: AMBIENT
SPECIFIC GRAVITY: 1.0
JOINT EFFICIENCY: 70%
RADIOGRAPHY: NONE
CORROSION ALLOWANCE: 0"
TEST: AIR TEST PER API 12F

MATERIAL

ROOF/SHELL & BOTTOM: A-36
REINFORCEMENTS PADS: A-36
STRUCTURAL SUPPORT: A-36
PIPE: A-53
FLANGES/BLINDS/COUPLINGS & PLUGS: SA-105
BOLTING: ASTM A 307 GRADE A or B
SERVICE GASKETS: 1/8" NEOPRENE
ESTIMATED WEIGHT EMPTY: 23,750 lbs.
CAPACITY: 750 BBL

SURFACE PREP: SSPC-SP-6
INTERIOR PAINT
ENVIROLINE 2405-100% INTERNALLY COATED

SURFACE PREP: SSPC-SP--
EXTERIOR PAINT
LONG INDUSTRIES STANDARD DTM
ENVIRO GREEN SW-4020

M1	1	36" X 36"	API - 12F		4.5"	2"	9, 24	1/4"	1/4"				N/A	N/A		N/A	1 PIECE MANWAY (TOP OF SLOPED FLOOR)	M1	
N7/N12	6	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	STEAM INLET	N7/N12
N6	1	20"	150#	SMF	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	EMERGENCY VENT	N6
N5	1	8"		TH 4oz/-, 4oz		5"	2"	9, 24	1/4"	1/4"				YES	78		N/A	THIEF HATCH CONNECTION	N5
N4	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	VENT	N4
N3	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	INLET/FILL	N3
N2	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	MANWAY VIEWING	N2
N1	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"				N/A	N/A		N/A	DISCHARGE	N1

SCHEDULE OF OPENINGS

MATERIAL THICKNESS

ROOF = 1/4" THK
SHELL = 1/4" THK
BOTTOM = 1/4" THK

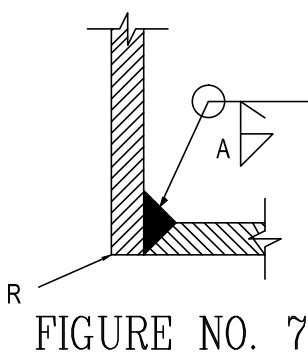


FIGURE NO. 7

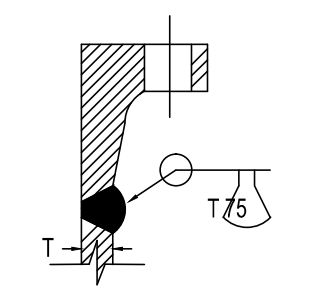


FIGURE NO. 2

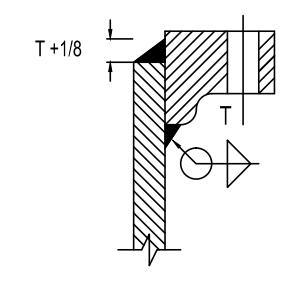


FIGURE NO. 24

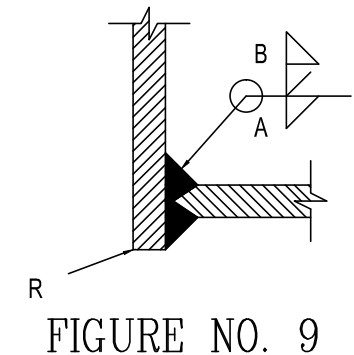


FIGURE NO. 9

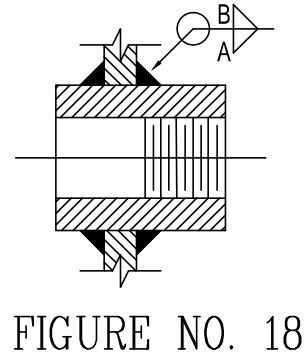


FIGURE NO. 18

4	C. V.	NO CHANGES THIS SHEET	4/22/19
3	M. C.	ADDED EXTERIOR PAINT COLOR	4/3/19
2	C. V.	ADDED 45° ELBOW TO CONNECTIONS (N7-N12)	3/21/19
1	M. C.	REMOVED N13 THRU N18/RELOCATED N7 THRU N12	2/22/19
0	M. C.	FOR APPROVAL	2/13/19
REV	INITIAL	DESCRIPTION	DATE

DRAWN BY:
M. COY

CHECKED BY:
B. MORGAN

LONG INDUSTRIES INC.

LONG INDUSTRIES.
105 FCR 413
BUFFALO TX 75831
(D) 903-389-3263
(F) 903-389-5505

ONYX CONTRACTORS
15' - 6" O. D. x 24' - 0" TALL SLUDGE TANK 750BBL

DRAWING NO.
519040-8

P. O. #ONYX 111318

SHEET #
8

FILED:\BIBUS\ONYX\SUNDANCE WEST\DRAWINGS\AREA 0 TANKS\SHEETS 19\02\2018\01\001\001\LONG TANK SHEETS.DWG

BOM for ONE SLUDGE TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 3 1/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	4	N1,N2,N3,N4	FLANGE, 6" 150# RFWN	SA-105
15	4	N1,N2,N3,N4	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	6	N7 THRU N12	FLANGE, 4" 150# RFWN	SA-105
17	6	N7 THRU N12	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N5	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N5	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N6	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N6	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	6	N7-N12	ELBOW, 45° SCH 40	A-234-WPB

INDUSTRIES

INC.

BUFFALO, TX
903-389-3263

MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

PO# ONYX 111318

MANUFACTURER LONG IND. BUFFALO, TX

SERIAL NUMBER 5-19-040-003

YEAR BUILT 2019

SPEC API 12 F

NOMINAL DIAMETER 15'-6"

NOMINAL HEIGHT 24'-0"

NOMINAL CAPACITY 750 BBL

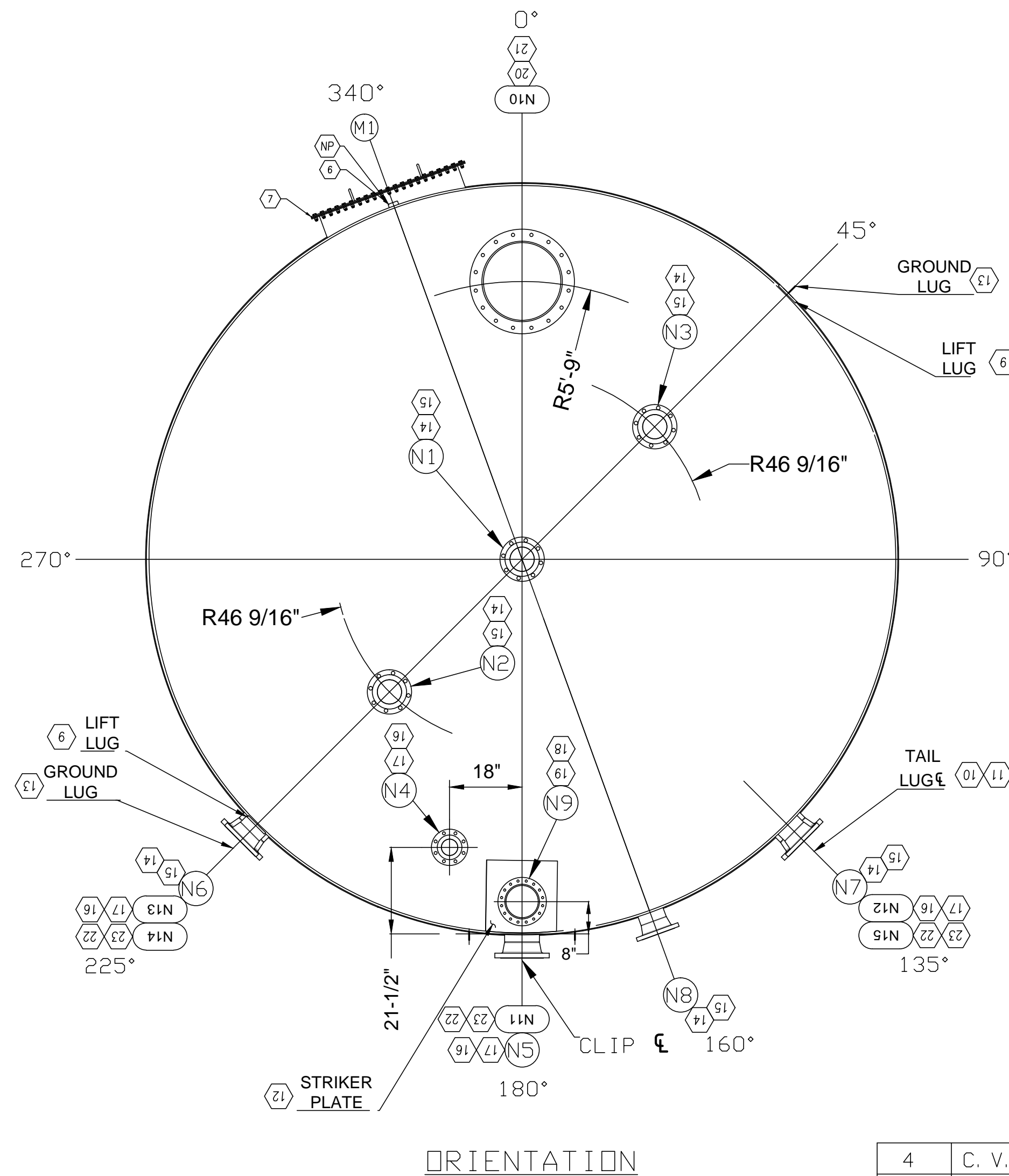
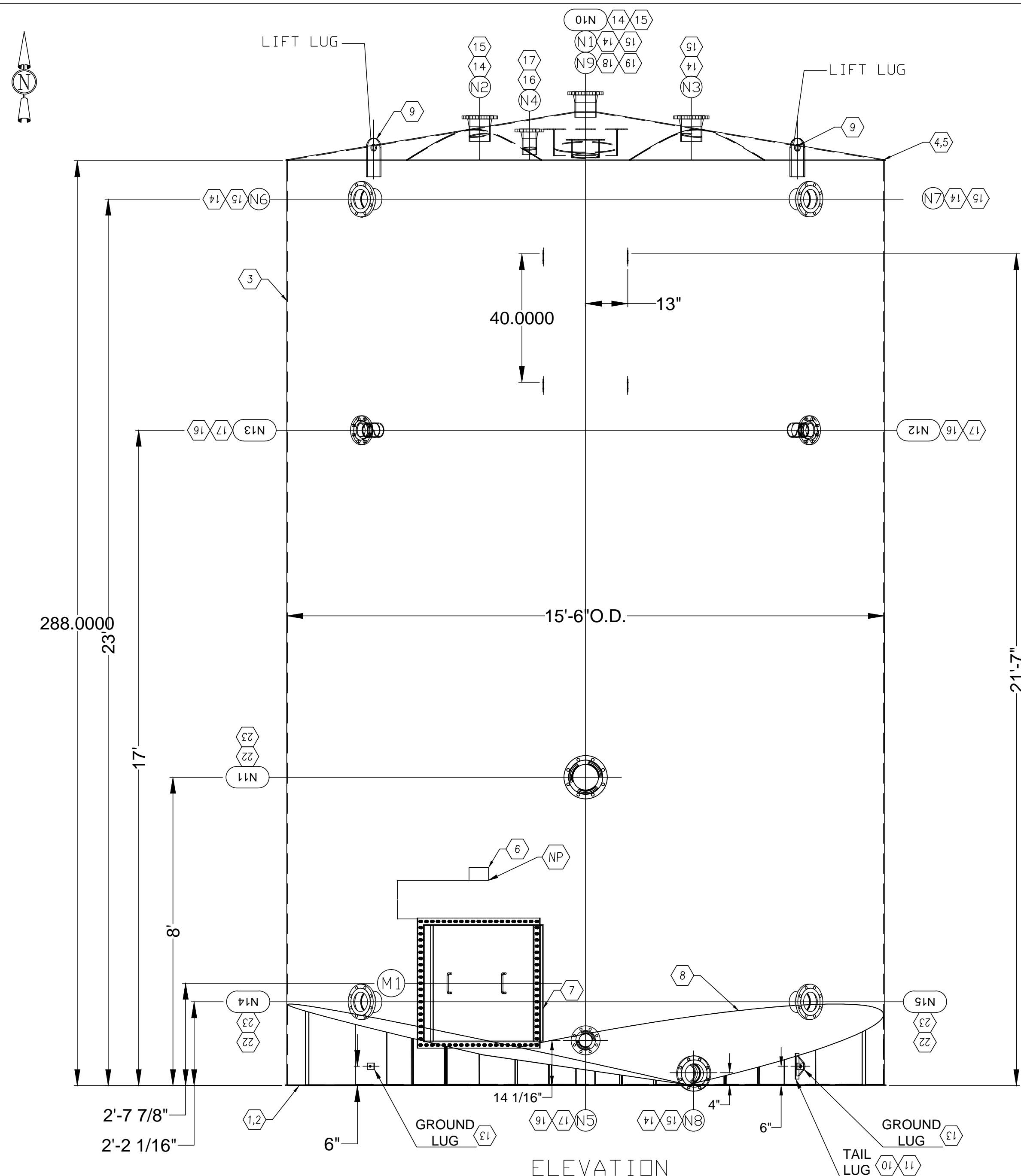
BOTTOM THICKNESS 1/4"

SHELL THICKNESS 1/4"

DECK THICKNESS 1/4"

DESIGN PRESSURE 8oz.

4	M. C.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	ADDED ITEM # 22 ON BILL OF MATERIAL	3/21/19
1	M. C.	CHANGED QTY FOR ITEM 16 , 17	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. COY		<div>LONG INDUSTRIES INC.</div>	LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			
			ONYX CONTRACTORS
			15' -6" O. D. x 24' -0" TALL SLUDGE TANK 750BBL BILL OF MATERIALS, DATA PLATE
			DRAWING NO. 518040-9
		P. O. # ONYX 111318	SHEET # . 9

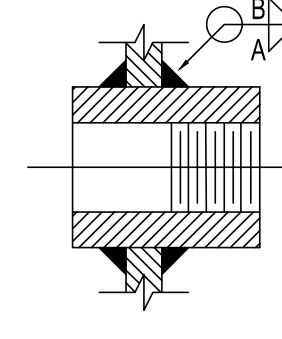
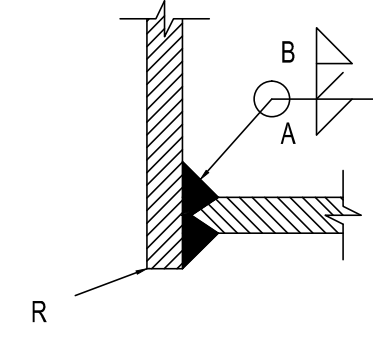
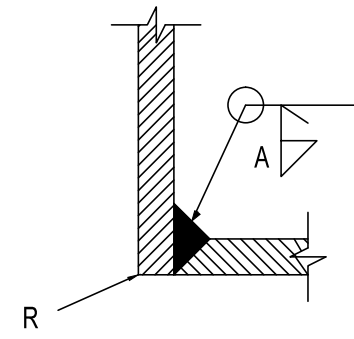
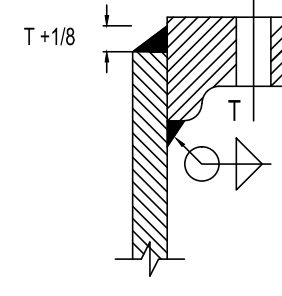
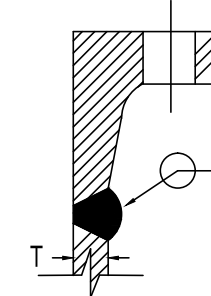


N1	1	36"	X 36"	API	- 12F	4. 5"	2"	9, 24	1/4"	1/4"			N/A	N/A		N/A	1 PIECE MANWAY (TOP OF SLOPED FLOOR)	M1
N15	1	8"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	WATER LEG	N15
N14	1	8"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	WATER LEG	N14
N13	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	OIL SKIM	N13
N12	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	OIL SKIM	N12
N11	1	8"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	WATER OUTLET/FILL	N11
N10	1	20"	150#	SMF	SCH 40	6"	2"	9, 24	1/4"	1/4"			N/A	N/A		N/A	EMERGENCY VENT	N10
N9	1	8"		TH 4oz/-	4oz	5"	2"	9, 24	1/4"	1/4"			YES	78		N/A	THIEF HATCH CONNECTION	N9
N8	1	6"	150#	NPT	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	SLUDGE CLEANOUT	N8
N7	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	OVERFLOE/DISCHARGE	N7
N6	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	OVERFLOE/SUMP DISCHARGE	N6
N5	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	OIL OUTLET	N5
N4	1	4"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	GUIDED WAVE RADAR	N4
N3	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	ANODE	N3
N2	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	ANODE	N2
N1	1	6"	150#	RFWN	SCH 40	6"	2"	2, 9	1/4"	1/4"			N/A	N/A		N/A	VENT	N1
MARK	QTY	SIZE	RATING	FACING	NECK	D. S. PROJ.	I. S. PROJ.	TYPE	' A '	' B '	REINFORCEMENT PAD	' C '	BLIND	NO STUDS		STUD SIZE	SERVICE	MARK

SCHEDULE OF OPENINGS

MATERIAL
THICKNESS

ROOF = 1/4" THK
SHELL = 1/4" THK
BOTTOM = 1/4" THK



4	C. V.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/3/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
<u>REV</u>	<u>INITIAL</u>	<u>DESCRIPTION</u>	<u>DATE</u>

DRAWN BY:	M. COY
CHECKED BY:	B. MORGAN

LONG
INDUSTRIES INC.

LONG INDUSTRIES.
105 FCR 413
BUFFALO TX 75831
(D) 903-389-3263
(F) 903-389-5505

ONYX CONTRACTORS

15'-6" O. D. x 24'-0" TALL GB TANK 750BBL

DRAWING NO.	519040-10
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P. □. # □NYX 111318

HEET #
10

FIG 0118185-01NYX-SUNDANCE WEST DRAWING AREA DTANKS SHEETS 19.02.2011 00156 LONG TANK SHEETS.DWG

BOM for ONE 24' GB TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 3 1/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	6	N1,N2,N3, N6,N7,N8	FLANGE, 6" 150# RFWN	SA-105
15	6	N1,N2,N3, N6,N7,N8	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	4	N4,N5,N12,N13	FLANGE, 4" 150# RFWN	SA-105
17	4	N4,N5,N12,N13	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N9	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N9	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N10	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N10	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	3	N11,N14,N15	FLANGE, 8" 150# RFWN	SA-105
23	3	N11,N14,N15	PIPE, 8" SCH. 40x 6" LG	SA-106B

INDUSTRIES INC.

BUFFALO, TX
903-389-3263

MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

PO# ONYX 111318

MANUFACTURER LONG IND. BUFFALO, TX

SERIAL NUMBER 5-19-040-004

YEAR BULT 2019

SPEC API 12 F

NOMINAL DIAMETER 15'-6"

NOMINAL HEIGHT 24'-0"

NOMINAL CAPACITY 750 BBL

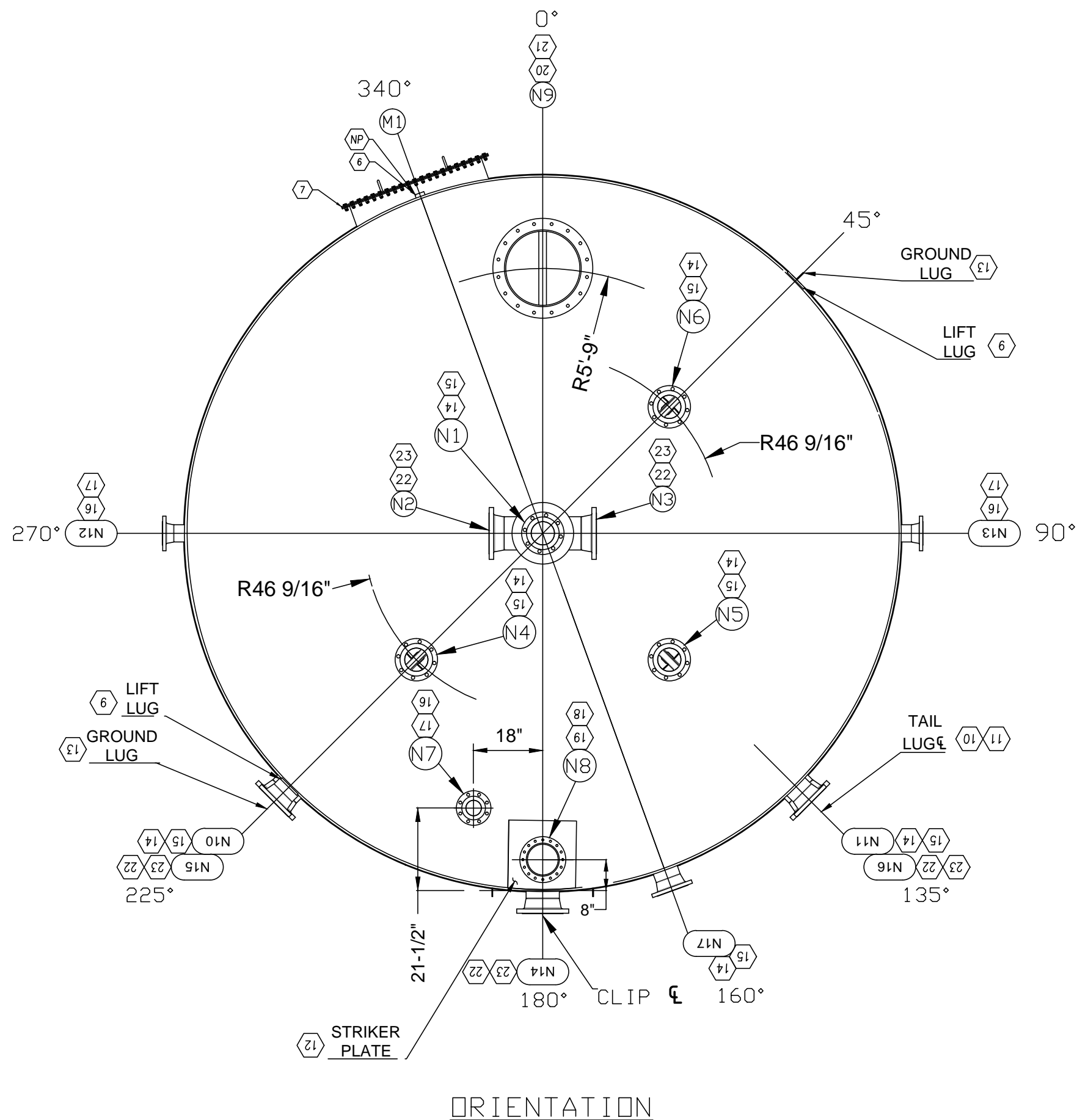
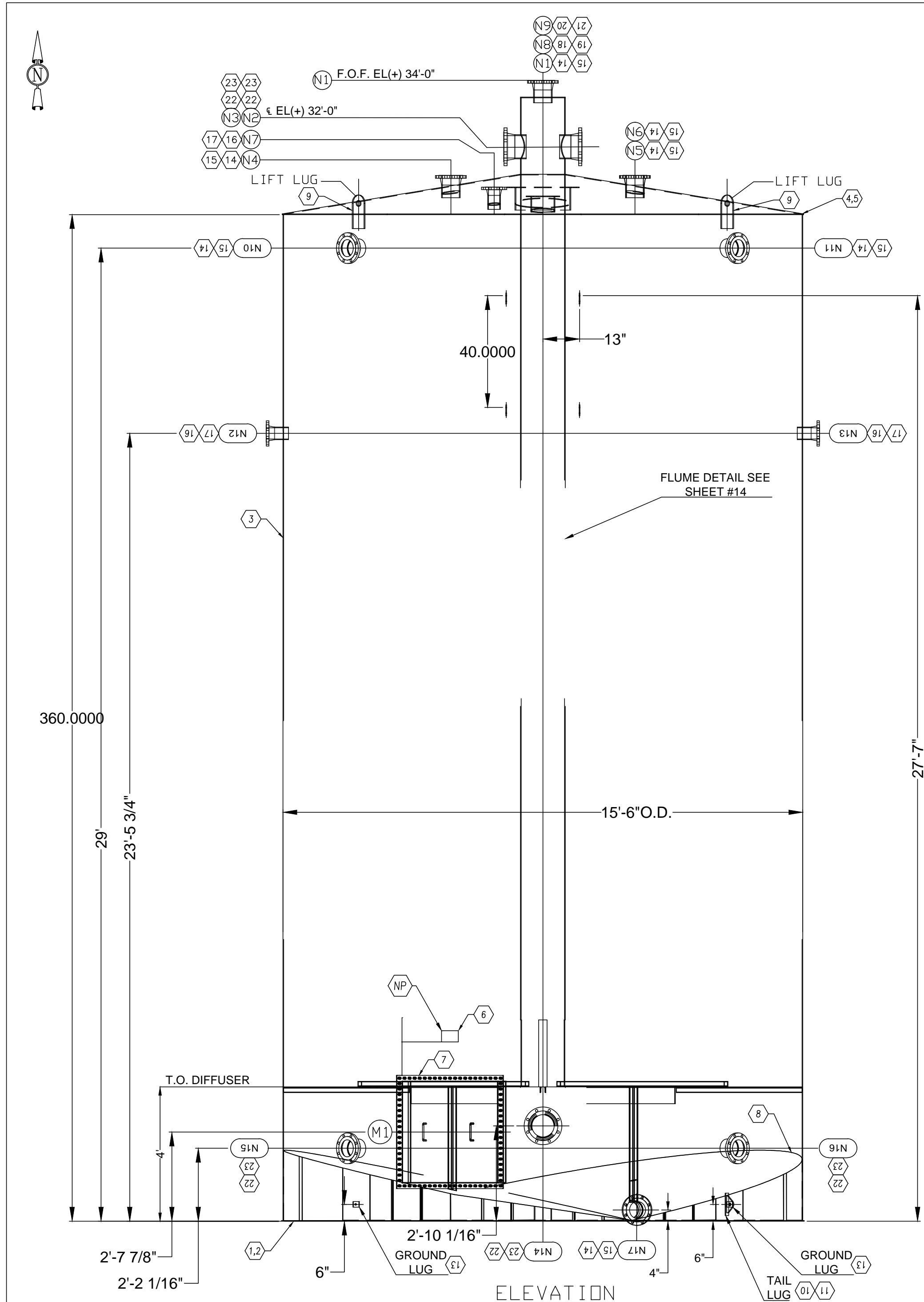
BOTTOM THICKNESS 1/4"

SHELL THICKNESS 1/4"

DECK THICKNESS 1/4"

DESIGN PRESSURE 8oz.

4	C. V.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. COY		<div>LONG INDUSTRIES INC.</div>	LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			
		ONYX CONTRACTORS 15' -6" O. D. x 24' -0" TALL GB TANK 750BBL BILL OF MATERIALS, DATA PLATE	
		DRAWING NO. 518040-11	
P. O. # ONYX 111318		SHEET # . 11	



30' GB TANK

QTY. 2

GENERAL NOTES

- 1) ALL BOLT HOLES TO STRADDLE NORMAL TANK CENTERLINES UNLESS SHOWN OTHERWISE.
- 2) NOZZLE PROJECTIONS ARE FROM OUTSIDE OF TANK TO FACE OF FLANGE UNLESS SHOWN OTHERWISE.
- 3) TANK TO BE FREE FROM FOREIGN DEBRIS BEFORE SHIPMENT.
- 4) ALL DIMENSION'S ARE FROM BOTTOM OF TANK.

DESIGN CRITERIA

CODE: API-12F
DESIGN PRESSURE: 8oz.
DESIGN VACUUM: -0.5oz.
DESIGN TEMPERATURE: AMBIENT
OPERATING PRESSURE: ATM
OPERATING VACUUM: ATM
OPERATING TEMPERATURE: AMBIENT
SPECIFIC GRAVITY: 1.0
JOINT EFFICIENCY: 20%
RADIOGRAPHY: NONE
CORROSION ALLOWANCE: 0"
TEST: AIR TEST PER API 12F

MATERIAL

ROOF/SHELL & BOTTOM: A-36
REINFORCEMENTS PADS: A-36
STRUCTURAL SUPPORT: A-36
PIPE: A-53
FLANGES/BLINDS/COUPLINGS & PLUGS: SA-105
BOLTING: ASTM A 307 GRADE A or B
SERVICE GASKETS: 1/8" NEOPRENE
ESTIMATED WEIGHT EMPTY: 18,780 lbs.
CAPACITY: 1000 BBL

SURFACE PREP: SSPC-SP-6
INTERIOR PAINT
ENVIROLINE 2405-BOTTOM & 8' UP

SURFACE PREP: SSPC-SP--
EXTERIOR PAINT
LONG INDUSTRIES STANDARD DTM
ENVIRO GREEN SW-4020

M1	1	36" X 36"	API - 12F	4.5'	2"	9.24	1/4"	1/4"			N/A	N/A		N/A	1 PIECE MANWAY (TOP OF SLOPED FLOOR)	M1
N17	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		SLUDGE CLEANOUT	N17
N16	1	8"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		WATER LEG	N16
N15	1	8"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		WATER LEG	N15
N14	1	8"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		WATER OUTLET/FILL	N14
N13	1	4"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		OIL SKIM	N13
N12	1	4"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		OIL SKIM	N12
N11	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		OVERFLOW/SUMP DISCHARGE	N11
N10	1	6"	150# NPT	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		OVERFLOW/SUMP DISCHARGE	N10
N9	1	20"	150# SMF	SCH 40	6"	2"	9.24	1/4"	1/4"			N/A	N/A		EMERGENCY VENT	N9
N8	1	8"	TH 4oz/- 4oz		5"	2"	9.24	1/4"	1/4"			YES	78		THIEF HATCH CONNECTION	N8
N7	1	4"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		GUIDED WAVE RADAR	N7
N6	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		ANODE	N6
N5	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		WATER LEG	N5
N4	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		WATER LEG	N4
N3	1	8"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		INLET	N3
N2	1	8"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		INLET	N2
N1	1	6"	150# RFWN	SCH 40	6"	2"	2.9	1/4"	1/4"			N/A	N/A		VENT	N1

MARK	QTY	SIZE	RATING	FACING	NECK	D. S. PROJ.	I. S. PROJ.	TYPE	' A'	' B'	REINFORCEMENT PAD	' C'	BLIND	NO STUDS	STUD SIZE	SERVICE	MARK
SCHEDULE OF OPENINGS																	

MATERIAL THICKNESS

ROOF = 1/4" THK
SHELL = 1/4" THK
BOTTOM = 1/4" THK

FIGURE NO. 2

FIGURE NO. 24

FIGURE NO. 7

FIGURE NO. 9

FIGURE NO. 18

4	C. V.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/3/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	INITIAL	DESCRIPTION	DATE

DRAWN BY:

M. COY

CHECKED BY:

B. MORGAN

LONG INDUSTRIES INC.

LONG INDUSTRIES.
105 FCR 413
BUFFALO Tx 75831
(D) 903-389-3263
(F) 903-389-5505

ONYX CONTRACTORS

15' -6" O. D. x 30' -0" TALL GB TANK 1000BBL

DRAWING NO.
519040-12

P. O. # ONYX 111318

SHEET # .
12

FILED:\BIBUS\ONYX\SUNDANCE WEST\DRAWINGS\AREA 0 TANKS\SHEETS 19\02\2018\01\001\001\LONG TANK SHEETS.DWG

BOM for ONE 24' GB TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	2	BOTTOM	1/4"x 57 3/4"x 172 13/16"	SA-36
2	1	BOTTOM	1/4"x 71 1/2"x 187"	SA-36
3	12	SHELL	1/4"x 72" x 194 5/8" (ROLLED TO 186" O.D.)	SA-36
4	2	TOP A	1/4"x 58 13/16"x 175"	SA-36
5	1	TOP B	1/4"x 71 1/2"x 189"	SA-36
6	1	NP	1/8"x 4"x 12" NAME PLATE BRACKET	SA-36
7	1	C.O. FRAME	36"x 36" C.O. FRAME ASSEMBLY (SEE SHT. #3)	SA-36
8	1	SLOPED FLOOR	SEE DETAIL SHEET #4	SA-36
9	2	LIFT LUG	PLATE, 1/2"x 6"x 12" LIFT LUG	SA-36
10	1	TAIL LUG	PLATE, 1/2"x 3 1/8"x 6" TAIL LUG	SA-36
11	1	TAIL LUG REPAD	PLATE, 1/4"x 4"x 8" REPAD	SA-36
12	1	STRIKER PLATE	PLATE, 1/4"x 18"x 18"	SA-36
13	2	GROUND LUG	PLATE, 1/4"x 2"x 4" GROUND LUG	SA-36
14	7	N1,N4,N5,N6 N10,N11,N17	FLANGE, 6" 150# RFWN	SA-105
15	7	N1,N4,N5,N6 N10,N11,N17	PIPE, 6" SCH. 40x 6" LG	SA-106B
16	3	N7,N12,N13	FLANGE, 4" 150# RFWN	SA-105
17	3	N7,N12,N13	PIPE, 4" SCH. 40x 6" LG	SA-106B
18	1	N8	PLATE, 1/4"x 8" SMF (SEE DETAIL SHT. #3)	SA-36
19	1	N8	PIPE, 8" SCH. 40x 9" LG	SA-106B
20	1	N9	PLATE, 1/4"x 20" SMF (SEE DETAIL SHT. #2)	SA-36
21	1	N9	PIPE, 20" SCH. 40x 9" LG	SA-106B
22	5	N2,N3,N14, N15,N16	FLANGE, 8" 150# RFWN	SA-105
23	5	N2,N3,N14, N15,N16	PIPE, 8" SCH. 40x 6" LG	SA-106B

INDUSTRIES INC.

BUFFALO, TX
903-389-3263

MANUFACTURED
IN ACCORDANCE
WITH API
SPECIFICATIONS
12F

PO# ONYX 111318

MANUFACTURER LONG IND. BUFFALO, TX

SERIAL NUMBER 5-19-040-004

YEAR BUILT 2019

SPEC API 12 F

NOMINAL DIAMETER 15'-6"

NOMINAL HEIGHT 30'-0"

NOMINAL CAPACITY 1000 BBL

BOTTOM THICKNESS 1/4"

SHELL THICKNESS 1/4"

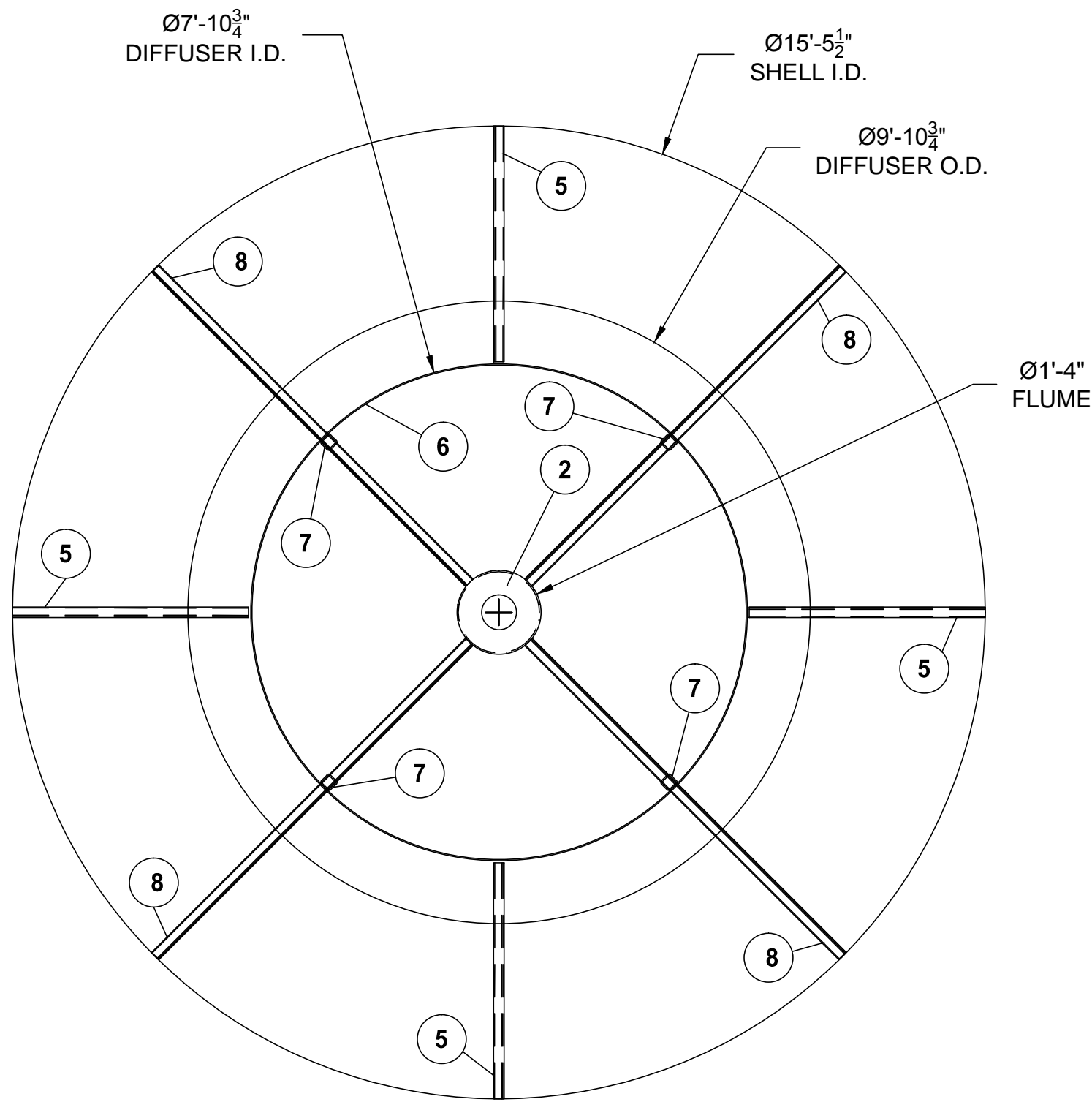
DECK THICKNESS 1/4"

DESIGN PRESSURE 8oz.

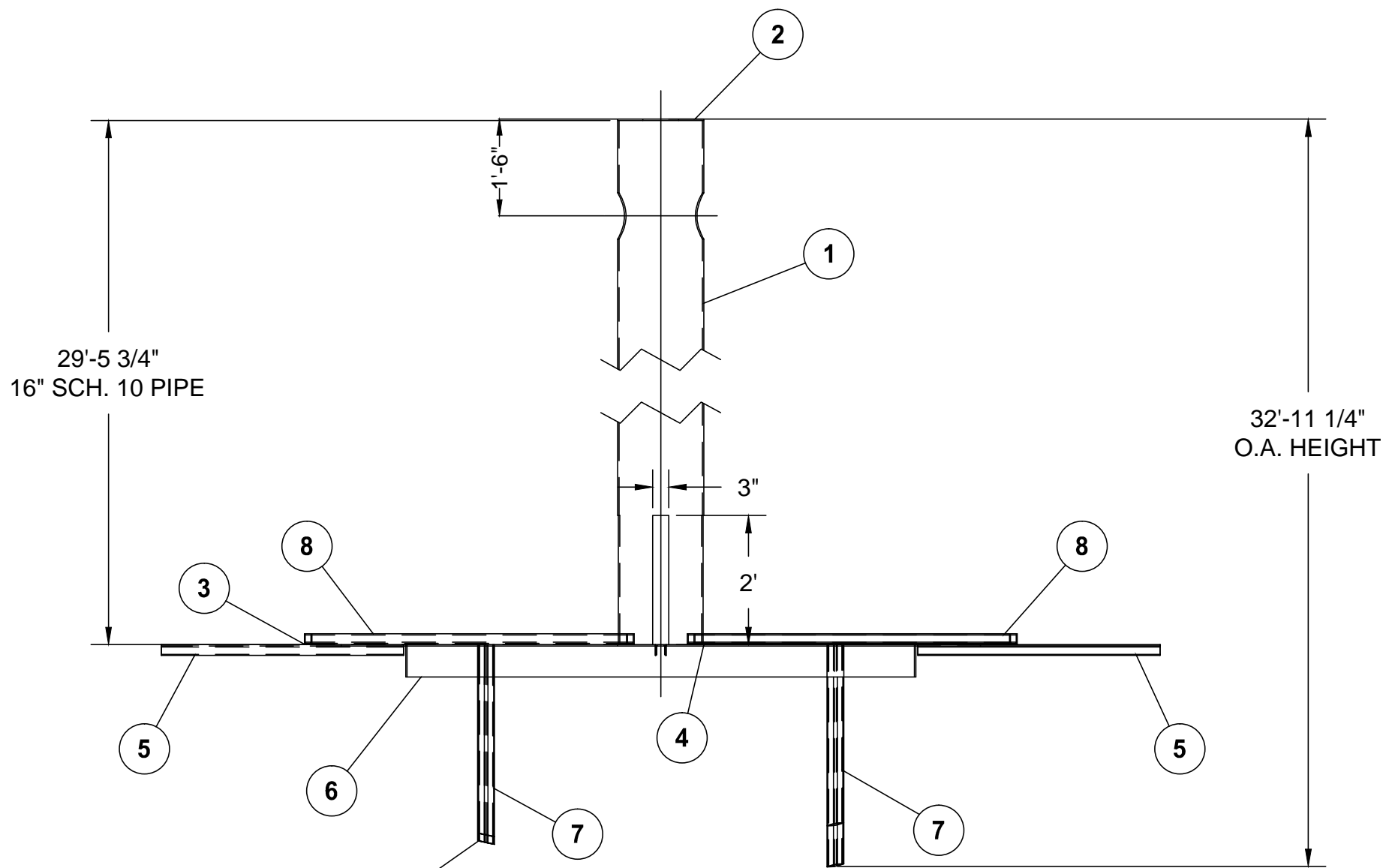
4	C. V.	NO CHANGE THIS SHEET	4/22/19
3	M. C.	NO CHANGE THIS SHEET	4/4/19
2	C. V.	NO CHANGE THIS SHEET	3/21/19
1	M. C.	NO CHANGE THIS SHEET	3/4/19
0	M. C.	FOR APPROVAL	2/13/19
REV	BY	DESCRIPTION	DATE

DRAWN BY: M. COY	<div>LONG INDUSTRIES INC.</div> <div>ONYX CONTRACTORS</div> <div>15'-6" O. D. x 30'-0" TALL GB TANK 1000BBL BILL OF MATERIALS, DATA PLATE</div> <div>DRAWING NO. 518040-13</div> <div>P. O. # ONYX 111318</div>	LONG INDUSTRIES. 105 FCR 413 BUFFALO Tx 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN		

FIG 01181015-ONYX-SUNDANCE WEST DRAWINGS AREA D TANKS SHEETS 19.02.2011 01181015-4 LONG TANK SHEETS.DWG

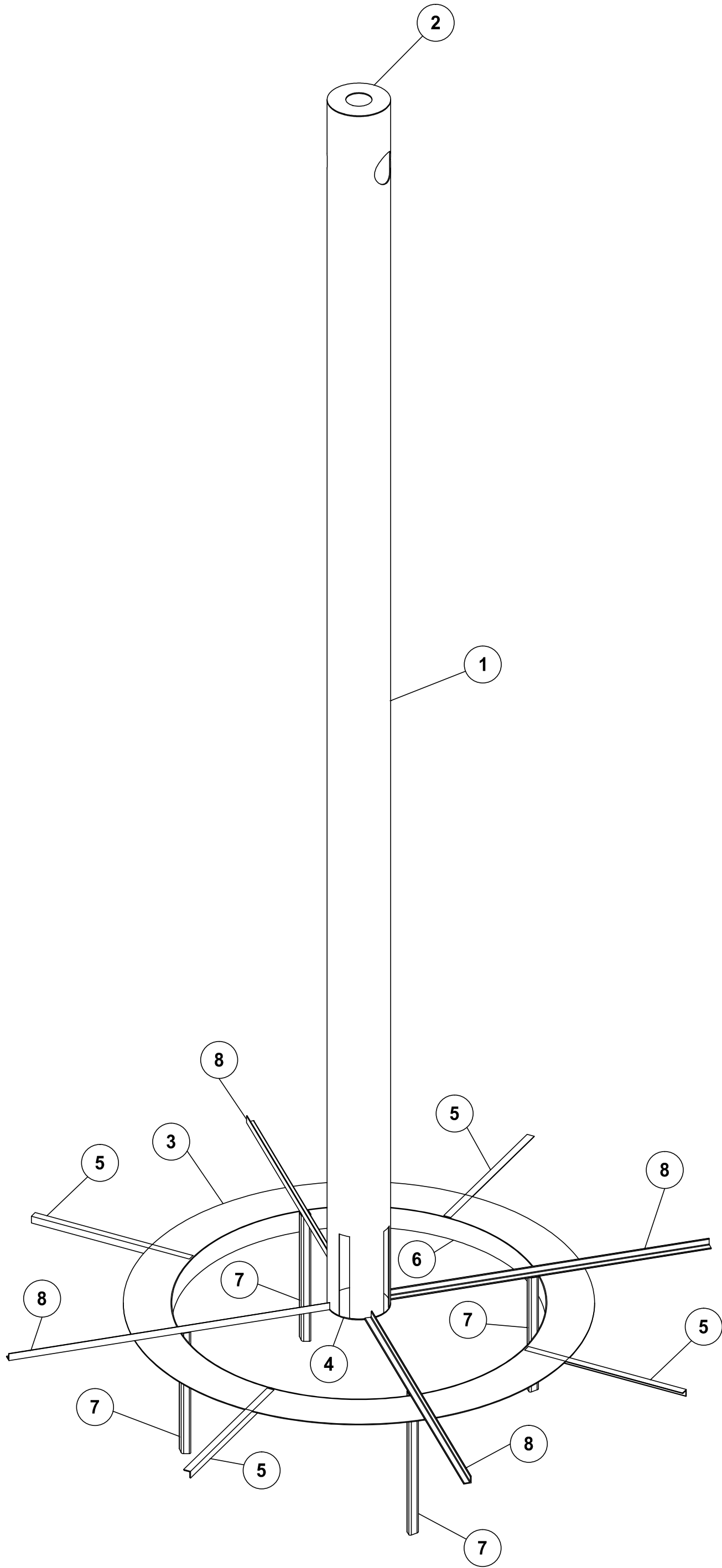


FLUME TOP VIEW




TRIM SUPPORT LEGS
TO FIT SLOPED BOTTOM

FLUME SIDE VIEW



FLUME ISO VIEW

BOM for 30' GB TANK				
ITEM NO.	QTY.	Part Number	DESCRIPTION	Material
1	1	FLUME	PIPE, 16"x 29' 5 3/4" SCH. 10	SA-106-B
2	1	FLUME CAP	PLATE, 1/4"x 6 5/8" I.D.x 16" O.D.	SA-36
3	1	FLUME DIFFUSER	PLATE, 1/4"x 94 3/4" I.D.x 118 3/4" O.D.	SA-36
4	1	FLUME BOTTOM	PLATE, 1/4"x 16" O.D.	SA-36
5	4	FLUME	∠, 1/4"x 2"x 2"x 45" LONG, DIFFUSER BRACE	SA-36
6	1	FLUME	PLATE, 6"x 94 3/4" O.D., DIFFUSER RING PLATE	SA-36
7	4	FLUME	TS, 1/4"x 2 1/2"x 2 1/2"x 45" LONG, DIFFUSER SUPPORT	SA-36
8	4	FLUME	∠, 1/4"x 2"x 2"x 84 5/8" LONG, FLUME BRACE	SA-36

4	C.V.	4/22/19	NO CHANGE THIS SHEET	
3	M.C.	4/4/19	NO CHANGE THIS SHEET	
2	C.V.	3/21/19	NO CHANGE THIS SHEET	
1	M.C.	3/4/19	NO CHANGE THIS SHEET	
0	M.C.	2/13/19	PRELIMINARY DRAWING	
REV	INITIALS	DATE	DESCRIPTION	
DRAWN BY: M. COY				LONG INDUSTRIES. 105 FCR 413 BUFFALO, TX 75831 (O) 903-389-3263 (F) 903-389-5505
CHECKED BY: B. MORGAN			<div>ONYX CONTRACTORS</div> <div>15' -6" O. D. x 30' -0" TALL GB TANK 1000BBL FLUME</div>	
			DRAWING NO.	
			519040-14	
			P.O. # ONYX 111318	
			SHEET # 14	

BILL OF MATERIAL				
BOM #	QTY	PART #	DESCRIPTION	MATERIAL
A	2	--	$\frac{1}{2}$ " x 2" x 2" x 120" Long Angle	A-36
B	6		$\frac{1}{2}$ " x 2" x 2" x 42" Long Angle	A-36
C	2		$\frac{1}{2}$ " x 2" x 120" Long Flat Bar	A-36
D	2		10' Pan	A-36
E	5		$\frac{1}{2}$ " x 2" x 2" x 30" Long Angle	A-36

TOP VIEW

FRONT VIEW

SIDE VIEW

Dimensions: 2'-6", 2'-2", 2'-6", 2'-6"

Callouts: A, B, C, D, E

Note: TYP ALL Ø

0	C.V.	7/7/15	PRELIMINARY DRAWING
REV	INITIALS	DATE	DESCRIPTION
DRAWN BY: C. VAZQUEZ			LONG INDUSTRIES INC. 105 FCR 413 BUFFALO TX 75831 (O) 903-389-5503 (F) 903-389-5505
CHECKED BY: B. MORGAN			
			<u>10' WALKWAY</u>
DRAWING #.			10' WALKWAY
			SHEET # 1

TOP VIEW

FRONT VIEW

SIDE VIEW FOR GO-IN ATTACHMENT SIDE

BILL OF MATERIAL

BOM #	QTY	PART #	DESCRIPTION	MATERIAL
A	1	--	$\frac{1}{2}$ " x 2" x 2" x 120" Long Angle	A-36
B	7		$\frac{1}{2}$ " x 2" x 2" x 42" Long Angle	A-36
C	1		$\frac{1}{2}$ " x 2" x 120" Long Flat Bar	A-36
D	2		10' Pan	A-36
E	6		$\frac{1}{2}$ " x 2" x 2" x 30" Long Angle	A-36
F	2		$\frac{1}{2}$ " x 2" x 2" x 47" Long Angle	A-36
G	2		$\frac{1}{2}$ " x 2" x 47" Long Flat Bar	A-36

REV	INITIALS	DATE	DESCRIPTION
0	C.V.	7/7/15	PRELIMINARY DRAWING

DRAWN BY: C. VAZQUEZ

CHECKED BY: B. MORGAN

LONG INDUSTRIES INC.

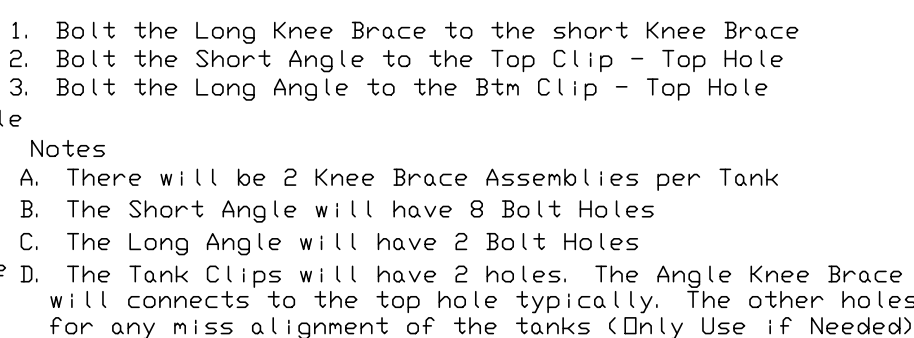
LONG INDUSTRIES.
105 FCR 415
BUFFALO TX 75831
(O) 903-389-3263
(F) 903-389-5505

10' WALKWAY WITH GO-IN FRAME

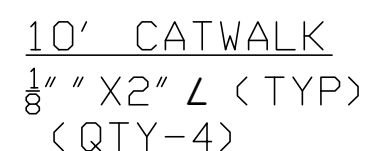
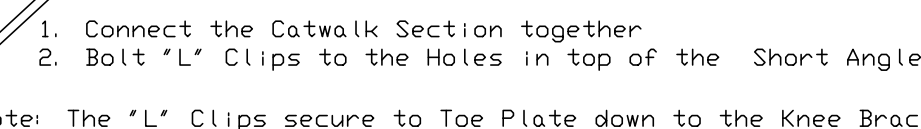
DRAWING #. 10' WALKWAY GO IN


SHEET # 1

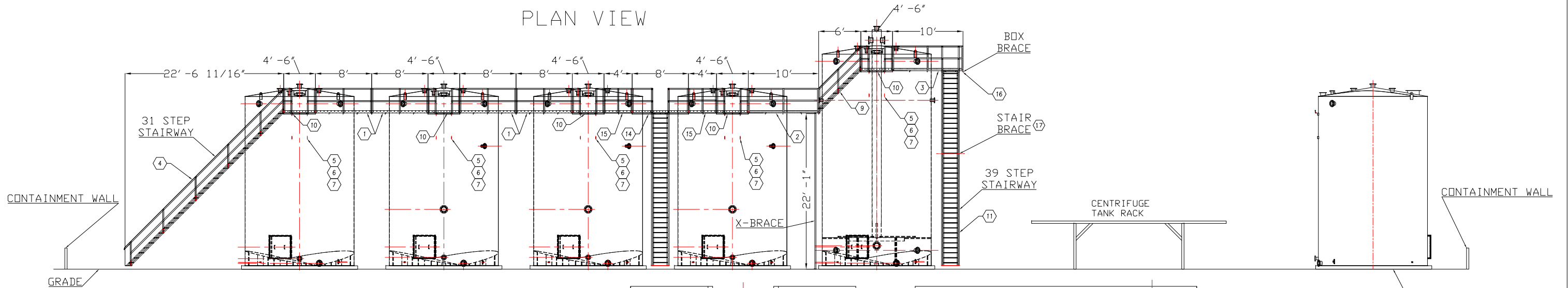
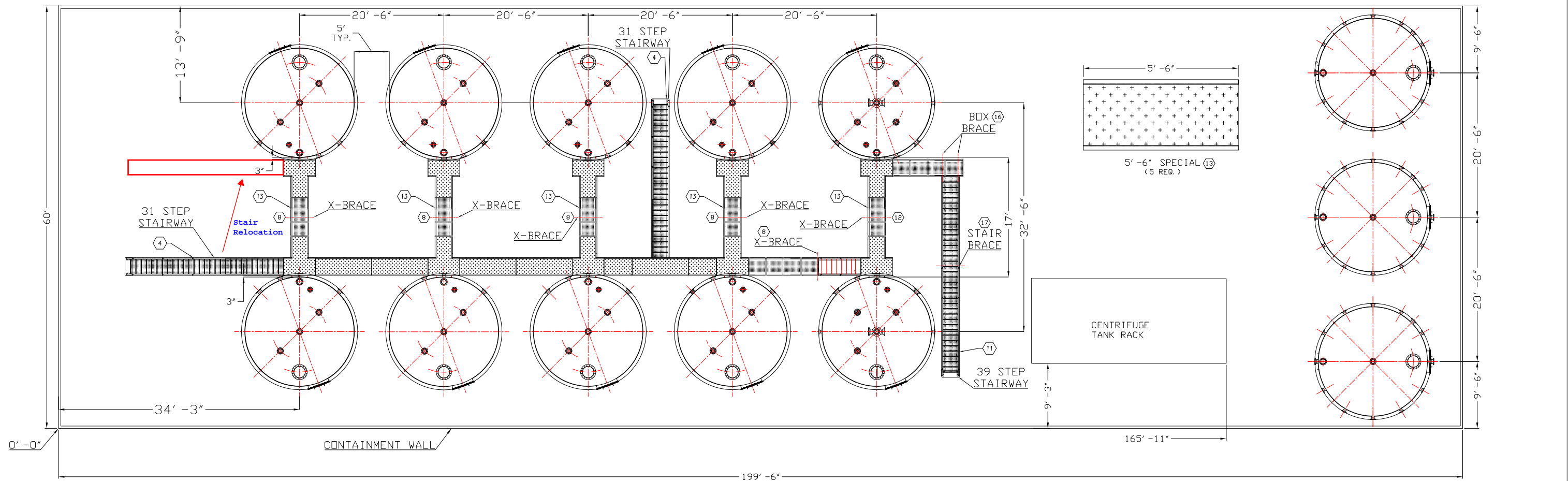
- Step #1: Assemble Knee Brace Unit



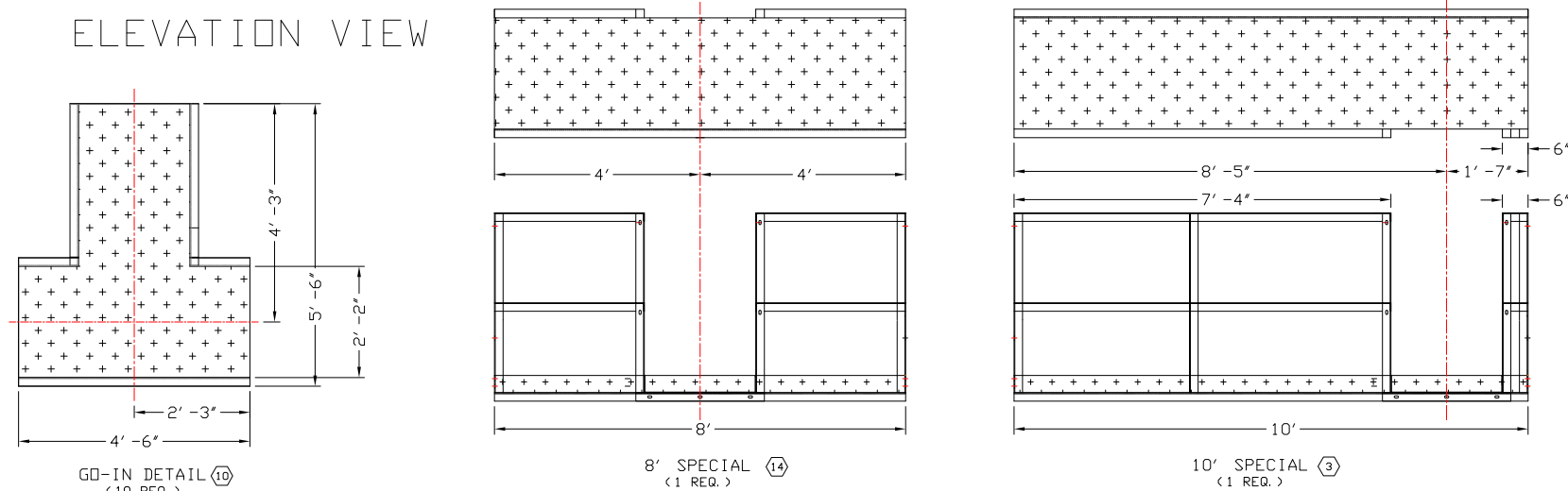
- Step #2: Install Catwalk



1		
0	FOR APPROVAL	
REV	DESCRIPTION	DATE
DRAWN BY: C. VAZQUEZ		LONG INDUSTRIES 105 FOR 413 BUFFALO TX 75831 (D) 903-389-3263 (F) 903-389-5505
CHECKED BY:		
	<p>-----</p> <p>CATWALK DETAILS</p>	
	DRAWING NO. -----	REV.
P. O. # -----		SHEET # 15

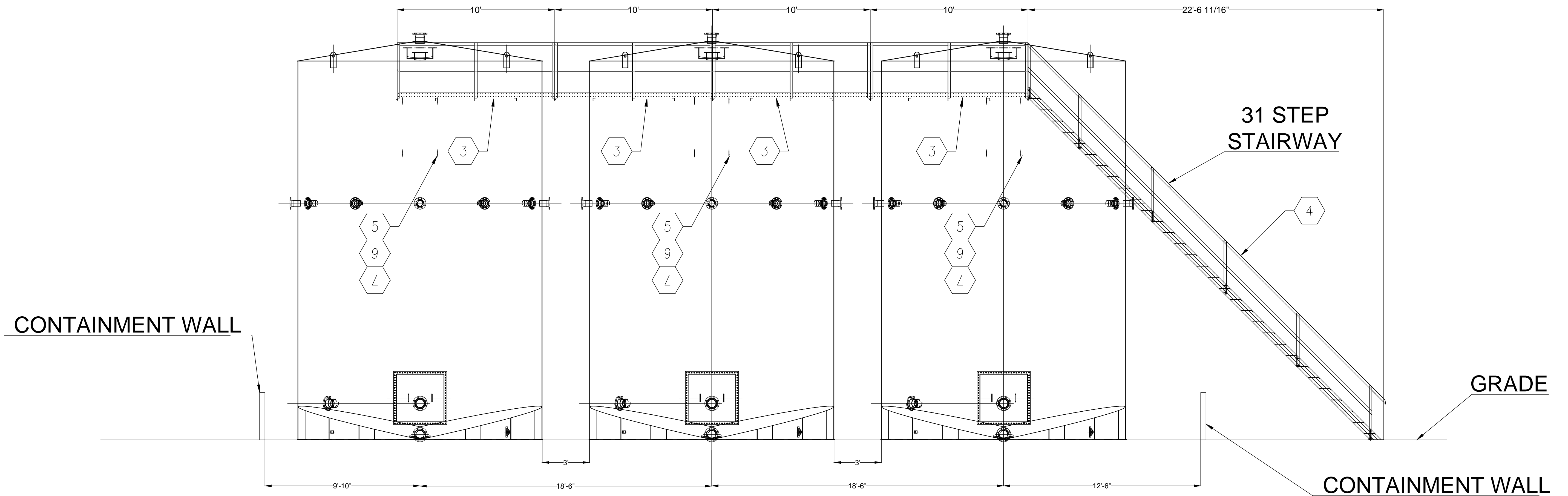


BILL OF MATERIAL			
CATWALK SETUP			
ITEM	QTY	DESCRIPTION	MATERIAL
1	4	8' STANDARD CATWALK	A-36
2	1	10' STD CATWALK	A-36
3	1	10' SPECIAL CATWALK	A-36
4	2	31 STEP STAIRWAY	A-36
5	20	31" KNEE BRACE	A-36
6	20	51" KNEE BRACE	A-36
7	40	J CLIPS	A-36
8	5	22'-1" X-BRACE SUPPORT	A-36
9	1	8 STEP EXTENSION	A-36
10	10	4'-6"x 5'-6" SPECIAL GO-INS (SEE DETAIL)	A-36
11	1	39 STEP STAIRWAY	A-36
12	1	28'-1" X-BRACE SUPPORT	A-36
13	5	5'-6" SPECIAL CATWALK	A-36
14	1	8' SPECIAL CATWALK	A-36
15	2	4' STANDARD CATWALK	A-36
16	1	28'-1" BOX BRACE	A-36
17	1	39 STEP STAIRWAY BRACE	A36



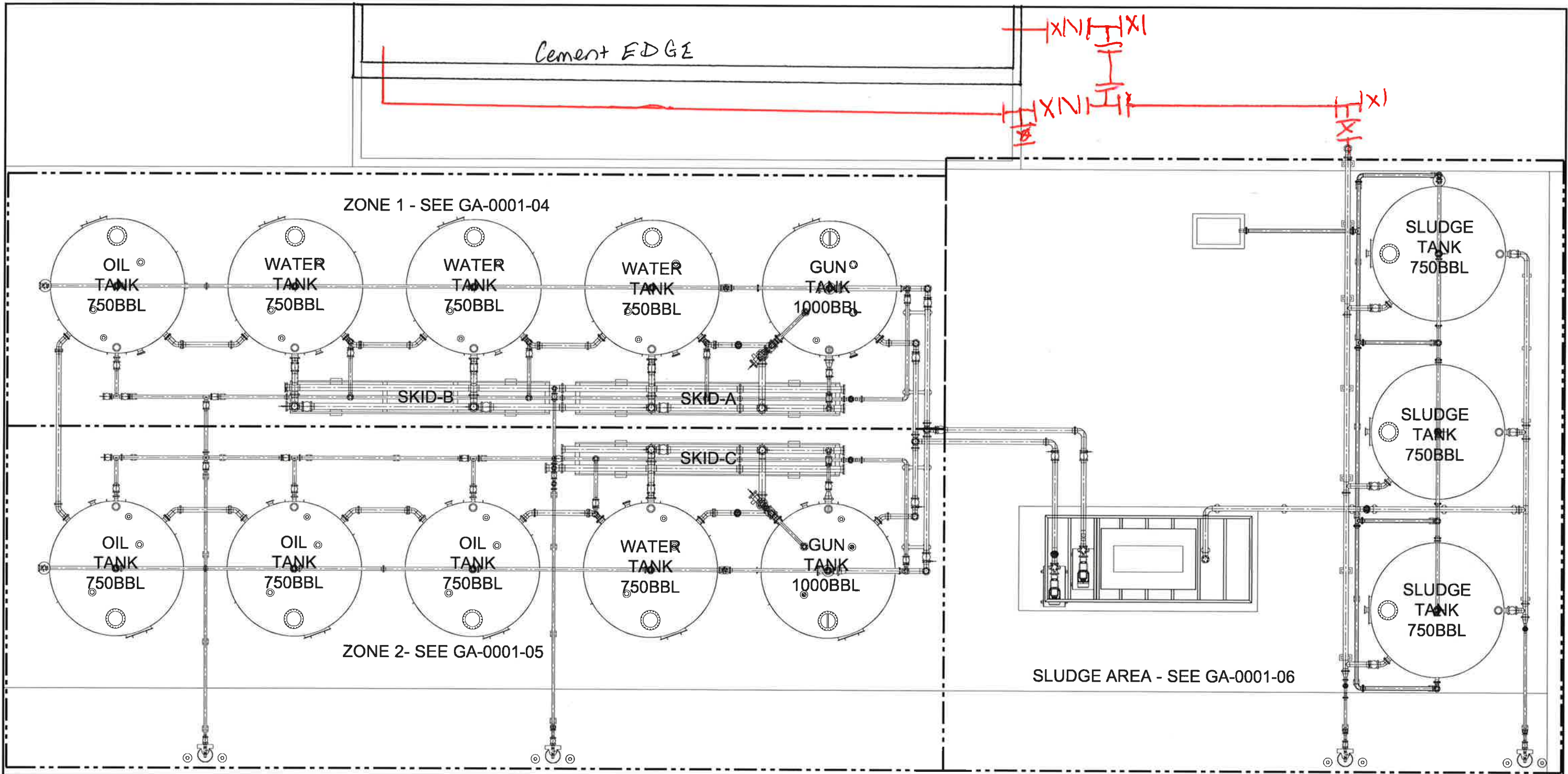
REV	BY	DESCRIPTION	DATE
3	M.C.	MODIFY CATWALK PER B. MORGAN	9/13/19
2	M.C.	MODIFY CATWALK PER B. MORGAN	9/10/19
1	M.C.	REARRANGE CATWALK PER CUSTOMERS DRAWING	5/10/19
0	M.C.	FOR APPROVAL	4/10/19
DRAWN BY: M. COY			
CHECKED BY: B. MORGAN			
LONG INDUSTRIES INC.			
LONG INDUSTRIES. 105 FCR 413 BUFFALO TX 75831 (D) 903-389-3263 (F) 903-389-5505			
ONYX CONTRACTORS CATWALK GENERAL ARRANGEMENT			
DRAWING NO. 519040-16			
P. O. # ONYX 111318			SHEET # . 16

FIG 01B1015-ONYX-SUNDANCE WEST DRAWINGS AREA D TANKS SHEETS 19.02.2018 190156 LONG TANK SHEETS.DWG





ELEVATION VIEW SECTION A-A

1	M. C.	ADDED THIS SHEET FOR CLARIFICATION	5/10/19
0	M. C.	FOR APPROVAL	4/10/19
REV	BY	DESCRIPTION	DATE
DRAWN BY: M. CDY		<div>LONG INDUSTRIES INC.</div>	
CHECKED BY: B. MORGAN			
		LONG INDUSTRIES. 105 FCR 413 BUFFALO TX 75831 (D) 903-389-3263 (F) 903-389-5505	
		ONYX CONTRACTORS CATWALK GENERAL ARRANGEMENT	
		DRAWING NO. 519040-17	
P. D. # ONYX 111318		SHEET # . 17	



OVERALL SITE KEY PLAN SCALE: NONE

REVISIONS				DRAWN BY: JLM		ENGINEER: BH		PROPRIETARY AND CONFIDENTIAL			BLAKELY OILFIELD MAINTENANCE & CONSTRUCTION SUNDANCE WEST MUD MANAGEMENT SYSTEM	
APPROVED FOR CONSTRUCTION JMDESIGN - 07/19/19		JLM		<div>AFC APPROVED FOR CONSTRUCTION</div>		THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF BLAKELY CONSTRUCTION COMPANY. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF BLAKELY CONSTRUCTION COMPANY IS PROHIBITED.		TANK GENERAL ARRANGEMENT – ISOMETRIC VIEW				
SUNDANCE-WEST-MUDMGMT-GA-0001-03												

Appendix B

Daily Field Reports and Photographs

Appendix B1

Daily Field Reports

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.209.00
Owner: _____ Date: 3/21/19 - 3/22/19
Project Location: Elmice Report No.: 1
Weather: _____
A.M. °F, _____
P.M.: 64°F, 14:30 - 1636 (3/22/19 - 0630 - 1130)

Contractor(s)

Onyx + onyx construction
Beyond Engineering (3/22/19)

Summary of Daily Construction Progress and Inspections:

Roller compacting slopes of @sump. South Slope 18% North 19%
Blade working on pad for grate area (Area B)
5 soil samples for borrow area

Summary of Problems and Resolutions:

Equipment:

Water Truck
Excavator
Roller
Sheeps foot

Summary of Meeting Held and Attendees:

Site CQA Technician

[Signature]
Signature

Mike Zbicoz
Print Name

GEI CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209.00
Owner: _____ Date: 3/27/19 - 3/28/19
Project Location: Enrico Report No.: _____
Weather: A.M. °F, 3/27/19 75° wind 15 mph
P.M.. °F, _____

Contractor(s)

Onyx

Summary of Daily Construction Progress and Inspections: 3
Compacting of newly graded Area B - Density measurements
Area C/D is compacted, crew applying H₂O to maintain moisture

Summary of Problems and Resolutions:

3 Density measurements in area B.

Equipment:

grader
sheepsfoot
excavator
water truck

Summary of Meeting Held and Attendees:

Site CQA Technician

[Signature]
Signature

mike zbrozek
Print Name

GEI CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 18.1209
Owner: Sundance Date: April 2, 2019
Project Location: East of Ennice, NM Report No.: -
Weather: A.M. 45°F, 15 mph wind hazy-cloudy
P.M. 65°F, lower winds sunny-cloudy

Contractor(s) Onyx (Mundo, Jason, operators) - later Dane is the AM
Falcon (Mundo)
DBS&A (Chase + Gundar)

Summary of Daily Construction Progress and Inspections:

The surface around the sump is roughly complete. Trenching with backhoe has begun around the sump to lay the leachate pipe. Onyx is primarily working on moving fill to extend, and bring to grade, the pads. In situ soil testing indicates density in Areas B, C, D is great, but moisture content is pretty low.

Summary of Problems and Resolutions:

Moisture content in soil is insufficient (4-8%) Onyx will plan to wet surface after trenching is complete and grades are fixed from trenching.

Equipment:

Deere Backhoe, Scraper (CAT 140M), ^{Digger}~~Loader~~ (CAT), Excavator, 2 articulated dump trucks. Water truck onsite, but not operating.

Summary of Meeting Held and Attendees:

C Stearnes met with Jason and Mundo to discuss daily activities. Mondo (Falcon) met with Chase + Jason for ~20 minutes to discuss liner installation needs & timeline. Falcon just needs a place to set up, but thinks surface is great. GEI is in conformance testing and everything should be ready in 1-2 wks.

Site CQA Technician

GEI CQA Officer

Chase Stearnes
Signature

Signature

Chase Stearnes
Print Name

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209.00
Owner: — Date: 4/4/19 + 4/5/19
Project Location: Gunite Report No.: —
Weather: A.M. °F, 4/4/19 ~ 80°
P.M. °F, 4/5/19 ~ 85° Windy

Contractor(s)
Onyx + Onyx construction

Summary of Daily Construction Progress and Inspections:

Excavator and 2 articulated dump trucks removing soil from NW section of Area A mud dry out pit

4/5/19 crews continue on NW corner of area A
Removing dirt out from trenches in sum.

Summary of Problems and Resolutions:

Water truck down for 7 day missing float valve.

Equipment:

2 articulated dump trucks
1 excavator
1 loader
1 grader - down for maintenance
1 water truck - down for maintenance

Summary of Meeting Held and Attendees:

Mike E + Jeremy Fisher

Site CQA Technician

Signature

Print Name

GEI CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: SUNDANCE WEST Project No.: -
Owner: _____ Date: 4/12/19
Project Location: _____ Report No.: -
Weather: A.M. °F,
P.M. 70°F, Si. Windy, Overcast

Contractor(s)

Summary of Daily Construction Progress and Inspections:

Summary of Problems and Resolutions:

Equipment:

JOHN DEER 3105J BACKHOE
CAT 140M GRADER
2 CAT 745 ARTICULATED HAUL TRUCKS
CAT 349F EXCAVATOR

WATER TRUCK
VACUUM TRUCK
CAT SWEEPS FOOT POWER CP56B
CAT SMOOTH DRUM ROLLER CS-563E
CAT 259D SKIDSTEER (TRACKED)
PIONEER PUMP ~~ES6012~~
ES6012L75-110

Summary of Meeting Held and Attendees:

Site CQA Technician

GEI CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -
Owner: _____ Date: _____
Project Location: Eunice, NM Report No.: -
Weather: A.M. °F, 63°F
P.M. °F, 63°F cloudy

Contractor(s) ONYX

Summary of Daily Construction Progress and Inspections:

~~#~~ Inventory of 2 truck loads of GCL

Summary of Problems and Resolutions:

N/A

Equipment:

Excavator to ~~#~~ unload GCL

Summary of Meeting Held and Attendees:

Talked about plan for week and update on the early week's work.

Albert, Edmundo, Jason (multiple conversations)

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: SUNDANCE WEST Project No.: DB18.1209
Owner: SWMM Date: 4/25/19
Project Location: EVMOG, NM Report No.: -
Weather: A.M. 55°F, COOL, CALM, BREEZY, CLEAR
P.M. 80°F, WARM, P. CLOUDY, BREEZY TO SE. WINDY

Contractor(s) ONYX

Summary of Daily Construction Progress and Inspections:

RECEIVED 2 TRUCKS OF GCL (38 ROLLS)
& 1 LOAD OF HDPE PIPE & FITTINGS
RESUMED DIRT WORK IN SE CORNER OF AREA A.

Summary of Problems and Resolutions:

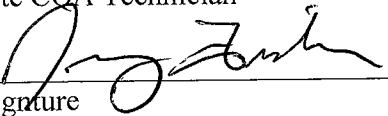
NOT ACHIEVING REQUIRED DENSITY @ 8 OF 10 TEST LOCATIONS,
HOWEVER THEY STILL HAVE TO DO FINAL SMOOTHING & COMPACTING

Equipment: BACKHOE LEFT @ ~ 1500
GRADER
EXCAVATOR
2 HAUL TRUCKS (CAT 745)
BULLDOZER
SMOOTH DRUM ROLLER
SHEEPS FOOT ROLLER
PUMP TRAILER
WATER TRUCK
SKID STEER

Summary of Meeting Held and Attendees:

MET W/ EDMUND & JASON TO DISCUSS PRODUCT SHIPMENTS,
PLAN FOR THE REST OF THE WEEK, & PLAN FOR NEXT WEEK

Site COA Technician


Signature

JENOME FISHER

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -
Owner: - Date: 4/26/2019
Project Location: Enrce, NM Report No.: -
Weather: 7:50 A.M: 59 °F,
P.M.: °F,

Contractor(s) ONYX

Summary of Daily Construction Progress and Inspections:

No earthwork, Inventory of 5 trucks of GCL and
3 trucks of HDPE Liner

Summary of Problems and Resolutions:

N/A

Equipment: Excavator used to unload rolls,

Summary of Meeting Held and Attendees:

Conversations with Edmundo Surveyors came out to
survey lowest points of each zone. (unknown, will
need to check report that will be generated,

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name



Daniel B Stephens & Associates, Inc

Field Report No.: _____

6020 Academy Road NE Suite 100
Albuquerque, NM 87109
505-822-9400
FAX: 505-822-8877

Distribution to:

_____	<input type="checkbox"/>	_____	<input type="checkbox"/>
_____	<input type="checkbox"/>	_____	<input type="checkbox"/>
_____	<input type="checkbox"/>	_____	<input type="checkbox"/>

Client: Southwest Landfill

Project: ES11.0070.17

Date: 5/1/2019 Time: 6:50 Weather: Clear ~~light~~, Sunny Temp: 49°F
Present at Site: South west Liners and Southwest Landfill Staff

Equipment and Materials at Site: Skytrak forklift, GCL, FML

Observations: GCL and FML was installed over approved subgrade. Ruts created by forklift were quickly fixed by Southwest landfill staff. Welds and patches all looked good.

Issues: Air test that failed was fixed and passed. Failed ~~was~~ + Ruts were fixed.

Items to Verify and Information or Action Required: N/A

Attachments: N/A

Report by: Omar Ruiz Reviewed by: _____

Page 1 of 1

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -
 Owner: _____ Date: 5-6-2019
 Project Location: Eunice NM Report No.: -
 Weather: 13:30 A.M. 90°F,
16:30 P.M. 93°F,

Contractor(s)

Falcon, Onyx

Summary of Daily Construction Progress and Inspections:

Summary of Daily Construction Progress and Inspections:
 Falcon - No liner was installed staff was onsite filling up sand bags.

up sand bags.
Onyx - Was ready for us to take high density readings at sump and mud out / set out (17 plus two repeats)
Repeat samples were located on south slope of sump C.

Summary of Problems and Resolutions:

Summary of Problems and Resolutions:

Two High density points failed. Jason had roller re compact and we re-test at which point test passed

Equipment:

ipment:
Roller was used to recompact slope of samp c.

Summary of Meeting Held and Attendees:

Summary of Meeting Held and Attendees:
Met with Oryx (Edmundo and Alberto)
Met with Falcon (Mando.)

Site CQA Technician

Signature _____

DBSA CQA Officer

Signature

Print Name _____

Print Name _____

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18120900
Owner: _____ Date: 5-7-2019
Project Location: Enire, NM Report No.: _____
Weather: 6:55 A.M. 55°F,
16:55 P.M. 90°F,

Contractor(s) Onyx (Jason Edwards and others)
Falcon (Mando and crew)
MHAT (Mason & Robert)

Summary of Daily Construction Progress and Inspections:

Inventory of Geonex. Rolls were transferred from Falcon warehouse. Windy morning, Falcon started installing around 9:55 am. GCL and HDPE liner is installed but testing will be completed after liner is installed for a whole section. Update of concrete construction.

Summary of Problems and Resolutions:

Welding problems occurred at different points. Falcon staff patched with temporary patches. Permanent patching will be completed along with testing.

Equipment:

Backhoe - fixed trenches. A bar was attached and used to carry rolls ~~to section~~ to laydown area.

Summary of Meeting Held and Attendees:

Minute meetings throughout all day to discuss plans and issues with Falcon and Onyx staff

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18120900
Owner: _____ Date: 5/8/2019
Project Location: Enise, NM Report No.: _____
6:30 ~~AM~~ A.M. 54°F.
Weather: _____
P.M. 80°F.

Contractor(s) Falcon (Mando and Staff)
Oryx (Edmundo, Jason) and Staff

Summary of Daily Construction Progress and Inspections:

Continued laying down GCL and HDPE at mud out/jet out
Completed most of the section (75% completed.)

Summary of Problems and Resolutions:

Pane 42 (GCL) needed to be patched after
it was ripped with ATV tires.

Equipment: Roller - minimal compaction at mud out/jet out
Section
Backhoe - a bar was attached and used to carry
rolls to layout area

Summary of Meeting Held and Attendees:

Miscellaneous meetings with Edmundo and
Mando

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -DB18.1209.00
Owner: _____ Date: 5/9/19
Project Location: _____ Report No.: -
Weather: A.M.: 50°F, Cool w/ light wind From the north.
P.M.: 65°F.

Contractor(s)

ONPX - Earthwork
Falcon - Liner services.

Summary of Daily Construction Progress and Inspections:

GCL + HDPE Deployed along SW Slope and leachate trench
Secured with bags and welded to existing liner.
Begin seam testing and repairs.

Summary of Problems and Resolutions:

Some seams were not sealed due to awkward geometry
Patch.

Equipment:

Welder
Extrusion welder.

Summary of Meeting Held and Attendees:

Site CQA Technician

[Signature]
Signature

Mike Toole
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -DB18.1209.00
Owner: _____ Date: 5/10/19
Project Location: _____ Report No.: -
Weather: A.M. 45°F, Strong wind, intermittent rain
P.M. °F,

Contractor(s)

Onyx - Earthwork Area
Falcon - Liner Installation

Summary of Daily Construction Progress and Inspections:

Vacuum test all repairs and DT, Strong rain and
lightning, secure liner return Saturday.

Summary of Problems and Resolutions:

Rain collecting in trenches,

Equipment:

—

Summary of Meeting Held and Attendees:

Site CQA Technician

[Signature]
Signature

Mike Zbiczek
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -DB18.1209.00
Owner: _____ Date: 5/11/19
Project Location: _____ Report No.: -
Weather: A.M. 48°F, cloudy, no wind
P.M. 65°F, clear sunny, cool no wind.

Contractor(s)

ONPX

Falcon

Summary of Daily Construction Progress and Inspections:

arrived onsite, ONPX was pumping water off of liner.
Begin Geocomposite, starting along east side of Pad B to wrap around
and cover existing HDPE.

Summary of Problems and Resolutions:

Large blow out below liner in catch sump, subgrade will need
Repair.

Equipment:

Summary of Meeting Held and Attendees:

Site CQA Technician

[Signature]
Signature

Mike Brooks
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 181209
Owner: _____ Date: 5-20-2019
Project Location: Eunice, NM Report No.: _____
Weather: A.M.: _____ °F, _____
P.M.: _____ °F, _____

Contractor(s) ONYX, Falcon

Summary of Daily Construction Progress and Inspections:

GCL and HDPE Liner was installed in Area C.
Approximately 50% complete, some GCL was exposed, assumptions of no rain were made.

Summary of Problems and Resolutions:

GCL ~~was~~ patched where ripped.

Equipment: Loader used as a roll transporter.

Summary of Meeting Held and Attendees:

Multiple meetings with ONYX and Falcon to discuss schedule for the day and the rest of the week. Area A needs subgrade density testing.

Site CQA Technician

[Signature]
Signature

Omer Fric
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 181209
Owner: _____ Date: 5/21/2019
Project Location: Eunice, NM Report No.: _____
Weather: 6:30 A.M.: 55°F,
4:15 P.M.: 80°F,
Contractor(s) OWYX, Falcon

Summary of Daily Construction Progress and Inspections: Continued GCL and HDPE
liner at Area C. Windy morning, did not create problems.

Summary of Problems and Resolutions:

Windy (20-30 mph), created sand problems for welding. Talked
to Falcon Manager staff Armando, who rapidly directed employees to clean
liner with more detail and attention. Creoset (top geotextile) was not
welded correctly and burnt at different location. Falcon staff will
fix later date.

Equipment: Loader used to transport rolls of geomembrane
Four wheeler used to unroll FML.

Summary of Meeting Held and Attendees:

Meetings to discuss plan of the day, wind conditions and
time/days of testing.

Site CQA Technician

[Signature]
Signature

Omar Riz
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB181209
Owner: Sundance Date: 5/22/2019
Project Location: Eunice, NM Report No.:
Weather: 6:30 A.M.: 60°F,
4:30 P.M.: 79°F,

Contractor(s) Onyx, Falcon

Summary of Daily Construction Progress and Inspections:

Finished Sump Area "C", Not tested but welded and temporary patched just in case it rains. 20% chance of rain. Testing and patching will be completed tomorrow

Summary of Problems and Resolutions:

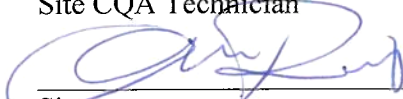
Afternoon winds caused sand to spread over FUEL. Continued sand in welding process, falcon started ~~see~~ cleaned sand as welding took place.

Equipment: Loader - to transport rolls
Four wheeler - to unroll and extend FUEL

Summary of Meeting Held and Attendees:

Meetings to know plan for the day, to talk about potential rain, end of the day plan.

Site CQA Technician


Signature

Omar Ruiz
Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Gundance West Project No.: - DB18.1209.00
Owner: _____ Date: 5/23/17
Project Location: Enlee NM Report No.: -
Weather: A.M.: 70°F, overcast, wind 20-25 mph
P.M.: 80°F,

Contractor(s)

Onyx
Falcon

Summary of Daily Construction Progress and Inspections:

Onyx preparing area A.
Falcon, review seams in C area, begin testing and patching.

Summary of Problems and Resolutions:

DT-11 located on N slope of C area failed field DT. A cap of HDPE
was placed on the seam and resealed into place.

Equipment:

DT's were sent to TRI for analysis

Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Mike, Zsazek, J. Fisher, Omar Ruiz
Signature

Mike, Zsazek, J. Fisher, Omar Ruiz
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: - DB18.1209.00
Owner: _____ Date: 5/24/19 Friday
Project Location: Ennice. Report No.: -
Weather: A.M.: 60°F, clear, no wind
P.M.: 90°F,

Contractor(s)

① Falcon

Onyx

Summary of Daily Construction Progress and Inspections:

Finish installation of Geonet 200 mil in Carea, tie in to b pad, clean and repair seams where necessary. Retest A area Subgrade density.

Summary of Problems and Resolutions:

density measurements passed 95% of 117.3 (Standard Proctor)

Equipment.

Water truck

excavator

Articulatating Hauler

Skidsteer

Backhoe

Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name



J. Fisher, M. Zbrozek

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -DB181209.00
Owner: _____ Date: 5/25/19 Saturday
Project Location: Funice Report No.: -
Weather: A.M. 65°F, cool mild
P.M. 80°F, Minor rain in forecast for the weekend.

Contractor(s)

Falcon

Summary of Daily Construction Progress and Inspections:

Walk all Geonet seams, mark + Repair.

Summary of Problems and Resolutions:

Holiday weekend No crew onsite Sun 5/26
mond 5/27

Equipment:

Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer



Signature

J. Fisher, M. Broeck

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: -DB18.1209.00
Owner: _____ Date: 5/29/19 Wednesday.
Project Location: Ennise Report No.: -
Weather: A.M. 80°F, some scattered showers in vicinity
P.M. 83°F, cloudy mild wind 10-15 mph

Contractor(s)

Onyx - Manciedo, Edmundo, Albert, Jason

Summary of Daily Construction Progress and Inspections:

Continue backfill of protective soil cover. Onyx laying out 6" perforated pipe and fusing in Barea, construction of Sump and 12" standpipe in Barea. Placement of aggregate to support the standpipe.

Summary of Problems and Resolutions:

During installation of standpipe in Barea sump, there was some confusion regarding perforation of the bottom of the standpipe. The standpipe was installed w/out perforation. After clarification w/ G. Peterson the pipe will need to be exposed and perforated ✓

Equipment:

Excavator, Backhoe, Dozer, Skidsteer, Pipe fuser,

Summary of Meeting Held and Attendees:


Consolation w/ G. Peterson on phone after crews were offsite

Site CQA Technician

Signature

Print Name

DBSA CQA Officer


Signature

J. Fisher / M. Brozek
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.120900
Owner: _____ Date: 5/28/19 Tuesday
Project Location: Enrico Report No.: _____
Weather: A.M. 60°F, Sunny calm
P.M. 89°F, Wind 10-15 mph

Contractor(s)

ONYX - Manicelo, Paul, Albert, Gilbert, Edmundo, Jason
Falcon - Mando Lara

Summary of Daily Construction Progress and Inspections:

Walk BTC area liner w/ Paul and Manicelo. Minor repairs made. Edmundo + Mando
sign sub liner approval to prepare backfill of protective soil cover

Summary of Problems and Resolutions:

Recommendation made to use cooler hours of day for protective soil backfill
Manicelo, Albert will continue backfill throughout the day despite risk
of wrinkles.
Ponding in sumps from afternoon, pumped before proceeding
Equipment:
Excavator, Backhoe, articulating haul trucks, dozer, pipe fuser.

Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

J. Fisher / M. Ebroeck

DAILY SUMMARY REPORT

Project: Sundance West. Project No.: DB18.1209.00
Owner: _____ Date: 5/31/19
Project Location: Ennice NM Report No.: -
Weather: A.M. 50°F,
P.M. 81°F, Cloudy cool, light wind ~5 mph

Contractor(s)

ONYX

Falcon - Return to start liner in A area

Summary of Daily Construction Progress and Inspections:

Falcon, set up and prepare to lay liner on A area pad. Working from the SE to the North. GCL P1-P17, HDPE P1-P6

ONYX continue protective soil layer in B area, start E transition
continue installing 6" HDPE

Summary of Problems and Resolutions:

In consultation w/ G. Peterson, decision was reached to install E sump
stand pipe vertically HDPE fused and bottom and will transition
to PVC 12" to surface via coupler,

Equipment:

Excavator, Backhoe, Dozer, skid steer, pipe inser
Backhoe for Falcon.

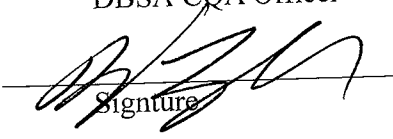
Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer


Signature

M. Eric Zbieck
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209.00
Owner: _____ Date: 5/30/19 Thursday
Project Location: Enclave NM Report No.: -
Weather: A.M. 75°F. wind and rain in forecast.
P.M. 80°F.

Contractor(s)

Onyx

Summary of Daily Construction Progress and Inspections:

Pipe walls exposed in B sump and perforated, begin construction of leachate lines in W area & trenches. Valves for B sump left in place w/ stand pipes installed and supported by Backfill.

Summary of Problems and Resolutions:

Decision to keep valves and install accesses.

Equipment:

Excavator, Haul truck, Pipe inser, Backhoe, Dozer, Shidsteer

Summary of Meeting Held and Attendees:

Week 18 safety Tailgate Onyx + DBSA

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

[Signature]
Signature

J. Fisher / M. Brooks
Print Name

6/3/19 Monday
DAILY SUMMARY REPORT

Project: Sundance West Project No.:
Owner: Date:
Project Location: Eunice NM Report No.:
Weather: A.M. 60°F,
P.M. 90°F,

Contractor(s) Onyx/Falcon

Summary of Daily Construction Progress and Inspections:

GCI & GM bins Laid. Leachate lines Backfilled
in Sump area

Summary of Problems and Resolutions:

water in Sump area Trenches, water pumped out

Equipment: welding, Front Loader

Summary of Meeting Held and Attendees:

Meetings with Armando & El mundo

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

John
Signature

Thomas Hopkins
Print Name

Bill
~~Contractor~~

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 18,1209.00
Owner: Sundance Date: 6/4/2019
Project Location: Bunice, NM Report No.: -
Weather: A.M. 60°F, Overcast
P.M. 90°F, Sunny
Contractor(s) Falcon / Onyx

Summary of Daily Construction Progress and Inspections:

Existing Liner in Area A patched, Seam tested, Vacuum tested.
Area C liner slope back-filled DT's Field Tested.
two Panels of Geocomposite laid G1-62

Summary of Problems and Resolutions: Ponding From storm night before
Sumps pumped,

Equipment: Front end loader, Pumps, welders,

Summary of Meeting Held and Attendees: Jason, Armand

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: - 6/5/19
Owner: " " Date: 6/5/19
Project Location: Eunice, NM Report No.: -
Weather: A.M. 68°F,
P.M. 93°F,
Contractor(s) ONYX/Falcon

Summary of Daily Construction Progress and Inspections:

Falcon Laying geocomposite, DTA1-12 passed, 3/4 of Area A covered. Geo composite fused.

Summary of Problems and Resolutions: additional rain night before. Subgrade muddy. Sumps pumped out.

Equipment. Vacuum Truck, welder, Backhoe, dozer.

Summary of Meeting Held and Attendees: Talked to Edmundo

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

T. Hopkins

Signature

T. Hopkins

Print Name

DAILY SUMMARY REPORT

Project: Sundance west Project No.: DB18-120900
Owner: " " Date: 6/6/19
Project Location: Evie, NM Report No.: -
Weather: A.M. 58°F,
P.M. 91°F,

Contractor(s) Falcon/Onyx

Summary of Daily Construction Progress and Inspections:

To muddy for Falcon. Falcon left site.
ONYX installed backfilled Leachate lines in Area C
Sumps in Area A pumped.

Summary of Problems and Resolutions:

Very wet, muddy. Falcon delaying liner activities
until tomorrow.
Sumps pumped

Equipment:

Pump Trucks, Dozer

Summary of Meeting Held and Attendees: Edmundo, Jason met with

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance west Project No.: - DB18 1209.00
Owner: " " Date: 6/7/19
Project Location: Eunice, NM Report No.: -
Weather: A.M. 60°F,
P.M. 97°F, Hot!

Contractor(s) Falcon/Onyx

Summary of Daily Construction Progress and Inspections:

GCI & HDPE deployed from HDPE panel 23 to North anchor trench (NAT).

Summary of Problems and Resolutions: Frontloader lost hydraulic fluid.
new one utilized

Equipment: Front end loader, Fusion welder

Summary of Meeting Held and Attendees: Gunder onsite from 12:00 - 14:00. Discussing
with Edmundo & Jason

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

John
Signature

T. Hopkins
Print Name

Saturday,
DAILY SUMMARY REPORT

Project: Sundance west Project No.: DB 181209.00
Owner: -- -- Date: 6/8/19
Project Location: Enice, NM Report No.: -
Weather: A.M. 65°F,
P.M. °F, 101°F!

Contractor(s) Falcon

Summary of Daily Construction Progress and Inspections:

HDPE from 6/7 patched, DTA 13-18 field tested, geocomposite deployed.

Summary of Problems and Resolutions:

8' X 6' X 1' of water directly under liner in East Sump Area A,

Equipment: Loader, welders,


Summary of Meeting Held and Attendees: Talked with Armando

Site CQA Technician

Signature

Print Name

DBSA CQA Officer


Signature

T. Hopkins
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 18(209
Owner: _____ Date: 6/12/2019
Project Location: El Niño, NM Report No.: _____
Weather: 6:35 A.M.: 61°F,
1:30 P.M.: 90°F,

Contractor(s) Falcon, Onyx

Summary of Daily Construction Progress and Inspections:

Falcon completed liner testing and geo composite installation.
Sump C compaction ^{or} not passed. Protective cover/backfill experiencing pumping. Onyx passed sheepfoot roller to decrease moisture.
Sump C did not get better, pumping continued.

Summary of Problems and Resolutions:

In order to fix pumping, backfill will be ~~removed~~ mostly removed
Will leave 5" to 6" of cover soil.
Water was pumped out of sump but approximately 1.5' of water
Still needs to be removed from sump.

Equipment: sheep foot roller, Loader, excavator

Summary of Meeting Held and Attendees:

Progress meeting with Onyx and Falcon.

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB 18120900
Owner: _____ Date: 6/12/2019
Project Location: Ennice, MN Report No.: _____
Weather: 6:55 A.M.: 64°F,
3:30 P.M.: 90°F,

Contractor(s) Falcon

Summary of Daily Construction Progress and Inspections:

Falcon completed securing the Area B to Area A connection. Finished repairs of all geocomposites in Area A. Sump C (Area C sump) still has water. Approximately 18.6% moisture content was detected by the troxler.

Summary of Problems and Resolutions:

Trench and ditch were not dug out, Falcon staff completed and took care of digging and placing liner back.

Equipment: Backhoe, Vacuum truck, Loader, Haul Truck

Summary of Meeting Held and Attendees:

Progress meetings with Onyx and Falcon.

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB181209.00
Owner: -- Date: 6/17/19
Project Location: Eunice, NM Report No.: --
Weather: A.M. °F,
P.M. 95°F,

Contractor(s) ONYX, M hat

Summary of Daily Construction Progress and Inspections:

Sump bottom compacted to 95%, Area B < 95%,

Summary of Problems and Resolutions: Sump bottom Elevation too high Took
off 4".

Equipment: Dozer, StecasFoot, Goblcat, grader

Summary of Meeting Held and Attendees: Talked with Jason ; Edmundo.

Site CQA Technician

DBSA CQA Officer

Signature

John 10~
Signature

Print Name

T. Hopkins
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: - DB18 1209.00
Owner: -- -- Date: 6/18/19
Project Location: Enine, NM Report No.: -
Weather: A.M. 65°F,
P.M. 97°F,

Contractor(s) ONYX, Mhat

Summary of Daily Construction Progress and Inspections:

Area B close to 95% completion on east side. Under on west side

Summary of Problems and Resolutions:

Settling in Sump Area C of ~3", no resolved today

Equipment: Digger, bobcat, grader

Summary of Meeting Held and Attendees: Daine engineer onsite considering settling and will get back with solution.

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

TLW
Signature

T. Hopkins
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB181209.00
Owner: " " Date: 6/19/19
Project Location: Eunice, NM Report No.: -
Weather: A.M. 70°F, 64°F
P.M. 100°F
Contractor(s) ONYX, MHAT

Summary of Daily Construction Progress and Inspections:

Test holes dug in Sump Area, 1 on S side had water.

Summary of Problems and Resolutions:

liner punctured in Sump area. Patched by Falcon

Equipment: extrusion welder, Earth movers.

Summary of Meeting Held and Attendees: Paul, Alberto, Jason, : Edmundo

ONYX thinks Sump area compaction adequate.

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 7/8/2019
Project Location: Eunice, NM Report No.: _____
Weather: A.M.: 74°F,
P.M.: 95°F, (101° at 1500)

Contractor(s): Onyx working in Area A. MHAT working in Area C.

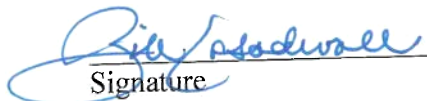
Summary of Daily Construction Progress and Inspections: Onyx has a dozer, loader, and haul truck backfilling north end of Area A. MHAT crew working to remove mud & water from heavy rain in Area C.; also working on rebar for walls on East, South, and west sides of Area C.

Summary of Problems and Resolutions: Mud and water from heavy rain on 7/7/19 flowed into the forms in Area C.

Equipment: Onyx - D6K dozer, Cat 745 end dump, Cat 950 loader

Summary of Meeting Held and Attendees: none

Site CQA Technician


Signature

Bill Casadevall
Print Name

DBS&A CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 7/9/14
Project Location: Eunice, NM Report No.: _____
Weather: A.M.: 84°F,
P.M.: °F,

Contractor(s): Onyx & MHAT

Summary of Daily Construction Progress and Inspections: Onyx continues backfilling Area A - about 60% covered to about 2 ft. MHAT set subar for wing walls on east, south & west sides. Drilled holes along north side form and set angled subar to tie into future ramp. Squared up Area B West and added 2 loads of dirt *
Summary of Problems and Resolutions: MHAT continues to remove mud & water from within Area A forms from heavy rain on 7/7.

Equipment: Onyx: Cat D6K dozer; Cat 745 loader; Cat 950 loader
Haul truck

Summary of Meeting Held and Attendees: Onyx received approval from project engineer via email to use

Site CQA Technician

DBS&A CQA Officer


Signature

Signature

Bill Casadevall
Print Name

Print Name

* on south edge (replace dirt lost from rain runoff).

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 7/8/2019
Project Location: Eunice, NM Report No.:
Weather: A.M. 74°F,
P.M. 95°F, (101° at 1500)

Contractor(s): Onyx working in Area A. MHAT working in Area C.


Summary of Daily Construction Progress and Inspections: Onyx has a dozer, loader, and haul truck backfilling north end of Area A. MHAT crew working to remove mud & water from heavy rain in Area C.; also working on rebar for walls on desert, south, and west sides of Area C.

Summary of Problems and Resolutions: Mud and water from heavy rain on 7/7/19 flowed into the forms in Area C.

Equipment: Onyx - DBK dozer, Cat 745 end dump, Cat 950 loader

Summary of Meeting Held and Attendees: none

Site CQA Technician


Signature

Bill Casadevall

Print Name

DBS&A CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 7/9/14
Project Location: Eunice, NM Report No.:
Weather: A.M. 84°F,
P.M. °F,

Contractor(s): Onyx & MHAT

Summary of Daily Construction Progress and Inspections: Onyx continues backfilling Area A - about 60% covered to about 2 ft. MHAT set rebar for wing walls on east, south & west sides. Drilled holes along North Side form and set angled rebar to tie into future ramp. Squared up Area B West and added 2 loads of dirt.*
Summary of Problems and Resolutions: MHAT continues to remove mud & water from within Area A forms from heavy rain on 7/7.

Equipment: Onyx: Cat 160K dozer; Cat 745 loader; Cat 950 loader
haul truck

Summary of Meeting Held and Attendees: Onyx received approval from project engineer via email to use.

Site CQA Technician

DBS&A CQA Officer


Signature

Signature

Bill Casadevall
Print Name

Print Name

* on south edge (replace dirt lost from rain runoff).

DAILY SUMMARY REPORT

Project: Sundance Project No.: DB18120900
Owner: _____ Date: 7/16/2019
Project Location: Eunice, NM Report No.: _____
Weather: 6:50 A.M. 79F,
P.M. °F,

Contractor(s) Onyx, MHAT

Summary of Daily Construction Progress and Inspections:

MHAT - trenching Area B west section, working on walls for Area C rebar, concrete pour of Area B west for next Tuesday (7/23)

Summary of Problems and Resolutions:

Leach lines around concrete pad in area C will be removed. covered with backfill. No Rock ~~that~~ ^{which} not ~~been~~ removed. ~~Asked Onyx~~ Asked Onyx if ditches had too much dirt, and they did agree, they removed some dirt from ditches before installing Leach line.

Equipment: skid steer, small excavator, loader

Summary of Meeting Held and Attendees:

Edmundo (Onyx), Robert (MHAT), OR, check concrete pour schedule.

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: SDW Project No.: DB16,1209,00
Owner: _____ Date: 7-11-19
Project Location: C Area Swamp Report No.: -
Weather: 0230 A.M.: 74F,
P.M.: _____ °F,

Contractor(s)

MHAT, PB Materials, Onyx
Beyond engineering (ACI concrete testing)

Summary of Daily Construction Progress and Inspections:

crews pouring C area Swamp Pad with Pump - Approx 300 yd³
of 5000 psi concrete. Trucks from PB Arriving ~ 2:50 am
See concrete receiving form for truck details.

Summary of Problems and Resolutions:

Trucks 5+6 did not meet spec. Too dry, rejected.
32 Trucks 320 yds less the 2 rejected loads.

Equipment:

concrete Pump + 5 trucks.

Summary of Meeting Held and Attendees:

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance Project No.: DB18120900
 Owner: ~~EC~~ Date: 7/15/2019
 Project Location: Enice NM Report No.: -
 A.M.: F.
 Weather: 12:15 P.M. 95°F

Contractor(s) MHAT, ONYX both onsite

Summary of Daily Construction Progress and Inspections:

Leach line was installed ~~over~~ by the concrete pad in area C. Outlet needs a sump and orgx will get parts to install. Area still needs cover work, MHA is working on trenches for Area B west and walls in Area C

Summary of Problems and Resolutions:

Summary of Problems and Resolutions:
 Onyx would like to drain water from leach line, Gunder
 made suggestion that Onyx will take

Equipment: skid steer, loader, small excavator,

Summary of Meeting Held and Attendees: Robert, Edmundo, Jason, Joan
Slope to area C will ~~be~~ be completed by Aug 3 if crux
finishes the preparation of subgrade

Site CQA Technician

Signature _____

Omar Pir

Print Name _____

DBSA CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance west Project No.: - DB18-1209
Owner: r r Date: 7/23/19
Project Location: Eunice, NM Report No.: -
Weather: A.M. °F, 68° F
P.M., °F, 85°

Contractor(s) Onyx, Mhat, PB materials

Summary of Daily Construction Progress and Inspections:

Concrete pour postponed from night before. Mhat trying rebar for wall.

Summary of Problems and Resolutions:

None

Equipment: Front Loader, @ lift

Summary of Meeting Held and Attendees: Discussed concrete pouring schedule with
Edmundo, Jason, Robert, and DainC. Tentative, ramp 8/1 and wall
8/7, then east Area B

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Thomas Hopkins
Signature

Thomas Hopkins
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18-1209 00
Owner: " " Date: 7/24/19
Project Location: Eunice NM Report No.: -
Weather: A.M. 68°F, Clear
P.M. 80°F, Clear

Contractor(s) PB materials, Mhat, Onyx,

Summary of Daily Construction Progress and Inspections:

Area B west slab poured.

Summary of Problems and Resolutions: Concrete pump arm crashed, cracked.
Arm cut off and new pump brought onsite,
Concrete pour required 65 Trucks (48 expected)
Equipment: two concrete pumps, 8 concrete trucks, Power trowels

Summary of Meeting Held and Attendees: Meetings with Onyx (Edmundo, Jason)
Mhat (Robert), (PB materials (Tamey), Beyond Engineering (Jaime?))

Site CQA Technician

Signature

Print Name

DBSA CQA Officer

Thomas Hopkin
Signature

Thomas Hopkin
Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209.00
Owner: rr rr Date: 7/25/19
Project Location: Enrico, New Mexico Report No.: -
Weather: A.M. 68°F, clear, no rain night before
P.M. °F,

Contractor(s) Mhat, Onyx

Summary of Daily Construction Progress and Inspections:

Onyx set corners on Area A slab. Mhat built rebar

Summary of Problems and Resolutions:

Mhat will narrow beam trenches in future

Equipment: Telescoping forklift.

Summary of Meeting Held and Attendees: Delineated Area A slab with Jason,
Edmund

Site CQA Technician

DBSA CQA Officer

Signature

Signature

Print Name

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 8/28/2019
Project Location: Eunice, NM Report No.:
Weather: A.M.: °F, 70° @ 0640 ; lightning delayed concrete pour.
P.M.: °F, 84 @ 1330

Contractor(s): MHAT, Onyx, Grundage-Bore (pump truck), PB Materials (concrete truck), Bend Engineering (cement testing), Blakely Construction


Summary of Daily Construction Progress and Inspections: Pour and finish concrete on second portions of east and west walls in Area C, and drain floor between areas B and C. Onyx moving dirt in Area A. Blakely has made crushed talike pad w/ drains in Area D and laid out looks.

Summary of Problems and Resolutions: none.

Equipment: pump truck, cement trucks,

Summary of Meeting Held and Attendees: none

Site CQA Technician


Signature

Bill Casadevall

Print Name

DBS&A CQA Officer

Signature

Print Name

DAILY SUMMARY REPORT

Project: Sundance West Project No.: DB18.1209
Owner: Sundance Date: 8/29/2019
Project Location: Eunice, NM Report No.:
Weather: A.M. °F, 76° @ 0745
P.M.. °F,

Contractor(s): MHAT, Onyx, Blakely Construction

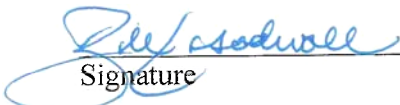
Summary of Daily Construction Progress and Inspections: MHAT crew are removing forms and preparing slab; Onyx is staging backfill dirt; Blakely to set gate posts for tanks.
Looked at yesterday's concrete with Edmundo; discuss plans for next week.

Summary of Problems and Resolutions: none

Equipment: Onyx has dump trucks

Summary of Meeting Held and Attendees: none

Site CQA Technician


Signature

Bill Casadevall
Print Name

DBS&A CQA Officer

Signature

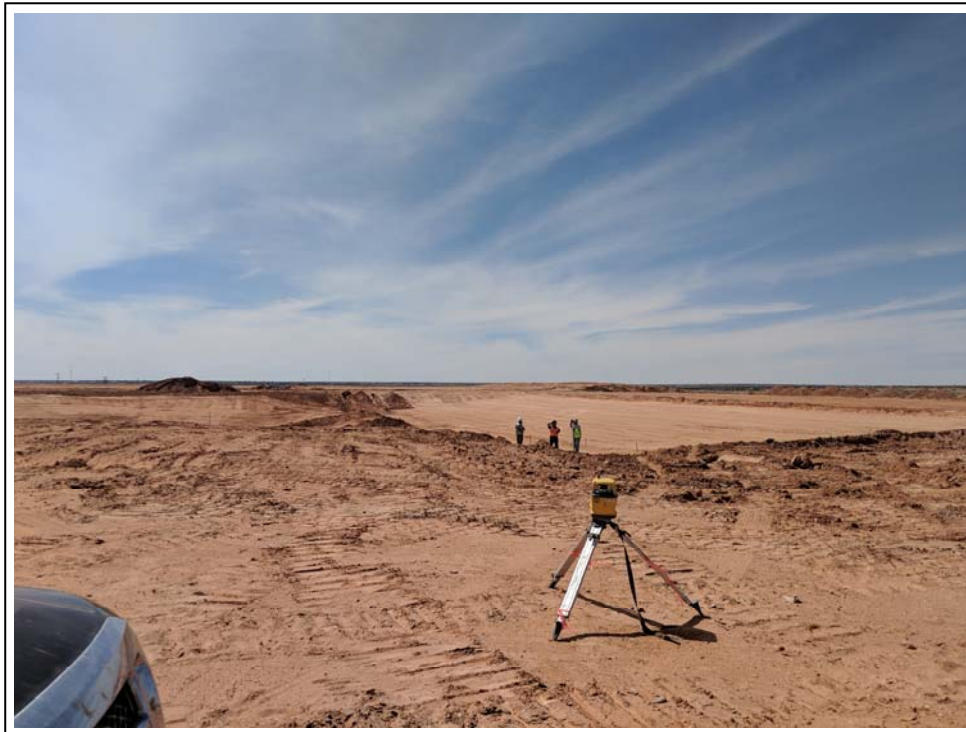
Print Name

Appendix B2

Photographs



1. 3/7/2019: Initial excavation of subgrade from existing soil stockpiles (view to east)



2. 4/4/2019: Mud dry out (Area A) excavation to grade, with survey station (view to west)



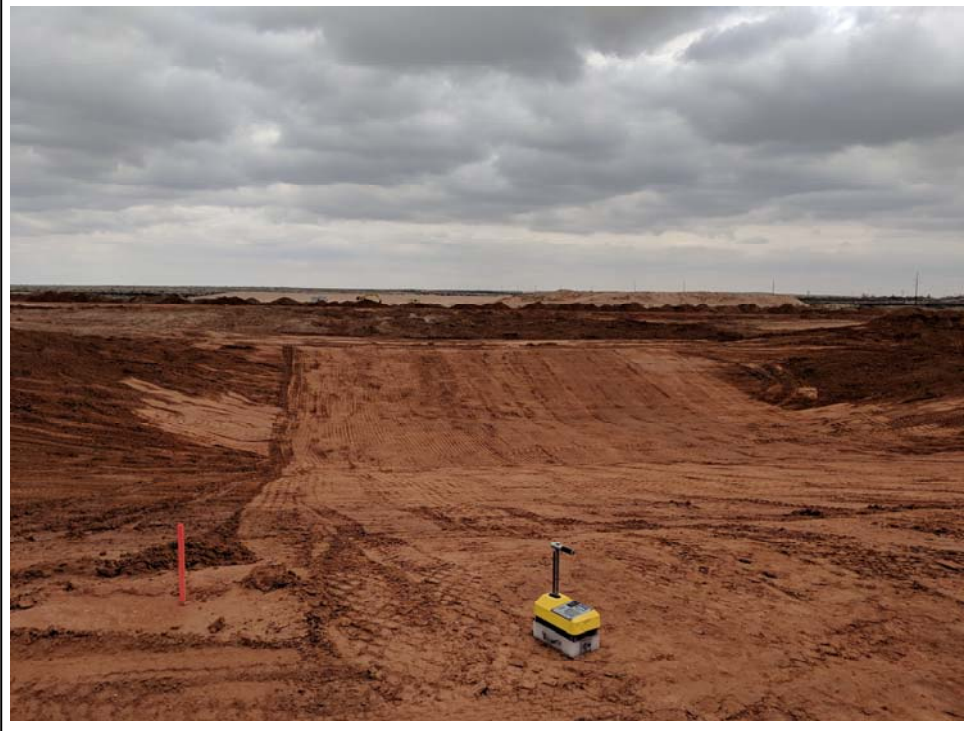


3. 3/22/2019: Sheepfoot and water on south slope of sump (view to southeast)



4. 3/28/2019: Mud jet out (Area B), grader and roller compaction (view to southwest)





5. 3/21/2019: Density measurements on slope of sump (Areas C) (view to north)



6. 4/4/2019: Mud jet out and sump (Areas B and C), leachate collection trenches (view to west)





7. 5/7/2019: Deployment of GCL panels along west edge of Area B (view to north)

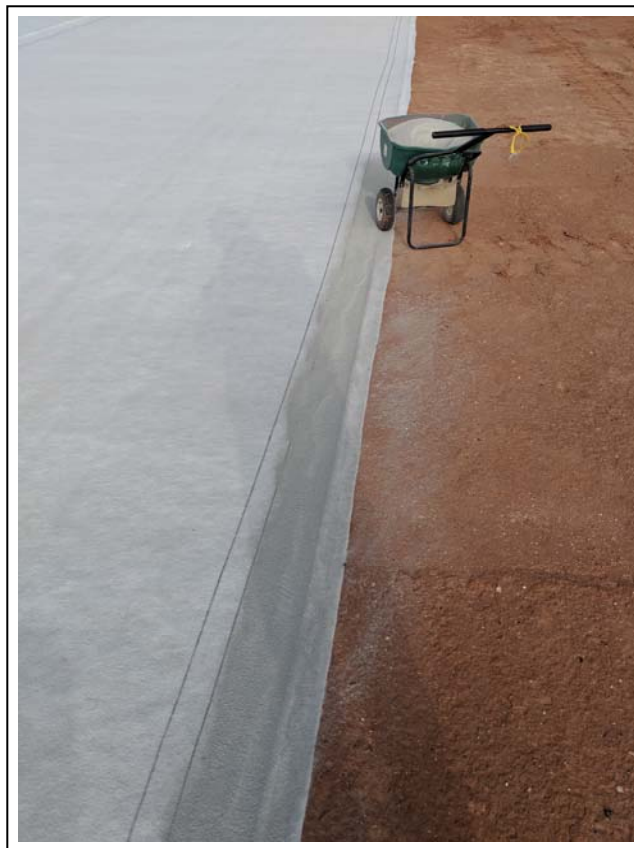


8. 5/8/2019: Mud jet out (Area B), deployment of GCL panels ahead of geomembrane liner (view to west)





9. 5/8/2019: Mud jet out (Area B), deployment of GCL panels along east anchor trench (view to east)



10. 6/1/2019: Bentonite applied along GCL seams





11. 5/20/2019: Pre-weld shear test



12. 6/1/2019: Fusion weld along 60-mil geomembrane, Area A (view to east)





13. 6/1/2019: Deployment of 60-mil geomembrane, Area A (view to west)



14. 6/11/2019: Location of seam pressure test and results





15. 6/11/2019: Extrusion welding patch over line, Area A



16. 5/11/2019: Deployment of 200-mil geonet panels along Area C slope (view to southwest)





17. 5/11/2019: Zip ties used to tie panels together before fabric is seamed with welder and heat guns



18. 5/29/2019: 6-inch perforated SDR 11 HDPE pipe, 40 feet





19. 5/29/2019: Diameter of 6-inch perforated SDR 11 HDPE pipe, 40 feet



20. 5/29/2019: Fusion of HDPE leachate collection lines





21. 5/29/2019: Placement of select aggregate on nonwoven geotextile fabric (view to north)



22. 8/22/2019: Select aggregate for leachate collection system





23. 5/29/2019: Select aggregate placement and leachate collection pipe end cap
(view to south)



24. 5/29/2019: Installation of leachate collection standpipe for mud jet out (Area B)
(view to north)





25. 7/8/2019: Area A backfill (view to east)



26. 5/28/2019: Pushing backfill to grade (view to northwest)





27. 5/29/2019: Compaction and placement of protective soil layer, Area B (view to north)



28. 5/29/2019: Operators use cones as guides to ensure 2-foot minimum thickness (view to west)





29. 6/18/2019: 40-foot tied rebar cages for footings



30. 6/26/2019: Placement of base aggregate and base liner in preparation of concrete, Area C (view to west)





31. 7/8/2019: Area C installation of rebar (view to northeast)



32. 8/1/2019: Rebar and lining placed on 19% grade to sump, construction of sump walls (view to north)





33. 11/12/2019: Using cordless rebar tying tool, Area A



34. 8/28/2019: Discharging concrete into pump truck hopper (view to south)





35. 9/9/2019: Pouring concrete footings on south end of pad
(view to west)



36. 9/10/2019: Operating the vibrating auto-screed to establish
concrete grading (view to east)





37. 9/10/2019: Vibrating screed operation along north end of Area A pad (view to west)



38. 9/10/2019: Curbing of concrete on Area A pad (view to south)





39. 7/24/2019: Power trowel finishing on west Area B pad (view to south)



40. 9/10/2019: Operation of two pumps for placement of Area A pad (view to south)





41. 8/29/2019: Wall forms and counterforks along south wall of Area C sump
(view to southwest)



42. 8/24/2019: MHAT crews vibrating each lift of concrete during placement
(view to northwest)





43. 8/28/2019: Beyond Engineering performing a slump test on concrete
(view to southwest)



44. 8/28/2019: Beyond Engineering filling cylinders with concrete for geotechnical testing
(view to southwest)





45. 9/4/2019: Tanks arriving on the site (view to north)



46. 9/4/2019: Tank specifications





47. 8/28/2019: Area D markings for aboveground tank placement on crushed caliche pad (view to southeast)



48. 9/4/2019: Placement of polyurethane tank pads (view to east)





49. 9/4/2019: Lining up tank onto tank base



50. 9/4/2019: Crane lifting tanks onto pads in Area D (view to southwest)





51. Catwalks and plumbing assembly in Area D tank battery (view to west)



52. Pressure testing of seals and valves at 60 psi.





53. Pump installed on concrete stand in Area C sump that supplies water to processing tanks (view to west)



Appendix C

Subgrade Material Testing

Appendix C1

Subgrade Laboratory Testing Report

Laboratory Report for Daniel B. Stephens & Associates, Inc.

DB18.1209.00 Sundance West

April 8, 2019



Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113



April 8, 2019

Gundar Peterson
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400

Re: DBS&A Laboratory Report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00
Sundance West Project

Dear Mr. Peterson:

Enclosed is the report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00 Sundance West project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to DBS&A and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory

4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113

505-889-7752
FAX 505-889-0258

Summaries



Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties ¹			Saturated Hydraulic Conductivity ²			Moisture Characteristics ³								Particle Size ⁴			Specific Gravity ⁵		Air Perm- eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K _{unsat}	DS	WS	H	F	C			
SDW-01															X	X					X	X
SDW-02															X	X					X	X
SDW-03															X	X					X	X
SDW-04															X	X					X	X
SDW-05															X	X					X	X

¹ G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

² CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

³ HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, K_{unsat} = Calculated Unsaturated Hydraulic Conductivity

⁴ DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

⁵ F = Fine (<4.75mm), C = Coarse (>4.75mm)



Notes

Sample Receipt:

Five samples, each in a full 5-gallon bucket sealed with a lid, were hand-delivered on March 25, 2019. All samples were received in good order.

Sample Preparation and Testing Notes:

All of the samples were subjected to particle size analysis, Atterberg limits and standard proctor compaction testing.

Based on the proctor compaction method, material larger than 4.75mm was removed from the sample material prior to compaction and remolding. Oversize correction calculations are not presented since the fraction removed was less than 5% of the bulk sample mass in all cases.

Particle diameter calculations in the hydrometer portion of the particle size analysis testing are based on the use of an assumed specific gravity value of 2.65.



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-01	0.012	0.15	0.18	15	5.6	WS/H	Silty sand (SM)	Loamy Sand
SDW-02	0.0034	0.15	0.18	53	20	WS/H	Silty sand (SM)	Loamy Sand
SDW-03	0.037	0.15	0.18	4.9	2.2	WS/H	Silty sand (SM)	Sand
SDW-04	0.0012	0.16	0.18	150	56	WS/H	Silty sand (SM)	Loamy Sand (Est)
SDW-05	0.0019	0.15	0.18	95	35	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-01	0.1	82.0	9.2	8.7
SDW-02	0.4	79.6	10.1	9.9
SDW-03	0.1	83.6	9.4	7.0
SDW-04	0.3	79.9	8.8	10.9
SDW-05	0.2	80.1	9.5	10.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-01	---	---	---	ML
SDW-02	---	---	---	ML
SDW-03	---	---	---	ML
SDW-04	---	---	---	ML
SDW-05	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-01	11.2	1.87	---	---
SDW-02	11.9	1.89	---	---
SDW-03	11.1	1.85	---	---
SDW-04	12.3	1.90	---	---
SDW-05	12.1	1.88	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable

Particle Size Analysis



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-01	0.012	0.15	0.18	15	5.6	WS/H	Silty sand (SM)	Loamy Sand
SDW-02	0.0034	0.15	0.18	53	20	WS/H	Silty sand (SM)	Loamy Sand
SDW-03	0.037	0.15	0.18	4.9	2.2	WS/H	Silty sand (SM)	Sand
SDW-04	0.0012	0.16	0.18	150	56	WS/H	Silty sand (SM)	Loamy Sand (Est)
SDW-05	0.0019	0.15	0.18	95	35	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-01	0.1	82.0	9.2	8.7
SDW-02	0.4	79.6	10.1	9.9
SDW-03	0.1	83.6	9.4	7.0
SDW-04	0.3	79.9	8.8	10.9
SDW-05	0.2	80.1	9.5	10.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 3-Apr-19

Initial Dry Weight of Sample (g): 19455.29
Weight Passing #10 (g): 19425.32
Weight Retained #10 (g): 29.97
Weight of Hydrometer Sample (g): 77.45
Calculated Weight of Sieve Sample (g): 77.57

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	19455.29	100.00
	2"	50	0.00	0.00	19455.29	100.00
	1.5"	38.1	0.00	0.00	19455.29	100.00
	1"	25	0.00	0.00	19455.29	100.00
	3/4"	19.0	0.00	0.00	19455.29	100.00
	3/8"	9.5	8.07	8.07	19447.22	99.96
	4	4.75	10.99	19.06	19436.23	99.90
	10	2.00	10.91	29.97	19425.32	99.85
-10	(Based on calculated sieve wt.)					
	20	0.85	0.11	0.23	77.34	99.70
	40	0.425	1.59	1.82	75.75	97.65
	60	0.250	11.91	13.73	63.84	82.30
	140	0.106	44.68	58.41	19.16	24.70
	200	0.075	5.30	63.71	13.86	17.87
	dry pan		0.39	64.10	13.47	
	wet pan			13.47	0.00	

d_{10} (mm): 0.012 d_{50} (mm): 0.15
 d_{16} (mm): 0.067 d_{60} (mm): 0.18
 d_{30} (mm): 0.11 d_{84} (mm): 0.27

Median Particle Diameter-- d_{50} (mm): 0.15
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 15
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 5.6
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:00

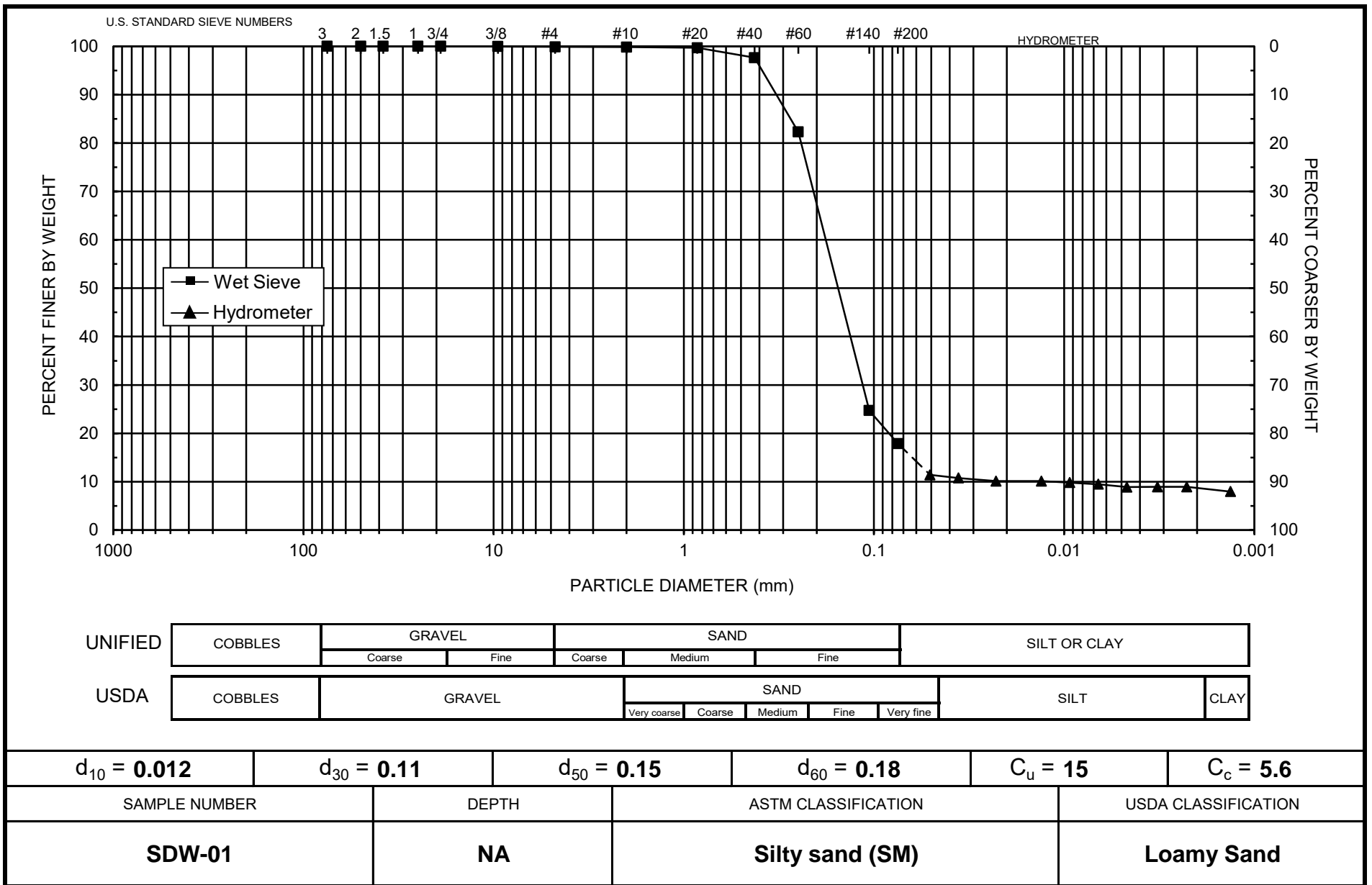
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 77.45
Total Sample Wt. (g): 19455.29
Wt. Passing #10 (g): 19425.32

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	15.0	6.2	8.9	13.8	0.05072	11.4	11.4
	2	20.0	14.5	6.2	8.4	13.9	0.03597	10.8	10.8
	5	20.0	14.0	6.2	7.9	14.0	0.02282	10.1	10.1
	15	20.0	14.0	6.2	7.9	14.0	0.01317	10.1	10.1
	30	20.0	13.8	6.2	7.6	14.0	0.00933	9.8	9.8
	60	20.0	13.5	6.2	7.4	14.1	0.00661	9.5	9.5
	120	20.1	13.0	6.1	6.9	14.2	0.00467	8.9	8.9
	250	20.3	13.0	6.1	6.9	14.2	0.00323	8.9	8.9
	497	21.2	13.0	6.1	6.9	14.2	0.00227	8.9	8.9
3-Apr-19	1457	21.2	12.0	5.8	6.2	14.3	0.00133	8.0	7.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 17872.02
Weight Passing #10 (g): 17781.58
Weight Retained #10 (g): 90.44
Weight of Hydrometer Sample (g): 69.23
Calculated Weight of Sieve Sample (g): 69.58

Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	17872.02	100.00
	2"	50	0.00	0.00	17872.02	100.00
	1.5"	38.1	0.00	0.00	17872.02	100.00
	1"	25	28.93	28.93	17843.09	99.84
	3/4"	19.0	0.00	28.93	17843.09	99.84
	3/8"	9.5	23.02	51.95	17820.07	99.71
	4	4.75	28.10	80.05	17791.97	99.55
	10	2.00	10.39	90.44	17781.58	99.49
-10	(Based on calculated sieve wt.)					
	20	0.85	0.17	0.52	69.06	99.25
	40	0.425	1.46	1.98	67.60	97.15
	60	0.250	10.66	12.64	56.94	81.83
	140	0.106	38.01	50.65	18.93	27.21
	200	0.075	5.03	55.68	13.90	19.98
	dry pan		0.31	55.99	13.59	
	wet pan			13.59	0.00	

d₁₀ (mm): 0.0034 d₅₀ (mm): 0.15
d₁₆ (mm): 0.057 d₆₀ (mm): 0.18
d₃₀ (mm): 0.11 d₈₄ (mm): 0.27

Median Particle Diameter--d₅₀ (mm): 0.15
Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 53
Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 20
Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:06

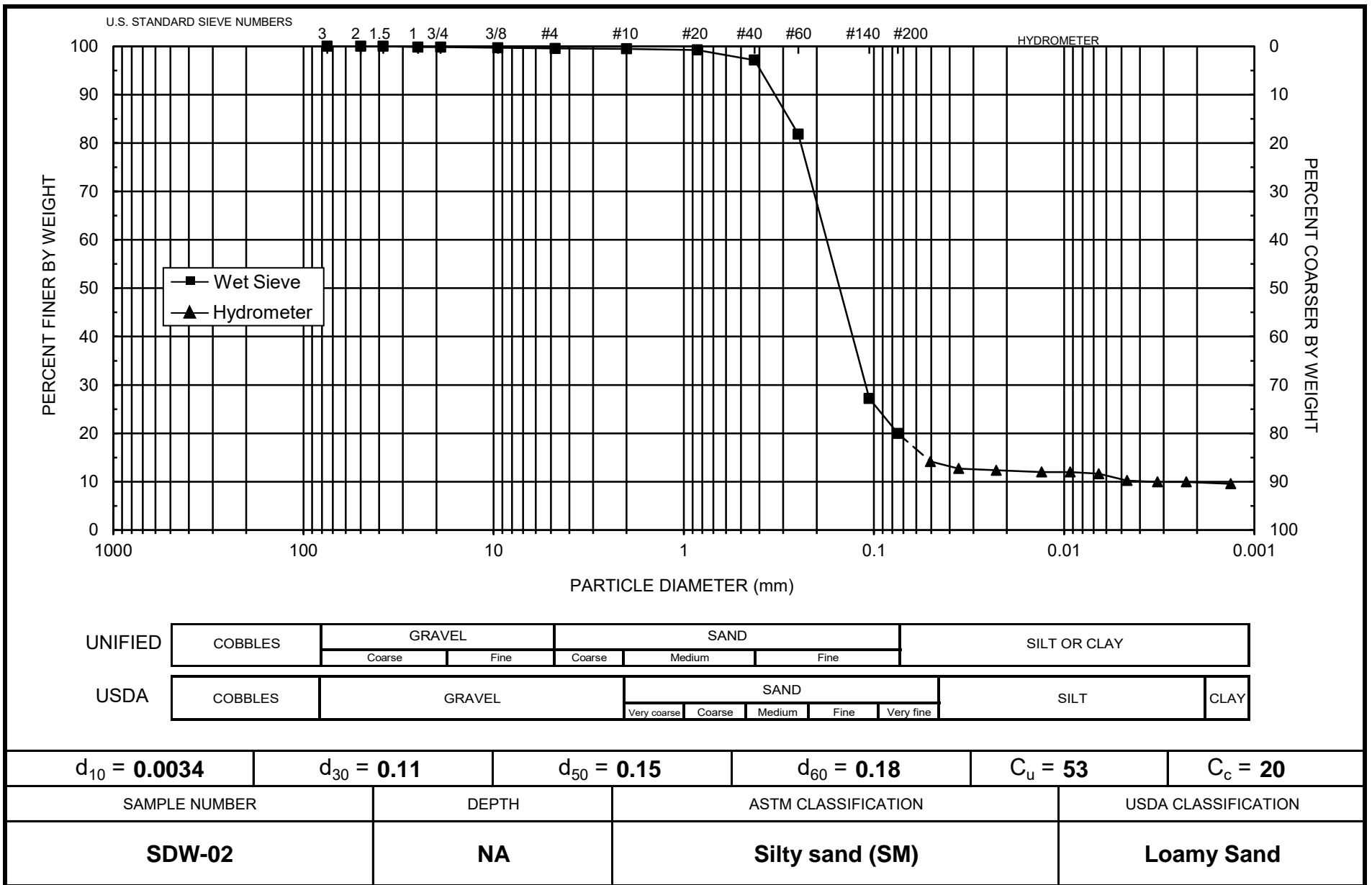
Type of Water Used: DISTILLED
Reaction with H₂O₂: NA
Dispersant*: (NaPO₃)₆
Assumed particle density: 2.65
Initial Wt. (g): 69.23
Total Sample Wt. (g): 17872.02
Wt. Passing #10 (g): 17781.58

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	16.0	6.2	9.9	13.7	0.05042	14.2	14.2
	2	20.0	15.0	6.2	8.9	13.8	0.03587	12.8	12.7
	5	20.0	14.8	6.2	8.6	13.9	0.02272	12.4	12.4
	15	20.0	14.5	6.2	8.4	13.9	0.01314	12.1	12.0
	30	20.0	14.5	6.2	8.4	13.9	0.00929	12.1	12.0
	60	20.0	14.3	6.2	8.1	14.0	0.00658	11.7	11.6
	120	20.1	13.3	6.1	7.1	14.1	0.00467	10.3	10.2
	250	20.3	13.0	6.1	6.9	14.2	0.00323	10.0	10.0
	492	21.2	13.0	6.1	6.9	14.2	0.00228	10.0	10.0
3-Apr-19	1452	21.2	12.5	5.8	6.7	14.3	0.00133	9.6	9.6

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 19229.20
Weight Passing #10 (g): 19209.20
Weight Retained #10 (g): 20.00
Weight of Hydrometer Sample (g): 88.70
Calculated Weight of Sieve Sample (g): 88.79

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	19229.20	100.00
	2"	50	0.00	0.00	19229.20	100.00
	1.5"	38.1	0.00	0.00	19229.20	100.00
	1"	25	0.00	0.00	19229.20	100.00
	3/4"	19.0	0.00	0.00	19229.20	100.00
	3/8"	9.5	5.03	5.03	19224.17	99.97
	4	4.75	6.09	11.12	19218.08	99.94
	10	2.00	8.88	20.00	19209.20	99.90
-10	(Based on calculated sieve wt.)					
	20	0.85	0.06	0.15	88.64	99.83
	40	0.425	1.66	1.81	86.98	97.96
	60	0.250	12.99	14.80	73.99	83.33
	140	0.106	52.63	67.43	21.36	24.06
	200	0.075	6.83	74.26	14.53	16.36
	dry pan		0.53	74.79	14.00	
	wet pan			14.00	0.00	

d_{10} (mm): 0.037 d_{50} (mm): 0.15
 d_{16} (mm): 0.073 d_{60} (mm): 0.18
 d_{30} (mm): 0.12 d_{84} (mm): 0.26

Median Particle Diameter-- d_{50} (mm): 0.15
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 4.9
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 2.2
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:12

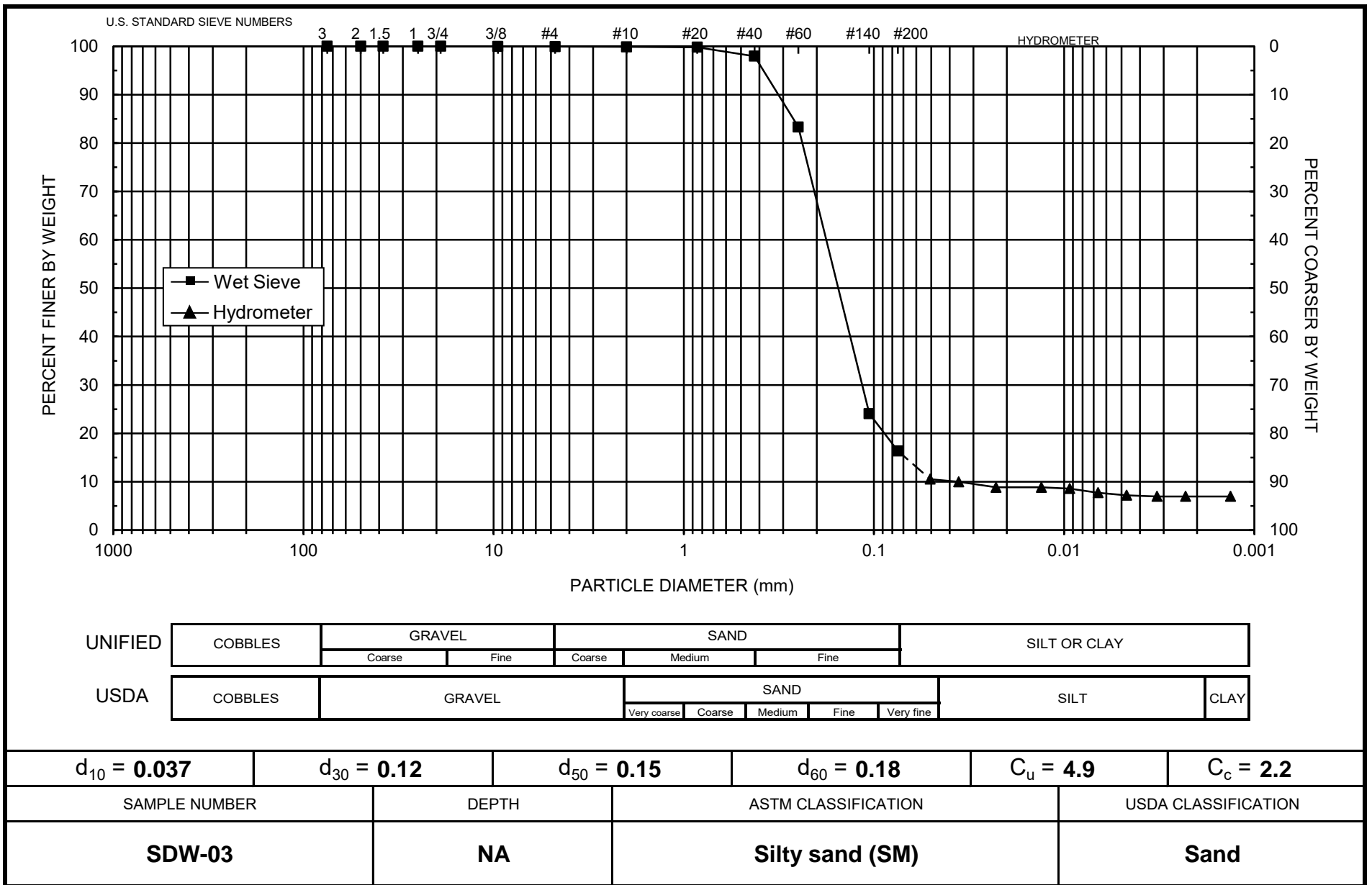
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(\text{NaPO}_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 88.70
Total Sample Wt. (g): 19229.20
Wt. Passing #10 (g): 19209.20

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	15.5	6.2	9.4	13.8	0.05057	10.5	10.5
	2	20.0	15.0	6.2	8.9	13.8	0.03587	10.0	10.0
	5	20.0	14.0	6.2	7.9	14.0	0.02282	8.9	8.8
	15	20.0	14.0	6.2	7.9	14.0	0.01317	8.9	8.8
	30	20.0	13.8	6.2	7.6	14.0	0.00933	8.6	8.6
	60	20.0	13.0	6.2	6.9	14.2	0.00663	7.7	7.7
	120	20.1	12.5	6.1	6.4	14.3	0.00469	7.2	7.2
	250	20.3	12.3	6.1	6.2	14.3	0.00324	7.0	7.0
	487	21.2	12.3	6.1	6.2	14.3	0.00230	7.0	7.0
3-Apr-19	1447	21.2	12.3	6.1	6.2	14.3	0.00133	7.0	7.0

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 20839.54
Weight Passing #10 (g): 20711.63
Weight Retained #10 (g): 127.91
Weight of Hydrometer Sample (g): 79.27
Calculated Weight of Sieve Sample (g): 79.76

Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	20839.54	100.00
	2"	50	0.00	0.00	20839.54	100.00
	1.5"	38.1	0.00	0.00	20839.54	100.00
	1"	25	0.00	0.00	20839.54	100.00
	3/4"	19.0	0.00	0.00	20839.54	100.00
	3/8"	9.5	10.81	10.81	20828.73	99.95
	4	4.75	60.81	71.62	20767.92	99.66
	10	2.00	56.29	127.91	20711.63	99.39
-10	(Based on calculated sieve wt.)					
	20	0.85	0.22	0.71	79.05	99.11
	40	0.425	2.01	2.72	77.04	96.59
	60	0.250	13.42	16.14	63.62	79.76
	140	0.106	43.20	59.34	20.42	25.60
	200	0.075	4.70	64.04	15.72	19.71
	dry pan		0.46	64.50	15.26	
	wet pan			15.26	0.00	

d₁₀ (mm): 0.0012 d₅₀ (mm): 0.16
d₁₆ (mm): 0.055 d₆₀ (mm): 0.18
d₃₀ (mm): 0.11 d₈₄ (mm): 0.29

Median Particle Diameter--d₅₀ (mm): 0.16
Uniformity Coefficient, C_u--[d₆₀/d₁₀] (mm): 150
Coefficient of Curvature, C_c--[(d₃₀)²/(d₁₀*d₆₀)] (mm): 56
Mean Particle Diameter--[(d₁₆+d₅₀+d₈₄)/3] (mm): 0.17

Note: Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:18

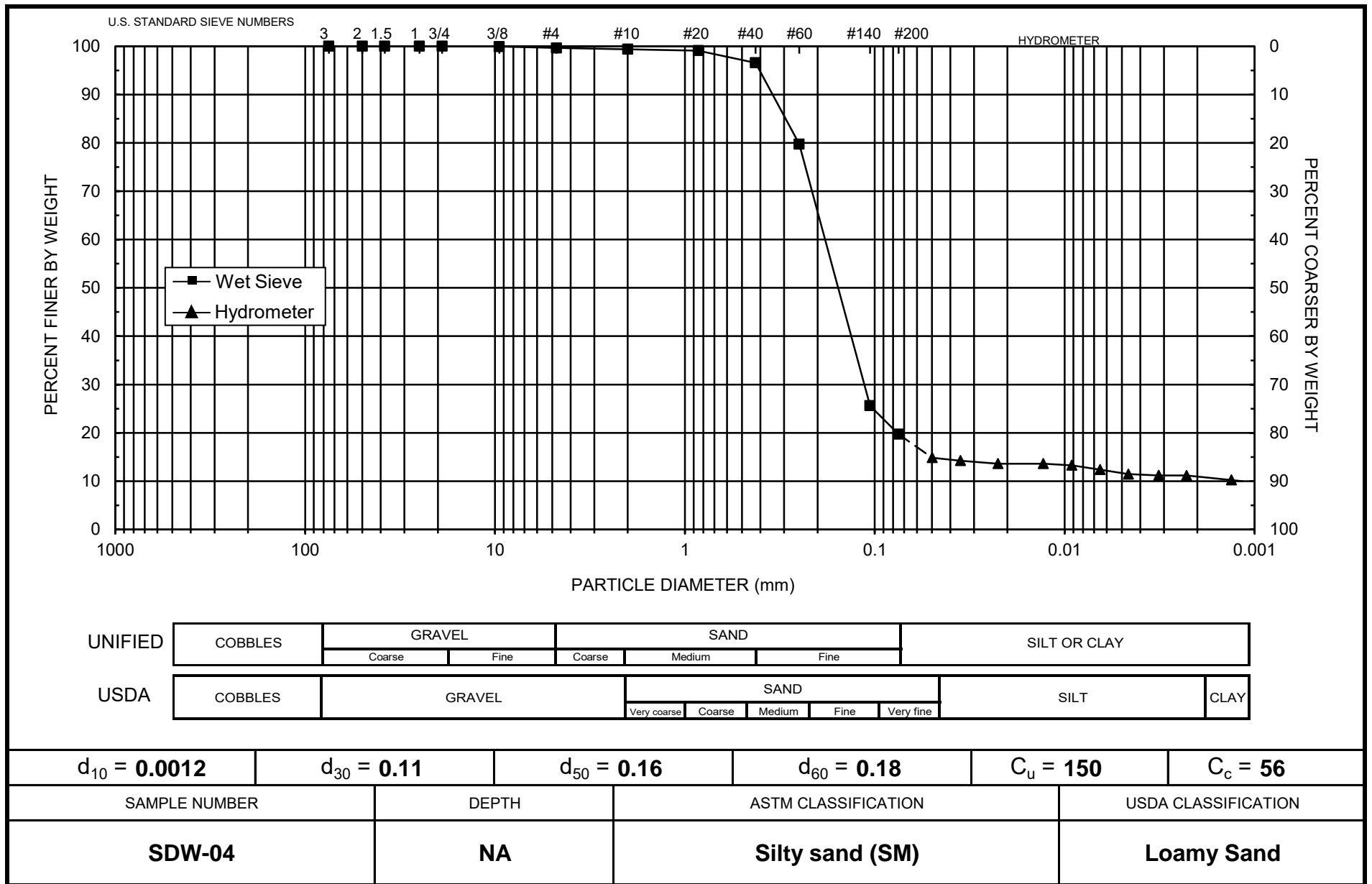
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 79.27
Total Sample Wt. (g): 20839.54
Wt. Passing #10 (g): 20711.63

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	18.0	6.2	11.9	13.3	0.04981	14.9	14.9
	2	20.0	17.5	6.2	11.4	13.4	0.03533	14.3	14.2
	5	20.0	17.0	6.2	10.9	13.5	0.02241	13.7	13.6
	15	20.0	17.0	6.2	10.9	13.5	0.01294	13.7	13.6
	30	20.0	16.8	6.2	10.6	13.6	0.00916	13.4	13.3
	60	20.1	16.0	6.1	9.9	13.7	0.00650	12.5	12.4
	120	20.1	15.3	6.1	9.1	13.8	0.00461	11.5	11.4
	250	20.3	15.0	6.1	8.9	13.8	0.00319	11.3	11.2
	482	21.2	14.8	5.8	8.9	13.9	0.00228	11.2	11.2
3-Apr-19	1442	21.2	14.0	5.8	8.2	14.0	0.00132	10.3	10.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Note: Reported values for d_{10} , C_u , C_c , and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.





Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 20109.25
Weight Passing #10 (g): 20040.05
Weight Retained #10 (g): 69.20
Weight of Hydrometer Sample (g): 84.41
Calculated Weight of Sieve Sample (g): 84.70

Shape: Rounded
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	20109.25	100.00
	2"	50	0.00	0.00	20109.25	100.00
	1.5"	38.1	0.00	0.00	20109.25	100.00
	1"	25	0.00	0.00	20109.25	100.00
	3/4"	19.0	0.00	0.00	20109.25	100.00
	3/8"	9.5	15.89	15.89	20093.36	99.92
	4	4.75	33.50	49.39	20059.86	99.75
	10	2.00	19.81	69.20	20040.05	99.66
-10	(Based on calculated sieve wt.)					
	20	0.85	0.20	0.49	84.21	99.42
	40	0.425	1.50	1.99	82.71	97.65
	60	0.250	12.62	14.61	70.09	82.75
	140	0.106	47.26	61.87	22.83	26.95
	200	0.075	6.22	68.09	16.61	19.61
	dry pan		0.84	68.93	15.77	
	wet pan			15.77	0.00	

d₁₀ (mm): 0.0019 d₅₀ (mm): 0.15
d₁₆ (mm): 0.059 d₆₀ (mm): 0.18
d₃₀ (mm): 0.11 d₈₄ (mm): 0.26

Median Particle Diameter--d₅₀ (mm): 0.15
Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 95
Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 35
Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:24

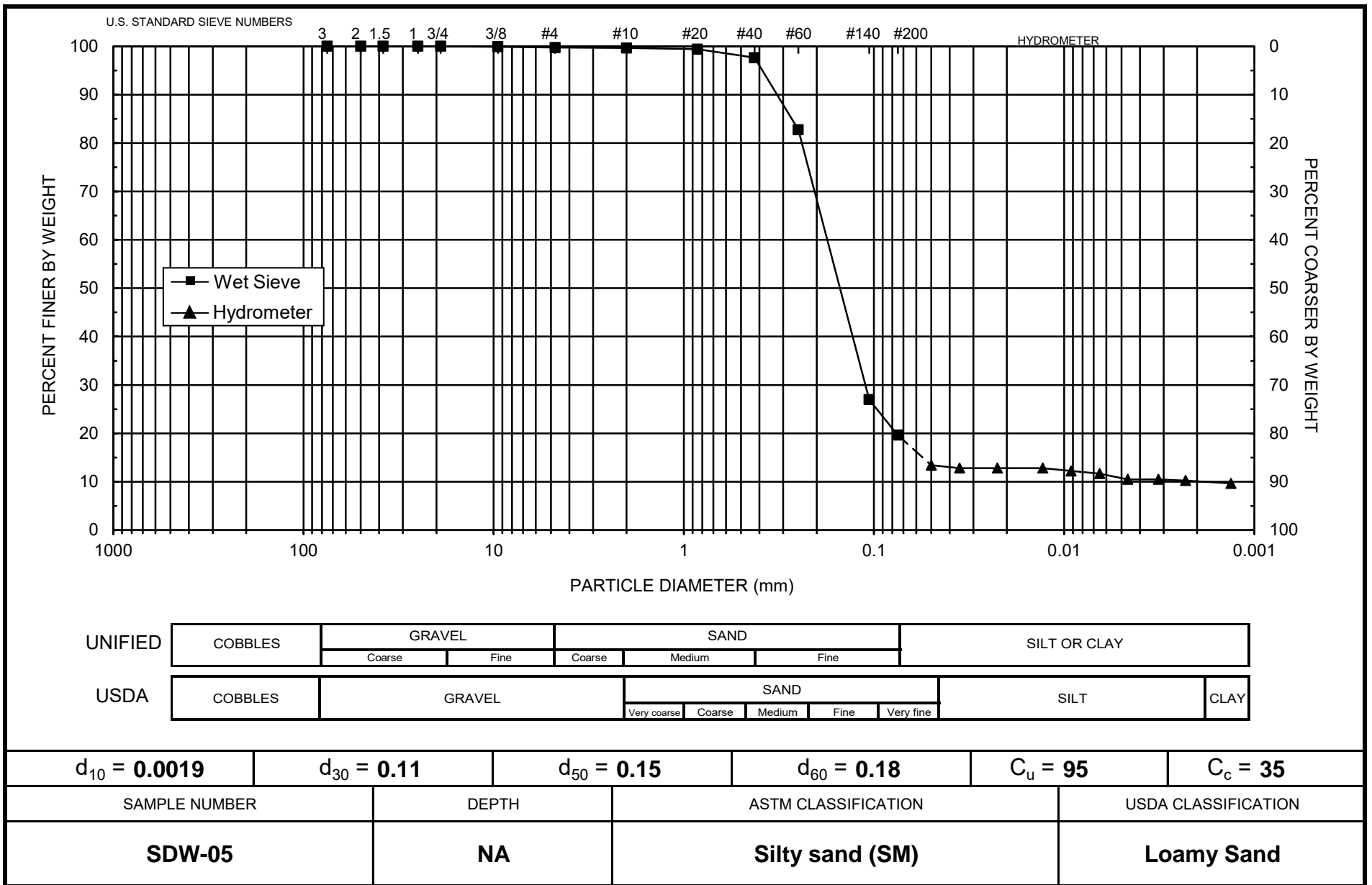
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 84.41
Total Sample Wt. (g): 20109.25
Wt. Passing #10 (g): 20040.05

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	17.5	6.2	11.4	13.4	0.04997	13.4	13.4
	2	20.0	17.0	6.2	10.9	13.5	0.03544	12.9	12.8
	5	20.0	17.0	6.2	10.9	13.5	0.02241	12.9	12.8
	15	20.0	17.0	6.2	10.9	13.5	0.01294	12.9	12.8
	30	20.0	16.5	6.2	10.4	13.6	0.00918	12.3	12.2
	60	20.1	16.0	6.1	9.9	13.7	0.00650	11.7	11.7
	120	20.1	15.0	6.1	8.9	13.8	0.00462	10.5	10.5
	250	20.4	15.0	6.1	8.9	13.8	0.00319	10.5	10.5
	476	21.2	14.5	5.8	8.7	13.9	0.00230	10.3	10.2
3-Apr-19	1437	21.2	14.0	5.8	8.2	14.0	0.00133	9.7	9.6

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Atterberg Limits/ Identification of Fines



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-01	---	---	---	ML
SDW-02	---	---	---	ML
SDW-03	---	---	---	ML
SDW-04	---	---	---	ML
SDW-05	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Data for Description and Identification of Fines (Visual-Manual Procedure)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
<i>Number of drops:</i>			
<i>Pan number:</i>			
<i>Weight of pan plus moist soil (g):</i>			
<i>Weight of pan plus dry soil (g)</i>			
<i>Weight of pan (g):</i>			
<i>Gravimetric moisture content (% g/g):</i>	---	---	---
<i>Liquid Limit:</i>	---		

Plastic Limit

	Trial 1	Trial 2
<i>Pan number:</i>		
<i>Weight of pan plus moist soil (g):</i>		
<i>Weight of pan plus dry soil (g)</i>		
<i>Weight of pan (g):</i>		
<i>Gravimetric moisture content (% g/g):</i>	---	---
<i>Plastic Limit:</i>	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Proctor Compaction



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-01	11.2	1.87	---	---
SDW-02	11.9	1.89	---	---
SDW-03	11.1	1.85	---	---
SDW-04	12.3	1.90	---	---
SDW-05	12.1	1.88	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
Job Number: DB18.1209.00 Mass of coarse material (g): 0.10
Sample Number: SDW-01 Mass of fines material (g): 99.90
Project Name: Sundance West Mold weight (g): 4196
Depth: NA Mold volume (cm³): 941.92
Test Date: 1-Apr-19 Compaction Method: Standard A
Preparation Method: Dry
As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6014	1116.90	1059.92	290.36	1.80	7.40
2	6100	1290.73	1205.81	293.31	1.85	9.31
3	6161	1128.63	1043.66	291.75	1.87	11.30
4	6148	1296.39	1177.82	283.44	1.83	13.26
5	6109	1261.63	1129.26	283.93	1.76	15.66

Soil Fractions

Coarse Fraction (% g/g): 0.1
Fines Fraction (% g/g): 99.9

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

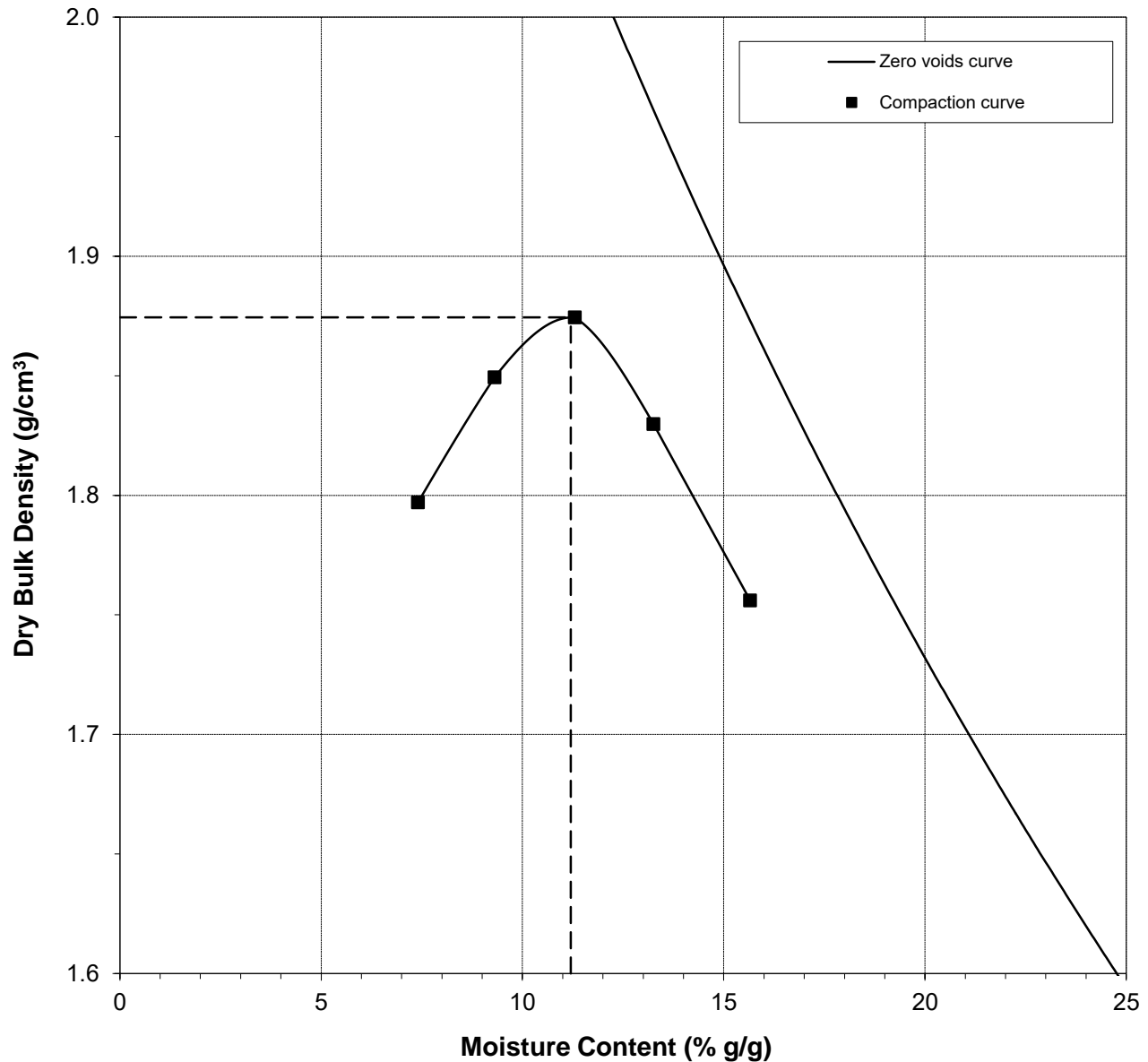


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-01

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.2	---
Maximum Dry Bulk Density (g/cm ³):	1.87	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.45
<i>Sample Number:</i> SDW-02	<i>Mass of fines material (g):</i> 99.55
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 1-Apr-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6021	1147.72	1083.43	288.54	1.79	8.09
2	6111	1134.23	1058.07	284.25	1.85	9.84
3	6191	1164.23	1070.96	282.87	1.89	11.83
4	6190	1127.19	1024.97	294.39	1.86	13.99
5	6128	1141.47	1025.52	289.23	1.77	15.75

Soil Fractions
Coarse Fraction (% g/g): 0.4
Fines Fraction (% g/g): 99.6

Properties of Coarse Material
Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Overflow Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Overflow correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

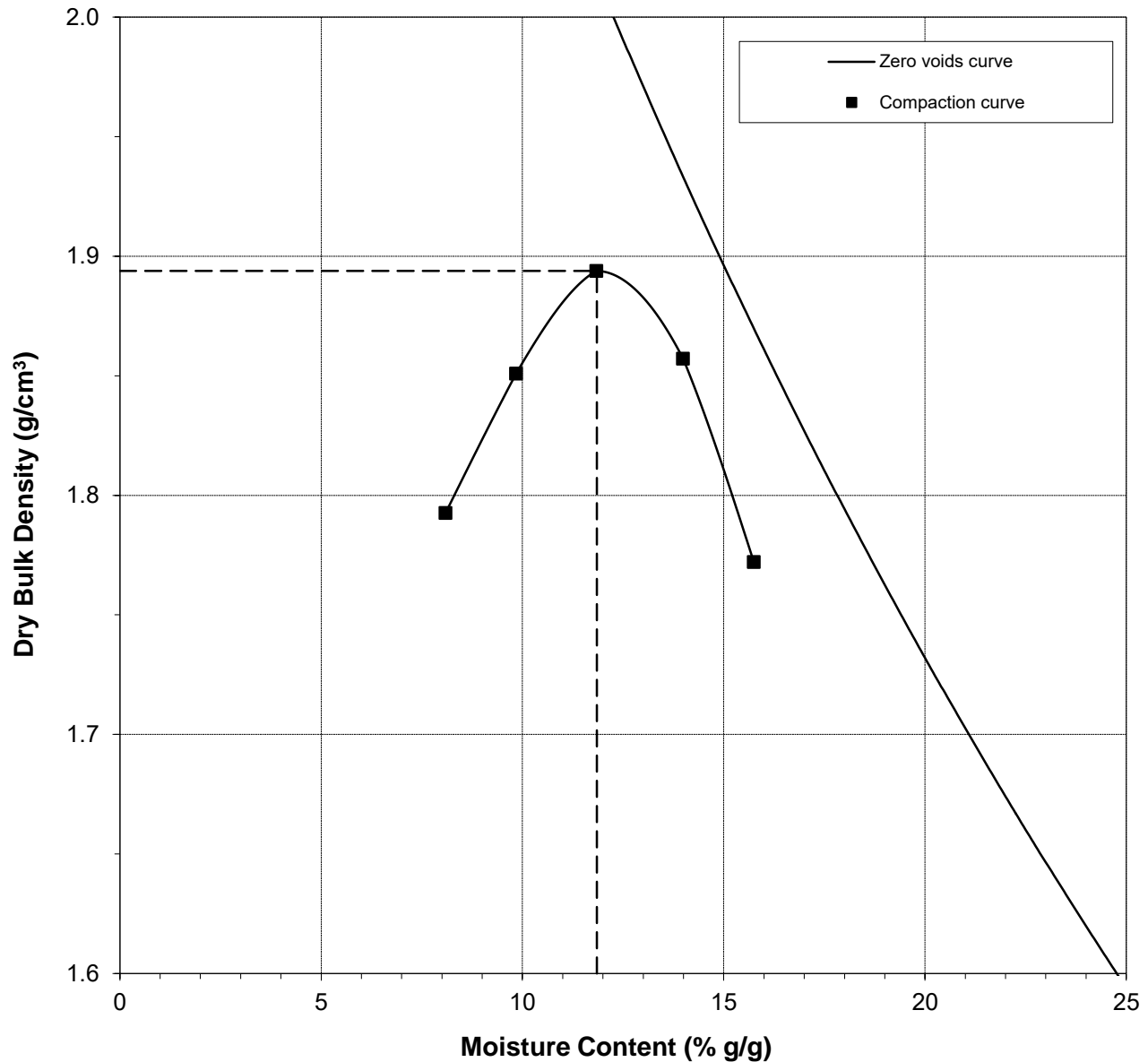


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-02

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.9	---
Maximum Dry Bulk Density (g/cm ³):	1.89	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.06
<i>Sample Number:</i> SDW-03	<i>Mass of fines material (g):</i> 99.94
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 1-Apr-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6030	1163.19	1103.13	284.74	1.81	7.34
2	6089	1212.63	1132.76	282.17	1.84	9.39
3	6137	1249.05	1149.30	267.88	1.85	11.32
4	6116	1360.27	1236.03	294.95	1.80	13.20
5	6083	1275.24	1145.21	286.72	1.74	15.15

Soil Fractions
Coarse Fraction (% g/g): 0.1
Fines Fraction (% g/g): 99.9

Properties of Coarse Material
Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Oversize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



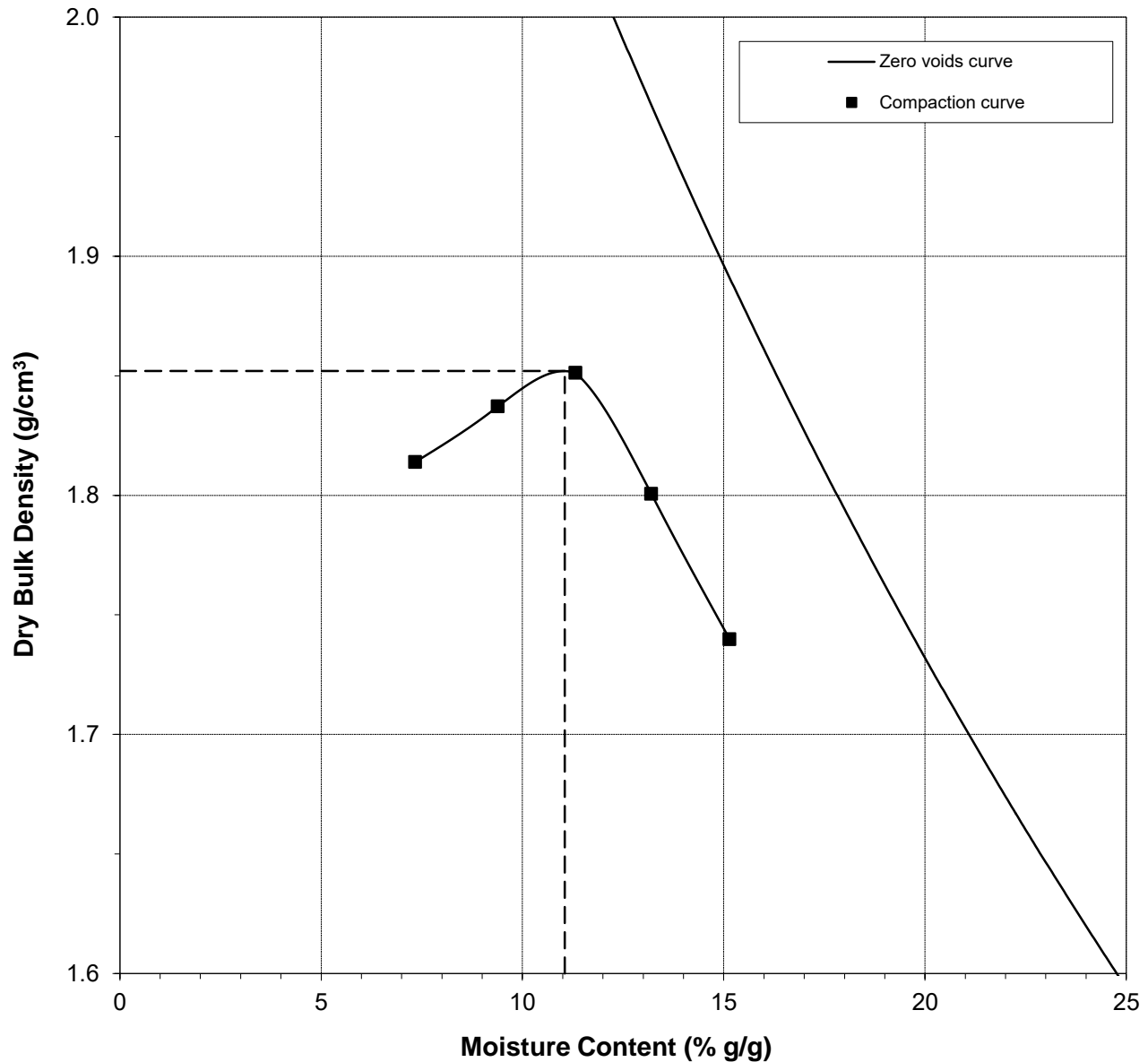
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-03

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.1	---
Maximum Dry Bulk Density (g/cm ³):	1.85	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.34
<i>Sample Number:</i> SDW-04	<i>Mass of fines material (g):</i> 99.66
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 29-Mar-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	5928	1071.31	1024.48	268.45	1.73	6.19
2	6034	1120.60	1058.86	296.81	1.81	8.10
3	6131	1072.20	997.17	267.20	1.86	10.28
4	6203	1011.25	931.45	282.81	1.90	12.30
5	6175	1151.81	1039.45	269.70	1.83	14.60
6	6018	1164.00	1032.82	300.01	1.64	17.90

Soil Fractions

Coarse Fraction (% g/g): 0.3
Fines Fraction (% g/g): 99.7

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Upsize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---
6	---	---

--- = Upsize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



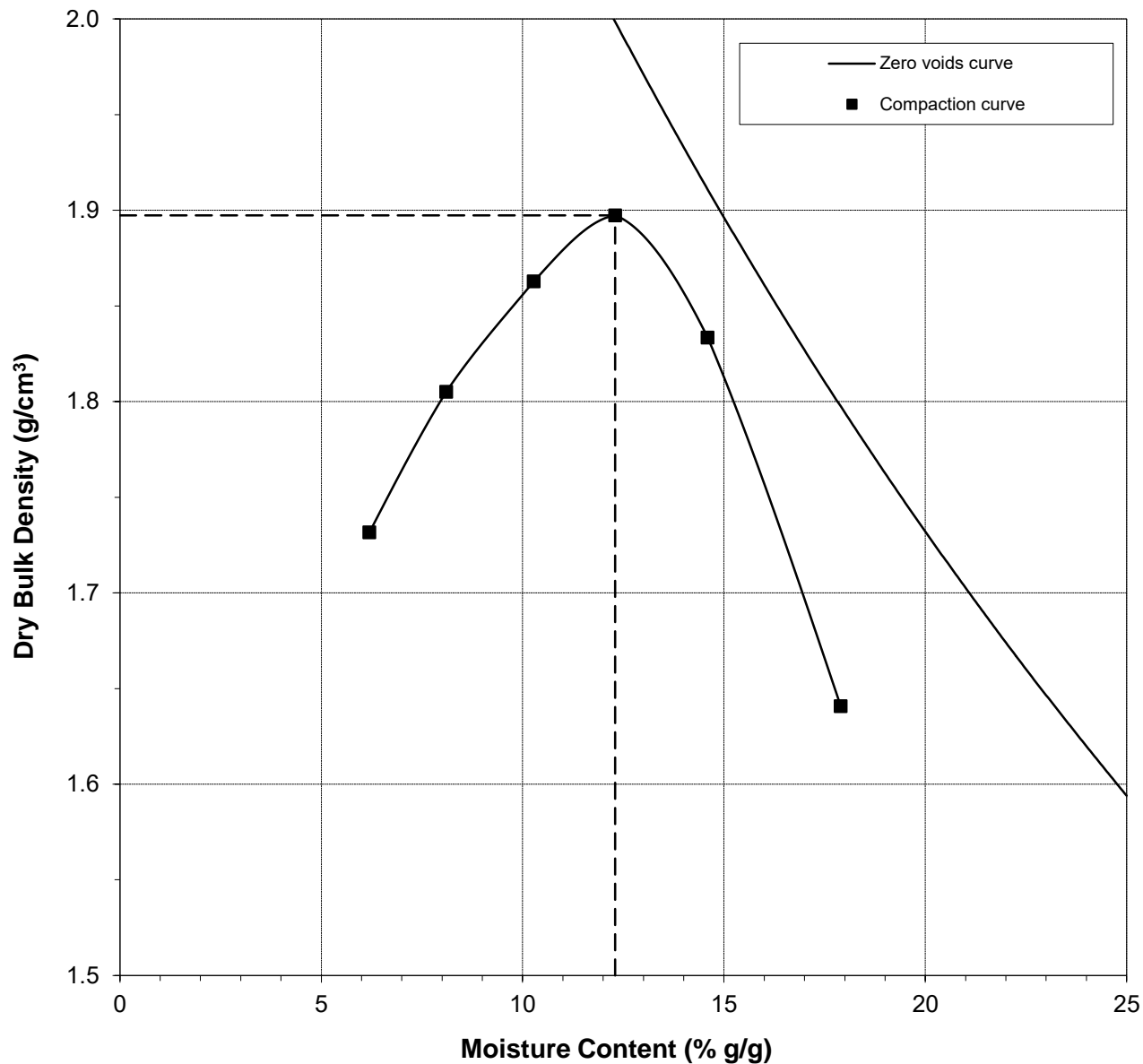
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-04

	Measured	Corrected
Optimum Moisture Content (% g/g):	12.3	---
Maximum Dry Bulk Density (g/cm ³):	1.90	---

Test Date: 29-Mar-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.25
<i>Sample Number:</i> SDW-05	<i>Mass of fines material (g):</i> 99.75
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 1-Apr-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6027	1041.27	985.85	291.69	1.80	7.98
2	6119	1082.17	1010.79	297.93	1.86	10.01
3	6186	1155.04	1061.07	283.68	1.88	12.09
4	6180	1261.77	1139.77	284.58	1.84	14.27
5	6100	1101.09	989.69	293.65	1.74	16.00

Soil Fractions
Coarse Fraction (% g/g): 0.2
Fines Fraction (% g/g): 99.8

Properties of Coarse Material
Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

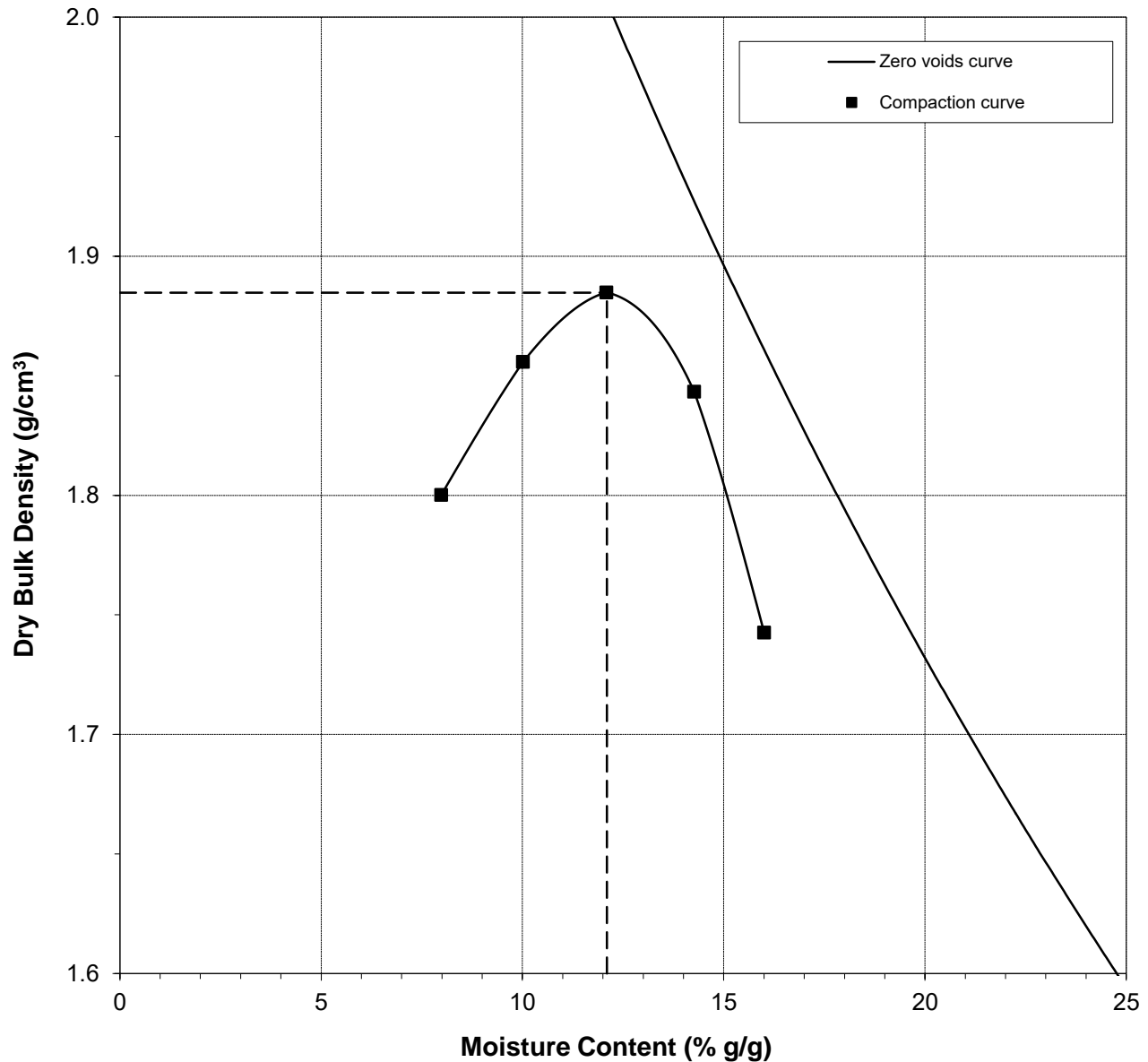


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-05

	Measured	Corrected
Optimum Moisture Content (% g/g):	12.1	---
Maximum Dry Bulk Density (g/cm ³):	1.88	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines

Laboratory Tests and Methods



Tests and Methods

Particle Size Analysis:	ASTM D7928, ASTM D6913
USCS (ASTM) Classification:	ASTM D7928, ASTM D6913, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488
Standard Proctor Compaction:	ASTM D698

Appendix C2

DBS&A Field Compaction Log

Appendix C2. Field Compaction Test Results

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
3/27/2019	1	111.5	103.3	91.1	7.5	111.0	32.443730	-103.0945820	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	2	111.5	112.8	101.2	9.9	124.0	32.443733	-103.0946280	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	3	111.5	110.8	99.4	9.1	120.8	32.443795	-103.0947610	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	4	111.5	108.5	97.4	7.2	116.4	32.443905	-103.0946890	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	5	111.5	115.1	103.3	5.9	121.9	32.443957	-103.0946200	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	6	111.5	114.4	102.6	9.0	124.7	32.443993	-103.0945480	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	7	111.5	113.9	102.2	6.8	121.7	32.444115	-103.0944940	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	8	111.5	112.0	100.5	5.2	117.9	32.444164	-103.0945810	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	B-01	111.5	106.3	95.3	5.8	112.4	32.444351	-103.0946310	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	B-02	111.5	103.6	92.9	7.8	111.7	32.444418	-103.0948750	Preliminary subgrade measurement	M. Zbrozek
3/27/2019	B-03	111.5	109.9	98.5	12.4	123.5	32.444461	-103.0943900	Preliminary subgrade measurement	M. Zbrozek
3/28/2019	B-1	111.5	107.4	96.3	6.8	114.7	32.444359	-103.0949330	Preliminary subgrade measurement	M. Zbrozek
3/28/2019	B-2	111.5	108.8	97.6	10.8	120.5	32.444406	-103.0945850	Preliminary subgrade measurement	M. Zbrozek
3/28/2019	B-3	111.5	113.2	101.5	11.9	126.6	32.444407	-103.0940840	Preliminary subgrade measurement	M. Zbrozek
4/2/2019	B-1	111.5	114.7	102.9	7.0	122.7	32.444368	-103.0943600	Preliminary subgrade measurement	C. Stearnes
4/2/2019	B-2	111.5	109.2	97.9	4.5	114.2	32.444290	-103.0948970	Preliminary subgrade measurement	C. Stearnes
4/2/2019	C-1	111.5	109.1	97.9	5.0	114.6	32.444148	-103.0945930	Preliminary subgrade measurement	C. Stearnes
4/2/2019	C-2	111.5	121.6	109.0	6.2	129.1	32.444038	-103.0946060	Preliminary subgrade measurement	C. Stearnes
4/2/2019	D-1	111.5	112.1	100.5	5.6	118.4	32.443746	-103.0945660	Preliminary subgrade measurement	C. Stearnes
4/2/2019	D-2	111.5	110.7	99.3	4.7	115.8	32.443830	-103.0946810	Preliminary subgrade measurement	C. Stearnes
4/25/2019	C-1	117.3	112.0	94.7	5.6	118.3	32.4437905	-103.04304440	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	C-2	117.3	111.0	93.8	5.3	116.9	32.4438253	-103.09460828	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	C-3	117.3	107.7	91.1	5.3	113.4	32.4437968	-103.09495194	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	C-4	117.3	105.5	89.2	4.6	110.4	32.4441205	-103.09491523	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	C-5	117.3	112.4	95.0	5.6	118.7	32.4440619	-103.09459101	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	C-6	117.3	108.8	92.0	5.7	115.0	32.4440375	-103.09427074	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	B-1	117.3	110.0	93.0	7.8	118.6	32.4443114	-103.09509024	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	B-2	117.3	108.9	92.1	8.6	118.2	32.4443209	-103.09475739	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	B-3	117.3	113.7	96.1	9.1	124.1	32.4443197	-103.09475739	Preliminary subgrade measurement	J. Fisher/O. Ruiz
4/25/2019	B-4	117.3	109.1	92.2	6.0	115.7	32.4443444	-103.09410235	Preliminary subgrade measurement	J. Fisher/O. Ruiz
5/1/2019	B-1	117.3	105.9	89.5	6.3	112.5	--	--	Preliminary subgrade measurement	M. Zbrozek
5/1/2019	B-2	117.3	112.1	94.8	6.1	119.0	--	--	Preliminary subgrade measurement	M. Zbrozek
5/1/2019	B-3	117.3	110.9	93.8	7.3	119.0	--	--	Preliminary subgrade measurement	M. Zbrozek
5/1/2019	C-1	117.3	117.1	99.0	7.6	125.9	--	--	Preliminary subgrade measurement	M. Zbrozek
5/1/2019	C-2	117.3	114.6	96.8	7.3	123.0	--	--	Preliminary subgrade measurement	M. Zbrozek
5/6/2019	CDT-01	117.3	110.7	93.6	6.8	118.3	32.443743	-103.09480000	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-02	117.3	109.2	93.1	5.7	115.4	32.443789	-103.09454000	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-03	117.3	112.7	96.1	5.5	118.9	32.443780	-103.09441800	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-04	117.3	112.2	95.7	6.6	119.7	32.443877	-103.09455200	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-05	117.3	119.1	101.6	5.9	126.2	32.443991	-103.09439900	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-06	117.3	119.1	101.6	6.1	126.4	32.444003	-103.09455900	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-07	117.3	119.4	101.8	7.1	127.8	32.443999	-103.09470000	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-08	117.3	110.1	93.8	6.7	117.4	32.443992	-103.09485500	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	BDT-09	117.3	116.5	99.4	10.0	128.1	32.444346	-103.09510300	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek

Appendix C2. Field Compaction Test Results

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
5/6/2019	BDT-10	117.3	116.0	98.9	8.9	126.4	32.444487	-103.09504100	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	BDT-11	117.3	112.7	96.1	9.2	123.0	32.444504	-103.0945550	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	BDT-12	117.3	114.3	97.5	8.2	123.7	32.444508	-103.0941180	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	BDT-13	117.3	114.1	97.3	6.9	122.0	32.444321	-103.0941250	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	BDT-14	117.3	116.6	99.4	6.1	123.6	32.444323	-103.0945820	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-15	117.3	114.3	97.4	5.7	120.8	32.444128	-103.0944720	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-16	117.3	111.7	95.2	5.5	117.8	32.444091	-103.0947200	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-17	117.3	109.6	93.4	3.8	113.7	32.443922	-103.0942640	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-01R	117.3	113.8	97.0	6.4	121.1	32.443743	-103.0948000	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek
5/6/2019	CDT-02R	117.3	111.4	94.9	5.7	117.7	32.443789	-103.0945400	Prelinary subgrade measurement C-Area	O. Ruiz/M. Zbrozek

5/15/2019	ADT-01	117.3	115.5	98.4	9.4	120.3	32.443375	-103.0937700	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-02	117.3	110.9	94.6	9.0	120.0	32.443353	-103.0934040	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-03	117.3	110.6	94.3	7.0	118.4	32.443354	-103.0930540	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-04	117.3	115.5	98.5	7.2	123.9	32.443377	-103.0927030	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-05	117.3	110.2	93.9	7.7	118.6	32.443643	-103.0927150	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-06	117.3	107.8	91.9	5.9	114.1	32.443645	-103.0930260	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-07	117.3	110.6	94.3	8.7	120.2	32.443683	-103.0934020	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-08	117.3	117.8	100.4	8.5	127.8	32.443704	-103.0936940	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-09	117.3	108.6	92.6	6.7	115.8	32.443975	-103.0937150	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-10	117.3	111.0	94.6	8.3	120.3	32.443963	-103.0933970	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-11	117.3	106.8	91.9	5.4	112.6	32.443989	-103.0931010	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-12	117.3	106.9	91.1	6.8	114.2	32.443989	-103.0927810	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-13	117.3	103.5	88.3	17.8	122.0	32.444308	-103.0927670	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-14	117.3	108.2	92.3	7.0	115.8	32.444329	-103.0931250	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-15	117.3	112.6	96.0	7.5	121.1	32.444405	-103.0934160	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-16	117.3	117.3	100.0	7.8	126.4	32.444398	-103.0937020	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-17	117.3	113.6	96.8	8.2	122.9	32.443704	-103.0936940	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-18	117.3	109.2	93.1	11.8	122.1	32.443377	-103.0927030	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-19	117.3	108.8	92.7	10.5	120.2	32.443580	-103.0932100	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins
5/15/2019	ADT-20	117.3	106.9	91.2	6.8	114.3	32.443850	-103.0931900	Prelinary subgrade measurement	M. Zbrozek/T. Hopkins

5/24/2019	ADT-01R	117.3	111.1	94.7	6.1	117.8	32.443375	-103.0937700	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-02R	117.3	115.2	98.2	7.3	123.6	32.443353	-103.0934040	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-03R	117.3	120.9	103.1	6.6	128.9	32.443354	-103.0930540	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-04R	117.3	114.0	97.2	5.4	120.2	32.443377	-103.0927030	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-05R	117.3	111.5	95.0	5.5	117.6	32.443643	-103.0927150	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-06R	117.3	113.5	96.8	10.3	125.2	32.443645	-103.0930260	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-07R	117.3	112.5	95.9	6.9	120.3	32.443683	-103.0934020	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-08R	117.3	113.6	96.8	6.7	121.2	32.443704	-103.0936940	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-09R	117.3	113.0	96.3	7.5	121.5	32.443975	-103.0937150	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-10R	117.3	117.8	100.4	6.0	124.8	32.443963	-103.0933970	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-11R	117.3	112.6	96.0	5.1	118.4	32.443989	-103.0931010	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-12R	117.3	112.0	95.5	5.3	117.9	32.443989	-103.0927810	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-13R	117.3	115.7	98.6	6.4	123.1	32.444308	-103.0927670	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher
5/24/2019	ADT-14R	117.3	116.6	99.4	7.3	125.1	32.444329	-103.0931250	Preliminary subgrade measurement A-Are	M. Zbrozek/J. Fisher

Appendix C2. Field Compaction Test Results

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
5/24/2019	ADT-15R	117.3	106.3	100.3	7.4	126.3	32.444405	-103.0934160	Preliminary subgrade measurement A-Area	M. Zbrozek/J. Fisher
5/24/2019	ADT-16R	117.3	119.2	101.6	7.8	128.5	32.444398	-103.0937020	Preliminary subgrade measurement A-Area	M. Zbrozek/J. Fisher
6/11/2019	PC-C1	117.3	108.7	92.7	6.5	115.8	32.44393	-103.0947000	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/11/2019	PC-C2	117.3	101.0	86.1	4.7	105.7	32.44397	-103.0945900	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/11/2019	PC-C3	117.3	100.3	85.5	4.4	104.7	32.44400	-103.0944700	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/12/2019	CSAT-1	117.3	109.6	93.4	5.5	110.7	32.443710	103.0949000	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CSAT-2	117.3	108.8	92.7	6.6	116.0	32.443710	103.0945500	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CSAT-3	117.3	105.6	90.0	5.6	111.5	32.443790	103.0942600	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CEAT-1	117.3	83.0	70.8	5.2	87.3	32.443890	103.0941500	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CEAT-2	117.3	102.7	87.5	4.0	106.8	32.443890	103.0941500	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BNAT-1	117.3	110.9	94.6	7.6	119.4	32.444070	103.0941400	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BNAT-2	117.3	115.9	98.8	5.7	122.5	32.444560	103.0945800	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BNAT-3	117.3	107.2	91.4	9.4	117.3	32.444580	103.0950900	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BWAT-1	117.3	107.2	91.4	6.0	113.6	32.444540	103.0952900	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BWAT-2	117.3	110.0	93.8	7.4	118.2	32.444250	103.0952600	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BSAT-1	117.3	107.1	91.3	7.4	115.0	32.444130	103.0951800	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	BSAT-2	117.3	103.0	85.5	5.1	105.4	32.444130	103.0949900	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CWAT-1	117.3	107.2	91.4	8.0	115.8	32.444050	103.0949500	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/12/2019	CWAT-2	117.3	101.6	86.6	6.4	108.2	32.443830	103.0949800	Anchor Trench Compaction	O. Ruiz/J. Fisher
6/13/2019	BPC-1	117.3	112.0	95.5	3.7	116.2	32.444470	103.0945700	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-2	117.3	99.7	85.0	4.9	104.6	32.444490	103.0949000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-3	117.3	108.6	92.6	5.9	114.5	32.444300	103.0949000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-4	117.3	109.0	92.9	9.5	119.4	32.444300	103.0951200	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-5	117.3	106.2	90.6	6.8	115.4	32.444490	103.0951000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-6	117.3	106.9	91.1	6.4	113.7	32.444520	103.0942200	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-7	117.3	108.8	92.8	11.8	121.7	32.444290	103.0942000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-8	117.3	110.7	94.4	4.3	115.5	32.444260	103.0940400	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-9	117.3	109.9	93.7	5.3	115.7	32.444500	103.0940500	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/14/2019	BPC-11	117.3	98.7	84.2	3.9	102.6	32.444160	103.0951200	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-1	117.3	102.3	87.2	4.5	106.9	32.444050	103.0948600	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-2	117.3	110.2	93.9	6.2	117.0	32.444120	103.0946800	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-3	117.3	109.9	93.7	5.7	110.2	32.444130	103.0943900	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-4	117.3	112.3	95.7	5.9	118.9	32.444010	103.0942700	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-5	117.3	107.0	91.3	5.6	113.1	32.443890	103.0943100	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-6	117.3	103.0	87.8	6.4	109.6	32.443810	103.0944400	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-7	117.3	109.4	93.3	5.2	115.1	32.443820	103.0947000	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/17/2019	B-1	117.3	106.1	90.5	5.7	112.2	32.444383	-103.0949333	NAD 83 - Preliminary PSL	T. Hopkins
6/17/2019	B-2	117.3	108.4	92.4	4.3	113.0	32.444383	-103.0949333	East Area B	T. Hopkins
6/17/2019	B-3	117.3	109.5	93.4	6.0	116.1	32.444550	-103.0943333		T. Hopkins
6/17/2019	C-1	117.3	115.1	98.2	8.6	125.0	32.444017	-103.0945333		T. Hopkins
6/17/2019	C-2	117.3	113.2	96.5	7.8	122.0	32.443917	-103.0946000		T. Hopkins

Appendix C2. Field Compaction Test Results

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
6/18/2019	C-3	117.3	111.1	94.7	10.4	122.7	32.443933	-103.0945667	In sump on pad, east Area B	T. Hopkins
6/18/2019	C-4	117.3	107.3	91.5	5.1	112.8	32.443950	-103.0945833	In sump on pad, east Area B	T. Hopkins
6/18/2019	B-4	117.3	112.4	95.8	7.0	120.3	32.444450	-103.0943167		T. Hopkins
6/18/2019	B-5	117.3	109.2	93.1	6.0	115.7	32.444417	-103.0947667		T. Hopkins
6/18/2019	B-6	117.3	108.1	92.1	5.8	114.3	32.444467	-103.0948667	West Area B	T. Hopkins
6/18/2019	B-7	117.3	104.6	89.2	11.1	116.2	32.444333	-103.0941333	East Area B	T. Hopkins
6/18/2019	B-8	117.3	112.0	95.5	9.2	122.3	32.444300	-103.0941333	East Area B	T. Hopkins
6/18/2019	B-9	117.3	110.5	94.2	12.0	123.8	32.444350	-103.0943333		T. Hopkins
6/20/2019	B-10	117.3	111.1	94.7	7.1	119.0	32.444400	-103.0943670	East Area B	T. Hopkins
6/20/2019	B-11	117.3	107.8	91.9	8.5	116.9	32.444300	-103.0940500	East Area B	T. Hopkins
6/20/2019	B-12	117.3	105.9	90.3	5.2	111.4	32.444550	-103.0941000	East Area B	T. Hopkins
6/20/2019	B-13	117.3	106.7	91.0	4.6	111.6	32.444000	-103.0942500	East Area B	T. Hopkins
6/20/2019	C-5	117.3	106.6	90.8	6.8	113.8	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-6	117.3	102.0	87.0	5.4	107.5	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-7	117.3	109.2	93.1	8.9	119.0	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-8	117.3	104.5	89.1	7.1	111.9	32.444017	-103.0946330	8-inch sump	T. Hopkins
6/20/2019	C-9	117.3	107.2	91.4	6.2	113.9	26.641000	-103.0946500	8-inch sump	T. Hopkins
6/20/2019	C-10	117.3	111.4	95.0	9.5	122.0	32.444033	-103.0946000		T. Hopkins
6/20/2019	C-11	117.3	109.2	93.1	7.3	117.2	32.443967	-103.0944830		T. Hopkins
6/20/2019	C-12	117.3	109.8	93.6	8.9	119.5	32.443983	-103.0944830		T. Hopkins
6/20/2019	C-13	117.3	111.1	94.8	9.1	121.2	32.443983	-103.0944830		T. Hopkins
6/20/2019	C-14	117.3	109.3	93.2	8.4	118.5	32.443983	-103.0944830	5 over	T. Hopkins
6/20/2019	C-15	117.3	112.1	95.6	7.0	119.9	32.443950	-103.0945000		T. Hopkins
6/20/2019	C-16	117.3	113.2	96.5	11.0	125.6	32.444050	-103.0946330		T. Hopkins
6/20/2019	B-14	117.3	108.6	92.6	7.3	116.5	32.444333	-103.0950330	West Area B	T. Hopkins
6/20/2019	B-15	117.3	104.8	89.3	11.3	116.6	32.444517	-103.0947500	West Area B	T. Hopkins
6/20/2019	B-16	117.3	113.5	96.3	7.7	122.3	32.444330	103.0951000		T. Hopkins
6/20/2019	B-17	117.3	109.2	93.1	4.4	114.0	32.444470	103.0951200		T. Hopkins
6/20/2019	B-18	117.3	109.7	93.5	8.2	118.7	32.444450	103.0949600		T. Hopkins
6/20/2019	B-19	117.3	109.3	93.1	12.5	123.0	32.444310	103.0949200		T. Hopkins
6/20/2019	B-20	117.3	112.1	95.6	10.9	124.4	32.444310	109.0947500		T. Hopkins
6/20/2019	B-21	117.3	112.7	96.1	8.7	122.5	32.444480	103.0947000		T. Hopkins
6/20/2019	B-19R	117.3	113.9	97.1	8.6	123.8	32.444470	103.0951200		T. Hopkins
6/20/2019	B-18R	117.3	112.1	95.6	7.8	120.8	32.444450	103.0949600		T. Hopkins
6/20/2019	B-17R	117.3	113.1	96.4	7.4	121.5	32.444310	103.0949200		T. Hopkins
6/20/2019	B-23	117.3	105.5	90.0	12.5	118.8	32.444490	103.0946800	Final grade	T. Hopkins
6/20/2019	B-24	117.3	102.9	87.7	10.0	113.2	32.444310	103.0947200	Final grade	T. Hopkins
6/20/2019	B-25	117.3	107.9	91.9	11.1	119.8	32.444310	103.0948900	Final grade	T. Hopkins
6/20/2019	B-26	117.3	109.1	93.0	10.9	121.0	32.444450	103.0948800	Final grade	T. Hopkins
6/20/2019	B-27	117.3	111.1	94.7	10.8	123.0	32.444450	103.0950900	Final grade	T. Hopkins
6/20/2019	B-28	117.3	116.3	99.2	7.8	125.5	32.444310	103.0951000	Final grade	T. Hopkins
6/20/2019	B-23	117.3	111.3	94.9	9.8	122.2	32.444490	103.0946800	Retest	T. Hopkins
6/20/2019	B-24	117.3	111.2	94.8	8.9	121.1	32.444310	103.0947200	Retest	T. Hopkins
6/20/2019	B-25	117.3		90.7	7.8		32.444310	103.0948900	Retest	T. Hopkins
6/20/2019	B-26	117.3	111.2	94.8	11.3	123.8	32.444450	103.0948800	Retest	T. Hopkins
6/20/2019	B-27	117.3	113.5	96.7	7.2	121.6	32.444450	103.0950900	Retest	T. Hopkins

Appendix C2. Field Compaction Test Results

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
8/22/2019	D-1	117.3	111.5	95.1	7.2	119.6	32.443740	-103.0947800	Subgrade measurement D-Area	J. Fisher
8/22/2019	D-2	117.3	105.8	90.2	8.5	114.8	32.443760	-103.0945200	Subgrade measurement D-Area	J. Fisher
8/22/2019	D-3	117.3	108.2	92.2	6.7	115.4	32.443840	-103.0943600	Subgrade measurement D-Area	J. Fisher
8/22/2019	D-4	117.3	108.1	92.2	9.2	118.1	32.443840	-103.0946800	Subgrade measurement D-Area	J. Fisher
8/24/2019	A-1	115.09	106.8	92.8	6.2	113.4	32.443310	-103.0932100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-2	115.09	111.4	96.7	8.2	120.5	32.443580	-103.0932100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-3	115.09	112.0	97.3	7.1	120.0	32.443850	-103.0931900	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-4	115.09	113.4	98.5	8.4	122.9	32.443860	-103.0929100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-5	115.09	115.4	100.3	8.1	124.8	32.443570	-103.0929000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-6	115.09	109.3	94.9	8.2	118.2	32.443310	-103.0929000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-7	115.09	106.1	92.2	8.8	115.4	32.443330	-103.0927000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-8	115.09	114.8	99.7	7.9	123.9	32.443610	-103.0926600	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-9	115.09	107.7	93.6	9.3	117.7	32.443900	-103.0926600	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
9/17/2019	A-10	115.09	110.4	116.8	5.8	95.9	32.443330	-103.0937000	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-11	115.09	110.4	115.4	4.6	95.9	32.443310	-103.0934700	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-12	115.09	108.8	113.1	4.0	94.5	32.443310	-103.0933200	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-13	115.09	144.5	121.9	6.4	99.5	32.443630	-103.0933300	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-14	115.09	110.0	110.5	5.8	95.6	32.443680	-103.0936300	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-15	115.09	105.9	112.1	5.8	92.0	32.443660	-103.0938600	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-16	115.09	115.1	125.6	9.1	100.0	32.444090	-103.0933700	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-17	115.09	116.0	124.7	7.5	100.8	32.444090	-103.0936200	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-18	115.09	114.7	122.5	6.7	99.8	32.444090	-103.093770	PSL Measurement - SW A-Area approval	O. Ruiz
11/5/2019	115A-1	115.09	117.6	102.2	6.9	124.6	32.444368	103.0921700	WGS 84 - PSL Measurement	M. Zbrozek
11/5/2019	115A-2	115.09	112.0	97.3	7.2	120.1	32.444282	103.0928920	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-3	115.09	113.3	98.5	6.0	120.2	32.444479	103.0929540	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-4	115.09	118.0	102.6	6.8	126.1	32.444388	103.0931180	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-5	115.09	113.4	98.5	5.6	119.8	32.444486	103.0932700	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-6	115.09	112.3	97.5	4.8	117.7	32.444307	103.0932740	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-7	115.09	119.7	103.7	6.4	126.9	32.444364	103.0934270	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-8	115.09	109.3	94.9	4.7	113.5	32.444507	103.0935750	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-9	115.09	112.2	97.5	7.5	120.6	32.444337	103.0937190	PSL Measurement - A-Area approval	M. Zbrozek

Appendix C3

Beyond Engineering Density Measurements



www.BeyondET.com
3011-B South County Road 1260
Midland, Texas 79706
432.561.5780

TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: A. Davila

DATE AND TIME: February 20, 2019
REPORT NO.: 902054.0220.3099A
PDF ID: 0220.3099A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Red brown poorly graded sand w/ silt	<u>From NW corner of road</u>				
	6' E and 35' S	123.9	10.6	112.0	98.8
	6' E and 85' S	124.4	13.2	109.9	96.9
	6' E and 150' S	120.2	10.6	108.7	95.8
SPECIFICATIONS					
Minimum Density Requirement 95%					
Moisture Requirement +/-2%	AREA: First lift of fill on road to mud station				
GAUGE NO.: 1540		DENSITY STANDARD: 2089			
MODEL NO.: Instrotek 3500		MOISTURE STANDARD: 761			
TRANSMISSION: Method A		DEPTH, INCHES: 6			

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-399

MAXIMUM DENSITY (pcf): 113.4
OPTIMUM MOISTURE (%): 11.2

COPIES TO: 1- Above

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Quality Review

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: J. Diego Garcia

DATE AND TIME: March 8, 2019
REPORT NO.: 902054.0308.3582A
PDF ID: 0308.3582A-SOL

COMPACTION TEST					
TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish brown pourly graded	<u>From NW corner, of North mud plant wall</u>				
	10' E and 35' N	125.4	11.9	112.1	98.8
	15' E and 80' N	127.8	11.3	114.8	101.3
SPECIFICATIONS					
Minimum Density Requirement 95%					
Moisture Requirement +/-2%	AREA: Second lift of fill on NW entrance ramp for Mud plant				
GAUGE NO.: 3495		DENSITY STANDARD:		2710	
MODEL NO.: Instron 3500		MOISTURE STANDARD:		740	
TRANSMISSION: Method A		DEPTH, INCHES:		8	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-399

MAXIMUM DENSITY (pcf): 113.4
OPTIMUM MOISTURE (%): 11.2

COPIES TO: 1- Above

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3011-B South County Road 1260
Midland, Texas 79706
432.561.5780

TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: J. Diego Garcia

DATE AND TIME: March 15, 2019
REPORT NO.: 902054.0315.3672A
PDF ID: 0315.3672A-SOL

COMPACTION TEST					
TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish brown pourly graded sand w/ silt	<u>North driveway; Entrance ramp</u>				
	20' E	120.9	10.6	109.3	96.4
	275' E	115.0	6.4	108.1	95.3
	East entrance ramp; Middle height	134.4	10.9	121.2	106.9
SPECIFICATIONS					
Minimum Density Requirement 95%					
Moisture Requirement +/-2%	AREA: Third lift of fill on north driveway/east entrance ramp (mud facility)				
GAUGE NO.: 3495		DENSITY STANDARD: 2705			
MODEL NO.: Instrotek 3500		MOISTURE STANDARD: 741			
TRANSMISSION: Method A		DEPTH, INCHES: 8			

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-399

MAXIMUM DENSITY (pcf): 113.4
OPTIMUM MOISTURE (%): 11.2

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: A. Sonza

DATE AND TIME: March 22, 2019
REPORT NO.: 902054.0322.3813A
PDF ID: 0322.3813A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	Sump; 15' S and 15' W from NE corner	124.2	12.2	110.7	99.3
	Sump; 15' S and 15' E from NW corner	128.0	9.5	116.9	104.8
	Center of containment	119.6	6.6	112.2	100.6
	18% slope; Middle third	116.1	5.9	109.6	98.3
SPECIFICATIONS	Flume; Middle	119.1	5.9	112.5	100.9
	AREA: Subgrade on sump, center of containment, 18% slope and flume				
Minimum Density Requirement 95%					
Moisture Requirement +/-2%					
GAUGE NO.: 1540		DENSITY STANDARD:		2103	
MODEL NO.: Instron 3500		MOISTURE STANDARD:		763	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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Midland, Texas 79706
432.561.5780

TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: D. Gandara

DATE AND TIME: March 28, 2019
REPORT NO.: 902054.0328.3926A
PDF ID: 0328.3926A-SOL

COMPACTION TEST					
TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Red brown fully graded sand w/ fill	<u>From NE corner</u>				
	55' S and 70' W	119.4	10.4	108.2	95.4
	55' S and 140' W	123.5	11.6	110.7	97.6
	55' S and 240' W	120.4	10.0	109.5	96.5
SPECIFICATIONS Minimum Density Requirement 95% Moisture Requirement +/-2%					
	AREA: Subgrade on mud out area B; 380 x 110				
GAUGE NO.: 3492		DENSITY STANDARD:		2742	
MODEL NO.: Instrotek 3500		MOISTURE STANDARD:		968	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-399

MAXIMUM DENSITY (pcf): 113.4
OPTIMUM MOISTURE (%): 11.2

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PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT MANAGER: Ruben Perez
TECHNICIAN: J. Waid

DATE AND TIME: May 13, 2019
REPORT NO.: 902054.0513.4535A
PDF ID: 0513.4535A-SOL

MDC DETERMINED IN ACCORDANCE WITH:	D-698	MAXIMUM DENSITY (pcf):	111.5
MD CURVE REFERENCE:	S-171	OPTIMUM MOISTURE (%):	12.8

Beyond Engineering and Testing, LLC

Quality Review

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Appendix D

GCL Certifications

Appendix D1

GCL Manufacturer Certifications



BentoLiner Manufacturing Certification

Sales Order: 86654
Customer: Falcon Environmental Lining Systems, Inc.
Project: Falcon - Sundance - Onyx
Product Type: BLI-075-06N-06W-D-30 BentoLiner NWL

The GCL purchased and shipped for the above referenced project does meet or exceed the project specifications.

The GCL supplied to this project has been continuously inspected for the presence of needles and is certified to be needle free.

Chuck Taylor
Laboratory Technician



Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Conformance: 1/100,000sf, min 1/lot, 1'rw
TRI TX

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502327132	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	Conformance
502327133	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327134	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327135	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327136	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327137	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327138	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327139	BLI-075-06N-06W-D-30	29040209	15.50	130510259	2025902300	1032919C	150.00	
502327140	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327141	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327142	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327143	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327144	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327145	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327146	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902300	1032919C	150.00	
502327147	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902280	1032919C	150.00	
502327148	BLI-075-06N-06W-D-30	29040209	15.50	130510246	2025902280	1032919C	150.00	
502327149	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327150	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327151	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327152	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327153	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327154	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327155	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327157	BLI-075-06N-06W-D-30	29040209	15.50	130510249	2025902280	1032919C	150.00	
502327158	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902280	1032919C	150.00	
502327159	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902280	1032919C	150.00	
502327160	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902280	1032919C	150.00	
502327161	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902280	1032919D	150.00	
502327162	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902280	1032919D	150.00	
502327163	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902262	1032919D	150.00	
502327164	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902262	1032919D	150.00	
502327165	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902262	1032919D	150.00	
502327166	BLI-075-06N-06W-D-30	29040209	15.50	130510245	2025902262	1032919D	150.00	
502327167	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327168	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327169	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327170	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327171	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327172	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327173	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	
502327174	BLI-075-06N-06W-D-30	29040209	15.50	130510200	2025902262	1032919D	150.00	



Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502327175	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025902262	1032919D	150.00	
502327176	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025902262	1032919D	150.00	
502327177	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025902262	1032919D	150.00	
502327178	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327179	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327180	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327181	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327182	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327183	BLI-075-06N-06W-D-30	29040209	15.50	130512072	2025872159	1032919D	150.00	
502327184	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327185	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327186	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327187	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327188	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327189	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327190	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	Conformance
502327191	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1032919D	150.00	
502327192	BLI-075-06N-06W-D-30	29040209	15.50	130510201	2025872159	1033119A	150.00	
502327193	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327194	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327195	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327196	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327197	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327198	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327199	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327200	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327201	BLI-075-06N-06W-D-30	29040209	15.50	130510250	2025902298	1033119A	150.00	
502327202	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327203	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327204	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327205	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327206	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327207	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	150.00	
502327208	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902298	1033119A	136.00	
502327210	BLI-075-06N-06W-D-30	29040209	15.50	130511511	2025902283	1033119A	150.00	
502327211	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327212	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327213	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327214	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327215	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327216	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	
502327217	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00	



Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length
502327218	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00
502327219	BLI-075-06N-06W-D-30	29040209	15.50	130512069	2025902283	1033119A	150.00
502327220	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902283	1033119B	150.00
502327221	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902283	1033119B	150.00
502327222	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902283	1033119B	150.00
502327223	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902283	1033119B	150.00
502327224	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902274	1033119B	150.00
502327225	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902274	1033119B	150.00
502327226	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902274	1033119B	150.00
502327227	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902274	1033119B	150.00
502327228	BLI-075-06N-06W-D-30	29040309	15.50	130512058	2025902274	1033119B	150.00
502327229	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327230	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327231	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327232	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327233	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327234	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327235	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327236	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327237	BLI-075-06N-06W-D-30	29040309	15.50	130512063	2025902274	1033119B	150.00
502327238	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902274	1033119B	150.00
502327239	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327240	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327241	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327242	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327243	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327244	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327245	BLI-075-06N-06W-D-30	29040309	15.50	130512076	2025902269	1033119B	150.00
502327246	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327247	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327248	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327249	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327250	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327251	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119B	150.00
502327252	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119C	150.00
502327253	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902269	1033119C	150.00
502327254	BLI-075-06N-06W-D-30	29040309	15.50	130512073	2025902290	1033119C	150.00
502327255	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00
502327256	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00
502327257	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00
502327258	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00
502327259	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00

Conformance



Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Serial number	Item Number	Daily lot	Roll width	Top	Bottom	Clay	Length	
502327260	BLI-075-06N-06W-D-30	29040309	15.50	130512077	2025902290	1033119C	150.00	
502327261	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327262	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327263	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327264	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327265	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327266	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327268	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327269	BLI-075-06N-06W-D-30	29040309	15.50	130511496	2025902290	1033119C	150.00	
502327270	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327271	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327272	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327273	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327274	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327275	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327276	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327277	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	
502327278	BLI-075-06N-06W-D-30	29040309	15.50	130512057	2025902259	1033119C	150.00	Conformance
502327279	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119C	150.00	
502327280	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119C	150.00	
502327281	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119C	150.00	
502327282	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119C	150.00	
502327283	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119D	150.00	
502327284	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119D	150.00	
502327285	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025902259	1033119D	150.00	
502327286	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025906108	1033119D	82.00	
502327287	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025906108	1033119D	82.00	
502327288	BLI-075-06N-06W-D-30	29040309	15.50	130512066	2025906108	1033119D	150.00	
502327289	BLI-075-06N-06W-D-30	29040309	15.50	130511503	2025906108	1033119D	150.00	
502327290	BLI-075-06N-06W-D-30	29040309	15.50	130511503	2025906108	1033119D	150.00	
502327291	BLI-075-06N-06W-D-30	29040309	15.50	130511503	2025906108	1033119D	150.00	
502327494	BLI-075-06N-06W-D-30	29040509	15.50	130512048	2025902292	1040219B	150.00	Conformance
502327495	BLI-075-06N-06W-D-30	29040509	15.50	130512048	2025902292	1040219B	150.00	
502327496	BLI-075-06N-06W-D-30	29040509	15.50	130512048	2025905354	1040219B	150.00	
502327497	BLI-075-06N-06W-D-30	29040509	15.50	130512048	2025905354	1040219B	150.00	
502327498	BLI-075-06N-06W-D-30	29040509	15.50	130512086	2025905354	1040219B	150.00	
502327499	BLI-075-06N-06W-D-30	29040509	15.50	130512086	2025905354	1040219B	150.00	
502327500	BLI-075-06N-06W-D-30	29040509	15.50	130512086	2025905354	1040219B	150.00	
502327501	BLI-075-06N-06W-D-30	29040509	15.50	130512086	2025905354	1040219B	150.00	
502327502	BLI-075-06N-06W-D-30	29040509	15.50	130512086	2025905354	1040219B	150.00	
502327503	BLI-075-06N-06W-D-30	29040509	15.50	130511386	2025905354	1040219B	150.00	



ROLL TEST DATA REPORT



Report Date: Apr/12/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327132	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327133	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327134	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327135	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327136	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327137	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327138	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327139	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327140	321	55	70.9	11.1	0.79	32.0	10.0	13.0
502327141	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327142	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327143	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327144	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327145	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327146	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327147	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327148	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327149	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327150	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327151	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327152	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327153	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327154	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327155	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327157	278	49	76.8	10.2	0.86	32.0	10.0	13.0
502327158	265	67	57.9	13.3	0.81	32.0	10.0	13.0
502327159	265	67	57.9	13.3	0.81	32.0	10.0	13.0
502327160	265	67	57.9	13.3	0.81	32.0	10.0	13.0
502327161	265	67	57.9	13.3	0.81	33.0	10.3	12.2
502327162	265	67	57.9	13.3	0.81	33.0	10.3	12.2
502327163	265	67	57.9	13.3	0.81	33.0	10.3	12.2
502327164	265	67	57.9	13.3	0.81	33.0	10.3	12.2
502327165	265	67	57.9	13.3	0.81	33.0	10.3	12.2
502327166	265	67	57.9	13.3	0.81	33.0	10.3	12.2



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327167	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327168	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327169	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327170	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327171	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327172	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327173	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327174	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327175	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327176	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327177	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327178	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327179	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327180	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327181	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327182	258	54	63.8	11.4	0.80	33.0	10.3	12.2
502327183	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327184	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327185	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327186	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327187	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327188	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327189	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327190	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327191	283	52	71.2	10.6	0.84	33.0	10.3	12.2
502327192	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327193	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327194	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327195	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327196	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327197	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327198	283	52	71.2	10.6	0.84	34.0	10.1	12.8
502327199	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327200	207	54	53.2	11.4	0.80	34.0	10.1	12.8



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327201	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327202	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327203	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327204	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327205	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327206	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327207	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327208	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327210	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327211	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327212	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327213	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327214	207	54	53.2	11.4	0.80	34.0	10.1	12.8
502327215	236	55	64.1	11.1	0.82	34.0	10.1	12.8
502327216	236	55	64.1	11.1	0.82	34.0	10.1	12.8
502327217	236	55	64.1	11.1	0.82	34.0	10.1	12.8
502327218	236	55	64.1	11.1	0.82	34.0	10.1	12.8
502327219	236	55	64.1	11.1	0.82	34.0	10.1	12.8
502327220	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327221	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327222	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327223	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327224	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327225	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327226	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327227	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327228	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327229	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327230	236	55	64.1	11.1	0.82	32.0	9.1	12.2
502327231	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327232	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327233	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327234	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327235	228	52	63.1	10.9	0.82	32.0	9.1	12.2



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327236	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327237	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327238	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327239	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327240	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327241	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327242	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327243	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327244	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327245	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327246	228	52	63.1	10.9	0.82	32.0	9.1	12.2
502327247	267	38	59.9	8.0	0.86	32.0	9.1	12.2
502327248	267	38	59.9	8.0	0.86	32.0	9.1	12.2
502327249	267	38	59.9	8.0	0.86	32.0	9.1	12.2
502327250	267	38	59.9	8.0	0.86	32.0	9.1	12.2
502327251	267	38	59.9	8.0	0.86	32.0	9.1	12.2
502327252	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327253	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327254	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327255	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327256	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327257	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327258	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327259	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327260	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327261	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327262	267	38	59.9	8.0	0.86	30.0	9.7	13.2
502327263	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327264	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327265	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327266	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327268	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327269	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327270	225	54	67.1	10.7	0.83	30.0	9.7	13.2

ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327271	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327272	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327273	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327274	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327275	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327276	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327277	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327278	225	54	67.1	10.7	0.83	30.0	9.7	13.2
502327279	284	51	67.4	10.4	0.82	30.0	9.7	13.2
502327280	284	51	67.4	10.4	0.82	30.0	9.7	13.2
502327281	284	51	67.4	10.4	0.82	30.0	9.7	13.2
502327282	284	51	67.4	10.4	0.82	30.0	9.7	13.2
502327283	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327284	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327285	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327286	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327287	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327288	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327289	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327290	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327291	284	51	67.4	10.4	0.82	30.5	8.5	12.6
502327494	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327495	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327496	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327497	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327498	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327499	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327500	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327501	300	76	73.5	16.3	0.81	30.0	11.0	13.4
502327502	300	76	73.5	16.3	0.81	30.0	11.0	13.4



ROLL TEST DATA REPORT



Report Date: Apr/12/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	BLI-075-06N-06W-D-30	

Roll Number	ASTM D4632 Grab Strength (lbs)	ASTM D4632 Peel Strength (lbs)	ASTM D6768 Tensile Strength (ppi)	ASTM D6496 Peel Strength (ppi)	ASTM D5993 Clay Content @ 0% Moisture (lbs/sf)	ASTM D5890 Free Swell (ml/2g)	ASTM D2216 Moisture Content (%)	ASTM D5891 Fluid Loss (ml)
502327503	300	76	73.5	16.3	0.81	30.0	11.0	13.4

Laboratory Manager 



GSE Environmental, LLC

ROLL TEST DATA REPORT



Report Date:

12-Apr-2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
86654	Falcon Environmental Lining Systems, Inc.	Falcon - Sundance - Onyx	BLI-GEO-NW-0605	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd ²)
130510200	8.0
130510201	8.0
130510245	8.6
130510246	7.6
130510249	7.6
130510250	8.4
130510259	7.5
130511386	8.3
130511511	8.2
130512048	7.7
130512072	7.9
130512086	6.6
130511496	8.6
130511503	8.3
130512057	7.7
130512058	7.7
130512063	7.6
130512066	7.0
130512069	7.8
130512073	7.9
130512076	7.5
130512077	7.9

Laboratory Manager

Mauricio Ossa



GSE Environmental, LLC

ROLL TEST DATA REPORT



Report Date:

12-Apr-2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
86654	Falcon Environmental Lining Systems, Inc.	Falcon - Sundance - Onyx	BLI-GEO-FW-0605	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd ²)
2025872159	6.5
2025902259	6.6
2025902262	7.2
2025902269	7.0
2025902274	6.5
2025902280	6.9
2025902283	6.7
2025902290	6.9
2025902292	6.7
2025902298	6.7
2025902300	6.3
2025905354	6.7
2025906108	6.7

Laboratory Manager

Mauricio Ossa

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2019

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0004135174	03-29-19	1032919B	7.9	0.09	0.41	12.0	120	32	1049	MARCH No. of CARS	M AVG	9.14	0.40	3.67	12.62	112.71	31.73	999.69
B0004135175	03-30-19	1032919C	8.8	0.25	7.02	11.2	118	32	1032		STD DEV	0.95	0.55	1.81	0.67	16.75	1.40	43.52
										YTD No. of CARS	M AVG	9.01	0.41	3.72	12.72	114.45	32.97	1016.10
										110	STD DEV	0.85	0.68	1.94	0.67	11.36	1.89	42.95

SOLD TO: GSE CLAY LINING TECHNOLOGY, Co.
3150 FIRST AVENUE
SPEARFISH, SD 57783

For any questions contact.
Q.A. SUPERVISOR

Attn: **Bob Stadler (rstadler@gseworld.com)**
Chuck Taylor (ctaylor@gseworld.com)
Cheryl Hofer (chofer@gseworld.com)
(ezimmel@gseworld.com)

SHIPPED TO: GSE CLAY LINING TECHNOLOGY, Co.
3150 FIRST AVENUE
SPEARFISH, SD 57783

CC: Thomas Anderson
Jason Tawse

Prepared by: TO
03/30/19

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2019

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN		% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	
B0004135176	03-31-19	1032919D	8.9	1.50	5.51	13.0	120	34	1062	MARCH No. of CARS 47	M AVG STD DEV	9.13 0.95	0.43 0.57	3.70 1.81	12.62 0.67	112.86 16.61	31.78 1.42	1000.96 43.97
										YTD No. of CARS 111	M AVG STD DEV	9.01 0.84	0.41 0.69	3.73 1.94	12.72 0.66	114.50 11.32	32.98 1.89	1016.50 42.97

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03/31/19

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PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN	MARCH No. of CARS 48	M AVG STD DEV	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0004135178	03-31-19	1033119A	9.2	0.11	3.38	12.4	114	32	1016			9.13 0.94	0.42 0.56	3.70 1.79	12.62 0.66	112.88 16.44	31.78 1.40	1001.26 43.58
										YTD No. of CARS 112	M AVG STD DEV	9.01 0.84	0.41 0.68	3.73 1.93	12.72 0.66	114.50 11.27	32.97 1.88	1016.50 42.79

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03/31/19

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COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0004135179	03-31-19	1033119B	7.7	0.05	0.93	12.6	114	32	1020	MARCH No. of CARS	M AVG	9.11	0.41	3.64	12.62	112.90	31.78	1001.63
B0004135180	04-01-19	1033119C	8.4	0.36	5.83	12.8	114	31	1001		STD DEV	0.95	0.56	1.81	0.65	16.28	1.39	43.23
										YTD No. of CARS	M AVG	8.99	0.41	3.72	12.72	114.49	32.95	1016.39
										114	STD DEV	0.84	0.68	1.94	0.66	11.18	1.88	42.45

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Prepared by: TO
04/01/19

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2019

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0004135182	04-01-19	1033119D	7.2	0.52	6.55	12.4	112	32	1017	MARCH No. of CARS	M AVG	9.11	0.41	3.64	12.62	112.90	31.78	1001.63
B0004135183	04-01-19	1040119A	6.7	0.27	8.30	12.6	112	33	1029		STD DEV	0.95	0.56	1.81	0.65	16.28	1.39	43.23
										YTD								
										No. of	M AVG	8.96	0.41	3.79	12.71	114.45	32.94	1016.50
										CARS	STD DEV	0.88	0.67	1.98	0.65	11.09	1.86	42.12
										116								

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Prepared by: TO
04/01/19

GSE BENTOLINER

CERTIFICATE OF ANALYSIS 2019

PRODUCT : NATIONAL® 30

SHIPPED FROM: **BENTONITE PERFORMANCE MINERALS LLC**
554 US HWY 212
COLONY PLANT
BELLE FOURCHE, S.D. 57717

BOL #	LOAD DATE	LOT CODE	% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC MEQ 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN			% MOIST 12 MAX	Mesh % + 20 15 MAX	Mesh % - 200 10 MAX	FL 18 MAX	MBC meq 70 MIN	SWELL INDEX 25 MIN	PWA 750 MIN
B0004140788	04-03-19	1040219B	9.8	0.19	9.77	13.2	116	32	1033	APRIL No. of CARS 10	M AVG STD DEV	8.38 1.27	0.48 0.19	6.70 2.28	12.80 0.31	113.80 3.03	32.10 0.83	1018.90 15.13
										YTD No. of CARS 123	M AVG STD DEV	8.95 0.90	0.41 0.66	3.94 2.12	12.72 0.64	114.44 10.81	32.90 1.83	1016.71 41.13

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Prepared by: TO
04/03/19

Appendix D2

GCL Inventory Control Log

Appendix D2. Geosynthetic Receiving and Manufacturing/Conformance Log for Sundance West Mud Management Facility

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results (P/F)	Approved for Installation (Y/N)
Bento Liner NWL GCL	04/24/19	29040509	502327503	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327502	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327501	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327494	2325	4/12/2019	P	P	Y
Bento Liner NWL GCL	04/24/19	29040509	502327500	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327496	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327495	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327498	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327282	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327291	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327281	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327280	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327499	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327497	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327288	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327279	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327289	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040509	502327278	2325	4/12/2019	P	P	Y
Bento Liner NWL GCL	04/24/19	29040509	502327290	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327229	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327236	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327233	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327235	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327237	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327232	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327231	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327225	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327242	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327234	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327226	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327240	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327241	2325	4/12/2019	P	N/A	Y

Appendix D2. Geosynthetic Receiving and Manufacturing/Conformance Log for Sundance West Mud Management Facility

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results (P/F)	Approved for Installation (Y/N)
Bento Liner NWL GCL	04/24/19	29040309	502327228	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327243	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327239	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327237	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327238	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/24/19	29040309	502327230	2325	4/12/2019	P	P	Y
Bento Liner NWL GCL	04/25/19	29040309	502327273	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327265	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327262	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327272	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327266	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327263	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327270	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327286	1271	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327268	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327283	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327264	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327277	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327271	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327269	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327285	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327276	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327274	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327275	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327284	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327249	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327287	1271	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327254	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327248	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327244	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327258	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327246	2325	4/12/2019	P	N/A	Y

Appendix D2. Geosynthetic Receiving and Manufacturing/Conformance Log for Sundance West Mud Management Facility

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results (P/F)	Approved for Installation (Y/N)
Bento Liner NWL GCL	04/25/19	29040309	502327245	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327251	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327252	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327261	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327253	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327255	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327247	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327250	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327259	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327260	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327256	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/25/19	29040309	502327257	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327163	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327162	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327161	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327159	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327150	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327154	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327157	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327148	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327149	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327155	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327160	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327152	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327153	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327158	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327151	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327164	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327167	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327166	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327165	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327173	2325	4/12/2019	P	N/A	Y

Appendix D2. Geosynthetic Receiving and Manufacturing/Conformance Log for Sundance West Mud Management Facility

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results (P/F)	Approved for Installation (Y/N)
Bento Liner NWL GCL	04/26/19	29040209	502327168	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327172	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327175	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327176	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327182	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327181	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327170	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327169	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327171	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327174	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327177	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327180	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327179	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327178	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327186	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327183	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327184	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327185	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327204	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327193	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327199	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327205	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327191	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327198	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327197	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327200	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327203	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327202	2325	4/12/2019	P	N/A	Y
Bento Liner NWL GCL	04/26/19	29040209	502327201	2325	4/12/2019	P	N/A	Y

Appendix D3

GCL Conformance Testing Results

April 11, 2019

Mail To:

Daine Innerarity
Onyx Contractors
P.O.Box60547
Midland TX 79711

Bill To:

<= Same

email: daine@onyxcontractors.com

Dear Mr Innerarity

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report for laboratory testing.

Project:	Sundance West
TRI Job Reference Number:	45671
Material(s) Tested:	Four, GSE Bentoliner NWL GCL(s)
Test(s) Requested:	Mass/Unit Area (ASTM D5993) Bentonite - Swell Index (ASTM D5890) Bentonite - Fluid Loss (ASTM D5891)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,



Mansukh Patel
Geosynthetic Services Division
www.GeosyntheticTesting.com

Lead GCL Technical Contact - Jeffrey A. Kuhn, Ph.D., P.E., jkuhn@tri-env.com, 512-952-1212

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL GCL
Sample Identification: 502327140
TRI Log #: 45671

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lbs/ft ²)	0.75	0.80	0.92	0.80	0.85	0.82	0.06	0.75min
Moisture Content (%)	8.8	8.9	9.0	8.9	9.4	9.0	0.2	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)	28					28		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:	24.3 °C		Slurry temperature at test completion:			21.5 °C		
Fluid Loss (mL)	12.2					12.2		18 max
Note: Bentonite sample tested is taken from finished GCL product.								

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL GCL
Sample Identification: 502327190
TRI Log #: 45671

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lbs/ft ²)	0.87	0.81	0.94	0.91	0.87	0.88	0.05	0.75min
Moisture Content (%)	9.5	9.3	9.5	9.4	9.6	9.5	0.1	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)	28					28		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:	25.2 °C		Slurry temperature at test completion:			21.6 °C		
Fluid Loss (mL)	12.6					12.6		18 max
Note: Bentonite sample tested is taken from finished GCL product.								

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL GCL
Sample Identification: 502327230
TRI Log #: 45671

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lbs/ft ²)	0.78	0.86	0.94	0.87	0.85	0.86	0.06	0.75min
Moisture Content (%)	9.5	9.6	9.5	9.7	9.7	9.6	0.1	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)	28					28		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:	26.1 °C		Slurry temperature at test completion:			21.6 °C		
Fluid Loss (mL)	12.4					12.4		18 max
Note: Bentonite sample tested is taken from finished GCL product.								

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL GCL
Sample Identification: 502327278
TRI Log #: 45671

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lbs/ft ²)	0.82	0.81	1.04	0.90	0.88	0.89	0.09	0.75min
Moisture Content (%)	8.8	8.7	8.7	8.7	8.9	8.8	0.1	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)	26					26		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:	26.3 ° C		Slurry temperature at test completion:			21.8 ° C		
Fluid Loss (mL)	12.2					12.2		18 max
Note: Bentonite sample tested is taken from finished GCL product.								



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

April 22, 2019

Mail To:

Daine Innerarity
Onyx Contractors
P.O.Box60547
Midland TX 79711

email: daine@onyxcontractors.com

Bill To:

<= Same

Dear Mr Innerarity

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Sundance West
TRI Job Reference Number:	45734
Material(s) Tested:	One, GSE Bentoliner NWL 35 GCL
Test(s) Requested:	Mass/Unit Area (ASTM D5993) Bentonite - Swell Index (ASTM D5890) Bentonite - Fluid Loss (ASTM D5891)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

A handwritten signature in black ink that reads 'Jarrett A. Nelson'.

Jarrett A. Nelson
Technical Director
www.GeosyntheticTesting.com

Lead GCL Technical Contact - Jeffrey A. Kuhn, Ph.D., P.E., jkuhn@tri-env.com, 512-952-1212

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL 35 GCL

Sample Identification: 502327494

TRI Log #: 45734

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lb:	0.91	0.87	0.96	0.93	0.95	0.92	0.04	0.75min
Moisture Content (%)	9.1	9.0	9.2	9.1	9.1	9.1	0.1	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)		30				30		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:		25.3 ° C		Slurry temperature at test completion:		21.8 ° C		
Fluid Loss (mL)		11.4				11.4		18 max
Note: Bentonite sample tested is taken from finished GCL product.								
MD Machine Direction		TD Transverse Direction		NA Not Available				



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

April 22, 2019

Mail To:

Daine Innerarity
Onyx Contractors
P.O.Box60547
Midland TX 79711

Bill To:

<= Same

email: daine@onyxcontractors.com

Dear Mr Innerarity

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	Sundance West
TRI Job Reference Number:	45734
Material(s) Tested:	One, GSE Bentoliner NWL 35 GCL
Test(s) Requested:	Mass/Unit Area (ASTM D5993) Bentonite - Swell Index (ASTM D5890) Bentonite - Fluid Loss (ASTM D5891)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

A handwritten signature in black ink that reads 'Jarrett A. Nelson'.

Jarrett A. Nelson
Technical Director
www.GeosyntheticTesting.com

Lead GCL Technical Contact - Jeffrey A. Kuhn, Ph.D., P.E., jkuhn@tri-env.com, 512-952-1212

GCL TEST RESULTS
TRI Client: Onyx Contractors
Project: Sundance West

Material: GSE Bentoloner NWL 35 GCL

Sample Identification: 502327494

TRI Log #: 45734

PARAMETER	TEST REPLICATE NUMBER					MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5			
Bentonite - Mass/Unit Area (ASTM D5993, result @ 0% M.C.)								
Bentonite mass/unit area (lb:	0.91	0.87	0.96	0.93	0.95	0.92	0.04	0.75min
Moisture Content (%)	9.1	9.0	9.2	9.1	9.1	9.1	0.1	
Bentonite - Swell Index (ASTM D5890)								
Swell index (mL/2g)		30				30		24 min
Note: Bentonite sample tested is taken from finished GCL product.								
Bentonite - Fluid Loss (ASTM D5891)								
Slurry temperature at test initiation:		25.3 ° C		Slurry temperature at test completion:		21.8 ° C		
Fluid Loss (mL)		11.4				11.4		18 max
Note: Bentonite sample tested is taken from finished GCL product.								
MD Machine Direction		TD Transverse Direction		NA Not Available				

Appendix E

**Daily Subgrade
Acceptance Forms**

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE ✓
2. GEOSYNTHETIC CLAY LINER (GCL) ✓
3. HDPE GEOMEMBRANE (FML) _____
4. GEONET _____

LOCATION: West Barento
_____ TO _____

REMARKS: Weather Cool morning 55° 90° Afternoon

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

DATE

PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

[Signature]
SIGNATURE

5/7/19
DATE

Mike Ebiokeh
PRINT NAME

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE ✓
2. GEOSYNTHETIC CLAY LINER (GCL) ✓
3. HDPE GEOMEMBRANE (FML) ✓
4. GEONET _____

LOCATION: _____ TO _____
_____ TO _____

REMARKS: Wind ~20 mph, Subgrade Dry, some blowing
sand.
GCL overlap okay - Patch @ P-42

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

5/8/19
DATE

PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

[Signature]
SIGNATURE

5/8/19
DATE

Mike Zbrozek
PRINT NAME

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT:	Sundance West	
LAYER:	1. SUBGRADE	Yes
	2. GEOSYNTHETIC CLAY LINER (GCL)	
	3. HDPE GEOMEMBRANE (FML)	
	4. GEONET	
LOCATION:	Area "C" TO	
		TO
REMARKS:	Area C was completed in three days, 5-20 to 5-21 of 2019. Subgrade was well prepared. Passed 95% when required.	

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:**LINER CONTRACTOR REPRESENTATIVE**

SIGNATURE: Armando Lara


PRINT NAME: Armando Lara

5-22-19
DATE

SUBMITTED TO:

CQA REPRESENTATIVE

QA REPRESENTATIVE



SIGNATURE

Omar Ruiz

PRINT NAME

5/22/2019
DATE

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West 5/28/19

LAYER:

1. SUBGRADE	_____
2. GEOSYNTHETIC CLAY LINER (GCL)	<u>✓</u>
3. HDPE GEOMEMBRANE (FML)	<u>✓</u>
4. GEONET	<u>✓</u>

LOCATION: Barea TO Cardon

_____ TO _____

REMARKS: Geonet was completed and patched 5/25/19
Walk through to determine suitability for
Backfill and leachate lines.

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Armando Lara
SIGNATURE

5-28-19
DATE

Armando Lara
PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

B. J. [Signature]
SIGNATURE

5/28/19
DATE

Mike B. [Signature]
PRINT NAME

Ed T. onyx
EDMUNDO TAVAREZ

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West 5/31/19

LAYER: 1. SUBGRADE ✓ a area

2. GEOSYNTHETIC CLAY LINER (GCL) ✓

3. HDPE GEOMEMBRANE (FML) ✓

4. GEONET _____

LOCATION: SE corner of A Area

GCL P1 TO P17

HDPE P1 TO P6

REMARKS: _____

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Armando Lara

SIGNATURE

Armando Lara

PRINT NAME

5-31-19

DATE

SUBMITTED TO:

CQA REPRESENTATIVE

[Signature]

SIGNATURE

Mike Ebozich

PRINT NAME

5/31/19

DATE

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance west 6/1/19

LAYER: 1. SUBGRADE ✓ A area

2. GEOSYNTHETIC CLAY LINER (GCL) ✓

3. HDPE GEOMEMBRANE (FML)

4. GEONET

LOCATION: GEL P18 TO _____

HDPE P6 TO

REMARKS: continue working North from SE corner
of Area pad.

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

~~LINE~~ CONTRACTOR REPRESENTATIVE

SIGNATURE

DATE _____

PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

~~SIGNATURE~~

DATE _____

PRINT NAME

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE
2. GEOSYNTHETIC CLAY LINER (GCL)
3. HDPE GEOMEMBRANE (FML)
4. GEONET

LOCATION: HDPE P12 TO P23
TO

REMARKS: bc wet, no ruts, no gullies
moist

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Arnold Lugo

SIGNATURE

Arnold Lugo

PRINT NAME

6/3/19

DATE

SUBMITTED TO:

CQA REPRESENTATIVE

Thomas H

SIGNATURE

T. Hopkins

PRINT NAME

6/3/19

DATE

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE

2. GEOSYNTHETIC CLAY LINER (GCL) _____

3. HDPE GEOMEMBRANE (FML) _____

4. GEONET _____

LOCATION: N. ex TO NAT in Area A

TO _____

REMARKS: Some tracks Hand crews smoothing

subgrade and "cleaning" subgrade

subgrade ready for GCL deployment

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Armando Lara

SIGNATURE

Armando Lara

PRINT NAME

6/7/19

DATE

SUBMITTED TO:

CQA REPRESENTATIVE

T. Hopkins

SIGNATURE

T. Hopkins

PRINT NAME

6/7/19

DATE

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: SUNDAKE WEST

LAYER:

1. SUBGRADE	<u>Area A</u>
2. GEOSYNTHETIC CLAY LINER (GCL)	<u>Area A</u>
3. HDPE GEOMEMBRANE (FML)	<u>Area A</u>
4. GEONET	<u>Area A</u>

LOCATION: TO Area A

TO _____

REMARKS: GCL Placement
FML Seamed, Patched, Tested
GEONET Seamed

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Armando Silva
SIGNATURE

6-13-19
DATE

Armando Silva
PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

Jay Fisher / DBSEA
SIGNATURE

6/13/19
DATE

Jenome Fisher
PRINT NAME

Edmundo Tavares / DM48
Edmundo Tavares

6/13/19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance

LAYER: 1. ~~SUBGRADE~~ Cover of geonet and geomembrane and GCL
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) _____
4. GEONET _____

LOCATION: Area A ~~to~~ _____
TO _____

REMARKS: Area A was covered with backfill above geonet.

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

DATE

PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

[Signature]
SIGNATURE

7/18/19
DATE

Omar Ruiz
PRINT NAME

onyx
Edmundo Tavaraz
Edmundo Tavaraz

7/18/19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: SUNDANCE WEST

LAYER: 1. SUBGRADE Area D

2. GEOSYNTHETIC CLAY LINER (GCL) _____

3. HDPE GEOMEMBRANE (FML) _____

4. GEONET _____

LOCATION: _____ TO _____

_____ TO _____

REMARKS: _____

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Armando Lopez
SIGNATURE

8/22/19
DATE

Armando Lopez
PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

Jonas Fister
SIGNATURE

8/22/19
DATE

Jonas Fister
PRINT NAME

ONYX REPRESENTATIVE

Jason Leathers
JASON LEATHERS

8/22/19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE _____

2. 2 GEOSYNTHETIC CLAY LINER (GCL) Area D

3. HDPE GEOMEMBRANE (FML) _____

4. GEONET _____

LOCATION: _____ TO _____

_____ TO _____

REMARKS: _____

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Edmundo Tavares
SIGNATURE

Edmundo Tavares
PRINT NAME

8-22-19
DATE

SUBMITTED TO:

CQA REPRESENTATIVE

Senora Fisher
SIGNATURE

Senora Fisher
PRINT NAME

8/22/19
DATE

Onyx Rep
Edmundo Tavares
Edmundo Tavares

8/22/19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE _____
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) Area D, Layer 1
4. GEONET _____

LOCATION: _____ TO _____
_____ TO _____

REMARKS: First layer FML

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

PRINT NAME

8/23/19
DATE

SUBMITTED TO:

CQA REPRESENTATIVE

SIGNATURE

PRINT NAME

8-23-19
DATE

Onyx

Sig Edmundo Tavaraz

Print Edmundo Tavaraz

Date 8-23-19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE _____
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) _____
4. GEONET Between FML 1 + 2

LOCATION: Area TO D _____
TO _____

REMARKS: Tape between FML 1 + 2

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

PRINT NAME

DATE

SUBMITTED TO:

CQA REPRESENTATIVE

SIGNATURE

PRINT NAME

DATE

ONyx Rep

Sig Edmundo Tavares

Print Edmundo Tavares

8/23/19
DATE

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE _____
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) FML 2
4. GEONET _____

LOCATION: _____ TO _____
_____ TO _____

REMARKS: FML 2 lapped from North
to South.

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

SIGNATURE

PRINT NAME

DATE

SUBMITTED TO:

CQA REPRESENTATIVE

SIGNATURE

PRINT NAME

DATE

Onyx Rep

Sig. Edmundo Taveira
Print Edmundo Taveira

Date 8-23-19

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: Sundance West

LAYER: 1. SUBGRADE _____
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) _____
4. GEONET layer 2

LOCATION: _____ TO _____
_____ TO _____

REMARKS: Top Geonnet okay to put
Top soil cover.

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

Charles Lico
SIGNATURE

8-23-19
DATE

Abraham Lico
PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

Mike Feroe
SIGNATURE

8/23/19
DATE

Mike Feroe
PRINT NAME

ONYX

3:9 Edmundo Taveres

Print Edmundo Taveres

Date 8-23-19

Appendix F

Panel Deployment and Seaming

Appendix F1

GCL Deployment Log

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (50232)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	7239	122	15.5	1,891.0	5/31/2019	MZ
P2	7238	149	15.5	2,309.5	5/31/2019	MZ
P3	7237	126	15.5	1,953.0	5/31/2019	MZ
P4	7237	23	15.5	356.5	5/31/2019	MZ
P5	7273	150	15.5	2,325.0	5/31/2019	MZ
P6	7265	150	15.5	2,325.0	5/31/2019	MZ
P7	7282	85	15.5	1,317.5	5/31/2019	MZ
P8	7282	64	15.5	992.0	5/31/2019	MZ
P9	7262	150	15.5	2,325.0	5/31/2019	MZ
P10	7266	150	15.5	2,325.0	5/31/2019	MZ
P11	7263	43	15.5	666.5	5/31/2019	MZ
P12	7263	107	15.5	1,658.5	5/31/2019	MZ
P13	7283	150	15.5	2,325.0	5/31/2019	MZ
P14	7270	150	15.5	2,325.0	5/31/2019	MZ
P15	7277	150	15.5	2,325.0	5/31/2019	MZ
P16	7264	150	15.5	2,325.0	5/31/2019	MZ
P17	7268	100	15.5	1,550.0	5/31/2019	MZ
P18	7268	50	15.5	775.0	6/1/2019	MZ
P19	7285	150	15.5	2,325.0	6/1/2019	MZ
P20	7271	150	15.5	2,325.0	6/1/2019	MZ
P21	7269	45	15.5	697.5	6/1/2019	MZ
P22	7269	105	15.5	1,627.5	6/1/2019	MZ
P23	7249	150	15.5	2,325.0	6/1/2019	MZ
P24	7274	150	15.5	2,325.0	6/1/2019	MZ
P25	7273	150	15.5	2,325.0	6/1/2019	MZ
P26	7254	150	15.5	2,325.0	6/1/2019	MZ
P27	7287	81	15.5	1,255.5	6/1/2019	MZ
P28	7275	16	15.5	248.0	6/1/2019	MZ
P29	7275	134	15.5	2,077.0	6/1/2019	MZ
P30	7258	150	15.5	2,325.0	6/1/2019	MZ

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (50232)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P31	7248	110	15.5	1,705.0	6/1/2019	MZ
P32	7248	40	15.5	620.0	6/1/2019	MZ
P33	7286	82	15.5	1,271.0	6/1/2019	MZ
P34	7284	150	15.5	2,325.0	6/1/2019	MZ
P35	7259	120	15.5	1,860.0	6/1/2019	MZ
P36	7259	30	15.5	465.0	6/1/2019	MZ
P37	7246	150	15.5	2,325.0	6/1/2019	MZ
P38	7244	150	15.5	2,325.0	6/1/2019	MZ
P39	7260	60	15.5	930.0	6/1/2019	MZ
P40	7261	92	15.5	1,426.0	6/3/2019	BC
P41	7251	150	15.5	2,325.0	6/3/2019	BC
P42	7245	150	15.5	2,325.0	6/3/2019	BC
P43	7257	150	15.5	2,325.0	6/3/2019	BC
P44	7261	150	15.5	2,325.0	6/3/2019	BC
P45	7252	86	15.5	1,333.0	6/3/2019	BC
P46	7252	64	15.5	992.0	6/3/2019	BC
P47	7255	152	15.5	2,356.0	6/3/2019	BC
P48	7253	148	15.5	2,294.0	6/3/2019	BC
P49	7256	28	15.5	434.0	6/3/2019	BC
P50	7256	122	15.5	1,891.0	6/3/2019	BC
P51	7250	149	15.5	2,309.5	6/3/2019	BC
P52	7247	118	15.5	1,829.0	6/3/2019	BC
P53	7247	32	15.5	496.0	6/3/2019	BC
P54	7160	147	15.5	2,278.5	6/3/2019	BC
P55	7149	150	15.5	2,325.0	6/3/2019	BC
P56	7163	60	15.5	930.0	6/3/2019	BC
P57	7163	91	15.5	1,410.5	6/3/2019	BC
P58	7158	150	15.5	2,325.0	6/3/2019	BC
P59	7155	150	15.5	2,325.0	6/3/2019	BC
P60	7160	150	15.5	2,325.0	6/3/2019	BC

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (50232)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P61	7151	150	15.5	2,325.0	6/3/2019	BC
P62	7152	91	15.5	1,410.5	6/3/2019	BC
P63	7152	59	15.5	914.5	6/3/2019	BC
P64	7161	150	15.5	2,325.0	6/3/2019	BC
P65	7166	150	15.5	2,325.0	6/3/2019	BC
P66	7153	31	15.5	480.5	6/3/2019	BC
P67	7153	119	15.5	1,844.5	6/3/2019	BC
P68	7159	150	15.5	2,325.0	6/3/2019	BC
P69	7165	122	15.5	1,891.0	6/3/2019	BC
P70	7165	28	15.5	434.0	6/3/2019	BC
P71	7164	150	15.5	2,325.0	6/3/2019	BC
P72	7150	150	15.5	2,325.0	6/3/2019	BC
P73	7179	62	15.5	961.0	6/3/2019	BC
P74	7179	88	15.5	1,364.0	6/7/2019	BC
P75	7167	150	15.5	2,325.0	6/7/2019	BC
P76	7154	150	15.5	2,325.0	6/7/2019	BC
P77	7178	150	15.5	2,325.0	6/7/2019	BC
P78	7170	150	15.5	2,325.0	6/7/2019	BC
P79	7157	94	15.5	1,457.0	6/7/2019	BC
P80	7157	16	15.5	248.0	6/7/2019	BC
P81	7157	40	15.5	620.0	6/7/2019	BC
P82	7186	150	15.5	2,325.0	6/7/2019	BC
P83	7169	150	15.5	2,325.0	6/7/2019	BC
P84	7173	54	15.5	837.0	6/7/2019	BC
P85	7173	96	15.5	1,488.0	6/7/2019	BC
P86	7183	150	15.5	2,325.0	6/7/2019	BC
P87	7171	150	15.5	2,325.0	6/7/2019	BC
P88	7168	150	15.5	2,325.0	6/7/2019	BC
P89	7184	150	15.5	2,325.0	6/7/2019	BC
P90	7174	150	15.5	2,325.0	6/7/2019	BC

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (50232)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P91	7172	150	15.5	2,325.0	6/7/2019	BC
P92	7185	90	15.5	1,395.0	6/7/2019	BC
P93	7185	60	15.5	930.0	6/7/2019	BC
P94	7177	40	15.5	620.0	6/7/2019	BC
P95	7177	110	15.5	1,705.0	6/7/2019	BC
P96	7175	150	15.5	2,325.0	6/7/2019	BC
P97	7194	133	15.5	2,061.5	6/7/2019	BC
P98	7194	18	15.5	279.0	6/7/2019	BC
P99	7180	150	15.5	2,325.0	6/7/2019	BC
P100	7176	150	15.5	2,325.0	6/7/2019	BC
P101	7196	64	15.5	992.0	6/7/2019	BC
P102	7196	86	15.5	1,333.0	6/7/2019	BC
P103	7148	150	15.5	2,325.0	6/7/2019	BC
P104	7182	150	15.5	2,325.0	6/7/2019	BC
P105	7195	150	15.5	2,325.0	6/7/2019	BC
P106	7200	150	15.5	2,325.0	6/7/2019	BC
P107	7192	150	15.5	2,325.0	6/7/2019	BC
P108	7181	17	15.5	263.5	6/7/2019	BC
P109	7181	85	7.5	637.5	6/7/2019	BC
P110	7181	85	7.5	637.5	6/7/2019	BC
P111	7181	24	15.5	372.0	6/7/2019	BC
P112	7203	41	15.5	635.5	6/10/2019	JF/OR
P113	7203	36	15.5	558.0	6/10/2019	JF/OR
P114	7203	43	15.5	666.5	6/10/2019	JF/OR
P115	7203	30	15.5	465.0	6/10/2019	JF/OR
P116	7193	149	15.5	2,309.5	6/10/2019	JF/OR
P117	7204	26	15.5	403.0	6/10/2019	JF/OR
P118	7204	26	15.5	403.0	6/10/2019	JF/OR
P119	7204	30	15.5	465.0	6/10/2019	JF/OR
P120	7204	62	15.5	961.0	6/10/2019	JF/OR

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (50232)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P121	7202	19	15.5	294.5	6/10/2019	JF/OR
P122	7202	26	15.5	403.0	6/10/2019	JF/OR
P123	7202	22	15.5	341.0	6/10/2019	JF/OR
P124	7202	27	15.5	418.5	6/10/2019	JF/OR
P125	7202	29	15.5	449.5	6/10/2019	JF/OR
P126	7202	13	15.5	201.5	6/10/2019	JF/OR
P127	7199	18	15.5	279.0	6/10/2019	JF/OR
P128	7199	29	15.5	449.5	6/10/2019	JF/OR
P129	7199	28	15.5	434.0	6/10/2019	JF/OR
P130	7199	29	15.5	449.5	6/10/2019	JF/OR
P131	7199	30	15.5	465.0	6/10/2019	JF/OR
P132	7199	21	15.5	325.5	6/11/2019	JF/OR
P133	7189	148	15.5	2,294.0	6/11/2019	JF/OR
P134	7201	149	15.5	2,309.5	6/11/2019	JF/OR
P135	7205	150	15.5	2,325.0	6/11/2019	JF/OR
P136	7215	25	15.5	387.5	6/11/2019	JF/OR
P137	7215	40	15.5	620.0	6/11/2019	JF/OR
P138	7215	40	15.5	620.0	6/11/2019	JF/OR
P139	7215	40	15.5	620.0	6/11/2019	JF/OR
P140	7187	40	15.5	620.0	6/11/2019	JF/OR
TOTAL LINER PLACED (ft²)				213,454.5		

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area B
PROJECT NUMBER: DB18.1209.00

PROJECT LOCATION: Eunice, NM
INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	7146	47	15.5	728.5	5/7/2019	mz
P2	7146	50	15.5	775.0	5/7/2019	mz
P3	7146	53	15.5	821.5	5/7/2019	mz
P4	7147	51	15.5	790.5	5/7/2019	mz
P5	7147	50	15.5	775.0	5/7/2019	mz
P6	7147	49	15.5	759.5	5/7/2019	mz
P7	7144	49	15.5	759.5	5/7/2019	mz
P8	7144	46	15.5	713.0	5/7/2019	mz
P9	7144	54	15.5	837.0	5/7/2019	mz
P10	7145	126	15.5	1,953.0	5/7/2019	mz
P11	7145	24	15.5	372.0	5/7/2019	mz
P12	7135	105	15.5	1,627.5	5/7/2019	mz
P13	7135	45	15.5	697.5	5/7/2019	mz
P14	7143	84	15.5	1,302.0	5/7/2019	mz
P15	7143	45	15.5	697.5	5/7/2019	mz
P16	7133	65	15.5	1,007.5	5/7/2019	mz
P17	7133	85	15.5	1,317.5	5/8/2019	mz
P18	7142	49	15.5	759.5	5/8/2019	mz
P19	7142	101	15.5	1,565.5	5/8/2019	mz
P20	7141	32	15.5	496.0	5/8/2019	mz
P21	7141	116	15.5	1,798.0	5/8/2019	mz
P22	7134	12	15.5	186.0	5/8/2019	mz
P23	7134	138	15.5	2,139.0	5/8/2019	mz
P24	7140	128	15.5	1,984.0	5/8/2019	mz
P25	7140	22	15.5	341.0	5/8/2019	mz
TOTAL LINER PLACED (ft²)				25,203.0		
P26	7138	105	15.5	1,627.5	5/8/2019	MZ
P27	7138	45	15.5	697.5	5/8/2019	MZ
P28	7139	95	15.5	1,472.5	5/8/2019	MZ
P29	7139	55	15.5	852.5	5/8/2019	MZ
P30	7136	75	15.5	1,162.5	5/8/2019	MZ
P31	7136	75	15.5	1,162.5	5/8/2019	MZ
P32	7137	53	15.5	821.5	5/8/2019	MZ
P33	7137	97	15.5	1,503.5	5/8/2019	MZ
P34	7132	32	15.5	496.0	5/8/2019	MZ
P35	7132	128	15.5	1,984.0	5/8/2019	MZ
P36	7502	12	15.5	186.0	5/8/2019	MZ
P37	7502	137	15.5	2,123.5	5/8/2019	MZ
P38	7501	127	15.5	1,968.5	5/8/2019	MZ
P39	7501	33	15.5	511.5	5/8/2019	MZ
P40	7494	109	15.5	1,689.5	5/8/2019	MZ
P41	7494	41	15.5	635.5	5/8/2019	MZ
P42	7500	87	15.5	1,348.5	5/8/2019	MZ
P43	7500	63	15.5	976.5	5/8/2019	MZ
P44	7496	68	15.5	1,054.0	5/8/2019	MZ
P45	7496	82	15.5	1,271.0	5/8/2019	MZ
P46	7495	50	15.5	775.0	5/8/2019	MZ
P47	7495	100	15.5	1,550.0	5/8/2019	MZ

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area B
PROJECT NUMBER: DB18.1209.00

PROJECT LOCATION: Eunice, NM
INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P48	7498	28	15.5	434.0	5/8/2019	MZ
P49	7498	122	15.5	1,891.0	5/8/2019	MZ
P50	7282	127	15.5	1,968.5	5/8/2019	MZ
TOTAL LINER PLACED (ft²)				30,163.0		
P51	7282	5	15.5	77.5	5/8/2019	MZ
P52	7282	18	15.5	279.0	5/8/2019	MZ
P53	7291	107	15.5	1,658.5	5/8/2019	MZ
P54	7291	43	15.5	666.5	5/9/2019	MZ
P55	7281	50	15.5	775.0	5/9/2019	MZ
P56	7281	50	15.5	775.0	5/9/2019	MZ
P57	7281	50	15.5	775.0	5/9/2019	MZ
P58	7280	45	15.5	697.5	5/9/2019	MZ
P59	7280	45	15.5	697.5	5/9/2019	MZ
P60	7280	45	15.5	697.5	5/9/2019	MZ
P61	7280	15	15.5	232.5	5/9/2019	MZ
P62	7499	31	15.5	480.5	5/9/2019	MZ
P63	7499	63	15.5	976.5	5/9/2019	MZ
P64	7499	39	15.5	604.5	5/9/2019	MZ
P65	7499	14	15.5	217.0	5/9/2019	MZ
P66	7499	26	15.5	403.0	5/9/2019	MZ
P67	7497	12	15.5	186.0	5/9/2019	MZ
P68	7497	26	15.5	403.0	5/9/2019	MZ
TOTAL LINER PLACED (ft²)				10,602.0		

Total of sheets (ft²) 65,968

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P69	7997	74	15.5	1,147.0	5/20/2019	JF/OR
P70	7288	75	15.5	1,162.5	5/20/2019	JF/OR
P71	7288	75	15.5	1,162.5	5/20/2019	JF/OR
P72	7230	74	15.5	1,147.0	5/20/2019	JF/OR
P73	7230	76	15.5	1,178.0	5/20/2019	JF/OR
P74	7279	74	15.5	1,147.0	5/20/2019	JF/OR
P75	7279	76	15.5	1,178.0	5/20/2019	JF/OR
P76	7289	121	15.5	1,875.5	5/20/2019	JF/OR
P77	7289	26	15.5	403.0	5/20/2019	JF/OR
P78	7229	93	15.5	1,441.5	5/20/2019	JF/OR
P79	7229	57	15.5	883.5	5/20/2019	JF/OR
P80	7278	66	15.5	1,023.0	5/20/2019	JF/OR
P81	7278	85	15.5	1,317.5	5/20/2019	JF/OR
P82	7236	37	15.5	573.5	5/20/2019	JF/OR
P83	7236	113	15.5	1,751.5	5/20/2019	JF/OR
P84	7290	10	15.5	155.0	5/20/2019	JF/OR
P85	7290	117	15.5	1,813.5	5/20/2019	JF/OR
P86	7233	71	15.5	1,100.5	5/21/2019	JF/OR
P87	7233	79	15.5	1,224.5	5/21/2019	JF/OR
P88	7227	71	15.5	1,100.5	5/21/2019	JF/OR
P89	7227	79	15.5	1,224.5	5/21/2019	JF/OR
P90	7235	71	15.5	1,100.5	5/21/2019	JF/OR
P91	7235	79	15.5	1,224.5	5/21/2019	JF/OR
P92	7232	66	15.5	1,023.0	5/21/2019	JF/OR
P93	7232	46	15.5	713.0	5/21/2019	JF/OR
P94	7225	50	15.5	775.0	5/21/2019	JF/OR
P95	7225	30	15.5	465.0	5/21/2019	JF/OR
P96	7232	37	15.5	573.5	5/21/2019	JF/OR
P97	7225	28	15.5	434.0	5/21/2019	JF/OR
P98	7231	91	15.5	1,410.5	5/22/2019	JF/OR

Appendix F1. GCL Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P99	7290	24	15.5	372.0	5/20/2019	JF/OR
P100	7242	75	15.5	1,162.5	5/22/2019	JF/OR
P101	7242	74	15.5	1,147.0	5/22/2019	JF/OR
P102	7234	74	15.5	1,147.0	5/22/2019	JF/OR
P103	7234	75	15.5	1,162.5	5/22/2019	JF/OR
P104	7226	60	15.5	930.0	5/22/2019	JF/OR
P105	7226	58	15.5	899.0	5/22/2019	JF/OR
P106	7240	45	15.5	697.5	5/22/2019	JF/OR
P107	7240	44	15.5	682.0	5/22/2019	JF/OR
P108	7226	31	15.5	480.5	5/22/2019	JF/OR
P109	7240	28	15.5	434.0	5/22/2019	JF/OR
P110	7240	33	15.5	511.5	5/22/2019	JF/OR
P111	7241	74	15.5	1,147.0	5/22/2019	JF/OR
P112	7241	75	15.5	1,162.5	5/22/2019	JF/OR
P113	7231	51	15.5	790.5	5/22/2019	JF/OR
P114	7243	11	15.5	170.5	5/22/2019	JF/OR
P115	7243	87	15.5	1,348.5	5/22/2019	JF/OR
P116	7243	49	15.5	759.5	5/22/2019	JF/OR
P117	7503	103	15.5	1,596.5	5/22/2019	JF/OR
P118	7503	50	15.5	775.0	5/22/2019	JF/OR
P119	7228	108	15.5	1,674.0	5/22/2019	JF/OR
P120	7228	41	15.5	635.5	5/22/2019	JF/OR
P121	7225	35	15.5	542.5	5/22/2019	JF/OR
P122	7997	50	15.5	775.0	5/22/2019	JF/OR
P123	7239	20	15.5	310.0	5/22/2019	JF/OR
TOTAL LINER PLACED (ft²)				53,041.0		

GCL DEPLOYMENT LOG

PROJECT NAME: Sundance West, Area D

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	7187	47	15.5	728.5	8/22/2019	MZ/JF
P2	7191	50	15.5	775.0	8/22/2019	MZ/JF
P3	7191	53	15.5	821.5	8/22/2019	MZ/JF
P4	7213	51	15.5	790.5	8/22/2019	MZ/JF
P5	7190	50	15.5	775.0	8/22/2019	MZ/JF
P6	7190	49	15.5	759.5	8/22/2019	MZ/JF
P7	7198	49	15.5	759.5	8/22/2019	MZ/JF
P8	7214	46	15.5	713.0	8/22/2019	MZ/JF
P9	7212	54	15.5	837.0	8/22/2019	MZ/JF
P10	7197	126	15.5	1,953.0	8/22/2019	MZ/JF
P11	7197	24	15.5	372.0	8/22/2019	MZ/JF
P12	7197	105	15.5	1,627.5	8/22/2019	MZ/JF
P13	7211	45	15.5	697.5	8/22/2019	MZ/JF
TOTAL LINER PLACED (ft²)				11,609.5		

Appendix F2

Geomembrane Deployment Log

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	4274	408	22.5	9,180.0	5/31/2019	MZ
P2	4274	142	22.5	3,195.0	5/31/2019	MZ
P3	1103	262	22.5	5,895.0	5/31/2019	MZ
P4	1103	282	22.5	6,345.0	5/31/2019	MZ
P5	1104	120	22.5	2,700.0	5/31/2019	MZ
P6	1104	400	22.5	9,000.0	5/31/2019	MZ
P7	1102	400	22.5	9,000.0	5/31/2019	MZ
P8	1102	140	22.5	3,150.0	5/31/2019	MZ
P9	1099	260	22.5	5,850.0	5/31/2019	MZ
P10	1099	285	22.5	6,412.5	5/31/2019	MZ
P11	1111	118	22.5	2,655.0	5/31/2019	MZ
P12	1111	400	22.5	9,000.0	5/31/2019	MZ
P13	1100	392	22.5	8,820.0	6/3/2019	BC
P14	1100	150	22.5	3,375.0	6/3/2019	BC
P15	1122	243	22.5	5,467.5	6/3/2019	BC
P16	1122	307	22.5	6,907.5	6/3/2019	BC
P17	1095	93	22.5	2,092.5	6/3/2019	BC
P18	1112	400	22.5	9,000.0	6/3/2019	BC
P19	1112	146	22.5	3,285.0	6/3/2019	BC
P20	1110	250	22.5	5,625.0	6/3/2019	BC
P21	1110	300	22.5	6,750.0	6/3/2019	BC
P22	1119	100	22.5	2,250.0	6/3/2019	BC
P23	1119	400	22.5	9,000.0	6/3/2019	BC
P24	1106	400	22.5	9,000.0	6/7/2019	BC
P25	1106	145	22.5	3,262.5	6/7/2019	BC
P26	1114	255	22.5	5,737.5	6/7/2019	BC
P27	1114	295	22.5	6,637.5	6/7/2019	BC
P28	1107	108	22.5	2,430.0	6/7/2019	BC
P29	1107	400	22.5	9,000.0	6/7/2019	BC
P30	1124	400	22.5	9,000.0	6/7/2019	BC

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P31	1124	147	22.5	3,307.5	6/7/2019	BC
P32	1123	245	22.5	5,512.5	6/7/2019	BC
P33	1123	305	22.5	6,862.5	6/7/2019	BC
P34	1107	39	22.5	877.5	6/7/2019	BC
P35	1113	256	22.5	5,760.0	6/10/2019	BC
P36	1113	265	22.5	5,962.5	6/10/2019	BC
P37	1121	220	22.5	4,950.0	6/11/2019	BC
P38	1121	225	22.5	5,062.5	6/11/2019	BC
TOTAL LINER PLACED (ft ²)				218,317.5		

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area B

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	4277	53	22.5	1,192.5	5/7/2019	MZ
P2	4277	55	22.5	1,237.5	5/7/2019	MZ
P3	4277	53	22.5	1,192.5	5/7/2019	MZ
P4	4277	55	22.5	1,237.5	5/7/2019	MZ
P5	4277	55	22.5	1,237.5	5/7/2019	MZ
P6	4277	52	22.5	1,170.0	5/7/2019	MZ
P7	4277	125	22.5	2,812.5	5/7/2019	MZ
P8	4277	96	22.5	2,160.0	5/7/2019	MZ
P9	4275	41	22.5	922.5	5/7/2019	MZ
P10	4275	130	22.5	2,925.0	5/7/2019	MZ
P11	4275	128	22.5	2,880.0	5/8/2019	MZ
P12	4275	132	22.5	2,970.0	5/8/2019	MZ
P13	4275	124	22.5	2,790.0	5/8/2019	MZ
P14	1108	12	22.5	270.0	5/8/2019	MZ
P15	1108	130	22.5	2,925.0	5/8/2019	MZ
P16	1108	130	22.5	2,925.0	5/8/2019	MZ
P17	1108	132	22.5	2,970.0	5/8/2019	MZ
P18	1108	139	22.5	3,127.5	5/8/2019	MZ
P19	1109	133	22.5	2,992.5	5/8/2019	MZ
P20	1109	134	22.5	3,015.0	5/8/2019	MZ
P21	1109	135	22.5	3,037.5	5/8/2019	MZ
P22	1109	132	22.5	2,970.0	5/8/2019	MZ
P23	1098	131	22.5	2,947.5	5/8/2019	MZ
P24	1098	133	22.5	2,992.5	5/8/2019	MZ
P25	1098	130	22.5	2,925.0	5/8/2019	MZ
P26	1098	40	22.5	900.0	5/9/2019	MZ
P27	1098	45	22.5	1,012.5	5/9/2019	MZ
P28	1098	45	22.5	1,012.5	5/9/2019	MZ
P29	1105	50	22.5	1,125.0	5/9/2019	MZ
P30	1105	50	22.5	1,125.0	5/9/2019	MZ
P31	1105	42	22.5	945.0	5/9/2019	MZ
P32	1105	31	22.5	697.5	5/9/2019	MZ
P33	1105	28	22.5	630.0	5/9/2019	MZ
P34	1105	28	22.5	630.0	5/9/2019	MZ
TOTAL LINER PLACED (ft ²)				65,902.5		

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P35	1105	195	22.5	4,387.5	5/20/2019	JF/OR
P36	1096	195	22.5	4,387.5	5/20/2019	JF/OR
P37	1096	195	22.5	4,387.5	5/20/2019	JF/OR
P38	1096	60	22.5	1,350.0	5/20/2019	JF/OR
P39	1096	91	22.5	2,047.5	5/20/2019	JF/OR
P40	1098	45	22.5	1,012.5	5/20/2019	JF/OR
P41	4276	81	22.5	1,822.5	5/21/2019	JF/OR
P42	4276	82	22.5	1,845.0	5/21/2019	JF/OR
P43	4276	83	22.5	1,867.5	5/21/2019	JF/OR
P44	4276	84	22.5	1,890.0	5/21/2019	JF/OR
P45	4276	87	22.5	1,957.5	5/21/2019	JF/OR
P46	4276	61	22.5	1,372.5	5/21/2019	JF/OR
P47	4276	47	22.5	1,057.5	5/21/2019	JF/OR
P48	1097	65	22.5	1,462.5	5/21/2019	JF/OR
P49	1097	44	22.5	990.0	5/21/2019	JF/OR
P50	1097	23	22.5	517.5	5/21/2019	JF/OR
P51	1097	86	22.5	1,935.0	5/22/2019	JF/OR
P52	1097	86	22.5	1,935.0	5/22/2019	JF/OR
P53	1097	59	22.5	1,327.5	5/22/2019	JF/OR
P54	1097	32	22.5	720.0	5/22/2019	JF/OR
P55	1097	30	22.5	675.0	5/22/2019	JF/OR
P56	1097	54	22.5	1,215.0	5/22/2019	JF/OR
P57	1097	70	22.5	1,575.0	5/22/2019	JF/OR
P58	4273	99	22.5	2,227.5	5/22/2019	JF/OR
P59	4273	99	22.5	2,227.5	5/22/2019	JF/OR
P60	4273	101	22.5	2,272.5	5/22/2019	JF/OR
P61	4273	102	22.5	2,295.0	5/22/2019	JF/OR
P62	1095	89	22.5	2,002.5	5/22/2019	JF/OR
P63	1095	87	22.5	1,957.5	5/22/2019	JF/OR
P64	1095	49	22.5	1,102.5	5/22/2019	JF/OR

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P65	1095	50	22.5	1,125.0	5/22/2019	JF/OR
P66	1095	50	22.5	1,125.0	5/22/2019	JF/OR
P67	1095	48	22.5	1,080.0	5/22/2019	JF/OR
CAP1	1097	51	5	255.0	5/23/2019	JF/OR
CAP2	1097	15	5	75.0	5/23/2019	JF/OR
TOTAL LINER PLACED (ft ²)				59,482.5		

Appendix F2. FML Deployment Log

PROJECT NAME: Sundance West, Area D

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P-1	1116	235	22.5	5,287.5	8/22/2019	MZ/JF
P-2	1116	252	22.5	5,670.0	8/22/2019	MZ/JF
P-3	1118	251	22.5	5,647.5	8/22/2019	MZ/JF
P-4	1118	109	12.5	1,362.5	8/22/2019	MZ/JF
P-5	1118	130	12.5	1,625.0	8/22/2019	MZ/JF
P-1	1120	245	22.5	5,512.5	8/23/2019	MZ/JF
P-2	1120	247	22.5	5,557.5	8/23/2019	MZ/JF
P-3	1117	243	22.5	5,467.5	8/23/2019	MZ/JF
P-4	1117	123	12.5	1,537.5	8/23/2019	MZ/JF
P-5	1117	112	12.5	1,400.0	8/23/2019	MZ/JF
TOTAL LINER PLACED (ft²)				39,067.5		

Appendix F3

Startup Welds and Destructive Field Test Records

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area A									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
6/3/19		Reuben	AM	7	850	6.0			P	136	133	131			Inside Outside AM
									P	121	123	125			
									S	158	160	159			
6/3/19		Reuben	AM	7	850	6.0			P	152	146	141			Inside Outside PM
									P	139	120	126			
									S	148	150	153			
6/4/19		Reuben	BC				295?		P	95	101	98			
									P						
									S	135	141	139			
6/3/19	A1	Reuben	SS	7	850	6.0			P	116	125	117	120	119	
									P	106	118	106	112	108	
									S	154	156	156	158	155	
6/3/19	A2	Reuben	SS	7	850	6.0			P	138	140	149	141	146	
									P	112	112	122	123	126	
									S	162	160	164	159	167	
6/3/19	A3	Reuben	SS	7	850	6.0			P	127	129	126	122	120	
									P	113	118	115	111	110	
									S	158	159	162	161	160	
6/3/19	A4	Reuben	SE	7	850	6.0			P	138	145	140	146	141	
									P	116	121	120	127	120	
									S	170	173	169	168	175	
6/3/19	A5	Reuben	SE	7	850	6.0			P	121	134	130	148	145	
									P	129	143	141	123	121	
									S	158	159	162	169	165	
6/3/19	A6	Reuben	SE	7	850	6.0			P	113	116	120	111	119	
									P	131	133	138	128	140	
									S	168	170	173	169	173	
6/3/19	A7	Reuben	AM	7	850	6.0			P	120	121	133	123	138	
									P	117	123	121	126	115	
									S	161	163	164	160	166	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area A									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
6/3/19	A8	Reuben	AM	7	850	6.0			P	134	129	139	133	130	
									P	110	118	119	121	114	
									S	165	167	169	169	161	
6/3/19	A9	Reuben	AM	7	850	6.0			P	143	142	139	138	140	
									P	111	118	119	111	113	
									S	157	159	157	155	159	
6/3/19	A10	Reuben	AM	7	850	6.0			P	137	122	137	125	126	
									P	122	120	122	123	119	
									S	158	159	161	163	167	
6/3/19	A11	Reuben	AM	7	850	6.0			P	139	138	140	142	140	
									P	117	116	119	121	119	
									S	164	161	159	165	168	
6/3/19	A12	Reuben	AM	7	850	6.0			P	150	148	153	146	143	
									P	124	120	127	118	116	
									S	160	163	157	159	159	
6/7/19		Reuben	AM	7	850	6.0			P	134	138	136			AM
									P	118	113	130			
									S	170	172	176			
6/7/19		Reuben	AM	8	850	6.0			P	137	138	137			PM
									P	139	128	139			
									S	160	166	155			
6/8/19	A13	Reuben	AM	7	850	6.5			P	154	124	122	121	128	
									P	117	116	117	114	118	
									S	167	169	170	175	176	
6/8/19	A14	Reuben	AM	7	850	6.5			P	153	145	128	130	150	
									P	128	137	116	120	126	
									S	167	169	171	172	176	
6/8/19	A156	Reuben	AM	8	850	6.5			P	149	157	158	150	147	
									P	115	124	135	121	118	
									S	169	170	172	174	176	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area A									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
6/8/19	A156	Reuben	AM	8	850	6.5			P	145	141	139	138	140	
									P	130	134	126	121	136	
									S	168	170	169	173	178	
6/8/19	A17	Reuben	AM	8	850	6.5			P	141	144	126	128	130	
									P	121	123	134	120	128	
									S	160	164	170	169	171	
6/8/19	A18	Reuben	AM	8	850	6.5			P	131	150	131	140	142	
									P	120	126	122	124	128	
									S	166	168	169	170	178	
6/10/19		Reuben	BE	2000			295	245	P	102	120	128			8:20
									P						
									S	168	169	173			
6/10/19		Reuben		7	850	6.0			P	147	137	135			Inside Inside Outside 15:20
									P	157	127	120			
									S	170	171	173			
6/11/19		Reuben	BE	2000			295		P	115	116	121			Inside; 8:20
									P						
									S	161	165	159			
6/11/19		Reuben	BE	2000			295		P	120	122	127			Inside; 16:00
									P						
									S	162	154	164			
6/11/19		Reuben	LC	6	850	6.0			P	130	120	124			Inside Outside
									P	132	130	136			
									S	164	160	158			
6/11/19		Reuben	LC	8	850	6.0			P	135	133	130			Inside Outside 15:16
									P	136	124	137			
									S	150	152	156			
6/12/19	A19	Reuben	LC	7	850	6.0			P	127	135	138	130	136	Inside Outside
									P	115	131	126	127	129	
									S	180	182	170	181	179	
6/12/19	A20	Reuben	LC	8	850	6.0			P	152	137	142	129	140	Inside Outside Shear
									P	129	147	133	135	131	
									S	175	177	179	180	178	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area B									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
5/7/19	TW 1346	AL	RL	7	850	5.0			P	114	114	117	121		
									P	121	129	121	134		
									S	158	147	147	143		
5/8/19	TW														
5/9/19	TW														
5/9/19	DT-1	RL	RL	7	850	6.5			P	159	152	149	151	156	P5-P7
									P	146	136	131	130	131	
									S	204	202	207	211	200	
5/9/19	DT-2	RL	SS	7	850	6.5			P	173	170	174	171	164	P10-P11
									P	179	131	135	136	135	
									S	206	209	206	203	206	
5/9/19	DT-3	RL	SS	7	850	6.5			P	176	184	170	175	170	P15-P16
									P	146	128	146	132	132	
									S	216	214	223	218	223	
5/9/19	DT-4	RL	SS	7	850	6.5			P	175	191	176	177	189	P19-P20
									P	140	143	140	137	138	
									S	210	218	216	215	212	
5/9/19	DT-5	RL	SS	7	850	6.5			P	173	171	165	171	169	P23-P24
									P	125	125	128	128	130	
									S	222	218	216	219	218	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area C									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
5/20/19		Reuben	AM	7	850	6			P	140	139	133			Inside Outside AM test
									P	134	117	120			
									S	156	150	157			
5/21/19		Reuben	AM	7	850	6			P	120	130	138			Inside Outside AM test
									P	108	115	127			
									S	167	169	171			
5/22/19		Reuben	AM	7	850	6			P	121	114	125			Inside Outside PM test
									P	116	111	115			
									S	155	151	159			
5/23/19		Reuben	BE	2000				290	P	115	113	118			Inside 8:00 AM
									P						
									S	150	145	151			
5/21/19		Reuben	BE	2000				295	P	121	125	130			Inside 12:35 PM
									P						
									S	151	156	154			
5/23/19	6	Reuben	AM	7	850	6			P	135	139	135	135	139	Inside Outside
									P	125	123	126	124	125	
									S	173	171	171	170	175	
5/23/19	7	Reuben	AM	7	850	6			P	140	139	145	125	138	Inside
									P	128	115	119	131	138	
									S	155	151	150	155	151	
5/23/19	8	Reuben	AM	7	850	6			P	120	127	123	123	121	Inside
									P	108	118	120	121	119	
									S	143	145	150	143	151	
5/23/19	9	Reuben	AM	7	850	6			P	132	128	128	120	121	Inside
									P	115	119	116	110	109	
									S	155	153	150	155	153	
5/23/19	10	Reuben	AM	7	850	6			P	136	133	143	140	138	
									P	120	121	126	131	125	
									S	158	156	149	151	153	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area C									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
5/23/19	11	Reuben	AM	7	850	6			P						
									P						
									S						
5/23/19	11-Top	Reuben							P	131	132	127	128	130	P-38-P61
									P	118	111	121	122	118	
									S	146	140	141	139	140	
5/23/19	TW/Patch	Reuben	AM	7	850	5	-	-	P	130	117	117			Seam test, For stack HP, Patch at DT11
									P	115	115	111			
									S	147	143	140			
5/23/19	11 bottom	Reuben							P	123	126	134	123	124	
									P	119	124	121	116	116	
									S	140	141	142	140	139	

Appendix F3. FML Destructive Field Test Record

PROJECT INFORMATION									PROJECT SPECIFICATIONS						
Project Name: Sundance West - Area D									Fusion Weld	Textured: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Location: Eunice, NM										Smooth: PEEL 98 lbs/in SHEAR 121 lbs/in					
Project Number: DB18.1209.00									Extrusion Weld	Textured: PEEL 78 lbs/in SHEAR 121 lbs/in					
Contractor: Falcon Environmental Lining Systems										Smooth: PEEL 78 lbs/in SHEAR 121 lbs/in					
Date	DT #	Tester's Initials	Welder's Initials	Machine #	Wedge Welds		Extrusion Welds		Test Type	Field Test Results (lbs/in)					Comments
					Temp (°F)	Speed (ft/min)	Barrel Temp (°F)	Pre-Heat Temp (°F)		Test #1	Test #2	Test #3	Test #4	Test #5	
8/22/19		Reuben	RL	9	850	5.0			P	134	135	132			Inside Outside PM
									P	138	139	134			
									S	151	156	153			
8/22/19		Reuben	BE	2			290		P	120	115	112			EXT PM
									P						
									S	160	165	161			
8/22/19	DT-1	Reuben	RL	9	850	5.0			P	139	139	120	131	120	Inside Outside PM
									P	124	122	125	126	130	
									S	160	156	162	163	165	
8/23/19		Reuben	RL	9	850	5.0			P	116	124	120			Inside Outside PM
									P	124	123	124			
									S	139	141	143			
8/23/19		Reuben	BE	2			295		P	122	119	117			EXT
									P						
									S	149	141	140			
8/23/19	DT-2	Reuben	RL	9	850	5.0			P	114	113	114	114	120	
									P	118	119	122	120	116	
									S	147	146	154	148	148	

Appendix F4

Geomembrane Seam Pressure Test Records

Appendix F4. FML Seam Pressure Test Log

Project Specifications	
PROJECT NAME: Sundance West, Area A	PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental
Min Start psi: 30	
Test Duration: 5 min.	
Max pressure drop: 5 psi	

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
6/4/2019	P7-P9	RL	0806	0811	30	30	BC	Pass
6/4/2019	P9-P8	RL	0804	0809	30	30	BC	Pass
6/4/2019	P7-P8	RL	0802	0807	30	30	BC	Pass
6/4/2019	P1-P3	RL	0732	0737	30	30	BC	Pass
6/4/2019	P1-P3	RL	0730	0735	30	30	BC	Pass
6/4/2019	P1-P2	RL	0736	0741	30	30	BC	Pass
6/4/2019	P2-P3	RL	0734	0739	30	30	BC	Pass
6/4/2019	P2-P4	RL	0740	0745	30	30	BC	Pass
6/4/2019	P3-P4	RL	0738	0743	30	30	BC	Pass
6/4/2019	P4-P5	RL	0749	0754	30	30	BC	Pass
6/4/2019	P3-P5	RL	0747	0752	30	30	BC	Pass
6/4/2019	P4-P6	RL	0755	0800	30	30	BC	Pass
6/4/2019	P5-P6	RL	0753	0758	30	30	BC	Pass
6/4/2019	P6-P7	RL	0758	0803	30	30	BC	Pass
6/4/2019	P9-P10	RL	0812	0817	30	30	BC	Pass
6/4/2019	P8-P10	RL	0815	0820	30	30	BC	Pass
6/4/2019	P9-P10	RL	0823	0828	30	30	BC	Pass
6/4/2019	P9-P11	RL	0821	0826	30	30	BC	Pass
6/4/2019	P11-P10	RL	0825	0830	30	30	BC	Pass
6/4/2019	P11-P12	RL	0819	0824	30	30	BC	Pass
6/4/2019	P10-P12	RL	0817	0822	30	30	BC	Pass
6/4/2019	P12-P13	RL	0830	0835	30	30	BC	Pass
6/4/2019	P13-P15	RL	0839	0844	30	30	BC	Pass
6/4/2019	P15-P14	RL	0836	0841	30	30	BC	Pass
6/4/2019	P14-P16	RL	0844	0849	30	28	BC	Pass
6/4/2019	P15-P16	RL	0842	0847	30	29	BC	Pass
6/4/2019	P15-P16	RL	0847	0852	30	30	BC	Pass
6/4/2019	P15-P17	RL	0848	0853	30	28	BC	Pass
6/4/2019	P17-P16	RL	0850	0855	30	28	BC	Pass
6/4/2019	P17-P18	RL	0857	0902	30	29	BC	Pass
6/4/2019	P16-P18	RL	0849	0854	30	30	BC	Pass
6/4/2019	P18-P19	RL	0859	0904	30	28	BC	Pass
6/4/2019	P18-P20	RL	0903	0908	30	29	BC	Pass
6/4/2019	P20-P19	RL	0901	0906	30	30	BC	Pass
6/4/2019	P19-P21	RL	0906	0911	30	30	BC	Pass
6/4/2019	P20-P21	RL	0912	0917	30	28	BC	Pass
6/4/2019	P20-P22	RL	0914	0919	30	28	BC	Pass
6/4/2019	P22-P21	RL	0908	0913	30	30	BC	Pass
6/4/2019	P21-P23	RL	0916	0921	30	29	BC	Pass

Appendix F4. FML Seam Pressure Test Log

Project Specifications	
PROJECT NAME: Sundance West, Area A	PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental
Min Start psi: 30	
Test Duration: 5 min.	
Max pressure drop: 5 psi	

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
6/4/2019	P22-P23	RL	0910	0915	30	29	BC	Pass
6/8/2019	P23-P24	RL	0740	0745	30	29	BC	Pass
6/8/2019	P24-P26	RL	0742	0747	30	30	BC	Pass
6/8/2019	P26-P28	RL	0744	0749	30	28	BC	Pass
6/8/2019	P28-P29	RL	0745	0750	30	29	BC	Pass
6/8/2019	P29-P30	RL	0803	0808	30	28	BC	Pass
6/8/2019	P30-P32	RL	0805	0810	30	29	BC	Pass
6/8/2019	P26-P25	RL	0747	0752	30	29	BC	Pass
6/8/2019	P24-P25	RL	0750	0755	30	30	BC	Pass
6/8/2019	P25-P27	RL	0748	0753	30	28	BC	Pass
6/8/2019	P32-P31	RL	0819	0824	30	30	BC	Pass
6/8/2019	P30-P31	RL	0818	0823	30	29	BC	Pass
6/8/2019	P31-P33	RL	0821	0826	30	28	BC	Pass
6/8/2019	P31-P33	RL	0827	0832	30	29	BC	Pass
6/8/2019	P31-P33	RL	0828	0833	30	30	BC	Pass
6/8/2019	P32-P34	RL	0806	0811	30	30	BC	Pass
6/8/2019	P34-P33	RL	0812	0817	30	30	BC	Pass
6/8/2019	P32-P33	RL	0810	0815	30	29	BC	Pass
6/8/2019	P28-P27	RL	0758	0803	30	29	BC	Pass
6/8/2019	P26-P27	RL	0757	0802	30	28	BC	Pass
6/8/2019	P27-P29	RL	0800	0805	30	29	BC	Pass
6/8/2019	P13-P14	RL	0835	0840	30	30	BC	Pass
6/8/2019	P13-P14	RL	0837	0842	30	30	BC	Pass
6/11/2019	P35-P36	RL	0720	0725	30	29	JF	Pass
6/11/2019	P35-P17	RL	0722	0727	30	30	JF	Pass
6/11/2019	P18-P35	RL	0723	0728	30	29	JF	Pass
6/11/2019	P20-P35	RL	0730	0735	30	29	JF	Pass
6/11/2019	P22-P35	RL	0732	0737	30	30	JF	Pass
6/11/2019	P23-P35	RL	0739	0744	30	30	JF	Pass
6/11/2019	P23-P35	RL	0741	0746	30	29	JF	Pass
6/11/2019	P24-P35	RL	0750	0755	30	29	JF	Pass
6/11/2019	P26-P35	RL	0752	0757	30	30	JF	Pass
6/11/2019	P28-P35	RL	0754	0759	30	30	JF	Pass
6/11/2019	P30-P35	RL	0756	0801	30	28	JF	Pass
6/11/2019	P32-P35	RL	0803	0808	30	29	JF	Pass
6/11/2019	P34-P35	RL	0805	0810	30	28	JF	Pass
6/11/2019	P36-P67	RL	0911	0916	30	29	JF	Pass
6/11/2019	P36-P67	RL	0913	0918	30	28	JF	Pass
6/11/2019	P1-P37	RL	1600	1605	30	29	JF	Pass

Appendix F4. FML Seam Pressure Test Log**Project Specifications**

PROJECT NAME: Sundance West, Area A	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 5 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
6/11/2019	P3-P37	RL	1601	1606	30	30	JF	Pass
6/11/2019	P5-P37	RL	1607	1612	30	30	JF	Pass
6/11/2019	P6-P37	RL	1608	1613	30	30	JF	Pass
6/11/2019	P7-P37	RL	1609	1614	30	30	JF	Pass
6/11/2019	P9-P37	RL	1610	1615	30	30	JF	Pass
6/11/2019	P11-P37	RL	1612	1617	30	29	JF	Pass
6/11/2019	P12-P37	RL	1613	1618	30	30	JF	Pass
6/11/2019	P13-P37	RL	1615	1620	30	30	JF	Pass
6/11/2019	P15-P37	RL	1616	1621	30	30	JF	Pass
6/11/2019	P35-P37	RL	1619	1624	30	28	JF	Pass
6/11/2019	P36-P38	RL	1621	1626	30	28	JF	Pass
6/11/2019	P37-P38	RL	1618	1623	30	28	JF	Pass

Appendix F4. FML Seam Pressure Test Log

Project Specifications

PROJECT NAME: Sundance West, Area B	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 3 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
5/9/2019	P34-P33	RL	1140	1145	30	30	MZ	Pass
5/9/2019	P34-P33	RL	1138	1143	30	30	MZ	Pass
5/9/2019	P34-P33	RL	1136	1141	40	40	MZ	Pass
5/9/2019	P34-P32	RL	1134	1139	30	30	MZ	Pass
5/9/2019	P33-P12	RL	1130	1135	30	30	MZ	Pass
5/9/2019	P33-P32	RL	1132	1137	30	30	MZ	Pass
5/9/2019	P32-P12	RL	1133	1138	30	30	MZ	Pass
5/9/2019	P32-P11	RL	1147	1152	30	30	MZ	Pass
5/9/2019	P32-P31	RL	1149	1152	30	30	MZ	Pass
5/9/2019	P31-P11	RL	1151	1154	30	30	MZ	Pass
5/9/2019	P12-P13	RL	1128	1133	30	30	MZ	Pass
5/9/2019	P11-P12	RL	1145	1150	30	30	MZ	Pass
5/9/2019	P10-P11	RL	1154	1159	30	30	MZ	Pass
5/9/2019	P31-P10	RL	1158	1103	30	30	MZ	Pass
5/9/2019	P31-P30	RL	1258	1304	30	30	MZ	Pass
5/9/2019	P30-P10	RL	1300	1305	30	30	MZ	Pass
5/9/2019	P8-P10	RL	1302	1307	30	30	MZ	Pass
5/9/2019	P30-P8	RL	1303	1308	30	30	MZ	Pass
5/9/2019	P30-P29	RL	1331	1336	30	30	MZ	Pass
5/9/2019	P30-P29	RL	1332	1337	30	30	MZ	Pass
5/9/2019	P29-P8	RL	1304	1309	30	30	MZ	Pass
5/9/2019	P8-P7	RL	1305	1310	30	30	MZ	Pass
5/9/2019	P29-P7	RL	1307	1312	30	30	MZ	Pass
5/9/2019	P29-P28	RL	1346	1351	30	30	MZ	Pass
5/9/2019	P28-P7	RL	1341	1346	30	30	MZ	Pass
5/9/2019	P1-P7	RL	1358	1403	30	30	MZ	Pass
5/9/2019	P28-P1	RL	1356	1401	30	30	MZ	Pass
5/9/2019	P28-P27	RL	1351	1356	30	28	MZ	Pass
5/9/2019	P27-P1	RL	1359	1402	30	30	MZ	Pass
5/9/2019	P27-P26	RL	1359	1404	30	30	MZ	Pass
5/9/2019	P26-P1	RL	1401	1406	30	30	MZ	Pass
5/9/2019	P1-P2	RL	1413	1418	30	30	MZ	Pass
5/9/2019	P1-P2	RL	1410	1415	30	30	MZ	Pass
5/9/2019	P2-P7	RL	1416	1421	30	30	MZ	Pass
5/9/2019	P2-P3	RL	1417	1422	30	30	MZ	Pass
5/9/2019	P3-P7	RL	1419	1424	30	30	MZ	Pass
5/9/2019	P3-P4	RL	1418	1423	30	30	MZ	Pass
5/9/2019	P3-P4	RL	1420	1425	30	30	MZ	Pass
5/9/2019	P4-P7	RL	1426	1431	30	30	MZ	Pass
5/9/2019	P4-P5	RL	1425	1430	30	29	MZ	Pass
5/9/2019	P5-P7	RL	1422	1427	30	30	MZ	Pass
5/9/2019	P5-P6	RL	1427	1432	30	30	MZ	Pass

Appendix F4. FML Seam Pressure Test Log**Project Specifications**

PROJECT NAME: Sundance West, Area B	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 3 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
5/9/2019	P6-P7	RL	1423	1428	30	30	MZ	Pass
5/9/2019	P7-P9	RL	1429	1434	30	30	MZ	Pass
5/9/2019	P9-P8	RL	1430	1435	30	30	MZ	Pass
5/9/2019	P9-P10	RL	1431	1436	30	30	MZ	Pass
5/9/2019	P14-P13	RL	1437	1442	30	30	MZ	Pass
5/9/2019	P14-P15	RL	1439	1444	30	30	MZ	Pass
5/9/2019	P13-P15	RL	1509	1514	30	30	MZ	Pass
5/9/2019	P15-P16	RL	1510	1515	30	30	MZ	Pass
5/9/2019	P16-P17	RL	1511	1516	30	30	MZ	Pass
5/9/2019	P17-P18	RL	1512	1517	30	30	MZ	Pass
5/9/2019	P18-P19	RL	1513	1518	30	30	MZ	Pass
5/9/2019	P18-P20	RL	1515	1520	30	30	MZ	Pass
5/9/2019	P20-P21	RL	1516	1521	30	30	MZ	Pass
5/9/2019	P21-P22	RL	1517	1522	30	30	MZ	Pass
5/9/2019	P22-P23	RL	1518	1523	30	30	MZ	Pass
5/9/2019	P23-P24	RL	1521	1526	30	30	MZ	Pass
5/9/2019	P24-P25	RL	1514	1524	30	30	MZ	Pass
5/9/2019	P24-P25	RL	1525	1530	30	30	MZ	Pass

Appendix F4. FML Seam Pressure Test Log

Appendix F4. FML Seam Pressure Test Log		Project Specifications
PROJECT NAME: Sundance West, Area C	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 5 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
5/21/2019	P47 - P50	RL	1306	1311	30	30	OR	Pass
5/21/2019	P50 - P49	RL	1308	1313	30	30	OR	Pass
5/21/2019	P46 - P47	RL	1310	1315	30	30	OR	Pass
5/21/2019	P47 - P49	RL	1309	1314	30	30	OR	Pass
5/21/2019	P47 - P49	RL	1312	1317	30	30	OR	Pass
5/21/2019	P46 - P49	RL	1314	1319	30	30	OR	Pass
5/21/2019	P46 - P48	RL	1318	1323	30	30	OR	Pass
5/21/2019	P45 - P46	RL	1316	1321	30	30	OR	Pass
5/21/2019	P45 - P48	RL	1320	1325	30	30	OR	Pass
5/21/2019	P44 - P48	RL	1319	1324	30	30	OR	Pass
5/21/2019	P44 - P45	RL	1322	1327	30	30	OR	Pass
5/21/2019	P44 - P45	RL	1324	1329	30	30	OR	Pass
5/21/2019	P35 - P45	RL	1325	1330	30	30	OR	Pass
5/21/2019	P35 - P44	RL	1328	1333	30	30	OR	Pass
5/21/2019	P44 - P43	RL	1326	1331	30	30	OR	Pass
5/21/2019	P35 - P43	RL	1337	1342	30	30	OR	Pass
5/21/2019	P42 - P43	RL	1335	1340	30	30	OR	Pass
5/21/2019	P35 - P42	RL	1342	1347	30	28	OR	Pass
5/21/2019	P41 - P42	RL	1347	1352	30	30	OR	Pass
5/21/2019	P35 - P41	RL	1350	1355	30	30	OR	Pass
5/21/2019	P34 - P41	RL	1353	1358	30	30	OR	Pass
5/21/2019	P34 - P41	RL	1356	1401	30	30	OR	Pass
5/21/2019	P32 - P41	RL	1359	1404	30	30	OR	Pass
5/21/2019	P31 - P41	RL	1402	1407	30	30	OR	Pass
5/21/2019	P35 - P34	RL	1412	1417	30	30	OR	Pass
5/21/2019	P33 - P35	RL	1413	1418	30	30	OR	Pass
5/21/2019	P13 - P33	RL	1418	1423	30	30	OR	Pass
5/21/2019	P13 - P35	RL	1424	1429	30	30	OR	Pass
5/21/2019	P15 - P25	RL	1426	1431	30	30	OR	Pass
5/21/2019	P15 - P36	RL	1430	1435	30	30	OR	Pass
5/21/2019	P35 - P36	RL	1420	1425	30	30	OR	Pass
5/21/2019	P16 - P36	RL	1431	1436	30	30	OR	Pass
5/21/2019	P36 - P37	RL	1432	1437	30	30	OR	Pass
5/21/2019	P16 - P37	RL	1433	1438	30	30	OR	Pass
5/21/2019	P17 - P37	RL	1434	1439	30	30	OR	Pass
5/21/2019	P37 - P38	RL	1445	1450	30	30	OR	Pass
5/21/2019	P17 - P38	RL	1440	1445	30	30	OR	Pass
5/21/2019	P18 - P38	RL	1442	1447	30	30	OR	Pass
5/21/2019	P36 - P27	RL	1453	1458	30	30	OR	Pass

Appendix F4. FML Seam Pressure Test Log

Appendix F4. FML Seam Pressure Test Log		Project Specifications
PROJECT NAME: Sundance West, Area C	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 5 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
5/21/2019	P40 - P39	RL	1451	1456	30	30	OR	Pass
5/21/2019	P38 - P40	RL	1447	1452	30	30	OR	Pass
5/21/2019	P37 - P40	RL	1448	1453	30	30	OR	Pass
5/23/2019	P53 - P54	RL	0708	0713	30	30	OR	Pass
5/23/2019	P54 - P55	RL	0706	0711	30	30	OR	Pass
5/23/2019	P55 - P56	RL	0710	0715	30	30	OR	Pass
5/23/2019	P53 - P56	RL	0728	0733	30	30	OR	Pass
5/23/2019	P56 - P57	RL	0730	0735	30	30	OR	Pass
5/23/2019	P52 - P57	RL	0738	0743	30	30	OR	Pass
5/23/2019	P57 - P58	RL	0739	0744	30	30	OR	Pass
5/23/2019	P52 - P53	RL	0740	0745	30	30	OR	Pass
5/23/2019	P52 - P57	RL	0741	0746	30	30	OR	Pass
5/23/2019	P51 - P57	RL	0747	0752	30	30	OR	Pass
5/23/2019	P54 - P40	RL	0749	0754	30	30	OR	Pass
5/23/2019	P59-P60	RL	812	817	30	30	OR	Pass
5/23/2019	P40-P60	RL	809	814	30	30	OR	Pass
5/23/2019	P59-P60	RL	815	820	30	30	OR	Pass
5/23/2019	P60-P39	RL	817	822	30	30	OR	Pass
5/23/2019	P60-P61	RL	819	824	30	30	OR	Pass
5/23/2019	P60-P61	RL	821	826	30	30	OR	Pass
5/23/2019	P38-P61	RL	823	828	30	30	OR	Pass
5/23/2019	P61-P62	RL	828	833	30	30	OR	Pass
5/23/2019	P38-P62	RL	830	835	30	30	OR	Pass
5/23/2019	P63-P62	RL	831	839	30	30	OR	Pass
5/23/2019	P38-P63	RL	844	849	30	30	OR	Pass
5/23/2019	P62-P63	RL	837	842	30	30	OR	Pass
5/23/2019	P18-P63	RL	848	853	30	30	OR	Pass
5/23/2019	P19-P63	RL	853	858	30	30	OR	Pass
5/23/2019	P20-P63	RL	916	921	30	30	OR	Pass
5/23/2019	P20-P63	RL	918	923	30	30	OR	Pass
5/23/2019	P21-P63	RL	920	935	30	30	OR	Pass
5/23/2019	P22-P63	RL	922	927	30	30	OR	Pass
5/23/2019	P63-P69	RL	928	933	30	30	OR	Pass
5/23/2019	P62-P64	RL	932	937	30	30	OR	Pass
5/23/2019	P61-P64	RL	934	939	30	30	OR	Pass
5/23/2019	P64-P22	RL	930	935	30	30	OR	Pass
5/23/2019	P23-P64	RL	940	946	30	30	OR	Pass
5/23/2019	P64-P65	RL	940	945	30	30	OR	Pass
5/23/2019	P23-P64	RL	947	952	30	30	OR	Pass

Appendix F4. FML Seam Pressure Test Log

Appendix F4. FML Seam Pressure Test Log		Project Specifications
PROJECT NAME: Sundance West, Area C	PROJECT LOCATION: Eunice, NM	Min Start psi: 30
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental	Test Duration: 5 min.
		Max pressure drop: 5 psi

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
5/23/2019	P24-P65	RL	954	959	30	30	OR	Pass
5/23/2019	P65-P66	RL	948	953	30	30	OR	Pass
5/23/2019	P24-P66	RL	956	1000	30	30	OR	Pass
5/23/2019	P25-P66	RL	1000	1005	30	30	OR	Pass
5/23/2019	P24-P65	RL	1000	1005	30	30	OR	Pass

Appendix F4. FML Seam Pressure Test Log

Project Specifications	
PROJECT NAME: Sundance West, Area D	PROJECT LOCATION: Eunice, NM
PROJECT NUMBER: DB18.1209.00	INSTALLED BY: Falcon Environmental
Min Start psi: 30	
Test Duration: 5 min.	
Max pressure drop: 5 psi	

Date	Panel #s Top-Bottom	Tester Initials	Time		Pressure (psi)		Observed By	Pass/Fail
			Start	Finish	Start	Finish		
8/22/2019	P1-P2	RM	15:43	15:48	30	30	MZ/JF	Pass
8/22/2019	P2-P3	RM	15:45	15:50	30	30	MZ/JF	Pass
8/22/2019	P3-P4	RM	15:06	15:11	30	30	MZ/JF	Pass
8/22/2019	P3-P5	RM	15:23	15:28	30	30	MZ/JF	Pass
8/22/2019	P4-P5	RM	15:08	3:13	30	30	MZ/JF	Pass
Top Liner								
8/23/2019	P1-P2	RM	14:01	14:06	30	30	MZ/JF	Pass
8/23/2019	P2-P3	RM	14:15	14:20	30	30	MZ/JF	Pass
8/23/2019	P3-P5	RM	14:45	14:50	30	30	MZ/JF	Pass
8/23/2019	P4-P5	RM	14:22	14:27	30	30	MZ/JF	Pass
8/23/2019	P3-P4	RM	14:36	0752	30	30	MZ/JF	Pass

Appendix F5

Geomembrane Repair Logs

Appendix F5. FML Seam Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Patch Size (ft)	Repair Tech	Number of Leaks	Testing Tech	Date Accepted	Observed By
R1	6/4/2019	P1-P2			BE	0	Reuben	6/4/2019	BC
R2	6/4/2019	P1-P2-P3	T-seam		BE	0	Reuben	6/4/2019	BC
R3	6/4/2019	P1-P2	DTA1		BE	0	Reuben	6/4/2019	BC
R4	6/4/2019	P2-P3-P4	T-seam		BE	0	Reuben	6/4/2019	BC
R5	6/4/2019	P3-P4-P5	T-seam		BE	0	Reuben	6/4/2019	BC
R6	6/4/2019	P3-P5	DTA2	2x3	BE	1 (fixed)	BS	6/4/2019	BC
R7	6/4/2019	P4-P5-P6	T-seam		BE	0	BS	6/4/2019	BC
R8	6/4/2019	P4-P5-P6	DTA3		BE	0	BS	6/4/2019	BC
R9	6/4/2019	P5-P6	DTA4		BE	0	BS	6/4/2019	BC
R10	6/4/2019	P7-P9	DTA5		BE	0	BS	6/4/2019	BC
R11	6/4/2019	P7-P10-P8	T-seam		BE	0	BS	6/4/2019	BC
R12	6/4/2019	P8-P10	East end	2x8	BE	0	BS	6/4/2019	BC
R13	6/4/2019	P8-P10	DTA6	2.5x4	BE	0	BS	6/4/2019	BC
R14	6/4/2019	P9-P8-P10	T-seam	2' circle	BE	0	BS	6/4/2019	BC
R15	6/4/2019	P9-P11-P10	T-seam	2' circle	BE	0	BS	6/4/2019	BC
R16	6/4/2019	P11-P10-P12	T-seam	2x4	BE	0	BS	6/4/2019	BC
R17	6/4/2019	P12-P13	DTA7	2.5x4	BE	0	BS	6/4/2019	BC
R18	6/4/2019	P13-P15	DTA8	3x4	BE	0	BS	6/4/2019	BC
R19	6/4/2019	P13-P15-P14	T-seam	2.5' circle	BE	0	BS	6/4/2019	BC
R20	6/4/2019	P15-P14-P16	T-seam	2' circle	BE	0	BS	6/4/2019	BC
R21	6/4/2019	P15-P16	DTA9	2.5x4	BE	0	BS	6/4/2019	BC
R22	6/4/2019	P15-P17-P16	T-seam	2.5x4	BE	0	BS	6/4/2019	BC
R23	6/4/2019	P17-P16-P18	T-seam	1.5' circle	BE	0	BS	6/4/2019	BC
R24	6/4/2019	P17-P18	DTA10	2.5x5	BE	0	BS	6/4/2019	BC
R25	6/4/2019	P18-P20-P19	T-seam	1' circle	BE	0	BS	6/4/2019	BC
R26	6/4/2019	P20-P19-P21	T-seam	1.5' circle	BE	0	BS	6/4/2019	BC
R27	6/4/2019	P19-P21	dta11	2.5x5	BE	0	BS	6/4/2019	BC
R28	6/4/2019	P21-P23	dta12	2x5	BE	0	BS	6/4/2019	BC
R29	6/4/2019	P22-P21-P23	T-seam	1.5' circle	BE	0	BS	6/4/2019	BC
R30	6/4/2019	P20-P22-P21	T-seam	1.5x4	BE	0	BS	6/4/2019	BC
R31	6/4/2019	P19-P21	seam	1.5x2	BE	0	BS	6/4/2019	BC
R32	6/4/2019	P23-P21	seam	1.5x1.5	BE	0	BS	6/4/2019	BC
R33	6/7/2019	P23-P24	DTA13	2x5	BE	0	BS	6/8/2019	BC
R34	6/7/2019	P24-P25-P26	T-seam	2' circle	BE	0	BS	6/8/2019	BC
R35	6/7/2019	P26-P25-P27	T-seam	1x2 oval	BE	0	BS	6/8/2019	BC
R36	6/7/2019	P26-P27-P28	T-seam	1.5' circle	BE	0	BS	6/8/2019	BC
R37	6/7/2019	P27-P28-P29	T-seam	1.5' circle	BE	0	BS	6/8/2019	BC
R38	6/7/2019	P24-P25	DTA14	2x5	BE	0	BS	6/8/2019	BC
R39	6/7/2019	P28-P29	DTA15		BE	0	BS	6/8/2019	BC
R40	6/7/2019	P29-P30	DTA16	2x5	BE	0	BS	6/8/2019	BC
R41	6/7/2019	P30-P31-P32	T-seam	2.5' circle	BE	0	BS	6/8/2019	BC
R42	6/7/2019	P30-P32	DTA17	2x4	BE	0	BS	6/8/2019	BC

Appendix F5. FML Seam Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Patch Size (ft)	Repair Tech	Number of Leaks	Testing Tech	Date Accepted	Observed By
R43	6/7/2019	P31-P32-P33	T-seam	2' circle	BE	0	BS	6/8/2019	BC
R44	6/7/2019	P32-P34	DTA18	2x5	BE	0	BS	6/8/2019	TH
R45	6/7/2019	P32-P33-P34	T-seam	2' circle	BE	0	BS	6/8/2019	TH
R46	6/8/2019	P31-P33	seam	1.5' circle	BE	0	BS	6/8/2019	BC
R47	6/8/2019	P31-P33	seam	3x2.5	BE	0	BS	6/8/2019	BC
R48	6/8/2019	P31-P33	seam	over EAT	BE	0	BS	6/8/2019	BC
R49	6/8/2019	P30-P31	fused seam		BE	0	BS	6/8/2019	BC
R50	6/8/2019	P29-P30	seam	on EAT	BE	0	BS	6/8/2019	BC
R51	6/8/2019	P27-P29	seam	on EAT	BE	0	BS	6/8/2019	BC
R52	6/8/2019	P25-P27	seam	on EAT	BE	0	BS	6/8/2019	BC
R53	6/8/2019	P24-P25	seam	on EAT	BE	0	BS	6/8/2019	BC
R54	6/11/2019	P17-P18-P35	T-seam		BE	0	DE	6/11/2019	JF/OR
R55	6/11/2019	P18-P20-P35	T-seam		BE	0	DE	6/11/2019	JF/OR
R56	6/11/2019	P20-P22-P35	T-seam		BE	0	DE	6/11/2019	JF/OR
R57	6/11/2019	P22-P23-P35	T-seam		BE	0	DE	6/11/2019	JF/OR
R58	6/11/2019	P23-P24-P35	T-seam		BE	0	DE	6/11/2019	JF/OR
R59	6/11/2019	P24-P26-P35	T-seam		BE	0	DE	6/11/2019	OR
R60	6/11/2019	P26-P25	DTA19		BE	0	DE	6/11/2019	OR
R61	6/11/2019	P26-P28-P35	T-seam		BE	0	DE	6/11/2019	OR
R62	6/11/2019	P28-P29-P35	T-seam		BE	0	DE	6/11/2019	OR
R63	6/11/2019	P29-P30-P35	T-seam		BE	0	DE	6/11/2019	OR
R64	6/11/2019	P30-P32-P35	T-seam		BE	0	DE	6/11/2019	OR
R65	6/11/2019	P32-P34-P35	T-seam		BE	0	DE	6/11/2019	OR
R66	6/11/2019	P67(B)-P36(A)	T-seam	On WAT	BE	0	DE	6/11/2019	JF/OR
R67	6/11/2019	P67-P26	seam		BE	0	DE	6/11/2019	OR
R68	6/11/2019	P67-P36	T-seam		BE	0	DE	6/11/2019	OR
R69	6/12/2019	P1-P3-P37	T-seam		BE	0	DE	6/12/2019	OR
R70	6/12/2019	P3-P5-P37	T-seam		BE	0	DE	6/12/2019	OR
R71	6/12/2019	P5-P6-P37	T-seam		BE	0	DE	6/12/2019	OR
R72	6/12/2019	P6-P7-P37	T-seam		BE	0	DE	6/12/2019	OR
R73	6/12/2019	P7-P9-P37	T-seam		BE	0	DE	6/12/2019	OR
R74	6/12/2019	P9-P11-P37	T-seam		BE	0	DE	6/12/2019	OR
R75	6/12/2019	P11-P12-P37	T-seam		BE	0	DE	6/12/2019	OR
R76	6/12/2019	P12-P13-P37	T-seam		BE	0	DE	6/12/2019	OR
R77	6/12/2019	P13-P15-P37	T-seam		BE	0	DE	6/12/2019	OR
R78	6/12/2019	P15-17-35-37	cross seam		BE	0	DE	6/12/2019	OR
R79	6/12/2019	P35-36-37-38	cross seam		BE	0	DE	6/12/2019	OR
R80	6/12/2019	P37-P38	DTA20		BE	0	DE	6/12/2019	OR
R81	6/12/2019	P37-P18	seam		BE	0	DE	6/12/2019	OR
R82	6/12/2019	P1-P37	seam		BE	0	DE	6/12/2019	OR

Appendix F5. FML Seam Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area B

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Repair Tech	Number of Leaks	Testing Tech	Date Accepted
R1	5/9/2019	P34-P33	Patch	BE	0	RM	5/10/2019
R2	5/9/2019	P34-P33	Patch	BE	0	RM	5/10/2019
R3	5/9/2019	P34-P33-P32	T-seam	BE	0	RM	5/10/2019
R4	5/9/2019	P33-P13-P12	T-seam	BE	0	RM	5/10/2019
R5	5/9/2019	P33-P32-P12	T-seam	BE	0	RM	5/10/2019
R6	5/9/2019	P32-P12-P11	T-seam	BE	0	RM	5/10/2019
R7	5/9/2019	P32-P31-P11	T-seam	BE	0	RM	5/10/2019
R8	5/9/2019	P31-P10-P11	T-seam	BE	0	RM	5/10/2019
R9	5/9/2019	P31-P30-P10	T-seam	BE	0	RM	5/10/2019
R10	5/9/2019	P30-P8-P10	T-seam	BE	0	RM	5/10/2019
R11	5/9/2019	P30-P29-P8	T-seam	BE	0	RM	5/10/2019
R12	5/9/2019	P30-P29	Patch	BE	0	RM	5/10/2019
R13	5/9/2019	P29-P8-P7	T-seam	BE	0	RM	5/10/2019
R14	5/9/2019	P29-P28P-P7	T-seam	BE	0	RM	5/10/2019
R15	5/9/2019	P28-P1-P7	T-seam	BE	0	RM	5/10/2019
R16	5/9/2019	P28-P27-P1	T-seam	BE	0	RM	5/10/2019
R17	5/9/2019	P27-P26-P1	T-seam	BE	0	RM	5/10/2019
R18	5/9/2019	P1-P2	Patch	BE	0	RM	5/10/2019
R19	5/9/2019	P1-P2-P7	T-seam	BE	0	RM	5/10/2019
R20	5/9/2019	P2-P3-P7	T-seam	BE	0	RM	5/10/2019
R21	5/9/2019	P3-P4-P7	T-seam	BE	0	RM	5/10/2019
R22	5/9/2019	P3-P4	Patch	BE	0	RM	5/10/2019
R23	5/9/2019	P4-P5-P7	T-seam	BE	0	RM	5/10/2019
R24	5/9/2019	P5-P7	DT-1	BE	0	RM	5/10/2019
R25	5/9/2019	P5-P6-P7	T-seam	BE	0	RM	5/10/2019
R26	5/9/2019	P7-P9-P8	T-seam	BE	0	RM	5/10/2019
R27	5/9/2019	P9-P8-P10	T-seam	BE	0	RM	5/10/2019
R28	5/9/2019	P10-P11	DT-2	BE	0	RM	5/10/2019
R29	5/9/2019	P11-P12	Patch	BE	0	RM	5/10/2019
R30	5/9/2019	P12-P13-P14	T-seam	BE	0	RM	5/10/2019
R31	5/9/2019	P14-P13-P15	T-seam	BE	0	RM	5/10/2019
R32	5/9/2019	P15-P16	DT-3	BE	0	RM	5/10/2019
R33	5/9/2019	P6-P7	Patch	BE	0	RM	5/10/2019
R34	5/9/2019	P19-P20	DT-4	BE	0	RM	5/10/2019
R35	5/9/2019	P23-P24	DT-5	BE	0	RM	5/10/2019
R36	5/9/2019	P24-P25	Patch	BE	0	RM	5/10/2019
R37	5/9/2019	P26-P1	Patch	BE	0	RM	5/10/2019

Appendix F5. FML Seam Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Repair Tech	Number of	Testing Tech	Date Accepted	Observed By
R38	5/21/2019	P47-P50-P49	Y-seam	BE	0	RM	5/21/2019	OR
R39	5/21/2019	P46-P47-P49	Y-seam	BE	0	RM	5/21/2019	OR
R40	5/21/2019	P46-P49	DT-8	BE	0	RM	5/21/2019	OR
R41	5/21/2019	P49-P48-P46	Y-seam	BE	0	RM	5/21/2019	OR
R42	5/21/2019	P46-P45-P48	Y-seam	BE	1	RM	5/21/2019	OR
R43	5/21/2019	P45-P44-P48	Y-seam	BE	0	RM	5/21/2019	OR
R44	5/21/2019	P45-P44	Patch	BE	0	RM	5/21/2019	OR
R45	5/21/2019	P45-P44-P35	Y-seam	BE	1	RM	5/21/2019	OR
R46	5/21/2019	P35-P44-P43	T-seam	BE	0	RM	5/21/2019	OR
R47	5/21/2019	P35-P43-P42	T-seam	BE	0	RM	5/21/2019	OR
R48	5/21/2019	P35-P42-P41	T-seam	BE	0	RM	5/21/2019	OR
R49	5/21/2019	P35-P41-P34	T-seam	BE	0	RM	5/21/2019	OR
R50	5/21/2019	P34-P41	Patch	BE	0	RM	5/21/2019	OR
R51	5/21/2019	P41-P34-P32	T-seam	BE	0	RM	5/21/2019	OR
R52	5/21/2019	P41-P31-P32	T-seam	BE	0	RM	5/21/2019	OR
R53	5/21/2019	P41-P31-P30	T-seam	BE	0	RM	5/21/2019	OR
R54	5/21/2019	P35-P45	DT-7	BE	0	RM	5/21/2019	OR
R55	5/21/2019	P36-P37	Patch	BE	1	RM	5/21/2019	OR
R56	5/21/2019	P37-P40-P39	DT6	BE	0	RM	5/21/2019	OR
R57	5/21/2019	P37-P38-P40	T-seam	BE	0	RM	5/21/2019	OR
R58	5/21/2019	P17-P18-P40	T-seam	BE	0	RM	5/21/2019	OR
R59	5/21/2019	P17-P37-P40	T-seam	BE	0	RM	5/21/2019	OR
R60	5/21/2019	P37-P16-P17	T-seam	BE	0	RM	5/21/2019	OR
R61	5/21/2019	P16-P37-P36	T-seam	BE	0	RM	5/21/2019	OR
R62	5/21/2019	P16-P37-P36	Patch	BE	0	RM	5/21/2019	OR
R63	5/21/2019	P15-P16-P36	T-seam	BE	0	RM	5/21/2019	OR
R64	5/21/2019	P15-P35-P36	T-seam	BE	0	RM	5/21/2019	OR
R65	5/21/2019	P13-P15-P35	T-seam	BE	0	RM	5/21/2019	OR
R66	5/21/2019	P13-P33-P35	T-seam	BE	0	RM	5/21/2019	OR
R67	5/21/2019	P13-P33	Patch	BE	0	RM	5/21/2019	OR
R68	5/21/2019	P33-P34-P35	T-seam	BE	0	RM	5/21/2019	OR
R69	5/23/2019	P53	T-seam	BE	0	RM	5/23/2019	OR
R70	5/23/2019	P52	T-seam	BE	1	RM	5/23/2019	OR
R71	5/23/2019	P51	T-seam	BE	2	RM	5/23/2019	OR
R72	5/23/2019	P34-P51	Patch	BE	0	RM	5/23/2019	OR
R73	5/23/2019	P51-P58	Patch	BE	0	RM	5/23/2019	OR
R74	5/23/2019	P40	T-seam	BE	1	RM	5/23/2019	OR
R75	5/23/2019	P40-P58-P59	T-seam	BE	0	RM	5/23/2019	OR
R76	5/23/2019	P58-P59	DT19	BE	0	RM	5/23/2019	OR
R77	5/23/2019	P38-P40-P60	T-seam	BE	0	RM	5/23/2019	OR
R78	5/23/2019	P59-P60	Patch	BE	0	RM	5/23/2019	OR
R79	5/23/2019	P38-P40-P60	T-seam	BE	0	RM	5/23/2019	OR

Appendix F5. FML Seam Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Repair Tech	Number of	Testing Tech	Date Accepted	Observed By
R80	5/23/2019	P38-P60-P61	T-seam	BE	0	RM	5/23/2019	OR
R81	5/23/2019	P60-P61	Patch	BE	0	RM	5/23/2019	OR
R82	5/23/2019	P38-P61	DT-11	BE	0	RM	5/23/2019	OR
R83	5/23/2019	P38-P61-P62	T-seam	BE	0	RM	5/23/2019	OR
R84	5/23/2019	P38-P62-P63	T-seam	BE	0	RM	5/23/2019	OR
R85	5/23/2019	P62-P63	Patch	BE	0	RM	5/23/2019	OR
R86	5/23/2019	P38-P18	Patch	BE	0	RM	5/23/2019	OR
R87	5/23/2019	P38-P18-P63	T-seam	BE	0	RM	5/23/2019	OR
R88	5/23/2019	P18-P19-P63	T-seam	BE	0	RM	5/23/2019	OR
R89	5/23/2019	P19-P20-P63	T-seam	BE	0	RM	5/23/2019	OR
R90	5/23/2019	P20-P63	Patch	BE	0	RM	5/23/2019	OR
R91	5/23/2019	P20-P21-P63	T-seam	BE	0	RM	5/23/2019	OR
R92	5/23/2019	P21-P22-P63	T-seam	BE	0	RM	5/23/2019	OR
R93	5/23/2019	P22-P63-P64	T-seam	BE	0	RM	5/23/2019	OR
R94	5/23/2019	P22-P23-P64	T-seam	BE	0	RM	5/23/2019	OR
R95	5/23/2019	P62-P63-P64	T-seam	BE	0	RM	5/23/2019	OR
R96	5/23/2019	P61-P62-P64	T-seam	BE	0	RM	5/23/2019	OR
R97	5/23/2019	P61-P64	Patch	BE	0	RM	5/23/2019	OR
R98	5/23/2019	P23-P64-P65	T-seam	BE	0	RM	5/23/2019	OR
R99	5/23/2019	P23-P24-P65	T-seam	BE	0	RM	5/23/2019	OR
R100	5/23/2019	P24-P65-P66	T-seam	BE	0	RM	5/23/2019	OR
R101	5/23/2019	P24-P25-P66	T-seam	BE	0	RM	5/23/2019	OR
R102	5/23/2019	P25-P66-P67	T-seam	BE	0	RM	5/23/2019	OR
CAP1	5/23/2019	CAP1	T-seam	BE	0	RM	5/23/2019	OR
CAP2	5/23/2019	CAP2	T-seam	BE	0	RM	5/23/2019	OR
R103	5/23/2019	P60-P61-CAP1	T-seam	BE	0	RM	5/23/2019	OR
R104	5/23/2019	P60-P61-CAP1	T-seam	BE	0	RM	5/23/2019	OR
R105	5/23/2019	P62-P63-CAP1	T-seam	BE	0	RM	5/23/2019	OR
R106	5/23/2019	P63-P38-CAP1	T-seam	BE	0	RM	5/23/2019	OR
R107	5/23/2019	P38-P40-CAP1	T-seam	BE	0	RM	5/23/2019	OR
R108	5/23/2019	P40-CAP1-CAP2	T-seam	BE	0	RM	5/23/2019	OR
R109	5/23/2019	P40-CAP2-P59	T-seam	BE	0	RM	5/23/2019	OR
R110	5/23/2019	P59-P60-CAP2	CAP	BE	0	RM	5/23/2019	OR
R111	5/23/2019	P60-CAP2-CAP1	CAP	BE	0	RM	5/23/2019	OR

Appendix F5. FML Seal Vacuum Test and Repair Log

PROJECT NAME: Sundance West, Area D

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Repair #	Repair Date	Panel #s Top-Bottom	Type of Repair	Repair Tech	Number of Leaks	Testing Tech	Date Accepted	Observed By
R1	8/22/2019	P3/P4/P5	T-seam	BE	0	RM	8/22/2019	JF/MZ
R2	8/22/2019	P1/P2	DT-1	BE	0	RM	8/22/2019	JF/MZ
Top Layer								
R1	8/23/2019	P1/P2	DT-1	BE	0	RM	8/23/2019	JF/MZ
R2	8/23/2019	P3/P4/P5	T-seam	BE	0	RM	8/23/2019	JF/MZ

Appendix F6

Destructive Test Results



Date: 2019-05-11

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetic testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Sundance West

TRI Job Reference Number:

46638

Material(s) Tested:

(5) Heat Fusion Weld Seam(s)

Test(s) Requested:

SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Jennifer Tenney
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 46638

TEST REPLICATE NUMBER						
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-1 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	147	123	146	142	152	142
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	163	155	158	132	159	153
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	172	172	165	170	167	169
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-2 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	126	141	143	139	140	138
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	151	148	153	152	146	150
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	178	178	174	174	172	175
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TRI ENVIRONMENTAL, INC.

9063 BEE CAVES RD. - AUSTIN, TX 78733 - USA | PH: 800.880.TEST OR 512.263.2101



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 46638

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-3 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	139	127	138	130	132	133
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	168	165	170	164	165	166
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	191	186	191	186	188	188
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-4 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	142	143	140	141	139	141
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	166	165	165	157	152	161
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	190	186	189	187	188	188
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 46638

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-5 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	123	127	129	135	136	130
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	171	164	170	168	162	167
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	196	199	191	191	190	193
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-05-24

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Sundance West

TRI Job Reference Number:

47008

Material(s) Tested:

(7) Heat Fusion Weld Seam(s)

Test(s) Requested:

SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Brian Anderson
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47008

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-6 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	143	149	139	150	144
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	145	152	156	154	149	151
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	192	190	187	186	186	188
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-7 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	135	132	139	136	136	136
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	149	154	150	149	157	152
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	182	179	179	178	178	179
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47008

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-8 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	128	155	139	131	138	138
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	137	130	141	137	143	138
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	165	165	162	163	160	163
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-9 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	127	130	131	132	132	130
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	143	127	140	129	142	136
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	180	180	177	177	175	178
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47008

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-10 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	115	119	86	103	88	102
Peel Incursion (%)	80	75	70	20	70	
Peel Locus Of Failure Code	AD-BRK	AD-BRK	AD-BRK	AD-BRK	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	156	158	154	166	147	156
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	172	163	172	164	169	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-11A Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	143	137	135	137	138
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	144	160	151	154	164	155
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	175	180	166	181	176	176
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TRI ENVIRONMENTAL, INC.

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47008

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-11B Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	136	140	132	139	130	135
Peel Incursion (%)	75	85	90	30	75	
Peel Locus Of Failure Code	AD-BRK	AD-BRK	AD-BRK	AD-BRK	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	143	149	140	146	137	143
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	165	167	168	172	167	168
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-06-05

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetic testing needs. TRI is pleased to submit this final report for laboratory testing.

Project: Sundance West

TRI Job Reference Number: **47357**

Material(s) Tested: (12) Heat Fusion Weld Seam(s)

Test(s) Requested: SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Brian Anderson
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

TEST REPLICATE NUMBER						
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DT-A1 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	141	146	144	143	134	142
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	144	145	138	144	132	141
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	174	178	178	183	180	179
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A2 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	154	138	132	143	159	145
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	172	177	172	171	166	172
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	193	193	186	188	185	189
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-A3 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	142	135	126	142	145	138
Peel Incursion (%)	<5	<5	90	<5	<5	
Peel Locus Of Failure Code	SE	SE	AD-BRK	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	156	159	151	159	150	155
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	193	194	187	190	188	190
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A4 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	167	157	131	141	132	146
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	178	170	169	167	165	170
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	199	197	194	193	193	195
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-A5 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	150	153	151	149	158	152
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	167	163	160	170	172	166
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	198	197	193	194	193	195
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A6 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	164	151	166	148	166	159
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	136	141	136	139	141	139
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	195	193	189	191	189	191
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-A7 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	134	146	120	146	140	137
Peel Incursion (%)	80	<5	20	<5	<5	
Peel Locus Of Failure Code	AD-BRK	SE	AD-BRK	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	138	149	140	148	142	143
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	195	194	183	190	188	190
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A8 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	141	156	139	142	137	143
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	163	164	164	165	158	163
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	191	192	189	190	190	190
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

TRI ENVIRONMENTAL, INC.

9063 BEE CAVES RD. - AUSTIN, TX 78733 - USA | PH: 800.880.TEST OR 512.263.2101



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-A9 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	146	155	147	155	144	149
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	166	169	174	168	162	168
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	192	191	187	188	186	189
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A10 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	152	149	147	148	143	148
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	166	168	161	146	158	160
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	190	192	186	187	182	187
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

TRI ENVIRONMENTAL, INC.

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47357

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-A11 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	141	143	138	140	138	140
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	179	172	178	175	169	175
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	196	197	191	193	190	193
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-A12 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	154	149	141	153	136	147
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	174	176	169	171	168	172
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	192	191	174	188	186	186
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TRI ENVIRONMENTAL, INC.

9063 BEE CAVES RD. - AUSTIN, TX 78733 - USA | PH: 800.880.TEST OR 512.263.2101



Date: 2019-06-11

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetic testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Sundance West

TRI Job Reference Number:

47524

Material(s) Tested:

(6) Heat Fusion Weld Seam(s)

Test(s) Requested:

SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Brian Anderson
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47524

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DTA-13 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	142	143	137	140	146	142
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	152	142	145	145	145	146
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	187	187	190	188	189	188
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DTA-14 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	137	140	134	157	149	143
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	157	153	150	161	152	155
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	196	193	191	188	191	192
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47524

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DTA-15 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	141	126	114	141	138	132
Peel Incursion (%)	80	30	<5	<5	50	
Peel Locus Of Failure Code	AD-BRK	AD-BRK	SE	SE	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	160	164	174	173	179	170
Peel Incursion (%)	10	<5	<5	<5	<5	
Peel Locus Of Failure Code	AD-BRK	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	193	192	188	188	188	190
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DTA-16 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	141	129	140	137	140	137
Peel Incursion (%)	65	50	60	80	20	
Peel Locus Of Failure Code	AD-BRK	AD-BRK	AD-BRK	AD-BRK	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	156	151	142	155	160	153
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	191	188	186	183	183	186
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TRI ENVIRONMENTAL, INC.

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DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47524

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DTA-17 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	136	122	135	128	135	131
Peel Incursion (%)	75	<5	<5	<5	<5	
Peel Locus Of Failure Code	AD-BRK	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	145	138	140	128	141	138
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	192	189	191	192	190	191
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DTA-18 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	149	132	152	134	140	141
Peel Incursion (%)	<5	<5	<5	20	90	
Peel Locus Of Failure Code	SE	SE	SE	AD-BRK	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	158	149	163	140	137	149
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	185	183	191	189	186	187
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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TRI ENVIRONMENTAL, INC.

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Date: 2019-06-13

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetic testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Sundance West

TRI Job Reference Number:

47606

Material(s) Tested:

(2) Heat Fusion Weld Seam(s)

Test(s) Requested:

SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Brian Anderson
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 47606

TEST REPLICATE NUMBER						
PARAMETER	1	2	3	4	5	MEAN
Sample ID: DTA-19 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	136	142	143	143	141	141
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	132	137	139	133	156	139
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	171	167	165	172	156	166
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DTA-20 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	120	146	119	154	150	138
Peel Incursion (%)	60	<5	60	<5	90	
Peel Locus Of Failure Code	AD-BRK	SE	AD-BRK	SE	AD-BRK	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	163	150	159	165	156	159
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	176	177	172	181	176	176
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

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Date: 2019-08-27

Mail To:

**Michael Zbrozek
Daniel B Stephens and Assoc.
6020 Academy Rd NE Suite 100
Albuquerque, NM, 87109**

Bill To:

Daniel B Stephens and Assoc.

e-mail: mzbrozek@geo-logic.com

Dear Mr. Zbrozek,

Thank you for consulting with TRI/Environmental, Inc. (TRI) for your geosynthetic testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:

Sundance West

TRI Job Reference Number:

49978

Material(s) Tested:

(2) Heat Fusion Weld Seam(s)

Test(s) Requested:

SAME DAY Peel and Shear
(ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

Codes:

AD	Adhesion Failure (100% Peel)
BRK	Break in sheeting away from Seam edge.
SE	Break in sheeting at edge of seam.
AD-BRK	Break in sheeting after some adhesion failure - partial peel.
SIP	Separation in the plane of the sheet (leaving the bond intact).
FTB	Film tearing bond (all non "AD" failures).
NON-FTB	100% peel.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Jennifer Tenney
Project Manager
Geosynthetic Services Division
<http://www.geosyntheticstestinc.com>



DESTRUCTIVE SEAM QUALITY ASSURANCE TEST RESULTS

TRI Client: Daniel B Stephens and Assoc.

Project: Sundance West

Material: 60 mil. HDPE

SAME DAY Peel and Shear (ASTM D 6392/GRI GM19/D 4437/NSF 54/882 mod.)

TRI Log#: 49978

PARAMETER	TEST REPLICATE NUMBER					MEAN
	1	2	3	4	5	
Sample ID: DT-1 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	166	163	146	176	164	163
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	140	135	139	137	143	139
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	189	189	189	193	193	191
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	
Sample ID: DT-2 Weld: Heat Fusion						
Side: A						Peel A
Peel Strength (ppi)	150	138	141	145	148	144
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Side: B						Peel B
Peel Strength (ppi)	130	140	130	129	143	134
Peel Incursion (%)	<5	<5	<5	<5	<5	
Peel Locus Of Failure Code	SE	SE	SE	SE	SE	
Peel NSF Failure Code	FTB	FTB	FTB	FTB	FTB	
Shear						Shear
Shear Strength (ppi)	184	185	187	183	183	184
Shear Elongation @ Break (%)	>50	>50	>50	>50	>50	

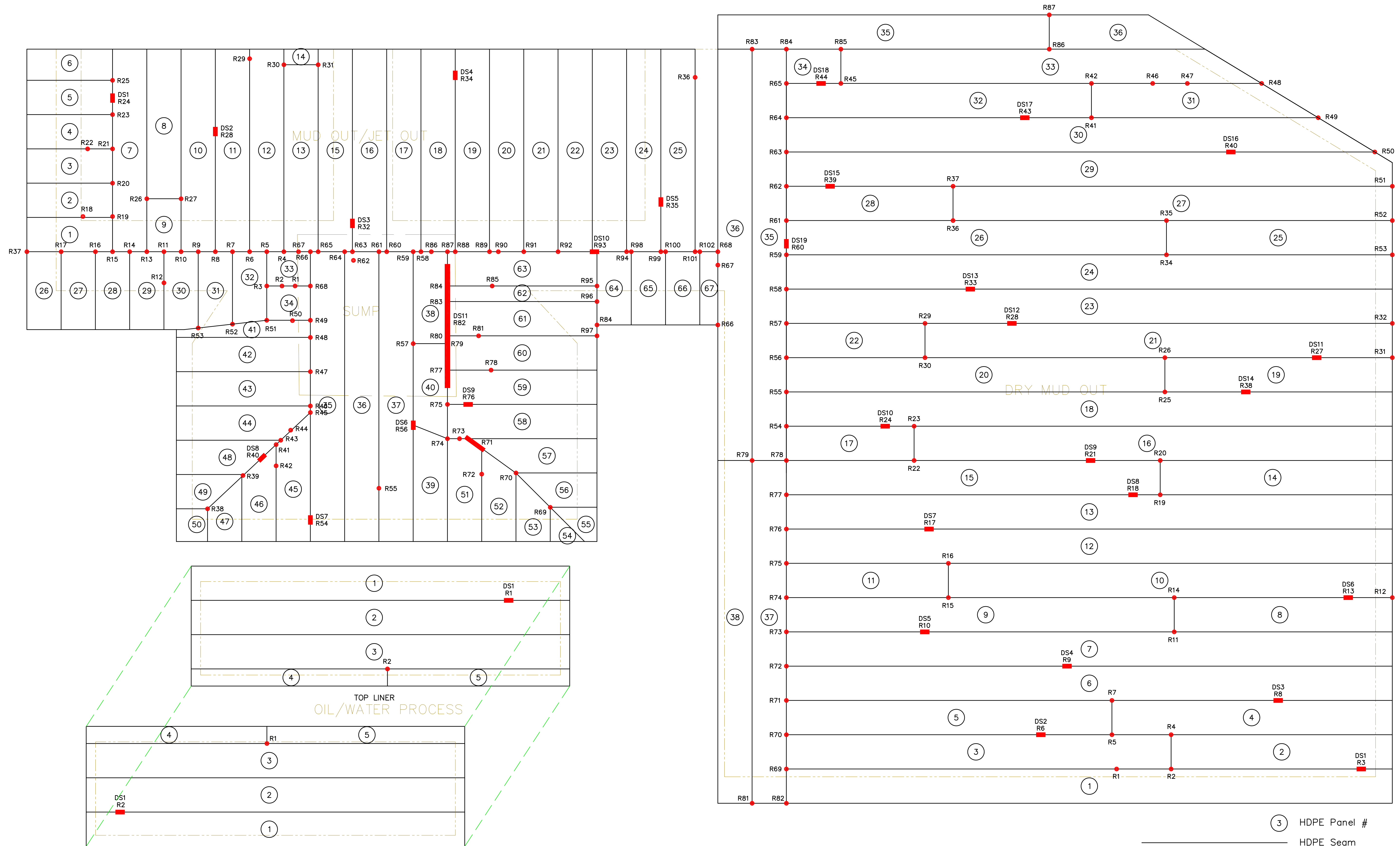
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TRI ENVIRONMENTAL, INC.

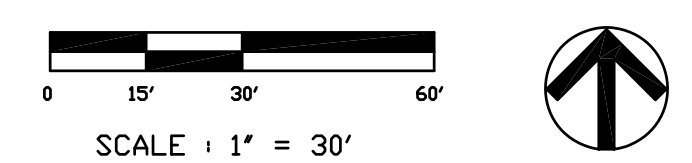
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Appendix F7

Geomembrane Panel Layout



AS-BUILT 60mil HD PANEL LAYOUT



- (3) HDPE Panel #
- HDPE Seam
- - - Excavation Toes
- R1 REPAIR/PATCH #
- DS1 R6 DESTRUCTIVE SAMPLE #

FALCON ENVIRONMENTAL LINING SYSTEMS, INC.
5200 Johnson Road, Odessa, TX 79764
(432) 366 2611 FAX - 366 2999

PROPOSED PANEL LAYOUT
SUNDANCE WEST MUD MANAGEMENT
LEA COUNTY, NM

Drawn By : JASMIN
Date : 02/27/19
Checked By :
Scale : 1" = 30'

Material :
G C L
60 mil HD
GEOCOMPOSITE
GEONET

Sheet No.
3
3

Appendix F8

Geocomposite Deployment Log

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (13156)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
G1	4030	303	14.75	4,469.25	6/4/2019	BC
G2	4046	305	14.75	4,498.75	6/4/2019	BC
G3	6623	305	14.75	4,498.75	6/5/2019	BC
G4	4027	305	14.75	4,498.75	6/5/2019	BC
G5	5139	305	14.75	4,498.75	6/5/2019	BC
G6	5140	305	14.75	4,498.75	6/5/2019	BC
G7	5186	305	14.75	4,498.75	6/5/2019	BC
G8	5148	305	14.75	4,498.75	6/5/2019	BC
G9	5149	305	14.75	4,498.75	6/5/2019	BC
G10	5155	305	14.75	4,498.75	6/5/2019	BC
G11	5181	305	14.75	4,498.75	6/5/2019	BC
G12	5178	305	14.75	4,498.75	6/5/2019	BC
G13	5156	305	14.75	4,498.75	6/5/2019	BC
G14	5142	305	14.75	4,498.75	6/5/2019	BC
G15	5179	305	14.75	4,498.75	6/5/2019	BC
G16	5154	305	14.75	4,498.75	6/5/2019	BC
G17	5143	305	14.75	4,498.75	6/5/2019	BC
G18	5202	305	14.75	4,498.75	6/5/2019	BC
G19	5198	305	14.75	4,498.75	6/5/2019	BC
G20	5190	305	14.75	4,498.75	6/5/2019	BC
G21	5203	305	14.75	4,498.75	6/5/2019	BC
G22	5162	305	14.75	4,498.75	6/8/2019	BC
G23	5194	305	14.75	4,498.75	6/8/2019	BC
G24	5134	305	14.75	4,498.75	6/8/2019	BC
G25	5135	305	14.75	4,498.75	6/8/2019	BC
G26	5158	305	14.75	4,498.75	6/8/2019	BC
G27	5199	305	14.75	4,498.75	6/8/2019	BC
G28	5192	305	14.75	4,498.75	6/8/2019	BC
G29	5153	305	14.75	4,498.75	6/8/2019	BC
G30	5177	305	14.75	4,498.75	6/8/2019	BC

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (13156)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
G31	5157	305	14.75	4,498.75	6/8/2019	BC
G32	5182	305	14.75	4,498.75	6/8/2019	BC
G33	5180	305	14.75	4,498.75	6/8/2019	
G34	5175	95	14.75	1,401.25	6/11/2019	
G35	5175	125	14.75	1,843.75	6/11/2019	
G36	5175	80	14.75	1,180.00	6/11/2019	
G37	6620	55	14.75	811.25	6/11/2019	
G38	6620	133	14.75	1,961.75	6/11/2019	
G39	6620	110	14.75	1,622.50	6/11/2019	
G40	5183	24	14.75	354.00	6/11/2019	
G41	5183	122	14.75	1,799.50	6/11/2019	
G42	5183	133	14.75	1,961.75	6/11/2019	
G43	5147	122	14.75	1,799.50	6/11/2019	
G44	5147	131	14.75	1,932.25	6/11/2019	
G45	5147	34	14.75	501.50	6/11/2019	
G46	5201	92	14.75	1,357.00	6/11/2019	
G47	5201	121	14.75	1,784.75	6/11/2019	
G48	5201	73	14.75	1,076.75	6/11/2019	
G49	5200	53	14.75	781.75	6/11/2019	
G50	5200	129	14.75	1,902.75	6/11/2019	
G51	5200	113	14.75	1,666.75	6/11/2019	
G52	5160	22	14.75	324.50	6/11/2019	
G53	5160	134	14.75	1,976.50	6/11/2019	
G54	5160	138	14.75	2,035.50	6/11/2019	
G55		236	14.75	3,481.00	6/12/2019	
G56		62	14.75	914.50	6/12/2019	
G57	6621	173	14.75	2,551.75	6/12/2019	
G58	6621	121	14.75	1,784.75	6/12/2019	
G59	5193	113	14.75	1,666.75	6/12/2019	
G60	5193	186	14.75	2,743.50	6/12/2019	

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area A

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (13156)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
G61	5150	55	14.75	811.25	6/12/2019	
G62	5150	245	14.75	3,613.75	6/12/2019	
G63	5144	242	14.75	3,569.50	6/12/2019	
G64	5144	58	14.75	855.50	6/12/2019	
G65	5176	186	14.75	2,743.50	6/12/2019	
G66	5176	114	14.75	1,681.50	6/12/2019	
G67	6621	126	14.75	1,858.50	6/12/2019	
G68	6621	179	14.75	2,640.25	6/12/2019	
G69	5189	75	14.75	1,106.25	6/12/2019	
G70	5189	143	14.75	2,109.25	6/12/2019	
TOTAL GEONET PLACED (ft²)				212,636.00		

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area B

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (13156)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	5161	133	14.75	1,961.75	5/20/2019	MZ
P2	5161	133	14.75	1,961.75	5/20/2019	MZ
P3	5161	34	14.75	501.50	5/20/2019	MZ
P4	5195	96	14.75	1,416.00	5/20/2019	MZ
P5	5195	132	14.75	1,947.00	5/20/2019	MZ
P6	5195	72	14.75	1,062.00	5/20/2019	MZ
P7	5168	63	14.75	929.25	5/20/2019	MZ
P8	5168	130	14.75	1,917.50	5/20/2019	MZ
P9	5168	107	14.75	1,578.25	5/20/2019	MZ
P10	5172	30	14.75	442.50	5/20/2019	MZ
P11	5172	134	14.75	1,976.50	5/20/2019	MZ
P12	5172	136	14.75	2,006.00	5/20/2019	MZ
P13	5167	133	14.75	1,961.75	5/20/2019	MZ
P14	5167	133	14.75	1,961.75	5/20/2019	MZ
P15	5167	34	14.75	501.50	5/20/2019	MZ
P16	5169	105	14.75	1,548.75	5/20/2019	MZ
P17	5169	136	14.75	2,006.00	5/20/2019	MZ
P18	5169	60	14.75	885.00	5/20/2019	MZ
P19	4020	76	14.75	1,121.00	5/20/2019	MZ
P20	4020	134	14.75	1,976.50	5/20/2019	MZ
P21	4020	90	14.75	1,327.50	5/20/2019	MZ
P22	5173	48	14.75	708.00	5/20/2019	MZ
P23	5173	133	14.75	1,961.75	5/20/2019	MZ
P24	5173	119	14.75	1,755.25	5/20/2019	MZ
P25	5166	16	14.75	236.00	5/20/2019	MZ
P26	5166	131	14.75	1,932.25	5/20/2019	MZ
P27	5166	131	14.75	1,932.25	5/20/2019	MZ
P28	5166	22	14.75	324.50	5/20/2019	MZ
P29	5164	112	14.75	1,652.00	5/20/2019	MZ
P30	5164	131	14.75	1,932.25	5/20/2019	MZ
P31	5164	57	14.75	840.75	5/20/2019	MZ
P32	5174	77	14.75	1,135.75	5/20/2019	MZ
P33	5174	130	14.75	1,917.50	5/20/2019	MZ
P34	5174	93	14.75	1,371.75	5/20/2019	MZ
P35	5171	39	14.75	575.25	5/20/2019	MZ
P36	5171	129	14.75	1,902.75	5/20/2019	MZ
P37	5171	50	14.75	737.50	5/20/2019	MZ
P38	5171	49	14.75	722.75	5/20/2019	MZ
P39	5171	34	14.75	501.50	5/20/2019	MZ
P40	4021	20	14.75	295.00	5/20/2019	MZ
P41	4021	51	14.75	752.25	5/20/2019	MZ
P42	4021	56	14.75	826.00	5/20/2019	MZ
P43	4021	50	14.75	737.50	5/20/2019	MZ
P44	4021	51	14.75	752.25	5/20/2019	MZ
P45	4021	52	14.75	767.00	5/20/2019	MZ

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area B

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number (13156)	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P46	4021	31	14.75	457.25	5/20/2019	MZ
P47	4015	31	14.75	457.25	5/20/2019	MZ
P48	4015	38	14.75	560.50	5/20/2019	MZ
P49	4015	43	14.75	634.25	5/20/2019	MZ
P50	4015	41	14.75	604.75	5/20/2019	MZ
P51	4015	48	14.75	708.00	5/20/2019	MZ
P52	4015	49	14.75	722.75	5/20/2019	MZ
P53	4015	52	14.75	767.00	5/20/2019	MZ
P54	5163	48	14.75	708.00	5/20/2019	MZ
P55	5163	41	14.75	604.75	5/20/2019	MZ
P56	5163	43	14.75	634.25	5/20/2019	MZ
P57	5163	41	14.75	604.75	5/20/2019	MZ
P58	5163	34	14.75	501.50	5/20/2019	MZ
P59	5163	35	14.75	516.25	5/20/2019	MZ
P60	5163	34	14.75	501.50	5/20/2019	MZ
TOTAL GEONET PLACED (ft ²)				66,242.25		

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P61	4026	188	14.75	2,773.00	5/24/2019	MZ
P62	4023	113	14.75	1,666.75	5/24/2019	MZ
P63	4023	77	14.75	1,135.75	5/24/2019	MZ
P64	4023	188	14.75	2,773.00	5/24/2019	MZ
P65	4023	37	14.75	545.75	5/24/2019	MZ
P66	4030	153	14.75	2,256.75	5/24/2019	MZ
P67	4030	149	14.75	2,197.75	5/24/2019	MZ
P68	5165	35	14.75	516.25	5/24/2019	MZ
P69	5165	189	14.75	2,787.75	5/24/2019	MZ
P70	5165	68	14.75	1,003.00	5/24/2019	MZ
P71	5170	127	14.75	1,873.25	5/24/2019	MZ
P72	5170	85	14.75	1,253.75	5/24/2019	MZ
P73	5170	74	14.75	1,091.50	5/24/2019	MZ
P74	4031	58	14.75	855.50	5/24/2019	MZ
P75	4031	37	14.75	545.75	5/24/2019	MZ
P76	5170	20	14.75	295.00	5/24/2019	MZ
P77	4031	80	14.75	1,180.00	5/24/2019	MZ
P78	4031	81	14.75	1,194.75	5/24/2019	MZ
P79	5184	83	14.75	1,224.25	5/24/2019	MZ
P80	5184	82	14.75	1,209.50	5/24/2019	MZ
P81	5184	84	14.75	1,239.00	5/24/2019	MZ
P82	4031	44	14.75	649.00	5/24/2019	MZ
P83	5184	55	14.75	811.25	5/24/2019	MZ
P84	5187	77	14.75	1,135.75	5/24/2019	MZ
P85	5187	21	14.75	309.75	5/24/2019	MZ
P86	5187	81	14.75	1,194.75	5/24/2019	MZ
P87	5187	72	14.75	1,062.00	5/24/2019	MZ
P88	5187	50	14.75	737.50	5/24/2019	MZ
P89	5196	87	14.75	1,283.25	5/24/2019	MZ
P90	5196	83	14.75	1,224.25	5/24/2019	MZ

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area C

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P91	5196	84	14.75	1,239.00	5/24/2019	MZ
P92	5188	82	14.75	1,209.50	5/24/2019	MZ
P93	5188	82	14.75	1,209.50	5/24/2019	MZ
P94	5188	52	14.75	767.00	5/24/2019	MZ
P95	5196	50	14.75	737.50	5/24/2019	MZ
P96	5196	40	14.75	590.00	5/24/2019	MZ
P97	5196	21	14.75	309.75	5/24/2019	MZ
P98	5196	24	14.75	354.00	5/24/2019	MZ
P99	5185	82	14.75	1,209.50	5/24/2019	MZ
P100	5185	160	14.75	2,360.00	5/24/2019	MZ
P101	5185	55	14.75	811.25	5/24/2019	MZ
P102	5197	103	14.75	1,519.25	5/24/2019	MZ
P103	5197	155	14.75	2,286.25	5/24/2019	MZ
TOTAL LINER PLACED (ft²)				52,628.00		

Appendix F8. Geonet Deployment Log

PROJECT NAME: Sundance West, Area D

PROJECT LOCATION: Eunice, NM

PROJECT NUMBER: DB18.1209.00

INSTALLED BY: Falcon Environmental Lining Systems

Panel Number	Roll Number	Approximate Length (ft)	Approximate Width (ft)	Approximate Area (ft ²)	Date Installed	Observed By
P1	131513428	205	14.75	3,023.75	8/22/2019	JF/MZ
P2	131513428	129	14.75	1,902.75	8/22/2019	JF/MZ
P3	13151603	144	14.75	2,124.00	8/22/2019	JF/MZ
P4	13151603	141	14.75	2,079.75	8/22/2019	JF/MZ
P5	13151603	48	14.75	708.00	8/22/2019	JF/MZ
P6	131513427	190	14.75	2,802.50	8/22/2019	JF/MZ
P7	131513427	27	14.75	398.25	8/22/2019	JF/MZ
P8	131513427	119	14.75	1,755.25	8/22/2019	JF/MZ
P9	13151660	106	14.75	1,563.50	8/22/2019	JF/MZ
P10	13151660	104	14.75	1,534.00	8/22/2019	JF/MZ
P1	13165137	237	14.75	3,495.75	8/23/2019	JF/MZ
P2	13165137	67	14.75	988.25	8/23/2019	JF/MZ
P3	131566622	172	14.75	2,537.00	8/23/2019	JF/MZ
P4	131566622	127	14.75	1,873.25	8/23/2019	JF/MZ
P5	131514048	121	14.75	1,784.75	8/23/2019	JF/MZ
P6	131514048	182	14.75	2,684.50	8/23/2019	JF/MZ
P7	131565145	65	14.75	958.75	8/23/2019	JF/MZ
P8	131565145	239	14.75	3,525.25	8/23/2019	JF/MZ
TOTAL LINER PLACED (ft²)				35,739.25		

Appendix G

FML Certifications

Appendix G1

Geomembrane Manufacturer Certifications

GSE Roll Allocation

Order SO-086654
Customer Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Roll#	Resin Lot	Product Code	Mfg Date	Length
104194273	19A1163	HST-060AE-BBB-B-W0	4/4/2019	540
104194274	19A1163	HST-060AE-BBB-B-W0	4/4/2019	540
104194275	19A1163	HST-060AE-BBB-B-W0	4/4/2019	540
104194276	19A1163	HST-060AE-BBB-B-W0	4/5/2019	540
104194277	19A1163	HST-060AE-BBB-B-W0	4/5/2019	540
108201095	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201096	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201097	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201098	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201099	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201100	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201102	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201103	19A1115	HST-060AE-BBB-B-W0	4/5/2019	540
108201104	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201105	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201106	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201107	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201108	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201109	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201110	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201111	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201112	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201113	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201114	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201115	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201116	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201117	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201118	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201119	19A1115	HST-060AE-BBB-B-W0	4/6/2019	540
108201120	19A1115	HST-060AE-BBB-B-W0	4/7/2019	540
108201121	19A1115	HST-060AE-BBB-B-W0	4/7/2019	540
108201122	19A1115	HST-060AE-BBB-B-W0	4/7/2019	540
108201123	19A1115	HST-060AE-BBB-B-W0	4/7/2019	540
108201124	19A1115	HST-060AE-BBB-B-W0	4/7/2019	540

ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	HST-060AE-BBB-B-W0	

Roll Number	Average Thickness ASTM D5994 (mils)	Minimum Thickness ASTM D5994 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D6396 (Views in Cat1-Cat2)	Asperity Height ASTM D7466 (mils) A Side
104194273	63	58	157	163	18	18	222	224	573	621	54	55	153	0.943	2.6	10	23
104194274	62	57	157	163	18	18	222	224	573	621	54	55	153	0.943	2.5	10	21
104194275	62	55	146	154	18	18	233	192	609	550	55	52	151	0.943	2.5	10	21
104194276	61	55	146	154	18	18	233	192	609	550	55	52	151	0.943	2.3	10	24
104194277	61	56	146	154	18	18	233	192	609	550	55	52	151	0.943	2.3	10	24
108201095	61	56	149	157	18	18	233	198	926	589	51	53	153	0.943	2.6	10	19
108201096	61	57	149	159	18	18	210	198	584	573	56	51	146	0.945	2.4	10	20
108201097	62	59	149	159	18	18	210	198	584	573	56	51	146	0.945	2.4	10	20
108201098	62	57	149	159	18	18	210	198	584	573	56	51	146	0.945	2.5	10	19
108201099	63	61	149	159	18	18	210	198	584	573	56	51	146	0.945	2.5	10	19
108201100	62	58	163	158	17	18	186	202	558	539	57	52	155	0.945	2.6	10	22
108201102	60	55	163	158	17	18	186	202	558	539	57	52	155	0.945	2.6	10	22
108201103	60	55	163	158	17	18	186	202	558	539	57	52	155	0.945	2.6	10	22
108201104	60	55	163	158	17	18	186	202	558	539	57	52	155	0.945	2.6	10	22
108201105	60	57	148	148	17	17	214	174	618	547	53	52	147	0.945	2.5	10	23
108201106	60	56	148	148	17	17	214	174	618	547	53	52	147	0.945	2.5	10	23
108201107	60	57	148	148	17	17	214	174	618	547	53	52	147	0.940	2.4	10	23
108201108	61	57	148	148	17	17	214	174	618	547	53	52	147	0.940	2.4	10	23
108201109	61	56	145	156	18	17	194	177	561	503	54	51	149	0.940	2.4	10	21
108201110	60	56	145	156	18	17	194	177	561	503	54	51	149	0.940	2.4	10	21
108201111	60	54	145	156	18	17	194	177	561	503	54	51	149	0.940	2.4	10	23
108201112	60	57	145	156	18	17	194	177	561	503	54	51	149	0.940	2.4	10	23
108201113	62	55	155	158	18	17	227	181	632	509	55	52	155	0.940	2.4	10	25
108201114	61	55	155	158	18	17	227	181	632	509	55	52	155	0.940	2.4	10	25
108201115	61	56	155	158	18	17	227	181	632	509	55	52	155	0.940	2.4	10	24
108201116	61	54	155	158	18	17	227	181	632	509	55	52	155	0.940	2.4	10	25
108201117	61	55	155	156	17	17	222	200	636	598	55	51	146	0.945	2.4	10	21
108201118	61	58	155	156	17	17	222	200	636	598	55	51	146	0.945	2.4	10	21
108201119	60	55	155	156	17	17	222	200	636	598	55	51	146	0.945	2.4	10	22
108201120	61	57	155	156	17	17	222	200	636	598	55	51	146	0.945	2.4	10	22
108201121	61	57	158	164	18	17	220	206	610	597	58	54	152	0.945	2.3	10	24
108201122	60	55	158	164	18	17	220	206	610	597	58	54	152	0.945	2.3	10	24
108201123	61	55	158	164	18	17	220	206	610	597	58	54	152	0.945	2.3	10	24



ROLL TEST DATA REPORT



Report Date: Apr/11/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	HST-060AE-BBB-B-W0	

Roll Number	Average Thickness ASTM D5994 (mils)	Minimum Thickness ASTM D5994 (mils)	Yield Strength ASTM D6693 (ppi) MD	Yield Strength ASTM D6693 (ppi) TD	Yield Elongation ASTM D6693 (%) MD	Yield Elongation ASTM D6693 (%) TD	Break Strength ASTM D6693 (ppi) MD	Break Strength ASTM D6693 (ppi) TD	Break Elongation ASTM D6693 (%) MD	Break Elongation ASTM D6693 (%) TD	Tear Resistance ASTM D1004 (lbs) MD	Tear Resistance ASTM D1004 (lbs) TD	Puncture Resistance ASTM D4833 (lbs)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Carbon Black Dispersion ASTM D6396 (Views in Cat1-Cat2)	Asperity Height ASTM D7466 (mils) A Side
108201124	60	56	158	164	18	17	220	206	610	597	58	54	152	0.945	2.3	10	24

Laboratory Manager 



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070

S/O NO : EU2A133
CUSTOMER PO : 03-514934
DATE SHIPPED: 2/28/19
LOT NO : 19A1115
WEIGHT (LB) : 193,950.00
CUSTID: FT03112 SPIDE3

PRODUCT : HL3812
RAILCAR FPAX970007
CLEANING/INSPECTION NO: 970007011019

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index, g/10min	ASTM D1238	.068
HLMI, g/10 min.	ASTM D1238	11.0
Density, g/cm3	ASTM D1505	.9361

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pressure OIT (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: GSE ENVIRONMENTAL, LLC
UP TRACK 14732 WESTFIELD
19103 GUNDLE ROAD
HOUSTON TX 77070

S/O NO : EU2A609
CUSTOMER PO : 03-515206
DATE SHIPPED: 3/08/19
LOT NO : 19A1163
WEIGHT (LB) : 196,150.00
CUSTID: FT03112 SPIDE3

PRODUCT : HL3812
RAILCAR MBKX175009
CLEANING/INSPECTION NO: 175009011419

TEST ITEM	REFERENCE METHOD	TEST VALUE
Melt Index, g/10min	ASTM D1238	.041
HLMI, g/10 min.	ASTM D1238	10.6
Density, g/cm3	ASTM D1505	.9375

Notes:
Notes: Additive levels were tested and meet the min specification for this lot As a result Standard OIT (by ASTM D3895) is greater than 120 mins (nominal values not tested on every lot). As a result, High Pressure OI T (by ASTM D5885) is greater than 1000 mins.

Linda Kao

QC SUPERVISOR: LINDA KAO



Report Date
4/11/2019

Quality Assurance Laboratory Test Results

Job Name: Falcon - Sundance - Onyx

Sales Order: 86654

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency:

Specification: ≤ 1.0 g/10 minutes

Product Code	Lot Number	Result
HST-060AE-BBB-B-W0	19A1163	0.04
HST-060AE-BBB-B-W0	19A1115	0.07

Approved by: Lana Hickman

Date: April 9, 2019

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.



Report Date
4/11/2019

Quality Assurance Laboratory Test Results

Job Name: Falcon - Sundance - Onyx
Sales Order: 86654

Required Testing: ASTM D 3895 -- Standard Test Method for Oxidative Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D 5397 -- Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

Specification: D 3895 - > 100 Minutes
D 5397 - > 500 Hours

Frequency: 1/200,000 lbs.

Product Code	Resin Lot Number	Test Results
HST-060AE-BBB-B-W0	19A1163	PASS
HST-060AE-BBB-B-W0	19A1115	PASS

Approved By: Lana Hickman
Date Approved: April 9, 2019

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Appendix G2

Geomembrane Receiving Log

Appendix G2. Geomembrane Receiving and Manufacturing/Conformance Log

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results(P/F)	Approved for Installation (Y/N)
GSE 60 mil textured HDPE	04/26/19	19A1115	108201108	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201109	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201105	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	104194275	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	104194277	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	104194276	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	104194273	12,150	3/29/2019	P	P	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	104194274	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201098	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201096	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201097	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201104	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201095	12,150	3/29/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201103	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201099	12,150	3/26/2019	P	P	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201102	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201100	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201112	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201119	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201111	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201114	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201124	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201122	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201110	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201113	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201115*	12,150	3/26/2019	P	P	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201106	12,150	3/26/2019	P	P	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201107	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201117*	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201120*	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201123	12,150	3/26/2019	P	P	Y

Appendix G2. Geomembrane Receiving and Manufacturing/Conformance Log

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results(P/F)	Approved for Installation (Y/N)
GSE 60 mil textured HDPE	04/26/19	19A1115	108201121	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201116	12,150	3/26/2019	P	N/A	Y
GSE 60 mil textured HDPE	04/26/19	19A1115	108201118*	12,150	3/26/2019	P	N/A	Y

Bold indicates that a conformance test was conducted for the sample.

* Denotes roll not used in installation or partial roll removed from site

Appendix G3

Geomembrane Conformance Testing



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | Anaheim, CA - USA | Anderson, SC - USA | Gold Coast - Australia | Suzhou - China

April 15, 2019

Mail To:

Daine Innerarity
Onyx Contractors
P.O Box 60547
Midland, TX 79711

Bill To:

<= Same

email: daine@onyxcontractors.com

Dear Mr. Innerarity:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West
TRI Job Reference Number:	45786
Material(s) Tested:	Four, Solmax GSE 60 mil Textured HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg) Tensile Properties (ASTM D 6693) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
 TRI Client: Onyx Contractors
 Project: Sundance West

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
 Sample Identification: 104194273
 TRI Log #: 45786

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	64	64	60	61	65	63	61	64	63	64	<div>63</div> <div>60</div>	2 =< min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.946	0.946								<div>0.946</div>	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.46	2.48									<div>2.47</div>	0.01	2.0 min
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.11	0.12									<div>0.12</div>		1.0 max
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	162	159	159	160	152						<div>158</div>	4	126 min
TD Yield Strength (ppi)	156	163	165	163	163						<div>162</div>	3	126 min
MD Break Strength (ppi)	234	219	220	212	197						<div>216</div>	13	90 min
TD Break Strength (ppi)	211	174	196	227	174						<div>196</div>	23	90 min
MD Yield Elongation (%)	22	21	21	21	21						<div>21</div>	0	12 min
TD Yield Elongation (%)	16	19	19	17	20						<div>18</div>	2	12 min
MD Break Elongation (%)	592	559	559	537	521						<div>554</div>	27	100 min
TD Break Elongation (%)	592	469	526	614	462						<div>533</div>	69	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	54	54	50	55	51	54	56	56	55	54	<div>54</div>	2	42 min
TD Tear Strength (lbs)	52	51	48	50	47	52	53	51	51	51	<div>51</div>	2	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
 TRI Client: Onyx Contractors
 Project: Sundance West

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
 Sample Identification: 108201099
 TRI Log #: 45786

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	62	62	60	63	60	60	62	62	60	<div>61</div> <div>60</div>	1 =< min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.948	0.948	0.948								<div>0.948</div>	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.48	2.46									<div>2.47</div>	0.01	2.0 min
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.10	0.10									<div>0.10</div>		1.0 max
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	152	160	156	158	159						<div>157</div>	3	126 min
TD Yield Strength (ppi)	167	169	163	164	171						<div>167</div>	3	126 min
MD Break Strength (ppi)	203	216	226	206	200						<div>210</div>	11	90 min
TD Break Strength (ppi)	197	172	182	175	190						<div>183</div>	10	90 min
MD Yield Elongation (%)	20	20	20	21	18						<div>20</div>	1	12 min
TD Yield Elongation (%)	16	18	17	16	18						<div>17</div>	1	12 min
MD Break Elongation (%)	537	563	602	535	514						<div>550</div>	34	100 min
TD Break Elongation (%)	544	462	507	492	522						<div>505</div>	31	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	53	53	54	53	52	54	55	55	56	55	<div>54</div>	1	42 min
TD Tear Strength (lbs)	47	50	52	49	51	54	52	51	51	50	<div>51</div>	2	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
 TRI Client: Onyx Contractors
 Project: Sundance West

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
 Sample Identification: 108201106
 TRI Log #: 45786

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	61	63	63	60	62	62	61	61	65	<div>62</div> <div>60</div>	1 << min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.946	0.947	0.947								<div>0.947</div>	0.001	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.41	2.39									<div>2.40</div>	0.01	2.0 min
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.111	0.111									<div>0.111</div>		1.0 max
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	157	167	163	161	162						<div>162</div>	4	126 min
TD Yield Strength (ppi)	168	172	172	162	164						<div>168</div>	5	126 min
MD Break Strength (ppi)	202	249	198	196	190						<div>207</div>	24	90 min
TD Break Strength (ppi)	195	200	212	188	175						<div>194</div>	14	90 min
MD Yield Elongation (%)	21	22	21	22	20						<div>21</div>	1	12 min
TD Yield Elongation (%)	17	18	17	15	18						<div>17</div>	1	12 min
MD Break Elongation (%)	536	648	497	510	490						<div>536</div>	65	100 min
TD Break Elongation (%)	565	571	595	533	504						<div>554</div>	35	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	55	55	54	54	56	53	56	54	53	54	<div>54</div>	1	42 min
TD Tear Strength (lbs)	52	48	51	50	49	50	53	51	52	53	<div>51</div>	2	42 min
MD Machine Direction	TD Transverse Direction												

GEOMEMBRANE TEST RESULTS
 TRI Client: Onyx Contractors
 Project: Sundance West

Material: Solmax GSE 60 mil Textured HDPE Geomembrane
 Sample Identification: 108201115
 TRI Log #: 45786

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	61	64	64	63	61	62	60	63	61	63	<div>62</div> <div>60</div>	1 =< min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.948								<div>0.947</div>	0.001	0.940 min
Carbon Black Content (ASTM D 4218)													
% Carbon Black	2.42	2.40									<div>2.41</div>	0.01	2.0 min
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.11	0.11									<div>0.11</div>		1.0 max
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	160	154	171	169	162						<div>163</div>	7	126 min
TD Yield Strength (ppi)	160	168	162	165	165						<div>164</div>	3	126 min
MD Break Strength (ppi)	221	179	163	222	211						<div>199</div>	27	90 min
TD Break Strength (ppi)	191	175	154	196	213						<div>186</div>	22	90 min
MD Yield Elongation (%)	19	20	22	21	19						<div>20</div>	1	12 min
TD Yield Elongation (%)	16	16	16	17	18						<div>17</div>	1	12 min
MD Break Elongation (%)	605	486	391	577	563						<div>524</div>	87	100 min
TD Break Elongation (%)	562	494	458	563	615						<div>538</div>	62	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	54	57	54	57	58	57	53	54	53	55	<div>55</div>	2	42 min
TD Tear Strength (lbs)	52	54	52	52	51	48	50	51	49	51	<div>51</div>	2	42 min
MD Machine Direction	TD Transverse Direction												



TESTING, RESEARCH, CONSULTING AND FIELD SERVICES

Austin, TX - USA | CA - USA | SC - USA | Gold Coast - Australia | Suzhou - China | Sao Paulo, Brazil | Johannesburg - Africa

April 24, 2019

Mail To:

Daine Innerarity
Onyx Contractors
P.O Box 60547
Midland, TX 79711

Bill To:

<= Same

email: daine@onyxcontractors.com

Dear Mr. Innerarity:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs.
TRI is pleased to submit this final report of the laboratory testing for the sample(s) listed below.

Project:	Sundance West
TRI Job Reference Number:	46090
Material(s) Tested:	One, Solmax GSE 60 mil Single Sided Textured HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Black Content (ASTM D 1603, mod.) Carbon Dispersion (ASTM D 5596) Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg) Tensile Properties (ASTM D 6693) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378

Sincerely,

Jarrett A. Nelson
Technical Director
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file

GEOMEMBRANE TEST RESULTS
 TRI Client: Onyx Contractors
 Project: Sundance West

Material: Solmax GSE 60 mil Single Sided Textured HDPE Geomembrane
 Sample Identification: 108201123
 TRI Log #: 46090

PARAMETER	TEST REPLICATE NUMBER										MEAN	STD. DEV.	PROJ. SPEC.
	1	2	3	4	5	6	7	8	9	10			
Thickness (ASTM D 5994)													
Thickness (mils)	62	60	60	64	62	60	61	61	64	60	<div>61</div> <div>60</div>	2 << min	57 min ave 54, 8 of 10 51 min ind
Density (ASTM D 1505)													
Density (g/cm3)	0.947	0.947	0.947								<div>0.947</div>	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.49	2.49									<div>2.49</div>	0.00	2.0 min
Carbon Black Dispersion (ASTM D 5596)													
Rating - 1st field view	1	1	1	1	1								9 Cat 1 or 2
Rating - 2nd field view	1	1	1	1	1								1 Cat 3
Melt Flow Index (ASTM D 1238, Method A, 190°C / 2.16 kg)													
Melt Flow Index (g/10 min)	0.107	0.109									<div>0.108</div>		1.0 max
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	147	151	176	177	165						<div>163</div>	14	126 min
TD Yield Strength (ppi)	171	160	176	168	162						<div>167</div>	7	126 min
MD Break Strength (ppi)	143	130	232	197	215						<div>183</div>	45	90 min
TD Break Strength (ppi)	220	172	195	203	209						<div>200</div>	18	90 min
MD Yield Elongation (%)	20	22	22	22	21						<div>21</div>	1	12 min
TD Yield Elongation (%)	18	17	17	15	18						<div>17</div>	1	12 min
MD Break Elongation (%)	377	316	597	469	575						<div>467</div>	122	100 min
TD Break Elongation (%)	627	501	529	578	610						<div>569</div>	53	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	54	55	53	53	53	58	59	58	57	59	<div>56</div>	2	42 min
TD Tear Strength (lbs)	56	53	49	53	49	55	55	52	54	52	<div>53</div>	2	42 min
MD Machine Direction	TD Transverse Direction												

Appendix G4

Geonet Manufacturer Certifications

Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Serial number	Item Number	Resin Lot	Bottom	Manufacturing date	Length
131565134	FS1-200E-08-00-FA-00	18L1311	130511346	3/22/2019	300.00
131565135	FS1-200E-08-00-FA-00	18L1311	130511346	3/22/2019	300.00
131565136	FS1-200E-08-00-FA-00	18L1311	130511346	3/22/2019	300.00
131565137	FS1-200E-08-00-FA-00	18L1311	130511346	3/22/2019	300.00
131565138	FS1-200E-08-00-FA-00	18L1311	130511341	3/22/2019	300.00
131565139	FS1-200E-08-00-FA-00	18L1311	130511331	3/22/2019	300.00
131565140	FS1-200E-08-00-FA-00	18L1311	130511331	3/22/2019	300.00
131565141	FS1-200E-08-00-FA-00	18L1311	130511331	3/22/2019	300.00
131565142	FS1-200E-08-00-FA-00	18L1311	130511331	3/22/2019	300.00
131565143	FS1-200E-08-00-FA-00	18L1311	130511347	3/22/2019	300.00
131565144	FS1-200E-08-00-FA-00	18L1311	130511347	3/22/2019	300.00
131565145	FS1-200E-08-00-FA-00	18L1311	130511347	3/22/2019	300.00
131565146	FS1-200E-08-00-FA-00	18L1311	130511347	3/22/2019	300.00
131565147	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565148	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565149	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565150	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565151	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565152	FS1-200E-08-00-FA-00	18L1311	130510779	3/22/2019	300.00
131565153	FS1-200E-08-00-FA-00	18L1311	130510783	3/22/2019	300.00
131565154	FS1-200E-08-00-FA-00	18L1311	130510783	3/22/2019	300.00
131565155	FS1-200E-08-00-FA-00	18L1311	130510783	3/22/2019	300.00
131565156	FS1-200E-08-00-FA-00	18L1311	130510783	3/22/2019	300.00
131565157	FS1-200E-08-00-FA-00	18L1311	130510781	3/22/2019	300.00
131565158	FS1-200E-08-00-FA-00	18L1311	130510781	3/22/2019	300.00
131565159	FS1-200E-08-00-FA-00	18L1311	130510781	3/22/2019	300.00
131565160	FS1-200E-08-00-FA-00	18L1311	130510781	3/22/2019	300.00
131565161	FS1-200E-08-00-FA-00	18L1311	130510780	3/22/2019	300.00
131565162	FS1-200E-08-00-FA-00	18L1311	130510780	3/22/2019	300.00
131565163	FS1-200E-08-00-FA-00	18L1311	130510780	3/22/2019	300.00
131565164	FS1-200E-08-00-FA-00	18L1311	130510780	3/22/2019	300.00
131565165	FS1-200E-08-00-FA-00	18L1311	130510780	3/22/2019	300.00
131565166	FS1-200E-08-00-FA-00	18L1311	130510782	3/22/2019	300.00
131565167	FS1-200E-08-00-FA-00	18L1311	130510782	3/22/2019	300.00
131565168	FS1-200E-08-00-FA-00	18L1311	130510782	3/22/2019	300.00
131565169	FS1-200E-08-00-FA-00	18L1311	130510782	3/22/2019	300.00
131565170	FS1-200E-08-00-FA-00	18L1311	130510782	3/22/2019	300.00
131565171	FS1-200E-08-00-FA-00	18L1311	130510788	3/22/2019	300.00
131565172	FS1-200E-08-00-FA-00	18L1311	130510788	3/22/2019	300.00
131565173	FS1-200E-08-00-FA-00	18L1311	130510788	3/22/2019	300.00
131565174	FS1-200E-08-00-FA-00	18L1311	130510788	3/22/2019	300.00
131565175	FS1-200E-08-00-FA-00	18L1311	130510788	3/22/2019	300.00
131565176	FS1-200E-08-00-FA-00	18L1311	130510786	3/22/2019	300.00
131565177	FS1-200E-08-00-FA-00	18L1311	130510786	3/22/2019	300.00
131565178	FS1-200E-08-00-FA-00	18L1311	130510786	3/22/2019	300.00
131565179	FS1-200E-08-00-FA-00	18L1311	130510403	3/22/2019	300.00
131565180	FS1-200E-08-00-FA-00	18L1311	130510403	3/22/2019	300.00
131565181	FS1-200E-08-00-FA-00	18L1311	130510403	3/22/2019	300.00
131565182	FS1-200E-08-00-FA-00	18L1311	130510403	3/22/2019	300.00
131565183	FS1-200E-08-00-FA-00	18L1311	130510403	3/22/2019	300.00
131565184	FS1-200E-08-00-FA-00	18L1311	130510402	3/22/2019	300.00
131565185	FS1-200E-08-00-FA-00	18L1311	130510402	3/22/2019	300.00
131565186	FS1-200E-08-00-FA-00	18L1311	130510402	3/22/2019	300.00
131565187	FS1-200E-08-00-FA-00	18L1311	130510402	3/22/2019	300.00
131565188	FS1-200E-08-00-FA-00	18L1311	130510789	3/22/2019	300.00
131565189	FS1-200E-08-00-FA-00	18L1311	130510789	3/22/2019	300.00
131565190	FS1-200E-08-00-FA-00	18L1311	130510789	3/22/2019	300.00
131565191	FS1-200E-08-00-FA-00	18L1311	130510789	3/22/2019	300.00
131565192	FS1-200E-08-00-FA-00	18L1311	130510789	3/22/2019	300.00
131565193	FS1-200E-08-00-FA-00	18L1311	130510787	3/22/2019	300.00
131565194	FS1-200E-08-00-FA-00	18L1311	130510787	3/22/2019	300.00
131565195	FS1-200E-08-00-FA-00	18L1311	130510787	3/22/2019	300.00
131565196	FS1-200E-08-00-FA-00	18L1311	130510787	3/22/2019	300.00
131565197	FS1-200E-08-00-FA-00	18L1311	130510608	3/22/2019	300.00
131565198	FS1-200E-08-00-FA-00	18L1311	130510608	3/22/2019	300.00
131565199	FS1-200E-08-00-FA-00	18L1311	130510608	3/22/2019	300.00
131565200	FS1-200E-08-00-FA-00	18L1311	130510608	3/22/2019	300.00
131565201	FS1-200E-08-00-FA-00	18L1311	130510608	3/22/2019	300.00
131565202	FS1-200E-08-00-FA-00	18L1311	130510522	3/22/2019	300.00



Roll Allocation List

Sales Order SO-086654
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

Serial number	Item Number	Resin Lot	Bottom	Manufacturing date	Length
131565203	FS1-200E-08-00-FA-00	18L1311	130510522	3/22/2019	300.00
131566620	FS1-200E-08-00-FA-00	18L1525	130512489	4/12/2019	300.00
131566621	FS1-200E-08-00-FA-00	18L1525	130512489	4/12/2019	300.00
131566622	FS1-200E-08-00-FA-00	18L1525	130512489	4/12/2019	300.00
131566623	FS1-200E-08-00-FA-00	18L1525	130512489	4/12/2019	300.00



ROLL TEST DATA REPORT



Report Date: Apr/16/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	FS1-200E-08-00-FA-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A
131565134	226	79	0.960	2.7	3.6
131565135	220	74	0.964	2.6	3.3
131565136	220	74	0.964	2.6	3.3
131565137	220	74	0.964	2.6	3.3
131565138	220	74	0.964	2.6	3.3
131565139	220	74	0.964	2.6	3.3
131565140	220	74	0.964	2.6	3.3
131565141	220	74	0.964	2.6	3.3
131565142	220	74	0.964	2.6	3.3
131565143	220	74	0.964	2.6	3.3
131565144	220	74	0.964	2.6	3.3
131565145	220	74	0.964	2.6	3.3
131565146	213	66	0.962	2.7	3.8
131565147	213	66	0.962	2.7	3.8
131565148	213	66	0.962	2.7	3.8
131565149	213	66	0.962	2.7	3.8
131565150	213	66	0.962	2.7	3.8
131565151	213	66	0.962	2.7	3.8
131565152	213	66	0.962	2.7	3.8
131565153	213	66	0.962	2.7	3.8
131565154	213	66	0.962	2.7	3.8
131565155	213	66	0.962	2.7	3.8
131565156	213	66	0.962	2.7	3.8
131565157	217	60	0.961	2.7	5.4
131565158	217	60	0.961	2.7	5.4
131565159	217	60	0.961	2.7	5.4
131565160	217	60	0.961	2.7	5.4
131565161	217	60	0.961	2.7	5.4
131565162	217	60	0.961	2.7	5.4
131565163	217	60	0.961	2.7	5.4
131565164	217	60	0.961	2.7	5.4
131565165	217	60	0.961	2.7	5.4
131565166	217	60	0.961	2.7	5.4
131565167	217	60	0.961	2.7	5.4



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	FS1-200E-08-00-FA-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A
131565168	211	62	0.957	2.6	5.2
131565169	211	62	0.957	2.6	5.2
131565170	211	62	0.957	2.6	5.2
131565171	211	62	0.957	2.6	5.2
131565172	211	62	0.957	2.6	5.2
131565173	211	62	0.957	2.6	5.2
131565174	211	62	0.957	2.6	5.2
131565175	211	62	0.957	2.6	5.2
131565176	211	62	0.957	2.6	5.2
131565177	211	62	0.957	2.6	5.2
131565178	211	62	0.957	2.6	5.2
131565179	219	75	0.960	2.5	5.7
131565180	219	75	0.960	2.5	5.7
131565181	219	75	0.960	2.5	5.7
131565182	219	75	0.960	2.5	5.7
131565183	219	75	0.960	2.5	5.7
131565184	219	75	0.960	2.5	5.7
131565185	219	75	0.960	2.5	5.7
131565186	219	75	0.960	2.5	5.7
131565187	219	75	0.960	2.5	5.7
131565188	219	75	0.960	2.5	5.7
131565189	219	75	0.960	2.5	5.7
131565190	212	66	0.960	2.7	5.2
131565191	212	66	0.960	2.7	5.2
131565192	212	66	0.960	2.7	5.2
131565193	212	66	0.960	2.7	5.2
131565194	212	66	0.960	2.7	5.2
131565195	212	66	0.960	2.7	5.2
131565196	212	66	0.960	2.7	5.2
131565197	212	66	0.960	2.7	5.2
131565198	212	66	0.960	2.7	5.2
131565199	212	66	0.960	2.7	5.2
131565200	212	66	0.960	2.7	5.2
131565201	222	76	0.966	2.6	5.4



ROLL TEST DATA REPORT



Report Date: Apr/16/2019

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice NM US	FS1-200E-08-00-FA-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (ppi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)	Ply Adhesion Average ASTM D7005 (ppi) Side A
131565202	222	76	0.966	2.6	5.4
131565203	222	76	0.966	2.6	5.4
131566620	215	69	0.958	2.4	3.3
131566621	207	62	0.959	2.4	3.8
131566622	207	62	0.959	2.4	3.8
131566623	207	62	0.959	2.4	3.8

Laboratory Manager



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-086654	Falcon Environmental Lining Systems, Inc.	Eunice , NM US	FBR-080E-EBC-E-00	

Roll Number	Mass per Unit Area ASTM D5261 (oz/yd ²)	ASTM D4491 Water Flow Rate (gpm/ft ²)	ASTM D4491 Permittivity (sec-1)	ASTM D4751 AOS (mm)	ASTM D4632 Grab Strength (lbs) MD	ASTM D4632 Grab Strength (lbs) TD	ASTM D4632 Grab Elongation (%) MD	ASTM D4632 Grab Elongation (%) TD	ASTM D4533 Trapezoidal Tear (lbs) MD	ASTM D4533 Trapezoidal Tear (lbs) TD	ASTM D6241 CBR Puncture (lbs)
130510402	9.0	155	2.10	0.180	285	336	98	134	121	174	807
130510403	9.0	155	2.10	0.180	285	336	98	134	121	174	807
130510522	8.4	136	1.80	0.180	251	273	131	162	177	259	692
130510608	8.1	113	1.50	0.180	319	255	87	122	139	188	799
130510779	8.9	137	1.80	0.180	258	300	75	113	154	230	774
130510780	9.9	145	1.90	0.180	313	336	93	123	141	235	785
130510781	9.9	145	1.90	0.180	313	336	93	123	141	235	785
130510782	9.9	145	1.90	0.180	313	336	93	123	141	235	785
130510783	9.9	145	1.90	0.180	313	336	93	123	141	235	785
130510786	9.3	150	2.00	0.180	292	332	80	116	144	246	813
130510787	9.3	150	2.00	0.180	292	332	80	116	144	246	813
130510788	9.3	150	2.00	0.180	292	332	80	116	144	246	813
130510789	9.3	150	2.00	0.180	292	332	80	116	144	246	813
130511331	8.9	156	2.10	0.180	244	280	89	104	153	190	724
130511341	9.8	152	2.00	0.180	253	353	100	134	154	233	794
130511346	8.5	168	2.20	0.180	239	321	84	139	134	165	700
130511347	9.0	160	2.10	0.180	265	292	87	117	147	185	681
130512489	8.7	142	1.90	0.180	245	281	72	83	118	137	701

Laboratory Manager



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis

(CONFIDENTIAL)

CUSTOMER: GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE

KINGSTREE

SC 29556

PRODUCT : HB5502B

RAILCAR FPAX214431

CLEANING/INSPECTION NO: 214431122618

S/O NO : EU2A124

CUSTOMER PO : 03-514935

DATE SHIPPED: 2/13/19

LOT NO : 18L1311

WEIGHT (LB) : 198,650.00

CUSTID: FT03112 SPIDE3

TEST ITEM

Melt Index, g/10min

Density, g/cm3

REFERENCE METHOD

ASTM D1238

ASTM D1505

TEST VALUE

.31

.9542

Linda Kao

QC SUPERVISOR: LINDA KAO



FORMOSA PLASTICS CORPORATION, TEXAS
201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT TX 77978

PHONE:(888)FPCUSA3

Certificate of Analysis
(CONFIDENTIAL)

CUSTOMER: GSE ENVIRONMENTAL LLC
C/O:
1245 EASTLAND AVE
KINGSTREE SC 29556
PRODUCT : HB5502B
RAILCAR HCBX001553

S/O NO : EU3A382
CUSTOMER PO : 03-515216
SHIP DATE : 3/19/19
LOT NO : 18L1525
WEIGHT : 200,300.00LBS.
CUSTID: FT03112-016 SPIDM4

TEST ITEM	REFERENCE METHOD	TEST VALUE
-----	-----	-----
Melt Index,g/10min	ASTM D1238	.330
Density, g/cm3	ASTM D1505	.9545

Linda Kao

QC SUPERVISOR: LINDA KAO



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131565134

ROLL IDENTIFICATION

CUSTOMER INFORMATION

Roll Number 131565134

Product Name FS1-200E-08-00-FA-00

Production Date 3/22/2019

Order Number 86654

Customer Name Falcon Environmental Lining Systems, Inc.

Project Name Falcon-Sundance-Onyx

Location Eunice, NM

Pressure (psf)	Gradient	Net/Composite	Transmissivity Results		Seat Time (min)	Boundary
			(m²/sec)	(gal/min/ft)		
10,000	0.10	Composite	1.28E-03	6.18	15	SS Plates
10,000	0.10	Composite	3.19E-03	15.41	15	SS Plates



GSE Roll Allocation

Order SO-086654
Customer Falcon Environmental Lining Systems, Inc.
Project Name Falcon - Sundance - Onyx

TRI/AUSTIN
1/100,000 sf, min 1/lot.
Geonet: 3 ft x roll width. Geotextile
3 ft x roll width. Geocomposite 3 ft x roll
width.

Roll#	Resin Lot	Product Code	Mfg Date	Length	Sent
131565134	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	5-Apr
131565135	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565136	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565137	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565138	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565139	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565140	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565141	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565142	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565143	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565144	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565145	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565146	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565147	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565148	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565149	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565150	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565151	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565152	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565153	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565154	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565155	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565156	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565157	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	5-Apr
131565158	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565159	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565160	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565161	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565162	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565163	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565164	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565165	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565166	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565167	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565168	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565169	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565170	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565171	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565172	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565173	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565174	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565175	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565176	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565177	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565178	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	5-Apr
131565179	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565180	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565181	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565182	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565183	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565184	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565185	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565186	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	

131565187	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565188	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565189	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565190	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565191	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565192	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565193	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565194	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565195	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565196	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565197	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565198	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565199	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565200	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	5-Apr
131565201	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565202	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131565203	18L1311	FS1-200E-08-00-FA-00	3/22/2019	300	
131566620	18L1525	FS1-200E-08-00-FA-00	4/12/2019	300	16-Apr
131566621	18L1525	FS1-200E-08-00-FA-00	4/12/2019	300	
131566622	18L1525	FS1-200E-08-00-FA-00	4/12/2019	300	
131566623	18L1525	FS1-200E-08-00-FA-00	4/12/2019	300	

Roll Allocation List

Sales Order SO-080852
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon/Sundance

Serial number	Item Number	Resin Lot	Bottom	Manufacturing date	Length
131513984	FS1-200E-08-00-FA-00	CB117A1504	2024812252	3/2/2017	300.00
131513985	FS1-200E-08-00-FA-00	CB117A1504	2024812252	3/2/2017	300.00
131513986	FS1-200E-08-00-FA-00	CB117A1504	2024812252	3/2/2017	300.00
131513987	FS1-200E-08-00-FA-00	CB117A1504	2024837479	3/2/2017	300.00
131513988	FS1-200E-08-00-FA-00	CB117A1504	2024837479	3/3/2017	300.00
131513989	FS1-200E-08-00-FA-00	CB117A1504	2024837479	3/3/2017	300.00
131513990	FS1-200E-08-00-FA-00	CB117A1504	2024837479	3/3/2017	300.00
131513991	FS1-200E-08-00-FA-00	CB117A1504	2024837479	3/3/2017	300.00
131513993	FS1-200E-08-00-FA-00	CB117A1504	2024837513	3/3/2017	300.00
131513994	FS1-200E-08-00-FA-00	CB117A1504	2024837513	3/3/2017	300.00
131513995	FS1-200E-08-00-FA-00	CB117A1504	2024837513	3/3/2017	300.00
131513996	FS1-200E-08-00-FA-00	CB117A1504	2024837513	3/3/2017	300.00
131513997	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131513998	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131513999	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131514000	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131514001	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131514002	FS1-200E-08-00-FA-00	CB117A1504	2024837510	3/3/2017	300.00
131514003	FS1-200E-08-00-FA-00	CB117A1504	2024837481	3/3/2017	300.00
131514004	FS1-200E-08-00-FA-00	CB117A1504	2024837481	3/3/2017	300.00
131514005	FS1-200E-08-00-FA-00	CB117A1504	2024837481	3/3/2017	300.00
131514006	FS1-200E-08-00-FA-00	CB117A1504	2024837481	3/3/2017	300.00
131514007	FS1-200E-08-00-FA-00	CB117A1504	2024837481	3/3/2017	300.00
131514008	FS1-200E-08-00-FA-00	CB117A1504	2024794723	3/3/2017	300.00
131514009	FS1-200E-08-00-FA-00	CB117A1504	2024794723	3/3/2017	300.00
131514010	FS1-200E-08-00-FA-00	CB117A1504	2024794723	3/3/2017	300.00
131514013	FS1-200E-08-00-FA-00	CB117A1504	2024794723	3/3/2017	300.00
131514014	FS1-200E-08-00-FA-00	CB117A1504	2024794727	3/3/2017	300.00
131514015	FS1-200E-08-00-FA-00	CB117A1504	2024794727	3/3/2017	300.00
131514016	FS1-200E-08-00-FA-00	CB117A1504	2024794727	3/3/2017	300.00
131514017	FS1-200E-08-00-FA-00	CB117A1504	2024794727	3/3/2017	300.00
131514018	FS1-200E-08-00-FA-00	CB117A1504	2024794727	3/3/2017	300.00
131514019	FS1-200E-08-00-FA-00	CB117A1504	2024793628	3/3/2017	300.00
131514020	FS1-200E-08-00-FA-00	CB117A1504	2024793628	3/3/2017	300.00
131514021	FS1-200E-08-00-FA-00	CB117A1504	2024793628	3/3/2017	300.00
131514022	FS1-200E-08-00-FA-00	CB117A1504	2024793628	3/3/2017	300.00
131514023	FS1-200E-08-00-FA-00	CB117A1504	2024793628	3/3/2017	300.00
131514024	FS1-200E-08-00-FA-00	CB117A1504	2024812191	3/3/2017	300.00
131514026	FS1-200E-08-00-FA-00	CB117A1504	2024812191	3/3/2017	300.00
131514027	FS1-200E-08-00-FA-00	CB117A1504	2024812191	3/3/2017	300.00
131514028	FS1-200E-08-00-FA-00	CB117A1504	2024812191	3/3/2017	300.00
131514029	FS1-200E-08-00-FA-00	CB117A1504	2024812250	3/3/2017	300.00
131514030	FS1-200E-08-00-FA-00	CB117A1504	2024812250	3/3/2017	300.00
131514031	FS1-200E-08-00-FA-00	CB117A1504	2024812250	3/3/2017	300.00
131514032	FS1-200E-08-00-FA-00	CB117A1504	2024812250	3/3/2017	300.00
131514033	FS1-200E-08-00-FA-00	CB117A1601	2024812250	3/3/2017	300.00
131514034	FS1-200E-08-00-FA-00	CB117A1601	2024794724	3/3/2017	300.00
131514035	FS1-200E-08-00-FA-00	CB117A1601	2024794724	3/3/2017	300.00
131514036	FS1-200E-08-00-FA-00	CB117A1601	2024794724	3/3/2017	300.00
131514037	FS1-200E-08-00-FA-00	CB117A1601	2024794724	3/3/2017	300.00
131514038	FS1-200E-08-00-FA-00	CB117A1601	2024794724	3/3/2017	300.00
131514039	FS1-200E-08-00-FA-00	CB117A1601	2024793632	3/3/2017	300.00
131514040	FS1-200E-08-00-FA-00	CB117A1601	2024793632	3/3/2017	300.00
131514041	FS1-200E-08-00-FA-00	CB117A1601	2024793632	3/3/2017	300.00
131514042	FS1-200E-08-00-FA-00	CB117A1601	2024793632	3/3/2017	300.00
131514043	FS1-200E-08-00-FA-00	CB117A1601	2024793632	3/3/2017	300.00
131514044	FS1-200E-08-00-FA-00	CB117A1601	2024812195	3/3/2017	300.00
131514045	FS1-200E-08-00-FA-00	CB117A1601	2024812195	3/3/2017	300.00
131514046	FS1-200E-08-00-FA-00	CB117A1601	2024812195	3/3/2017	300.00
131514047	FS1-200E-08-00-FA-00	CB117A1601	2024812195	3/3/2017	300.00
131514048	FS1-200E-08-00-FA-00	CB117A1601	2024812195	3/3/2017	300.00
131514049	FS1-200E-08-00-FA-00	CB117A1601	2024812196	3/3/2017	300.00
131514050	FS1-200E-08-00-FA-00	CB117A1601	2024812196	3/3/2017	300.00
131514051	FS1-200E-08-00-FA-00	CB117A1601	2024812196	3/3/2017	300.00
131514052	FS1-200E-08-00-FA-00	CB117A1601	2024812196	3/4/2017	300.00
131514053	FS1-200E-08-00-FA-00	CB117A1601	2024812193	3/4/2017	300.00
131514054	FS1-200E-08-00-FA-00	CB117A1601	2024812193	3/4/2017	300.00
131514055	FS1-200E-08-00-FA-00	CB117A1601	2024812193	3/4/2017	300.00

Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:
KINGSTREE SC

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Equistar Material : 16838 PETROTHENE LR732001
Batch Number : CB117A1504
Vehicle Number : EQUX15060
Estimated Quantity : 215,600 LBS

Customer Order No. : 03-508415
Customer Number : 151477
Date Shipped : January 18, 2017
Equistar Order No. : 4460324 000010
Delivery Item No. : 88618741 000010

Test Description	Test Result	Unit of Measure
------------------	-------------	-----------------

Vehicle ID	EQUX15060	
Vehicle Type	HOPPER CAR H	
Density, Extrudate @ 23C	0.9545	g/cm3 STM 011
Melt Index, 2160g @ 190C	0.35	g/10 min. STM 002

Delivery Number:



Cust/PO Number:



Data reported was generated in an approved
Quality Assurance Lab.

Print Date: January 19, 2017
This information is available 24 hours a day at
<https://tyb.customerexpress.com/>
Questions ? Call Customer Service: 888-777-0232

BSSIMMO1

This Certificate of Analysis contains the most current information available as of the print date. Results provided by Seller are intended to be representative in nature only and are not to be construed as a guarantee of future product performance. Before using a LyondellBasell product, customers and other users should make their own independent determination that the product is suitable for the intended use. This document does not constitute a warranty, express or implied, including a warranty of merchantability or fitness for a particular purpose. This document shall not be reproduced except in full without written approval of the issuer.

Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:
KINGSTREE SC

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Equistar Material : 16838 PETROTHENE LR732001
Batch Number : CB117A1601
Vehicle Number : EQUX630621
Estimated Quantity : 216,350 LBS

Customer Order No. : 03-508415
Customer Number : 151477
Date Shipped : January 18, 2017
Equistar Order No. : 4460325 000010
Delivery Item No. : 88618744 000010

Test Description	Test Result	Unit of Measure	
Vehicle ID	EQUX630621		
Vehicle Type	HOPPER CAR H		
Density, Extrudate @ 23C	0.9545	g/cm3	STM 011
Melt Index, 2160g @ 190C	0.34	g/10 min.	STM 002

Delivery Number:



Cust/PO Number:



Data reported was generated in an approved
Quality Assurance Lab.

Print Date: January 19, 2017
This information is available 24 hours a day at
<https://lyb.customerexpress.com/>
Questions ? Call Customer Service: 888-777-0232

BSSIMMO1

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Quality Assurance Laboratory Test Results

Job Name: Falcon-Phillips 66 Brine Pond
Sales Order: 80852
Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
Frequency 1/Lot
Specification: ≤ 1.0 g/10 minutes

Product Code	Roll Number	Lot Number	Result
FS1-200E-08-00-FA-00	131513775	CB117A1504	0.33
FS1-200E-08-00-FA-00	131514033	CB117A1601	0.35

Approved by: Barbara McCrea
Date: March 6, 2017

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.



Report Date
3/6/2017

Quality Assurance Laboratory Test Results

Job Name: Falcon
Sales Order: 80852

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Frequency 1/Lot
Specification: ≤ 1.0 g/10 minutes

Product Code	Roll Number	Lot Number	Result
FS1-200E-08-00-FA-00	131513775	CB117A1504	0.33
FS1-200E-08-00-FA-00	131514033	CB117A1601	0.35

Approved by: Barbara McCrea
Date: March 6, 2017

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.



1245 Eastland Avenue
Kingstree, SC 29556
Phone 843-382-4603
Fax 843-382-4604

Date: March 6, 2017

Project: # Falcon

Ref: Ultraviolet (UV) Resistance

To Whom It May Concern:

The resistance of nonwoven needle punched geotextiles to ultraviolet light depends primarily on antioxidant and carbon black package mixed with resin to prepare a formulation for fiber extrusion. As long as this formulation remains the same the UV resistance of a geotextiles does not change. Therefore, GSE performs UV testing only once per resin formulation. The testing is performed according to ASTM Test Method D 4355 and results are included on GSE geotextile specification sheet. Currently, all GSE geotextiles meet or exceed a value of 70% strength retained after 500 hours of UV exposure. GSE will meet or exceed this value for the referenced project.

Although GSE geotextiles are manufactured using one of the best available antioxidant packages, we recommend covering the geotextiles within 30 days of exposure to direct Sunlight. This period does not include time during which geotextiles rolls remain on site covered in black shrink-wrap. Our recommendation is based on UV performance data published in technical literature indicating geotextile strength can decrease sharply after prolonged exposure to Sunlight.

A handwritten signature in black ink that reads "Mauricio Ossa".

Mauricio Ossa
Director of Global Quality



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513884

ROLL IDENTIFICATION

Roll Number 131513884
Product Name FS1-200E-08-00-FA-00
Production Date 3/1/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon
Project Name
Location

<i>Pressure (psf)</i>	<i>Gradient</i>	<i>Net/Composite</i>	<i>Transmissivity Results</i>		<i>Seat Time (min)</i>	<i>Boundary</i>
			<i>(m²/sec)</i>	<i>(gal/min/ft)</i>		
10,000	0.1	Cpmposite	1.81E-03	8.74	15	SS plates
10,000	0.1	Net	3.51E-03	16.96	15	SS plates



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513775

ROLL IDENTIFICATION

Roll Number 131513775
Product Name FS1-200E-08-00-FA-00
Production Date 2/28/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name Falcon
Location

<i>Pressure (psf)</i>	<i>Gradient</i>	<i>Net/Composite</i>	<i>Transmissivity Results</i>		<i>Seat Time (min)</i>	<i>Boundary</i>
			<i>(m²/sec)</i>	<i>(gal/min/ft)</i>		
10,000	0.1	Cpmposite	1.60E-03	7.73	15	SS plates
10,000	0.1	Net	3.23E-03	15.60	15	SS plates



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513972

ROLL IDENTIFICATION

Roll Number 131513972
Product Name FS1-200E-08-00-FA-00
Production Date 3/2/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon
Project Name
Location

Pressure (psf)	Gradient	Net/Composite	Transmissivity Results		Seat Time	Boundary
			(m ² /sec)	(gal/min/ft)	(min)	
10,000	0.1	Cpmposite	2.41E-03	11.64	15	SS plates
10,000	0.1	Net	4.59E-03	22.17	15	SS plates



Roll Allocation List

Sales Order SO-080852
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name

Serial number	Item Number	Resin Lot	Manufacturing date	Length
131512590	GNS-200E-00-00-E-00	CB117A0805	2/11/2017	330.00
131512690	GNS-200E-00-00-E-00	CB117A0805	2/12/2017	330.00
131512813	GNS-200E-00-00-E-00	CB117A0805	2/13/2017	330.00
131513304	GNS-200E-00-00-E-00	CB117A1104	2/22/2017	330.00
131513305	GNS-200E-00-00-E-00	CB117A1104	2/22/2017	330.00
131513306	GNS-200E-00-00-E-00	CB117A1104	2/22/2017	330.00
131513373	GNS-200E-00-00-E-00	CB117A1104	2/23/2017	330.00
131513377	GNS-200E-00-00-E-00	CB117A1104	2/23/2017	330.00
131513414	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513415	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513416	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513417	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513418	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513419	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513420	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513421	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513422	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513423	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513424	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513425	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513426	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513427	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513428	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513430	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513431	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513432	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513433	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513434	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513435	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513436	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513437	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513438	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513439	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513440	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513441	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513442	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513443	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513444	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513445	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513446	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513447	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513448	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513449	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513450	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513451	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513452	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513453	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513454	GNS-200E-00-00-E-00	CB117A1104	2/24/2017	330.00
131513455	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513456	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513457	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513458	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513459	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513460	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513461	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513462	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513463	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513464	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513465	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513466	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513467	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513468	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513469	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513470	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513471	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513472	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513473	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00
131513474	GNS-200E-00-00-E-00	CB117A1503	2/24/2017	330.00



Roll Allocation List

Sales Order SO-080852
Customer Name Falcon Environmental Lining Systems, Inc.
Project Name

Serial number	Item Number	Resin Lot	Manufacturing date	Length
131513612	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513613	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513614	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513615	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513616	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513617	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513618	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513619	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513620	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513621	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513622	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513623	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513624	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513625	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513626	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513627	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513628	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513629	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513630	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513631	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513632	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513633	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513634	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513635	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513636	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513637	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513638	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513639	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513640	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513641	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513642	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513643	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513644	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513658	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513660	GNS-200E-00-00-E-00	CB117A1503	2/26/2017	330.00
131513662	GNS-200E-00-00-E-00	CB117A1503	2/27/2017	330.00
131513663	GNS-200E-00-00-E-00	CB117A1503	2/27/2017	330.00
131513665	GNS-200E-00-00-E-00	CB117A1503	2/27/2017	330.00
131513667	GNS-200E-00-00-E-00	CB117A1503	2/27/2017	330.00



ROLL TEST DATA REPORT



Report Date: Mar/1/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-080852	Falcon Environmental Lining Systems, Inc.		GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (psi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)
131512590	238	60	0.963	2.7
131512690	226	59	0.964	2.8
131512813	224	56	0.964	2.4
131513304	227	74	0.974	2.7
131513305	224	56	0.964	2.4
131513306	224	56	0.964	2.4
131513373	224	56	0.964	2.4
131513377	224	56	0.964	2.4
131513414	229	68	0.959	2.2
131513415	230	65	0.961	2.3
131513416	230	65	0.961	2.3
131513417	230	65	0.961	2.3
131513418	230	65	0.961	2.3
131513419	230	65	0.961	2.3
131513420	230	65	0.961	2.3
131513421	230	65	0.961	2.3
131513422	230	65	0.961	2.3
131513423	230	65	0.961	2.3
131513424	230	65	0.961	2.3
131513425	229	61	0.977	2.1
131513426	229	61	0.977	2.1
131513427	229	61	0.977	2.1
131513428	229	61	0.977	2.1
131513430	229	61	0.977	2.1
131513431	229	61	0.977	2.1
131513432	229	61	0.977	2.1
131513433	229	61	0.977	2.1
131513434	229	61	0.977	2.1
131513435	219	64	0.968	2.3
131513436	219	64	0.968	2.3
131513437	219	64	0.968	2.3
131513438	219	64	0.968	2.3
131513439	219	64	0.968	2.3
131513440	219	64	0.968	2.3



ROLL TEST DATA REPORT



Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-080852	Falcon Environmental Lining Systems, Inc.		GNS-200E-00-00-E-00	

Roll Number	Geoner Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (psi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)
131513578	232	59	0.961	2.3
131513579	232	59	0.961	2.3
131513580	232	59	0.961	2.3
131513581	232	59	0.961	2.3
131513582	232	59	0.961	2.3
131513583	232	59	0.961	2.3
131513584	232	59	0.961	2.3
131513585	229	54	0.963	2.4
131513586	229	54	0.963	2.4
131513587	229	54	0.963	2.4
131513588	229	54	0.963	2.4
131513589	229	54	0.963	2.4
131513590	229	54	0.963	2.4
131513591	229	54	0.963	2.4
131513592	229	54	0.963	2.4
131513593	229	54	0.963	2.4
131513594	229	54	0.963	2.4
131513595	232	64	0.963	2.4
131513596	232	64	0.963	2.4
131513597	232	64	0.963	2.4
131513598	232	64	0.963	2.4
131513599	232	64	0.963	2.4
131513600	232	64	0.963	2.4
131513601	232	64	0.963	2.4
131513602	232	64	0.963	2.4
131513603	232	64	0.963	2.4
131513604	232	64	0.963	2.4
131513605	226	57	0.961	2.2
131513606	226	57	0.961	2.2
131513607	226	57	0.961	2.2
131513608	226	57	0.961	2.2
131513609	226	57	0.961	2.2
131513610	226	57	0.961	2.2
131513611	226	57	0.961	2.2



ROLL TEST DATA REPORT



Report Date: Mar/1/2017

Sales Order No.	Customer Name	Project Location	Product Name	BOL Number
SO-080852	Falcon Environmental Lining Systems, Inc.		GNS-200E-00-00-E-00	

Roll Number	Geonet Thickness ASTM D5199 (mils)	Tensile Strength ASTM D7179 (psi)	Density ASTM D1505 (g/cc)	Carbon Black Content ASTM D4218 (%)
131513660	221	62	0.962	2.3
131513662	221	62	0.962	2.3
131513663	221	62	0.962	2.3
131513665	221	62	0.962	2.3
131513667	221	62	0.962	2.3

Laboratory Manager

Mauricio Osora



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513377

ROLL IDENTIFICATION

Roll Number 131513377
Product Name GNS-200E-00-00-E-00
Production Date 2/24/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon Environmental Lining Systems, INC
Project Name
Location

Pressure (psf)	Gradient	Net/Composite	Transmissivity Results		Seal Time	Boundary
			(m ² /sec)	(gal/min/ft)	(min)	
10,000	0.10	NET	3.05E-03	14.73	15	S plates

Transmissivity Report

ASTM D4716

Roll No.

131513444

ROLL IDENTIFICATION

Roll Number 131513444
Product Name GNS-200E-00-00-E-00
Production Date 2/24/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon Environmental Lining Systems, INC
Project Name
Location

Pressure (psf)	Gradient	Net/Composite	Transmissivity Results		Seat Time (min)	Boundary
(m ² /sec)	(gal/min/ft)					
10,000	0.10	NET	4.29E-03	20.72	15	S plates



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513534

ROLL IDENTIFICATION

Roll Number 131513534
Product Name GNS-200E-00-00-E-00
Production Date 2/25/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon Environmental Lining Systems, INC
Project Name
Location

<i>Pressure (psf)</i>	<i>Gradient</i>	<i>Net/Composite</i>	<i>Transmissivity Results</i>		<i>Seal Time (min)</i>	<i>Boundary</i>
			<i>(m²/sec)</i>	<i>(gal/min/ft)</i>		
10,000	0.10	NET	5.27E-03	25.46	15	S plates



GSE Environmental, LLC.

Transmissivity Report

ASTM D4716

Roll No.

131513614

ROLL IDENTIFICATION

Roll Number 131513614
Product Name GNS-200E-00-00-E-00
Production Date 2/26/2017

CUSTOMER INFORMATION

Order Number 80852
Customer Name Falcon Environmental Lining Systems, INC
Project Name
Location

<i>Pressure (psf)</i>	<i>Gradient</i>	<i>Net/Composite</i>	<i>Transmissivity Results</i>		<i>Seal Time (min)</i>	<i>Boundary</i>
			<i>(m²/sec)</i>	<i>(gal/min/ft)</i>		
10,000	0.10	NET	5.30E-03	25.60	15	S plates



Report Date
3/1/2017

Quality Assurance Laboratory Test Results

Job Name: Falcon/
Sales Order: 80852

Required Testing: ASTM D 1238, 190 / 2.16 -- Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

Specification: ≤ 1.0 g/10 minutes

Product Code	Lot Number	Roll Number	Result
GNS-200E-00-00-E-00	CB117A0805	131512690	0.39
GNS-200E-00-00-E-00	CB117A1104	131513604	0.38

Approved by: Thomas Harrelson
Date: March 1, 2017

The above stated data shall not be reproduced except in full, without the written approval of the laboratory.

Equistar Chemicals, LP
One Houston Center
1221 McKinney
Houston TX 77010

Certificate Of Analysis

Certificate of Analysis Contact:
KINGSTREE SC

Ship-To Address:
GSE ENVIRONMENTAL LLC
1245 EASTLAND AVE
KINGSTREE SC 29556
UNITED STATES

Equistar Material : 16838 PETROTHENE LR732001
Batch Number : CB117A1104
Vehicle Number : CITX200159
Estimated Quantity : 215,250 LBS

Customer Order No. : 03-508415
Customer Number : 151477
Date Shipped : January 17, 2017
Equistar Order No. : 4481477 000010
Delivery Item No. : 88612229 000010

Test Description	Test Result	Unit of Measure	
Vehicle ID	CITX200159		
Vehicle Type	HOPPER CAR H		
Density, Extrudate @ 23C	0.9529	g/cm3	STM 011
Melt Index, 2160g @ 190C	0.36	g/10 min.	STM 002

Delivery Number:



Cust/PO Number:



Data reported was generated in an approved
Quality Assurance Lab.

Print Date: January 18, 2017
This information is available 24 hours a day at
<https://lyb.customerexpress.com/>
Questions ? Call Customer Service: 888-777-0232

BSSIMMO1

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Appendix G5

Geonet Receiving Log

Appendix G5. Geonet Receiving and Manufacturing/Conformance Log

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results(P/F)	Approved for Installation (Y/N)
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565183	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565182	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565144	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565143	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565142	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565147	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565175	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565201	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565200	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565199	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565180	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565179	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565178	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565149	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565181	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565135	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565134	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565158	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565154	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565156	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565155	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565148	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565176	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/01/19	18L1311	131565177	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565151	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565192	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565157	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565152	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565153	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/02/19	18L1311	131565176	4425	4/16/2019	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514046	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514015	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514020	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514021	4425	3/6/2017	P	N/A	Y

Appendix G5. Geonet Receiving and Manufacturing/Conformance Log

Material Type	Receiving Date	Lot Number	Roll Number	Sheet Area (est. sf)	MQC Recieved Date	MQC Results (P/F)	Conformance Test Results(P/F)	Approved for Installation (Y/N)
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514023	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514026	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514030	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514031	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514036	4425	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514046	9675	3/6/2017	P	N/A	Y
GSE 200 mil 1 Sided Fabrinet	05/07/19	CB117A1504	131514048	9675	3/6/2017	P	N/A	Y

Bold indicates rolls from Falcon Environmental Liner Systems, inc. Warehouse.

Appendix H

**Leachate System
Certifications**

Appendix H1

Select Aggregate Laboratory Testing

Laboratory Report for Daniel B. Stephens & Associates, Inc.

DB18.1209.00 Sundance West

May 28, 2019



Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113



May 28, 2019

Gundar Peterson
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400

Re: DBS&A Laboratory Report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00
Sundance West Project

Dear Mr. Peterson:

Enclosed is the report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00 Sundance West project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to DBS&A and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Adam Bland
Laboratory Operations Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory

4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113

505-889-7752
FAX 505-889-0258

Summaries



Daniel B. Stephens & Associates, Inc.

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties ¹			Saturated Hydraulic Conductivity ²			Moisture Characteristics ³								Particle Size ⁴			Specific Gravity ⁵		Air Perm- eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K _{unsat}	DS	WS	H	F	C			
LCG-01 (Sundance)															X							

¹ G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

² CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

³ HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box,
EP = Effective Porosity, WHC = Water Holding Capacity, K_{unsat} = Calculated Unsaturated Hydraulic Conductivity

⁴ DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

⁵ F = Fine (<4.75mm), C = Coarse (>4.75mm)



Daniel B. Stephens & Associates, Inc.

Notes

Sample Receipt:

One sample was received in a box on May 6, 2019 and additional material was received in a 1/2 full 5-gallon bucket on May 20, 2019. The sample was received in good order.

Sample Preparation and Testing Notes:

The sample was subjected to coarse aggregate particle size analysis.



Percent Gravel, Sand, Silt and Clay

Sample Number	% Gravel (>4.75mm)	% Sand/Silt/Clay (<4.75mm)	USCS Classification
LCG-01 (Sundance)	99.70	0.30	Poorly-graded gravel (GP)

Particle Size Analysis



Percent Gravel, Sand, Silt and Clay

Sample Number	% Gravel (>4.75mm)	% Sand/Silt/Clay (<4.75mm)	USCS Classification
LCG-01 (Sundance)	99.70	0.30	Poorly-graded gravel (GP)



Daniel B. Stephens & Associates, Inc.

Sieve Analysis of Coarse Aggregates

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Initial Dry Weight of Sample (g):</i> 28369.50
<i>Job Number:</i> DB18.1209.00	<i>Weight Passing #4 (g):</i> 84.45
<i>Sample Number:</i> LCG-01 (Sundance West)	<i>Weight Retained #4 (g):</i> 28285.05
<i>Date Sampled:</i> 5/6/19	<i>Weight of Hydrometer Sample (g):</i> 84.45
<i>Depth:</i> NA	<i>Calculated Weight of Sieve Sample (g):</i> 28369.50
<i>Test Date:</i> 6-May-19	<i>Shape:</i> Angular
	<i>Hardness:</i> Weathered & Friable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+4						
	4"	100	0.00	0.00	28369.50	100.0
	3.5"	90	0.00	0.00	28369.50	100.0
	3"	75	0.00	0.00	28369.50	100.0
	2.5"	63	0.00	0.00	28369.50	100.0
	2"	50.0	2843.72	2843.72	25525.78	90.0
	1 1/2"	37.5	12164.60	15008.32	13361.18	47.1
	1"	25.00	12603.40	27611.72	757.78	2.7
	3/4"	19.00	587.78	28199.50	170.00	0.60
	1/2"	12.50	76.04	28275.54	93.96	0.33
	3/8"	9.50	5.61	28281.15	88.35	0.31
	4	4.75	3.90	28285.05	84.45	0.30
-4			(Based on calculated sieve wt.)			
	dry pan	0.85	84.45	28369.50	0.00	

USCS Soil Classification: Poorly-graded gravel (GP)

Laboratory analysis by: C. Krous/J. Newcomer

Data entered by: C. Krous

Checked by: J. Hines

Laboratory Tests and Methods



Daniel B. Stephens & Associates, Inc.

Tests and Methods

Particle Size Analysis: ASTM C136

Appendix H2

HDPE Pipe Material Data



Submittal #5.0

Onyx General Contractors LLC
P.O. Box 60547
Midland, Texas 79711
Phone: (432) 561-8900
Fax: (432) 561-8644

Project: 18-005 - Sundance Mud Management and Processing Area
1001 6th Street
Eunice, New Mexico 88231

HDPE Pipe

SPEC SECTION:		SUBMITTAL MANAGER:	Daine Innerarity (Onyx General Contractors LLC)
STATUS:	Open	DATE CREATED:	02/21/2019
ISSUE DATE:	02/21/2019	REVISION:	0
RESPONSIBLE CONTRACTOR:	ISCO Industries	RECEIVED FROM:	Guy Spencer
RECEIVED DATE:	02/21/2019	SUBMIT BY:	02/21/2019
FINAL DUE DATE:	03/4/2019	LOCATION:	42 Sundance Lane, Eunice
SUB JOB:		COST CODE:	
LEAD TIME:	10 day(s)	Product Information	TYPE:
APPROVERS:	Gundar Peterson (Daniel B. Stephens & Associates, Inc.), Andy Wambsganss (Sundance West)		

BALL IN COURT:

Gundar Peterson (Daniel B. Stephens & Associates, Inc.), Andy Wambsganss (Sundance West)

DISTRIBUTION:

Jeremy Gaddis (Onyx General Contractors LLC) , Maurizio Iaquaniello (Onyx General Contractors LLC) , Alfredo Payan (Onyx General Contractors LLC) , Daine Innerarity (Onyx General Contractors LLC) , Sue Mussani (Sundance West) , Arif Mussani (Sundance West) , Tariq Mussani (Sundance West) , Michael Carrillo (Sundance West) , Joe Carrillo (Sundance West) , Misty Pratt (Sundance West) , Michael Ginsberg (Sundance West) , Thomas Golden (Daniel B. Stephens & Associates, Inc.)

DESCRIPTION:

See attached for product data(showing pipe properties) and shop drawings for HDPE pipes.

ATTACHMENTS:

SUBMITTAL WORKFLOW

NAME	SUBMITTER/ APPROVER	SENT DATE	DUE DATE	RETURNED DATE	RESPONSE	ATTACHMENTS	COMMENTS
Gundar Peterson	Approver		3/4/2019		Pending		
Andy Wambsganss	Approver		3/4/2019		Pending		

For Review

Daine Innerarity
BY

02/21/2019
DATE

COPIES TO

Table 1: Typical Cell Classification by Current Thermoplastic Piping Material Designation Code

PHYSICAL PROPERTY	ASTM TEST METHOD	UNITS	PE2708		PE3608		PE4710	
			CELL NUMBER	TYPICAL VALUE	CELL NUMBER	TYPICAL VALUE	CELL NUMBER	TYPICAL VALUE
DENSITY	D 1505	GR/CC	2	>0.925-0.940	3	>0.940-0.947	4	>0.947-0.955
MELT INDEX	D 1238	GR/10 MIN	3	<0.4-0.15	4	<0.15	4	<0.15
FLEXURAL MODULUS	D 790	PSI	3	40,000 - <80,000	5	110,000 - <180,000	5	110,000 - <180,000
TENSILE STRENGTH	D 638	PSI	3	2600 - <3000	4	3000 - <3500	4	3000 - <3500
RESISTANCE TO SLOW CRACK GROWTH	F 1473	HOURS	7	500 MIN	6	100 MIN	7	500 MIN
HYDROSTATIC DESIGN BASIS, HDB	D 2387	PSI	3	1250	4	1600	4	1600
UV STABILIZER	D 1603	%	E	COLORED WITH UV STABILIZER	C	2% MIN CARBON BLACK	C	2% MIN CARBON BLACK

Notes:

- 1) The density provided is base resin density (without the influence of carbon black). Typical PE4710 HDPE pipe has a density of 0.956 to 0.964 with carbon black.
- 2) To be designated a PE4710, the pipe resin must meet certain supplementary requirements established by the Hydrostatic Stress Board (HSB) of the Plastics Pipe Institute (PPI).

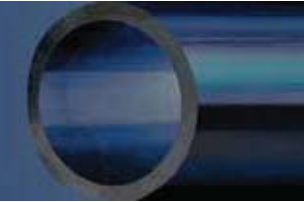
It should be noted that other PE thermoplastics piping material designation codes do exist and may be encountered in the market place occasionally. However, the three primary PE thermoplastic piping material designations codes of Table 1 represent the principle PE piping products in the market today. For more information regarding these other thermoplastic piping material designation codes, please contact your ISCO sales professional.

Table 2 below provides a simplification of Table 1 and illustrates the relative ease with which PE piping products may be specified. Using this approach allows the designer or specifier to accurately designate the appropriate PE piping product through the use a single thermoplastic piping material designation code and a relatively simple text string that establishes the physical property requirements for seven key performance properties.

Table 2: Representative Minimum Cell Classification by Thermoplastic Piping Material Designation Code

THERMOPLASTIC PIPING MATERIAL DESIGNATION CODE	MINIMUM CELL CLASSIFICATION PER ASTM D3350
PE2708	233373E
PE3608	345464C
PE4710	445474C

The selected thermoplastic piping material designation code and minimum cell classification is then combined with the appropriate production and installation standards to effectively specify a tough, durable PE piping system. ISCO Industries can provide model specifications for a wide range of PE pipe applications. These model specifications are available at www.isco-pipe.com or by contacting your ISCO sales professional.



HDPE Pipe

1-800-345-ISCO

www.isco-pipe.com

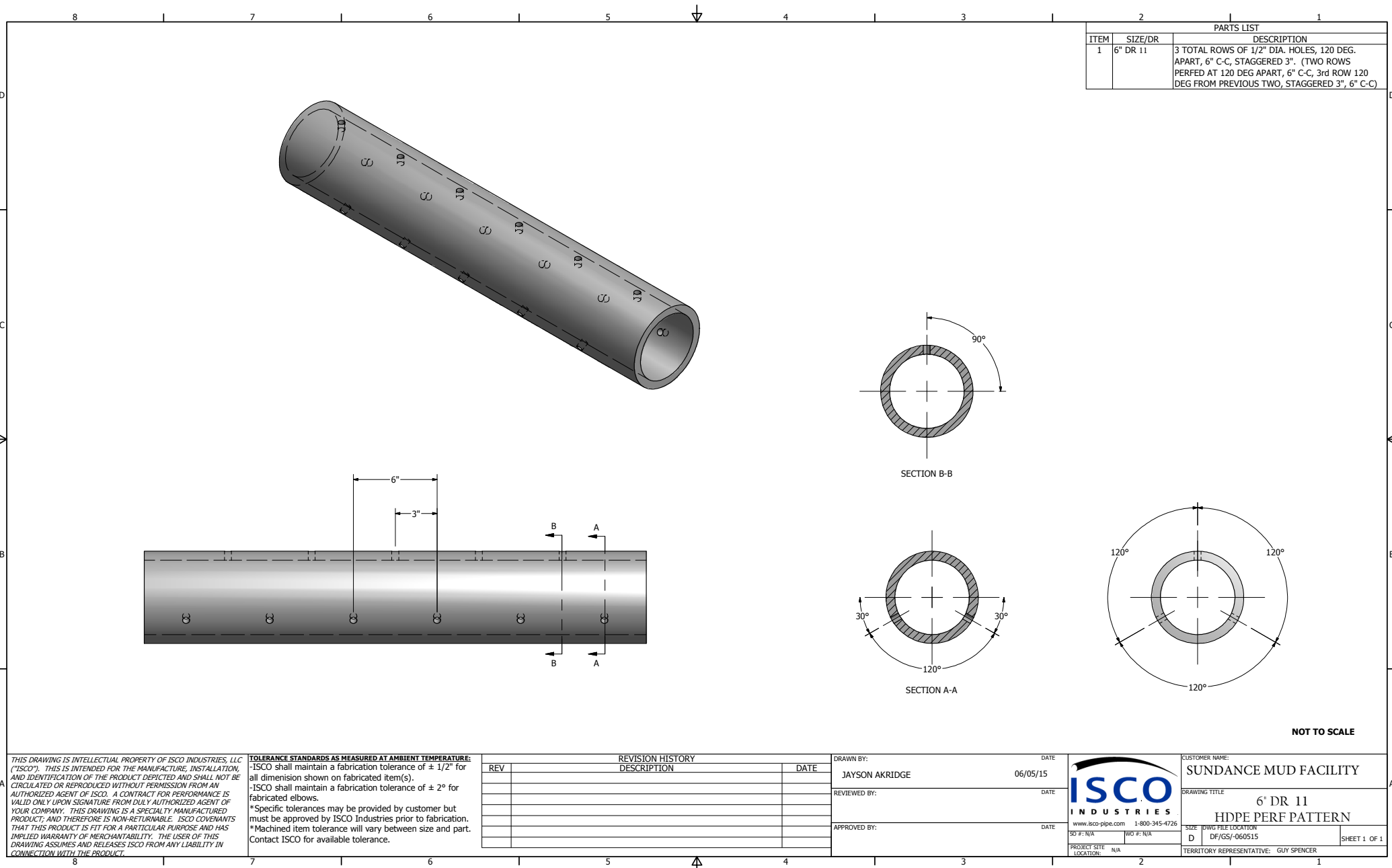
HDPE PIPE SIZES IPS PE3608 AND PE4710

Tamaños HDPE tuberías IPS PE3608 y PE4710

DR		11			13.5			15.5		
PE3608 Pressure Rating Resistencia a la Presión		160 psi			128 psi			110 psi		
PE4710 Pressure Rating Resistencia a la Presión		200 psi			160 psi			138 psi		
Nom. OD DE Nominal (in)	Actual OD DE Actual (in)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)	Min Wall Espesor Mini- mo de Pared (in)	Avg ID DI Promedio (in)	Weight Peso (lb/ft)
¾	1.05	0.095	0.848	0.13	---	---	---	---	---	---
1	1.32	0.12	1.062	0.2	---	---	---	---	---	---
1¼	1.66	0.151	1.34	0.314	---	---	---	---	---	---
1½	1.9	0.173	1.534	0.411	---	---	---	---	---	---
2	2.38	0.216	1.917	0.642	0.176	2.002	0.534	0.153	2.05	0.47
3	3.5	0.318	2.825	1.395	0.259	2.95	1.16	0.226	3.021	1.02
4	4.5	0.409	3.633	2.31	0.333	3.793	1.92	0.29	3.885	1.687
5	5.375	0.489	4.339	3.29	0.398	4.531	2.73	0.347	4.64	2.4
5	5.563	0.506	4.491	3.523	0.412	4.689	2.928	0.359	4.802	2.58
6	6.625	0.602	5.348	5	0.491	5.585	4.152	0.427	5.719	3.656
7	7.125	0.648	5.752	5.78	0.528	6.006	4.8	0.46	6.15	4.21
8	8.625	0.784	6.963	8.47	0.639	7.271	7.04	0.556	7.445	6.197
10	10.75	0.977	8.678	13.16	0.796	9.062	10.932	0.694	9.28	9.626
12	12.75	1.159	10.293	18.51	0.944	10.748	15.38	0.823	11.006	13.53
14	14	1.273	11.302	22.32	1.037	11.801	18.54	0.903	12.085	16.31
16	16	1.455	12.916	29.15	1.185	13.487	24.22	1.032	13.812	21.3
18	18	1.636	14.531	36.89	1.333	15.173	30.651	1.161	15.538	26.95
20	20	1.818	16.145	45.541	1.481	16.859	37.84	1.29	17.265	33.28
22	22	2	17.76	55.105	1.63	18.545	45.79	1.419	18.991	39.712
24	24	2.182	19.375	65.58	1.778	20.231	54.49	1.548	20.717	47.92
26	26	2.364	20.989	77.44	1.926	21.917	64.261	1.677	22.444	56.532
28	28	2.545	22.604	89.785	2.074	23.603	74.522	1.806	24.17	65.563
30	30	2.727	24.218	103.076	2.222	25.289	85.543	1.935	25.897	75.264
32	32	2.909	25.833	117.285	2.37	26.975	97.324	2.065	27.623	85.672
34	34	3.091	27.447	132.411	2.519	28.661	109.905	2.194	29.35	96.714
36	36	3.273	29.062	148.454	2.667	30.347	123.208	2.323	31.076	108.424
42	42	---	---	---	3.111	35.404	167.675	2.71	36.255	147.568
48	48	---	---	---	---	---	---	3.097	41.435	192.774
54	54	---	---	---	---	---	---	3.484	46.614	243.921
63	62.99	---	---	---	---	---	---	---	---	---
65	65	---	---	---	---	---	---	---	---	---

- Pressures are based on using water at 23°C (73°F).
- Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary.
- Other piping sizes or DR's may be available upon request.
- Standard Lengths:
 - 40' for 2"-24"
 - 50' for 26" and larger
 - Coils available for ¾ - 4" (6" by special order)

- Las presiones están basadas en el uso de agua a 23°C (73°F)
- El diámetro interno promedio calculado el diámetro externo nominal y la pared mínima más 6% para uso la estimación de flujos de fluidos. El diámetro interno real variará.
- Otros tamaños o DR de tubería pueden estar disponibles bajo pedido.
- Longitudes estándar
 - 40 pies para 2 -24 pulgadas
 - 50 pies para 26 pulgadas o mayores
 - Bobinas disponibles para ¾ a 6 pulgadas (8 pulgadas para pedidos especiales)



PARTS LIST		
ITEM	SIZE/DR	DESCRIPTION
1	6" DR 11	3 TOTAL ROWS OF 1/2" DIA. HOLES, 120 DEG. APART, 6" C-C, STAGGERED 3". (TWO ROWS PERF AT 120 DEG APART, 6" C-C, 3rd ROW 120 DEG FROM PREVIOUS TWO, STAGGERED 3", 6" C-C)

NOT TO SCALE

THIS DRAWING IS INTELLECTUAL PROPERTY OF ISCO INDUSTRIES, LLC ("ISCO"). THIS IS INTENDED FOR THE MANUFACTURE, INSTALLATION, AND IDENTIFICATION OF THE PRODUCT DEPICTED AND SHALL NOT BE CIRCULATED OR REPRODUCED WITHOUT PERMISSION FROM AN AUTHORIZED AGENT OF ISCO. A CONTRACT FOR PERFORMANCE IS VALID ONLY UPON SIGNATURE FROM DULY AUTHORIZED AGENT OF YOUR COMPANY. THIS DRAWING IS A SPECIALTY MANUFACTURED PRODUCT; AND THEREFORE IS NON-RETURNABLE. ISCO COVENANTS THAT THIS PRODUCT IS FIT FOR A PARTICULAR PURPOSE AND HAS IMPLIED WARRANTY OF MERCHANTABILITY. THE USER OF THIS DRAWING ASSUMES AND RELEASES ISCO FROM ANY LIABILITY IN CONNECTION WITH THE PRODUCT.

TOLERANCE STANDARDS AS MEASURED AT AMBIENT TEMPERATURE:
-ISCO shall maintain a fabrication tolerance of $\pm 1/2"$ for all dimension shown on fabricated item(s).
-ISCO shall maintain a fabrication tolerance of $\pm 2^\circ$ for fabricated elbows.
*Specific tolerances may be provided by customer but must be approved by ISCO Industries prior to fabrication.
*Machined item tolerance will vary between size and part. Contact ISCO for available tolerance.

REVISION HISTORY		
REV	DESCRIPTION	DATE

DRAWN BY:	DATE
JAYSON AKRIDGE	06/05/15
REVIEWED BY:	DATE
APPROVED BY:	DATE



www.isco-pipe.com 1-800-345-4726

SO # : N/A WO # : N/A

PROJECT SITE : N/A LOCATION :

CUSTOMER NAME:	
SUNDANCE MUD FACILITY	
DRAWING TITLE	
6" DR 11 HDPE PERF PATTERN	
SIZE : DWG FILE LOCATION	SHEET 1 OF 1
D DF/GS/-060515	
TERRITORY REPRESENTATIVE: GUY SPENCER	

Appendix I

**Protective Soil Layer
Material Testing**

Appendix I1

PSL Laboratory Testing Reports

Laboratory Report for Daniel B. Stephens & Associates, Inc.

DB18.1209.00 Sundance West

June 11, 2019



Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113



June 11, 2019

Gundar Peterson
Daniel B. Stephens & Associates, Inc.
6020 Academy Road NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400

Re: DBS&A Laboratory Report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00
Sundance West Project

Dear Mr. Peterson:

Enclosed is the report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00 Sundance West project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to DBS&A and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory

4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113

505-889-7752
FAX 505-889-0258

Summaries



Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties ¹			Saturated Hydraulic Conductivity ²			Moisture Characteristics ³								Particle Size ⁴			Specific Gravity ⁵		Air Perm- eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K _{unsat}	DS	WS	H	F	C			
SDW-01															X	X					X	X
SDW-01 (90%)	X	X		X																		
SDW-02															X	X					X	X
SDW-02 (90%)	X	X		X																		
SDW-03															X	X					X	X
SDW-03 (91%)	X	X		X																		
SDW-04															X	X					X	X
SDW-04 (90%)	X	X		X																		
SDW-05															X	X					X	X
SDW-05 (90%)	X	X		X																		

¹ G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

² CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

³ HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, K_{unsat} = Calculated Unsaturated Hydraulic Conductivity

⁴ DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

⁵ F = Fine (<4.75mm), C = Coarse (>4.75mm)



Notes

Sample Receipt:

Five samples, each in a full 5-gallon bucket sealed with a lid, were hand-delivered on March 25, 2019. All samples were received in good order.

Sample Preparation and Testing Notes:

All of the samples were subjected to particle size analysis, Atterberg limits and standard proctor compaction testing.

A portion of each sample was remolded into a testing ring to target 90% of the respective maximum dry bulk density at the respective optimum moisture content, based on the standard proctor compaction test results. Each of these remolded sub-samples was subjected to initial properties analysis and saturated hydraulic conductivity testing.

The actual percentage of maximum dry bulk density achieved was added to each sub-sample ID.

Based on the proctor compaction method, material larger than 4.75mm was removed from the sample material prior to compaction and remolding. Oversize correction calculations are not presented since the fraction removed was less than 5% of the bulk sample mass in all cases.

Porosity calculations, and the particle diameter calculations in the hydrometer portion of the particle size analysis testing, are based on the use of an assumed specific gravity value of 2.65.



Summary of Sample Preparation/Volume Changes

Sample Number	Proctor Data		Target Remold Parameters ¹			Actual Remold Data			Volume Change Post Saturation ²		
	Optimum Moisture Content (%, g/g)	Max. Dry Density (g/cm ³)	Moisture Content (%, g/g)	Dry Bulk Density (g/cm ³)	% of Max. Density (%)	Moisture Content (%, g/g)	Dry Bulk Density (g/cm ³)	% of Max. Density (%)	Dry Bulk Density (g/cm ³)	% Volume Change (%)	% of Max. Density (%)
SDW-01 (90%)	11.2	1.87	11.2	1.69	90%	11.2	1.69	90.0%	1.69	---	90.0%
SDW-02 (90%)	11.9	1.89	11.9	1.70	90%	11.7	1.71	90.0%	1.71	---	90.0%
SDW-03 (91%)	11.1	1.85	11.1	1.67	90%	10.6	1.68	90.5%	1.68	---	90.5%
SDW-04 (90%)	12.3	1.90	12.3	1.71	90%	12.7	1.70	89.7%	1.70	---	89.7%
SDW-05 (90%)	12.1	1.88	12.1	1.70	90%	12.1	1.70	90.0%	1.70	---	90.0%

¹Target Remold Parameters: Provided by the client: 90% of maximum dry density at optimum moisture content.

²Volume Change Post Saturation: Volume change measurements were obtained after saturated hydraulic conductivity testing.

Notes:

"+" indicates sample swelling, "-" indicates sample settling, and "---" indicates no volume change occurred.



Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
SDW-01 (90%)	1.9E-03	---	X	
SDW-02 (90%)	2.0E-03	---	X	
SDW-03 (91%)	3.6E-03	---	X	
SDW-04 (90%)	1.6E-03	---	X	
SDW-05 (90%)	2.0E-03	---	X	

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-01	0.012	0.15	0.18	15	5.6	WS/H	Silty sand (SM)	Loamy Sand
SDW-02	0.0034	0.15	0.18	53	20	WS/H	Silty sand (SM)	Loamy Sand
SDW-03	0.037	0.15	0.18	4.9	2.2	WS/H	Silty sand (SM)	Sand
SDW-04	0.0012	0.16	0.18	150	56	WS/H	Silty sand (SM)	Loamy Sand (Est)
SDW-05	0.0019	0.15	0.18	95	35	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-01	0.1	82.0	9.2	8.7
SDW-02	0.4	79.6	10.1	9.9
SDW-03	0.1	83.6	9.4	7.0
SDW-04	0.3	79.9	8.8	10.9
SDW-05	0.2	80.1	9.5	10.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-01	---	---	---	ML
SDW-02	---	---	---	ML
SDW-03	---	---	---	ML
SDW-04	---	---	---	ML
SDW-05	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-01	11.2	1.87	---	---
SDW-02	11.9	1.89	---	---
SDW-03	11.1	1.85	---	---
SDW-04	12.3	1.90	---	---
SDW-05	12.1	1.88	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable

Saturated Hydraulic Conductivity



Summary of Saturated Hydraulic Conductivity Tests

Sample Number	K_{sat} (cm/sec)	Oversize Corrected K_{sat} (cm/sec)	Method of Analysis	
			Constant Head	Falling Head
SDW-01 (90%)	1.9E-03	---	X	
SDW-02 (90%)	2.0E-03	---	X	
SDW-03 (91%)	3.6E-03	---	X	
SDW-04 (90%)	1.6E-03	---	X	
SDW-05 (90%)	2.0E-03	---	X	

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass
 NR = Not requested
 NA = Not applicable



Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01 (90%)
Project Name: Sundance West
Depth: NA

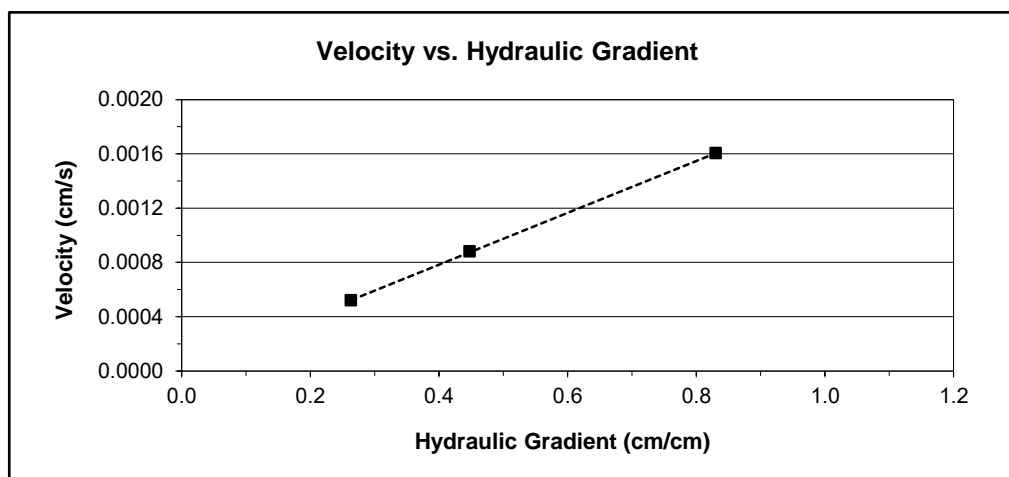
Type of water used: TAP
Collection vessel tare (g): 29.96
Sample length (cm): 7.59
Sample diameter (cm): 6.09
Sample x-sectional area (cm²): 29.17

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
5-Jun-19	9:41:00	22.0	6.3	38.38	8.4	180	1.9E-03	1.8E-03
5-Jun-19	9:44:00							
Test # 2:								
5-Jun-19	9:54:00	22.0	3.4	34.58	4.6	180	2.0E-03	1.9E-03
5-Jun-19	9:57:00							
Test # 3:								
5-Jun-19	10:07:00	22.0	2	32.69	2.7	180	2.0E-03	1.9E-03
5-Jun-19	10:10:00							

Average Ksat (cm/sec): 1.9E-03
Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02 (90%)
Project Name: Sundance West
Depth: NA

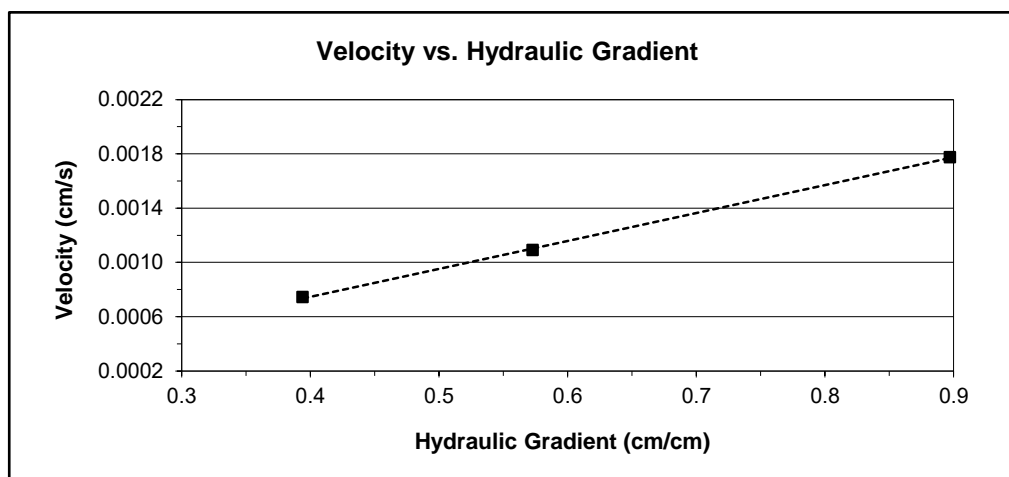
Type of water used: TAP
Collection vessel tare (g): 29.37
Sample length (cm): 7.55
Sample diameter (cm): 6.10
Sample x-sectional area (cm²): 29.24

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
5-Jun-19	9:41:30	22.0	6.4	38.71	9.3	180	2.1E-03	2.0E-03
5-Jun-19	9:44:30							
Test # 2:								
5-Jun-19	9:54:30	22.0	3.95	35.11	5.7	180	2.1E-03	2.0E-03
5-Jun-19	9:57:30							
Test # 3:								
5-Jun-19	10:07:30	22.0	2.6	33.28	3.9	180	2.2E-03	2.1E-03
5-Jun-19	10:10:30							

Average Ksat (cm/sec): 2.0E-03
Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03 (91%)
Project Name: Sundance West
Depth: NA

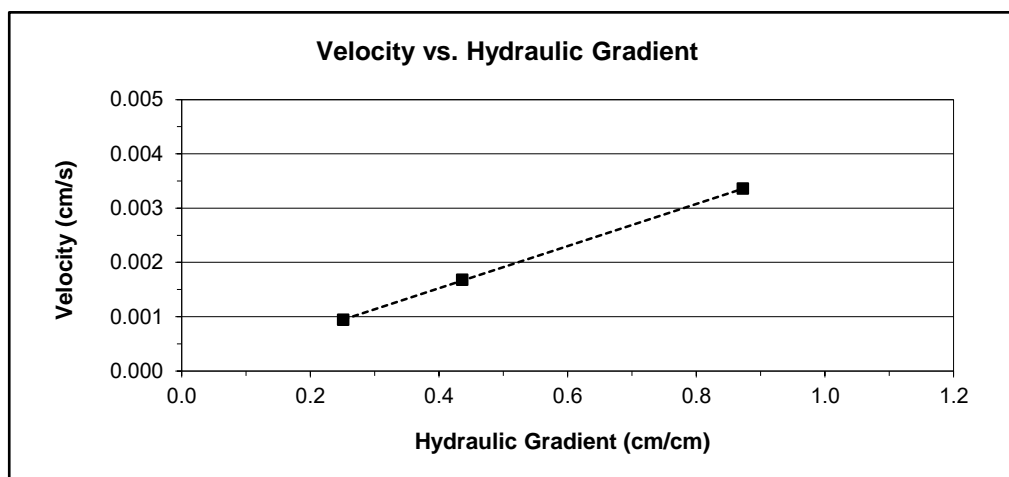
Type of water used: TAP
Collection vessel tare (g): 29.47
Sample length (cm): 7.56
Sample diameter (cm): 6.12
Sample x-sectional area (cm²): 29.37

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
5-Jun-19	9:42:00	22.0	6.6	47.22	17.8	180	3.8E-03	3.7E-03
5-Jun-19	9:45:00							
Test # 2:								
5-Jun-19	9:55:00	22.0	3.3	38.34	8.9	180	3.8E-03	3.7E-03
5-Jun-19	9:58:00							
Test # 3:								
5-Jun-19	10:08:00	22.0	1.9	34.42	5.0	180	3.7E-03	3.6E-03
5-Jun-19	10:11:00							

Average Ksat (cm/sec): 3.6E-03
Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04 (90%)
Project Name: Sundance West
Depth: NA

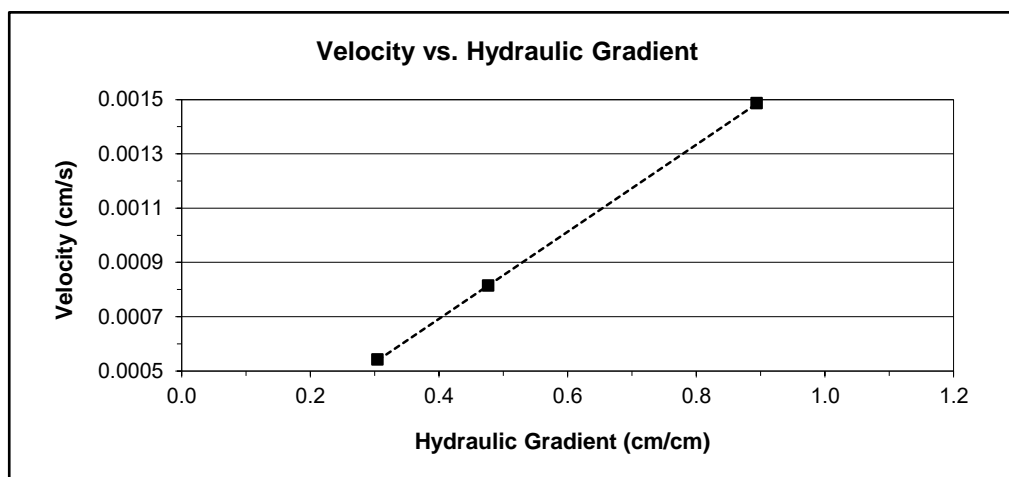
Type of water used: TAP
Collection vessel tare (g): 29.08
Sample length (cm): 7.55
Sample diameter (cm): 6.09
Sample x-sectional area (cm²): 29.17

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
5-Jun-19	9:42:30	22.0	6.75	36.88	7.8	180	1.7E-03	1.6E-03
5-Jun-19	9:45:30							
Test # 2:								
5-Jun-19	9:55:30	22.0	3.6	33.35	4.3	180	1.7E-03	1.6E-03
5-Jun-19	9:58:30							
Test # 3:								
5-Jun-19	10:08:30	22.0	2.3	31.92	2.8	180	1.8E-03	1.7E-03
5-Jun-19	10:11:30							

Average Ksat (cm/sec): 1.6E-03
Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Saturated Hydraulic Conductivity Constant Head Method

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05 (90%)
Project Name: Sundance West
Depth: NA

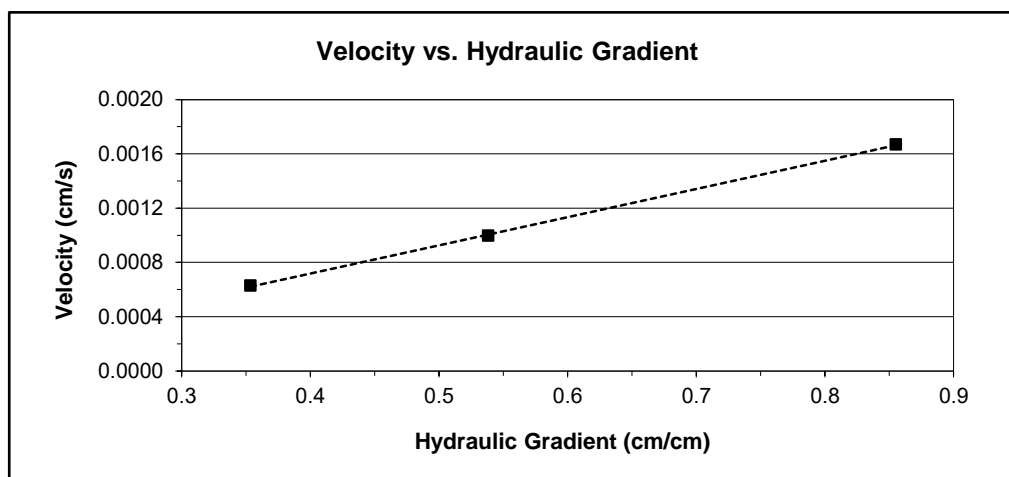
Type of water used: TAP
Collection vessel tare (g): 29.49
Sample length (cm): 7.57
Sample diameter (cm): 6.10
Sample x-sectional area (cm²): 29.21

Date	Time	Temp (°C)	Head (cm)	Q + Tare (g)	Q (cm ³)	Elapsed time (sec)	Ksat (cm/sec)	Ksat @ 20°C (cm/sec)
Test # 1:								
5-Jun-19	9:43:00	22.0	6.1	38.26	8.8	180	2.1E-03	2.0E-03
5-Jun-19	9:46:00							
Test # 2:								
5-Jun-19	9:56:00	22.0	3.7	34.72	5.2	180	2.0E-03	1.9E-03
5-Jun-19	9:59:00							
Test # 3:								
5-Jun-19	10:09:00	22.0	2.3	32.79	3.3	180	2.1E-03	2.0E-03
5-Jun-19	10:12:00							

Average Ksat (cm/sec): 2.0E-03
Oversize Corrected Ksat (cm/sec): ---

Comments:

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass



Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines

Particle Size Analysis



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-01	0.012	0.15	0.18	15	5.6	WS/H	Silty sand (SM)	Loamy Sand
SDW-02	0.0034	0.15	0.18	53	20	WS/H	Silty sand (SM)	Loamy Sand
SDW-03	0.037	0.15	0.18	4.9	2.2	WS/H	Silty sand (SM)	Sand
SDW-04	0.0012	0.16	0.18	150	56	WS/H	Silty sand (SM)	Loamy Sand (Est)
SDW-05	0.0019	0.15	0.18	95	35	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-01	0.1	82.0	9.2	8.7
SDW-02	0.4	79.6	10.1	9.9
SDW-03	0.1	83.6	9.4	7.0
SDW-04	0.3	79.9	8.8	10.9
SDW-05	0.2	80.1	9.5	10.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 3-Apr-19

Initial Dry Weight of Sample (g): 19455.29
Weight Passing #10 (g): 19425.32
Weight Retained #10 (g): 29.97
Weight of Hydrometer Sample (g): 77.45
Calculated Weight of Sieve Sample (g): 77.57

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	19455.29	100.00
	2"	50	0.00	0.00	19455.29	100.00
	1.5"	38.1	0.00	0.00	19455.29	100.00
	1"	25	0.00	0.00	19455.29	100.00
	3/4"	19.0	0.00	0.00	19455.29	100.00
	3/8"	9.5	8.07	8.07	19447.22	99.96
	4	4.75	10.99	19.06	19436.23	99.90
	10	2.00	10.91	29.97	19425.32	99.85
-10	(Based on calculated sieve wt.)					
	20	0.85	0.11	0.23	77.34	99.70
	40	0.425	1.59	1.82	75.75	97.65
	60	0.250	11.91	13.73	63.84	82.30
	140	0.106	44.68	58.41	19.16	24.70
	200	0.075	5.30	63.71	13.86	17.87
	dry pan		0.39	64.10	13.47	
	wet pan			13.47	0.00	

d_{10} (mm): 0.012 d_{50} (mm): 0.15
 d_{16} (mm): 0.067 d_{60} (mm): 0.18
 d_{30} (mm): 0.11 d_{84} (mm): 0.27

Median Particle Diameter-- d_{50} (mm): 0.15
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 15
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 5.6
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:00

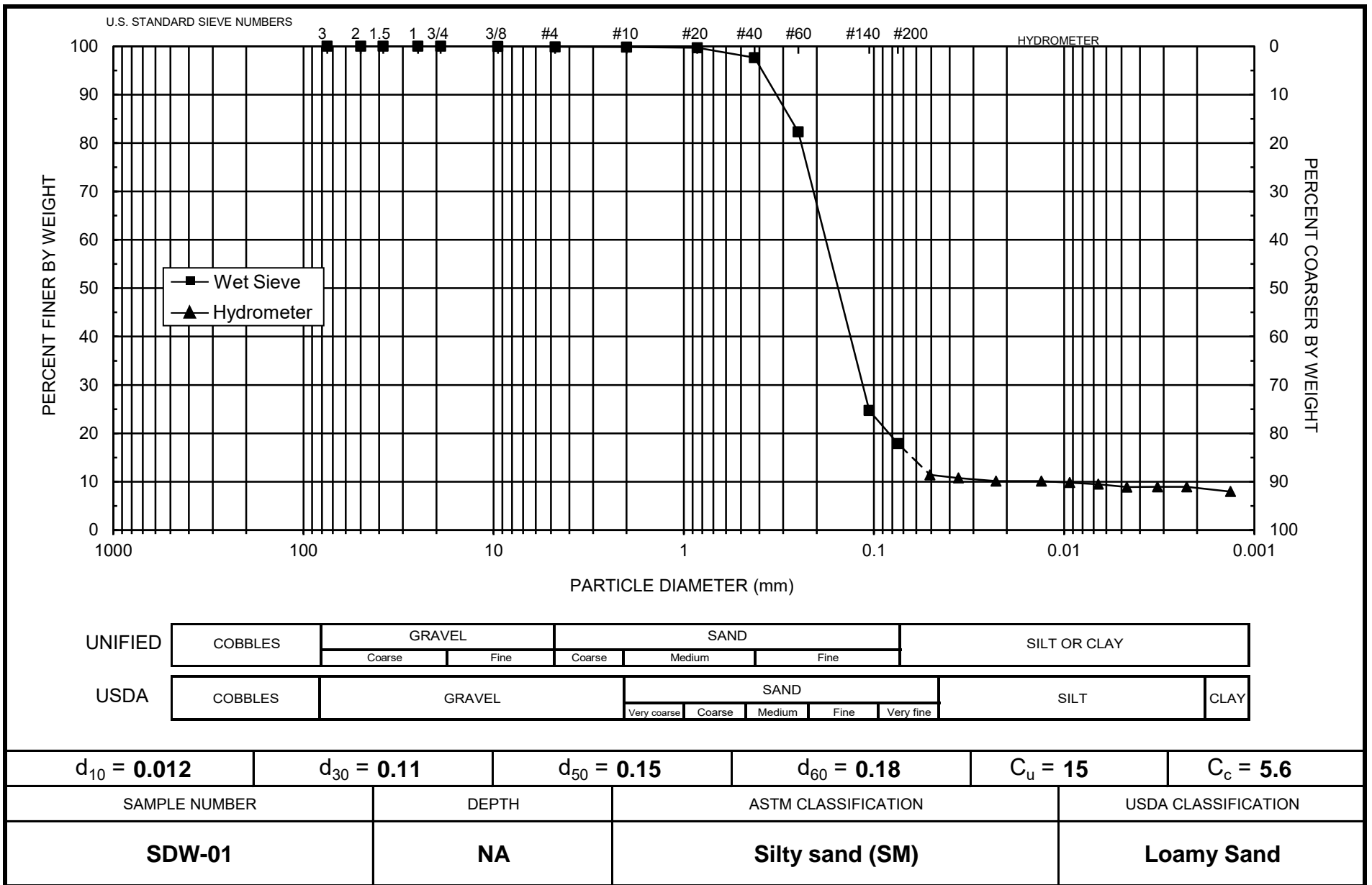
Type of Water Used: DISTILLED
Reaction with H₂O₂: NA
Dispersant*: (NaPO₃)₆
Assumed particle density: 2.65
Initial Wt. (g): 77.45
Total Sample Wt. (g): 19455.29
Wt. Passing #10 (g): 19425.32

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	15.0	6.2	8.9	13.8	0.05072	11.4	11.4
	2	20.0	14.5	6.2	8.4	13.9	0.03597	10.8	10.8
	5	20.0	14.0	6.2	7.9	14.0	0.02282	10.1	10.1
	15	20.0	14.0	6.2	7.9	14.0	0.01317	10.1	10.1
	30	20.0	13.8	6.2	7.6	14.0	0.00933	9.8	9.8
	60	20.0	13.5	6.2	7.4	14.1	0.00661	9.5	9.5
	120	20.1	13.0	6.1	6.9	14.2	0.00467	8.9	8.9
	250	20.3	13.0	6.1	6.9	14.2	0.00323	8.9	8.9
	497	21.2	13.0	6.1	6.9	14.2	0.00227	8.9	8.9
3-Apr-19	1457	21.2	12.0	5.8	6.2	14.3	0.00133	8.0	7.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 17872.02
Weight Passing #10 (g): 17781.58
Weight Retained #10 (g): 90.44
Weight of Hydrometer Sample (g): 69.23
Calculated Weight of Sieve Sample (g): 69.58

Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	17872.02	100.00
	2"	50	0.00	0.00	17872.02	100.00
	1.5"	38.1	0.00	0.00	17872.02	100.00
	1"	25	28.93	28.93	17843.09	99.84
	3/4"	19.0	0.00	28.93	17843.09	99.84
	3/8"	9.5	23.02	51.95	17820.07	99.71
	4	4.75	28.10	80.05	17791.97	99.55
	10	2.00	10.39	90.44	17781.58	99.49
-10	(Based on calculated sieve wt.)					
	20	0.85	0.17	0.52	69.06	99.25
	40	0.425	1.46	1.98	67.60	97.15
	60	0.250	10.66	12.64	56.94	81.83
	140	0.106	38.01	50.65	18.93	27.21
	200	0.075	5.03	55.68	13.90	19.98
	dry pan		0.31	55.99	13.59	
	wet pan			13.59	0.00	

d₁₀ (mm): 0.0034 d₅₀ (mm): 0.15
d₁₆ (mm): 0.057 d₆₀ (mm): 0.18
d₃₀ (mm): 0.11 d₈₄ (mm): 0.27

Median Particle Diameter--d₅₀ (mm): 0.15
Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 53
Coefficient of Curvature, Cc--[(d₃₀)²/(d₁₀*d₆₀)] (mm): 20
Mean Particle Diameter--[(d₁₆+d₅₀+d₈₄)/3] (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:06

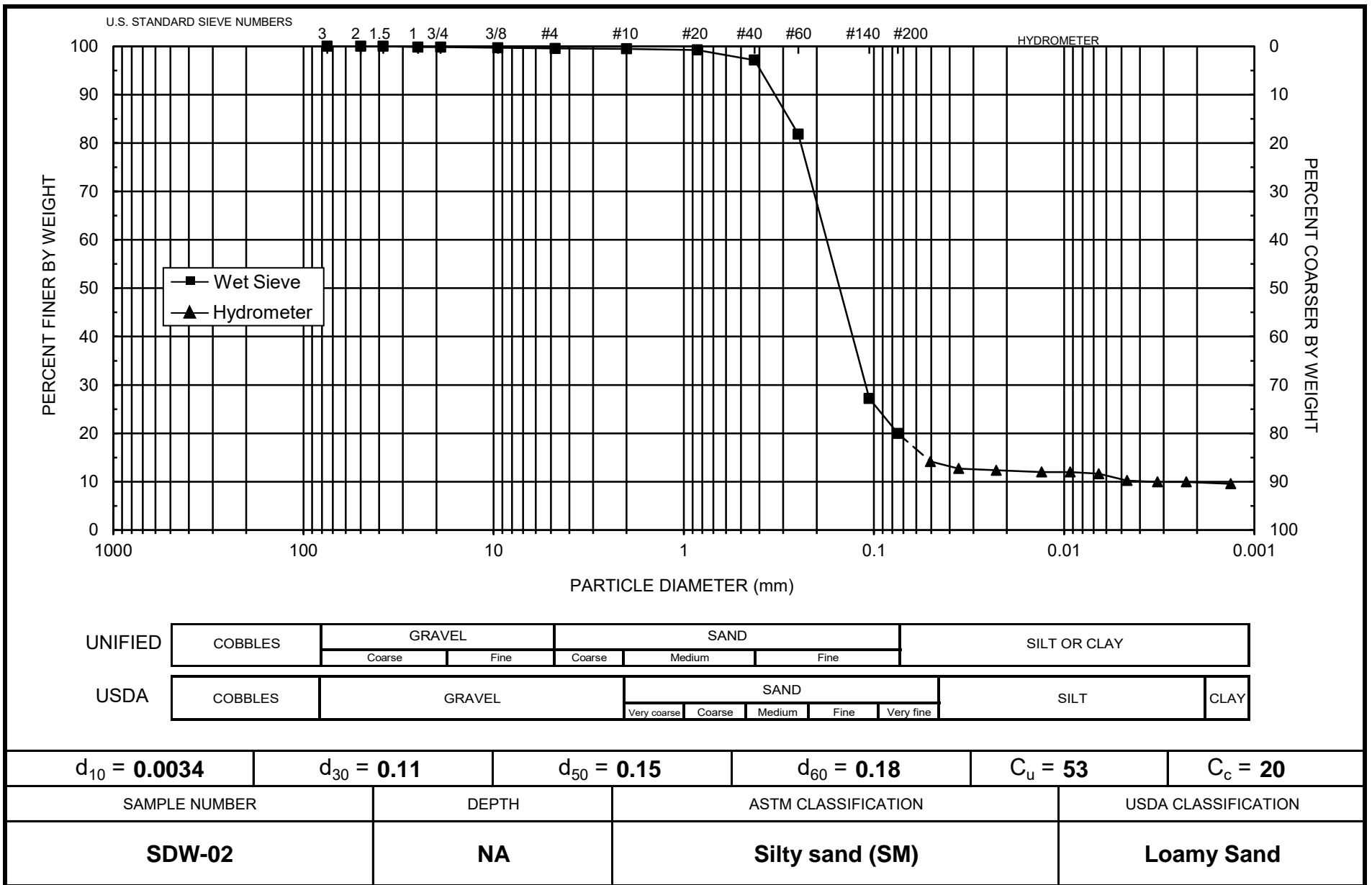
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 69.23
Total Sample Wt. (g): 17872.02
Wt. Passing #10 (g): 17781.58

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	16.0	6.2	9.9	13.7	0.05042	14.2	14.2
	2	20.0	15.0	6.2	8.9	13.8	0.03587	12.8	12.7
	5	20.0	14.8	6.2	8.6	13.9	0.02272	12.4	12.4
	15	20.0	14.5	6.2	8.4	13.9	0.01314	12.1	12.0
	30	20.0	14.5	6.2	8.4	13.9	0.00929	12.1	12.0
	60	20.0	14.3	6.2	8.1	14.0	0.00658	11.7	11.6
	120	20.1	13.3	6.1	7.1	14.1	0.00467	10.3	10.2
	250	20.3	13.0	6.1	6.9	14.2	0.00323	10.0	10.0
	492	21.2	13.0	6.1	6.9	14.2	0.00228	10.0	10.0
3-Apr-19	1452	21.2	12.5	5.8	6.7	14.3	0.00133	9.6	9.6

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 19229.20
Weight Passing #10 (g): 19209.20
Weight Retained #10 (g): 20.00
Weight of Hydrometer Sample (g): 88.70
Calculated Weight of Sieve Sample (g): 88.79

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	19229.20	100.00
	2"	50	0.00	0.00	19229.20	100.00
	1.5"	38.1	0.00	0.00	19229.20	100.00
	1"	25	0.00	0.00	19229.20	100.00
	3/4"	19.0	0.00	0.00	19229.20	100.00
	3/8"	9.5	5.03	5.03	19224.17	99.97
	4	4.75	6.09	11.12	19218.08	99.94
	10	2.00	8.88	20.00	19209.20	99.90
-10	(Based on calculated sieve wt.)					
	20	0.85	0.06	0.15	88.64	99.83
	40	0.425	1.66	1.81	86.98	97.96
	60	0.250	12.99	14.80	73.99	83.33
	140	0.106	52.63	67.43	21.36	24.06
	200	0.075	6.83	74.26	14.53	16.36
	dry pan		0.53	74.79	14.00	
	wet pan			14.00	0.00	

d_{10} (mm): 0.037 d_{50} (mm): 0.15
 d_{16} (mm): 0.073 d_{60} (mm): 0.18
 d_{30} (mm): 0.12 d_{84} (mm): 0.26

Median Particle Diameter-- d_{50} (mm): 0.15
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 4.9
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 2.2
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:12

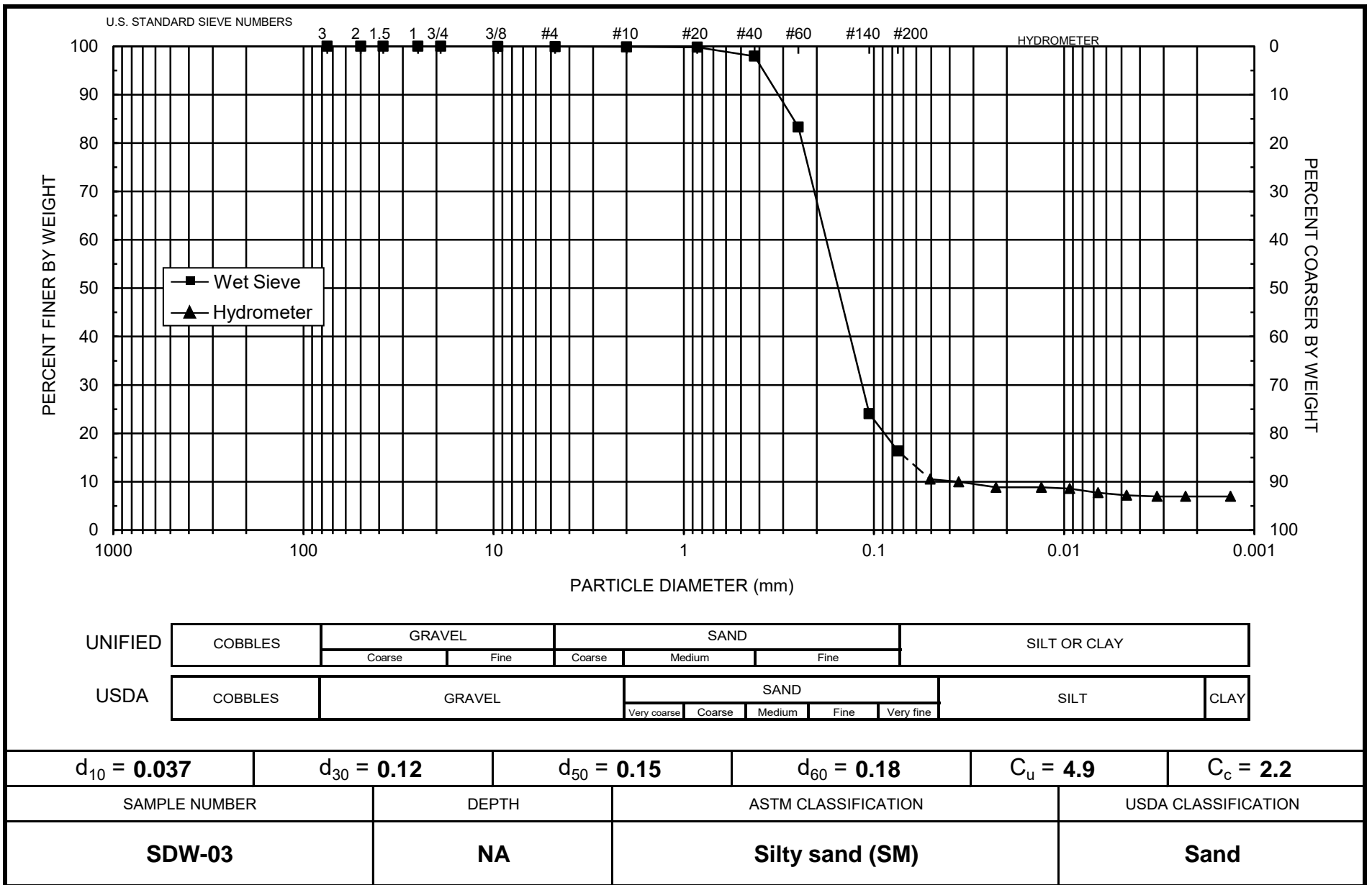
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(\text{NaPO}_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 88.70
Total Sample Wt. (g): 19229.20
Wt. Passing #10 (g): 19209.20

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	15.5	6.2	9.4	13.8	0.05057	10.5	10.5
	2	20.0	15.0	6.2	8.9	13.8	0.03587	10.0	10.0
	5	20.0	14.0	6.2	7.9	14.0	0.02282	8.9	8.8
	15	20.0	14.0	6.2	7.9	14.0	0.01317	8.9	8.8
	30	20.0	13.8	6.2	7.6	14.0	0.00933	8.6	8.6
	60	20.0	13.0	6.2	6.9	14.2	0.00663	7.7	7.7
	120	20.1	12.5	6.1	6.4	14.3	0.00469	7.2	7.2
	250	20.3	12.3	6.1	6.2	14.3	0.00324	7.0	7.0
	487	21.2	12.3	6.1	6.2	14.3	0.00230	7.0	7.0
3-Apr-19	1447	21.2	12.3	6.1	6.2	14.3	0.00133	7.0	7.0

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 20839.54
Weight Passing #10 (g): 20711.63
Weight Retained #10 (g): 127.91
Weight of Hydrometer Sample (g): 79.27
Calculated Weight of Sieve Sample (g): 79.76

Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	20839.54	100.00
	2"	50	0.00	0.00	20839.54	100.00
	1.5"	38.1	0.00	0.00	20839.54	100.00
	1"	25	0.00	0.00	20839.54	100.00
	3/4"	19.0	0.00	0.00	20839.54	100.00
	3/8"	9.5	10.81	10.81	20828.73	99.95
	4	4.75	60.81	71.62	20767.92	99.66
	10	2.00	56.29	127.91	20711.63	99.39
-10	(Based on calculated sieve wt.)					
	20	0.85	0.22	0.71	79.05	99.11
	40	0.425	2.01	2.72	77.04	96.59
	60	0.250	13.42	16.14	63.62	79.76
	140	0.106	43.20	59.34	20.42	25.60
	200	0.075	4.70	64.04	15.72	19.71
	dry pan		0.46	64.50	15.26	
	wet pan			15.26	0.00	

d_{10} (mm): 0.0012 d_{50} (mm): 0.16
 d_{16} (mm): 0.055 d_{60} (mm): 0.18
 d_{30} (mm): 0.11 d_{84} (mm): 0.29

Median Particle Diameter-- d_{50} (mm): 0.16
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 150
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 56
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.17

Note: Reported values for d_{10} , C_u , C_c , and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:18

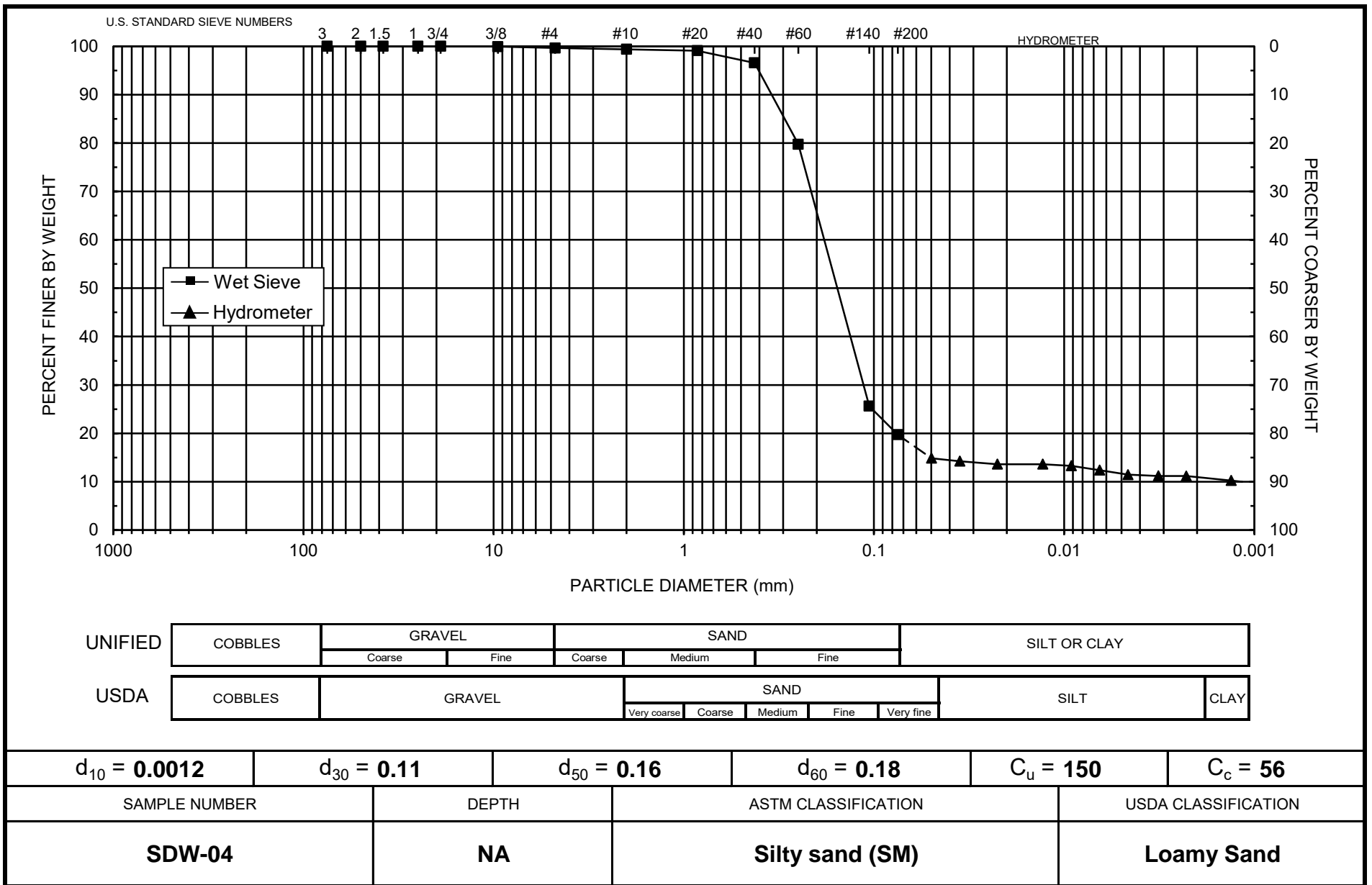
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 79.27
Total Sample Wt. (g): 20839.54
Wt. Passing #10 (g): 20711.63

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	18.0	6.2	11.9	13.3	0.04981	14.9	14.9
	2	20.0	17.5	6.2	11.4	13.4	0.03533	14.3	14.2
	5	20.0	17.0	6.2	10.9	13.5	0.02241	13.7	13.6
	15	20.0	17.0	6.2	10.9	13.5	0.01294	13.7	13.6
	30	20.0	16.8	6.2	10.6	13.6	0.00916	13.4	13.3
	60	20.1	16.0	6.1	9.9	13.7	0.00650	12.5	12.4
	120	20.1	15.3	6.1	9.1	13.8	0.00461	11.5	11.4
	250	20.3	15.0	6.1	8.9	13.8	0.00319	11.3	11.2
	482	21.2	14.8	5.8	8.9	13.9	0.00228	11.2	11.2
3-Apr-19	1442	21.2	14.0	5.8	8.2	14.0	0.00132	10.3	10.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Note: Reported values for d_{10} , C_u , C_c , and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.





Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Initial Dry Weight of Sample (g): 20109.25
Weight Passing #10 (g): 20040.05
Weight Retained #10 (g): 69.20
Weight of Hydrometer Sample (g): 84.41
Calculated Weight of Sieve Sample (g): 84.70

Shape: Rounded
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	20109.25	100.00
	2"	50	0.00	0.00	20109.25	100.00
	1.5"	38.1	0.00	0.00	20109.25	100.00
	1"	25	0.00	0.00	20109.25	100.00
	3/4"	19.0	0.00	0.00	20109.25	100.00
	3/8"	9.5	15.89	15.89	20093.36	99.92
	4	4.75	33.50	49.39	20059.86	99.75
	10	2.00	19.81	69.20	20040.05	99.66
-10	(Based on calculated sieve wt.)					
	20	0.85	0.20	0.49	84.21	99.42
	40	0.425	1.50	1.99	82.71	97.65
	60	0.250	12.62	14.61	70.09	82.75
	140	0.106	47.26	61.87	22.83	26.95
	200	0.075	6.22	68.09	16.61	19.61
	dry pan		0.84	68.93	15.77	
	wet pan			15.77	0.00	

d₁₀ (mm): 0.0019 d₅₀ (mm): 0.15
d₁₆ (mm): 0.059 d₆₀ (mm): 0.18
d₃₀ (mm): 0.11 d₈₄ (mm): 0.26

Median Particle Diameter--d₅₀ (mm): 0.15
Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 95
Coefficient of Curvature, Cc--[d₃₀²/(d₁₀*d₆₀)] (mm): 35
Mean Particle Diameter--[d₁₆+d₅₀+d₈₄]/3] (mm): 0.16

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)
USDA Soil Classification: Loamy Sand

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 2-Apr-19
Start Time: 9:24

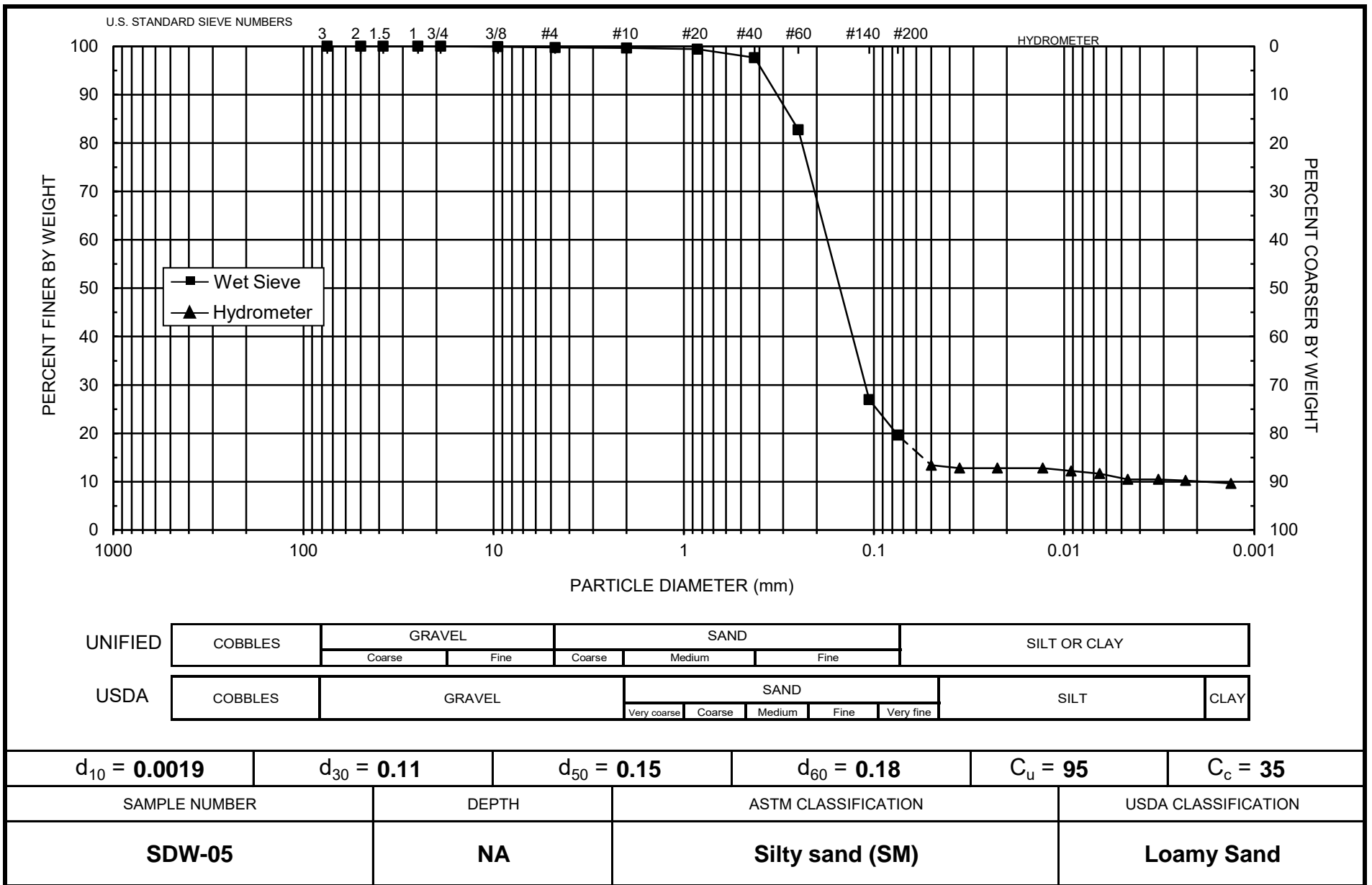
Type of Water Used: DISTILLED
Reaction with H₂O₂: NA
Dispersant*: (NaPO₃)₆
Assumed particle density: 2.65
Initial Wt. (g): 84.41
Total Sample Wt. (g): 20109.25
Wt. Passing #10 (g): 20040.05

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
2-Apr-19	1	20.0	17.5	6.2	11.4	13.4	0.04997	13.4	13.4
	2	20.0	17.0	6.2	10.9	13.5	0.03544	12.9	12.8
	5	20.0	17.0	6.2	10.9	13.5	0.02241	12.9	12.8
	15	20.0	17.0	6.2	10.9	13.5	0.01294	12.9	12.8
	30	20.0	16.5	6.2	10.4	13.6	0.00918	12.3	12.2
	60	20.1	16.0	6.1	9.9	13.7	0.00650	11.7	11.7
	120	20.1	15.0	6.1	8.9	13.8	0.00462	10.5	10.5
	250	20.4	15.0	6.1	8.9	13.8	0.00319	10.5	10.5
	476	21.2	14.5	5.8	8.7	13.9	0.00230	10.3	10.2
	1437	21.2	14.0	5.8	8.2	14.0	0.00133	9.7	9.6

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: C. Krous
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Atterberg Limits/ Identification of Fines



Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-01	---	---	---	ML
SDW-02	---	---	---	ML
SDW-03	---	---	---	ML
SDW-04	---	---	---	ML
SDW-05	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-01
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-02
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-03
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Data for Description and Identification of Fines (Visual-Manual Procedure)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-04
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
<i>Number of drops:</i>			
<i>Pan number:</i>			
<i>Weight of pan plus moist soil (g):</i>			
<i>Weight of pan plus dry soil (g)</i>			
<i>Weight of pan (g):</i>			
<i>Gravimetric moisture content (% g/g):</i>	---	---	---
<i>Liquid Limit:</i>	---		

Plastic Limit

	Trial 1	Trial 2
<i>Pan number:</i>		
<i>Weight of pan plus moist soil (g):</i>		
<i>Weight of pan plus dry soil (g)</i>		
<i>Weight of pan (g):</i>		
<i>Gravimetric moisture content (% g/g):</i>	---	---
<i>Plastic Limit:</i>	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-05
Project Name: Sundance West
Depth: NA
Test Date: 4-Apr-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Weak

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: C. Krous
Checked by: J. Hines

Proctor Compaction



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-01	11.2	1.87	---	---
SDW-02	11.9	1.89	---	---
SDW-03	11.1	1.85	---	---
SDW-04	12.3	1.90	---	---
SDW-05	12.1	1.88	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
Job Number: DB18.1209.00 Mass of coarse material (g): 0.10
Sample Number: SDW-01 Mass of fines material (g): 99.90
Project Name: Sundance West Mold weight (g): 4196
Depth: NA Mold volume (cm³): 941.92
Test Date: 1-Apr-19 Compaction Method: Standard A
Preparation Method: Dry
As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6014	1116.90	1059.92	290.36	1.80	7.40
2	6100	1290.73	1205.81	293.31	1.85	9.31
3	6161	1128.63	1043.66	291.75	1.87	11.30
4	6148	1296.39	1177.82	283.44	1.83	13.26
5	6109	1261.63	1129.26	283.93	1.76	15.66

Soil Fractions

Coarse Fraction (% g/g): 0.1
Fines Fraction (% g/g): 99.9

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

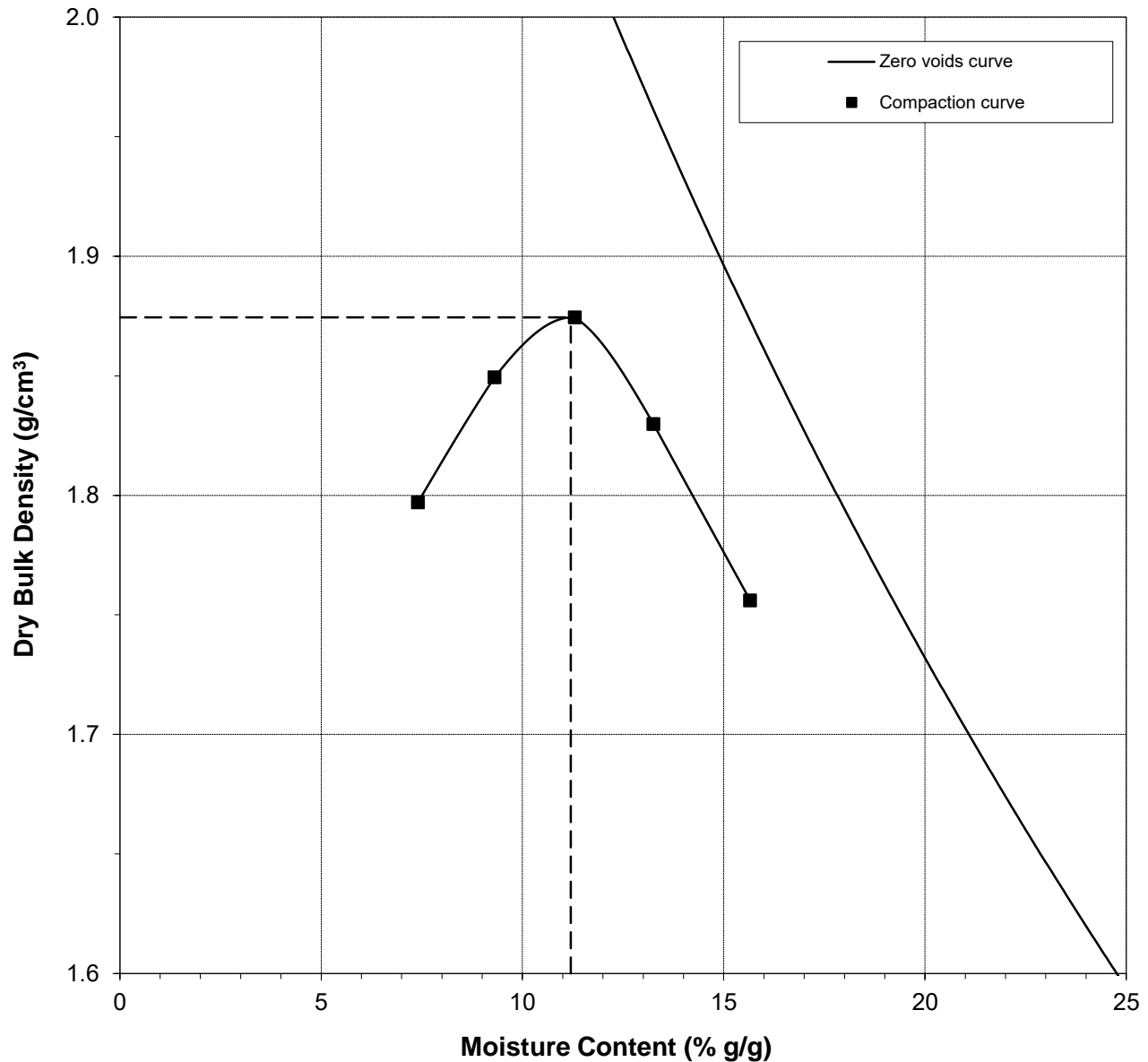


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-01

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.2	---
Maximum Dry Bulk Density (g/cm ³):	1.87	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
Job Number: DB18.1209.00 Mass of coarse material (g): 0.45
Sample Number: SDW-02 Mass of fines material (g): 99.55
Project Name: Sundance West Mold weight (g): 4196
Depth: NA Mold volume (cm³): 941.92
Test Date: 1-Apr-19 Compaction Method: Standard A
Preparation Method: Dry
As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6021	1147.72	1083.43	288.54	1.79	8.09
2	6111	1134.23	1058.07	284.25	1.85	9.84
3	6191	1164.23	1070.96	282.87	1.89	11.83
4	6190	1127.19	1024.97	294.39	1.86	13.99
5	6128	1141.47	1025.52	289.23	1.77	15.75

Soil Fractions

Coarse Fraction (% g/g): 0.4
Fines Fraction (% g/g): 99.6

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

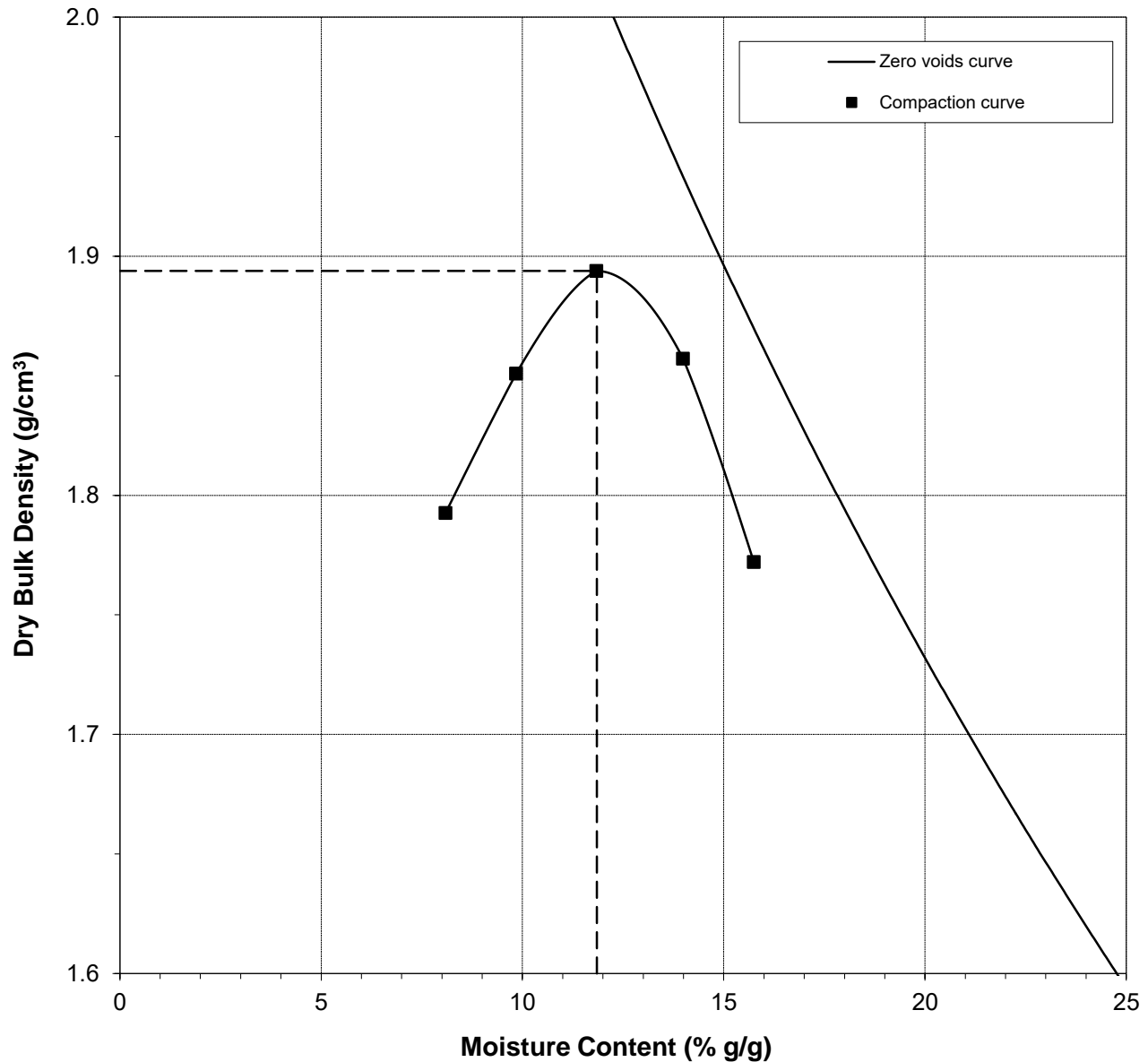


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-02

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.9	---
Maximum Dry Bulk Density (g/cm ³):	1.89	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
Job Number: DB18.1209.00 Mass of coarse material (g): 0.06
Sample Number: SDW-03 Mass of fines material (g): 99.94
Project Name: Sundance West Mold weight (g): 4196
Depth: NA Mold volume (cm³): 941.92
Test Date: 1-Apr-19 Compaction Method: Standard A
Preparation Method: Dry
As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6030	1163.19	1103.13	284.74	1.81	7.34
2	6089	1212.63	1132.76	282.17	1.84	9.39
3	6137	1249.05	1149.30	267.88	1.85	11.32
4	6116	1360.27	1236.03	294.95	1.80	13.20
5	6083	1275.24	1145.21	286.72	1.74	15.15

Soil Fractions

Coarse Fraction (% g/g): 0.1
Fines Fraction (% g/g): 99.9

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Oversize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



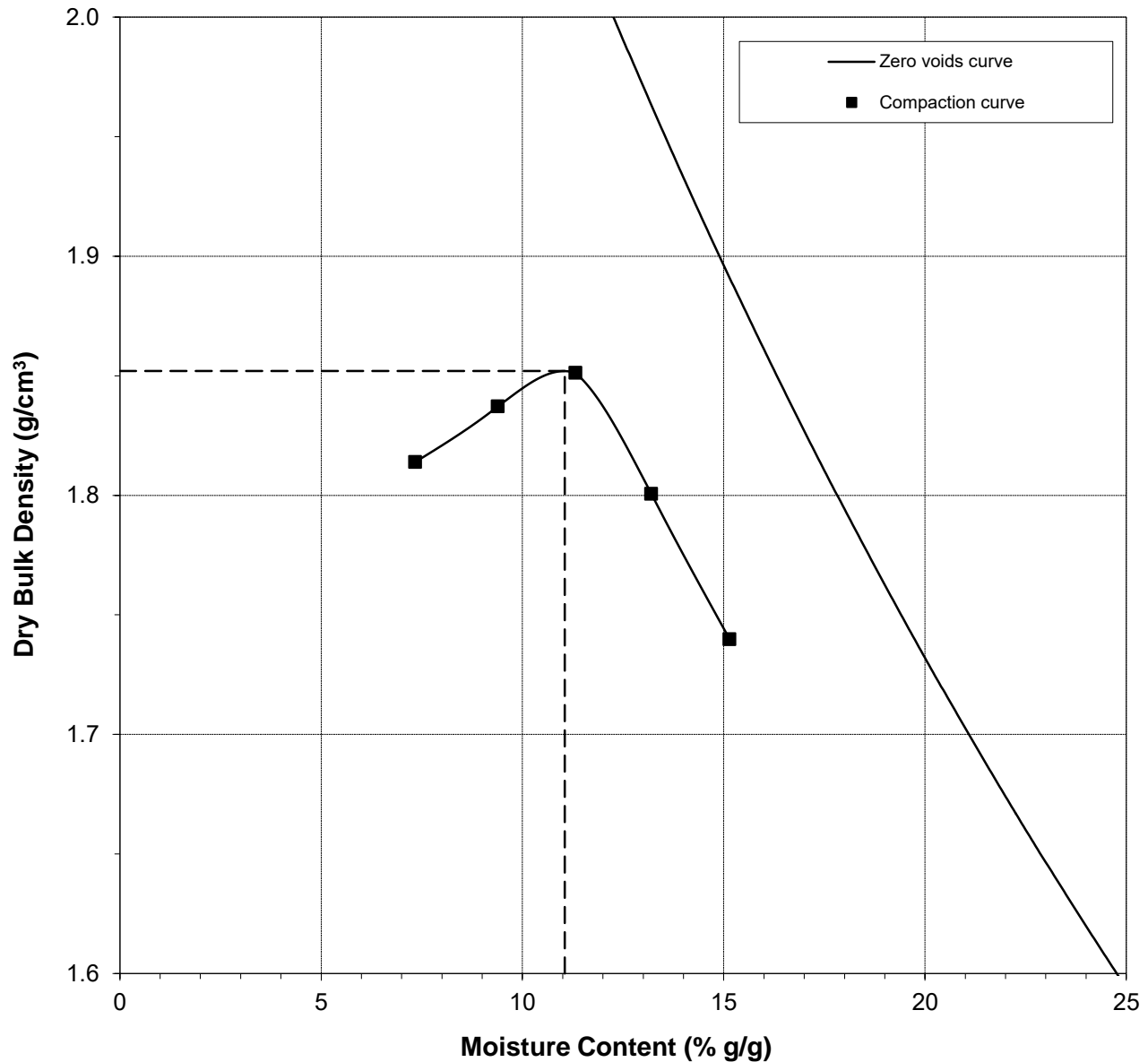
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-03

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.1	---
Maximum Dry Bulk Density (g/cm ³):	1.85	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.34
<i>Sample Number:</i> SDW-04	<i>Mass of fines material (g):</i> 99.66
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 29-Mar-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	5928	1071.31	1024.48	268.45	1.73	6.19
2	6034	1120.60	1058.86	296.81	1.81	8.10
3	6131	1072.20	997.17	267.20	1.86	10.28
4	6203	1011.25	931.45	282.81	1.90	12.30
5	6175	1151.81	1039.45	269.70	1.83	14.60
6	6018	1164.00	1032.82	300.01	1.64	17.90

Soil Fractions
Coarse Fraction (% g/g): 0.3
Fines Fraction (% g/g): 99.7

Properties of Coarse Material
Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Upsize Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---
6	---	---

--- = Upsize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

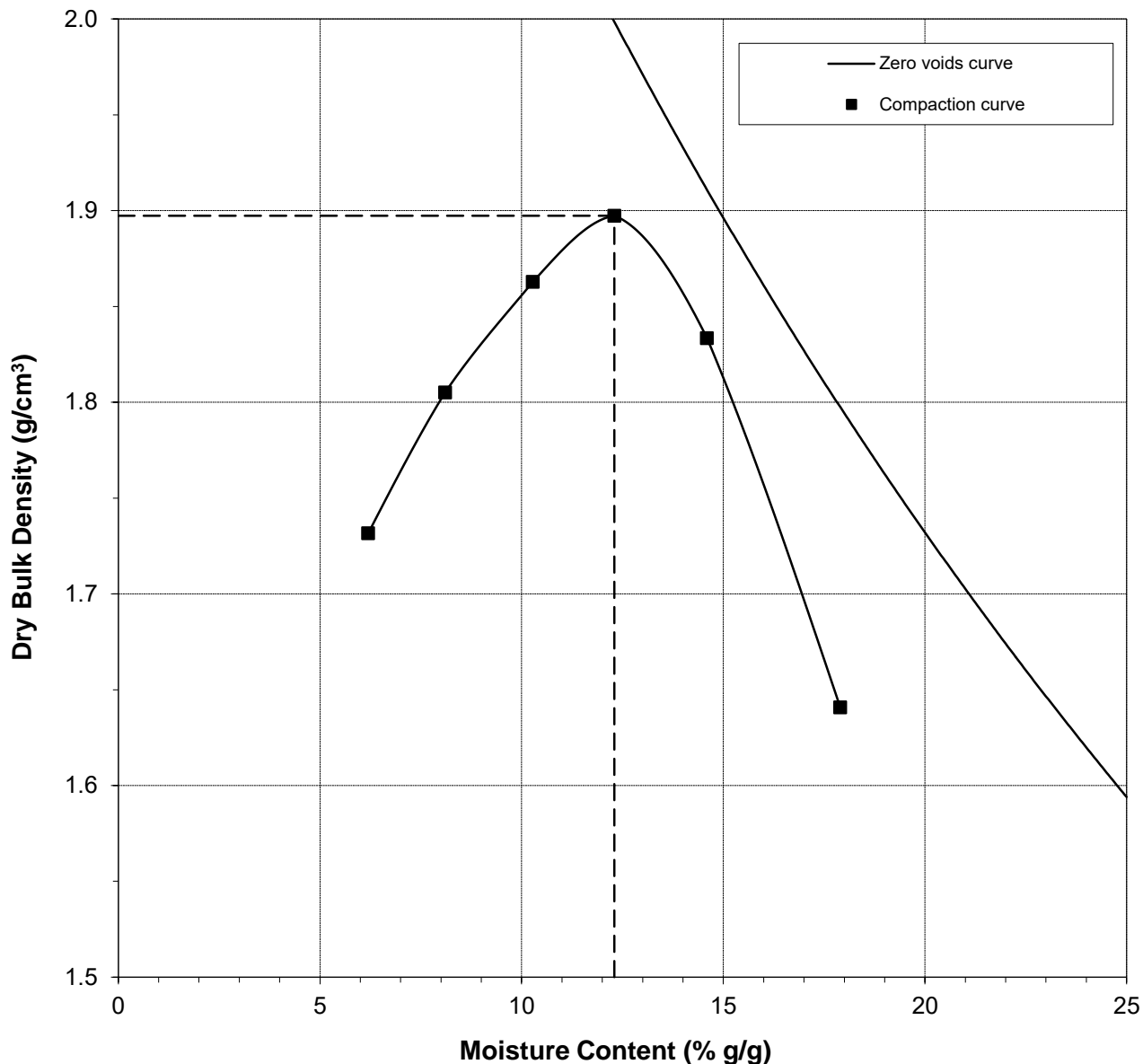


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-04

	Measured	Corrected
Optimum Moisture Content (% g/g):	12.3	---
Maximum Dry Bulk Density (g/cm ³):	1.90	---

Test Date: 29-Mar-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

<i>Job Name:</i> Daniel B. Stephens & Associates, Inc.	<i>Split (3/4", 3/8", #4):</i> #4
<i>Job Number:</i> DB18.1209.00	<i>Mass of coarse material (g):</i> 0.25
<i>Sample Number:</i> SDW-05	<i>Mass of fines material (g):</i> 99.75
<i>Project Name:</i> Sundance West	<i>Mold weight (g):</i> 4196
<i>Depth:</i> NA	<i>Mold volume (cm³):</i> 941.92
<i>Test Date:</i> 1-Apr-19	<i>Compaction Method:</i> Standard A
	<i>Preparation Method:</i> Dry
<i>As Received Moisture Content (% g/g):</i> NA	<i>Type of Rammer:</i> Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6027	1041.27	985.85	291.69	1.80	7.98
2	6119	1082.17	1010.79	297.93	1.86	10.01
3	6186	1155.04	1061.07	283.68	1.88	12.09
4	6180	1261.77	1139.77	284.58	1.84	14.27
5	6100	1101.09	989.69	293.65	1.74	16.00

Soil Fractions
Coarse Fraction (% g/g): 0.2
Fines Fraction (% g/g): 99.8

Properties of Coarse Material
Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

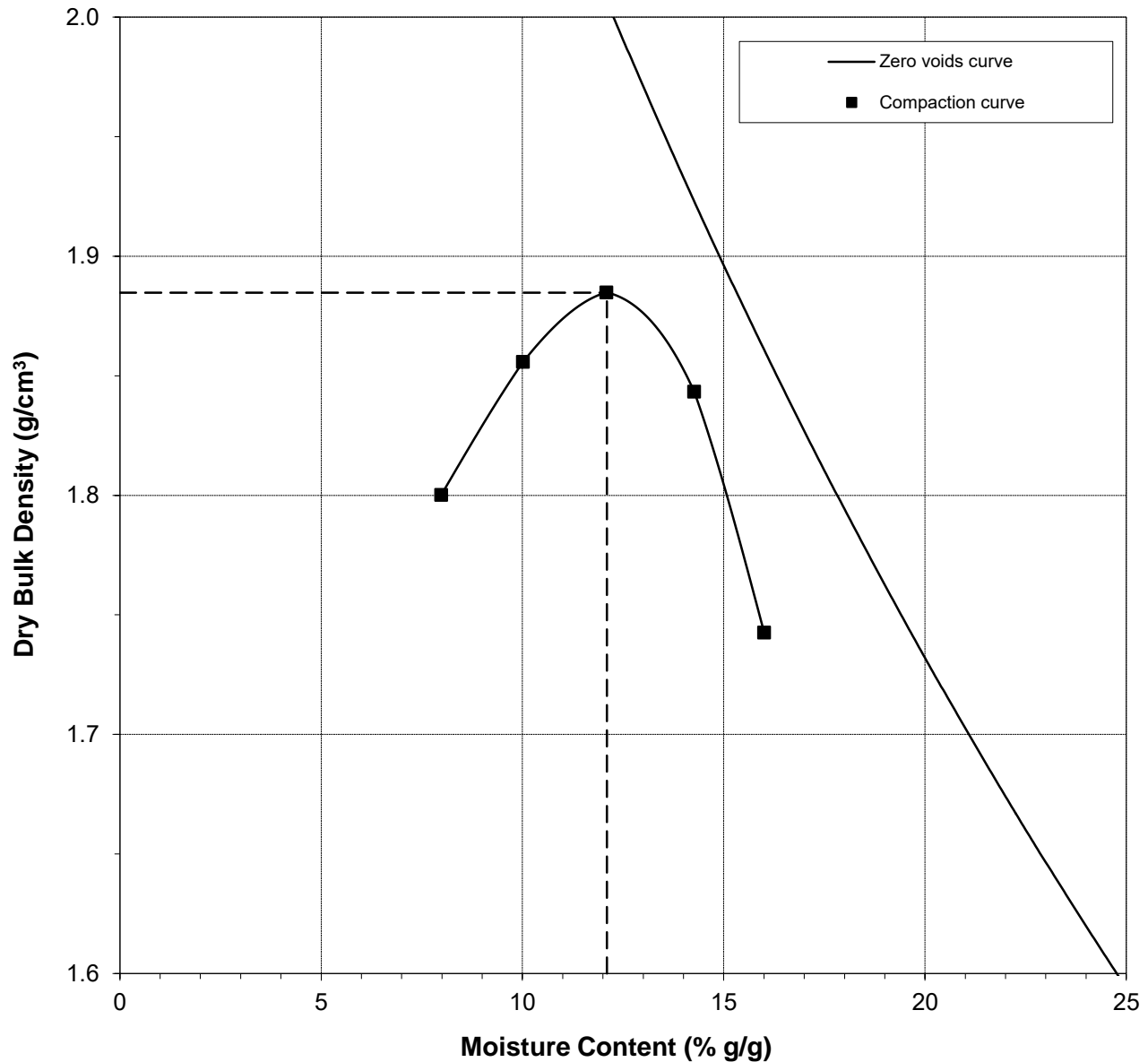


Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-05

	Measured	Corrected
Optimum Moisture Content (% g/g):	12.1	---
Maximum Dry Bulk Density (g/cm ³):	1.88	---

Test Date: 1-Apr-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines

Laboratory Tests and Methods



Tests and Methods

Dry Bulk Density:	ASTM D7263
Moisture Content:	ASTM D7263, ASTM D2216
Calculated Porosity:	ASTM D7263
Saturated Hydraulic Conductivity:	
Falling or Constant Head:	ASTM D 5856
(Rigid Wall)	
Particle Size Analysis:	ASTM D7928, ASTM D6913
USCS (ASTM) Classification:	ASTM D7928, ASTM D6913, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488
Standard Proctor Compaction:	ASTM D698

Laboratory Report for Daniel B. Stephens & Associates, Inc.

DB18.1209.00 Sundance West

September 9, 2019



Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113



September 9, 2019

Gundar Peterson
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd NE, Suite 100
Albuquerque, NM 87109
(505) 822-9400

Re: DBS&A Laboratory Report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00
Sundance West Project

Dear Mr. Peterson:

Enclosed is the report for the Daniel B. Stephens & Associates, Inc. DB18.1209.00 Sundance West project sample. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to DBS&A and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Adam Bland
Laboratory Operations Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory

4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113

505-889-7752
FAX 505-889-0258

Summaries



Daniel B. Stephens & Associates, Inc.

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties ¹			Saturated Hydraulic Conductivity ²			Moisture Characteristics ³								Particle Size ⁴			Specific Gravity ⁵		Air Perm- eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K _{unsat}	DS	WS	H	F	C			
SDW-Alt borrow																X	X				X	X

¹ G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

² CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

³ HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box,
EP = Effective Porosity, WHC = Water Holding Capacity, K_{unsat} = Calculated Unsaturated Hydraulic Conductivity

⁴ DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

⁵ F = Fine (<4.75mm), C = Coarse (>4.75mm)



Notes

Sample Receipt:

One sample was received as loose material in a 5-gallon bucket on August 16, 2019. The sample was received in good order.

Sample Preparation and Testing Notes:

The sample was subjected to standard proctor compaction testing, particle size analysis and Atterberg limits testing.

Particle diameter calculations in the hydrometer portion of the particle size analysis testing are based on the use of an assumed specific gravity value of 2.65.

Based on the proctor compaction method, material larger than 4.75mm was removed from the sample material prior to compaction and remolding. Oversize correction calculations are not presented since the fraction removed was less than 5% of the bulk sample mass.



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-Alt borrow	0.0084	0.16	0.19	23	7.6	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Daniel B. Stephens & Associates, Inc.

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-Alt borrow	1.7	79.2	10.9	8.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Daniel B. Stephens & Associates, Inc.

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-Alt borrow	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-Alt borrow	11.6	1.84	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable

Particle Size Analysis



Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
SDW-Alt borrow	0.0084	0.16	0.19	23	7.6	WS/H	Silty sand (SM)	Loamy Sand

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

[†] Greater than 10% of sample is coarse material



Daniel B. Stephens & Associates, Inc.

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
SDW-Alt borrow	1.7	79.2	10.9	8.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Wet Sieve Data (#10 Split)

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-Alt borrow
Date Sampled: 8/16/19
Depth: NA
Test Date: 22-Aug-19

Initial Dry Weight of Sample (g): 14666.85
Weight Passing #10 (g): 14319.85
Weight Retained #10 (g): 347.00
Weight of Hydrometer Sample (g): 104.51
Calculated Weight of Sieve Sample (g): 107.04

Shape: Angular
Hardness: Weathered and friable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	14666.85	100.00
	2"	50	0.00	0.00	14666.85	100.00
	1.5"	38.1	0.00	0.00	14666.85	100.00
	1"	25	0.00	0.00	14666.85	100.00
	3/4"	19.0	48.56	48.56	14618.29	99.67
	3/8"	9.5	106.45	155.01	14511.84	98.94
	4	4.75	91.07	246.08	14420.77	98.32
	10	2.00	100.92	347.00	14319.85	97.63
-10	(Based on calculated sieve wt.)					
	20	0.85	0.28	2.81	104.23	97.37
	40	0.425	2.08	4.89	102.15	95.43
	60	0.250	15.20	20.09	86.95	81.23
	100	0.150	38.94	59.03	48.01	44.85
	140	0.106	20.40	79.43	27.61	25.79
	200	0.075	7.19	86.62	20.42	19.08
	dry pan		0.45	87.07	19.97	
	wet pan			19.97	0.00	

d₁₀ (mm): 0.0084 d₅₀ (mm): 0.16

d₁₆ (mm): 0.060 d₆₀ (mm): 0.19

d₃₀ (mm): 0.11 d₈₄ (mm): 0.28

Median Particle Diameter--d₅₀ (mm): 0.16

Uniformity Coefficient, Cu--[d₆₀/d₁₀] (mm): 23

Coefficient of Curvature, Cc--[(d₃₀)²/(d₁₀*d₆₀)] (mm): 7.6

Mean Particle Diameter--[(d₁₆+d₅₀+d₈₄)/3] (mm): 0.17

Classification of fines (visual method): ML

ASTM Soil Classification: Silty sand (SM)

USDA Soil Classification: Loamy Sand

Laboratory analysis by: J. Newcomer

Data entered by: A. Albay-Yenney

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-Alt borrow
Date Sampled: 8/16/19
Depth: NA
Test Date: 4-Sep-19
Start Time: 9:12

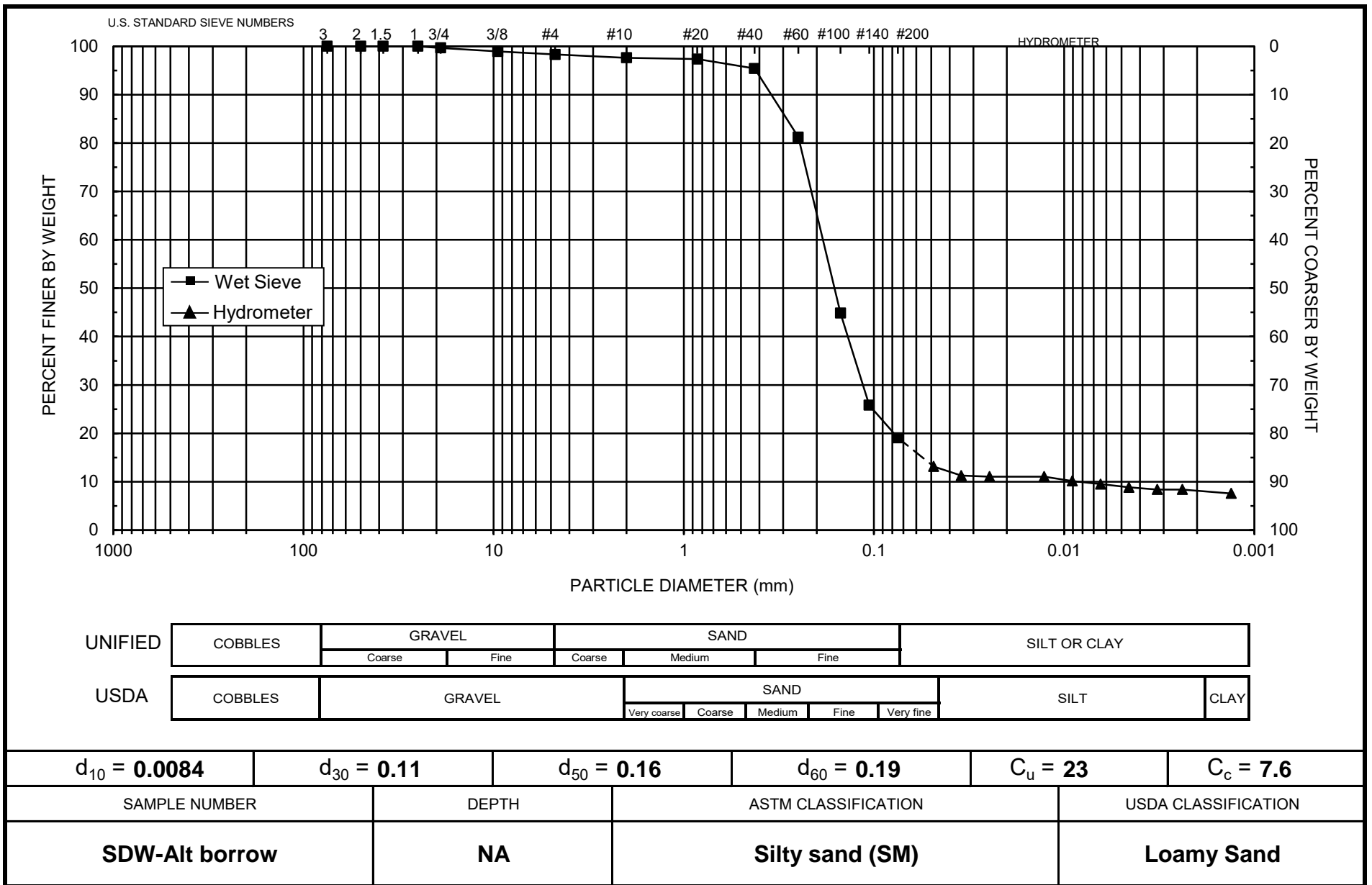
Type of Water Used: DISTILLED
Reaction with H_2O_2 : NA
Dispersant*: $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g): 104.51
Total Sample Wt. (g): 14666.85
Wt. Passing #10 (g): 14319.85

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	H _m (cm)	D (mm)	P (%)	% Finer
4-Sep-19	1	21.7	19.25	5.19	14.1	13	0.0485	13	13.1
	2	21.7	17.25	5.19	12.1	13	0.0348	12	11.3
	4	21.7	17.00	5.19	11.8	13	0.0246	11	11.0
	15	21.7	17.00	5.19	11.8	13	0.0127	11	11.0
	30	21.8	16.00	5.15	10.9	13	0.0090	10	10.1
	60	22.0	15.25	5.08	10.2	13	0.0064	10	9.5
	120	22.1	14.50	5.04	9.5	13	0.0046	9	8.8
	240	22.1	14.00	5.04	9.0	14	0.0032	9	8.4
	442	22.1	14.00	5.04	9.0	14	0.0024	9	8.4
5-Sep-19	1450	21.8	13.25	5.15	8.1	14	0.0013	8	7.6

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: A. Bland
Data entered by: A. Albay-Yenney
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Atterberg Limits/ Identification of Fines



Daniel B. Stephens & Associates, Inc.

Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
SDW-Alt borrow	---	---	---	ML

--- = Soil requires visual-manual classification due to non-plasticity



Atterberg Limits

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-Alt borrow
Date Sampled: 8/16/19
Depth: NA
Test Date: 29-Aug-19

Liquid Limit

	Trial 1	Trial 2	Trial 3
Number of drops:			
Pan number:			
Weight of pan plus moist soil (g):			
Weight of pan plus dry soil (g)			
Weight of pan (g):			
Gravimetric moisture content (% g/g):	---	---	---
Liquid Limit:	---		

Plastic Limit

	Trial 1	Trial 2
Pan number:		
Weight of pan plus moist soil (g):		
Weight of pan plus dry soil (g)		
Weight of pan (g):		
Gravimetric moisture content (% g/g):	---	---
Plastic Limit:	---	

Results

Percent of Sample Retained on #40 Sieve: See Sieve

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---
Classification (Visual Method): ML

Comments:

- = Soil requires visual-manual classification due to non-plasticity
- * = 1-point method requested by client

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines



**Data for Description and Identification of Fines
(Visual-Manual Procedure)**

Job Name: Daniel B. Stephens & Associates, Inc.
Job Number: DB18.1209.00
Sample Number: SDW-Alt borrow
Date Sampled: 8/16/19
Depth: NA
Test Date: 29-Aug-19

Visual-manual classification of material passing the #40 sieve in lieu of
Atterberg analysis due to non-plasticity:

Descriptive Information:

Color of Moist Sample: Strong Brown (7.5 YR 4/6)
Odor: None
Moisture Condition: Moist
HCl Reaction: Strong

Preliminary Identification:

Dry Strength: None
Dilatency: Rapid
Toughness: Low
Plasticity: Non-plastic

Identification of Inorganic Fine Grained Soils:

Silt (ML)

Laboratory analysis by: D. O'Dowd
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Proctor Compaction



Summary of Proctor Compaction Tests

Sample Number	Measured		Oversize Corrected	
	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)	Optimum Moisture Content (% g/g)	Maximum Dry Bulk Density (g/cm ³)
SDW-Alt borrow	11.6	1.84	---	---

--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

NR = Not requested

NA = Not applicable



Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data

Job Name: Daniel B. Stephens & Associates, Inc. Split (3/4", 3/8", #4): #4
Job Number: DB18.1209.00 Mass of coarse material (g): 246.08
Sample Number: SDW-Alt borrow Mass of fines material (g): 14420.77
Date Sampled: 8/16/19 Mold weight (g): 4205.3
Depth: NA Mold volume (cm³): 942.44
Test Date: 20-Aug-19 Compaction Method: Standard A
Preparation Method: Dry
As Received Moisture Content (% g/g): NA Type of Rammer: Mechanical

Trial	Weight of Mold and Compacted Soil (g)	Weight of Container and Wet Soil (g)	Weight of Container and Dry Soil (g)	Weight of Container (g)	Dry Bulk Density (g/cm ³)	Moisture Content (% g/g)
1	6013	983.19	937.74	289.57	1.79	7.01
2	6082	1271.20	1185.33	282.97	1.82	9.52
3	6144	1199.90	1103.28	269.49	1.84	11.59
4	6142	1297.60	1172.18	283.56	1.80	14.11
5	6102	1062.20	954.25	268.44	1.74	15.74

Soil Fractions

Coarse Fraction (% g/g): 1.7
Fines Fraction (% g/g): 98.3

Properties of Coarse Material

Assumed particle density (g/cm³): 2.65
Assumed Initial Moisture Content (% g/g): 0.0

Override Corrected Values for Dry Bulk Density and Moisture Content

Trial	Dry Bulk Density of Composite (g/cm ³)	Moisture Content of Composite (% g/g)
1	---	---
2	---	---
3	---	---
4	---	---
5	---	---

--- = Override correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Bland
Data entered by: A. Bland
Checked by: J. Hines



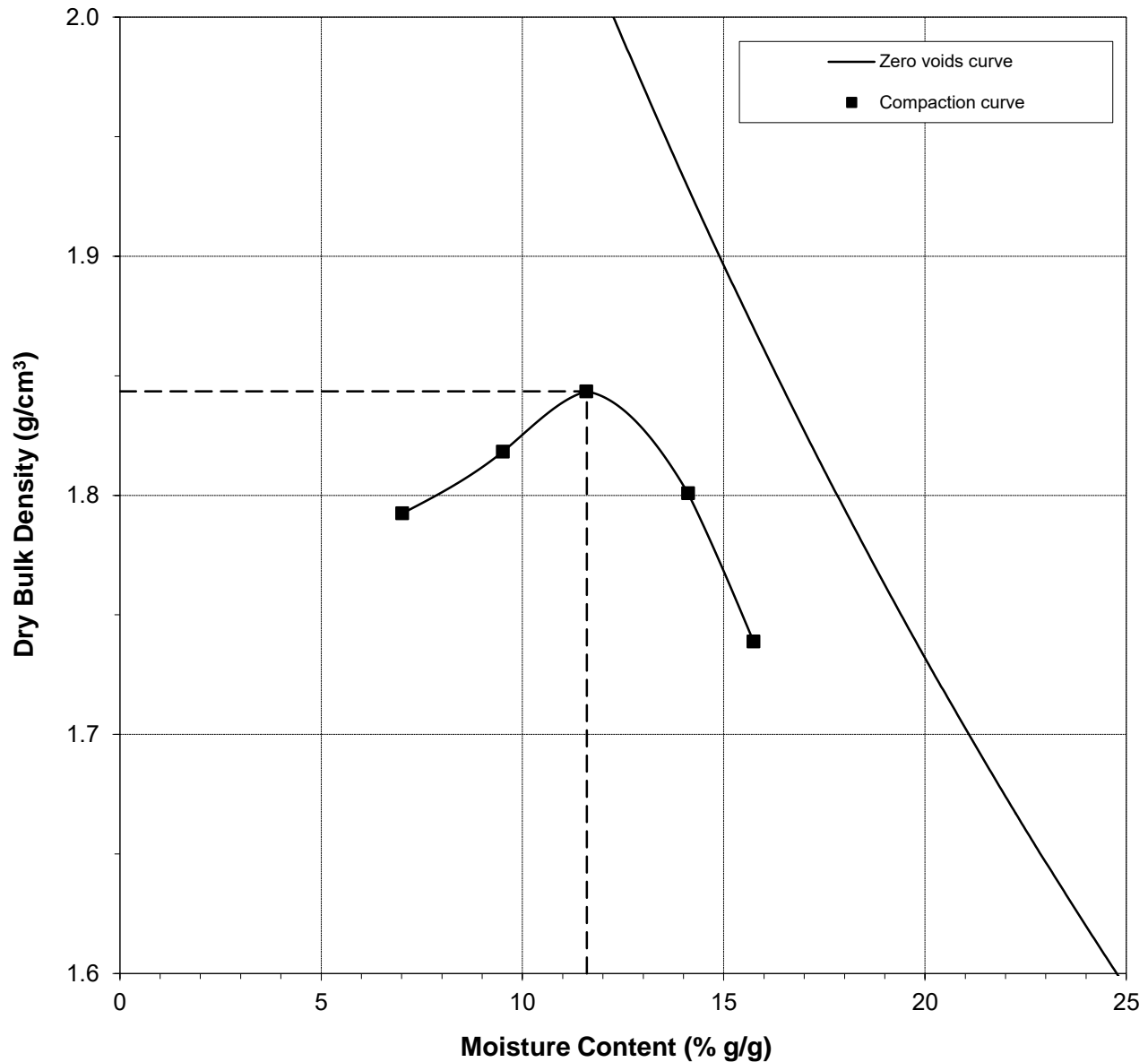
Daniel B. Stephens & Associates, Inc.

Proctor Compaction Data Points with Fitted Curve

Sample Number: SDW-Alt borrow

	Measured	Corrected
Optimum Moisture Content (% g/g):	11.6	---
Maximum Dry Bulk Density (g/cm ³):	1.84	---

Test Date: 20-Aug-19



--- = Oversize correction is unnecessary since coarse fraction < 5% of composite mass

Laboratory analysis by: A. Bland

Data entered by: A. Bland

Checked by: J. Hines

Laboratory Tests and Methods



Tests and Methods

Particle Size Analysis:	ASTM C136
USCS (ASTM) Classification:	ASTM D7928, ASTM D6913, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle
Atterberg Limits:	ASTM D4318
Visual-Manual Description:	ASTM D2488
Standard Proctor Compaction:	ASTM D698

Appendix I2

PSL Density Measurements

Appendix I2. PSL Density Measurements

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
6/13/2019	BPC-1	117.3	112.0	95.5	3.7	116.2	32.444470	103.0945700	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-2	117.3	99.7	85.0	4.9	104.6	32.444490	103.0949000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-3	117.3	108.6	92.6	5.9	114.5	32.444300	103.0949000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-4	117.3	109.0	92.9	9.5	119.4	32.444300	103.0951200	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-5	117.3	106.2	90.6	6.8	115.4	32.444490	103.0951000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-6	117.3	106.9	91.1	6.4	113.7	32.444520	103.0942200	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-7	117.3	108.8	92.8	11.8	121.7	32.444290	103.0942000	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-8	117.3	110.7	94.4	4.3	115.5	32.444260	103.0940400	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/13/2019	BPC-9	117.3	109.9	93.7	5.3	115.7	32.444500	103.0940500	NAD 83 - Preliminary PSL Measurement	O. Ruiz/J. Fisher
6/11/2019	PC-C1	117.3	108.7	92.7	6.5	115.8	32.44393	-103.0947000	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/11/2019	PC-C2	117.3	101.0	86.1	4.7	105.7	32.44397	-103.0945900	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/11/2019	PC-C3	117.3	100.3	85.5	4.4	104.7	32.44400	-103.0944700	Preliminary PSL Measurement C-Area	O. Ruiz/J. Fisher
6/14/2019	BPC-11	117.3	98.7	84.2	3.9	102.6	32.444160	103.0951200	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-1	117.3	102.3	87.2	4.5	106.9	32.444050	103.0948600	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-2	117.3	110.2	93.9	6.2	117.0	32.444120	103.0946800	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-3	117.3	109.9	93.7	5.7	110.2	32.444130	103.0943900	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-4	117.3	112.3	95.7	5.9	118.9	32.444010	103.0942700	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-5	117.3	107.0	91.3	5.6	113.1	32.443890	103.0943100	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-6	117.3	103.0	87.8	6.4	109.6	32.443810	103.0944400	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/14/2019	CPC-7	117.3	109.4	93.3	5.2	115.1	32.443820	103.0947000	Preliminary PSL Measurement B-Area	O. Ruiz/J. Fisher
6/17/2019	B-1	117.3	106.1	90.5	5.7	112.2	32.444383	-103.0949333	NAD 83 - Preliminary PSL	T. Hopkins
6/17/2019	B-2	117.3	108.4	92.4	4.3	113.0	32.444383	-103.0949333	East Area B	T. Hopkins
6/17/2019	B-3	117.3	109.5	93.4	6.0	116.1	32.444550	-103.0943333		T. Hopkins
6/17/2019	C-1	117.3	115.1	98.2	8.6	125.0	32.444017	-103.0945333		T. Hopkins
6/17/2019	C-2	117.3	113.2	96.5	7.8	122.0	32.443917	-103.0946000		T. Hopkins
6/18/2019	C-3	117.3	111.1	94.7	10.4	122.7	32.443933	-103.0945667	In sump on pad, east Area B	T. Hopkins
6/18/2019	C-4	117.3	107.3	91.5	5.1	112.8	32.443950	-103.0945833	In sump on pad, east Area B	T. Hopkins
6/18/2019	B-4	117.3	112.4	95.8	7.0	120.3	32.444450	-103.0943167		T. Hopkins
6/18/2019	B-5	117.3	109.2	93.1	6.0	115.7	32.444417	-103.0947667		T. Hopkins
6/18/2019	B-6	117.3	108.1	92.1	5.8	114.3	32.444467	-103.0948667	West Area B	T. Hopkins
6/18/2019	B-7	117.3	104.6	89.2	11.1	116.2	32.444333	-103.0941333	East Area B	T. Hopkins
6/18/2019	B-8	117.3	112.0	95.5	9.2	122.3	32.444300	-103.0941333	East Area B	T. Hopkins
6/18/2019	B-9	117.3	110.5	94.2	12.0	123.8	32.444350	-103.0943333		T. Hopkins
6/20/2019	B-10	117.3	111.1	94.7	7.1	119.0	32.444400	-103.0943670	East Area B	T. Hopkins
6/20/2019	B-11	117.3	107.8	91.9	8.5	116.9	32.444300	-103.0940500	East Area B	T. Hopkins
6/20/2019	B-12	117.3	105.9	90.3	5.2	111.4	32.444550	-103.0941000	East Area B	T. Hopkins
6/20/2019	B-13	117.3	106.7	91.0	4.6	111.6	32.444000	-103.0942500	East Area B	T. Hopkins

Appendix I2. PSL Density Measurements

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
6/20/2019	C-5	117.3	106.6	90.8	6.8	113.8	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-6	117.3	102.0	87.0	5.4	107.5	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-7	117.3	109.2	93.1	8.9	119.0	32.443950	-103.0944830	8-inch sump	T. Hopkins
6/20/2019	C-8	117.3	104.5	89.1	7.1	111.9	32.444017	-103.0946330	8-inch sump	T. Hopkins
6/20/2019	C-9	117.3	107.2	91.4	6.2	113.9	26.641000	-103.0946500	8-inch sump	T. Hopkins
6/20/2019	C-10	117.3	111.4	95.0	9.5	122.0	32.444033	-103.0946000		T. Hopkins
6/20/2019	C-11	117.3	109.2	93.1	7.3	117.2	32.443967	-103.0944830		T. Hopkins
6/20/2019	C-12	117.3	109.8	93.6	8.9	119.5	32.443983	-103.0944830		T. Hopkins
6/20/2019	C-13	117.3	111.1	94.8	9.1	121.2	32.443983	-103.0944830		T. Hopkins
6/20/2019	C-14	117.3	109.3	93.2	8.4	118.5	32.443983	-103.0944830	5 over	T. Hopkins
6/20/2019	C-15	117.3	112.1	95.6	7.0	119.9	32.443950	-103.0945000		T. Hopkins
6/20/2019	C-16	117.3	113.2	96.5	11.0	125.6	32.444050	-103.0946330		T. Hopkins
6/20/2019	B-14	117.3	108.6	92.6	7.3	116.5	32.444333	-103.0950330	West Area B	T. Hopkins
6/20/2019	B-15	117.3	104.8	89.3	11.3	116.6	32.444517	-103.0947500	West Area B	T. Hopkins
6/20/2019	B-16	117.3	113.5	96.3	7.7	122.3	32.444330	103.0951000		T. Hopkins
6/20/2019	B-17	117.3	109.2	93.1	4.4	114.0	32.444470	103.0951200		T. Hopkins
6/20/2019	B-18	117.3	109.7	93.5	8.2	118.7	32.444450	103.0949600		T. Hopkins
6/20/2019	B-19	117.3	109.3	93.1	12.5	123.0	32.444310	103.0949200		T. Hopkins
6/20/2019	B-20	117.3	112.1	95.6	10.9	124.4	32.444310	109.0947500		T. Hopkins
6/20/2019	B-21	117.3	112.7	96.1	8.7	122.5	32.444480	103.0947000		T. Hopkins
6/20/2019	B-19R	117.3	113.9	97.1	8.6	123.8	32.444470	103.0951200		T. Hopkins
6/20/2019	B-18R	117.3	112.1	95.6	7.8	120.8	32.444450	103.0949600		T. Hopkins
6/20/2019	B-17R	117.3	113.1	96.4	7.4	121.5	32.444310	103.0949200		T. Hopkins
6/20/2019	B-23	117.3	105.5	90.0	12.5	118.8	32.444490	103.0946800	Final grade	T. Hopkins
6/20/2019	B-24	117.3	102.9	87.7	10.0	113.2	32.444310	103.0947200	Final grade	T. Hopkins
6/20/2019	B-25	117.3	107.9	91.9	11.1	119.8	32.444310	103.0948900	Final grade	T. Hopkins
6/20/2019	B-26	117.3	109.1	93.0	10.9	121.0	32.444450	103.0948800	Final grade	T. Hopkins
6/20/2019	B-27	117.3	111.1	94.7	10.8	123.0	32.444450	103.0950900	Final grade	T. Hopkins
6/20/2019	B-28	117.3	116.3	99.2	7.8	125.5	32.444310	103.0951000	Final grade	T. Hopkins
6/20/2019	B-23	117.3	111.3	94.9	9.8	122.2	32.444490	103.0946800	Retest	T. Hopkins
6/20/2019	B-24	117.3	111.2	94.8	8.9	121.1	32.444310	103.0947200	Retest	T. Hopkins
6/20/2019	B-25	117.3		90.7	7.8		32.444310	103.0948900	Retest	T. Hopkins
6/20/2019	B-26	117.3	111.2	94.8	11.3	123.8	32.444450	103.0948800	Retest	T. Hopkins
6/20/2019	B-27	117.3	113.5	96.7	7.2	121.6	32.444450	103.0950900	Retest	T. Hopkins
8/22/2019	D-1	117.3	111.5	95.1	7.2	119.6	32.443740	-103.0947800	Pre-liner measurement D-Area	J. Fisher
8/22/2019	D-2	117.3	105.8	90.2	8.5	114.8	32.443760	-103.0945200	Pre-liner measurement D-Area	J. Fisher
8/22/2019	D-3	117.3	108.2	92.2	6.7	115.4	32.443840	-103.0943600	Pre-liner measurement D-Area	J. Fisher
8/22/2019	D-4	117.3	108.1	92.2	9.2	118.1	32.443840	-103.0946800	Pre-liner measurement D-Area	J. Fisher

Appendix I2. PSL Density Measurements

Date	Test Number	Reference Proctor (PCF)	Dry Density (PCF)	% RSP	% Moisture	Wet Density	Latitude	Longitude	Comments	Technician
8/24/2019	A-1	115.09	106.8	92.8	6.2	113.4	32.443310	-103.0932100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-2	115.09	111.4	96.7	8.2	120.5	32.443580	-103.0932100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-3	115.09	112.0	97.3	7.1	120.0	32.443850	-103.0931900	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-4	115.09	113.4	98.5	8.4	122.9	32.443860	-103.0929100	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-5	115.09	115.4	100.3	8.1	124.8	32.443570	-103.0929000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-6	115.09	109.3	94.9	8.2	118.2	32.443310	-103.0929000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-7	115.09	106.1	92.2	8.8	115.4	32.443330	-103.0927000	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-8	115.09	114.8	99.7	7.9	123.9	32.443610	-103.0926600	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher
8/24/2019	A-9	115.09	107.7	93.6	9.3	117.7	32.443900	-103.0926600	PSL Measurement - SE A-Area approval	M. Zbrozek/ J. Fisher

9/17/2019	A-10	115.09	110.4	116.8	5.8	95.9	32.443330	-103.0937000	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-11	115.09	110.4	115.4	4.6	95.9	32.443310	-103.0934700	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-12	115.09	108.8	113.1	4.0	94.5	32.443310	-103.0933200	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-13	115.09	144.5	121.9	6.4	99.5	32.443630	-103.0933300	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-14	115.09	110.0	110.5	5.8	95.6	32.443680	-103.0936300	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-15	115.09	105.9	112.1	5.8	92.0	32.443660	-103.0938600	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-16	115.09	115.1	125.6	9.1	100.0	32.444090	-103.0933700	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-17	115.09	116.0	124.7	7.5	100.8	32.444090	-103.0936200	PSL Measurement - SW A-Area approval	O. Ruiz
9/17/2019	A-18	115.09	114.7	122.5	6.7	99.8	32.444090	-103.093770	PSL Measurement - SW A-Area approval	O. Ruiz

11/5/2019	115A-1	115.09	117.6	102.2	6.9	124.6	32.444368	103.0921700	WGS 84 - PSL Measurement	M. Zbrozek
11/5/2019	115A-2	115.09	112.0	97.3	7.2	120.1	32.444282	103.0928920	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-3	115.09	113.3	98.5	6.0	120.2	32.444479	103.0929540	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-4	115.09	118.0	102.6	6.8	126.1	32.444388	103.0931180	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-5	115.09	113.4	98.5	5.6	119.8	32.444486	103.0932700	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-6	115.09	112.3	97.5	4.8	117.7	32.444307	103.0932740	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-7	115.09	119.7	103.7	6.4	126.9	32.444364	103.0934270	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-8	115.09	109.3	94.9	4.7	113.5	32.444507	103.0935750	PSL Measurement - A-Area approval	M. Zbrozek
11/5/2019	115A-9	115.09	112.2	97.5	7.5	120.6	32.444337	103.0937190	PSL Measurement - A-Area approval	M. Zbrozek



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Midland, Texas 79706
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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: Jareth Waid

DATE AND TIME: June 21, 2019
REPORT NO.: 902054.0621.5579A
PDF ID: 0621.5579A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Red silty sand	East side; 5' W and 5' N from SE corner	127.0	10.9	114.5	102.7
	West side; 10' E and 5' N from SE corner	122.7	9.7	111.9	100.3
SPECIFICATIONS	Minimum Density Requirement 95%				
	Moisture Requirement +/-2%	AREA: Subgrade on sump			
GAUGE NO.: 26038		DENSITY STANDARD:		1828	
MODEL NO.: Troxler 3440		MOISTURE STANDARD:		635	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

COPIES TO: 1- Above

Beyond Engineering and Testing, LLC


Quality Review

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: Jareth Waid

DATE AND TIME: July 1, 2019
REPORT NO.: 902054.0701.6177A
PDF ID: 0701.6177A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Red silty sand	West pad- west side	115.4	5.0	109.9	98.6
	West pad- east side	117.2	6.4	110.2	98.8
	East pad- east side	112.2	5.3	106.6	95.6
	East pad- west side	124.0	8.7	114.1	102.3
SPECIFICATIONS	Minimum Density Requirement 95%				
	Moisture Requirement +/-2%	AREA: Subgrade on seperator pads			
GAUGE NO.: 26038		DENSITY STANDARD:		1821	
MODEL NO.: Troxler 3440		MOISTURE STANDARD:		639	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

COPIES TO: 1- Above

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Quality Review

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: Jareth Waid

DATE AND TIME: July 22, 2019
REPORT NO.: 902054.0722.6377A
PDF ID: 0722.6377A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Red silty sand	19% slope- Top	120.7	7.2	112.6	101.0
	19% slope- Bottom	116.7	10.1	106.0	95.1
SPECIFICATIONS Minimum Density Requirement 95% Moisture Requirement +/-2%	AREA: Subgrade on 19% going from main grade downward				
GAUGE NO.: 26038		DENSITY STANDARD:		1861	
MODEL NO.: Troxler 3440		MOISTURE STANDARD:		652	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

COPIES TO: 1- Above

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: J. Diego Garcia

DATE AND TIME: August 19, 2019
REPORT NO.: 902054.0819.6776A
PDF ID: 0819.6776A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	<u>From SE corner</u>				
	40' N and 20' W	115.9	8.9	106.4	95.5
	200' N and 30' W	117.4	7.8	108.9	97.7
	300' N and 20' W	120.8	9.2	110.6	99.2
	40' N and 100' W	117.3	10.1	106.5	95.6
	200' N and 110' W	125.5	11.4	112.7	101.0
	320' N and 115' W	120.2	9.7	109.6	98.3
	30' N and 300' W	120.7	8.1	111.7	100.1
	200' N and 320' W	114.0	7.6	105.9	95.0
	350' N and 300' W	119.6	10.3	108.4	97.2
	40' N and 400' W	121.7	7.2	113.5	101.8
	200' N and 440' W	120.2	8.9	110.4	99.0
	360' N and 420' W	120.9	9.6	110.3	98.9
	340' N and 500' W	122.9	10.0	111.7	100.2
SPECIFICATIONS	220' N and 520' W	119.7	7.7	111.1	99.7
Minimum Density Requirement 95%	AREA: Final lift of backfill on dry out pad				
Moisture Requirement +/-2%					
GAUGE NO.: 3495		DENSITY STANDARD: 2690			
MODEL NO.: Instrotek 3500		MOISTURE STANDARD: 738			
TRANSMISSION: Method A		DEPTH, INCHES: 8			

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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www.BeyondET.com
3011-B South County Road 1260
Midland, Texas 79706
432.561.5780

TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: J. Diego Garcia

DATE AND TIME: August 19, 2019
REPORT NO.: 902054.0819.6776B
PDF ID: 0819.6776B-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	<u>From SE corner</u>				
	40' N and 510' W	119.4	9.1	109.4	98.2
	50' N and 570' W	120.9	8.7	111.2	99.8
	240' N and 580' W	121.6	7.9	112.7	101.1
	380' N and 600' W	119.5	10.1	108.5	97.3
SPECIFICATIONS	Minimum Density Requirement 95%				
	Moisture Requirement +/-2%	AREA: Final lift of backfill on dry out pad			
GAUGE NO.: 3495		DENSITY STANDARD:		2690	
MODEL NO.: Instron 3500		MOISTURE STANDARD:		738	
TRANSMISSION: Method A		DEPTH, INCHES:		8	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: C. Apolinar

DATE AND TIME: September 24, 2019

REPORT NO.: 902054.0924.7244A

PDF ID: 0924.7244A-SOL

COMPACTION TEST					
TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	<u>From NE Corner of Dry Pad</u>				
	300' W and 20' S	125.7	11.6	112.6	101.0
	300' W and 80' S	127.6	13.0	112.9	101.3
	300' W and 160' S	118.1	11.3	106.1	95.2
	250' W and 20' S	117.3	9.7	106.9	95.9
	250' W and 80' S	118.0	9.3	108.0	96.8
	250' W and 160' S	117.3	8.6	108.0	96.9
	350' W and 20' S	117.0	9.1	107.2	96.2
	350' W and 80' S	115.1	7.6	107.0	95.9
	350' W and 160' S	122.4	10.6	110.7	99.3
	350' W and 200' S	112.4	6.0	106.0	95.1
SPECIFICATIONS					
Minimum Density Requirement 95%					
Moisture Requirement +/-2%	AREA: Final lift of fill on southwest corner of dry out pad				
GAUGE NO.: 3562		DENSITY STANDARD:		2703	
MODEL NO.: Instron 3500		MOISTURE STANDARD:		735	
TRANSMISSION: Method A		DEPTH, INCHES:		6	

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: N. Juarez

DATE AND TIME: October 25, 2019
REPORT NO.: 902054.1025.7654A
PDF ID: 1025.7654A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	<u>From SE corner of pad</u>				
	5' W and 5' N	119.6	7.3	111.5	100.0
	20' W and 5' N	125.0	8.7	115.0	103.1
	20' W and 20' N	121.7	5.8	115.0	103.2
	5' W and 20' N	124.3	7.5	115.6	103.7
SPECIFICATIONS	Minimum Density Requirement 95%				
	Moisture Requirement +/-2%	AREA: Subgrade on east pad for area B			
GAUGE NO.: 3562		DENSITY STANDARD: 2692			
MODEL NO.: Instrotek 3500		MOISTURE STANDARD: 736			
TRANSMISSION: Method A		DEPTH, INCHES: 6			

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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www.BeyondET.com
3011-B South County Road 1260
Midland, Texas 79706
432.561.5780

TO: Onyx General Contractors
Attn: Albert Natividad
1010 S. 1788
Midland, Texas 79706

PROJECT: Sundance West Project
Waclach Lane
Eunice, New Mexico 88231

PROJECT NO.: WT1902054

PROJECT MANAGER: Ruben Perez
TECHNICIAN: N. Juarez

DATE AND TIME: October 31, 2019
REPORT NO.: 902054.1031.7734A
PDF ID: 1031.7734A-SOL

COMPACTION TEST

TYPE OF SOIL	TEST LOCATION	ASTM D 6938			PERCENT COMPACTION
		WET DENSITY LBS/CU FT	PERCENT MOISTURE	DRY DENSITY LBS/CU FT	
Reddish sand w/ caliche	<u>From SE corner of pad</u>				
	50' N and 15' W	119.5	7.2	111.5	100.0
	25' N and 15' W	128.4	11.3	115.4	103.5
	50' N and 50' W	125.2	13.5	110.3	98.9
	25' N and 50' W	117.1	6.6	109.8	98.5
	50' N and 100' W	125.3	9.3	114.6	102.8
	25' N and 100' W	121.5	8.5	112.0	100.4
	50' N and 150' W	121.1	8.7	111.4	99.9
	25' N and 150' W	121.3	7.4	112.9	101.3
SPECIFICATIONS					
Minimum Density Requirement 95%					
Moisture Requirement +/-2%	AREA: Subgrade on Area A, north pad				
GAUGE NO.: 3523		DENSITY STANDARD: 2658			
MODEL NO.: Instrotek 3500		MOISTURE STANDARD: 708			
TRANSMISSION: Method A		DEPTH, INCHES: 6			

MDC DETERMINED IN ACCORDANCE WITH: D-698
MD CURVE REFERENCE: S-171

MAXIMUM DENSITY (pcf): 111.5
OPTIMUM MOISTURE (%): 12.8

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Appendix J

Concrete Placement and Testing Results

Appendix J1
Concrete Mix Design

Project Name : SUNDANCE SERVICES WEST MUD MANAGEMENT

Customer : MHAT, LLC.

Date : 03/26/2019

Suggested Mix Design: L3020A55



PROJECT SPECIFICATIONS:

Mix Designation: 3000 PSI W/ ASH/AIR

Compressive Strength @28 days: 3000 psi

Air Content : 6 +/- 1.5% (Tolerance per ACI 117)

Mix Design:

Material Type	Constituents :	Source Supplier	<ASTM> Standard	One Cubic Yard
Cement	CEMENT	GCC-SAMALAYUCA	ASTM C150	376 lb
Fly Ash	FLY ASH CLASS C	LAFARGE-TOLK	ASTM C618	94 lb
Coarse Aggregate	57 ROCK	PB MATERIALS-EUNICE #326	ASTM C33	1683 lb
Fine Aggregate	CONCRETE SAND	PB MATERIALS-GRAND FALLS #322	ASTM C33	1324 lb
Water	WATER	JAL-CITY WATER	ASTM C1602	260 lb
Admixture	DARACEM 55	GRACE-CAMBRIDGE, MA	ASTM C494	31 lq oz
Admixture	DARAVAIR 1000	GRACE-CAMBRIDGE, MA	ASTM C260	3 lq oz
Air Content, Calculated		4.50 %	-	-
Design Slump		5 in	-	-
Design W/C		0.55	-	-

The batch weights of the aggregate are given on a SSD basis and should be adjusted according to the amount of free moisture in the aggregates.
Proportioning is calculated in compliance with ACI 301 and ACI 211.11

Remarks :

- The amount of DARACEM 55 may be varied to maintain workability.
- The amount of DARAVAIR 1000 may be varied to maintain the desired air content.

Prepared By : Baltazar Mendoza Quality Control Supervisor

Approved By :

Date : 03/26/2019

Date : 03/26/2019



L3020A55 - 3000 PSI W/ ASH/AIR

<u>Slump</u>	<u>Air</u>	<u>7 Day Strength</u>	<u>28 Day Strength</u>
5.00	5.5	3425	4110
3.00	6.0	4635	5848
5.75	7.3	3560	4575
5.75	6.8	3888	4843
5.75	7.2	4110	5545
6.00	7.2	3745	5048
3.75	6.8	4138	5300
4.00	7.6	4798	5542
6.25	6.8	3335	4180
6.50	7.3	3580	4378
3.00	5.1	3890	4993
3.50	5.6	4005	5008
3.50	5.5	4653	5845
4.75	5.8	4790	5978
3.00	5.2	4528	5615
4.25	5.3	3708	4803
6.00	5.5	3543	4813
5.75	5.8	3778	4908
5.50	5.5	3443	4633
6.50	5.7	3310	4365
4.25	6.4	4313	5888
4.25	5.0	3338	4385
4.00	5.0	3523	4768
4.25	5.5	3883	5185
4.00	5.7	4080	5358
4.75	5.6	4283	5108
4.50	6.0	4443	5508
4.00	5.3	4350	5340
3.25	5.8	3148	4033
4.00	6.3	4673	5780

Number of observations: 30



ACI 318 Overdesign Report of L3020A55 - 3000 PSI W/ ASH/AIR

ACI 318 Overdesign Report

Statistical Strength Summary

Target strength at 28 days	:	3000 psi
Average strength based on 30 tests	:	5056 psi
Overall Standard Deviation	:	568 psi
Good		
Overall coefficient of variation	:	11.23 %
Overall within-test coefficient of variation	:	2.28 %
Excellent		

ACI 318 Minimum Recommended Strength	:	3823 psi
--------------------------------------	---	----------

Average strength > minimum recommended strength by 1233 psi



GCC Rio Grande

Manufacturing Plant:
Samalayuca, Chih., Mex.

Mailing Address:
4253 Montgomery Blvd. N.E.
Suite 210
Albuquerque, New Mex. 87109
(505) 881-5303
FAX (505) 881-5304

CEMENT MILL TEST REPORT

Car Numbers:	Report No.:	171230
	Date Shipped:	12 / 1-31 /2017
	Test date	12 / 1-31 /2017
	Mfg. Plant:	SAMALAYUCA
	Cement Type:	I-II Low Alkalie
	Quantity:	Trucks
	Shipping No.:	171230

STANDARD CHEMICAL REQUIREMENTS	SPECIFICATIONS ASTM	II	TEST RESULTS
Silicon Dioxide (SiO ₂) - Percent			20.1
Aluminum Oxide (Al ₂ O ₃) - Percent	Maximum >	6.0	4.81
Ferric Oxide (Fe ₂ O ₃) - Percent	Maximum >	6.0	3.27
Calcium Oxide (CaO) - Percent		*	63.2
Magnesium Oxide (MgO) - Percent	Maximum >	6.0	2.0
Sulfur Trioxide (SO ₃)- Percent	Maximum >	3.0	2.86
Loss on Ignition - Percent	Maximum >	3.5	2.55
Insoluble Residue - Percent	Maximum >	1.50	0.49
Carbon dioxide (CO ₂) - Percent			1.62
Limestone content --Percent			3.90
Corrected Limestone -Percent			3.20
CaCO ₃ in Limestone - Percent	Minimum >	70.0	94.0
Tricalcium Silicate (C ₃ S) - Percent		*	50
Dicalcium Silicate (C ₂ S) - Percent		*	20
Tricalcium Aluminate (C ₃ A) - Percent	Maximum >	8.0	7
Tetracalcium Aluminoferrite (C ₄ AF) - Percent		*	10
C ₄ AF + 2 (C ₃ A) or C ₄ AF + C ₂ F - Percent		*	24
Alkalies (Sodium Oxide Equivalent) - Percent *	Maximum >	0.60	0.58

STANDARD PHYSICAL REQUIREMENTS			
Specific Surface , Blaine ,m ² /kg	Minimum >	280	362
- 325 Mesh - Percent		*	94.7
Compressive Strengths,psi (MPa)(C 109 cubes)			
psi (MPa)		psi (Mpa)	
1 DAY		*	2020 (13.9)
3 DAYS	Minimum >	1500 (10.0)	3600 (24.8)
7 DAYS	Minimum >	2500 (17.0)	4340 (29.9)
28 DAYS	Minimum >	*	5480 (37.8)
Time of Setting (Vicat)			
Initial ,minutes	Minimum >	45	140
Final ,minutes	Maximum >	375	250
False Set - Percent *	Minimum >	50	80
Air Content of Mortar - Percent	Maximum >	12	7.1
Autoclave Expansion - Percent	Maximum >	0.80	0.03
Mortar Bar Expansion (ASTM C -1038) Only for T-V - Percent	Maximum >	0.020	

*Optional (Sodium Oxide Equivalent) MIN. 0.53 MAX 0.59

Samples will be retained by 3 months.

**RIO GRANDE PORTLAND CEMENT IS WARRANTED TO CONFORM AT THE TIME OF SHIPMENT
WITH ASTM C -150 NO OTHER WARRANTY IS MADE OR IMPLIED. HAVING NO CONTROL OVER
THE USE OF IT'S CEMENTS , RIO GRANDE PORTLAND DOES NOT GUARANTEE FINISHED WORK.**

p.a.

SAMALAYUCA PLANT - TECHNICAL MANAGER



Lafarge Material Performance Center

1263 Lakeview Drive

Romeoville, IL 60446

1-630-243-4699

FLY ASH SOURCE: TOLK UNIT 1 CLASS C
COMPOSITE DATE: 11-Nov-17 to 22-Nov-17
SAMPLE IDENTIFICATION: TO1171111-1122

CHEMICAL ANALYSIS			SPECIFICATIONS	
			ASTM C 618 CLASS C	AASHTO M 295 CLASS C
SiO ₂ (silicon dioxide), %	=	35.48		
Al ₂ O ₃ (aluminum oxide), %	=	18.27		
Fe ₂ O ₃ (iron oxide), %	=	7.38		
SiO ₂ +Al ₂ O ₃ +Fe ₂ O ₃ , %	=	61.1	50 Min	50 Min
CaO (calcium oxide), %	=	25.88		
MgO (magnesium oxide), %	=	5.27		
SO ₃ (sulfur trioxide), %	=	1.43	5.0 Max	5.0 Max
Moisture content, %	=	0.07	3.0 Max	3.0 Max
Loss On Ignition, %	=	0.20	6.0 Max	5.0 Max
Na ₂ O (sodium oxide), %	=	1.79		
K ₂ O (potassium oxide), %	=	0.54		
Total Equivalent Na ₂ O, %	=	2.15		
PHYSICAL ANALYSIS				
Fineness, amount retained on #325 sieve, %	=	10.1	34 Max	34 Max
variation, points from average	=	0	5 Max	5 Max
Density, Mg/m ³	=	2.67		
variation from average, %	=	0	5 Max	5 Max
Strength Activity Index with Portland Cement at 7 days, % of cement control	=	97	75 Min	75 Min
Cement: LafargeHolcim Ste.Genevieve Type I/II				
Water Requirement % of cement control	=	94	105 Max	105 Max
Soundness, autoclave expansion or contraction, %	=	0.01	0.8 Max	0.8 Max

The test results for this composite sample comply with the applicable specifications of ASTM C 618 and AASHTO M 295. This fly ash source is approved for use by the following state agencies:

Brian Borowski
Quality Assurance Manager
Lafarge North America

2/1/2018
Report Date

Brian.Borowski@LafargeHolcim.com

ASTM C 618 Note 1 - Finely divided materials may tend to reduce the entrained air content of concrete. Hence, if a mineral admixture is added to any concrete for which entrainment of air is specified, provision should be made to ensure that the specified air content is maintained by air content tests and by use of additional air-entraining admixture or use of an air-entraining admixture in combination with air-entraining hydraulic cement.



PaveTex
12804 CR 2500
Lubbock, TX 79404
(806) 771-7283

Client: PB Materials

Report No.: 40769
Report Date: 10/29/2018

Report of: Concrete Aggregate

Project: Quality Control, PO #0016132
Contractor: PB Materials
Producer: PB Materials
Sample Location: Eunice Pit
Material Description: Concrete Coarse Aggregate
Out of Town Mileage: N/A

Lab. No.: 18-843
Sample Date: 10/19/2018
Sampled By: Client
Date Tested: 10/29/2018
Time Out: N/A
Time In: N/A
Tested By: Chris Cunningham

Sieve Size	% Passing	Specification		Meets	Test Method
		NMDOT - 1.0"	ASTM - No. 57		
1 1/2"	100	100	100	Yes	AASHTO T 27, ASTM C 136 & C 117
1"	99	95/100	95/100	Yes	AASHTO T 27, ASTM C 136 & C 117
1/2"	36	25/60	25/60	Yes	AASHTO T 27, ASTM C 136 & C 117
No. 4	4	0/10	0/10	Yes	AASHTO T 27, ASTM C 136 & C 117
No. 8	3	0/5	0/5	Yes	AASHTO T 27, ASTM C 136 & C 117
No. 200	1	0/2	-	Yes	AASHTO T 27, ASTM C 136 & C 117

Test	Results	Specification		Meets	Test Method
		NMDOT - 1.0"	ASTM - No. 57		
Magnesium Sulfate Soundness	18	N/A	18 Maximum	Yes	AASHTO T 104, ASTM C 33
L.A. Abrasion	28	N/A	50 Maximum	Yes	AASHTO T 96, ASTM C 40
Delet. - Soft Fragments	0	2.0 Maximum	N/A	Yes	AASHTO T 112
Delet. - Coal and Lignite	0	0.25 Maximum	0.5 Maximum	Yes	AASHTO T 112, ASTM C 142
Delet. - Clay Lumps	0	2.5 Maximum	N/A	Yes	AASHTO T 112
Delet. - Passing 200	0.8	2.0 Maximum	1 Maximum	Yes	AASHTO T 112, ASTM C 142
Delet. - Clay Lumps and Friable	0	N/A	5 Maximum	Yes	ASTM C 142
Delet. - Chert	0	N/A	5 Maximum	Yes	ASTM C 142
Delet. - Sum of Clay and Chert	0	N/A	7 Maximum	Yes	ASTM C 142
Fractured Faces - 1 Face	100	50 Minimum	N/A	Yes	AASHTO T 355
Flat and Elongated - 3:1	0	15 Maximum	N/A	Yes	ASTM D 4791
Unit Weight	83.67	N/A	N/A	N/A	AASHTO T, ASTM C 29
SSD Specific Gravity	2.425	N/A	N/A	N/A	AASHTO T 11, ASTM C 127
Apparent Specific Gravity	2.557	N/A	N/A	N/A	AASHTO T 11, ASTM C 127
Bulk Specific Gravity	2.341	N/A	N/A	N/A	AASHTO T 11, ASTM C 127
% Absorption	3.61	N/A	N/A	N/A	AASHTO T 11, ASTM C 127




10/29/2018

PaveTex Engineering LLC
Firm Registration No. F-961

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**PaveTex****12804 CR 2500****Lubbock, TX 79404****(806) 771-7283****Client:** PB Materials**Report No.:** 41378**Report Date:** 2/6/2019**Report of: Concrete Aggregate****Project:** Quality Control, PO #0018031**Contractor:** PB Materials**Producer:** PB Materials**Sample Location:** Grand Falls Pit**Material Description:** Concrete Fine Aggregate**Out of Town Mileage:** N/A**Lab. No.:** 19-45**Sample Date:** 1/24/2019**Sampled By:** Baltazar Mendoza**Date Tested:** 2/5/2019**Time Out:** N/A**Time In:** N/A**Tested By:** Chris Cunningham

Sieve Size	% Passing	Specification		Meets	Test Method
		TxDOT - Gr. 1	ASTM		
3/8"	100	100	100	Yes	ASTM C 136 & C 117, Tex-401-A
No. 4	100	95/100	95/100	Yes	ASTM C 136 & C 117, Tex-401-A
No. 8	84	80/100	80/100	Yes	ASTM C 136 & C 117, Tex-401-A
No. 16	68	50/85	50/85	Yes	ASTM C 136 & C 117, Tex-401-A
No. 30	49	25/65	25/60	Yes	ASTM C 136 & C 117, Tex-401-A
No. 50	23	10/35	5/30	Yes	ASTM C 136 & C 117, Tex-401-A
No. 100	6	0/10	0/10	Yes	ASTM C 136 & C 117, Tex-401-A
No. 200	3	0/3	-	Yes	ASTM C 136 & C 117, Tex-401-A

Test	Results	Specification		Meets	Test Method
		TxDOT - Gr. 1	ASTM		
Fineness Modulus	2.71	2.3 - 3.1	2.3 - 3.1	Yes	ASTM C 33, Tex-402-A
Organic Impurities	Lighter	Stand or Lighter	Stand or Lighter	Yes	ASTM C 40, Tex-408-A
Delet. - Clay Lumps and Friable	0.3	0.50 Maximum	3 Maximum	Yes	ASTM C 142, Tex-413-A
Deleterious - Chert	0	N/A	3 Maximum	Yes	ASTM C 142
Deleterious - Passing 200	3.0	N/A	3 Maximum	Yes	ASTM C 142
Delet. - Coal and Lignite	0	N/A	0.5 Maximum	Yes	ASTM C 142
Unit Weight	101.4	N/A	N/A	N/A	ASTM C 29, Tex-404-A
SSD Specific Gravity	2.608	N/A	N/A	N/A	ASTM C 127, Tex-403-A
Apparent Specific Gravity	2.659	N/A	N/A	N/A	ASTM C 127, Tex-403-A
Bulk Specific Gravity	2.577	N/A	N/A	N/A	ASTM C 127, Tex-403-A
% Absorption	1.19	N/A	N/A	N/A	ASTM C 127, Tex-403-A
Sand Equivalent	80	80 Minimum	N/A	Yes	ASTM D 2419, Tex-203-F



2/7/2019

PaveTex Engineering LLC
Firm Registration No. F-961

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Grace Concrete Products

DARACEM® 55

Mid-range water-reducing admixture

ASTM C494 Type A and F

Product Description

Daracem® 55 is a mid-range water reducer specifically formulated to produce concretes with dramatically enhanced finishing characteristics and normal setting times. Effective through a wide addition rate range, Daracem 55 combines the benefits of normal and high-range water reducers allowing for the ultimate control of the concretes placing and finishing properties.

Daracem 55 is an aqueous solution of complex organic compounds, each of which contributes uniquely to the concretes final properties. It contains both patented dispersing and patented finishability agents that provide performance superior to conventional water-reducing products. Daracem 55 is also formulated with a catalyst which promotes more complete hydration of Portland cement to assure superior strength performance. It is manufactured under rigid controls which provide uniform, predictable performance. Daracem 55 contains no calcium chloride. Daracem 55 is supplied as a dark brown, low viscosity liquid, weighs approximately 10.7 lbs/gal (1.28 kg/L).

Uses

Daracem 55 produces a concrete with lower water content, improved placement properties, and enhanced finishability. It yields a less permeable and more durable concrete.

Daracem 55 is used in ready-mix, job site, and concrete paving plants for normal and lightweight concrete, in block and precast. It imparts a “slickness” to the surface of the concrete making it most appropriate for concrete flatwork as well as slip form work. Daracem 55 is also particularly effective in lean or fly ash and slag compensated mixes.

Advantages

Daracem 55 offers significant advantages over conventional water reducers. Laboratory and field work has consistently demonstrated:

- **Ultimate workability and finishability**
The exceptional water-reducing capabilities allow for concrete production at higher slumps with better water retention and internal cohesiveness, providing a less “sticky” concrete with improved placement properties. Formulated with proven finishing enhancing components, Daracem 55 controls bleeding while bringing the mortar to the surface. Finishers have stated that the concrete has improved trowelability. The influence of Daracem 55 on the finishability of lean mixes has been particularly noticeable. Floating and troweling, by machine or by hand, easily imparts a smooth, close tolerance surface with less machine time and labor.

Product Advantages

- Ultimate workability and finishability
- Neutral setting times
- Superior strength performance



- **Neutral setting times**

Formulated with a set control agent, Daracem 55 provides normal setting characteristics throughout its addition rate range. This allows for increased water reduction and increased slump without significantly extended setting times. It also allows the flexibility to vary addition based on specific job and weather requirements.

- **Superior strength performance**

The water reduction properties, up to 12%, and dispersion characteristics allow the production of lower water to cement ratio concretes and more complete hydration. The combined effect is increased compressive and flexural strengths at all ages.

Addition Rates

The addition rate range of Daracem 55 is 3 to 15 fl oz/100 lbs (190 to 980 mL/100 kg) of cement. Typically excellent results are achieved between 5 to 7 fl oz/100 lbs (325 to 460 mL/100 kg) of cement. Optimum addition depends on the other concrete mixture components, job conditions, and desired performance characteristics.

Compatibility with Other Admixtures and Batch Sequencing

Daracem 55 is compatible with most Grace admixtures as long as they are added separately to the concrete mix. In general, it is recommended that Daracem 55 be added to the concrete mix near the beginning of the batch sequence but after the cement and water are combined for optimum performance. Different sequencing may be used if local testing shows better performance. Please see Grace Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. Daracem 55 should not come in contact with any other admixture before or during the batching process, even if diluted in mix water.

Pretesting of the concrete mix should be performed before use, and as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. For concrete that requires air entrainment, the use of an ASTM C260 air-entraining agent (such as Daravair® or Darex® product lines) is recommended to provide suitable air void parameters for freeze-thaw resistance.

Packaging & Handling

Daracem 55 is available in bulk, delivered in metered tank trucks, and 55 gal (210 L) drums. Daracem 55 contains no flammable ingredients. It will freeze at approximately 15°F (-9°C) but will return to full strength after thawing and thorough mechanical agitation.

Dispensing Equipment

A complete line of accurate, automatic dispensing equipment is available. Daracem 55 may be added to the concrete mix on the sand or in the batch water.

Specifications

Concrete shall be designed in accordance with *Standard Recommended Practice for Selecting Proportions for Concrete*, ACI 211.

The water-reducing admixture shall be a mid-range water-reducing admixture such as Daracem 55 as manufactured by Grace Construction Products, or its equivalent. The admixture shall not contain calcium chloride. It meets the requirements of *Specification for Chemical Admixtures for Concrete* ASTM Designation C494 as a Type A and Type F admixture. Certification of compliance shall be made available on request. The admixture shall be considered part of the total mixing water.

The admixture shall be delivered as a ready-to-use liquid product and shall require no mixing at the batching plant or job site.

www.graceconstruction.com

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Daracem, Daravair and Darex are registered trademarks of W. R. Grace & Co.—Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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FA/LVI/1M

GRACE

DARAVAIR® 1000

Air-entraining admixture

ASTM C260

Product Description

Daravair® 1000 is a liquid air-entraining admixture that provides freeze-thaw resistance, yield control, and finishability performance across the full range of concrete mix designs. Daravair 1000 is a clean, light-orange product designed to generate specification-quality air systems. Based on a high-grade saponified rosin formulation, Daravair 1000 is chemically similar to vinsol-based products, but with increased purity and supply dependability. Daravair 1000 weighs approximately 8.5 lbs/gal (1.02 kg/L). Daravair 1000 does not contain intentionally added chloride.

Uses

Daravair 1000 air-entraining admixture may be used wherever the purposeful entrainment of air is required by concrete specifications. Formulated to perform across the entire spectrum of production mixes, Daravair 1000 generates quality, freeze-thaw resistant air systems in concrete conditions that include the following:

- Low slump
- Paving
- Central mix
- Extruded slip form
- Mixes containing hot water and accelerators
- Precast

- High cement factor
- Fly ash and slag
- Superplasticizers
- Manufactured sands

Performance

Air is incorporated into the concrete by the mechanics of mixing and stabilized into millions of discrete semi-microscopic bubbles in the presence of a specifically designed air-entraining admixture such as Daravair 1000. These air bubbles act much like flexible ball bearings increasing the mobility, or plasticity and workability of the concrete. This can permit a reduction in mixing water with no loss of slump. Placeability is improved. Bleeding, plastic shrinkage and segregation are minimized.

Through the purposeful entrainment of air, Daravair 1000 markedly increases the durability of concrete to severe exposures particularly to freezing and thawing. It has also demonstrated a remarkable ability to impart resistance to the action of frost and de-icing salts as well as sulfate, sea and alkaline waters.

Product Advantages

- Rapid air build suitable for short mix cycles
- Can be used in wide spectrum of mix designs



Addition Rates

There is no standard addition rate for Daravair 1000. The amount to be used will depend upon the amount of air required for job conditions, usually in the range of 4 to 8%. Typical factors which might influence the amount of air-entraining admixture required are temperature, cement, sand gradation, and the use of extra fine materials such as fly ash and microsilica. Typical Daravair 1000 addition rates range from ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement. Pretesting of concrete should be performed to confirm dosage rates required to achieve desired concrete performance.

The air-entraining capacity of Daravair 1000 is usually increased when other concrete admixtures are contained in the concrete, particularly water-reducing admixtures and water-reducing retarders. This may allow up to ⅔ reduction in the amount of Daravair 1000 required.

Mix Adjustment

Entrained air will increase the volume of the concrete making it necessary to adjust the mix proportions to maintain the cement factor and yield. This may be accomplished by a reduction in water requirement and aggregate content.

Compatibility with Other Admixtures and Batch Sequencing

Daravair 1000 is compatible with most Grace admixtures as long as they are added separately to the concrete mix. In general, it is recommended that Daravair 1000 be added to the concrete mix near the beginning of the batch sequence for optimum performance, preferably by “dribbling” on the sand. Different sequencing may be used if local testing shows better performance. Please see Grace

Technical Bulletin TB-0110, *Admixture Dispenser Discharge Line Location and Sequencing for Concrete Batching Operations* for further recommendations. Daravair 1000 should not be added directly to heated water.

Pretesting of the concrete mix should be performed before use, and as conditions and materials change in order to assure compatibility, and to optimize dosage rates, addition times in the batch sequencing and concrete performance. Please consult your Grace representative for guidance.

Packaging & Handling

Daravair 1000 is available in bulk, delivered by metered tank trucks and in 55 gal (210 L) drums. **Daravair 1000 will freeze at about 30°F (-1°C) but its air-entraining properties are completely restored by thawing and thorough mechanical agitation.**

Dispensing Equipment

A complete line of accurate automatic dispensing equipment is available. These dispensers can be located to discharge into the water line, the mixer, or on the sand.

Specifications

Concrete shall be air entrained concrete, containing 4 to 8% entrained air. The air contents in the concrete shall be determined by the pressure method (ASTM Designation C231) or volumetric method (ASTM Designation C173). The air-entraining admixture shall be a completely neutralized rosin solution, such as Daravair 1000, as manufactured by Grace Construction Products, or equal, and comply with *Standard Specification for Air-Entraining Admixtures* (ASTM Designation C260). The air-entraining admixture shall be added at the concrete mixer or batching plant at approximately ½ to 3 fl oz/100 lbs (30 to 200 mL/100 kg) of cement, or in such quantities as to give the specified air contents.

www.graceconstruction.com

North American Customer Service: 1-877-4AD-MIX1 (1-877-423-6491)

Daravair is a registered trademark of W. R. Grace & Co.—Conn.

We hope the information here will be helpful. It is based on data and knowledge considered to be true and accurate and is offered for the users' consideration, investigation and verification, but we do not warrant the results to be obtained. Please read all statements, recommendations or suggestions in conjunction with our conditions of sale, which apply to all goods supplied by us. No statement, recommendation or suggestion is intended for any use which would infringe any patent or copyright. W. R. Grace & Co.—Conn., 62 Whittemore Avenue, Cambridge, MA 02140. In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.

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GRACE



Tel :

Date : 4/25/2019

Mix Code : 8G5020N45

Description : 5000 3/8" PEA GRAVEL W/ ASH

Revision Number : 2

Creation Date : 25 Apr 2019

Customer :

Plant : HOBBS

Created By : bburke

Project :

Specifications

Consistence Class : 4

Max W/C : 0.45

Max Agg Size :

Strength Class : 5000

Min Cement :

Air Class : 2 %

Grading Specification :

Material Type	Description	Supplier Source	Design Quantity	Specific Gravity	Volume ft3
Cement	CEMENT	GCC-PUEBLO	526 lb	3.15	2.68
Fly Ash	FLY ASH CLASS F	CHARAH-MIAMI FORT	132 lb	2.56	0.83
Coarse Aggregate	3/8" ROCK	PB MATERIALS-GRAND FALLS #322	1650 lb	2.64	10.02
Fine Aggregate	CONCRETE SAND	PB MATERIALS-DAMRON #239	1350 lb	2.64	8.20
Water	WATER GALLON	HOBBS-CITY WATER	35.5 gal	1.00	4.75
Admixture	MRWR/HRWR	GRACE-CAMBRIDGE, MA	40 lq oz	-	-
			Air Content	2.00 %	0.54
			Yield	3954lb	27.00

Design Properties

W/C Eq : 0.45

Density : 146.5 lb/ft3

Actual Dmax : 0 mm

Cement Eq : 658

Chloride/Cem : 0.00 %

Prepared By :

Tel :



Date : 4/24/2019

Mix Code : 8G5000N43

Description : 5000 PSI 3/8 PG

Revision Number : 6

Creation Date : 24 Apr 2019

Customer :

Plant : ODESSA

Created By : bburke

Project :

Specifications

Consistence Class : 4

Max W/C : 0.43

Max Agg Size :

Strength Class : 5000

Min Cement :

Air Class : 3 %

Grading Specification :

Material Type	Description	Supplier Source	Design Quantity	Specific Gravity	Volume ft3
Cement	CEMENT	GCC-SAMALAYUCA	625 lb	3.15	3.18
Coarse Aggregate	3/8" ROCK	PB MATERIALS-GRAND FALLS #322	1461 lb	2.64	8.87
Fine Aggregate	CONCRETE SAND	PB MATERIALS-GRAND FALLS #322	1612 lb	2.64	9.79
Water	WATER	PB MATERIALS-WELL WATER	269 lb	1.00	4.31
Admixture	MRWR/HRWR	GRACE-CAMBRIDGE, MA	44 lq oz	-	-
			Air Content	3.00 %	0.81
			Yield	3967lb	26.96

Design Properties

W/C Eq : 0.43

Density : 147.2 lb/ft3

Actual Dmax : 0 mm

Cement Eq : 625

Chloride/Cem : 0.00 %

Prepared By :

**PaveTex****12804 CR 2500****Lubbock, TX 79404****(806) 771-7283****Client:** PB Materials**Report No.:** 41586**Report Date:** 3/13/2019**Report of: Concrete Aggregate****Project:** Quality Control, PO #001915**Contractor:** PB Materials**Producer:** PB Materials**Sample Location:** Grand Falls Pit**Material Description:** Grade 8 Aggregate**Out of Town Mileage:** N/A**Lab. No.:** 19-101**Sample Date:** 2/20/2019**Sampled By:** Baltazar Mendoza**Date Tested:** 3/1/2019**Time Out:** N/A**Time In:** N/A**Tested By:** Chris Cunningham

Sieve Size	% Passing	Specification		Meets	Test Method
		TxDOT - Gr. 7	ASTM - No. 8		
1/2"	100	100	100	Yes	ASTM C 136 & C 117, Tex-401-A
3/8"	95	70/95	85/100	Yes	ASTM C 136 & C 117, Tex-401-A
No. 4	14	0/25	10/30	Yes	ASTM C 136 & C 117, Tex-401-A
No. 8	2	-	0/10	Yes	ASTM C 136 & C 117, Tex-401-A
No. 16	1	-	0/5	Yes	ASTM C 136 & C 117, Tex-401-A

Test	Results	Specification		Meets	Test Method
		TxDOT - Gr. 7	ASTM - No. 8		
Magnesium Sulfate Soundness	3	18 Maximum	18 Maximum	Yes	ASTM C 88, Tex-411-A
L.A. Abrasion	17	40 Maximum	50 Maximum	Yes	ASTM C 131, Tex-410-A
Delet. - Clay Lumps and Friable	0	N/A	5 Maximum	Yes	ASTM C 142
Delet. - Chert	0	N/A	5 Maximum	Yes	ASTM C 142
Delet. - Sum of Clay and Chert	0	N/A	7 Maximum	Yes	ASTM C 142
Delet. - Passing 200	0.4	N/A	1 Maximum	Yes	ASTM C 142
Delet. - Coal and Lignite	0	N/A	0.5 Maximum	Yes	ASTM C 142
Delet. - Clay Lumps	0	0.25 Maximum	N/A	Yes	Tex-413-A
Delet. - Shale	0	1.0 Maximum	N/A	Yes	Tex-413-A
Delet. - Lam. and Friable	0	5.0 Maximum	N/A	Yes	Tex-413-A
Decantation	0.4	1.5 Maximum	N/A	Yes	Tex-406-A
Unit Weight	103.1	N/A	N/A	N/A	ASTM C 29, Tex-404-A
SSD Specific Gravity	2.610	N/A	N/A	N/A	ASTM C 127, Tex-403-A
Apparent Specific Gravity	2.655	N/A	N/A	N/A	ASTM C 127, Tex-403-A
Bulk Specific Gravity	2.583	N/A	N/A	N/A	ASTM C 127, Tex-403-A
% Absorption	1.0	N/A	N/A	N/A	ASTM C 127, Tex-403-A



3/14/2019

PaveTex Engineering LLC
Firm Registration No. F-961

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Project: Grandfalls Grade 8

Sample ID: 322-226-19

Sample Date: 4/15/2019

Report Date: 4/17/2019

MATERIAL PROPERTIES OF CONCRETE AGGREGATES

Test Procedure: ASTM C-117, ASTM C-136

Material Description: Coarse Aggregate: Grade 8, 3/8" nominal

Location of Sample: Plant 322 Production Sample. Grandfalls Tx.

SIEVE ANALYSIS

<u>Sieve Size</u>	<u>Percent Passing</u>	ASTM C 33 Grade 8 <u>Specification</u>
1/2"	100	100
3/8"	99.9	85-100
No. 4	21.5	10-30
No. 8	4.9	0-10
No. 16	---	0-5
No. 200 (decant)	0.9	0-1.0


Rick Swaney
Quality Control Supervisor

SPECHARD

Water-Based Siliconate Sealer / Densifier



DESCRIPTION

SPECHARD is a proprietary, colorless chemical solution that increases the wear surface strength of concrete floors subjected to pedestrian and vehicle traffic. SPECHARD penetrates concrete surfaces to seal, densify and harden. SPECHARD floors last longer, cost less to maintain, are safe to use, and are guaranteed to resist dusting for years after application. It is V.O.C. compliant, odorless, environmentally safe and simple to apply. SPECHARD penetrates the concrete surface and undergoes a chemical reaction that turns the concrete substrate into a hardened, densified mass. Surfaces treated with SPECHARD are not only more abrasion resistant, but are more resistant to chemicals and water than untreated concrete. The deeply penetrating chemical action leaves no film and will not alter the natural non-slip texture of the concrete floor.

FEATURES/BENEFITS

- Reduces porosity and increases hardness of the concrete surface.
- V.O.C. compliant and Non-Yellowing
- Resists staining and penetration of oil and many chemicals
- Minimizes tire marks and makes them easier to remove
- Equipment can be cleaned with water
- Can be applied to fresh, new, or existing concrete
- Low sheen enhances the appearance of concrete surface
- Compatible with SpecChem Spec Tilt bond breakers for tilt-up projects
- Cures, seals, hardens, dustproofs and prevents efflorescence
- Promotes bonding of secondary toppings
- Controls hairline crack
- One application, economical
- Clean equipment with water

SPECIFICATIONS/COMPLIANCES

- Recommended for ACI 302. Class 1 through 4 concrete floors, and class 9 super flat floor
- USDA accepted
- Typical Properties

Active Ingredients:	100%
Type:	Proprietary blend
Flash Point:	None
Odor:	None
Color:	Clear
Dry Time:	2-4 hours
VOC:	0.0

APPLICATION

Sealer/Densifier Application:

Coverage:

Hard Troweled Finish	200-350 ft ² /gal
Broom or Float Finish	150-250 ft ² /gal
Rough Slab Finish	150-200 ft ² /gal
Old Concrete	150-250 ft ² /gal

The exact coverage depends upon the porosity and roughness of the slab. If the concrete is extremely porous or rough, more than one coat may be necessary. Application temperature

above 40° & rising is recommended.

Application to Existing Concrete:

Surface preparation: Surface must be clean and sound. Remove all dirt, grease, curing compounds or other foreign matter with SpecChem Citrus Cleaner. Completely rinse any residue away and allow to dry. Surface must be completely dry to allow for penetration of SPECHARD.

Application: Spray, squeegee or broom apply based on concrete porosity. For best results, SPECHARD should be applied and scrubbed using mechanical scrubbers. Immediately follow application by light brooming to assure penetration and to avoid ponding. Keep surface saturated with SPECHARD for 20-30 minutes.

As the surface absorbs the SPECHARD, apply a light water spray to enhance penetration and to keep the SPECHARD in solution from drying on the surface. **Squeegee away excess and allow to dry.**

Caution: Should white crystals develop, it is a sign that the slab will not absorb any more SPECHARD and that the surface has started to dry. Immediately flush with water, brush with a stiff bristle broom and squeegee any surface water away. Allow to dry.

SPECHARD will develop a low gloss satin finish with use. If desired, a floor buffer can bring out the shine immediately on a well finished, hard troweled floor.

Repeat procedure to porous areas to ensure a uniform finish.

Application to Fresh Concrete:

Curing Application: After the final troweling and bleeding, saturate the concrete surface with a base coat of SPECHARD at approximately 200 ft² per gallon. Optimum penetration can be achieved by applying SPECHARD 1-2 hours after final finishing (usually immediately after control joints have been cut). Broom or mop the SPECHARD into the slab, reapplying SPECHARD to areas that absorb the sealer.

Keep the slab saturated with SPECHARD for 30-45 minutes, working it into the concrete by brooming. Apply a light water spray to the treated area to finalize penetration and dissolve any remaining SPECHARD. After the saturation period, thoroughly rinse and then squeegee or brush off excess SPECHARD until dry.

Although not compliant with ASTM C-309-91 as a membrane forming curing compound, SPECHARD can be used as a curing compound and sealer by following the aforementioned procedures.

When curing conditions are severe (wind, sun, etc.), the use of SPECHARD and an ASTM C-309-91 curing compound in conjunction with the SPECHARD will provide concrete flatwork with greater durability and abrasion resistance. Contact SpecChem for specific application procedures.

PACKAGING

55 gallon drums (208.2 L)
5 gallon pails (18.9 L)



1511 Baltimore Ave, Suite 600
Kansas City, MO 64108

www.specchemllc.com

866.791.8700

LIMITATIONS/PRECAUTIONS

When SPECHARD is to be applied to fresh concrete, pozzolanic (fly ash, blast furnace slag) usage in concrete mix designs should be kept to a minimum (i.e. 5-10% by weight of Portland Cement) to optimize the sealing and hardening effects of SPECHARD.

SPECHARD can be applied to concrete mix designs containing over 10% as long as the concrete has cured for 28 days.

Protect metal, glass, brick and painted surfaces from SPECHARD. If accidentally mis-applied, wash with clean water at once.

Do not use over colored or pigmented concrete or as a cure on slabs intended for use as a tilt up casting bed without consulting SpecChem technical services. If freezing occurs, contact SpecChem.

Keep out of the reach of children. Do not take internally. Avoid prolonged contact with skin. If swallowed, call a physician. If splashed in eyes, wash repeatedly with clean water and call a physician. Wear rubber gloves, goggles, and protective clothing. Avoid hazards by following all precautions found in the Material Safety Data Sheet (MSDS), product labels, and technical literature. Please read this information prior to using the product.

Application temperature above 40° & rising is recommended.

DO NOT EXPOSE TO OR APPLY NEAR FIRE OR FLAMES. FOR WELL VENTILATED OR EXTERIOR USE ONLY!

STORAGE/SHELF LIFE

SPECHARD containers are to be stored in a clean, dry area between 40°F and 100°F (5°C - 40°C). Shelf life of SPECHARD in unopened containers is 2 years if properly stored. Do Not Freeze.

TECHNICAL SERVICES

For assistance, contact technical services at:

866-791-8700

913-371-870

www.specchemllc.com

WARRANTY

NOTICE-READ CAREFULLY

CONDITIONS OF SALE

SpecChem offers this product for sale subject to and limited by the warranty which may only be varied by written agreement of a duly authorized corporate officer of SpecChem. No other representative of or for SpecChem is authorized to grant any warranty or to waive limitation of liability set forth below.

WARRANTY LIMITATION

SpecChem warrants this product to be free of manufacturing defects. If the product when purchased was defective and was within use period indicated on container or carton, when used, SpecChem will replace the defective product with new product without charge to the purchaser. SpecChem makes no other warranty, either expressed or implied, concerning this product. There is no warranty of merchantability. NO CLAIM OF ANY KIND SHALL BE GREATER THAN THE PURCHASE PRICE OF THE PRODUCT IN RESPECT OF WHICH DAMAGES ARE CLAIMED.

INHERENT RISK

Purchaser assumes all risk associated with the use or application of the product.



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Kansas City, MO 64108

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Appendix J2

Concrete Receiving Forms

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area C, Slab

Observed by: M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
07/11/19	368	27687	10	255								
07/11/19	362	27695	20	305	314							
07/11/19	352	27705	30	323	328	331	335	12		7.0		
07/11/19	3104	27713	40	335	340	343	353	18	90	5.25	0	
07/11/19	350	27721	50	342	347	356	423	41				Batch removed
07/11/19	368	27728	60	350	355	358	425	35				Batch removed
07/11/19	362	27736	70	358	403	429	440	42	90	3.0	6	1902054 (1)
07/11/19	3104	27744	80	400	405	432	445	45				
07/11/19	352	27753	90	413	418	447	500	47				
07/11/19	368	27801	100	458	503	505	515	17				
07/11/19	362	27805	110	505	510	513	523	18				
07/11/19	350	27814	120	519	524	528	533	14				
07/11/19		27876 27835	110	530	535	537	555	25		5.0	6	1902054 (2)
07/11/19	3104	27852	140	548	553	553	600	12				
07/11/19	368	27856	150	555	600	604	610	15				
07/11/19	362	27870	160	602	607	610	619	17				
07/11/19	350	27876	170	613	618	621	628	15				
07/11/19	352	27898	180	624	629	632	640	16				
07/11/19	3104	27908	190	637	642	645	652	15	80	7.25	0	
07/11/19	368	27932	200	645	650	655	701	16				
07/11/19	362	27949	220	655	700	701	710	15				
07/11/19	350	27958	230	704	709	712	720	16				
07/11/19	352	27967	210	710	715	716	726	16				

CONCRETE RECEIVING FORMMix ID: 5,000 psiProject Name: Sundance West, Eunice, NMWork Area: Area C, SlabObserved by: M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
07/11/19	3104	27986	250	720	725	726	734	14				
07/11/19	368	28007	260	728	733	736	745	17				
07/11/19	329	27945	210	738	743	746	758	20				
07/11/19	362	28020	270	738	743	746	800	22				
07/11/19	350	28041	280	747	752	802	808	21				
07/11/19	352	28057	270	758	803	806	814	16	86	8.0	6	1902054 (3)
07/11/19	3104	28070	300	808	813	816	823	15				
07/11/19	368	28087	310	824	829	830	838	14				
07/11/19	3104	28180	319	909	914	916	928	19				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area B West, Slab

Observed by: T. Hopkins

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
07/24/19	362	37411	10	130	135	147	201	31		5.5		
07/24/19	PBM3	37414	20	132	137	202	210	38		5.0		
07/24/19	352	37421	30	150	155	211	215	65		4.5/6.5		Retested slump
07/24/19	333	37424	40	201	206	216	225	24		4.5/6.5		Retested slump
07/24/19	635	37430	50	212	217	227	236	24	83	6.0	5	
07/24/19	633	37434	60	219	224	226	232	13				
07/24/19	562	37437	70	223	228	237	241	18				
07/24/19	561	37414	80	234	239	242	248	14				
07/24/19	362	37444	90	244	249	251	256	12				
07/24/19	PBM3	37449	100	250	255	301	306	16	80	5.25	0	
07/24/19	352	37452	110	298	303	307	313	15				
07/24/19	333	37453	120	306	311	313	319	13				
07/24/19	633	37458	130	313	318	321	326	13				
07/24/19	635	37468	140	323	328	330	338	15				
07/24/19	562	37475	150	329	334	338	349	20	84	8.5/6.75	5	Retested slump
07/24/19	561	37478	160	334	339	342	351	17				
07/24/19	362	37487	170	340	345	352	358	18				
07/24/19	PBM3	37494	180	346	351	358	403	17				
07/24/19	352	37500	190	353	358	403	409	16				
07/24/19	333	37506	200	401	406	420	427	26		7.0		
07/24/19	633	37502	210	405	410	411	420	15				
07/24/19	635	37511	220	415	420	428	439	24				
07/24/19	562	37513	230	417	422	432	441	24				
07/24/19	561	37519	240	425	430	442	448	23	85	5.5	5	

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area B West, Slab

Observed by: T. Hopkins

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
07/24/19	362	37524	250	432	437	448	453	21				
07/24/19	PBM3	37539	260	440	445	453	458	18				
07/24/19	352	37541	270	450	455	555	610	80				Work stop; pumper down
07/24/19	633	37548	280	456	501	615	637	101				
07/24/19	333	37557	290	505	510	610	615	70				
07/24/19	635	37565	300	511	516	637	647	96		6.5	0	
07/24/19	562	37623	310	602	607	648	659	57				
07/24/19	362	37632	320	613	618	656	703	50				
07/24/19	561	37657	330	629	634	703	711	42				
07/24/19	PBM3	37683	340	637	642	706	722	45				
07/24/19	352	37700	350	649	654	722	729	40	83	6.25	5	
07/24/19	333	37747	360	712	717	722	735	23				On second pumper
07/24/19	633	37759	370	715	720	735	740	25				
07/24/19	635	37778	380	724	729	739	748	24				
07/24/19	562	37789	390	734	739	748	756	22				
07/24/19	362	37799	400	742	747	750	812	30		6.0		
07/24/19	561	37814	410	750	755	811	821	31				
07/24/19	PBM3	37826	420	759	804	819	828	29				
07/24/19	352	37747	430	810	815	828	833	23				
07/24/19	333	37858	440	822	827	830	845	23				
07/24/19	633	37877	450	824	829	844	849	25	83	5.0	5	
07/24/19	435	37890	460	835	840	849	854	19				
07/24/19	562	37906	470	842	847	854	908	26				
07/24/19	362	37911	480	847	852	908	913	26				
07/24/19	561	37930	490	858	903	913	920	22				
07/24/19	PBM3	37942	500	905	910	920	924	19		5.5		

CONCRETE RECEIVING FORMMix ID: 5,000 psiProject Name: Sundance West, Eunice, NMWork Area: Area B West, SlabObserved by: T. Hopkins

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
07/24/19	352	37956	510	919	924	927	935	16				
07/24/19	333	37971	520	930	935	936	942	12				
07/24/19	635	37993	530	936	941	942	949	13				
07/24/19	633	38015	540	946	951	952	1005	59				
07/24/19	562	38044	550	998	1003	1028	1037	39	81	4.5/5.5	5	Added water and retested slump
07/24/19	362	38057	560	1004	1009	1029	1043	39				
07/24/19	561	38073	570	1016	1021	1044	1058	42				
07/24/19	PBM3	38093	580	1022	1027	1045	1058	36				
07/24/19	352	38117	590	1040	1045	1055	1105	25				
07/24/19	333	38130	600	1054	1059	1105	1122	28		5.0		
07/24/19	635	38152	610	1100	1105	1122	1130	30				
07/24/19	633	38214	620	1138	1143	1145	1155	17				
07/24/19	368	38186	630	1197	1202	1205	1220	23				
07/24/19	362	38217	640	1217	1222	1225	1234	17				
07/24/19	PBM3	38228	650	1228	1233	1237	1248	20				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: 19% Slope, Slab

Observed by: M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
08/02/19	362	46680	10	200	217	232	243	43	81	6.0	0	
08/02/19	329	46683	20	220	225	236	250	30	81	6.5	0	
08/02/19	LM63	46685	30	232	236	245	256	24	82	5.5	0	
08/02/19	561	46688	40	242	244	256	303	21	83	6.75	0	
08/02/19	398	46692	50		250				83	7.25	5	
08/02/19	354	76698	60	255	300	305	317	22				
08/02/19	362	46702	70	300	305	308	323	23				
08/02/19	329	46705	80	319	324	325	335	16				
08/02/19	LM63	46711	90	324	328	330	341	17				
08/02/19	561	46720	100	332	338	347	355	23	82	3.25	0	MHAT decided to reduce slump
08/02/19	398	46722	110	339	352	353	428	49				
08/02/19	354	46724	120	348	400	404	433	45				
08/02/19	362	46741	130	356	406	429						
08/02/19	329	46747	140	403	417	434	502	59				
08/02/19	LM63	46756	150	413 440	428 445	518			84 85	7.0 4.25	5	Initial delivery too wet; returned to plant to dry out mix
08/02/19	561	no ticket			433							Rejected
08/02/19	398	46795	170	441	458	504						
08/02/19	354	46805	180	502	508	520						
08/02/19	LM56	46817	190	518	519	544						
08/02/19	362	46829	190	517	529	555	620	63				2nd ticket for 190 yd3
08/02/19	329	46836	200	536	540	619	627		85	4.25		
08/02/19	LM63	46843	210	546	552	621	633	47				
08/02/19	398	46872	220	614	623	628					5	

CONCRETE RECEIVING FORMMix ID: 5,000 psiProject Name: Sundance West, Eunice, NMWork Area: 19% Slope, SlabObserved by: M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
08/02/19	354	46942	230	645	710	717			83	3.0		

CONCRETE RECEIVING FORM

Mix ID: 3,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area Wall Pour

Observed by: O. Ruiz

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
08/09/19	5534	52950	10	1136	1220	1237	1305	89	89	7.0		
08/09/19	5523	52991	20	1227	1255	1308	1317	50	91	6.0		
08/09/19	5531	53065	30	1253	1316	1338	1400	67		4.5		
08/09/19	5534	53106	40	1326	1342	1342	1426	60				Truck backed up to pumper on arrival
08/09/19	368	53137	50	1345	1402	1405	1436	51				
08/09/19	5523	53156	60	1401	1420	1443	1505	64	83	6.5		
08/09/19	357	53191	70	1433	1455	1459	1525	52				
08/09/19	371	53231	78	1521	1543	1600	1630	69	85	6.25		
08/09/19	371	53281	86	1632	1657	1659	1715	43				

CONCRETE RECEIVING FORMMix ID: 3,000 psiProject Name: Sundance West, Eunice, NMWork Area: Counter Forks, South WallObserved by: M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
08/14/19	371		10	455	500	615	705	130	86	3.8	5	Added water to truck & spin
08/14/19	387		20	531	536	710	750	139				

CONCRETE RECEIVING FORMMix ID: 5,000 psiProject Name: Sundance West, Eunice, NMWork Area: Flume & Second Lift Area C WallsObserved by: B. Casadevall

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
08/28/19	355	64212	10	640	644	654	740	60	84	4.5		Added 10 gal water
08/28/19	368	64225	20	641	647	700	750	69	84	5.3		Added 10 gal water
08/28/19	635	64248	30	654	700	745	755	59	86	5.0	5	Added 10 gal water
08/28/19	562	64280	40	715	719	723	805	50				
08/28/19	633	64297	50	715	720	755	810	55				
08/28/19	355	64342	60	805	810	813	824	19				
08/28/19	635	64349	70	819	823	825	832	13				
08/28/19	368	64361	80	830	834	852	856	26	86	7.25 6.5	5	Mix is lumpy; spin to mix and retest
08/28/19	355	64390	90	902	906	908	913	11				
08/28/19	633	64402	100	911	916	920	941	30				
08/28/19	562	64415	110	924	928	930	943	19				
08/28/19	352	64423	120	937	942	947	1000	23	85	6.0		
08/28/19	368	64428	130	945	950	951	1008	23				
08/28/19	355	64439	140	954	959	1007	1025	31				
08/28/19	633	64470	150	1008	1012	1020	1120	72				
08/28/19	562	64484	160	1047	1051	1100	1133	46				
08/28/19	352	64540	170	1115	1120	1130	1150	35				
08/28/19	355	64605	180	1219	1223	1230	1240	21				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, South Third

Observed by: M. Zbrozek & O. Ruiz

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch (estimated)	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
9/9/2019	3104	71120	10	2054	2059	2106	2109	15	80	6.0		Pump Rig 1
9/9/2019	395		2	2104	2109	2110	2123	19				Pump Rig 1
9/9/2019	5			2104	2109	2110	2119	15				Pump Rig 2
9/9/2019	329		3	2110	2115	2115	2124	14				Pump Rig 1
9/9/2019	366	71126	60	2120	2125	2238	2252	92	82	1.5/5	5	Pump Rig 1; added 30 gallons, spin & retest
9/9/2019	352	71125	50	2130	2135	2140	2145	15				Pump Rig 2
9/9/2019	394	71128		2136	2143	2145	2150	14				Pump Rig 2
9/9/2019	3103			2136	2151	2157	2201	25				Pump Rig 2
9/9/2019	368	71129		2142	2145	2149	2201	19				Pump Rig 2
9/9/2019	395	71135	150	2151	2205	2208	2219	28	87	6.5		Pump Rig 2
9/9/2019	3104	71136		2159	2212	2216	2237	38				Pump Rig 2
9/9/2019	352	71139		2220	2223	2230	2255	35				Pump Rig 2
9/9/2019	33		5	2233	2238	2238	2252	19				Pump Rig 1
9/9/2019	329	71140		2234	2242	2243	2300	26				Pump Rig 2
9/9/2019	366	71143		2236	2250	2255	2305	29				Pump Rig 2
9/9/2019	372	71146	260	2245	2400	006	030	125				Pump Rig 2; add 25 gallons of water & spin
9/9/2019	354		6	2248	2253	2254	2302	14		1.0		Pump Rig 1; added 30 gallons water & spin
9/9/2019	5		7	2253	2258	2259	2308	15				Pump Rig 1; added 10 gal water
9/9/2019	398		8	2258	2303	2304	2311	13				?: Pump Rig 1
9/9/2019	394	71145	250	2300	2308	2314	2324	24	85 85	1.0 8.0		Pump Rig 2; add 40 gallons water, spin & retest
9/9/2019	398	71149	290	2300	2311	2315	2331	31				Pump Rig 2
9/9/2019	350		9	2306	2311	2312	2321	15				?: Pump Rig 1

9/9/2019	381	71151	310	2306	2322	2331						Pump Rig 2
9/9/2019	5528	71153	330	2316	2320	2324						Pump Rig 2
9/9/2019	LM62		10	2316	2321	2322	2330	14				?, Pump Rig 1
9/9/2019	LM63	71154	340	2323	2335	2338	2350	27				Pump Rig 2
9/9/2019	LM65		11	2324	2329	2330	2342	18				Pump Rig 1
9/9/2019	368	71157	370	2330	2347	2350	2400	30				Pump Rig 2
9/9/2019	910		12	2334	2339	2344	2352	18				Pump Rig 1
9/9/2019	33		13	2341	2346	2350	2400	19				Pump Rig 1
9/9/2019	395	71159	390	2342	2357	005	017	25				Pump Rig 2
9/9/2019	5536		14	2343	2348	2355	2400	17				Pump Rig 1
9/9/2019	5540		15	2354	2359	2359	2409	15				Pump Rig 1
9/10/2019	3104	71165	430	001	020	025						Pump Rig 2
9/10/2019	354		16	005	010	011	023	18				Pump Rig 1
9/10/2019	5531		17	008	013	013	027	19				Pump Rig 1
9/10/2019	910	71167	450	009	026	032	047	38	88	7.5		Pump Rig 2
9/10/2019	LM62		18	023	028	030	042	19				Pump Rig 1
9/10/2019	350/373		19	023	028	030	044	21				Pump Rig 1
9/10/2019	350	71172	500	032	052	053	100	28				Pump Rig 2
9/10/2019	355		20	037	042	050	100	23	92	6.5		Pump Rig 1
9/10/2019	33		21	040	045	045	055	15				Pump Rig 1
9/10/2019	333	71176	520	040	050	050	051	11				Pump Rig 2
9/10/2019	329		22	047	052	056	106	19				Pump Rig 1
9/10/2019	3103	71177	530	047	055	102	106	19				Pump Rig 2
9/10/2019	368	71180	550	051	102	105	124	33	85	6.5		Pump Rig 2
9/10/2019	395	71184	580	057	114	119	128	31				Pump Rig 2
9/10/2019	302		23	059	104	104	118	19				Pump Rig 1
9/10/2019	366		24	102	107	109	125	23				Pump Rig 1
9/10/2019	910	71188	610	112	128	131	140	28				Pump Rig 2
9/10/2019	354		25	113	118	119	128	15				Pump Rig 1
9/10/2019	398		26	118	123	126	131	13				Pump Rig 1
9/10/2019	394			125	130	131	140	15				Pump Rig 1
9/10/2019	352			129	134	135	147	18				Pump Rig 1
9/10/2019	LM62			130	135	137	149	19				Pump Rig 1

9/10/2019	381	71194	660	131	148	217	246	75				Pump Rig 2; add water & spin
9/10/2019	352	71191	640	133	138	141						Pump Rig 2
9/10/2019	LM62	71193	650	133	144	146	157	24				Pump Rig 2
9/10/2019	373	71197	680	137	157	205	213	36				Pump Rig 2
9/10/2019	372			138	143	144	156	18				Pump Rig 1
9/10/2019	350	71199	690	148	159	205	217	29				Pump Rig 2
9/10/2019	372	71200	700	153	208	224	246	53	90	6.5	5	Pump Rig 2
9/10/2019	333			199	204	205	213	14				Pump Rig 1
9/10/2019	373			200	205	206	214	14				Pump Rig 1
9/10/2019	329			206	211	212	220	14				Pump Rig 1
9/10/2019	366			208	213	215	223	15				Pump Rig 1
9/10/2019	368	71206	740	208	237	248	258	50				Pump Rig 2
9/10/2019	3014			217	222	223	229	12				Pump Rig 1
9/10/2019	398			219	224	228	236	17				Pump Rig 1
9/10/2019	910	71213	790	228	241	250	300	32				Pump Rig 2
9/10/2019	302			231	236	238	302	31				Pump Rig 1
9/10/2019	394			235	240	241	308	33				Pump Rig 1
9/10/2019	354			245	250	305	315	30				Pump Rig 1
9/10/2019	352	71219	830	245	301	305	314	29				Pump Rig 2
9/10/2019	3103	71222	850	253	304	307	323	30				Pump Rig 2
9/10/2019	381	71225	870	302	316	318	336	34				Pump Rig 2
9/10/2019	LM63		710	305	310	312	319	14				Pump Rig 1
9/10/2019	3103		730	310	315	316	324	14				Pump Rig 1
9/10/2019	372	71231	890	311	328	332	343	32				Pump Rig 2
9/10/2019	33		720	315	320	321	332	17				Pump Rig 1
9/10/2019	329		750	321	326	327	339	18				Pump Rig 1
9/10/2019	366		760	327	332	332	340	13				Pump Rig 1
9/10/2019	395		770	328	333	340	347	19				Pump Rig 1
9/10/2019	395	71244	930	329	342	344	355	26				Pump Rig 2
9/10/2019	329	71247	940	333	350	351	401	28				Pump Rig 2
9/10/2019	398		780	335	340	348	356	21				Pump Rig 1
9/10/2019	368	71249	950	336	351	356	407	31				Pump Rig 2
9/10/2019	635/394		800	343	348	353	400	17				Pump Rig 1

9/10/2019	366	71251	960	344	406	408	416	32				Pump Rig 2
9/10/2019	910	71255	970	345	417	419	432	47				Pump Rig 2
9/10/2019	302		820	353	358	401	415	22				Pump Rig 1
9/10/2019	3104		810	354	359	359	411	17				Pump Rig 1
9/10/2019	LM63	71262	990	400	411	412	422	22				Pump Rig 2
9/10/2019	394		840	401	406	411	425	24				Pump Rig 1
9/10/2019	354		860	408	413	415	430	22				Pump Rig 1
9/10/2019	3104	71265	1010	414	425	427	438	24				Pump Rig 2
9/10/2019	LM62		880	416	421	422	437	21				Pump Rig 1
9/10/2019	352	71272	1040	421	434	436	450	29				Pump Rig 2
9/10/2019	350	71235	900	429	434	438	459	30	90	7.0		Pump Rig 1
9/10/2019	373		910	430	435	436	450	20				Pump Rig 1
9/10/2019	3103	71274	1050	431	438	440	450	19				Pump Rig 2
9/10/2019	333		920	435	440	453	512	37				Pump Rig 1
9/10/2019	350	71282	1080	444	457	500	512	28				Pump Rig 2
9/10/2019	398		980	454	459	505	519	25				Pump Rig 1
9/10/2019	366	71290	1110	500	515	517	534	34				Pump Rig 2
9/10/2019	LM62	71294	1120	510	520	522	530	20				Pump Rig 2
9/10/2019	368	71298	1140	516	528	534	550	34				Pump Rig 2
9/10/2019	354		1000	520	525	527	537	17				Pump Rig 1
9/10/2019	LM62		1020	522	527	528	544	22				Pump Rig 1
9/10/2019	910	71305	1160	523	540	545	552	29				Pump Rig 2
9/10/2019	398	71307	1170	525	543	545	552	27				Pump Rig 2
9/10/2019	372	71366	1240	527	614	620	631	64				Pump Rig 2
9/10/2019	3104	71312	1180	531	548	555	612	41				Pump Rig 2
9/10/2019	302		1030	535	540	540	554	19				Pump Rig 1
9/10/2019	352	71319	1200	538	555	600	625	47				Pump Rig 2
9/10/2019	394		1060	545	550	551	604	19				Pump Rig 1
9/10/2019	3103	71329	1220	546	604	614	620	34				Pump Rig 2
9/10/2019	372			553	558	559	616	23				Pump Rig 1
9/10/2019	329		1090	603	608	610	621	18				Pump Rig 1
9/10/2019	329	71344	1260	607	620	620	638	31				Pump Rig 2
9/10/2019	373	71284	1100	608	613	620	633	25	81	7.0		Pump Rig 1

9/10/2019	373	71348	1270	609	628	631	647	38				Pump Rig 2
9/10/2019	395		1130	616	621	622	635	19				Pump Rig 1
9/10/2019	LM62	71358	1300	620	635	647	657	37	87	6.5	5	Pump Rig 2
9/10/2019	910	71362	1310	625	641	643	654	29				Pump Rig 2
9/10/2019	333		1150	630	635	636	640	10				Pump Rig 1
9/10/2019	368	71378	1330	634	645	655	735	61				Pump Rig 2
9/10/2019	398	71387	1340	640	657	701	735	55				Pump Rig 2
9/10/2019	LM63		1190	650	655	659	710	20				Pump Rig 1
9/10/2019	352	71401	1380	653	709	735	744	51				Pump Rig 2
9/10/2019	354		1210	654	659	701	729	35				Pump Rig 1
9/10/2019	394		1230	706	711	712	734	28				Pump Rig 1
9/10/2019	350	71424	1420	712	709	741	749	37				Pump Rig 2
9/10/2019	350		1250	715	720	736	747	32				Pump Rig 1
9/10/2019	373	71433	1440	718	735	745	756	38				Pump Rig 2
9/10/2019	395			725	730	745	752	27				Pump Rig 1
9/10/2019	LM62	71443	1460	728	740	752	801	33				Pump Rig 2
9/10/2019	910	71455	1470	734	741	757	808	34				Pump Rig 2
9/10/2019	3104	71460	1490	741	752	802	813	32				Pump Rig 2
9/10/2019	366		1280	743	748	748	759	16				Pump Rig 1
9/10/2019	333		1320	748	753	753	802	14				Pump Rig 1
9/10/2019	3103	71470	1520	750	806	811	819	29				Pump Rig 2
9/10/2019	LM62	71468	1510	752	809	815	823	31				Pump Rig 2
9/10/2019	3104		1350	795	800	802	814	19				Pump Rig 1
9/10/2019	LM62		1360	799	804	804	818	19				Pump Rig 1
9/10/2019	352	71486	1550	804	813	820	838	34				Pump Rig 2
9/10/2019	354		1370	807	812	815	838	31				Pump Rig 1
9/10/2019	398	71493	1560	809	822	827	843	34				Pump Rig 2
9/10/2019	3103		1390	813	818	819	840	27				Pump Rig 1
9/10/2019	329		1400	822	827	841	856	34				Pump Rig 1
9/10/2019	373	71510	1590	824	833	839	859	35				Pump Rig 2
9/10/2019	372		1410	825	830	840	859	34				Pump Rig 1
9/10/2019	910	71517	1610	831	825	845	903	32				Pump Rig 2
9/10/2019	LM62	71522	1620	834	845	900	909	35				Pump Rig 2

9/10/2019	3104	71539	1650	848	900	904	926	38				Pump Rig 2
9/10/2019	394		1430	852	857	858	907	14				Pump Rig 1
9/10/2019	395		1450	855	900	901	911	16				Pump Rig 1
9/10/2019	366		1480	903	908	900	917	14				Pump Rig 1
9/10/2019	368		1530	907	912	913	922	15				Pump Rig 1
9/10/2019	333	71462	1500	912	917	918	932	20	81	7.0		Pump Rig 1
9/10/2019	LM63	71570	1700	912	929	930	938	26				Pump Rig 2
9/10/2019	LM63		1540	917	922	924	935	18				Pump Rig 1
9/10/2019	372		1570	919	924	933	943	24				Pump Rig 1
9/10/2019	354		1580	920	925	939	948	28				Pump Rig 1
9/10/2019	350		1600	932	937	944	1005	33				Pump Rig 1
9/10/2019	395		1630	949	954	956	1010	21				Pump Rig 1
9/10/2019	329		1640	1001	1006	1007	1015	14				Pump Rig 1
9/10/2019	394		1660	1002	1007	1012	1020	18				Pump Rig 1
9/10/2019	3103		1670	1005	1010	1018	1025	20				Pump Rig 1
9/10/2019	368		1680	1016	1021	1022	1058	42				Pump Rig 1
9/10/2019	366		1690	1016	1021	1023	1050	34				Pump Rig 1
9/10/2019	352	71576	1710	1032	1052	1053	1106	34				Pump Rig 1
9/10/2019	3155		1720	1045	1050	1107						Pump Rig 1
9/10/2019	333		1700	1054	1059	1059	1110	16				Pump Rig 1

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area:

Observed by: J. Fisher (Pump Rig 1)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/26/19	3104	82105		1755	1805	1810	1826	31				Pump 1
09/26/19	355	82113	70	1753	1813	1816	1834	41				Pump 1
09/26/19	329	82116	90	1800	1815	1828	1851	51				Pump 1
09/26/19	394	82117	100	1807	1818	1838	1857	50				Pump 1
09/26/19	398	82124	170	1830	1841	1855	1907	37				Pump 1
09/26/19	395	82125	180	1836	1849	1902	1915	39				Pump 1
09/26/19	352	82126	190	1837	1852	1910	1921	44				Pump 1
09/26/19	368	82128	210	1848	1858	1913	1929	41				Pump 1
09/26/19	3104	82131	240	1856	1904	1923	1939	43				Pump 1
09/26/19	3103	82133	260	1903	1910	1930	1946	43	87	7.0	5	Pump 1
09/26/19	394	82136	290	1911	1927	1941	1955	44				Pump 1
09/26/19	398	82132	250	1903	1935	1950	2003	60				Pump 1
09/26/19	355	82138	310	1932	1942	1958	2008	30				Pump 1
	352	82140	330	1937								Not on field Receiving Form
09/26/19	354	82142	350	1939	1951	2005	2019	40				Pump 1
09/26/19	395	82144	370	1946	1957	2012	2027	41				Pump 1
09/26/19	3104	82146	390	1953	2005	2025	2039	46				Pump 1
09/26/19	3103	82149	420	2003	2011	2030	2044	41				Pump 1
09/26/19	394	82150	430	2007	2017	2041	2057	50				Pump 1
09/26/19	352	82152	450	2019	2033	2046	2106	47				Pump 1
09/26/19	354	82157	500	2039	2050	2059	2111	32	85	7.5	0	Pump 1
09/26/19	396	82158	510	2047	2055	2108	2126	39				Pump 1
09/26/19	3103	82159	520	2051	2105	2112	2132	41				Pump 1
09/26/19	329	82161	540	2101	2115	2128	2140	39				Pump 1
09/26/19	355	82163	560	2108	2119	2134	2147	39				Pump 1
09/26/19	352	82166	590	2117	2129	2142	2158	41				Pump 1

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area:

Observed by: J. Fisher (Pump Rig 1)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/26/19	394	82167	600	2123	2134	2149	2210	47				Pump 1
09/26/19	368	82170	630	2133	2143	2200	2217	44				Pump 1
09/26/19	351	82172	650	2140	2154	2112	2223	43	86	9/8	5	Pump 1; mix for 5 minutes and retes
09/26/19	3103	82175	680	2153	2210	2219	2230	37				Pump 1
09/26/19	354	82179	720	2214	2226	2234	2246	32	86	8	0	Pump 1
09/26/19	3104	82180	730	2217	2229	2232	2251	34				Pump 1
09/26/19	398	82183	760	2227	2239	2249	2257	30				Pump 1
09/26/19	329	82185	780	2239	2252	2256	2308	29				Pump 1
09/26/19	PBM3	82187	800	2246	2301	2305	2315	29				Pump 1
09/26/19	354	82188	810	2252	2302	2310	2320	28				Pump 1
09/26/19	355	82190	830	2259	2308	2318	2327	28				Pump 1
09/26/19	396	82191	840	2304	2315	2322	2332	28				Pump 1
09/26/19	394	82193	860	2311	2322	2329	2338	27				Pump 1
09/26/19	350	82194	870	2313	2323	2334	2345	32				Pump 1
09/26/19	395	82195	880	2318	2331	2340	2358	40	81	8.5	0	Pump 1
09/26/19	329	82197	900	2324	2339	2348	008	44				Pump 1
09/26/19	355	82202	940	2350	009	010	021	31				Pump 1
09/27/19	396	82203	950	006	021	027	033	27				Pump 1
09/27/19	354	82201	930	014	027	028	046	32				Pump 1
09/27/19	398	82200	920	034	038	040	052	18				Pump 1
09/27/19	352	82207	970	056	103	107	126	70				Pump 1
09/27/19	399	82210	990	105	125	127	140	35				Pump 1
09/27/19	355	82212	1020	112	126	129	148	36				Pump 1
09/27/19	3103	82220	1060	132	144	149	156	24	79	8.0	5	Pump 1
09/27/19	351	82222	1080	143	152	154	203	20				Pump 1
09/27/19	302	82239	1170	217	230	249	304	47				Pump 1

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: _____

Observed by: J. Fisher (Pump Rig 1)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/27/19	355	82245	1190	233	245	257	313	40	80	9.5	0	Pump 1
09/27/19	3104	82256	1240	248	259	311	326	38				Pump 1
09/27/19	307	82257	1250	259	313	315	333	34				Pump 1
09/27/19	352	82265	1270	304	317	328	343	39				Pump 1
09/27/19	302	82280	1310	321	331	335	350	29				Pump 1
09/27/19	395	82288	1340	333	347	352	401	28				Pump 1
09/27/19	354	82290	1350	341	351	353	401	20				Pump 1
09/27/19	355	82295	1360	347	359	403	413	26				Pump 1
09/27/19	396	82303	1380	356	406	408	415	19				Pump 1
09/27/19	3104	82307	1390	357	407	420	435	38	81	7.0	0	Pump 1
09/27/19	399	82315	1410	406	415	417	439	33				Pump 1
09/27/19	307	82316	1420	413	427	437	450	37				Pump 1
09/27/19	398	82330	1450	422	441	447	456	34	80	7.0	5	Pump 1
09/27/19	PBM3	82335	1460	433	451	453	507	34				Pump 1
09/27/19	395	82345	1480	443	455	457	520	37				Pump 1
09/27/19	3103	82358	1510	502	511	514	528	26				Pump 1
09/27/19	329	82359	1520	500	514	522	536	36				Pump 1
09/27/19	PBM3	82370	1540	512	525	531	546	34				Pump 1
09/27/19	394	82378	1560	522	534	538	552	30	82	4.0	0	Pump 1
09/27/19	352	82426	1620	619	634	637	712	53				Pump 1

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area:

Observed by: Y. Morgan (Pump Rig 2)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/26/19	368	82108	20	1734	1741	1743			85	10		
09/26/19	396	82107	10	1734	1741							
09/26/19	350	82110	40	1738	1750				85	7.0		
09/26/19	395	82109	30	1752	1755				85	10		
09/26/19	352	82111	50	1754	1757				85	5.5	5+5	
	3104	82115	80	1755								Not on field Receiving Form
09/26/19	368	82118	110	1815	1818				85	8.0		
09/26/19	396	82120	130	1824	1830							
09/26/19	351	82121	140	1820	1831	1835	1843	23				
09/26/19	398	82122	150	1823	1835	1843						
09/26/19	350	82123	160	1827	1836							
09/26/19	PBM3	82127	200	1842	1852							
09/26/19	355	82129	220	1848	1858							
09/26/19	396	82130	230	1854	1904							
09/26/19	351	82134	270	1910	1919	1922						
09/26/19	329	82135	280	1919	1922				87	6.5		
	394	82136	290									Not on field Receiving Form
09/26/19	350	82137	300	1917	1928							
09/26/19	PBM3	82139	320	1927	1938							
09/26/19	352	82140	330	1927	1940							
09/26/19	351	82141	340	1936	1945							
09/26/19	368	82143	360	1943	1954							
09/26/19	396	82145	380	1951	2005							
09/26/19	329	82147	400	2000	2011							
09/26/19	350	82151	440	2010	2020	2037						
09/26/19	PBM3	82148	410	2017	2029							

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area:

Observed by: Y. Morgan (Pump Rig 2)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/26/19	355	82153	460	2023	2036				86	9.5		Mix for additional 5 minutes
09/26/19	398	82154	470	2033	2038		2101	28				
09/26/19	368	82156	490	2037	2051		2110	33				
09/26/19	351	82155	480	2029	2052	2103	2113	44				
09/26/19	395	82160	530	2054	2108							
09/26/19	3104	82162	550	2103	2114							
09/26/19	350	82165	580	2110	2117		2130	20				
09/26/19	PBM3	82164	570	2115	2130		2141	26				
09/26/19	398	82168	610	2125	2137							
09/26/19	354	82171	640	2137	2146							
09/26/19	395	82169	620	2140	2150							
09/26/19	396	82173	660	2142	2152				84	8.5		Mix for additional 5 minutes
09/26/19	329	82174	670	2150	2205							
09/26/19	PBM3	82176	690	2158	2209							
09/26/19	355	82177	700	2206	2227							
09/26/19	350	82178	710	2207	2228		2239	32				
09/26/19	396	82182	750	2222	2235	2235	2245	23				
09/26/19	394	82181	740	2230	2243	2245						
09/26/19	352	82184	770	2235	2247							
09/26/19	368	82186	790	2243	2256		2326	43				
09/26/19	351	82189	820	2256	2305		2346	50				
09/26/19	3103	82192	850	2304	2315		002	58	84	9.5	5+5	
09/26/19	3104	82196	890	2321	2333		007	46				
09/26/19	PBM3	82198	910	2343	2355		015	32				
09/27/19	395	82206	970	031	049		059	28				ticket says left plant at 12:44 (00:44)
09/27/19	351	82208	980	047	059	101	106	19				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: _____

Observed by: Y. Morgan (Pump Rig 2)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/27/19	PBM3	82209	990	055	112		123	28				
09/27/19	3136	82211	1010	105	120	122	132	27				ticket says left plant at 2:20 (1:20)
09/27/19	302	82217	1050	125	134							
09/27/19	329	82213	1030	120	136							ticket says left plant at 1:32
09/27/19	396	82216	1050	128	138							Second ticket for 1050 yd3
09/27/19	307	82221	1070	136	150					9.0/8.75		Mix additional 10 minutes & retest
09/27/19	3104	82224	1090	141	159							
09/27/19	394	82228	1110	149	200		223	34				
09/27/19	398	82226	1100	150	201							
09/27/19	354	82232	1130	157	214							
09/27/19	352	82231	1120	200	215							
09/27/19	399	82236	1150	207	216							
09/27/19	395	82234	1140	204	224					7.5		
09/27/19	PBM3	82238	1160	213	225							
09/27/19	3136	82243	1180	223	239							
09/27/19	3103	82246	1200	227	240							
09/27/19	351	82253	1220	240	250							
09/27/19	396	82252	1210	240	251							
09/27/19	329	82255	1230	248	301							
09/27/19	398	82261	1260	255	309		340		82	9.0	5+5	Extra mixing before sample
09/27/19	399	82272	1290	312	323		336					
09/27/19	PBM3	82276	1300	317	331							
09/27/19	3136	82282	1320	325	340							
09/27/19	3103	82287	1330	332	350		430			5.25		
09/27/19	351	82296	1370	344	356							
09/27/19	329	82313	1400	403	416		436					

CONCRETE RECEIVING FORMMix ID: 5,000 psiProject Name: Sundance West, Eunice, NM

Work Area: _____

Observed by: Y. Morgan (Pump Rig 2)

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
09/27/19	352	82320	1430	414	428							
09/27/19	394	82329	1440	422	445							
09/27/19	302	82338	1470	435	447							
09/27/19	351	82346	1490	447	500		521	34				
09/27/19	355	82353	1500	451	512		529	38				
09/27/19	352	82366	1530	511	525							
09/27/19	3104	82375	1550	520	534							
09/27/19	398	82386	1570	529	546		601	32	82	7.5		
09/27/19	351	82391	1580	539	552		608	29				
09/27/19	395	82394	1590	539	554		637	58				
09/27/19	355	82403	1600	550	602	603						
09/27/19	3103	82414	1610	603	619							
09/27/19	329	82436	1630	629	647							
09/27/19	355	82493	1640	719	730							

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NMWork Area: Area A, Northeast cornerObserved by: B. Casadevall & M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/15/19	357	117527	10	735	740	747	759	24				
11/15/19	350	117543	20	745	750	800	810	25		6.5	5	
11/15/19	396	117566	30	757	800	804	815	18				
11/15/19	395	117573	40	759	804	815	822	23				
11/15/19	329	117578	50	805	810	818	830	25				
11/15/19	355	117589	60	813	818	828	836	23				
11/15/19	333	117604	70	822	825	836	842	20				
11/15/19	354	117610	80	827	829	841	851	24				
11/15/19	398	117643	90	831	836	844	855	24				
11/15/19	357	117653	100	836	842	843	907	31				
11/15/19	350	117668	110	844	849	852	912	28				
11/15/19	396	117683	120	900	903	918	927	27	54	6.5	5	
11/15/19	395	117698	130	902	905	909	922	20				
11/15/19	329	117708	140	859	913	923	935	36				
11/15/19	355	117716	150	905	924	930	940	35				
11/15/19	333	117726	160	913	932	935	945	32				
11/15/19	354	117741	170	923	937	941	949	26				
11/15/19	398	117758	180	928	944	947	954	26				
11/15/19	357	117773	190	940	948	951	958	18				
11/15/19	350	117788	200	951	953	957	1004	13				
11/15/19	395	117801	210	947	958	1000	1009	22				
11/15/19	355	117845	230	1013	1016	1023	1029	16	54	7.0	5	
11/15/19	329	117817	220	1006	1010	1020	1033	27				
11/15/19	333	117849	240	1022	1024	1030	1038	16				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, Northeast corner

Observed by: B. Casadevall & M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/15/19	354	117869	250	1027	1031	1034	1043	16				
11/15/19	398	117878	260	1029	1035	1038	1048	19				
11/15/19	357	117894	270	1036	1041	1045	1051	15				
11/15/19	350	117898	280	1048	1051	1053	1100	12				
11/15/19	395	117923	290	1054	1056	1058	1107	13				
11/15/19	355	117930	300	1103	1110	1112	1117	14				
11/15/19	323	117940	310	1108	1112	1115	1120	12				
11/15/19	333	117954	320	1117	1120	1121	1129	12				
11/15/19	354	117970	330	1120	1124	1125	1136	16				
11/15/19	398	117981	340	1131	1136	1137	1144	13				
11/15/19	357	117989	350	1140	1141	1200	1208	28	60	6.5	5	
11/15/19	350	118002	360	1139	1143	1148	1159	20				
11/15/19	395	117016	370	1148	1151	1202	1212	24				
11/15/19	355	118030	380	1158	1203	1211	1216	18				
11/15/19	329	118032	390	1205	1209	1214	1222	17				
11/15/19	333	118045	400	1211	1215	1219	1228	17				
11/15/19	354	118068	410	1217	1222	1223	1235	18				
11/15/19	350	118083	420	1225	1230	1232	1243	18				
11/15/19	398	118098	430	1235	1239	1243	1250	15				
11/15/19	357	118110	440	1238	1243	1246	1255	17				
11/15/19	395	118124	450	1247	1250	1253	1300	13				
11/15/19	355	118136	460	1257	1300	1302	1313	16				
11/15/19	329	118161	470	1306	1309	1313	1323	17				
11/15/19	333	118176	480	1315	1318	1320	1325	10				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, Northeast corner

Observed by: B. Casadevall & M. Zbrozek

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/15/19	354	118187	490	1320	1323	1323	1336	16				
11/15/19	350	118212	500	1327	1341	1343	1351	24				
11/15/19	398	118214	510	1335	1338	1357	1409	34	62	7.0		Add "Slump Buster" & spin
11/15/19	357	118226	520	1335	1344	1347	1356	21				
11/15/19	395	118244	530	1350	1353	1354	1405	15				
11/15/19	355	118262	540	1358	1400	1356	1423	25				
11/15/19	329	118279	550	1408	1411	1414	1428	20				
11/15/19	333	118286	560	1413	1416	1430	1449	36				
11/15/19	354	118301	570	1418	1421	1447	1507	49				
11/15/19	350	118316	580	1421	1428	1455	1516	55				
11/15/19	357	118327	590	1431	1436	1510	1527	56				
11/15/19	395		600	1444	1446	---	---	---				Did not use this truck

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, Northwest corner

Observed by: B. Casadevall

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/19/19	395	120153	10	332	336	416	422	50	42	4.5	5	
11/19/19	352	120157	20	345	348	421	428	43				
11/19/19	350	120162	30	347	351	427	433	46				
11/19/19	345	120168	40	356	400	433	439	43				
11/19/19	3103	120170	50	400	405	439	447	47				
11/19/19	354	120181	60	410	413	447	452	42				
11/19/19	329	120189	70	418	422	452	501	43				
11/19/19	333	120193	80	425	429	501	506	41				
11/19/19	352	120201	90	440	443	506	511	31				
11/19/19	395	120209	100	447	451	511	516	29				
11/19/19	350	120217	110	455	459	516	522	27				
11/19/19	345	120219	120	504	510	522	527	23				
11/19/19	3103	120238	130	510	515	527	533	23				
11/19/19	354	120244	140	520	525	533	539	19				
11/19/19	329	120257	150	534	538	544	550	16				
11/19/19	333	120263	160	542	545	550	557	15				
11/19/19	352	120273	170	628	631	642	648	20		9.5/7.0		Initial delivery too wet; returned to plant to dry out mix
11/19/19	350	120280	180	550	553	557	603	13				
11/19/19	395	120289	190	557	601	603	610	13				
11/19/19	345	120293	200	606	610	622	628	22	45	7.0	5	
11/19/19	3103	120309	210	610	615	617	623	13				
11/19/19	354	120313	220	620	624	629	637	17				
11/19/19	329	120320	230	626	630	636	642	16				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, Northwest corner

Observed by: B. Casadevall

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/19/19	333	120341	240	638	640	648	653	15				
11/19/19	350	120348	250	640	643	653	659	19				
11/19/19	395	120360	260	647	650	658	703	16				
11/19/19	345	120365	270	651	654	703	709	18				
11/19/19	3103	120371	280	700	704	712	717	17				
11/19/19	354	120388	290	704	708	712	720	16				
11/19/19	352	120390	300	713	716	719	728	15				
11/19/19	329	120429	310	722	725	729	736	14				
11/19/19	333	120439	320	734	737	741	748	14				
11/19/19	350	120458	330	735	740	742	752	17				
11/19/19	345	120496	340	744	748	741	747	3				
11/19/19	395	120501	350	748 811	752 815	818	824	13		9.5		Initial delivery too wet; returned to plant to dry out mix
11/19/19	3103	120519	360	755	800	801	806	11				
11/19/19	354	120535	370	802	806	823	830	28		8.0		Add "Slump Buster" and spin
11/19/19	352	120558	380	810	813	828	836	26		6.0	5	
11/19/19	329	120576	390	824	828	834	844	20				
11/19/19	333	120625	400	831	835	843	852	21				
11/19/19	350	120635	410	835	839	846	900	25				
11/19/19	345	120649	420	845	848	855	904	19				
11/19/19	3103	120655	430	859	902	908	914	15				
11/19/19	395	120676	440	901	905	913	920	19				
11/19/19	354	120688	450	906	910	919	929	23	52	6.0	5	
11/19/19	352	120703	460	916	918	928	933	17				

CONCRETE RECEIVING FORM

Mix ID: 5,000 psi

Project Name: Sundance West, Eunice, NM

Work Area: Area A, Northwest corner

Observed by: B. Casadevall

Date	Truck #	Ticket	Cumulative Volume (yd3)	Time					Cement Properties			Comments
				Dispatch	Site Arrival	Start Discharge	End Discharge	Elapsed Time (min)	Temp (°F)	Slump (inches)	No. Cyls.	
11/19/19	329	120716	470	932	936	936	939	7				
11/19/19	333	120751	480	940	945	949	957	17				
11/19/19	350	120769	490	950	952	957	1008	18				
11/19/19	345	120772	500	955	959	1007	1018	23				
11/19/19	3103	120785	510	1001	1005	1016	1025	24				
11/19/19	395	120795	520	1008	1012	1024	1032	24				
11/19/19	354	120808	530	1016	1020	1031	1039	23				
11/19/19	352	120831	540	1025	1027	1037	1047	22				
11/19/19	329	120837	550	1032	1036	1050	1100	28	52	6.0	5	
11/19/19	333	120861	560	1039	1042	1059	1106	27				
11/19/19	350	120869	570	1045	1048	1106	1115	30				
11/19/19	345	120891	580	1055	1057	1113	1122	27				
11/19/19	3103	120900	590	1103	1107	1121	1132	29				
11/19/19	395	120914	600	1111	1115	1132	1140	29				
11/19/19	329	121007	610	1203	1207	1210	1224	21				
11/19/19	350	121008	620	1207	1210	1223	1235	28				

Appendix J3

Concrete Testing Results

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
07/11/19	0530	1332588	5,000	70	85	2.0	3.00	7	7/18	65,845	5,240	Pass	902054.0711.6213A
								14	7/25	74,690	5,940	Pass	
								28	8/8	86,295	6,870	Pass	
								28	8/8	87,975	7,000	Pass	
								28	8/8	88,770	7,060	Pass	
07/11/19	0700	27835	5,000	130	88	2.5	4.00	7	7/18	78,685	6,260	Pass	902054.0711.6213B
								14	7/25	83,810	6,670	Pass	
								28	8/8	102,690	8,170	Pass	
								28	8/8	102,185	8,130	Pass	
								28	8/8	102,315	8,140	Pass	
07/11/19	1000	28057	5,000	290	80	2.5	7.00	7	7/18	84,090	6,690	Pass	902054.0711.6213C
								14	7/25	89,075	7,090	Pass	
								28	8/8	104,545	8,320	Pass	
								28	8/8	110,830	8,820	Pass	
								28	8/8	109,140	8,690	Pass	
07/24/19	0200	37430	5,000	50	83	na	6.00	7	7/31	68,870	5,480	Pass	902054.0724.6436B
								14	na				
								28	8/21	80,285	6,390	Pass	
								28	8/21	80,765	6,430	Pass	
								28	8/21	83,910	6,680	Pass	
07/24/19	0330	37475	5,000	150	84	na	6.75	7	7/31	66,675	5,310	Pass	902054.0724.6436C
								14	na				
								28	8/21	83,020	6,610	Pass	
								28	8/21	83,490	6,640	Pass	
								28	8/21	80,805	6,430	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
07/24/19	0530	37430	5,000	240	85	na	5.50	7	7/31	68,705	5,470	Pass	902054.0724.6436D
								14	na				
								28	8/21	82,785	6,590	Pass	
								28	8/21	81,610	6,490	Pass	
								28	8/21	82,380	6,560	Pass	
07/24/19	0700	37700	5,000	350	83	na	6.25	7	7/31	71,840	5,720	Pass	902054.0724.6436E
								14	na				
								28	8/21	84,705	6,740	Pass	
								28	8/21	86,670	6,900	Pass	
								28	8/21	80,760	6,430	Pass	
07/24/19	0930	37877	5,000	450	83	na	5.00	7	7/31	75,970	6,050	Pass	902054.0724.6436F
								14	na				
								28	8/21	91,105	7,250	Pass	
								28	8/21	89,155	7,090	Pass	
								28	8/21	89,865	7,150	Pass	
07/24/19	1030	38044	5,000	550	81	na	5.50	7	7/31	68,470	5,450	Pass	902054.0724.6436G
								14	na				
								28	8/21	78,620	6,260	Pass	
								28	8/21	82,815	6,590	Pass	
								28	8/21	76,450	6,080	Pass	
08/02/19	0200	46692	5,000	50	83	na	7.25	7	8/9	75,585	6,010	Pass	902054.0802.6573B
								14	na				
								28	8/30	93,955	7,480	Pass	
								28	8/30	90,965	7,240	Pass	
								28	8/30	103,645	8,250	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
08/02/19	0320	46720	5,000	150	82	na	3.25	7	8/9	84,700	6,740	Pass	902054.0802.6573C
								14	na				
								28	8/30	97,010	7,720	Pass	
								28	8/30	99,530	7,920	Pass	
								28	8/30	97,995	7,800	Pass	
08/02/19	0700	na	5,000	10	85	na	4.50	7	8/9	79,405	6,320	Pass	902054.0802.6573D
								14	na				
								28	8/30	108,340	8,620	Pass	
								28	8/30	107,695	8,570	Pass	
								28	8/30	92,985	7,400	Pass	
08/09/19	na	52991	5,000	20	91	5.9	6.00	11	8/20	34,560	2,750		902054.0802.6748A
								14	na				
								28	9/6	44,170	3,510		
								28	9/6	42,290	3,370		
								28	9/6	41,460	3,300		
								56	10/4	52,935	4,210		
08/09/19	na	53231	5,000	78	85	4.4	6.25	11	8/20	38,645	3,080		902054.0802.6573B
								14	na				
								28	9/6	52,435	4,170		
								28	9/6	49,790	3,960		
								28	9/6	49,410	3,930		
								56	10/4	61,340	4,880		

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
08/14/19	0740	55224	3,000	10	86	4.1	3.75	7	8/21	30,190	2,400		902054.0802.6702A
								14	8/28	30,265	2,410		
								28	9/11	33,150	2,640		
								28	9/11	37,555	2,990		
								56	10/9	35,545	2,830		
08/28/19	0820	64248	5,000	30	84	na	5.00	8	9/5	94,325	7,510	Pass	902054.0802.6929A
								14	9/11	105,725	8,410	Pass	
								28	9/25	102,350	8,140	Pass	
								28	9/25	106,235	8,450	Pass	
								28	9/25	109,255	8,690	Pass	
08/28/19	1000	64361	5,000	80	86	na	6.50	8	9/5	87,320	6,950	Pass	902054.0802.6929B
								14	9/11	94,335	7,510	Pass	
								28	9/25	102,270	8,140	Pass	
								28	9/25	105,100	8,360	Pass	
								28	9/25	103,270	8,220	Pass	
08/28/19	1200	64423	5,000	120	85	na	6.00	8	9/5	72,630	5,780	Pass	902054.0802.6925A
								14	9/11	82,010	6,530	Pass	
								28	9/25	87,800	6,990	Pass	
								28	9/25	86,890	6,910	Pass	
								28	9/25	85,650	6,820	Pass	
09/09/19	0920	71126	5,000	60	82	1.5	1.50	7	9/16	72,610	5,780	Pass	902054.0802.7098B
								14	9/23	69,415	5,520	Pass	
								28	10/7	84,940	6,760	Pass	
								28	10/7	87,335	6,950	Pass	
								28	10/7	86,410	6,880	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
09/09/19	1112	71145	5,000	250	85	na	8.00	7	9/16	77,950	6,200	Pass	902054.0802.7098C
								14	9/23	81,030	6,450	Pass	
								28	10/7	100,480	8,000	Pass	
								28	10/7	92,060	7,330	Pass	
								28	10/7	96,960	7,720	Pass	
09/09/19	1245	71167	5,000	450	88	na	7.50	7	9/16	90,130	7,170	Pass	902054.0802.7098D
								14	9/23	91,375	7,270	Pass	
								28	10/7	100,130	7,970	Pass	
								28	10/7	107,030	8,520	Pass	
								28	10/7	105,005	8,360	Pass	
09/09/19	0215	71200	5,000	700	90	na	6.50	7	9/16	74,645	5,940	Pass	902054.0802.7098E
								14	9/23	72,075	5,740	Pass	
								28	10/7	97,635	7,770	Pass	
								28	10/7	97,570	7,760	Pass	
								28	10/7	94,505	7,520	Pass	
09/09/19	0330	71235	5,000	900	89	na	7.00	7	9/16	70,200	5,590	Pass	902054.0802.7098F
								14	9/23	74,710	5,950	Pass	
								28	10/7	86,980	6,920	Pass	
								28	10/7	84,610	6,730	Pass	
								28	10/7	85,810	6,830	Pass	
09/09/19	0500	71284	5,000	1100	81	na	7.00	7	9/16	85,205	6,780	Pass	902054.0802.7098G
								14	9/23	80,200	6,380	Pass	
								28	10/7	96,245	7,660	Pass	
								28	10/7	95,080	7,570	Pass	
								28	10/7	100,260	7,980	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
09/09/19	0630	71358	5,000	1300	81	na	6.00	7	9/16	70,220	5,590	Pass	902054.0802.7098H
								14	9/23	81,410	6,480	Pass	
								28	10/7	94,590	7,530	Pass	
								28	10/7	97,885	7,790	Pass	
								28	10/7	96,250	7,660	Pass	
09/09/19	0743	71462	5,000	1500	81	na	7.00	7	9/16	70,775	5,630	Pass	902054.0802.7098I
								14	9/23	64,125	5,100	Pass	
								28	10/7	83,155	6,620	Pass	
								28	10/7	83,600	6,650	Pass	
								28	10/7	83,785	6,670	Pass	
09/09/19	1020	7156	5,000	1710	83	na	8.00	7	9/16	71,525	5,690	Pass	902054.0802.7098J
								14	9/23	80,055	6,370	Pass	
								28	10/7	90,465	7,200	Pass	
								28	10/7	89,215	7,100	Pass	
								28	10/7	89,790	7,150	Pass	
09/17/19	0810	75839	3,000	10	84	5.5	5.50	7	9/24	29,595	2,360		902054.0802.7184B
								14	10/1	38,115	3,030	Pass	
								28	10/15	39,345	3,130	Pass	
								28	10/15	42,925	3,420	Pass	
								28	10/15	41,345	3,290	Pass	
09/25/19	1620	81384	5,000	10	87	na	5.00	7	10/2	88,530	7,040	Pass	902054.0802.7098A
								14	10/9	93,470	7,440	Pass	
								28	10/23	104,695	8,330	Pass	
								28	10/23	114,285	9,090	Pass	
								28	10/23	103,335	8,220	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
09/26/19	1754	82111	5,000	50	85	na	5.50	7	10/3	111,925	8,910	Pass	902054.0802.7323B
								14	10/10	119,455	9,510	Pass	
								28	10/24	123,600	9,840	Pass	
								28	10/24	127,265	10,130	Pass	
								28	10/24	121,240	9,650	Pass	
09/26/19	1925	82133	5,000	260	87	na	7.00	7	10/3	105,910	8,430	Pass	902054.0802.7323C
								14	10/10	119,020	9,470	Pass	
								28	10/24	126,390	10,060	Pass	
								28	10/24	127,385	10,140	Pass	
								28	10/24	128,125	10,280	Pass	
09/26/19	2045	82153	5,000	450	86	na	9.50	7	10/3	74,275	5,910	Pass	902054.0802.7323D
								14	10/10	85,545	6,810	Pass	
								28	10/24	93,785	7,460	Pass	
								28	10/24	95,245	7,580	Pass	
								28	10/24	96,345	7,670	Pass	
09/26/19	2220	82172	5,000	650	83	na	8.00	7	10/3	105,195	8,370	Pass	902054.0802.7323E
								14	10/10	113,120	9,000	Pass	
								28	10/24	123,320	9,810	Pass	
								28	10/24	129,635	10,320	Pass	
								28	10/24	119,495	9,510	Pass	
09/26/19	2330	82192	5,000	85	84	na	9.50	7	10/3	104,235	8,290	Pass	902054.0802.7323F
								14	10/10	115,595	9,200	Pass	
								28	10/24	130,935	10,420	Pass	
								28	10/24	128,705	10,240	Pass	
								28	10/24	133,400	10,620	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
09/27/19	0150	82220	5,000	1060	79	na	na	7	10/3	100,475	8,000	Pass	902054.0802.7323G
								14	10/10	120,290	9,570	Pass	
								28	10/24	128,360	10,210	Pass	
								28	10/24	128,706	10,240	Pass	
								28	10/24	129,000	10,270	Pass	
09/27/19	0330	82261	5,000	1260	82	na	9.00	7	10/4	101,120	8,050	Pass	902054.0802.7323H
								14	10/11	115,700	9,210	Pass	
								28	10/25	115,995	9,230	Pass	
								28	10/25	123,060	9,790	Pass	
								28	10/25	126,270	10,050	Pass	
09/27/19	0430	82330	5,000	1450	80	na	7.00	7	10/4	94,795	7,540	Pass	902054.0802.7323I
								14	10/11	108,025	8,600	Pass	
								28	10/25	131,430	10,460	Pass	
								28	10/25	140,710	11,200	Pass	
								28	10/25	128,085	10,190	Pass	
10/04/19	1130	87058	3,000	10	85	6.2	4.00	7	10/11	38,065	3,030	Pass	902054.0802.7385A (Revised)
								7	10/11	39,880	3,170	Pass	
								28	11/1	54,920	4,370	Pass	
								28	11/1	54,125	4,310	Pass	
								28	11/1	56,960	4,530	Pass	
10/15/19	1057	93679	3,000	10	76	2.6	5.75	7	10/22	38,840	3,090	Pass	902054.0802.7516A
								14	10/29	46,835	3,730	Pass	
								28	11/12	52,305	4,160	Pass	
								28	11/12	56,855	4,520	Pass	
								28	11/12	55,575	4,420	Pass	

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
11/05/19	0415	109958	5,000	10	62	na	5.50	7	11/12	76,890	6,120		902054.0802.7787A
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				
11/05/19	0500	109992	5,000	100	60	na	6.75	7	11/12	79,365	6,320		902054.0802.7787B
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				
11/05/19	0615	11060	5,000	200	58	na	6.25	7	11/12	94,775	7,540		902054.0802.7787C
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				
11/05/19	0745	110177	5,000	300	60	na	6.75	7	11/12	78,535	6,250		902054.0802.7787D
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				
11/05/19	0850	110319	5,000	400	64	na	6.25	7	11/12	89,755	7,140		902054.0802.7787E
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				

CONCRETE TESTING RESULTS

Project Name: Sundance West, Eunice, NM

Testing by: Beyond Engineering & Testing, LLC

Sample Date	Sample Time	PB Materials Ticket No.	28 Day PSI Requirement	Cubic Yards	Field Tests			Laboratory Tests					BET Report No.
					Concrete Temp. (°F)	Air Content (%)	Slump (inches)	Age Days	Date Tested	Total Load (pounds)	Compressive Strength (psi)		
11/05/19	1045	100565	5,000	500	60	na	7.75	7	11/12	79,365	6,320		902054.0802.7787F
								14	11/19				
								28	12/3				
								28	12/3				
								28	12/3				
								7					902054.0802.7
								14					
								28					
								28					
								28					
								7					902054.0802.7
								14					
								28					
								28					
								28					
								7					902054.0802.7
								14					
								28					
								28					
								28					