RED ROCK CONSULTING

Final Report of Geotechnical Investigation

OF THE

CUT ANALYSIS – WEST PHASE II STATE HIGHWAY 29 STEPHENS COUNTY, OKLAHOMA

29657(04)

Prepared For:

SRB 100 Northeast 5th Street Oklahoma City, Oklahoma 73104

Prepared By:

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> April 30, 2024 Project No. 18043



April 30, 2024

SRB

100 Northeast 5th Street Oklahoma City, Oklahoma 73104

Attention:

Mr. Greg Allen, PE

Re:

Final Report of Geotechnical Investigation

SH 29 Cut Analysis - West Phase II

Stephens County, Oklahoma

29657(04)

Project No. 18043

Dear Mr. Allen,

I am pleased to submit herewith this report entitled "Geotechnical Investigation, SH 29 Cut Analysis – West Phase II, Stephens County, Oklahoma, 29657(04)".

It has been our pleasure to assist you with this project. Should you have any questions regarding the contents of this report, please contact Red Rock Consulting.

Yours very truly, RED ROCK CONSULTING, LLC CA No. 5707 Exp. 06/30/25

Emma Coggin, El

Project Specialist

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REPORT OF GEOTECHNICAL INVESTIGATION

SH 29 CUT ANALYSIS - WEST PHASE II STEPHENS COUNTY, OKLAHOMA

29657(04)

PROJECT NO. 18043

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REPORT OF GEOTECHNICAL INVESTIGATION

SH 29 CUT ANALYSIS – WEST PHASE II STEPHENS COUNTY, OKLAHOMA

29657(04)

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INTRODUCTION

General

This report presents the results of the geotechnical investigation performed for the cut analysis associated with the offset alignment of SH 29 through Stephens County, Oklahoma. The purpose of this investigation is to evaluate the subsurface conditions at the site and to provide information pertaining to the geotechnical aspects of the proposed project.

Several boring locations were inaccessible at the time of the Phase I investigation in 2018. In 2024 a Phase II investigation was conducted to include the remaining original borings as well as an additional 37 borings. This report includes both Phase I and Phase II investigations as well as the associated data and analyses. As such, the Phase I borings have been renumbered so they appear in numerical order with the Phase II boring numbers for this report.

Proposed Construction

The approximate 5.44-mile-long project consists of the construction of a new roadway on an offset alignment from 11.48 miles east of US 81 extending east 5.44 miles in Stephens County, Oklahoma. This report focuses on the cut sections required for the construction of the project.

The first cut section, which includes CW-1 to CW-8, will be approximately 900 feet long between stations 652+00 to 661+00. The maximum proposed cut depth is 19 feet at station 655+00. The second cut section, which includes CW-9 to CW-14, will be approximately 1,460 feet long between stations 668+00 to 682+59. The maximum proposed cut depth is 15 feet at station 682+59. The third cut section, which includes CW-15 to CW-19, will be approximately 500 feet long between stations 718+00 to 723+00. The maximum proposed cut depth is 9 feet at stations 718+00 and 720+00. The fourth cut section, which includes CW-20 to CW-31, will be approximately 1,000 feet long between stations 766+00 to 776+17. The maximum proposed cut depth is 32 feet at station 772+00. The fifth cut section, which includes CW-32 to CW-44, will be

approximately 1,300 feet long between stations 823+00 to 836+00. The maximum proposed cut depth is 18 feet at station 829+00. The sixth cut section, which includes CW-45 to CW-52, will be approximately 1,300 feet long between stations 842+00 to 855+00. The maximum proposed cut depth is 17 feet at station 847+00. The seventh cut section, which includes CW-53 to CW-56, will be approximately 250 feet long between stations 873+50 to 876+00. The maximum proposed cut depth is 11 feet at station 874+00.

Scope of Work

The scope of this investigation includes the following:

- 1. Review of previous geotechnical and geological information of sites near this site. This was augmented with data obtained during the field investigation phases of the project.
- 2. Investigation of the subsurface soils by drilling and testing a total of 56 boreholes within the planned project area
- 3. A laboratory testing program consisting of moisture content, Atterberg limits, and sieve analysis on representative samples of the overburden soils
- 4. Rippability analysis of the bedrock encountered within the proposed cut depths
- 5. Maximum cut slopes for the soils and bedrock encountered within the proposed cut sections

FIELD AND LABORATORY INVESTIGATIONS

Field Exploration

The Phase I field exploration was performed on May 16th and July 11th to 13th, 2018. The Phase II field exploration was performed on April 3rd to 5th, 11th, and 15th, 2024. The borings were located in the field by a representative of Red Rock Consulting by measuring distances from known site reference points as depicted on plans provided by SRB. The locations of the borings should be considered accurate only to the degree implied by the methods used to define them.

The subsurface exploration program consisted of drilling 56 borings under the full-time supervision of a geologist or engineer. The borings are shown on the Boring Location Diagrams, which are included in Appendix A.

The borings were advanced with solid stem augers or hollow stem augers in all borings except CW-26, which was advanced using wet rotary drilling methods. All borings were advanced to approximately the maximum anticipated cut depth based on the cross sections provided, or to a depth equal to 10 feet below the maximum anticipated cut depth using an all-terrain vehicle (ATV) mounted CME-750 drill rig equipped with an automatic hammer. The approximate cut and boring depths are summarized in Table 1.

Table 1 – Cut & Boring Depths

			<u> </u>	
Boring	Station	CRL Offset	Proposed Cut Depth	Boring Depth
		(feet)	(feet)	(feet)
CW-1	652+70	50' LT	13	13
CW-2	652+70	9' RT	12	12
CW-3	654+00	50' LT	17	30
CW-4	655+00	50' LT	19	29
CW-5	655+00	9' RT	18	18
CW-6	656+00	50' LT	16	25
CW-7	657+00	46' LT	13	13
CW-8	657+00	5' RT	12	12
CW-9	668+00	50' LT	10	20
CW-10	668+00	6' RT	9	9
CW-11	670+00	45' LT	7	7
CW-12	670+00	19' RT	7	7
CW-13	676+00	50' LT	14	25
CW-14	682+59	95' LT	15	25
CW-15	718+00	54' LT	9	9
CW-16	718+00	20' LT	4	5.5

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CW-17	720+00	50' LT	9	19
CW-18	720+00	5' RT	6	6.5
CW-19	722+15	55' LT	4	5.5
CW-20	766+00	50' LT	5	6.5
CW-21	766+00	15' RT	5	6.5
CW-22	768+00	50' LT	12	12
CW-23	768+00	5' RT	10	11.5
CW-24	770+00	50' LT	20	30
CW-25	770+30	15' RT	20	20
CW-26	772+00	50' LT	32	45
CW-27	772+00	0	30	40
CW-28	774+00	50' LT	20	30
CW-29	774+00	10' RT	18	18
CW-30	775+89	50' LT	7	7
CW-31	775+89	9' RT	4	5.5
CW-32	823+00	73' LT	12	12
CW-33	823+00	5' LT	9	10.3
CW-34	825+25	55' LT	15	15
CW-35	825+25	6' LT	11	11
CW-36	827+00	55' LT	16	16
CW-37	827+00	5' LT	13	14
CW-38	829+00	55' LT	18	28
CW-39	829+00	5' LT	14	14
CW-40	830+50	48' LT	17	17
CW-41	831+00	1' LT	8	9.5
CW-42	834+00	41' LT	6	6.3
CW-43	835+00	54' LT	7	17
CW-44	836+00	66' LT	4	5
CW-45	847+00	55' RT	17	30
CW-46	849+00	50' RT	13	25
CW-47	850+00	10' LT	6	6
CW-48	850+00	50' RT	12	12
CW-49	852+00	20' LT	6	6
CW-50	852+00	20' RT	11	21
CW-51	854+00	20' LT	3	4
CW-52	854+00	50' RT	8	8
CW-53	874+00	3' RT	6	6
CW-54	874+00	46' RT	11	21
CW-55	876+00	3' LT	9	9
CW-56	876+00	45' RT	9	9.5

Samples of the overburden materials were obtained in the borings as per Oklahoma Department of Transportation (ODOT) specifications. Representative samples of the

overburden materials were obtained from the split-barrel sampler used for the standard penetration test (SPT) in general accordance with ASTM Specifications D-1586. After SPT refusal was attained, the hardness of bedrock was evaluated using a Texas Cone Penetrometer (TCP). The TCP was used in accordance with the AASHTO Manual on Subsurface Investigation and as modified by the Oklahoma Department of Transportation. The sampling procedures are presented on the Boring Logs in Appendix A.

The SPT test uses a standard, 2-inch outside diameter, split-barrel sampling spoon that is driven into the bottom of the boring with a 140-pound automatic drive hammer that falls 30 inches. The blows per foot, N, is the number of hammer blows required to advance the sampling spoon the last 12 inches, or less, of an 18-inch sampling interval. The N value is used to estimate the in-situ relative density of granular soils, the consistency of cohesive soils, and the hardness of weathered bedrock.

The TCP test is a standard test developed by the Texas Highway Department to evaluate the consistency or hardness of the bedrock material. The TCP test drives a penetrometer cone into the bedrock material with a 140-pound automatic drive hammer that falls 30 inches. The TCP is driven for a series of blows, the first 10 being seating blows, followed by two 50 blow counts. After 50 blows of the automatic hammer, the distance the TCP has advanced is measured and recorded. The distance the TCP is driven is used to estimate the hardness of bedrock.

After performing SPT and TCP tests, the holes were backfilled with grout and cuttings as required by the Oklahoma State Statutes for Geotechnical drilling.

Samples were collected and transported back to the lab for further classification and testing. The final boring logs were developed from the draft logs, observations and test results of the samples returned to the laboratory. The stratigraphic contacts indicated are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times. The boring logs, presenting conditions encountered at each location explored, are included in Appendix A.

Laboratory Testing

Representative soil samples were tested to refine the field classifications and evaluate physical properties of the soils which may affect the geotechnical aspects of project design and construction.

The laboratory testing program included the following:

Moisture content (AASHTO T265 / ASTM D2216)

- Liquid limit and plastic limit (AASHTO T89 & T90 / ASTM D4318)
- Particle size analysis of soils (AASHTO T88 / ASTM D1140)

The results of the physical laboratory tests conducted are shown on the Boring Logs in Appendix A and are also included in Appendix B.

The above laboratory tests were performed in general accordance with applicable AASHTO or ASTM procedures, or generally accepted practice. It should be noted that reference to AASHTO or ASTM procedures does not imply that all cross-referenced procedures in AASHTO or ASTM standards have been used, or that all AASHTO or ASTM procedures used have been followed exactly. Only those AASHTO or ASTM procedures and/or portions of procedures, which, in the professional judgment of the geotechnical engineer of record for this report, are applicable, appropriate, and necessary for this project, have been used or followed.

SITE DESCRIPTION

Surface Conditions

At the time of the field investigation, SH 29 was a two-lane undivided asphalt surfaced highway in the project area. There were grass shoulders to each side of the roadway through the cut sections. All the cut sections included in this report had shallow ditches. The surfaces were relatively flat where the borings were drilled. The boring locations were dry at the time of the field investigation. The ATV drill rig did not have any trouble moving around the sites. Dozer work was required to access the borings in cut sections 2, 4, and 5 to clear out trees and level the ground surface.

The surface elevations were estimated from plans provided by SRB. Based on the plans, the elevations of the borings ranged between 1115 and 1232 feet. The approximate elevation at each boring location is shown on the Boring Location Diagrams and on the Boring Logs in Appendix A. All station numbers and offsets were also estimated from the plans provided by SRB.

Cut Section 1 (CW-1 to CW-8) - Phase I & Phase II

The first cut section, consisting of CW-1 to CW-8, was located on the north side of SH 29 in a grass covered pasture. The pasture was elevated approximately 10 feet above the existing roadway.

Cut Section 2 (CW-9 to CW-14) - Phase I & Phase II

The second cut section, consisting of CW-9 to CW-14, was located on the north side of SH 29. The western and eastern ends of the second cut section were relatively densely wooded. The middle of the second cut second was in a grass yard. Most of the second cut section was elevated approximately 5 feet above the existing roadway. On the eastern end, there was a dry creek running north and south approximately 40 feet to the east of CW-14, then curving to the west of the boring approximately 40 feet to the north.

Cut Section 3 (CW-15 to CW-19) - Phase II

The third cut section, consisting of CW-15 to CW-19, was located on the north side of SH 29 in a grass covered pasture. The pasture was mostly open with several trees located throughout. The eastern end of the pasture was more densely wooded, following a creek bed that ran northwest. SH 17 was located approximately 700 feet to the west. The pasture was elevated approximately 5 feet above the existing roadway.

Cut Section 4 (CW-20 to CW-31) – Phase I & Phase II

The fourth cut section, consisting of CW-20, to CW-31, was located on the north side of SH 29 on top of a hill. The area was a moderately dense wooded area with small patches of clearings. There was a 70-foot-wide clearing north of the boring locations running east and west for a pipeline. County Road 2970 was located approximately 225 feet to the west. At the western end of the cut section, the ground surface north of SH 29 was approximately 5 feet below the existing roadway. Continuing east going up the hill, the ground surface north of SH 29 was elevated approximately 20 feet above the existing roadway at the highest point. The hill had exposed rock outcrops near the existing roadway. At the tallest point of the hill where the steepest slope was located, extensive erosion was visible on the existing slope.

Cut Section 5 (CW-32 to CW-44) – Phase II

The fifth cut section, consisting of CW-32 to CW-44, was located on the north side of SH 29 in a grass covered pasture. The pasture was mostly open on the western side with several trees located throughout. The eastern side of the pasture had more trees and two ponds, and turned to densely wooded approximately 120 feet before the eastern end. The pasture was elevated approximately 5 to 10 feet above the existing roadway.

Cut Section 6 (CW-45 to CW-52) - Phase I & Phase II

The sixth cut section, consisting of CW-45 to CW-52, was located on the south side of SH 29 in a grass and dirt covered pasture with a hill on the south side. 16 Mile Road was located approximately 750 feet to the east. The hill was elevated approximately 10 feet above the existing roadway.

Cut Section 7 (CW-53 to CW-56) - Phase II

The seventh cut section, consisting of CW-53 to CW-56, was located on the south side of SH 29 in a grass covered pasture. Poteet Road was located approximately 350 feet to the west. The pasture was elevated approximately 5 feet above the existing roadway.

Site Geology

The geology of the cut sections was researched using the "Division Seven Engineering Classification of Geological Materials", published by the Oklahoma Department of Transportation (ODOT) and the Geologic Map of the "Hydrologic Atlas 3, Reconnaissance of the Water Resources of the Ardmore and Sherman quadrangles, southern Oklahoma," by Donald L. Hart, Jr., published by the Oklahoma Geological Survey in cooperation with the U.S. Geological Survey, 1974 and 1983.

ODOT PUBLICATION

The ODOT publication indicates all of the cut sections are underlain by the **El Reno unit** (Per). The geologic deposit and unit are described therein as follows:

The El Reno unit consists of a heterogeneous mixture of sandstones, shale, siltstone, and siltstone conglomerate. In northeastern Stephens County, the lowermost 40 to 100 feet of the unit consists dominantly of sandstones which are coarse-grained, nearly white to buff, and moderately soft; but a few hard, massive sandstone beds up to six feet thick occur near the base of the unit. Northward, across Grady County, the sandstones of this lower section become red, progressively finer grained, and moderately hard to hard.

The upper portion of the unit is known as "The Purple Series" in Stephens and Grady Counties. Here, some 80 feet of soft purple sandstone, 50 feet of soft pink sandstones, and 50 feet of moderately soft purple mudstone conglomerate are present in descending order. Westward, in Comanche and southern Caddo counties, the sandstones grade into red shales with minor amounts of gypsum and siltstones. Locally, in southeastern Grady County, near Cox City, a few sandstone beds in the upper portion are hard, limy, and occur in beds up to seven feet thick.

The unit thickens northward from 420 feet in Stephens County to 460 feet in Western Caddo County to 660 feet in northern Grady County.

The El Reno unit outcrops in a four to eight-mile-wide northwest-southeast band across southern Caddo, northeastern Comanche, and northwestern Stephens Counties. The outcrop then circles the southeastern end of the Anadarko basin in northern Stephens County and covers a broad area up to eighteen miles wide across northeastern Stephens and Grady Counties of Division 7. In Grady and eastern Caddo Counties, north of T4N, the upper 0 to 230 feet is mapped separately as the Dog Creek-Blaine subunits undifferentiated. Northward, in Division 4, and westward from Caddo County, in Division 5, the rock strata of the El Reno unit are separable and are mapped as the Flowerpot, Blaine, and Dog Creek units.

Topographically, the unit generally forms rolling hills with a pronounced escarpment at the base in Stephens and southern Grady Counties where the sandstones are thickest. Northwestward, the topography is rolling with gently rolling topography dominant in western Caddo County where the shales are thickest. The sandstone ridges are usually marked by oak vegetation and erosional gullies in the sandy soils. The shales generally form the valleys and gently rolling hills and support the growth of short grass. Some mesquite and prickly pear are evident in the salty or gypsiferous areas.

OKLAHOMA GEOLOGICAL SURVEY

According to the hydrologic atlas, all the cut sections are underlain by the **Duncan** Sandstone (Pd) of the Permian-aged El Reno Group. The geologic deposit and formation are described therein as follows:

Duncan Sandstone: **Sandstone**, white to buff, fine to coarse grained, **moderately indurated**, **with interbedded mudstone conglomerates and siltstone**; thickness, 100 to 400 feet, decreasing southeastward. Yields small to moderate amounts of water of fair quality.

Subsurface Conditions

Information collected during this investigation indicates that the overburden consisted of clays with varying amounts of sand, sands with varying amounts of silt and clay and silt with varying amounts of sand that extended from the surface to the top of bedrock. Bedrock was encountered in all borings except for CW-16, CW-19 to 21, CW-23, CW-41 and CW-56. The overburden materials, including the sandstone rock, appeared to be native to the site.

The bedrock consisted of sandstone in all the borings discussed in this report, except for CW-27, with slight variations in color. Boring CW-27 had a layer shale bedrock below the sandstone bedrock. The approximate depths and types of bedrock are summarized in Table 2.

Table 2 – Depth & Type of Bedrock

Boring	Station	CRL Offset (feet)	Depth to Bedrock (feet)	Elevation (feet)	Туре
CW-1	652+70	50' LT	6	1218	Sandstone
CW-2	652+70	9' RT	5	1221	Sandstone
CW-3	654+00	50' LT	0.5	1227.5	Sandstone
CW-4	655+00	50' LT	5.5	1224.5	Sandstone
CW-5	655+00	9' RT	7.5	1224.5	Sandstone
CW-6	656+00	50' LT	6	1220	Sandstone
CW-7	657+00	46' LT	5.5	1216.5	Sandstone
CW-8	657+00	5' RT	7	1216	Sandstone
CW-9	668+00	50' LT	5.5	1199.5	Sandstone
CW-10	668+00	6' RT	6	1200	Sandstone
CW-11	670+00	45' LT	5.5	1197.5	Sandstone
CW-12	670+00	19' RT	6	1201	Sandstone
CW-13	676+00	50' LT	10.5	1203.5	Sandstone

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CW-14 682+59 95' LT 20 1171.5 Sandstone CW-15 718+00 54' LT 5.5 1127.5 Sandstone CW-17 718+00 20' LT 5 1124 Sandstone CW-18 720+00 5' RT 10.5 1116.5 Sandstone CW-22 720+00 5' RT 10.5 1116.5 Sandstone CW-24 722+15 55' LT 6 1135 Sandstone CW-25 766+00 50' LT 8.5 1134.5 Sandstone CW-26 766+00 5' RT 36 1120 Shale CW-27 768+00 5' RT 36 1120 Shale CW-28 770+00 50' LT 5 1137.5 Sandstone CW-29 770+30 15' RT 10 1133 Sandstone CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 50' LT 8.2 1163.5 <						
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CW-27 768+00 50' LT 6 1150 Sandstone CW-28 770+00 5' RT 36 1120 Shale CW-28 770+00 50' LT 5 1137.5 Sandstone CW-29 770+30 15' RT 10 1133 Sandstone CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandst	CW-25	766+00	50' LT	8.5	1134.5	Sandstone
CW-27 768+00 5' RT 36 1120 Shale CW-28 770+00 50' LT 5 1137.5 Sandstone CW-29 770+30 15' RT 10 1133 Sandstone CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-40 827+00 55' LT 7 1181 Sand	CW-26	766+00	15' RT	4.5	1150.5	Sandstone
CW-28 770+00 5 RI 36 1120 Shale CW-28 770+00 50' LT 5 1137.5 Sandstone CW-29 770+30 15' RT 10 1133 Sandstone CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-40 827+00 5' LT 7 1181 Sandst	C\M 27	768+00	50' LT	6	1150	Sandstone
CW-29 770+30 15' RT 10 1133 Sandstone CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-38 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 5' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171	CVV-21	768+00	5' RT	36	1120	Shale
CW-30 772+00 50' LT 6 1121 Sandstone CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-38 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 5' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 5' LT 11 1166 S	CW-28	770+00	50' LT	5	1137.5	Sandstone
CW-31 772+00 0 5 1122 Sandstone CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-37 823+00 5' LT 11 1178 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-42 829+00 5' LT 11 1166	CW-29	770+30	15' RT	10	1133	Sandstone
CW-32 774+00 50' LT 8.2 1163.5 Sandstone CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-36 823+00 5' LT 13.5 1171.5 Sandstone CW-37 823+00 5' LT 11 1178 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-40 827+00 5' LT 6 1171 Sandstone CW-42 827+00 5' LT 11 1166 Sandstone CW-43 829+00 5' LT 4.5 1169.5	CW-30	772+00	50' LT	6	1121	Sandstone
CW-33 774+00 10' RT 10 1162 Sandstone CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-40 827+00 5' LT 6 1171 Sandstone CW-42 827+00 5' LT 11 1166 Sandstone CW-42 827+00 5' LT 11 1166 Sandstone CW-42 827+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5	CW-31	772+00	0	5	1122	Sandstone
CW-34 775+89 50' LT 5.5 1175.5 Sandstone CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-43 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163	CW-32	774+00	50' LT	8.2	1163.5	Sandstone
CW-35 775+89 9' RT 6 1174 Sandstone CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-43 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-48 835+00 54' LT 10.5 1153.5	CW-33	774+00	10' RT	10	1162	Sandstone
CW-36 823+00 73' LT 8.5 1176.5 Sandstone CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-43 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-48 835+00 54' LT 10.5 1153.5	CW-34	775+89	50' LT	5.5	1175.5	Sandstone
CW-37 823+00 5' LT 13.5 1171.5 Sandstone CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5	CW-35	775+89	9' RT	6	1174	Sandstone
CW-38 825+25 55' LT 11 1178 Sandstone CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5	CW-36	823+00	73' LT	8.5	1176.5	Sandstone
CW-39 825+25 6' LT 13.5 1175.5 Sandstone CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4 1171 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5	CW-37	823+00	5' LT	13.5	1171.5	Sandstone
CW-40 827+00 55' LT 7 1181 Sandstone CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-44 829+00 5' LT 4 1171 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 <	CW-38	825+25	55' LT	11	1178	Sandstone
CW-42 827+00 5' LT 6 1171 Sandstone CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5	CW-39	825+25	6' LT	13.5	1175.5	Sandstone
CW-43 829+00 55' LT 11 1166 Sandstone CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-40	827+00	55' LT	7	1181	Sandstone
CW-44 829+00 5' LT 4.5 1169.5 Sandstone CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-42	827+00	5' LT	6	1171	Sandstone
CW-45 830+50 48' LT 4 1171 Sandstone CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-43	829+00	55' LT	11	1166	Sandstone
CW-46 831+00 1' LT 4 1163 Sandstone CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-44	829+00	5' LT	4.5	1169.5	Sandstone
CW-47 834+00 41' LT 3 1157 Sandstone CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-45	830+50		4	1171	Sandstone
CW-48 835+00 54' LT 10.5 1153.5 Sandstone CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-46	831+00	1' LT	4	1163	Sandstone
CW-49 836+00 66' LT 3.5 1151.5 Sandstone CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-47		41' LT	3	1157	Sandstone
CW-50 847+00 55' RT 5.5 1149.5 Sandstone CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-48	835+00	54' LT	10.5	1153.5	Sandstone
CW-51 849+00 50' RT 3.5 1142.5 Sandstone CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-49	836+00	66' LT	3.5	1151.5	Sandstone
CW-52 850+00 10' LT 6 1142 Sandstone CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-50	847+00	55' RT	5.5	1149.5	Sandstone
CW-53 850+00 50' RT 2.5 1116.5 Sandstone CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-51	849+00	50' RT	3.5	1142.5	Sandstone
CW-54 852+00 20' LT 3.5 1112.5 Sandstone	CW-52	850+00	10' LT	6	1142	Sandstone
	CW-53	850+00	50' RT	2.5	1116.5	Sandstone
CW-55 852+00 20' RT 5 1121 Sandstone	CW-54	852+00	20' LT	3.5	1112.5	Sandstone
	CW-55	852+00	20' RT	5	1121	Sandstone

The rippability of bedrock is discussed in the *Rippability of Bedrock* section of this report. Subsurface conditions are described in greater detail on the Boring Logs in Appendix A.

Groundwater Conditions

Groundwater conditions were monitored in the borings during and immediately following the completion of drilling activities. The approximate groundwater levels are summarized in Table 3. Borings not mentioned in Table 3 did not encounter groundwater during or immediately after drilling. All the borings remained open (did not cave in) following drilling, other than boring CW-15. Boring CW-15 caved in at 8 feet immediately following drilling.

Table 3 - Groundwater Levels

		CDI Offeet	<u>Durin</u>	<u>During Drilling</u>		After Drilling		
Boring	Station	CRL Offset (feet)	Depth (feet)	Elevation (feet)	Hours After	Depth (feet)	Elevation (feet)	
CW-14	682+59	95' LT	23	1168.5	0	21	1170.5	
CW-15	718+00	54' LT	8	1125	0	8	1125	
CW-24	770+00	50' LT	15	1123	0	16.5	1124.5	
CW-27	772+00	0	38	1118	0	20	1136	
CW-38	829+00	55' LT	26	1163	0	26	1163	
CW-45	847+00	55' RT	10	1165	0	12	1163	
CW-54	874+00	46' RT	19	1097	0	19	1097	
CVV-04	01 4 ±00	40 KI	19	1091	24	12	1104	

Based on the borings, groundwater is expected to be encountered during excavation in the areas of cut section 3 (CW-15), cut section 4 (CW-24 and CW-27), cut section 6 (CW-45) and cut section 7 (CW-54). Long term seepage could occur in these areas where the excavation slope intercepts the groundwater. Measures should be taken to intercept the groundwater and direct the discharge to a suitable drainage area.

To obtain more accurate groundwater level information, long-term observations in a well or piezometer that is sealed from the influence of surface water would be needed. Fluctuations in groundwater levels can occur due to seasonal variations in the amount of rainfall, runoff, altered drainage paths, and other factors not evident at the time borings were advanced. Consequently, the contractor should be aware of these possibilities while constructing this project.

RIPPABILITY OF BEDROCK

Very poorly cemented to very well cemented sandstone bedrock and hard shale was encountered in the borings and are summarized in Table 4. Difficulties in excavating due to the hardness of the bedrock should be anticipated for this project. Generally, this project appears to have alternating layers of both rippable and non-rippable bedrock. Borings not shown in Table 4 did not encounter bedrock within the proposed cut depth.

Table 4 - Hardness of Bedrock Materials

		-		-			-	-
Boring	Station	CRL Offset (feet)	Depth of Bedrock (feet)	Elevation (feet)	Туре	TCP Value (in/100 blows)	Hardness	Rippability*
CW-1	652+70	50' LT	6-10	1218-1214	Sandstone	2.3	Cemented	Rippable
CVV-1	032+70	30 L1	10-13	1214-1211	Sandstone	1.3-1.8	Well cemented	Non-rippable
			5-9	1221-1217	Sandstone	6	Poorly cemented	Rippable
CW-2	652+70	9' RT	9-12	1217-1214	Sandstone	9	Very poorly cemented	Rippable
			12	1214	Sandstone	3.5	Poorly cemented	Rippable
			0.5-16	1227.5-1212	Sandstone	6.8-10.8	Very poorly cemented	Rippable
CW-3	654+00	50' LT	16-21	1212-1207	Sandstone	1.3	Well cemented	Non-rippable
OVV-3	034100	30 L1	21-26	1207-1202	Sandstone	0.9	Very well cemented	Non-rippable
			26-31	1202-1197	Sandstone	1-1.1	Well cemented	Non-rippable
			5.5-10	1224.5-1220	Sandstone	6	Poorly cemented	Rippable
CW-4	655+00	50' LT	10-15	1220-1215	Sandstone	6+	Very poorly cemented	Rippable
			15-29	1215-1201	Sandstone	1-1.5	Well cemented	Non-rippable
			29	1201	Sandstone	2.3	Cemented	Rippable
			7.5-13	1224.5-1219	Sandstone	4.4	Poorly cemented	Rippable
CW-5	655+00	9' RT	13-18	1219-1214	Sandstone	2.3	Cemented	Rippable
			18	1214	Sandstone	1.3	Well cemented	Non-rippable
CW-6	656+00	50' LT	6-10	1220-1216	Sandstone	8	Very poorly cemented	Rippable
			10-25	1216-1201	Sandstone	1-1.3	Well cemented	Non-rippable
			5.5-10	1216.5-1212	Sandstone	2.9	Cemented	Rippable
CW-7	657+00	46' LT	10-13	1212-1209	Sandstone	1.1	Well cemented	Non-rippable
			13	1209	Sandstone	5.3	Poorly cemented	Rippable
CW-8	657+00	5' RT	7-12	1216-1211	Sandstone	4.3	Poorly cemented	Rippable
•			12	1211	Sandstone	2.5	Cemented	Rippable
CW-9	668+00	50' LT	5.5-10	1199.5-1195	Sandstone	2	Well cemented	Rippable
OVV-9 000100	O OO LI	10-20	1195-1185	Sandstone	1.1-1.8	Well cemented	Non-rippable	

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CW-10	668+00	6' RT	6-9	1200-1197	Sandstone	1.5-1.8	Well cemented	Non-rippable
CW-11	670+00	45' LT	5.5-7	1197.5-1196	Sandstone	2	Well cemented	Rippable
CW-12	670+00	19' RT	6-7	1201-1200	Sandstone	1	Well cemented	Non-rippable
			10.5-15	1203.5-1199	Sandstone	2.4	Cemented	Rippable
CW-13	676+00	50' LT	15-20	1199-1194	Sandstone	2	Well cemented	Rippable
			20-25	1194-1189	Sandstone	0.8-0.9	Very well cemented	Non-rippable
0)4/ 4.4	000 - 50	0511.7	20-25.5	1171.5-1166	Sandstone	1.4	Well cemented	Non-rippable
CW-14	682+59	95' LT	25.5	1166	Sandstone	0.4	Very well cemented	Non-rippable
0)4/ 45	740.00	- 41	5.5-9	1127.5-1124	Sandstone	1.8	Well cemented	Non-rippable
CW-15	718+00	54' LT	9	1124	Sandstone	0.6	Very well cemented	Non-rippable
CW-17	720+00	50' LT	5-15	1124-1114	Sandstone	3-3.3	Poorly cemented	Rippable
			15-19	1114-1110	Sandstone	1.3	Well cemented	Non-rippable
CW-18	720+00	5' RT	6-6.5	1121-1120.5	Sandstone	3.5	Poorly cemented	Rippable
CW-22	768+00	50' LT	10.5-12	1116.5-1115	Sandstone	3.8	Poorly cemented	Rippable
			6-10	1135-1131	Sandstone	5.1	Poorly cemented	Rippable
			10-15	1131-1126	Sandstone	2.8	Cemented	Rippable
CW-24	770+00	50' LT	15-20	1126-1121	Sandstone	1.2	Well cemented	Non-rippable
			20-25	1121-1116	Sandstone	3.5	Poorly cemented	Rippable
			25-30	1116-1111	Sandstone	1.2-1.5	Well cemented	Non-rippable
			8.5-15	1134.5-1128	Sandstone	2.8	Cemented	Rippable
CW-25	770+30	15' RT	15-20	1128-1123	Sandstone	0.6	Very well cemented	Non-rippable
			20	1123	Sandstone	2.5	Cemented	Rippable
			4.5-10	1150-1144.5	Sandstone	5	Poorly cemented	Rippable
014/00	=== 00	=0.1. =	10-15	1144.5-1139.5	Sandstone	2.8	Cemented	Rippable
CW-26	772+00	50' LT	15-35	1139.5-1129.5	Sandstone	0.5-0.8	Very well cemented	Non-rippable
			35-45	1129.5-1109.5	Sandstone	1.2-1.4	Well cemented	Non-rippable
			6-10	1150-1146	Sandstone	6.5	Very poorly cemented	Rippable
			10-15	1146-1141	Sandstone	1	Well cemented	Non-rippable
CW-27	772+00	0	15-20	1141-1136	Sandstone	0.8	Very well cemented	Non-rippable
CVV-21	112700	U	20-25	1136-1131	Sandstone	2.5	Cemented	Rippable
			25-30	1131-1126	Sandstone	0.6	Very well cemented	Non-rippable
			25-30 30-36	1126-1120	Sandstone	1-1.5	cemented Well cemented	Non-rippable
			25-30 30-36 36-40	1126-1120 1120-1116	Sandstone Shale	1-1.5 1.3	cemented Well cemented Hard	Non-rippable
			25-30 30-36 36-40 5-10	1126-1120 1120-1116 1137.5-1132.5	Sandstone Shale Sandstone	1-1.5 1.3 2.1	cemented Well cemented Hard Cemented	Non-rippable
		50' I T	25-30 30-36 36-40	1126-1120 1120-1116	Sandstone Shale	1-1.5 1.3	cemented Well cemented Hard	Non-rippable
CW-28	774+00	50' LT	25-30 30-36 36-40 5-10	1126-1120 1120-1116 1137.5-1132.5	Sandstone Shale Sandstone	1-1.5 1.3 2.1	cemented Well cemented Hard Cemented	Non-rippable Non-rippable Rippable
		50' LT	25-30 30-36 36-40 5-10 10-20	1126-1120 1120-1116 1137.5-1132.5 1132.5-1122.5	Sandstone Shale Sandstone Sandstone	1-1.5 1.3 2.1 1.3-1.8	cemented Well cemented Hard Cemented Well cemented	Non-rippable Non-rippable Rippable Non-rippable

SH 29 Cut Analysis – West Phase II Stephens County, Oklahoma 29657(04) RRC Project No. 18043 April 30, 2024

			30	1112.5	Sandstone	0.8	Very well cemented	Non-rippable
			10-15	1133-1128	Sandstone	1.3	Well cemented	Non-rippable
CW-29	774+00	10' RT	15-18	1128-1125	Sandstone	4	Poorly cemented	Rippable
			18	1125	Sandstone	1	Well cemented	Non-rippable
CW-30	775+89	50' LT	6-7	1121-1120	Sandstone	1	Well cemented	Non-rippable
CW-31	775+89	9' RT	5-5.5	1122-1121.5	Sandstone	5.5	Poorly cemented	Rippable
CW-32	823+00	73' LT	8.5-12	1163.5-1160	Sandstone	1.5	Well cemented	Non-rippable
OW-02	020.00	70 [1	12	1160	Sandstone	3.4	Poorly cemented	Rippable
			5.5-10	1175.5-1171	Sandstone	3.3	Poorly cemented	Rippable
CW-34	825+25	55' LT	10-15	1171-1166	Sandstone	2.6	Cemented	Rippable
			15	1166	Sandstone	4.5	Poorly cemented	Rippable
CW-35	825+25	6' LT	6-11	1174-1169	Sandstone	2.3	Cemented	Rippable
OW-00	020.20	O LI	11	1169	Sandstone	4.3	Poorly cemented	Rippable
CW-36	827+00	55' LT	8.5-16	1176.5-1169	Sandstone	1-1.3	Well cemented	Non-rippable
			11-16	1178-1173	Sandstone	4.1	Poorly cemented	Rippable
			16-21	1173-1168	Sandstone	2.2	Cemented	Rippable
CW-38	829+00	55' LT	21-26	1168-1163	Sandstone	1.9	Well cemented	Non-rippable
			26-28	1163-1161	Sandstone	5.1	Poorly cemented	Rippable
			28	1161	Sandstone	1.8	Well cemented	Non-rippable
CW-39	829+00	5' LT	13.5-14	1175.5-1175	Sandstone	3.5	Poorly cemented	Rippable
CW 40	020+50	48' LT	7-12	1181-1176	Sandstone	0.4	Very well cemented	Non-rippable
CW-40	830+50	46 L1	12-17	1176-1171	Sandstone	1.8	Well cemented	Non-rippable
			17	1171	Sandstone	2.1	Cemented	Rippable
CW-42	834+00	41' LT	6-6.3	1171-1170.7	Sandstone	2	Well cemented	Rippable
CW-43	835+00	54' LT	11-16	1166-1161	Sandstone	2.3	Cemented	Rippable
		· ·	16-17	1161-1160	Sandstone	1.4-1.8	Well cemented	Non-rippable
CW-45	847+00	55' RT	4-14.5	1171-1160.5	Sandstone	2.1-2.3	Cemented	Rippable
	 	00	14.5-29.5	1160.5-1145.5	Sandstone	1.1-1.5	Well cemented	Non-rippable
			4-14.5	1163-1152.5	Sandstone	1.3-1.5	Well cemented	Non-rippable
CW-46	849+00	50' RT	14.5-19.5	1152.5-1147.5	Sandstone	0.8	Very well cemented	Non-rippable
			19.5-24.5	1147.5-1142.5	Sandstone	2.3	Cemented	Rippable
			24.5	1142.5	Sandstone	1.4	Well cemented	Non-rippable
CW-47	850+00	10' LT	3-6	1157-1154	Sandstone	1	Well cemented	Non-rippable
O 11-41	000.00		6	1154	Sandstone	2	Well cemented	Rippable
CW-48	850+00	50' RT	10.5-12	1153.5-1152	Sandstone	2	Well cemented	Rippable
CW-49	852+00	20' LT	3.5-6	1151.5-1149	Sandstone	4.3-4.8	Poorly cemented	Rippable
CW-50	852+00	20' RT	5.5-11	1149.5-1144	Sandstone	3.8	Poorly cemented	Rippable
O 1 1 - 0 0	002.00	20 1(1	11-21	1144-1134	Sandstone	1-1.5	Well cemented	Non-rippable
CW-51	854+00	20' LT	3.5-4	1142.5-1142	Sandstone	2.3	Cemented	Rippable

SH 29 Cut Analysis – West Phase II Stephens County, Oklahoma 29657(04) RRC Project No. 18043 April 30, 2024

CW-52	854+00	50' RT	6-8	1142-1140	Sandstone	4.5	Poorly cemented	Rippable	
CVV-32	034+00	30 KT	8	1140	Sandstone	2.1	Cemented	Rippable	
CW-53	874+00	3' RT	2.5-6	1116.5-1113	Sandstone	2.8	Cemented	Rippable	
CVV-33	074+00	3 1(1	6	1113	Sandstone	1.1	Well cemented	Non-rippable	
			3.5-9	1112.5-1107	Sandstone	4.1	Poorly cemented	Rippable	
				9-14	1107-1102	Sandstone	2.1	Cemented	Rippable
CW-54	874+00	46' RT	14-19	1102-1097	Sandstone	0.6	Very well cemented	Non-rippable	
			19-21	1097-1095	Sandstone	1-1.3	Well cemented	Non-rippable	
CW-55	876+00	3' LT	5-9	1121-1117	Sandstone	2-2.8	Cemented	Rippable	

*"Rippable" is generally defined as a sedimentary rock with a penetration of 2 inches or more per 100 blows of the TCP test and can typically be excavated with normal excavating equipment. Hardness of bedrock and corresponding rippability can be variable between tests within each boring, between borings or in relatively short distances.

Generally, sedimentary rock which have a penetration of 2 inches or more per 100 blows of the Texas Cone Penetrometer (TCP) test can typically be excavated with normal excavating equipment. The TCP tests that resulted in a penetration of less than 2 inches is assumed to be the massive basal sandstone mentioned below that is considered non-rippable. Generally, this project appears to have alternating layers of both rippable and non-rippable bedrock. The non-rippable sandstone was encountered within the proposed cut section depths in borings CW-1, CW-3, CW-4, CW-6, CW-7, CW-10, CW-12, CW-15, CW-24, CW-25, CW-26, CW-27, CW-28, CW-29, CW-30, CW-32, CW-36, CW-40, CW-45, CW-46 and CW-47. The borings with non-rippable sandstone within the proposed cut section depths are located in cut sections 1, 2, 3, 4, 5 and 6. The non-rippable sandstone appears to be relatively thick in cut sections 4, 5 and 6. Additional non-rippable areas not identified in the borings will likely be encountered in the cut sections because hardness of bedrock and corresponding rippability can be variable between tests within each boring, between borings or in relatively short distances.

It should also be noted the "Engineering Classification of Geologic Materials" manual published by the Oklahoma Department of Transportation (ODOT) indicates that the apparent rippability of the bedrock materials (as defined for the El Reno geologic unit in Stephens County) is "generally rippable; six feet thick massive basal sandstone is non-rippable". The ODOT publication also defines rippability as the susceptibility of a rock to be broken by a ripping device as pulled by a Caterpillar D9 or its equivalent.

MAXIMUM CUT SLOPES

The maximum soil slopes and rock slopes summarized in Table 5 are generally based on the maximum proposed cut depth for each cut section and the presence of groundwater within the cut depth. All soils in the cut sections should have a maximum vertical slope of 3:1. Where the vertical rock slope height is greater than 20 feet and/or groundwater was encountered within the cut depth, a maximum rock slope of 3:1 should be used. For vertical rock slope heights of less than 20 feet without groundwater, a maximum slope of 2 ½:1 should be used.

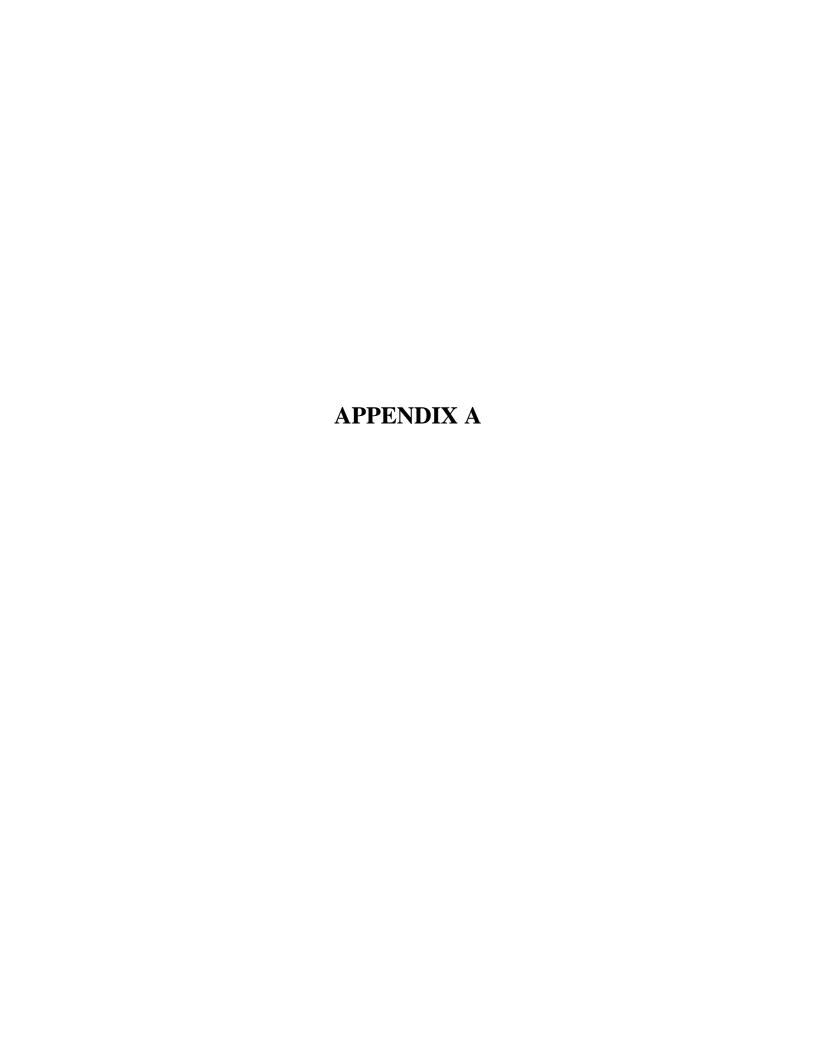
Table 5 – Maximum Cut Slopes for Soil and Bedrock

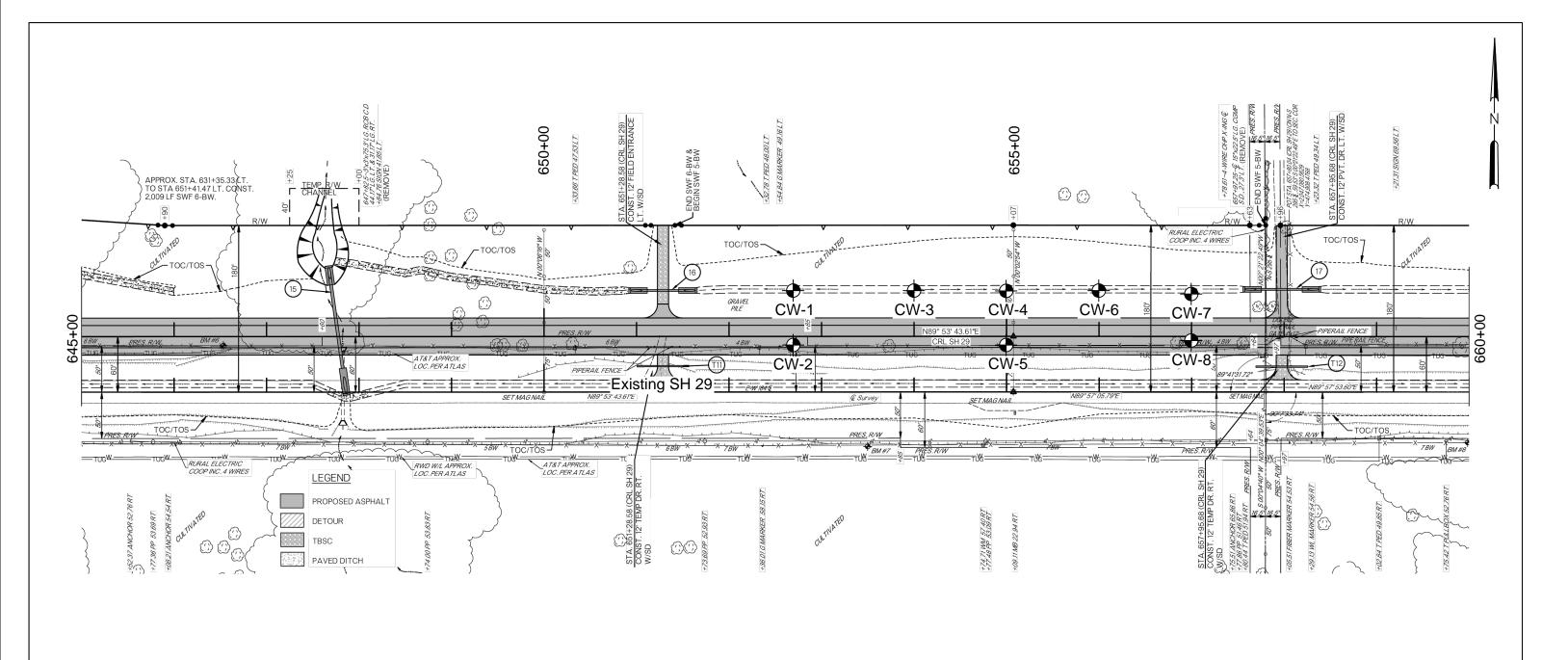
Cut Section	Station Extents	CRL Offset	Maximum Soil Slope	Maximum Rock Slope
1	652+00 to 661+00	LT	3:1	2 ½:1
2	668+00 to 682+59	LT	3:1	2 ½:1
3	718+00 to 723+00	LT	3:1	3:1
4	766+00 to 776+17	LT	3:1	3:1
5	823+00 to 836+00	LT	3:1	2 ½:1
6	842+00 to 855+00	RT	3:1	3:1
7	873+50 to 876+00	RT	3:1	3:1

CLOSURE

The data presented in this report are based on the negotiated scope for this project and site conditions as they existed at the time of the field exploration. The conditions encountered in the exploratory borings are representative subsurface conditions within the study area.

This report was prepared for the exclusive use of SRB, ODOT and their agents and consultants. It should be made available to prospective contractors for information and factual data only and not as a warranty of subsurface conditions similar to those interpreted from the boring logs or discussions presented herein.





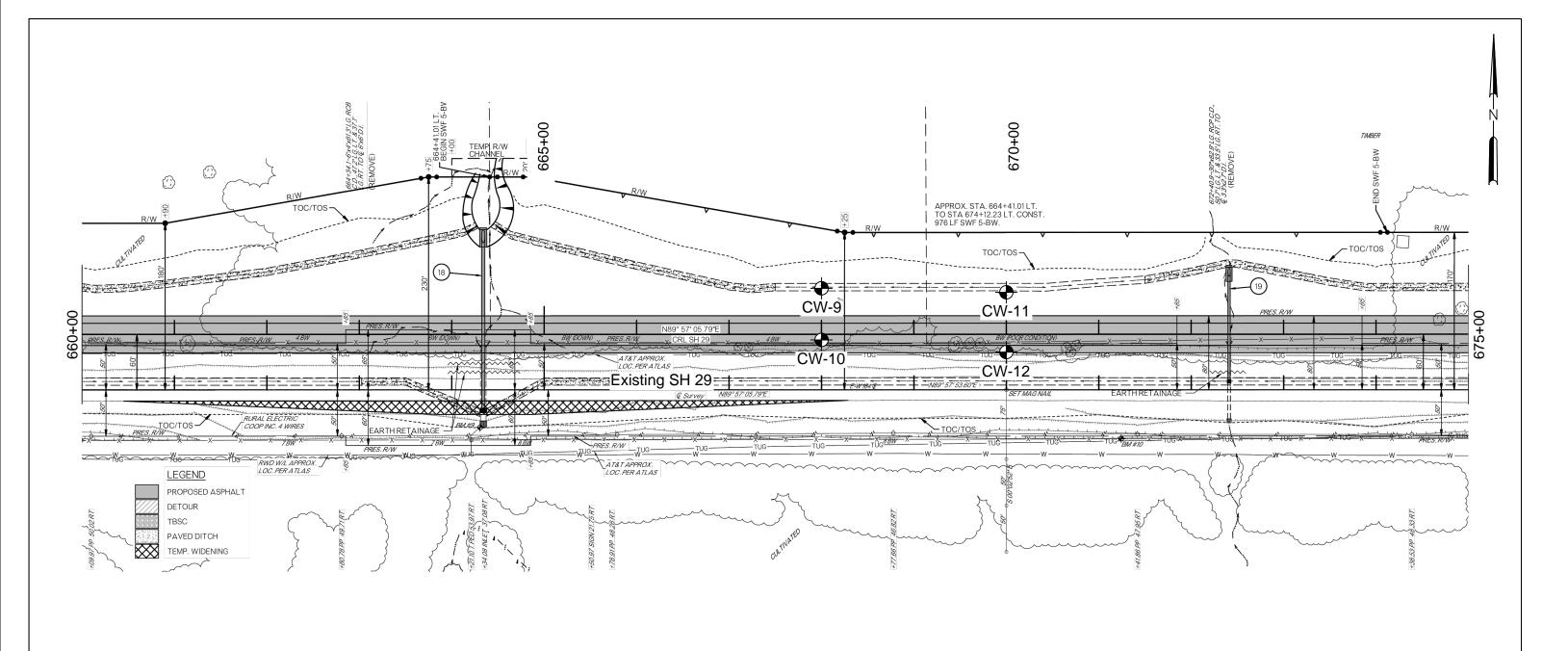
BORING LOCATIONS AND ELEVATIONS CRL Survey Offset Boring Elevation Station CW-1 652+70 50' left 1224' CW-2 652+70 9' right 1226' CW-3 654+00 1228' 50' left CW-4 655+00 50' left 1230' CW-5 655+00 9' right 1232' CW-6 656+00 1226' 50' left CW-7 657+00 46' left 1222' CW-8 657+00 5' right 1223'

Stations, offsets and elevations estimated from plans provided by SRB

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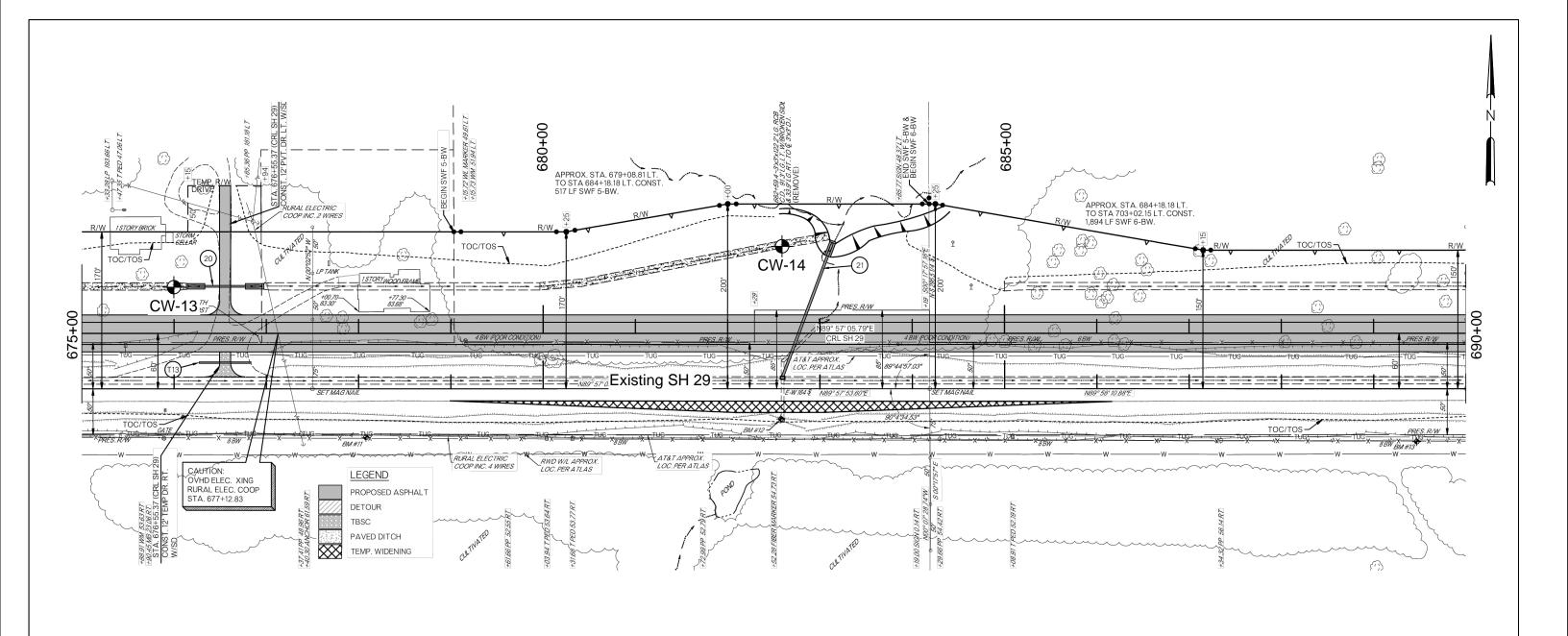
BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-9	668+00	50' left	1205'	
CW-10	668+00	6' right	1206'	
CW-11	670+00	45' left	1203'	
CW-12	670+00	19' right	1207'	

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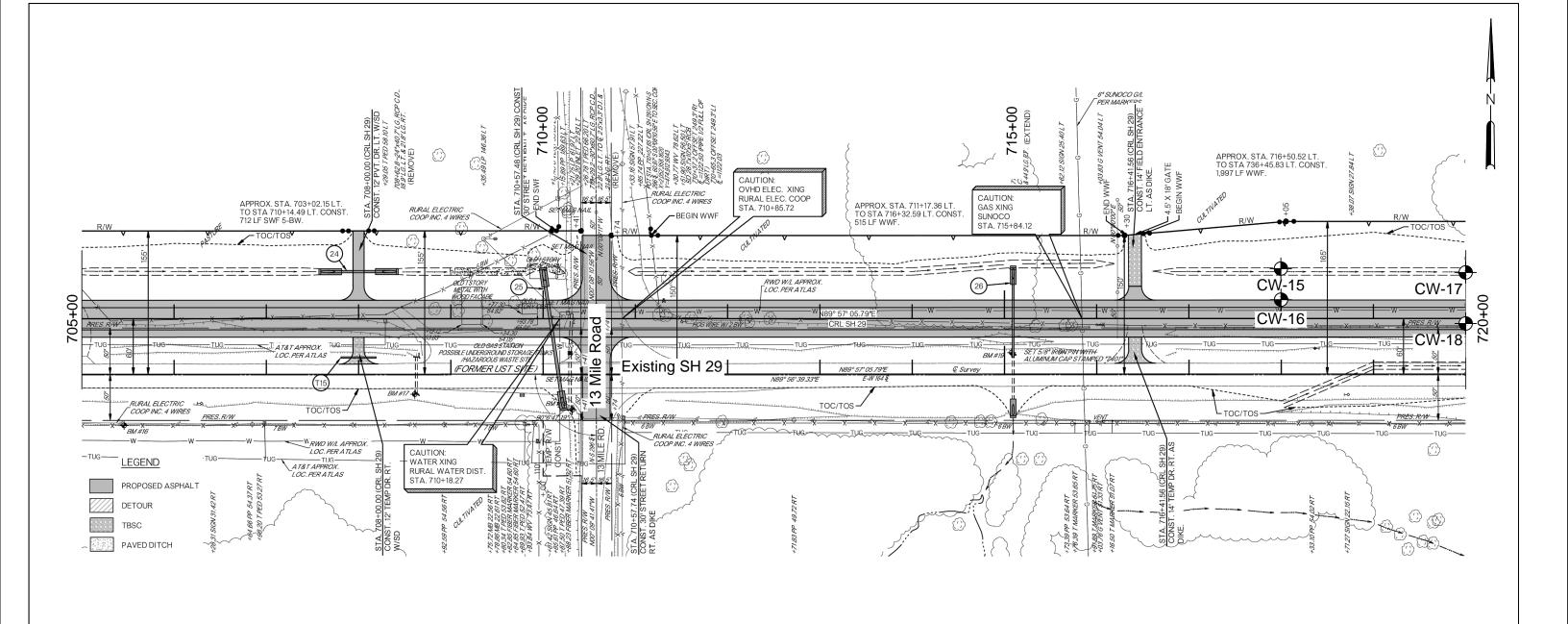
BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-13	676+00	50' left	1214'
CW-14	682+59	95' left	1191.5'

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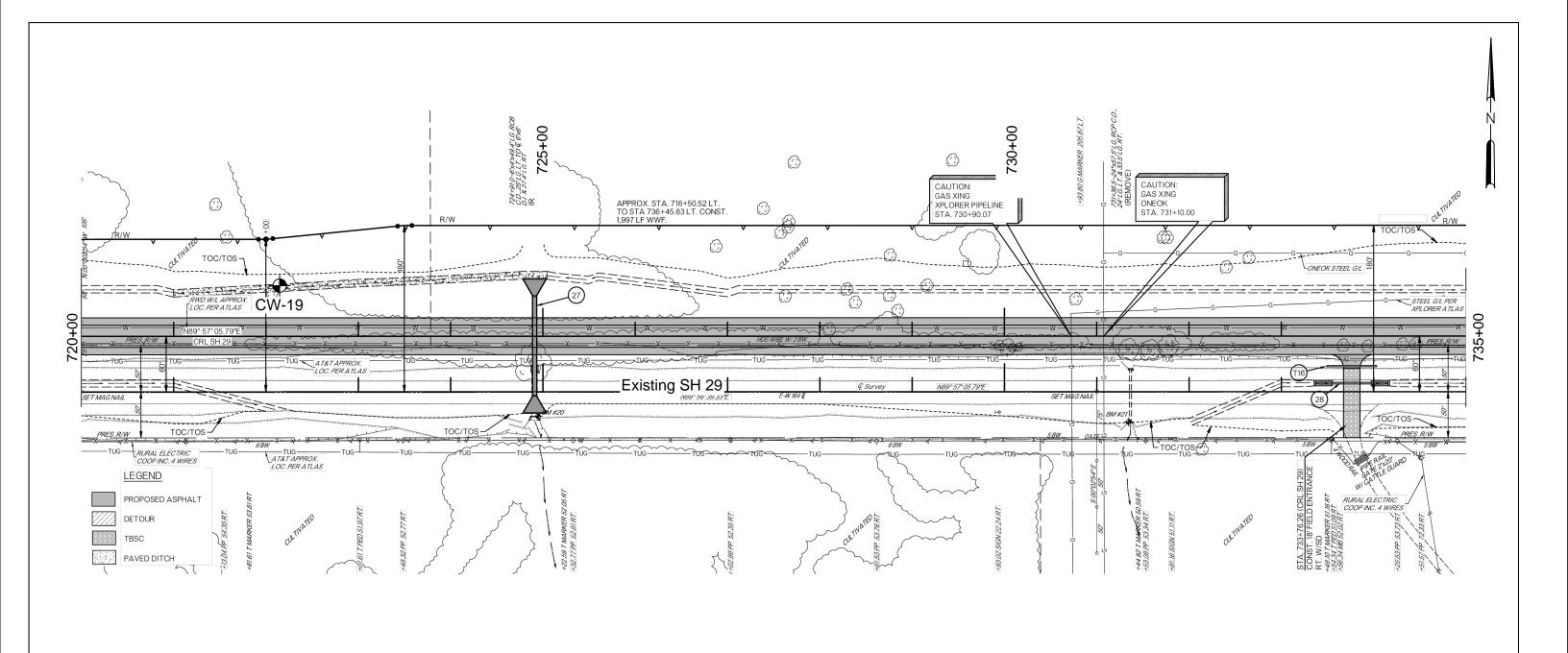
BORING LOCATIONS AND ELEVATIONS CRL Survey Offset Boring Elevation Station CW-15 718+00 54' left 1133' CW-16 718+00 20' left 1131' CW-17 720+00 50' left 1129' CW-18 720+00 5' right 1127'

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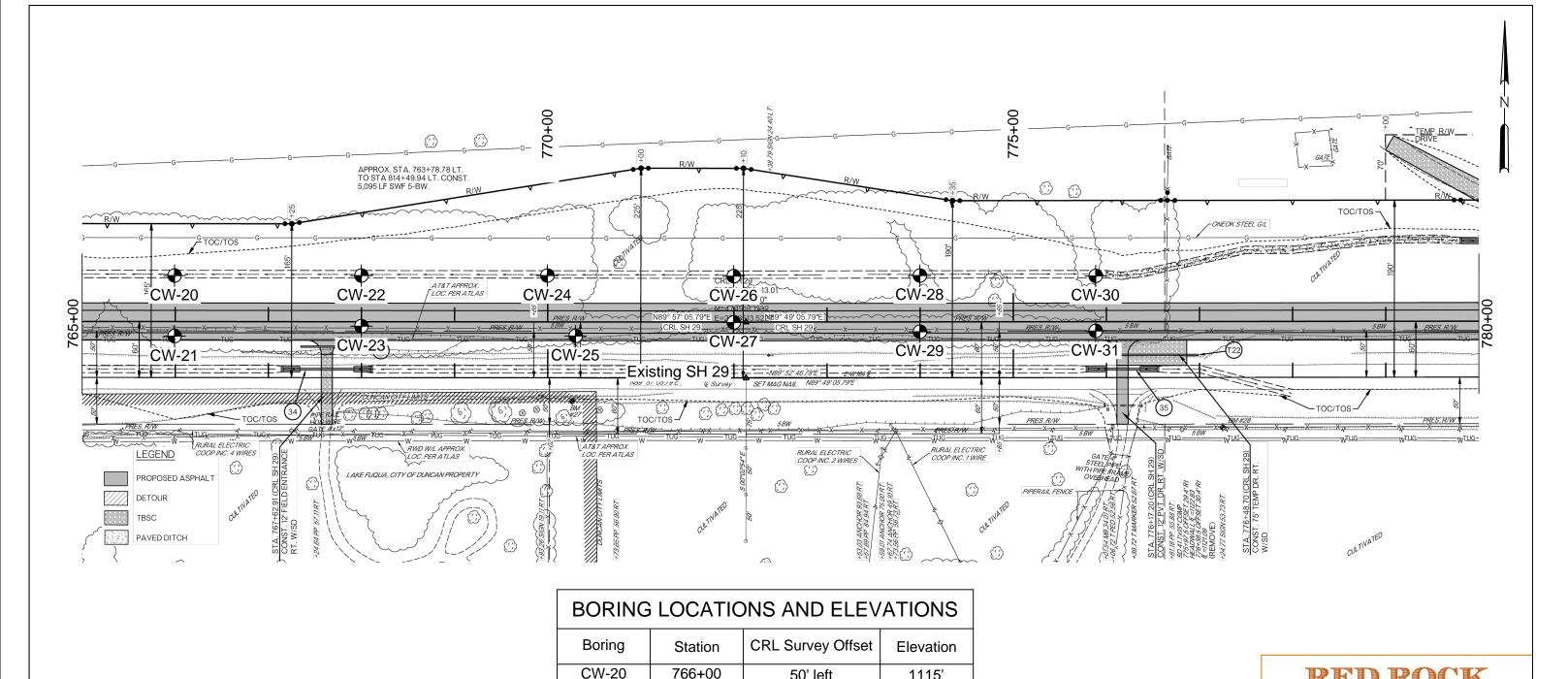
BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-19	722+15	55' left	1118'	

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50' left

15' right

50' left

5' right

50' left

15' right

50' left

0

50' left

10' right

50' left

9' right

Stations, offsets and elevations estimated from plans provided by SRB

1115'

1116'

1127'

1128'

1141'

1143'

1154.5'

1156'

1142.5'

1143'

1127'

1127

766+00

766+00

768+00

768+00

770+00

770+30

772+00

772+00

774+00

774+00

775+89

775+89

CW-21

CW-22

CW-23

CW-24

CW-25

CW-26

CW-27

CW-28

CW-29

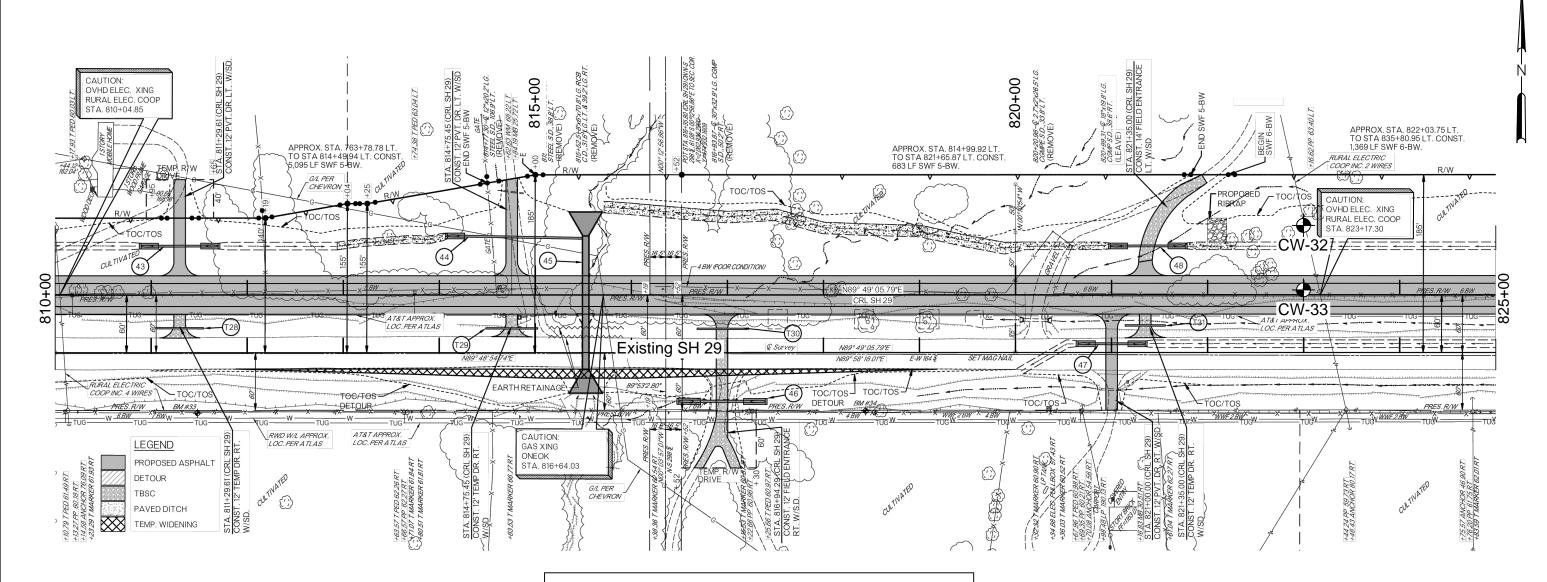
CW-30

CW-31

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BORING LOCATIONS AND ELEVATIONS

Boring	Station	CRL Survey Offset	Elevation
CW-32	823+00	73' left	1172'
CW-33	823+00	5' left	1172'

Stations, offsets and elevations estimated from plans provided by SRB

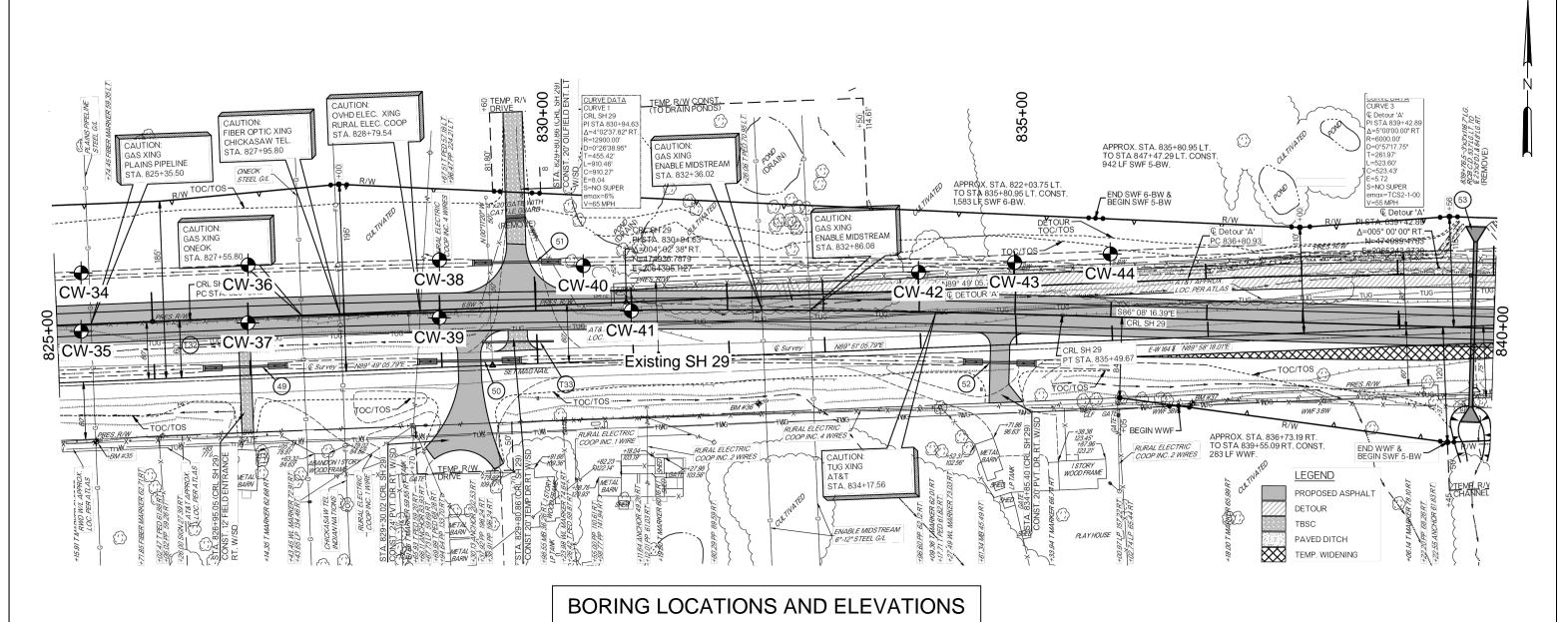
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BORING LOCATION DIAGRAM CUT ANALYSIS - WEST PHASE II STATE HIGHWAY 29 STEPHENS COUNTY, OKLAHOMA

29657(04)

Project Mngr:	EDC	Project No.	18043
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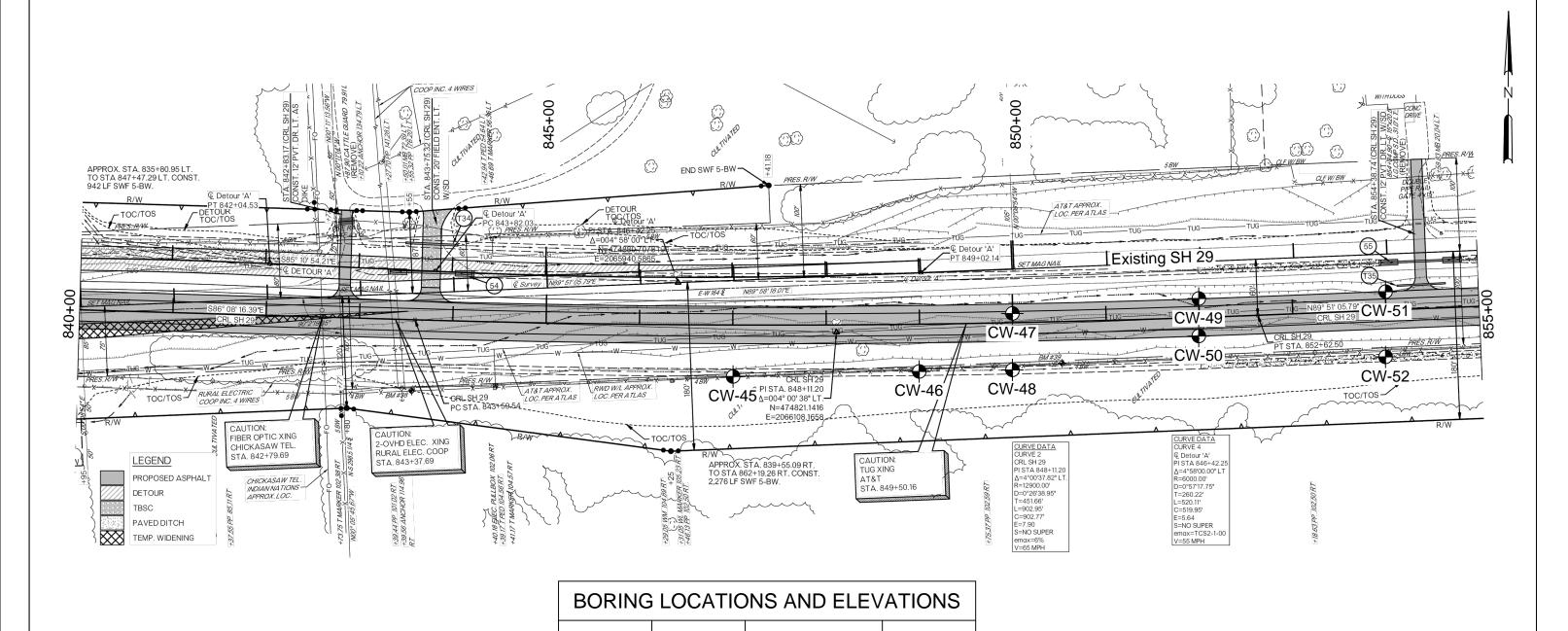
Boring	Station	CRL Survey Offset	Elevation
CW-34	825+25	55' left	1181'
CW-35	825+25	6' left	1180'
CW-36	827+00	55' left	1185'
CW-37	827+00	5' left	1185'
CW-38	829+00	55' left	1189'
CW-39	829+00	5' left	1189'
CW-40	830+50	48' left	1188'
CW-41	831+00	1' left	1183'
CW-42	834+00	41' left	1177'
CW-43	835+00	54' left	1177'
CW-44	836+00	66' left	1174'

Stations, offsets and elevations estimated from plans provided by SRB

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Boring Station **CRL Survey Offset** Elevation CW-45 847+00 55' right 1175' CW-46 849+00 50' right 1167' CW-47 850+00 10' left 1160'

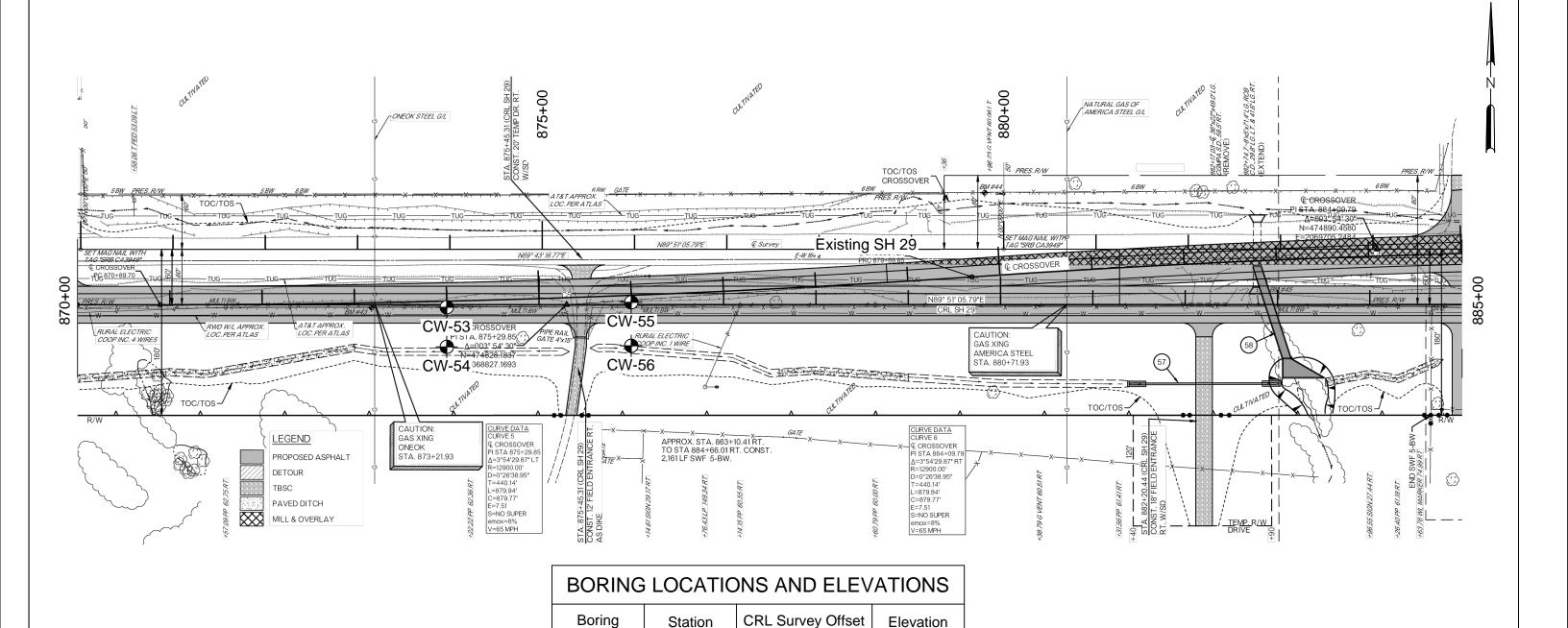
CW-48 850+00 50' right 1164' CW-49 852+00 20' left 1155' CW-50 852+00 20' right 1155' CW-51 854+00 20' left 1146' CW-52 854+00 50' right 1148'

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3' right

46' right

3' left

45' right

Stations, offsets and elevations estimated from plans provided by SRB

1119'

1116'

1126'

1123'

CW-53

CW-54

CW-55

CW-56

874+00

874+00

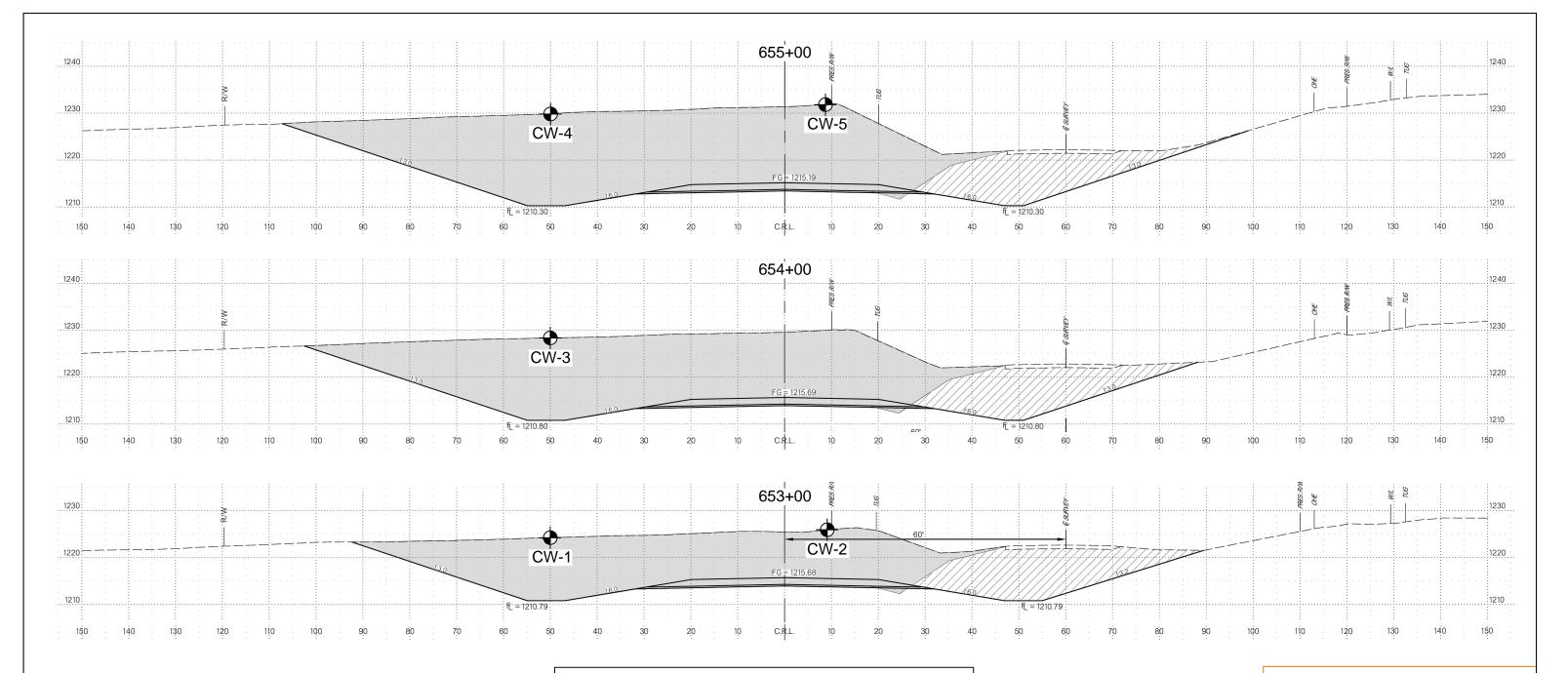
876+00

876+00

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BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-1	652+70	50' left	1224'	
CW-2	652+70	9' right	1226'	
CW-3	654+00	50' left	1228'	
CW-4	655+00	50' left	1230'	
CW-5	655+00	9' right	1232'	

Stations, offsets and elevations estimated from plans provided by SRB

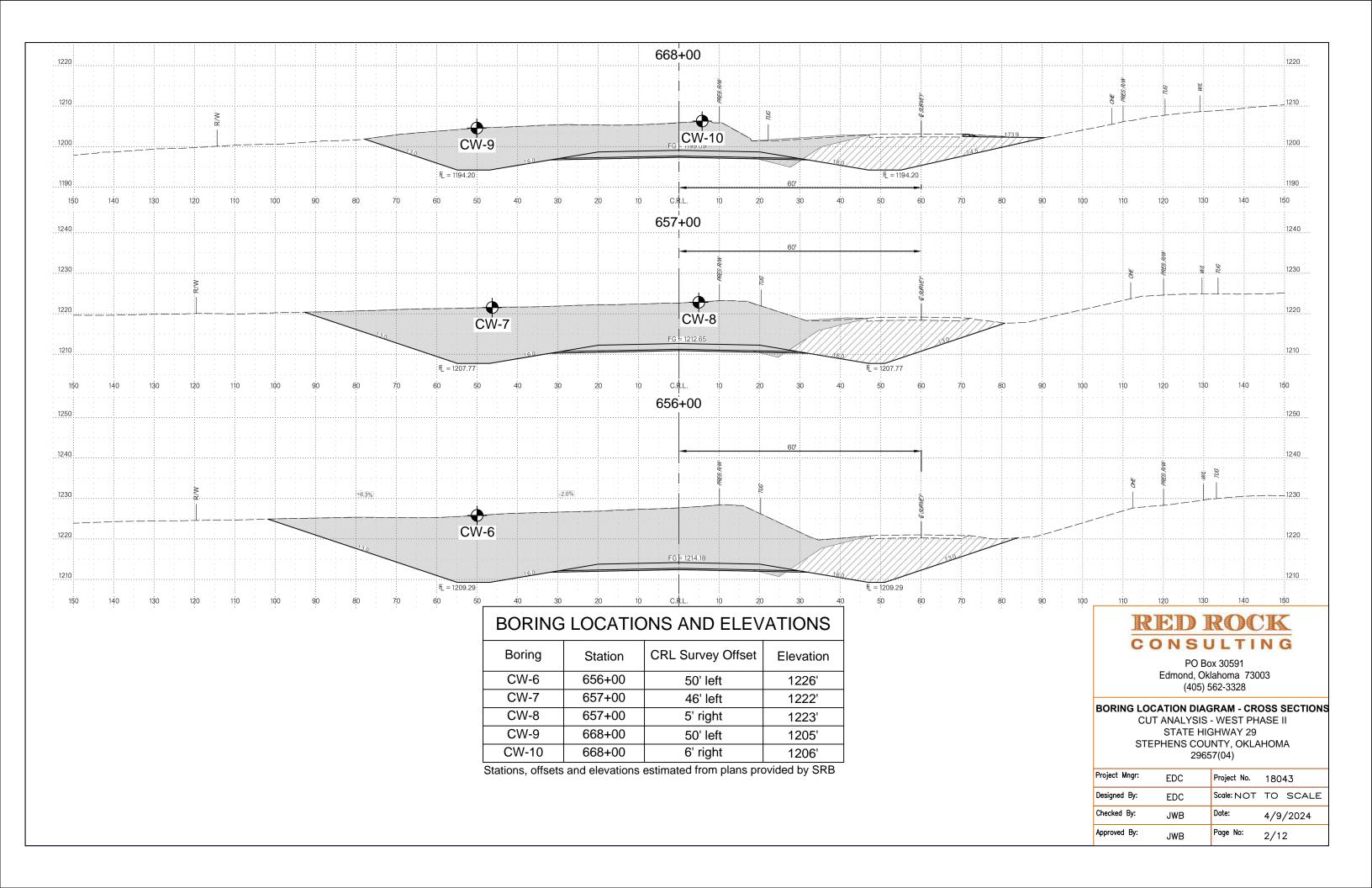
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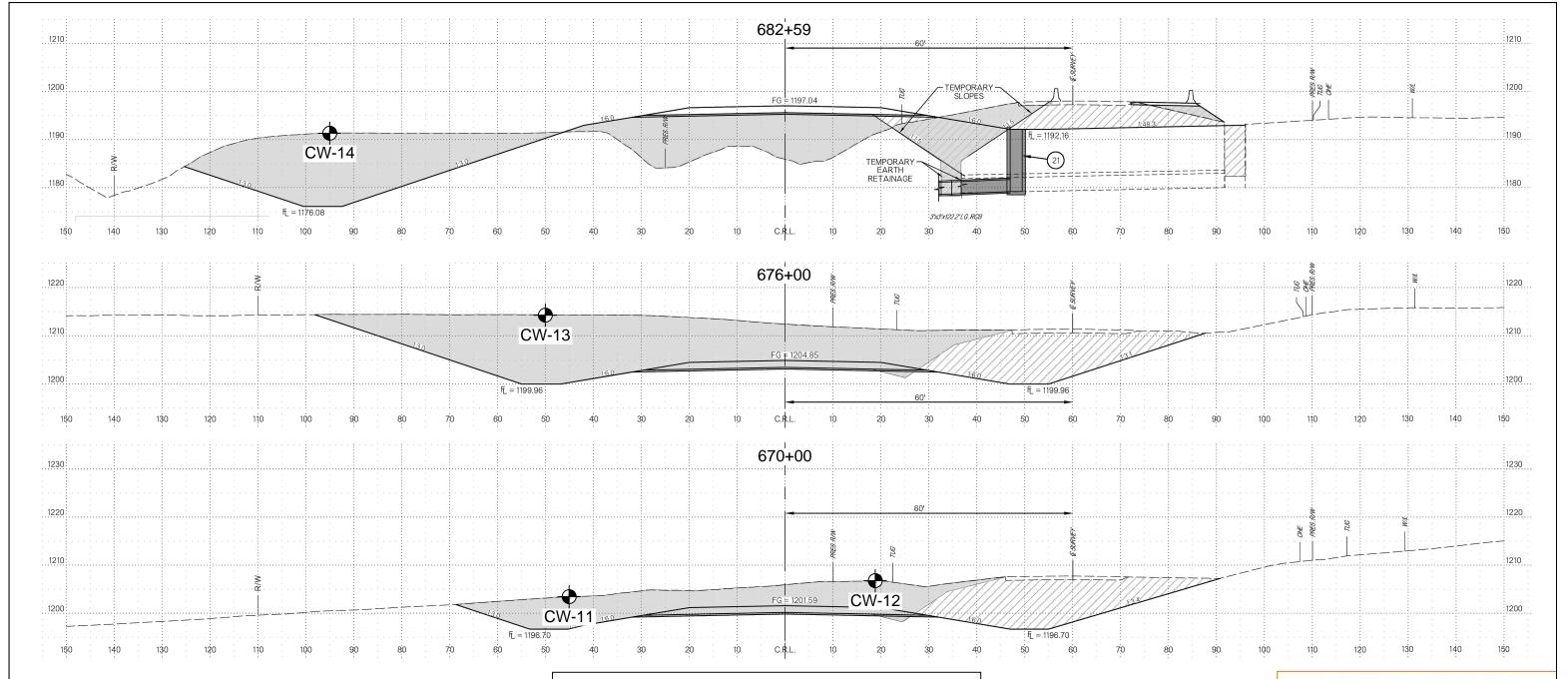
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BORING LOCATION DIAGRAM - CROSS SECTIONS

CUT ANALYSIS - WEST PHASE II STATE HIGHWAY 29 STEPHENS COUNTY, OKLAHOMA 29657(04)

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BORING LOCATIONS AND ELEVATIONS

Boring	Station	CRL Survey Offset	Elevation
CW-11	670+00	45' left	1203'
CW-12	670+00	19' right	1207'
CW-13	676+00	50' left	1214'
CW-14	682+59	95' left	1191.5'

Stations, offsets and elevations estimated from plans provided by SRB

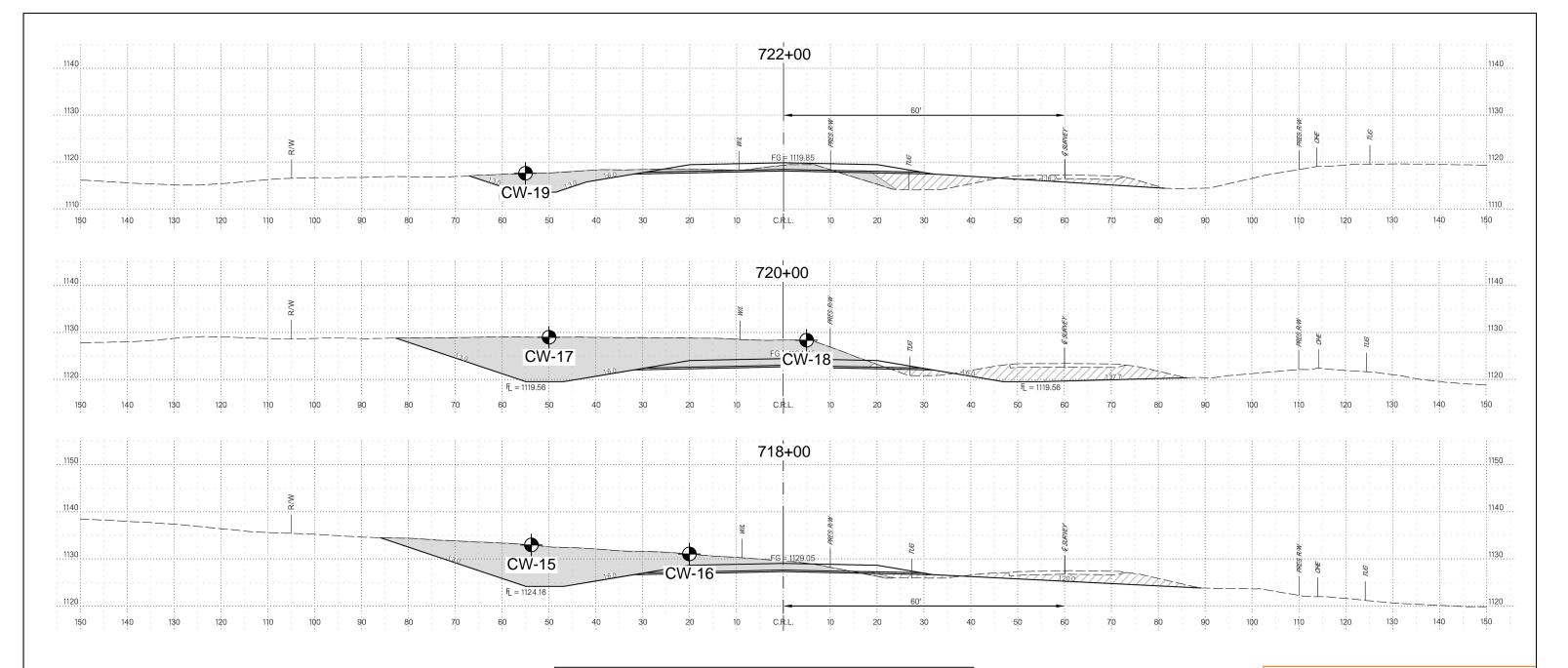
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BORING LOCATION DIAGRAM - CROSS SECTIONS

CUT ANALYSIS - WEST PHASE II STATE HIGHWAY 29 STEPHENS COUNTY, OKLAHOMA 29657(04)

Project Mngr:	EDC	Project No.	18043
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BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-15	718+00	54' left	1133'	
CW-16	718+00	20' left	1131'	
CW-17	720+00	50' left	1129'	
CW-18	720+00	5' right	1127'	
CW-19	722+15	55' left	1118'	

Stations, offsets and elevations estimated from plans provided by SRB

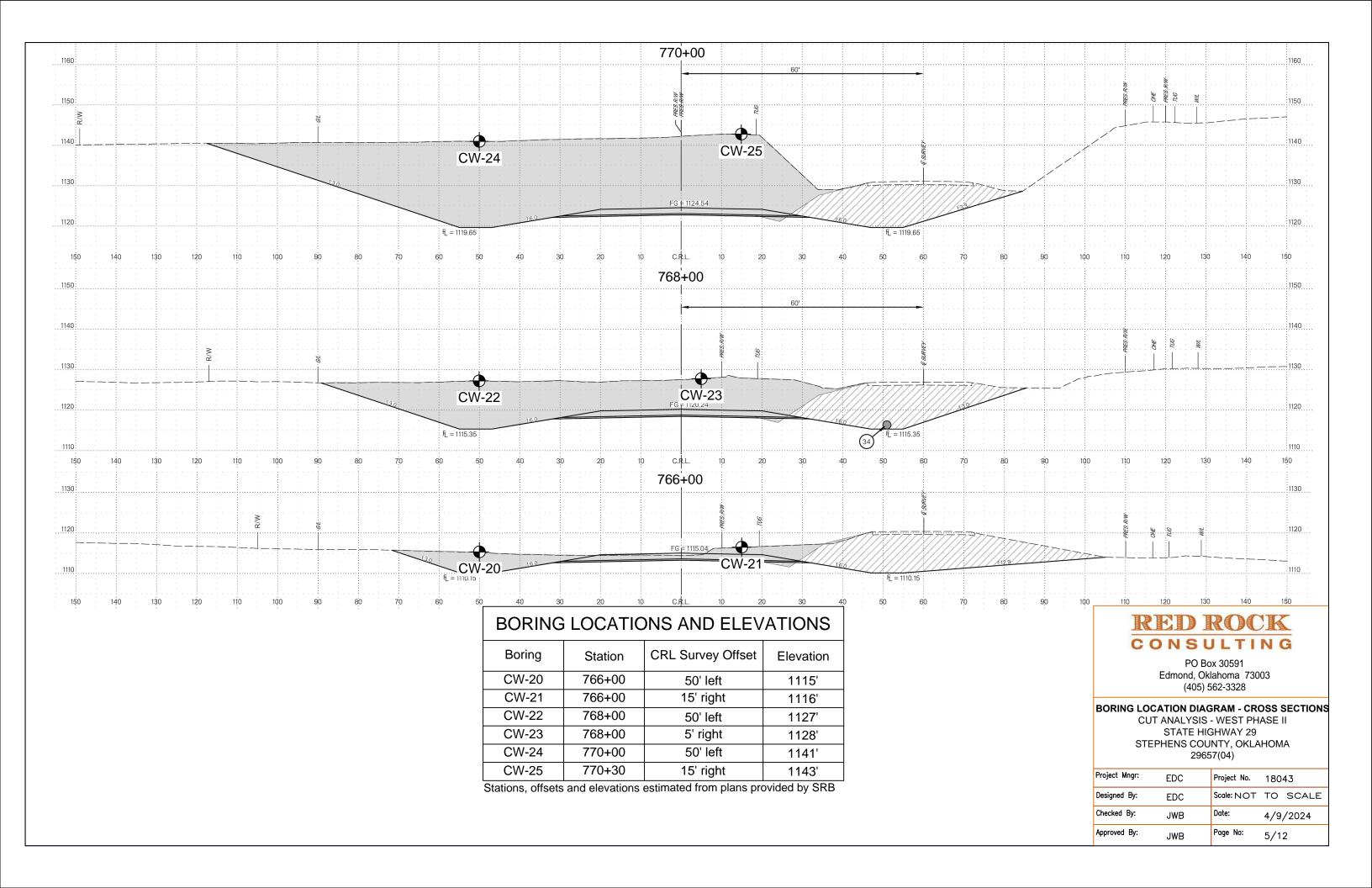
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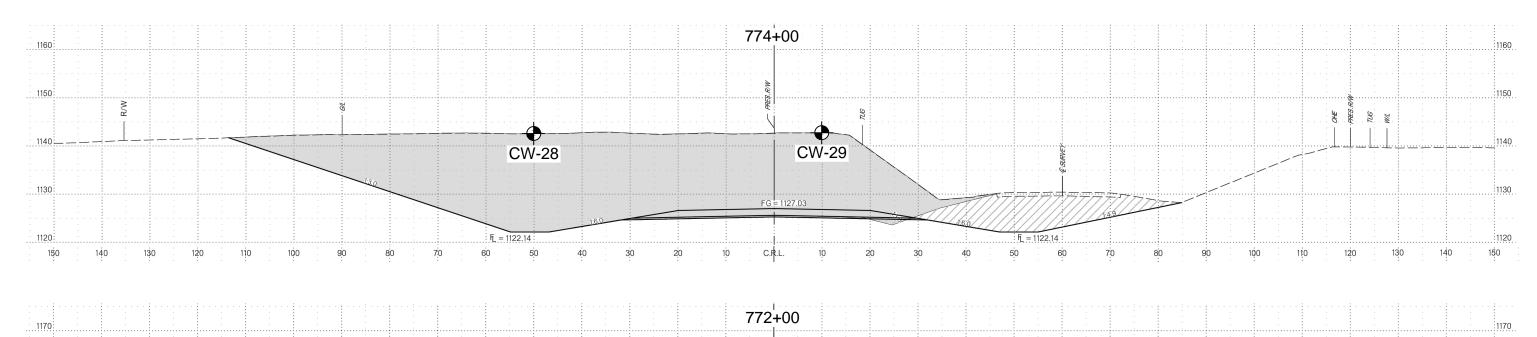
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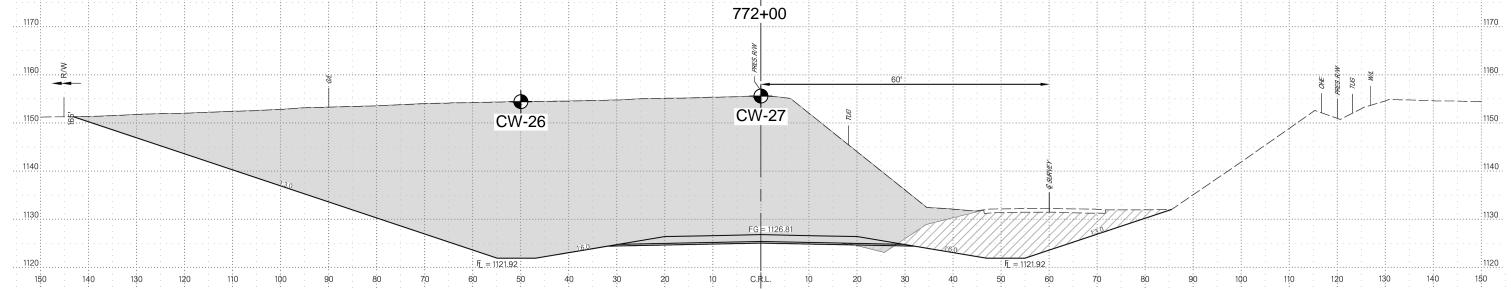
BORING LOCATION DIAGRAM - CROSS SECTIONS

CUT ANALYSIS - WEST PHASE II STATE HIGHWAY 29 STEPHENS COUNTY, OKLAHOMA 29657(04)

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Approved By:	JWB	Page No: 4/12







BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-26	772+00	50' left	1154.5'	
CW-27	772+00	0	1156'	
CW-28	774+00	50' left	1142.5'	
CW-29	774+00	10' right	1143'	

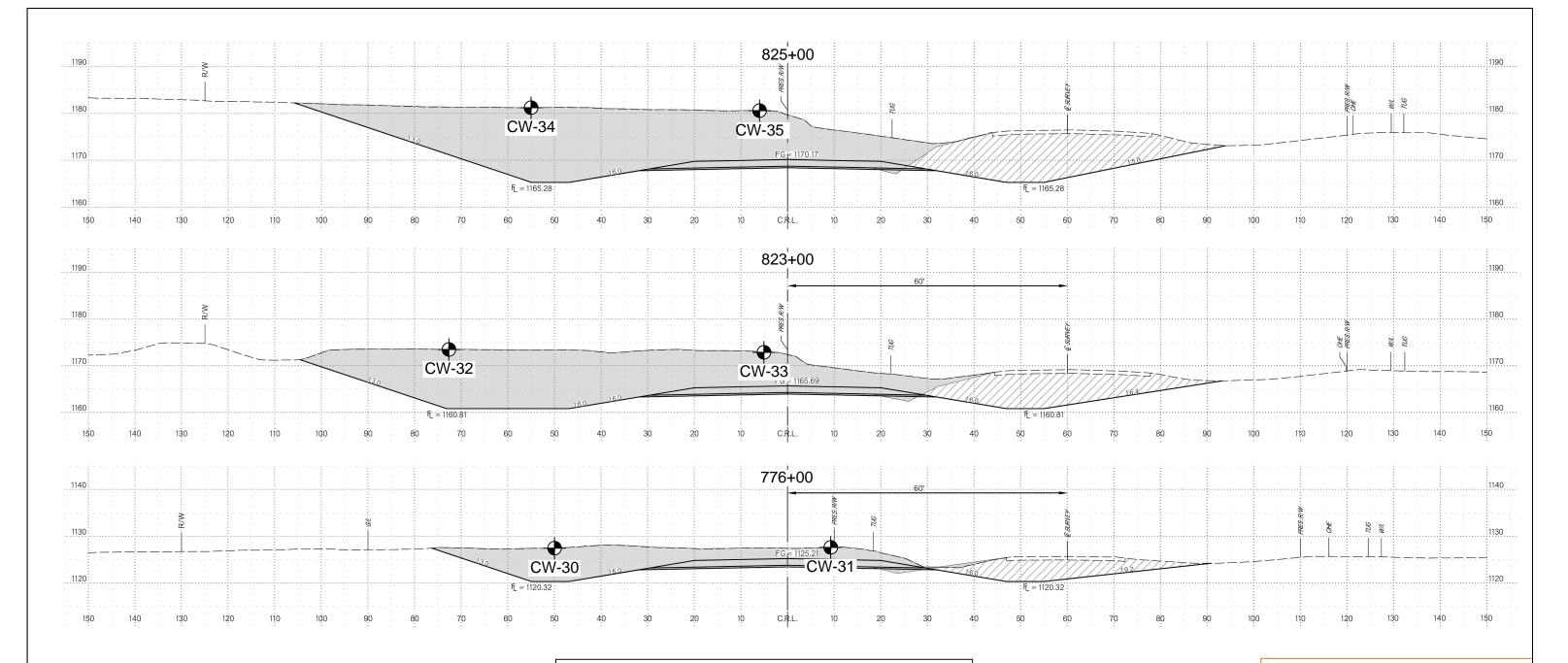
Stations, offsets and elevations estimated from plans provided by SRB

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PO Box 30591 Edmond, Oklahoma 73003 (405) 562-3328

BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No. 18043	
Designed By:	EDC	Scale: NOT TO SCALE	-
Checked By:	JWB	Date: 4/9/2024	
Approved By:	JWB	Page No: 6/12	



BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-30	775+89	50' left	1127'	
CW-31	775+89	9' right	1127'	
CW-32	823+00	73' left	1172'	
CW-33	823+00	5' left	1172'	
CW-34	825+25	55' left	1181'	
CW-35	825+25	6' left	1180'	

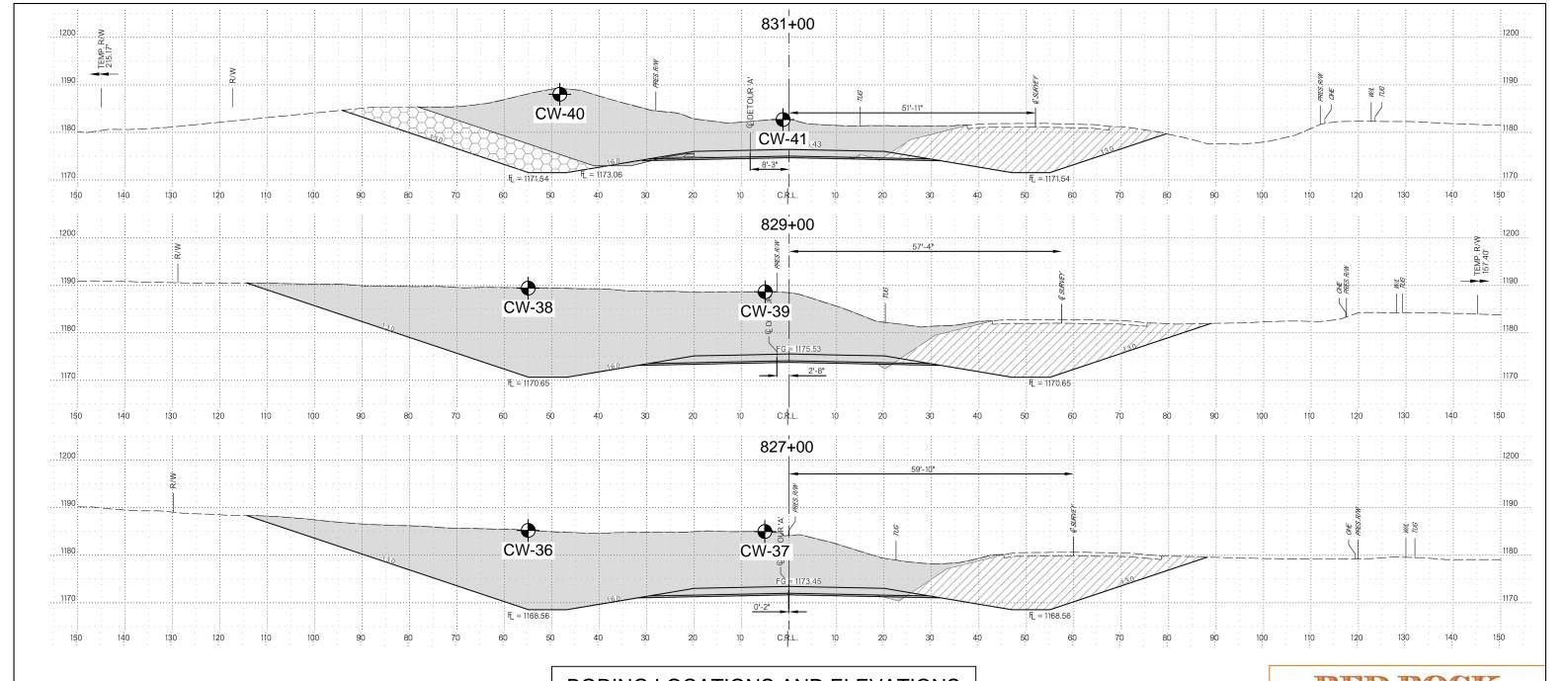
Stations, offsets and elevations estimated from plans provided by SRB

RED ROCK CONSULTING

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BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No. 18043
Designed By:	EDC	Scale: NOT TO SCALE
Checked By:	JWB	Date: 4/9/2024
Approved By:	JWB	Page No: 7/12



BORING LOCATIONS AND ELEVATIONS Boring **CRL Survey Offset** Station Elevation CW-36 827+00 55' left 1185' CW-37 827+00 5' left 1185' CW-38 829+00 55' left 1189' CW-39 829+00 5' left 1189' CW-40 830+50 48' left 1188'

Stations, offsets and elevations estimated from plans provided by SRB

1' left

1183'

831+00

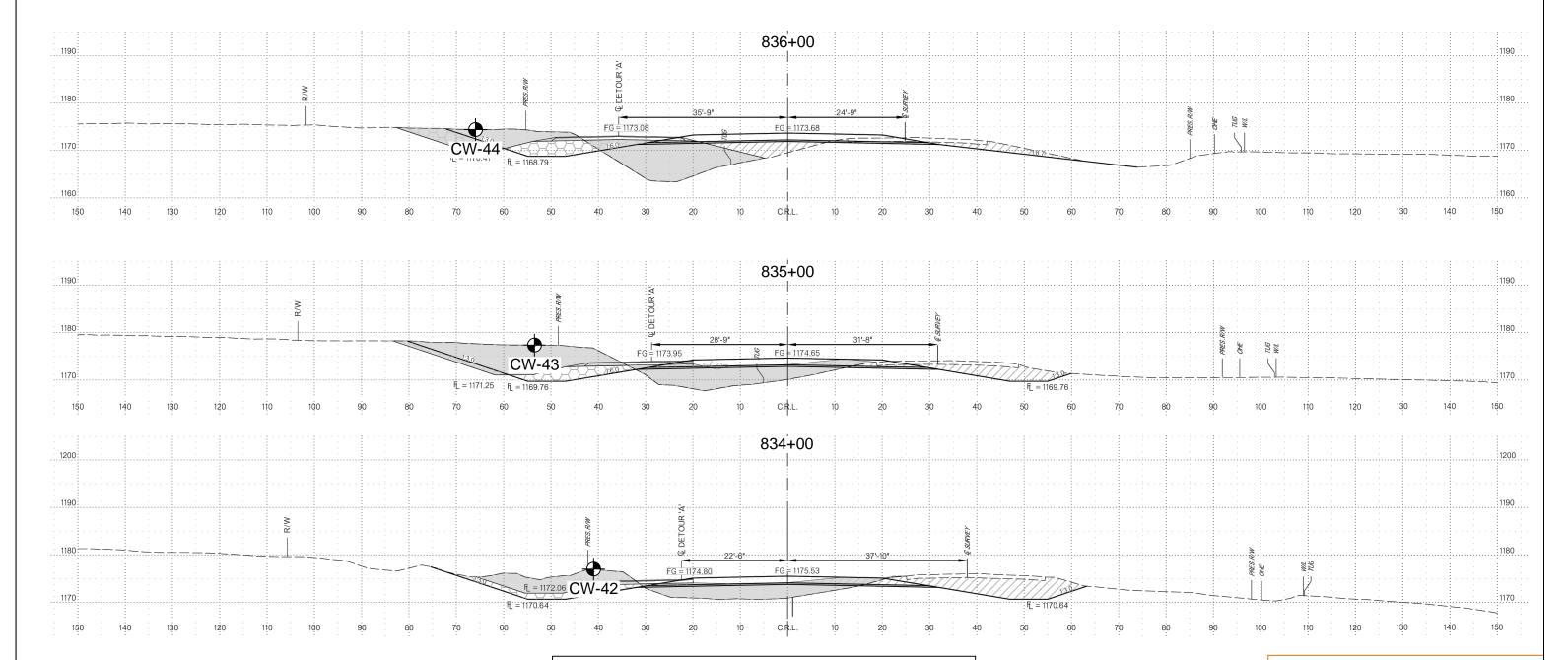
CW-41

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BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No. 18043
Designed By:	EDC	Scale: NOT TO SCALE
Checked By:	JWB	Date: 4/9/2024
Approved By:	JWB	Page No: 8/12



BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-42	834+00	41' left	1177'	
CW-43	835+00	54' left	1177'	
CW-44	836+00	66' left	1174'	

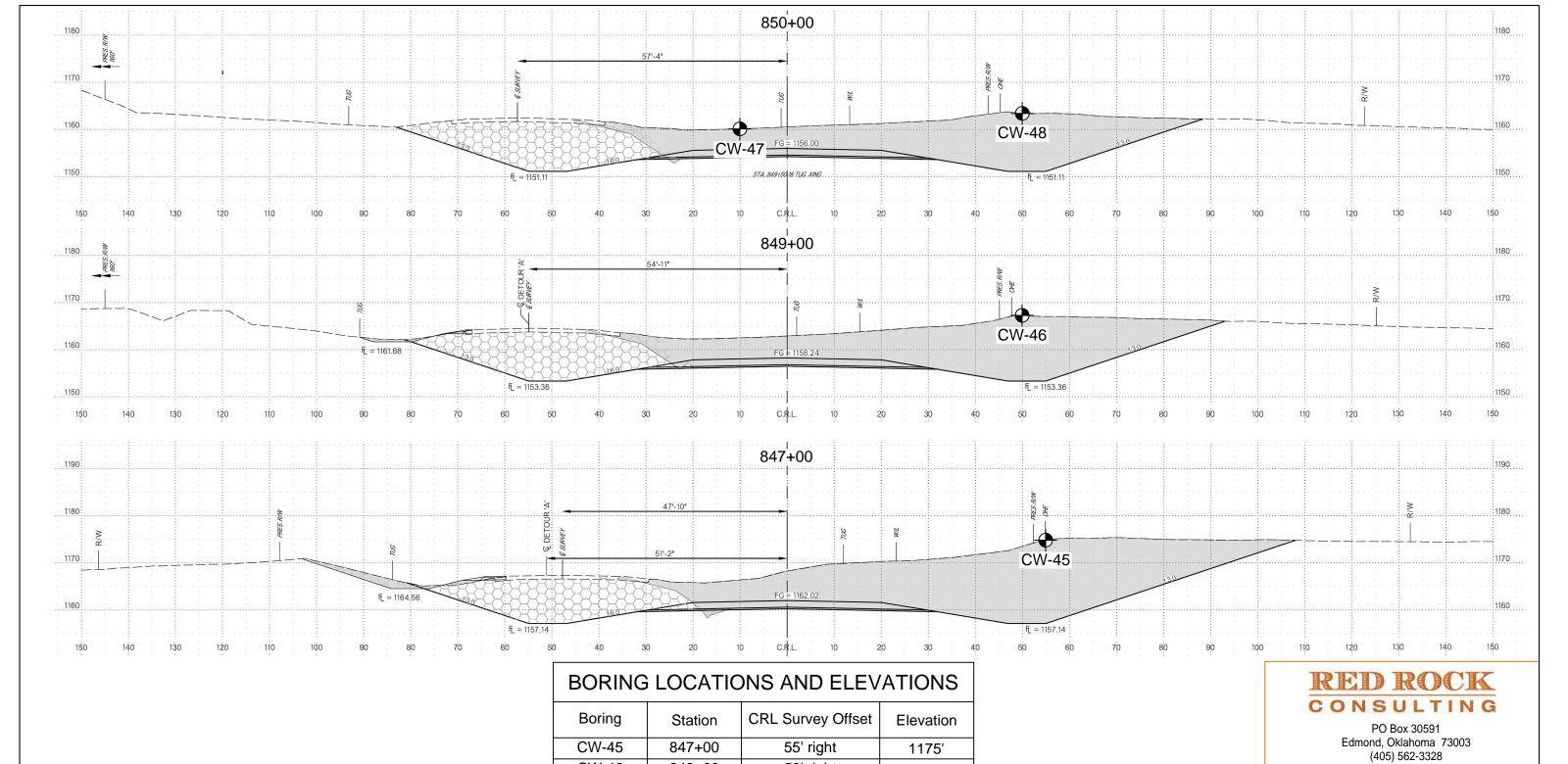
Stations, offsets and elevations estimated from plans provided by SRB

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BORING LOCATION DIAGRAM - CROSS SECTIONS

	Project Mngr:	EDC	Project No.	18043
	Designed By:	EDC	Scale: NOT	TO SCALE
	Checked By:	JWB	Date:	4/9/2024
	Approved By:	JWB	Page No:	9/12



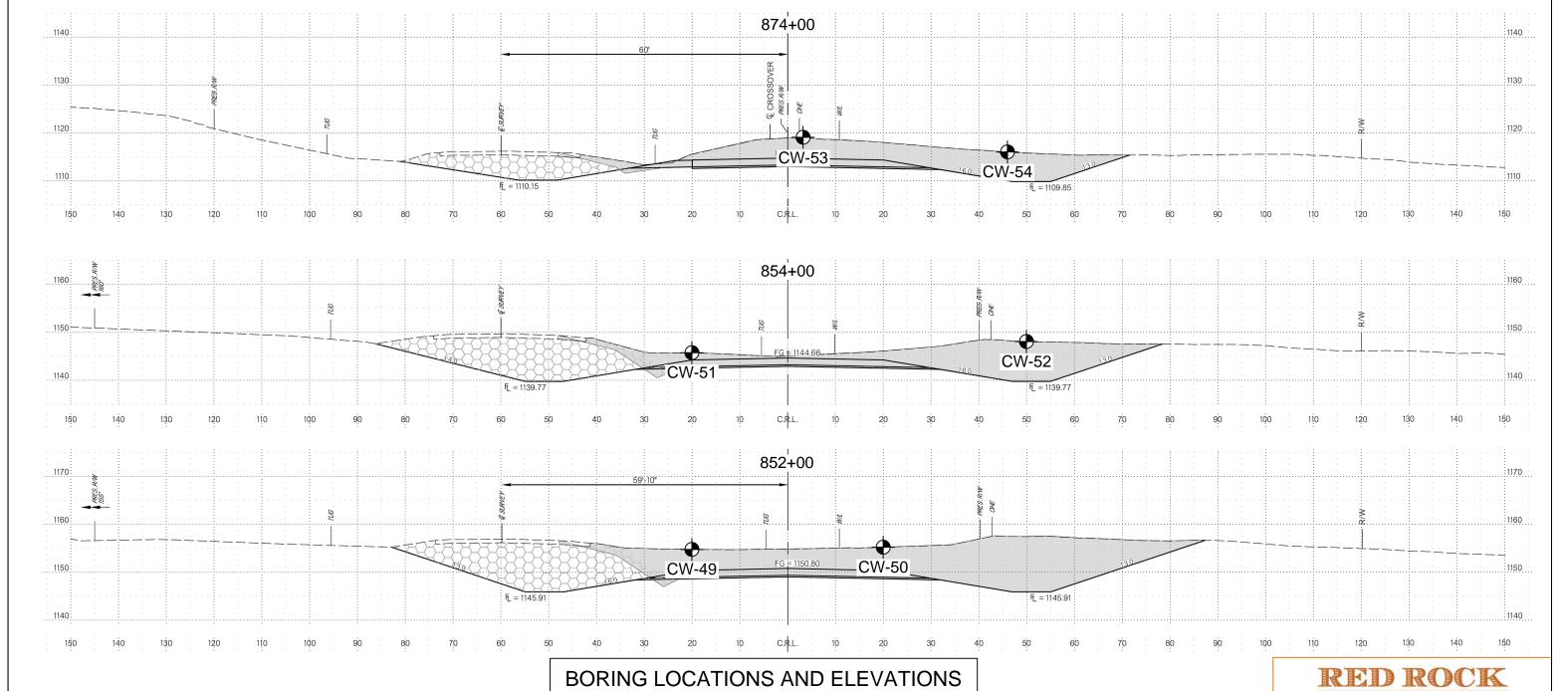
CW-46 849+00 50' right 1167'

CW-47 850+00 10' left 1160' 50' right CW-48 850+00 1164'

Stations, offsets and elevations estimated from plans provided by SRB

BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No. 18043
Designed By:	EDC	Scale: NOT TO SCALE
Checked By:	JWB	Date: 4/9/2024
Approved By:	JWB	Page No: 10/12



Boring	Station	CRL Survey Offset	Elevation		
CW-49	852+00	20' left	1155'		
CW-50	852+00	20' right	1155'		
CW-51	854+00	20' left	1146'		
CW-52	854+00	50' right	1148'		
CW-53	874+00	3' right	1119'		
CW-54	874+00	46' right	1116'		

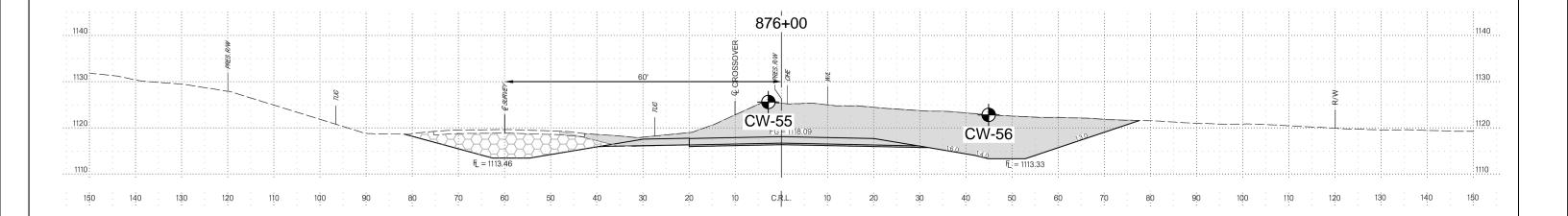
Stations, offsets and elevations estimated from plans provided by SRB

CONSULTING

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BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No.	18043
Designed By:	EDC	Scale: NOT	TO SCALE
Checked By:	JWB	Date:	4/9/2024
Approved By:	JWB	Page No:	11/12



BORING LOCATIONS AND ELEVATIONS				
Boring	Station	CRL Survey Offset	Elevation	
CW-55	876+00	3' left	1126'	
CW-56	876+00	45' right	1123'	

Stations, offsets and elevations estimated from plans provided by SRB

RED ROCK CONSULTING

PO Box 30591 Edmond, Oklahoma 73003 (405) 562-3328

BORING LOCATION DIAGRAM - CROSS SECTIONS

Project Mngr:	EDC	Project No.	1804	43
Designed By:	EDC	Scale: NOT	то	SCALE
Checked By:	JWB	Date:	4/9/2024	/2024
Approved By:	JWB	Page No:	12/	12

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-01 PAGE 1 OF 1

CONSULTING 405-562-3268

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/3/24 COMPLETED 4/3/24 GROUND ELEVATION 1224 ft STATION 652+70 OFFSET 50' LT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

 LOGGED BY _ EDC
 CHECKED BY _ JWB
 0 hrs AFTER DRILLING _ none

 NOTES _ JP# 29657(04)
 Cave In Depth _ none

NOT	ES _	JP# 29	Gave In Depth	none							
ELEVATION (ft)	O DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIGUID	PLASTIC LIMIT	S 	PASSING #200 SIEVE (%)
			SANDY LEAN CLAY, red, medium stiff	1224'	SPT	7	16	33	14	19	58.8
1220	 - 5 _		SANDY SILTY CLAY, yellow, purplish red and gray, hard	1222'							
1215	 - 10_ 		SANDSTONE, yellow, purplish red and gray to medium reddish brown, cemented to well cemented	1218	SPT TC	16 40 50/6" 50/1.5" 50/0.8" 50/0.8"	16	25	18	7	51.1
121 <u>0</u> 			Boring Termination Depth = 13 feet Boring Completed and Backfilled on 4/3/2024	-	▼ TC	50/0.8" \50/0.5"/					
1205											
1200											
1195											
1190											
1185											
1185											
1175											
1175											

PO Box 30591 Edmond, OK 73003 PAGE 1 OF 1

RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043
PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/3/24 COMPLETED 4/3/24
PROJECT LOCATION 1226 ft STATION 652+70 OFFSET 9' RT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma
DRILLING METHOD 4.5" augers - CME 750 ATV
DURING DRILLING none

LOGGED BY EDC CHECKED BY JWB 0 hrs AFTER DRILLING none

NOTES JP# 29657(04)
Cave in Depth none

					ᄼ	TS	(%	АТ	ERBE	RG	00
	O DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	PASSING #200
25			SANDY LEAN CLAY, brown to red, medium stiff	1226'	SPT	6	9	27	16	11	50.
‡	 - 5		SANDY SILTY CLAY, purplish red, light gray and light brown, hard	1224'	SPT	21	9	24	19	5	50.
20	·		<u>SANDSTONE</u> , light gray and light brown to medium reddish brown, very poorly cemented to poorly cemented	1221'	▼ TC	36 50/4" 50/4"	9	24	19	5	50
15	10_				▼ TC	50/2" 50/5.5" 50/3.5"/					
			Boring Termination Depth = 12 feet		TC	50/2"					
1			Boring Completed and Backfilled on 4/3/2024			\ <u>50/1.5"</u> /					
10											
)5											
_											
00											
-											
5											
-											
90											
35											
95 90 35 30											
+											

BORING NUMBER CW-3 PAGE 1 OF 1 RED ROCK CONSULTING

DATI DRILL DRILL LOG	E STA LLING LLING GGED	NUMBER <u>18</u> ARTED <u>5/16/1</u>	18 R DSO - E	COMPLETED 5/ Drilling Services of Okla CME 750 ATV CHECKED BY	ahoma	PROJECT NAME PROJECT LOCA GROUND ELEVAT GROUND WATER DURING DR 0 hrs AFTER	TION St. TION 122 LEVELS: LILLING CONTROLLING	ephens C 28 ft S : none	ounty, (Oklahor	na	PFFSE	r _50'	LT
ELEVATION (ft)		GRAPHIC LOG		MATERIAL C	DESCRIPTION			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	LIQUID	PLASTIC IT INIT INIT		PASSING #200 SIEVE (%)
1225 	5 _			ANDY LEAN CLAY, re DNE, light gray with pur cel			12 <u>28'</u> 1227.5'	▼ TC	4" 50/6" 50/4.3" 50/2.8" 50/4.3" 50/2.5"	2	24	15	9	64
121 <u>5</u> 121 <u>0</u>	15_							TC TC	32/6" 50/4.8" 50/0.8" 50/0.5"					
1205	25								50/0.6" 50/0.3" 50/0.8" 50/0.3"					
100kN/G AFTER CAVE N 18643 LOGS/GF2 DATA TEMPLATE:GD1 9/6/18				Boring Termina Boring Completed a	tion Depth = 31 f ind Backfilled on s		1197'	TC	50/0.6" 50/0.4"					

BORING NUMBER CW-04 PAGE 1 OF 1

PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

CLII	ENT	SRB		PROJECT NAME SH 29 C	ut - West	Phase II					
PRO	JEC.	T NUM	MBER 18043	PROJECT LOCATION Ste	phens Co	unty, Okl	ahoma				
DAT	E ST	ARTE	ED 4/3/24 COMPLETED 4/3/24	GROUND ELEVATION 123	30 ft S	TATION	l _655+	00_ 0 I	FFSE1	ر <u>50' ا</u>	LT
DRI	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	:						
DRI	LLIN	G MET	THOD HSA - CME 750 ATV	DURING DRILLING	none						
LOC	GED	BY _	EDC CHECKED BY JWB	0 hrs AFTER DRILLIN	NG none						
NOT	ES _	JP# 2	9657(04)	Cave In Depth none	!						
	-										
ft)					Ш	2	(9		TERBE LIMITS		00
SELEVATION (ft)	I (ft)	¥″			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				ASSING #200 SIEVE (%)
ÄŢ	DEРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION) LE	00/	IST TEN	LIQUID	STIC	ASTICI	SING
:LEV	В	9			W W	LOV	M N N N	일특	PLASTIC LIMIT	PLASTICITY INDEX	ASS
ш 1 <u>230</u>	0	/////				В				곱	ď.
			LEAN CLAY , light brown to red, very s	tiff 1230	SPT	15	21	30	15	15	86.3
			CLAYEY SAND, light brown, light red, purple and gold	d, medium dense 1228							
1225	- 5										
-		1///	SANDSTONE, gray and purple to pale red to purplisi	h red to reddish 1224.5	SPT TC	17 50/6"	11	28	20	8	43.5
			brown, very poorly cemented to well ceme	nted	V IC	50/4" 50/2"					
1000	_ _10_					30/2					
1220	_ 10_				▼ TC	50/12"					
1215	_15_				▼ TC	50/0.5"					
					V 1	50/0.5"					
1210	_20_					E0/0.0"					
					V IC	50/0.8" 50/0.3"					
_											
1205	_ _25_										
					▼ TC	50/0.5" 50/1"					
1200			Boring Termination Depth = 29 feet		▼ TC	50/1.8"					
			Boring Completed and Grouted on 4/3/20	024	V 10	50/0.5"					
 :=											
1195											
1190											
1185											
1180											

BORING NUMBER CW-05

PAGE 1 OF 1

RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	ENI	SKB		_ PROJECT NAME SH 29 (out - vvest	Phase i	l				
PROJECT NUMBER 18043 DATE STARTED 4/3/24 COMPLETED 4/3/24 DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma				_ PROJECT LOCATION _Ste	ephens Co	unty, Ok	lahoma				
DAT	TE S	TARTE	O 4/3/24 COMPLETED 4/3/24	_ GROUND ELEVATION _12	32 ft S	OITAT	N 655+	00 o	FFSE	r 9'R	T.
DRI	LLIN	IG CON	TRACTOR DSO - Drilling Services of Oklahoma								
			HOD 4.5" augers - CME 750 ATV	DURING DRILLING	none						
			EDC CHECKED BY JWB								
			0657(04)	Cave In Depth _none							
		01 # 2	007(04)		•						
				_		- 40		AT	TERBE	ERG	
ELEVATION (ft)	Œ	O			SAMPLE TYPE	NTS	щ (%)		LIMITS		500
امِ	Ę	GRAPHIC LOG	MATERIAL DECORIDATION		<u> </u>	00	FF	0.	ပ	Ĕ	# % <u>0</u>
ΙA	DEPTH (L &	MATERIAL DESCRIPTION		I			LIQUID	ST	ASTICI'	SSI
		9			SAN	BLOW COUNTS	MOISTURE CONTENT (%)	= =	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)
_	0	(/////	SANDY LEAN CLAY, brown to red with light bro	own, medium stiff 1232	2'\ apz						
1230	<u> </u>				J 31 1	5	18	29	17	12	69.1
	┞.	-	<u>SILTY SAND</u> , purplish red and light gra	y, dense 1230)'						
	5										
1225	Γ.				SPT	50	10	0	0	NP	33.7
1225	1		SANDY SILTY CLAY, red and light brown	n, very stiff / 1225	SPT	20	11	25	20	5	54.5
 	Ι]:::::	SANDSTONE, gray to pale reddish brown and pucemented to well cemented		TC	50/6" 50/3"					
_ =	10	-	cemented to well cemented			50/1.4"	1				
1220]:::::									
	┼ .	-			TC.	50/1.5"	1				
	15				V 10	50/0.8"	1				
	ļ.	-									
1212		-									
			Boring Termination Depth = 18 fe Boring Completed and Backfilled on 4/	et 3/2024	TC	50/1" \50/0.3"					
	1		Borning Completed and Backinied On 4/	0/2024		(00,0.0	1				
1210)										
	1										
1205	5										
	-										
1200	<u>)</u>										
	-										
1195	5										
	1										
 -											
1190)										
	-										
_ 1185	5										
- -	-										
120 <u>0</u>	1										

RED ROCK CONSULTING BORING NUMBER CW-6 PAGE 1 OF 1

PRO	JECT	T NUM	BER 18043	_ PROJECT LOCA	ATION Ste	ephens C	ounty, C	Oklahor	na			
DAT	E ST	ARTE	D _5/16/18	_ GROUND ELEVA	TION 122	.6 ft S	TATION	N <u>656</u> -	+00_C	FFSE	T <u>50'</u>	LT
			TRACTOR DSO - Drilling Services of Oklahoma	_ GROUND WATE	R LEVELS:							
			HOD _4.5" augers - CME 750 ATV	DURING D	rilling <u></u>	none						
		BY_		_ 0 hrs AFTE	R DRILLIN	IG none						
NOT	ES_	JP# 2	9657(04)	_ Cave In De	pth none							
ft)						Й	TS	(9)	AT	TERBI		00
ELEVATION (ft)	H (FE)	GRAPHIC LOG				SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)			_) #2(%)
'ATI	DЕРТН (ft)	KAPI LOC	MATERIAL DESCRIPTION			出	8z	IST TEN	∃E	STIC	들쬬	
LEV		P.				WY.	Į Š	M N N	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)
	0					0)	<u> </u>	U			4	п.
1225			LEAN CLAY WITH SAND , reddish brown	n, medium stiff	1226'	SPT	5	21	47	19	28	72.6
_												
- +	 5											
1220	_ J _ 		SANDY LEAN CLAY, light brown	, hard	1221'	SPT	10	5	25	12	13	61.8
- +		 	SANDSTONE, light gray, very poorly cemente	d to well cemented	1220'	TC	27 50/5.5")					
- †		:::::				V	50/3.5" 50/4.5"					
1015	_10_											
1215		:::::				TC	50/0.8" 50/0.5"					
- 1]:::::										
- +	 15	 ::::										
1210	- · • -]:::::				ТС	50/0.8" 50/0.5"					
- +		::::					,50/0.5	1				
_]:::::										
1005	_20_	:::::					50/0.6"	-				
1205	_	<u> </u> :::::				TC	50/0.6" 50/0.4"					
- 1												
- †	 25	::::										
1200			Boring Termination Depth = 25		1201'	TC	50/0.8" 50/0.4"					
			Boring Completed and Backfilled on	3/10/10			00/011	1				
- 1												
119 <u>5</u>												
1190												
- 1												
-]												
1185												
]												
1180												
1										1		

BORING NUMBER CW-07 PAGE 1 OF 1

RED ROCK	PO Box 30591
HANDE HAU CHE	Edmond, OK 73003
CONSULTING	405-562-3268

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

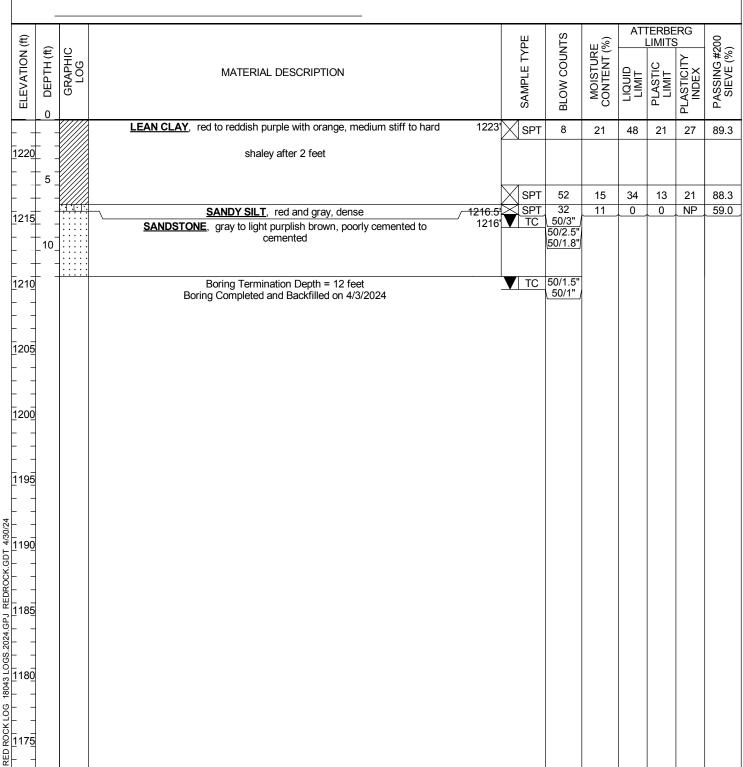
CLIENT SRB PROJECT NUMBER 18043							PROJECT NAME	SH 29 C	ut - V	Vest	Phase II						
PRO	JEC.	T NUN	IBER <u>18043</u>	3			PROJECT LOCAT	TION Step	ohens	S Cou	unty, Okl	ahoma_					
DA	E ST	ARTE	D 4/3/24		COMPLETE	4/3/24		GROUND ELEVA	TION _122	22 ft	s	TATION	657+0	00_OI	FFSET	46' I	_T_
DRI	LLING	G CON	ITRACTOR _	DSO - Dril	ling Services of	Oklahoma		GROUND WATER	R LEVELS:	:							
DRI	LLING	3 MET	HOD 4.5" a	ugers - CM	1E 750 ATV			DURING DE	RILLING _	none							
LO	GED	BY _	EDC		CHECKED B	Y JWB		0 hrs AFTE	R DRILLIN	IG _r	none						
NO	ES _	JP# 2	9657(04)					Cave In De	oth none								
	_																
£										L	Ш	လှ	<u></u>		ERBE		0
ELEVATION (ft)	Œ	≌									SAMPLE IYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
ATIC	DEPTH (ft)	GRAPHIC LOG			MATERIA	AL DESCRIPTION	ON			į į	4	8	ISTL TEN	윽닡	STIC	EXI	SING
LEV	DE	GR.								:	₹	NO.	Q N	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS
ш	0	,,,,,									n	IB BI	0		Ъ	PL	Δ.
1220				LEAN	CLAY with SA	ND , reddish b	prown to r	ed, stiff	1222'	\boxtimes	SPT	10	22	46	18	28	77.7
					SILTY SAND,	pale red, mediu	um dense	e	1220'								
	- 5																
			SAN	DSTONE	nale reddish ni	ırnle to light gra	av noorly	cemented to well	1216.5'	\sim	SPT	18 23	6	0	0	NP	34.0
1215	-		. SAN	DOTOILE,		cemented	ly, poorly	ocinicited to well	1210.0	V	TC	50/6" 50/1.8"					
												50/1.1"					
-	_10_		:								TC	50/0.8"					
1210	_											50/0.3"/					
	-				Boring Term	ination Depth =	: 13 feet				TC	50/4"					
				Вс	oring Completed	l and Backfilled	on 4/3/2	024				\ <u>50/1.3"</u> /					
1205																	
1200																	
1200																	
1195																	
1190																	
_ 																	
 1180																	
1180																	
1175																	
	l	l										1					

BORING NUMBER CW-08

PAGE 1 OF 1

RED ROCK PO Box 30591 Edmond, OK 73003 CONSULTING 405-562-3268 PROJECT NAME SH 29 Cut - West Phase II **CLIENT** SRB PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma DATE STARTED 4/3/24 COMPLETED 4/3/24 GROUND ELEVATION 1223 ft STATION 657+00 OFFSET 5' RT **DRILLING CONTRACTOR** DSO - Drilling Services of Oklahoma **GROUND WATER LEVELS:** DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY EDC CHECKED BY JWB 0 hrs AFTER DRILLING none **NOTES** JP# 29657(04) Cave In Depth none



BORING NUMBER CW-09 PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

PAGE 1 OF 1

CLIENT SRB			PROJECT NAME SH	29 Cut - Wes	st Phase II					
PROJECT NUM	BER <u>18043</u>		PROJECT LOCATION	Stephens C	ounty, Okl	ahoma				
DATE STARTE	D 4/4/24	COMPLETED 4/4/24	GROUND ELEVATION	1205 ft	STATION	l <u>668</u> +	00 o	FFSE	r <u>50'</u>	LT
DRILLING CON	TRACTOR DSO) - Drilling Services of Oklahoma	GROUND WATER LEV	/ELS:						
DRILLING MET	HOD 4.5" augers	s - CME 750 ATV	DURING DRILLI	NG none						
LOGGED BY _	EDC	CHECKED BY JWB	0 hrs AFTER DR	RILLING nor						
NOTES JP# 29	9657(04)		Cave In Depth	none						
					ω.			TERBE		
(#) Z (#) D				TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS	S 	PASSING #200 SIEVE (%)
DEPTH (ft) GRAPHIC LOG		MATERIAL DESCRIPTION			1 00	STU	□⊢	일	le X	NG.
EVA DEP GRZ				SAMPLE	MO	NO!S	LIQUID	PLASTIC LIMIT	ASTICI INDEX	SSI
1 205 0				S A	BL(20		d	PLA =	4 °
203 0	SILTY S	SAND, brown to red to light brown and p	urplish red, loose to	1205' SP	Т 4	11	0	0	NP	19.9
+ + 1		medium dense		7 1 31						1010
200 5				V CD	T 15	9			ND	15.0
+ -	SANDS	STONE, purplish red to light reddish bro	wn, well cemented 1	199.5 SP	50/6" /	9	0	0	NP	15.2
Ţ Ţ:::::					50/1.5" 50/0.5"					
195_10_:::::										
				V TO	50/1"					
+ -					30/0.3					
1 1:::::										
190_15_::::				V TO	50/0.8"					
<u> </u>				V 10	50/0.3"/					
+ -:::::										
185 20 :::::										
		Boring Termination Depth = 20 Boring Completed and Grouted on 4	feet /4/2024	V TO	50/1.5"					
1		Borning Completed and Crouted on 4	14/2024		(30.0.0)					
180										
-										
175										
-										
170										
-										
_										
165										
_										
4										
160										
]										
170 - - - 165 - - 160 - - - 155										
_]										
155										L

BORING NUMBER CW-10 RED ROCK PO Box 30591 Edmond, OK 73003 CONSULTING 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma DATE STARTED <u>4/4/24</u> COMPLETED <u>4/4/24</u> GROUND ELEVATION 1206 ft STATION 668+00 OFFSET 6' RT DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma **GROUND WATER LEVELS:** DURING DRILLING none DRILLING METHOD 4.5" augers - CME 750 ATV LOGGED BY EDC CHECKED BY JWB 0 hrs AFTER DRILLING none

PAGE 1 OF 1

NOT	ES _	JP# 296	7(04)	Cave In Depth	none							
(ft)						PE	STS	%) E	АТ	TERBE	RG	500
ELEVATION (ft)	O DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)
1205			SILTY, CLAYEY SAND, red with purple, loose		1206'	SP	Т 4	17	21	16	5	46.3
	 5 _		SILTY SAND. gray with purple and orange, dense		1204'							
200	 		SANDSTONE, gray and purple, well cemented		1200'	V TC	50/3.5' 50/1"	1	0	0	NP	13.
19 <u>5</u> - -			Boring Termination Depth = 9 feet Boring Completed and Backfilled on 4/4/2024			V TO	50/0.8' 50/1" 50/0.5'	7 7				
19 <u>0</u> - -												
18 <u>5</u> - -												
18 <u>0</u> - -												
7 <u>5</u>												
7 <u>0</u>												
75 												
160												

BORING NUMBER CW-11 PAGE 1 OF 1

RED	ROCK	PO Box 30591 Edmond, OK 73003
	SULTING	

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

CLIE	NT .	SRB				PROJECT NAME	SH 29 C	ut - West	Phase II					
PRO.	JEC ⁻	T NUN	MBER <u>18043</u>			PROJECT LOCAT	ION Step	ohens Co	unty, Okl	ahoma				
DATI	E ST	ARTE	D 4/4/24	COMPLETED 4/4/24	1(GROUND ELEVAT	ION 120	3 ft S	TATION	670+	<u>00</u> 0 1	FFSET	45' l	_T_
DRIL	LING	G CON	ITRACTOR DS	SO - Drilling Services of Oklahon	na (GROUND WATER	LEVELS:							
DRIL	LING	G MET	THOD 4.5" aug	ers - CME 750 ATV		DURING DR	ILLING _	none						
LOG	GED	BY _	EDC	CHECKED BY _JWB		0 hrs AFTEF	R DRILLIN	IG none						
NOTI	ES _	JP# 2	9657(04)			Cave In Dep	oth none							
	_													
£								Ш	Ŋ			ERBE		0
ELEVATION (ft)	Œ	ಲ						SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS		PASSING #200 SIEVE (%)
8	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESC	RIPTION			LEJ	000	STO	∟⊇	PLASTIC LIMIT	흔≍	NG Æ (
EX	H H	GR/ L						MP	×	<u>Š</u>	LIQUID	AS.	Z H	SSI
ᆸ	0							SA	BL(28		PI	PLASTICITY INDEX	P.
				SANDY LEAN CLAY, red to re	d and gray, med	ium stiff	1203'	SPT	7	17	35	15	20	51.1
1200	-			SILTY SAND, gray with	red and orange		1201'	Z V						
- +	·		<u>;</u>	<u> </u>										
- +	5 _			SANDY SILTY CLAY,	grav. verv stiff		/ 1198 '	SPT	21	7	25	19	6	56.8
:		::::		SANDSTONE , gray,	well cemented		1197.5'		50/6"					
1195				Boring Termination D Boring Completed and Bac	epth = 7 feet	24		TC	50/1.5" 50/0.5"/					
				Boiling Completed and Bac	Killied Oil 4/4/20	24								
- 4														
1190														
1185														
_]														
1180														
1175														
_]														
1170														
1165														
- 1														
1160														
_														
1155														
- +														

BORING NUMBER CW-12 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond OK 73003
CONSULTING	405-562-3268

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

CLII	ENT	SRB					PROJECT NAME SH	1 29 Cut	- West	Phase II							
PRO	JEC	T NUM	IBER <u>180</u> 4	43			PROJECT LOCATION Stephens County, Oklahoma										
DAT	TE ST	ARTE	D 4/4/24		COMPLETED	4/4/24	GROUND ELEVATION	N 1207	ft S	TATION	670+	<u>00</u> 0 1	FFSET	19'	RT		
DRI	LLING	G CON	TRACTOR	DSO - Dri	lling Services of	Oklahoma	GROUND WATER LE	VELS:									
DRI	LLING	S MET	'HOD <u>4.5"</u>	augers - CN	ME 750 ATV		DURING DRILL	.ING _nc	ne								
LOC	GED	BY _	EDC		CHECKED B	Y JWB	0 hrs AFTER D	RILLING	_none								
NOT	TES _	JP# 29	9657(04)				Cave In Depth	none									
£)							တ	_		ERBE		0					
ELEVATION (ft)	Œ	2						SAMPLE TYPE					IMITS		PASSING #200 SIEVE (%)		
\TIC	DEPTH (ft)	GRAPHIC LOG			MATERIA	L DESCRIPTION			<u>'</u>	BLOW COUNTS	MOISTURE CONTENT (%)	≘⊨	PLASTIC LIMIT	PLASTICITY INDEX	ING VE (
Ē	DEF	GR L							AMP) O	N N N	LIQUID	LAS LIM	ASTIC! INDEX	ASS		
山	0								Ś	В	_ O		Ь	PL/	Δ		
1205				<u>LEA</u>	N CLAY with SA	AND, red to red with	gray, stiff	1207'	SPT	11	18	32	15	17	70.2		
1205	_				SILTY SAND,	gray and purple, den	se	1205'									
	5																
	³								SPT	20	5	0	0	NP	29.0		
1200	_			<u>SA</u>		t reddish gray, well ce		1201	TC	37 50/5"							
				В	boring rerm oring Completed	ination Depth = 7 feet and Backfilled on 4/4	/2024		7 10	50/0.5" 50/0.5"							
1195																	
_ 1190																	
1185																	
1180																	
1175																	
 117 <u>0</u>																	
 =																	
1165																	
1160																	
_			1														

BORING NUMBER CW-13 PAGE 1 OF 1

RI	ED	L	20	C	K
CO	NS	U	LT	IN	1 G

1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

CLIE	NT _	SRB	PROJECT	PROJECT NAME SH 29 Cut Analysis - West Phase I									
	_		BER 18043 PROJECT	LOCATION Ste	ephens Co	ounty, C	Oklahon	na					
DAT	E ST	ARTE	D <u>5/16/18</u> COMPLETED <u>5/16/18</u> GROUND E	LEVATION 121	4 ft S	TATION	676+	00 o	FFSE	Γ <u>50'</u>	LT		
DRIL	LINC	CON	TRACTOR DSO - Drilling Services of Oklahoma GROUND W	ATER LEVELS:									
				DURING DRILLING none									
		_		0 hrs AFTER DRILLING none									
NOT	ES _	JP# 2	.9657(04) Cave	In Depth none									
Œ					Щ	TS	(%)	AT	TERBE LIMIT		8		
N O	DЕРТН (ft)	GRAPHIC LOG			T	NNC	URE VT (°				(%)		
ΑTI	ΞPΤ	RA P S S	MATERIAL DESCRIPTION		PLE	ŏz	JIST NTEN	LIQUID	STIC	들찄	SINC		
ELEVATION (ft)	Ö	Ō			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	일트	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)		
	0	1577	CLAYEY SAND, reddish brown, very loose	1214'									
			CEATET SAND, Teddistribiown, very loose	1214	SPT	3	13	32	12	20	48.4		
121 <u>0</u>													
1210	5 _												
			LEAN CLAY WITH SAND , reddish brown, very stiff	1209'	SPT	25	10	43	15	28	81.1		
-													
1205	- 10												
_	- · · -	1111	SANDY SILT, reddish brown, very dense	120 4'	SPT	30 50/6" /	7	0	0	NP	53.9		
- +			SANDSTONE, light gray with reddish brown, cemented to very cemented	well 1203.5'	▼ TC	50/1.4"							
1200					1	50/1"							
- +	_15_				TC TC	50/1.5"							
_		::::			V IC	50/0.5"							
_ 1195													
	20	::::				FO/O FI							
					TC	50/0.5" 50/0.4"							
1190	25	::::											
			Boring Termination Depth = 25 feet Boring Completed and Backfilled on 5/16/18	1189'	ТС	50/0.5" 50/0.3",							
			Borning Completed and Basicined Sit 6/16/10		Ì								
<u>1</u> 185													
_													
1180													
- 1													
_ 1175													
- 7													
_													
 117 <u>0</u>													
11/0													
-]													
_ 													
1165													

BORING NUMBER CW-14 PAGE 1 OF 1

I				L	RO		I	
C	0	N	S	U	LT	1	N	G

1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

	_	SRB		PROJECT NAME_								
			MBER 18043	PROJECT LOCAT								
			ED 7/13/18 COMPLETED 7/13/18	GROUND ELEVATI			TATION	682+	·59_ 0	FFSE	r <u>95'</u>	LT
			NTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER								
			THOD _4.5" augers - CME 750 ATV	$\frac{\sqrt{2}}{2}$ DURING DRI								
LOG	LOGGED BY SAH CHECKED BY JWB To hrs AFTER DRILLING 21.0 ft / Elev 1170.5 ft											
NOT	NOTESJP# 29657(04)											
Œ						111	Ø		AT	TERBI		0
ELEVATION (ft)	(#)	೨			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)		LIMIT		PASSING #200 SIEVE (%)	
SE	DEРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			E I	ÖΖ	STU	∟	PLASTIC LIMIT	Ę×	NG Æ
EV)EP	 				MP	ΝC	JOIS TNC	LIQUID	AS.	E.S.	SSI
딥	0					SA	BL(20		П	PLASTICITY INDEX	Α.
4400			SANDY LEAN CLAY, orangish brown	n, stiff	1191.5'	SPT	14	8	27	13	14	50.5
<u>1</u> 190	[/ 101 1				.0		
	-											
	5											
_ 1185			SILTY SAND, orangish brown, medium	n dense	1186.5'	SPT	17	7	0	0	NP	42.5
	10					V apr	16					00.0
1180						SPT	10	4	0	0	NP	30.0
	 15											
_ 1175	Г -		SILTY, CLAYEY SAND, light gray, mediu	ım dense	1176.5'	SPT	22	4	23	17	6	28.6
	-											
	20		▼ SANDSTONE, orangish brown, well cemented to v	vom cavall compensed	1171 E	≥ SPT)	50/5 R"	10 /	21 /	15 /	6	40.5
1170	-		SANDSTONE, orangish brown, well cemented to v	very well cernemed	1171.3	TC	50/1"			_13_/		_40.5_/
			abla			,	50/0.4"/					
	 25											
_ 116 <u>5</u>			Boring Termination Depth = 25.5 fe	eet .	1166'	— TO	50/0 3"					
			Boring Completed and Grouted on 7/	13/18	1100	TC	50/0.1"					
1160												
_ 1155												
_ 135												
1150												
_ 114 <u>5</u>												
_1 145												
											ļ	

PO Box 30591 Edmond, OK 73003 PAGE 1 OF 1

CLIENT SRB	PROJECT NAME SH 29 Cut - West Phase II											
PROJECT NUMBER 18043	PROJECT LOCATION Stephens County, Oklahoma											
DATE STARTED 4/4/24 COMPLETED 4/4/24	GROUND ELEVATION 1133 ft STATION 718+00 OFFSET 54' LT											
DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:											
DRILLING METHOD 4.5" augers - CME 750 ATV	$\overline{igspace}$ DURING DRILLING $\underline{ ext{8 ft / Elev 1125 ft}}$											
LOGGED BY EDC CHECKED BY JWB	▼0 hrs AFTER DRILLING 8 ft / Elev 1125 ft											
NOTES JP# 29657(04)	▼ Cave In Depth _8 ft / Elev 1125 ft											
£	μ σ ATTERBERG S LIMITS S											

	-									
(ft)				PE	TS	(%	AT	TERBE	RG	000
NOIL	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	<u>+</u>	COUN	STURI ENT (∟∟	은ㄴ	ΕX	NG #2/ /E (%
ELEVATION (ft)	DEP	GR/ L		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)
	0		SILTY SAND, red to light gray with purplish red, loose to medium dense 1133		9	14	0	0	⊼ NP	35.7
1130				7 (01.1						00.1
-	5									
	ļ .		SANDSTONE, purplish red with light brown, well cemented to very well 1127.5 cemented	SPT TC	22 50/6" 50/1"	14	0	0	NP	32.5
1125			Devices Townships Depth - Ofest	TC.	50/0.8"					
-			Boring Termination Depth = 9 feet Boring Completed and Grouted on 4/4/2024	TC	50/0.5" \50/0.1"					
1120)									
-										
1115	5									
-										
1110	<u>)</u>									
-										
1105	<u> </u>									
4										
1100										
XX.6DT										
EDROC										
109 <u>5</u> 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20	<u> </u>									
38.2024										
2 1090)									
1 RED ROCK LOG 18043 LOGS.2024.6PJ REDROCK.GDT 4/30/24	1									
- - - 	5									
RED F	1									

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-16

CONSULTING 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/4/24 COMPLETED 4/4/24 GROUND ELEVATION 1131 ft STATION 718+00 OFFSET 20' LT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY EDC CHECKED BY JWB 0 hrs AFTER DRILLING none

NOTES JP# 29657(04) Cave In Depth none

NOTI	ES _	JP# 29657(04)		Cave In Depth	none							
(#)						ъ Д	ST	(%	AT	TERBE	ERG	00
ELEVATION (ft)	O DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	_	PASSING #200 SIEVE (%)
1130			SILTY SAND, brown to red, medium dense		1131	SPT	12	17	0	0	NP	38.5
+ +												
1125	5_		LEAN CLAY , shaley, red with gray, hard		1127'	SPT	44	15	32	13	19	93.5
RED ROCK LOGS 18843 LOGS: 2024 GDT 1100			Boring Termination Depth = 5.5 feet Boring Completed and Backfilled on 4/4/2024									

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-17 PAGE 1 OF 1

CONSULTING 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/4/24 COMPLETED 4/4/24 GROUND ELEVATION 1129 ft STATION 720+00 OFFSET 50' LT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY EDC CHECKED BY JWB Ohrs AFTER DRILLING none

Cave In Depth none

ATTERBERG LIMITS 8

NOT	NOTES JP# 29657(04) Cave In Depth _ none												
					1	T							
ELEVATION (ft)	O DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	TIMIT LIMIT	PLASTIC LIMIT LIMIT	PLASTICITY SHIP	PASSING #200 SIEVE (%)		
			SILTY SAND, gray with purple and orange, loose	112	9' SPT	7	11	0	0	NP	43.5		
1125													
	5	<i>\\\\\\</i>	LEAN CLAY with SAND , red, purple and gray SANDSTONE , red, purple and gray to light reddish brown, po	oorly 112	5' 4' SPT	50/5"	9	26	15	11 /	81.9		
1120	10	- - - - - - - -	cemented to well cemented	oony 112	4' SPT TC	50/5" 50/2.5" 50/0.5"					(01.0)		
1115	-				▼ TC	50/1.8" \50/1.5"							
	15	- - - - - - -			▼ TC	50/0.8" \50/0.5"							
1110			Boring Termination Depth = 19 feet		▼ TC	50/1"	<u> </u> 						
1105			Boring Completed and Backfilled on 4/4/2024		V 10	50/0.3"							
1100	-												
OCK.GDT 4/30	5												
24.GPJ REDR 0601 1000	<u> </u>												
043 LOGS:20; 													
1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24													
원 [108 <u>0</u>)												

BORING NUMBER CW-18

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PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

CLIE	ENT .	SRB					P	ROJECT NAM	E SH 2	29 Cut	- West	Phase II					
PRO	JEC	T NUM	IBER <u>180</u> 4	43			Р	ROJECT LOCA	ATION _	Steph	ens Cou	unty, Ok	ahoma				
DAT	E ST	ARTE	D 4/4/24		COMPLET	ED 4/4/24	G	ROUND ELEV	ATION _	1127	ft S	TATION	720+	00_ 0 I	FFSET	5' R	Т
DRIL	LINC	CON	TRACTOR	DSO - E	Orilling Services	of Oklahoma		ROUND WATI									
DRIL	LING	MET	HOD 4.5"	' augers - (CME 750 ATV			DURING I	DRILLING	G no	ne						
LOG	GED	BY _	EDC		CHECKED	BY JWB		0 hrs AFT	ER DRIL	LLING	none						
NOT	ES_	JP# 29	9657(04)					Cave In D									
_												- (0		АТТ	ERBE	RG	
ELEVATION (ft)	£)	O									SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS		PASSING #200 SIEVE (%)
6	DЕРТН (ft)	GRAPHIC LOG			MATE	RIAL DESCRIPTIO	NI				Ш	no	ļ ģ k	o.	ౖౖ.	Ϊ×	1G # E (%
\ \	EP1	Z. Z.			IVIATE	RIAL DESCRIPTIO	JIN				Æ	×	SIS N	LIQUID	YST IMIT	ASTICI INDEX	SSIN
	О	O									SAN	310	ΣÖ	= =	PLASTIC LIMIT	PLASTICITY INDEX	PAS S
_	0	<i>7.7</i> [1]:			SILTY CLAVE	Y SAND, brown to	o rod loos	20	1:	127'	/						
1125					SILTT, CLATE	. I SAND, DIOWITE	0 rea, 100s	oC	'	121	SPT	6	19	23	19	4	47.1
- 1																	
- +	- ₋ -																
_				SANDY L	EAN CLAY, sh	naley, red and purp	ole with gra	ay, very stiff	1	122'	SPT	9	10	27	14	13	70.0
1120						NE, gray, poorly ce				121 ¹	TC	21 50/5"					
- +					Boring Ter Boring Complet	mination Depth = 6 ed and Backfilled	6.5 feet on 4/4/202	24				50/2.5" 50/1"					
- 1					3 - 7 - 7							30/1					
1115																	
-																	
1110																	
_																	
4405																	
1105																	
- 1																	
1100																	
1095																	
1095																	
_]																	
1090																	
1085																	
_																	
-]																	
1080																	
- 4																	

BORING NUMBER CW-19 PAGE 1 OF 1

RED ROCK PO Box	30591
Edmond	I, OK 73003
CONSULTING 405-562	

1 RED ROCK LOG 18043 LOGS 2024 GPJ REDROCK GDT 4/30/24

CLI	ENI	SKB		PROJECT NAME SH 29 Cut - West Phase II									
PRO)JEC	T NUM	BER 18043	PROJECT LOCATION Stephens County, Oklahoma GROUND ELEVATION 1118 ft STATION 722+15 OFFSET 55' LT									
DA	TE ST	ARTE	D 4/4/24 COMPLETED 4/4/24										
DRI	LLIN	G CON	TRACTOR DSO - Drilling Services of Oklahoma										
			HOD _4.5" augers - CME 750 ATV	DURING DRIL									
			EDC CHECKED BY JWB	_									
			9657(04)	0 hrs AFTER DRILLINGnone Cave in Depthnone									
.,	_	01 # 2	9037 (04)	_ Oave in Depti	I <u>HOHC</u>								
	_			-					A T 7		.D.C		
€						밆	ITS	<u>@</u>		TERBE LIMITS		PASSING #200 SIEVE (%)	
O	(#) -	일 :				≽	Š	J. P.			≽	3#2	
ΑTI	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			PLE	ŏ >	TEI TEI		ĭĬ	듣삤	N N	
ELEVATION (ft)	🛎	9				SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	SHS	
ш	0	V / V / /·					В	Ŭ			Д_	ш	
			SANDY LEAN CLAY, shaley, red and purple with	gray, medium stiff	1118'	SPT	7	13	31	14	17	54.6	
1115	_												
	5		SANDY SILTY CLAY, light brown, ver	v etiff	1114'	\/		_					
	_ 3 -		Boring Termination Depth = 5.5 fee		1114	SPT	18	6	23	16	7	53.8	
1110			Boring Completed and Backfilled on 4/4	₋ /2024									
1110													
1105													
1100													
-													
1095													
1090													
1085	i												
1080	1												
	1												
-													
1075													
- -]												
	-												
1070	1												
	1										.		

BORING NUMBER CW-20 PAGE 1 OF 1

PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLIENT SRB		PROJECT NAME SH 29 Cut - West Phase II									
PROJECT NUMBER 18043		PROJECT LOCATION Stephens County, Oklahoma									
DATE STARTED 4/5/24	COMPLETED _4/5/24	GROUND ELEVATION 1115 ft STATION 766+00 OFFSET 50' LT									
DRILLING CONTRACTOR _	OSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:									
DRILLING METHOD 4.5" au	gers - CME 750 ATV	DURING DRILLING none	9								
LOGGED BY EDC	CHECKED BY JWB	0 hrs AFTER DRILLING									
NOTES JP# 29657(04)		Cave In Depthnone									
		_									
				0	AT	TERBE	RG	Γ_			
ELEVATION (ft) DEPTH (ft) GRAPHIC LOG			SAMPLE TYPE	MOISTURE	<u> </u>	LIMITS		PASSING #200 SIEVE (%)			
EVATION (DEPTH (#) GRAPHIC LOG	MATERIAL DESCRIPTION		<u> </u> E				PLASTICITY INDEX	#5 U			
LC LC	WATERIAL BEGORIE HOR				LIQUID	PLASTIC LIMIT	STI	SSI			
			SAI] ≥ (3 =-] _	\ <u>\</u>	PA S			
1115 0	<u>SILTY SAND</u> , brown, very loose	1115	CDT			_					
	<u>512 1 7 55 412</u> , Srewn, very leases		SPT	3 13	0	0	NP	26.9			
1110 5											
	SILTY, CLAYEY SAND, red, medium	dense 1110	SPT 1	1 14	22	17	5	37.4			
	Boring Termination Depth = 6.5 fe	et -/2004									
	Boring Completed and Backfilled on 4/5	0/2024									
1105											
1100											
1095											
1090											
1085											
1080											
<u> </u>											
<u>- </u>											
1080 1080 1075 1075 1070 1070 1070 1070											
1070											
<u> </u>											
[1065]											

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-21 PAGE 1 OF 1

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/5/24 COMPLETED 4/5/24 GROUND ELEVATION 1116 ft STATION 766+00 OFFSET 15' RT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY EDC CHECKED BY JWB 0 hrs AFTER DRILLING none

NOTES JP# 29657(04) Cave In Depth none

CONSULTING 405-562-3268

	_	01 # 20	2037(04) Cave in Deptin None							
ELEVATION (ft)	O DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIMIT	PLASTIC LIMIT	} 	PASSING #200 SIEVE (%)
1115			SILTY SAND, reddish brown to light reddish brown, loose 1116	SPT	4	13	0	0	NP	30.9
 	5									
1110	-		Boring Termination Depth = 6.5 feet Boring Completed and Backfilled on 4/5/2024	X SPT	8	8	0	0	NP	22.1
1105 11095 1095 1085 1080 1080 1075 1070 										

BORING NUMBER CW-22 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	

CLI	ENT	SRB			PROJECT NAME SH 29 Cut - West Phase II									
PRO	OJEC	T NUM	BER <u>18043</u>		PROJECT LOCATION	ON Ste	phens Cou	ınty, Ok	lahoma					
DA	TE ST	ARTE	D _4/5/24	COMPLETED 4/5/24	_ GROUND ELEVATI	ON _11:	27 ft S	TATION	1 _768+	00_ 0	FFSE1	50'	LT	
DRI	LLIN	G CON	TRACTOR DSO -	Drilling Services of Oklahoma	_ GROUND WATER I	LEVELS	:							
DRI	LLIN	G MET	HOD 4.5" augers -	CME 750 ATV	_ DURING DRII	LLING _	none							
LO	GGED	BY E	EDC	CHECKED BY _JWB	_ 0 hrs AFTER	DRILLII	NG none							
NO.	TES	JP# 29	9657(04)		Cave In Depth _ none									
	_				_									
-								- (0		AT	TERBE	RG		
ELEVATION (ft)	æ	0					SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS	}	PASSING #200 SIEVE (%)	
6	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION			<u>Г</u>	Ŋ		<u> </u>	ပ္ .	<u> </u>	IG# E (%	
\{ \}	EPI	LC RAI		MATERIAL DESCRIPTION			I PL			LIQUID	AST MIT	E G	SSIN	
		ا					SAN	320	ΣÖ	= =	PLASTIC LIMIT	PLASTICITY INDEX	PAS S	
<u> </u>	0		SII TV SAN	D , brown to reddish brown to red to purp	lish gray very loose	1127								
1125	<u> </u>		<u> OILTT OAN</u>	to medium dense	mon gray, very loose	1121	SPT	2	10	0	0	NP	26.4	
-	┼ -													
	5]													
1120	<u> </u>						SPT	7	10	0	0	NP	35.9	
- 129	1 -													
	10													
Ė			•	SANDSTONE, gray and purple, poorly c	emented	1116.5	SPT	12 50/6"	3	0	0	NP	31.1	
1115	-	:::::		Boring Termination Depth = 12 fee			▼ TC	50/3"						
				Boring Completed and Backfilled on 4/5	5/2024		¥ 1	50/0.8"	1					
-	1													
1110	0													
<u> </u>														
F -														
1105	5													
	-													
1100	7													
1100														
-														
24														
§ 1095	5													
GDT														
%	1													
1090														
교 -														
024.0														
000 1085	5													
243 LC]													
- 180	1													
1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24	<u>'</u>													
RED -														
=														

BORING NUMBER CW-23 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	

1 RED ROCK LOG 18043 LOGS 2024 GPJ REDROCK GDT 4/30/24

CLII	ENT	SRB	PROJECT NA	PROJECT NAME SH 29 Cut - West Phase II										
PRC	JEC	T NUN	MBER 18043 PROJECT LO	PROJECT LOCATION Stephens County, Oklahoma										
DAT	E S	ARTE	ED 4/5/24 COMPLETED 4/5/24 GROUND ELI	GROUND ELEVATION 1128 ft STATION 768+00 OFFSET 5' RT										
DRII	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahoma GROUND WA	TER LEVELS	:									
DRII	LLIN	G MET	THOD 4.5" augers - CME 750 ATV DURING	G DRILLING _	none									
LOG	GEE	BY _	EDC CHECKED BY JWB 0 hrs A	FTER DRILLIN	IG none	<u> </u>								
ТОИ	ES _	JP# 2	29657(04) Cave In	Depth none										
	-													
£					Ш	ပ္ပ			TERBE		0			
ELEVATION (ft)	(#)	을			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS 		ASSING #200 SIEVE (%)			
ATIC	DЕРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		LE.	8	STL	≘ ⊨	 	EXI	NE VE			
LEV	DEI	GR _			AMF	ŏ	Q N	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS			
Ш	0				Ø	BI	0		<u> </u>	Ы	Ф.			
			POORLY-GRADED SAND with SILT, red and brown, very loose	1128	SPT	2	14	0	0	NP	9.7			
1125														
	 5													
_	_		SANDY LEAN CLAY, red to red with white, very stiff	1123	SPT	21	8	27	8	19	51.0			
1120														
<u>-</u>														
- =	_10_				SPT	24	9	28	12	16	51.1			
- : =			Boring Termination Depth = 11.5 feet		J JF I	24	9	20	12	10	31.1			
1115			Boring Completed and Backfilled on 4/5/2024											
_														
1110														
_														
1105														
1100														
<u> </u>														
- 														
1095														
_														
1090														
1085														
1080														
		1												

BORING NUMBER CW-24 PAGE 1 OF 1

K	L	20	0		I				
C	0	N	S	U	L	T	I	N	G

CLIENT SRB PROJECT NUMBER 18043		PROJECT NAME SH 29 C							
DATE STARTED 7/11/18	COMPLETED 7/11/18	GROUND ELEVATION 114					NEE CE	T 501	
DRILLING CONTRACTOR DSC		GROUND WATER LEVELS:		IAIIO	110	<u> </u>)FF3E	i <u>50</u>	LI
DRILLING METHOD 4.5" augers		∇ DURING DRILLING Δ		lov 1126	s O ft				
LOGGED BY SAH	CHECKED BY JWB	▼ 0 hrs AFTER DRILLIN				4			
NOTES JP# 29657(04)	OHLOKED BI_ 3WB		16.5	It / Elev	1124.5	π			
NOTES 3F# 29037(04)		Cave In Depth none							
£ _			1 2 ST		@	AT	TERB LIMIT		8
DEPTH (ft) GRAPHIC LOG			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)				(%)
TA PTI	MATERIAL DESCRIPTION		H	ŏΖ	TS E	5	STIC	ASTICI	PASSING #200 SIEVE (%)
			NA W	0	ΝŠ	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS
0			0)	B				П	
140	SILTY SAND, brown, loose	1141'	SPT	8	4	0	0	NP	22.6
+ +									
I 100									
135 5 <u>[:: :: :</u>	SANDY SILTY CLAY, reddish brown,	very stiff 1136'	A opt	13		00	45		
	ANDSTONE, light gray, poorly cemented to		SPT	30	8	22	15	7	55.8
I]::::			TC	50/5" 50/3.3"					
$+_{10}$				50/1.8"					
130 ::::			ТС	50/1.8" 50/1"	İ				
+ -				50/1	1				
+ -									
<u> </u>									
125			TC	50/0.8" 50/0.4"					
+ -					1				
I]::::{									
120				50/2 5"	-				
			TC	50/2.5" , 50/1"					
I]::::									
+ 25									
115			TC	50/1"					
+ - ::::			V 10	50/0.5"	1				
<u> </u>									
30:::::				50/0 OII					
110	Boring Termination Depth = 30 f Boring Completed and Grouted on 7		TC	50/0.8" 50/0.4"					
	5 .								
_									
105									
-									
100									
4									
-									
]									
095									
-									
→									

BORING NUMBER CW-25 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond OK 73003
CONSULTING	405-562-3268

1 RED ROCK LOG 18043 LOGS 2024 GPJ REDROCK GDT 4/30/24

CLIE	ENT	SRB		PROJECT NAME SH 29 Cut - West Phase II									
PRC	JEC ⁻	T NUN	IBER 18043	PROJECT LOCATION Stephens County, Oklahoma									
DAT	E ST	ARTE	ED 4/5/24 COMPLETED 4/5/24	GROUND ELEVATION 1143 ft STATION 770+30 OFFSET 15' RT									
DRII	LING	G CON	ITRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:	:								
DRII	LING	3 MET	THOD 4.5" augers - CME 750 ATV	DURING DRILLING _	none								
LOG	GED	BY _	EDC CHECKED BY JWB	_ 0 hrs AFTER DRILLIN	IG _	none							
TON	ES _	JP# 2	9657(04)	Cave In Depth _none									
	-			_									
£)					ļ	щ	S	(9)		TERBE LIMITS		00	
NC	(#)	GRAPHIC LOG			!	₹	N N	JRE IT (%				; #2((%)	
ATI	DEРТН (ft)	% No	MATERIAL DESCRIPTION			7	00/	IST	LIQUID	ST[C	ASTICI INDEX	SING EVE	
ELEVATION (ft)	В	9				SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	Z Z	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)	
ш	0	1 . 4		4440							П	ш	
			SILTY SAND, brown, very loose CLAYEY SAND, red, loose	e 1143' 1142'	\bowtie	SPT	3	16	24	16	8	38.0	
1140			<u> </u>										
	- ₅ -												
_			SILTY SAND, light gray and red, mediu	m dense 1138	X	SPT	16	8	0	0	NP	31.3	
1135													
_		ZZ111.	SILTY, CLAYEY SAND, gray, der			SPT TC	33 50/3"	7	_23_	16	7	49.6	
_	_10_ _		SANDSTONE, gray to light reddish brown, cem cemented	ented to very well	V	10	50/2" 50/0.8"						
							00/0.0						
	15					TC	50/0.5"						
							50/0.1"/						
1125													
	20	:::::					50/0"						
			Boring Termination Depth = 20 fe Boring Completed and Grouted on 4/5	eet 5/2024	V	TC	50/2" \50/0.5"/						
1120													
_													
1115													
_													
1110													
_													
1105													
1105													
1100													
1095													

BORING NUMBER CW-26 PAGE 1 OF 1

R	I	20	0		I				
C	0	N	S	U	L	T	1	N	G

1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

CLIE	NT	SRB	PROJI	ECT NAME SH 29	Cut Analy	sis - We	st Phas	-							
	_			PROJECT LOCATION Stephens County, Oklahoma											
DAT	E ST	ARTE	D 7/12/18 COMPLETED 7/12/18 GROUI	ND ELEVATION 1	154.5 ft S	TATION	1 <u>772</u> +	-00 C	FFSE	r 50'	LT				
DRIL	LING	CON	TRACTOR DSO - Drilling Services of Oklahoma GROU	ND WATER LEVEL	S:										
DRIL	LING	MET	Wet rotary - CME 750 ATV	DURING DRILLING	none										
		_		hrs AFTER DRILL	ING none										
NOT	ES_	JP# 2	29657(04)	Cave In Depth non	e										
(#)					l h	TS	@	AT	TERBI LIMIT		00				
ELEVATION (ft)	DЕРТН (ft)	GRAPHIC LOG			SAMPLE TYPE	N N C	15 P				3 #2 : (%)				
VAT	EPT	RAF LO	MATERIAL DESCRIPTION		I	ŏz	ISIS I	LIQUID	PLASTIC LIMIT		SIN				
ELE		G			SAN	BLOW COUNTS N	MOISTURE CONTENT (%)	L	7 -	PLASTICITY INDEX	PASSING #200 SIEVE (%)				
	0	<i>?</i> /[[<u>SILTY, CLAYEY SAND</u> , light brown, medium dens	e 1154.5	5' X SPT	20	5	23	16	7	30.4				
			,,		351	20	5	23	10		30.4				
1150	5 _		SILTY SAND, light brown, very dense	1150,5 mented 1150	. =	30 50/4"	8	0	0	NP	23.0				
	_		<u>SANDSTONE</u> , light gray, poorly cemented to very well ce	emented	TC TC	50/3" 50/2"									
_						00.2									
1145	_ _10_														
_					TC	50/1.8" 50/1"									
1140	 15														
					TC	50/0.3" 50/0.3"									
						00/0.0									
1135															
	20				TC	50/0.4" 50/0.3"									
_					V	50/0.3"									
	25				TC	50/0.5" 50/0.3"									
					V IC	50/0.3"									
1125	30_					50/0 4"									
					TC	50/0.4" 50/0.1"									
_		::::													
1120															
					TC	50/1" 50/0.4"									
		::::													
1115	- 40														
	-				TC	50/0.8" 50/0.4"									
						00/0.4									
_ 1110	1E														
- 7	_45_		Boring Termination Depth = 45 feet	1109.5	б' Т С	50/0.8" ,50/0.5"									
_			Boring Completed and Backfilled on 7/12/18		V	JOU/U.5"									

BORING NUMBER CW-27 RED ROCK PO Box 30591 Edmond, OK 73003 PAGE 1 OF 1 CONSULTING 405-562-3268 PROJECT NAME SH 29 Cut - West Phase II **CLIENT** SRB PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma COMPLETED 4/5/24 DATE STARTED 4/5/24 GROUND ELEVATION 1156 ft STATION 772+00 OFFSET 0 **DRILLING CONTRACTOR** DSO - Drilling Services of Oklahoma **GROUND WATER LEVELS:** ☐ DURING DRILLING 38 ft / Elev 1118 ft DRILLING METHOD HSA - CME 750 ATV ▼0 hrs AFTER DRILLING 20 ft / Elev 1136 ft LOGGED BY EDC **CHECKED BY** JWB NOTES JP# 29657(04) Cave In Depth none **ATTERBERG** PASSING #200 SIEVE (%) **BLOW COUNTS** SAMPLE TYPE ELEVATION (ft) MOISTURE CONTENT (%) LIMITS GRAPHIC LOG DEPTH (ft) PLASTICITY INDEX PLASTIC LIMIT LIQUID MATERIAL DESCRIPTION 0 SILTY SAND, brown to reddish brown to light gray and purple, loose to SPT 4 18 0 0 NΡ 29.7 medium dense 5 1150 SPT 19 16 3 27.3 27 **SANDSTONE**, light gray and purple to light reddish brown to light gray, TC 50/3.3 very poorly cemented to very well cemented 50/4" 50/2.5' 10 50/0.5' TC 50/0.5" TC 50/0.5" 50/0.3" 20 TC 50/1.5' 1135 50/1" 50/0.3" TC 50/0.3" 30 50/0.5' 50/0.5' TC 1125 RED ROCK LOG 18043 LOGS. 2024 GPJ REDROCK.GDT 4/30/24

SHALE, red, hard

Boring Termination Depth = 40 feet

Boring Completed and Grouted on 4/5/2024

50/1"

50/0.5"

50/0.8'

TC

TC

1120

35

40

BORING NUMBER CW-28 PAGE 1 OF 1

K	ZI			L	ROC				
C	0	N	S	U	L	T	I	N	G

1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

CI IF	NT	SRR	PROJECT I	PROJECT NAME SH 29 Cut Analysis - West Phase I									
	_			PROJECT LOCATION Stephens County, Oklahoma									
									FFSE	r 50'			
DRIL	LING	CON		GROUND ELEVATION 1142.5 ft STATION 774+00 OFFSET 50' LT GROUND WATER LEVELS:									
DRIL	LING	MET	HOD 4.5" augers - CME 750 ATV DURIN	DURING DRILLING none									
LOG	GED	BY_	SAH CHECKED BY JWB 0 hrs.	0 hrs AFTER DRILLING none									
ТОИ	NOTESIP# 29657(04) Cave In Depthnone												
£					Й	S	(9)	AT	TERBE	ERG	00		
ELEVATION (ft)	I (ft)	9 €			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)		LIMIT		PASSING #200 SIEVE (%)		
'ATI(DЕРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		PLE	0 V	ISTI TEN	₽₩	STIC	들찗	SING EVE		
I.EV	DE	Ę.			WA.	LOV	MO	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	SHE		
	0	/////		4440.51	1	_				П			
 			SANDY LEAN CLAY, reddish brown, stiff	1142.5'	SPT	11	11	25	16	9	51.3		
1140													
	 5												
			SANDSTONE, light gray with reddish brown, cemented to very cemented	well 1137.5'	SPT	50/5" 50/1.3"	4	0	0	NP	24.1		
1135			cemented			50/0.8							
	10	: : : :			TC	50/1.3" 50/0.5"							
_ 113 <u>0</u>					V 10	50/0.5"							
		: : : :											
	15					50/4"							
		::::			TC	50/1" 50/0.3" __							
<u>1</u> 12 <u>5</u>													
	20												
	20				ТС	50/1.5"							
_ 112 <u>0</u>					_	50/1"							
	25				—	50/1"							
_ 111 <u>5</u>					TC	50/0.4"							
		::::											
	30												
			Boring Termination Depth = 30 feet Boring Completed and Backfilled on 7/11/18	1112.5'	TC	50/0.4" 50/0.4",							
<u>1</u> 110			3 1										
_ 110 <u>5</u>													
1100													
1095													

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	ENT	SRB		PROJECT NAME SH 29 Cut - West Phase II							
PRO	JEC.	T NUM	MBER 18043	PROJECT LOCATION Ste	phens C	ounty, Ok	lahoma				
DAT	E ST	ARTE	ED _4/5/24	GROUND ELEVATION 11	43 ft	STATION	774+	00_0	FFSET	10' 1	RT
DRI	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	i:						
DRI	LLIN	G MET	THOD 4.5" augers - CME 750 ATV	DURING DRILLING	none						
LOC	GEE	BY _	EDC CHECKED BY JWB	0 hrs AFTER DRILLI	NG non	e					
NOT	ES _	JP# 29	9657(04)	Cave In Depth _none	9						
	_										
ft)					Й	TS	(9)		TERBE		00
ELEVATION (ft)	(#)	GRAPHIC LOG			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
/ATI	DEPTH (ft)	RAP LO	MATERIAL DESCRIPTION		PLE	O	TSI TEI	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	SINC
ELE)	🛎	ਹ			SAM	LOV	MOS	음들	P.F.	LAS	SHS
	0	(17.577	CANDY LEAN CLAY raddish brown and a	vrov ooft 1112							
- 	-		SANDY LEAN CLAY, reddish brown and g	gray, soft 1143	SP	Γ 4	19	25	15	10	67.2
1140											
	5										
	-		SILTY SAND, light gray and reddish purple	e, dense 1138	SP	Г 47	8	0	0	NP	33.5
1135	_ =										
	_ 10										
-			SANDSTONE, gray and reddish purple, poorly ce cemented	emented to well 1133	SP TC	50/5" 50/1"	7	0_,	0	NP.	32.1
1130	_		·			50/0.3"					
-	15										
_	_ 13_				▼ TC	50/2"	1				
1125						50/2"	1				
	-		Boring Termination Depth = 18 feet	10004	▼ TC	50/0.5"					
			Boring Completed and Backfilled on 4/5/	2024		30/0.5					
1120											
1115											
1110											
1105											
1100											
- 											
1095											

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI		SKB		PROJECT NAME SH 29 Cut - West Phase II									
PRC	JEC.	T NUM	BER 18043	PROJECT LOCATION Stephens County, Oklahoma									
			D 4/4/24 COMPLETED 4/4/24			TATION	775+8	89_ O I	FFSET	50'	LT		
			ITRACTOR DSO - Drilling Services of Oklahoma										
			HOD 4.5" augers - CME 750 ATV EDC CHECKED BY JWB	DURING DRILLING									
		_		0 hrs AFTER DRILLII									
NO	L3 _	JF# 23	9657(04)	Cave In Depth none									
	_							ΔΤΊ	TERBE	RG			
£	£	C			/PE	NTS	щ ⁽ %)		LIMITS	}	200		
ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	PASSING #200 SIEVE (%)		
П	0				SA	BL(20		로_	PLA	₽ A		
			SANDY SILT, brown to red, very loos	se 1127	SPT	3	18	0	0	NP	56.8		
1125	- 												
-	5		SANDY LEAN CLAY, purple, red and gray,	very stiff 1123		18							
1120	- -		SANDSTONE, gray to light reddish brown, wel	I cemented 1121		24 50/6"	11	26	18	8	50.2		
			Boring Termination Depth = 7 feet Boring Completed and Backfilled on 4/4/2	2024	TC	50/0.5" 50/0.5"							
			3 · · · · · · · · · · · · · · · · · · ·			50/0.5							
1115													
_													
-													
1105													
1100													
- 													
1095													
-													
1090													
_													
1085													
1080													

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	CLIENT SRB						PROJECT NAME SH 29 Cut - West Phase II										
PRO	JEC	T NUM	BER _180	43				PROJECT LOCA	ATION Ste	phens Co	unty, Ok	lahoma					
DA	E S	ARTE	D 4/4/24		COMPLETE	D 4/4/24		GROUND ELEV	ATION 112	27 ft S	TATION	775+	89 O I	FFSET	9' R	Т	
DRI	LLIN	G CON	TRACTOR	DSO - Drilli	ng Services o	of Oklahoma		GROUND WATE	ER LEVELS	:							
DRI	LLIN	G MET	HOD 4.5"	' augers - CME	E 750 ATV			DURING I	DRILLING _	none							
LOC	GEE	BY _	EDC		CHECKED	BY JWB		0 hrs AFTER DRILLING none									
NO	res .	JP# 29	9657(04)					Cave In Depth none									
	-																
£										Ш	လှ	<u> </u>		ERBE		0	
ELEVATION (ft)	€	일								SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS		PASSING #200 SIEVE (%)	
ATIC	DEPTH (ft)	GRAPHIC LOG			MATER	IAL DESCRI	PTION			_ _ _	8	STL	윽늘	TIC	글심	NE.NG	
LEV	日	GR _								AMF	ŏ	Q N	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS	
Ш	0									S	BI	0		ш	Д	Д.	
1125	-			SII TV /	: CLAYEY SAI	4" TOPSOIL		ım donoo	/ <u>1127</u> 1126.7	SPT	17	9	22	17	5	37.9	
	_			SIL I I, I	CLATET SAI	שט, grayand	a rea, meait	um dense	1120.1								
	5			SII TV SA	AND, light pu	rnlich rod an	d gray mag	lium dense	1123	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	19	40					
	_	.1	\vdash		NE, light pur				/ 1122	SPT TC	27 50/5.5"	10	0	0	NP	28.3	
1120				Bor	Boring Terming Complete	nination Dept	h = 5.5 feet	t 2024		V 10	50/3"						
				Doi	ing complete	a and backin	iica on 4/4/	2024			50/2.5"						
1115																	
1110																	
1105																	
100																	
1100																	
1095																	
-																	
1090																	
1085																	
1080																	
	I	1	l								1	1	1				

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PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II										
PROJE	ECT N	IUMBER 18043 PROJECT L	OCATION Ste	phens Co	unty, Ok	lahoma				
DATE	STAF	RTED _4/15/24	EVATION 117	72 ft S	MOITAT	823+	00 o	FFSE	r 73' l	LT
DRILL	ING C	CONTRACTOR DSO - Drilling Services of Oklahoma GROUND W	ATER LEVELS	:						
DRILL	ING N	METHOD 4.5" augers - CME 750 ATV DURIN	IG DRILLING _	none						
LOGG	ED B	Y DLW CHECKED BY JWB 0 hrs.	AFTER DRILLIN	NG none						
NOTES	S _JP:	# 29657(04) Cave	In Depth none	!						
æ l				111	S			TERBE		0
ELEVATION (ft)	≘ ≘			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS 	> -	#20 %)
H	GRAPHIC	MATERIAL DESCRIPTION		<u> </u>	8	STC EN	₽⊨	PLASTIC LIMIT	I	PASSING #200 SIEVE (%)
EV EV	뭐용			MM	NO N	ON C	LIQUID	LAS	PLASTICI INDEX	\SS SIE
				8	B	- 0		۵	PL/	Α
		CLAYEY SAND, red, loose	1172	SPT	5	16	25	15	10	31.5
1170		SILTY, CLAYEY SAND, red to brown to light gray and red, very de	nse 1170							
ΓŢ.	_ = //									
+ +) - // <i>/</i>			SPT	54	9	21	15	6	43.1
1165	1//	CANDYOU T Fish to an and an a first day	4405		0-1		-	13		40.1
+ +	-11:	SANDY SILT, light gray and red, medium dense	1165	SPT	30	8	0	0	NP	56.5
[0]::	SANDSTONE, light gray and dark red, poorly cemented to well cemented	1163.5	TC	50/5.5" 50/1"					
1160	- ::	:::			50/0.5"					
FT		Boring Termination Depth = 12 feet		TC	50/2" 50/1.4"					
		Boring Completed and Backfilled on 4/15/2024			30/1.4					
1155										
1150										
 										
1145										
1140										
-										
11135										
<u> </u>										
1130										
# 1140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140 1 140										

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CL	ENT SRB			PROJECT NAME SH 29 Cut - West Phase II							
PR	OJECT NUME	BER 18043		PROJECT LOCATION _	Stephens C	ounty, Ok	lahoma				
DA	TE STARTED	4/15/24	COMPLETED 4/15/24	GROUND ELEVATION	1172 ft	STATION	823+	00_ o	FFSE	Γ_5'L	Т
DR	ILLING CONT	RACTOR DS	O - Drilling Services of Oklahoma	GROUND WATER LEVE	ELS:						
DR	ILLING METH	IOD 4.5" auge	ers - CME 750 ATV	DURING DRILLIN	G none						
LO	GGED BY D	LW	CHECKED BY _JWB	0 hrs AFTER DRI	LLING non	е					
NO	TES JP# 296	657(04)		Cave In Depth _n	one						
				_							
£					Ш	ပ	<u></u>		TERBE LIMITS		0
ELEVATION (ft)	€ 2				SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
\A A∏⊝	DEPTH (ft) GRAPHIC LOG		MATERIAL DESCRIPTION		<u>ٿ</u>	8	ST		PLASTIC LIMIT	PLASTICITY INDEX	ING VE (
ļ Š	GR GR				AMP.) N	ON O	LIQUID	[AS]	AST INDI	ASS SIE
	0				S)	В	0		6	P	Α'
447		<u>S</u>	ANDY LEAN CLAY, red to red with yellow	v, medium stiff 1	172' SP	Г 8	21	34	14	20	50.6
117											
F			SANDY SILTY CLAY, dark red,	nord 1	168'						
Ė	5		SANDY SILTY CLAY, Wark reu, i	iaiu i	SP	Г 67	11	21	15	6	61.0
116					7 1						
L											
F	10		<u>SILTY SAND</u> , red and light gray and re <u>SANDSTONE</u> , red and light gray, ce		163' SP ⁻ 162'	²³ 21	7	0	0	NP	25.1
116			Boring Termination Depth = 10.3	feet	102	50/4"					
F			Boring Completed and Backfilled on 4	/15/2024							
	1										
115											
[13											
-											
Ė											
115	<u> </u>										
	1										
-	-										
114											
-	-										
75/114	-										
4/3											
99-											
28 -											
113	5										
GPJ											
2024											
113	<u> </u>										
043 L											
G 18	1										
Ž 112											
1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24	1										
	1										

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	ENT	SRB		PROJECT NAME SH 29	Cut - West	Phase I						
PRO	JEC	T NUM	IBER 18043	PROJECT LOCATION Stephens County, Oklahoma								
			D 4/15/24 COMPLETED 4/15/24	_		OITAT	825+	<u>25</u> Of	FFSET	<u>55' l</u>	_T	
			ITRACTOR DSO - Drilling Services of Oklahoma 'HOD 4.5" augers - CME 750 ATV	_ GROUND WATER LEVEL _ DURING DRILLING								
			DLW CHECKED BY JWB	_ 0 hrs AFTER DRILL								
				_ Cave In Depth _no		:						
NO	L3 _	JF# 23	9657(04)	Cave iii Deptii _IIO	ic							
_				_		ω			ΓERBE			
ELEVATION (ft)	Œ	ಲ			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	L	LIMITS		PASSING #200 SIEVE (%)	
)TIO	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			000	STU ENJ	<u></u> ⊔⊔	PLASTIC LIMIT	Ę×I	NG VE (
ΈV	当	GR			MP	NO O	ON L	LIQUID	LAS	ST	SSI	
Щ	0				<i>t</i> s	BL	- 8			PLASTICITY INDEX	Ъ/	
1180			SILTY, CLAYEY SAND, dark reddish brown to ligi dense	ht brown, medium 118	1 SPT	18	16	26	20	6	45.4	
	_ :		conce									
	5											
1175		7.71.11	SILTY SAND, light brown, medium d	ense 11	6 SPT	15	8	0	0	NP	25.5	
	<u> </u>		SANDSTONE, dark red and purple, poorly cemer	nted to cemented 1175	5' TC	50/4.5" 50/2"	l					
	_ :					50/1.3"						
1170	_10_	:::::			V TC	50/1.8"	1					
					V 1.5	50/0.8"	1					
	-	-										
	15					50/0"						
1165			Boring Termination Depth = 15 fee Boring Completed and Backfilled on 4/1	et 5/2024	TC	50/3" \50/1.5"						
-												
1160												
-												
1155												
1150												
1145												
1140												
1135												
	1											

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RED ROCK PO Box 30591 Edmond, OK 73003
CONSULTING 405-562-3268

CLI	ENT	SRB		PROJECT NAME SH 29 Cut - West Phase II							
PRO	OJEC	T NUN	MBER 18043	PROJECT LOCATION Stephens County, Oklahoma							
DA	TE S	TARTE	ED 4/15/24 COMPLETED 4/15/24	GROUND ELEVATION _118	30 ft S	TATION	825+	25 o	FFSE	r 6' L'	Т
DRI	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	:						
DRI	LLIN	G ME1	THOD 4.5" augers - CME 750 ATV	DURING DRILLING _	none						
LO	GGE	BY _	DLW CHECKED BY JWB	0 hrs AFTER DRILLI	NG none						
NO	TES	JP# 2	9657(04)	Cave In Depth _none	!						
	_			_							
t)					111	Ø			TERBE		0
ELEVATION (ft)	£	ੂ			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS	>	(%) #20 (%)
ATIC	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		E	8	ST	≘⊨	PLASTIC LIMIT	I 등 流	PASSING #200 SIEVE (%)
ΕŽ	H	GR			MP.) O	NO NO	LIQUID	AS	PLASTICI INDEX	ASS SIE
1180	0				/S	ᆸ	_ O	-		<u> </u>	Δ'
			CLAYEY SAND, red, loose	1180	SPT	5	17	29	16	13	39.9
-	+ -										
<u> </u>	‡ :										
1175	5 _		SILTY SAND, light gray to brown, medi	um dense 1175	SPT	7	7	0	0	NP	16.7
	‡ :		SANDSTONE, light gray and red, poorly cemer		1/ / -: :	27 50/3.5"		0		INI	10.7
-	+ -	1::::				50/1.3"					
1170	10					50/1"					
	├ -	::::	: Boring Termination Depth = 11 fe	<u> </u>	TC	50/3"	-				
			Boring Completed and Backfilled on 4/	15/2024	V 1.0	50/1.3"	1				
1165											
100											
	-										
-	1										
1160	D										
	1										
[]											
1155	5										
-	-										
1150											
1150)										
:	-										
1145	5										
	-										
-	1										
11140)										
	-										
1135	5										
}-	-										
	1										
1145	1										
- [1136	/	1				l .	1	1		1	l

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RED ROCK PO Box 30591 Edmond, OK 7300	
Edmond, OK 7300)3
CONSULTING 405-562-3268	

CLI	ENT	SRB		PROJECT	NAME SH 29 Cu	ut - West	Phase II					
PRO)JEC	T NUM	BER 18043	PROJECT LOCATION Stephens County, Oklahoma								
DA	TE ST	ARTE	D 4/15/24 COMPLETED 4/15/24	GROUND E	ELEVATION 118	5 ft S	TATION	827+	00 O I	FFSET	55' I	_T
DRI	LLIN	G CON	TRACTOR DSO - Drilling Services of Oklahoma		WATER LEVELS:							
DRI	LLIN	G MET	HOD _4.5" augers - CME 750 ATV	DUR	ING DRILLING _	none						
LO	GEE	BY _	DLW CHECKED BY JWB	0 hrs	AFTER DRILLIN	IG none						
NO	ΓES	JP# 2	9657(04)		e In Depth none							
				_								
_	Г						(0		АТТ	TERBE	RG	
E 7	₽	ပ				YPE	NTS	% (%)		LIMITS	3	£200 %)
ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		ျပူျ	PLASTICITY INDEX	PASSING #200 SIEVE (%)
ΞVΑ	Eb.	3RA L	WW. TELWIE BEGOLD THOSE			MPL	× ×	O S S S S S S S S S S S S S S S S S S S	LIQUID	PLASTIC LIMIT	STE	SSII
Щ.						SA	BLC	≥0		ᅵᅩᆸᆝ	٦ ع	A O
1185	0		CLAYEY SAND, red to dark brown, lo	ose	1185'	SPT	8	17	32	15	17	43.2
	Ι.					/ 1011		.,	02			70.2
1180	5		1500 OLAY 111 OAND		4.400							
			LEAN CLAY with SAND , gray and red	, hard	1180'	SPT	85	12	28	16	12	75.9
	Ι.					N ODT	0.5					74.0
1175	10	1	SANDSTONE, gray and red, well ceme	ented	1176.5'	▼ SPT TC	35 50/2.5"	8	26	15	11	71.0
							50/0.6" 50/0.4"					
		:::::										
						TC	50/0.8"					
1170	15	 				V .5	50/0.5"/					
	-		Boring Termination Depth = 16 fee	t		TC	50/0.8" \50/0.4"/					
			Boring Completed and Backfilled on 4/15	0/2024			30/0.4					
1165												
1160												
1155												
1100												
_												
1150												
1145	1											
1140												
<u>.</u> 140												
	-											
1135	i	1								, !		

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RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	

CLI	ENT	SRB		PROJECT NAME SH 29 Cut - West Phase II									
PRO)JEC	T NUM	BER 18043	PROJECT LOCATION Stephens County, Oklahoma									
DA	TE ST	TARTE	O 4/15/24 COMPLETED 4/15/24	GROUND ELEVATION 11	85 ft S	TATION	827+	00_ 0	FFSE1	5' L	Т		
DRI	LLIN	G CON	TRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	S :								
DRI	LLIN	G MET	HOD _4.5" augers - CME 750 ATV	DURING DRILLING	none								
			DLW CHECKED BY JWB	0 hrs AFTER DRILLI	NG none								
			657(04)	Cave In Depth non									
	-			· —									
(ft)					ш	ည	<u> </u>		TERBE LIMITS		01		
N	£	일			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)		
ELEVATION	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		<u> </u>	8	STL	≘⊨	PLASTIC LIMIT	EX.	ING VE (
E E	DEF	GR.			MP	M _O	<u>ov</u>	LIQUID	LAS	ST	\SS SIE		
	0				\sqrt{s}	BL	-8	_	颪	PLASTICITY INDEX	P/		
-	-		<u>SILTY SAND</u> , light gray to brown, very	loose 1189	SPT	3	13	0	0	NP	22.9		
<u> </u>	<u> </u>												
1180	- 5												
1100			LEAN CLAY , brown to reddish brown, v	ery stiff 1180) SPT	23	18	32	14	18	87.7		
- - -	‡ <u> </u>		SILTY, CLAYEY SAND, light gray and yellow	, very dense 117	7 SPT	52	13	24	20	4	38.0		
1175	10_				SPT	68	12	24	20	4	34.8		
F -	Ι.				011	00	12	24	20	7	34.0		
<u> </u>	t :	7.71.11	SILTY SAND, red and gray, medium of	lense /117;	2 SPT	14	9	0	0	NP	24.1		
1170)		SANDSTONE, red and gray with purple, poor		5'	50/6"	1						
-			Boring Termination Depth = 14 fee Boring Completed and Backfilled on 4/15	it 5/2024									
1165													
	-												
	1												
1160													
	1												
	1												
1155	5												
	-												
<u> </u>													
1150)												
-	1												
[-												
1145	5												
	-												
_													
1140													
۲ ' 4 ۷													
1145	-												
<u> </u>													
: 1135	5												

RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	405-562-3268

		SRB	IBER 18043	PROJECT NAME _								
DAT DRII DRII LOG	TE ST LLIN LLIN GGE	TARTE G CON G MET D BY	COMPLETED	GROUND ELEVATION GROUND WATER IN DURING DRIIN OF the second of the secon	ON 118 LEVELS: LLING 2	9 ft S 26 ft / Elev	TATION v 1163 f	829+	<u>00</u> o	FFSE	「 _55'	LT_
NOI	-	JF# 2	9037(04)	_ Cave iii Dept	.n <u>none</u>		PE ZIS		ΔΤ.	TERBE	EDC:	
ELEVATION (ft)	o DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		PLASTIC LIMIT		PASSING #200 SIEVE (%)
 _1185	5		CLAYEY SAND, reddish brown to dark brown and and red, loose to medium dense	purple to light gray	1189'	SPT	7	12	25	13	12	42.2
 	10					SPT	11	13	26	16	10	24.8
1175 11770 1165			SILTY, CLAYEY SAND, light red and gray SANDSTONE, light red and gray, poorly cemented		1179' 1178'	▼ TC	12 50/5" 50/2.8" 50/1.3" 50/1.4" 50/0.8" 50/0.6"		25	18	7	42.7
1160 1155 1150 1145 1140			Boring Termination Depth = 28 feet Boring Completed and Grouted on 4/15			▼ TC	50/3.8" 50/1.3" 50/1" 50/0.8"					

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	ENT	SRB		PROJECT NAME SH 29 C	ut - West	Phase II					
			BER 18043	PROJECT LOCATION Ste							
			D <u>4/15/24</u> COMPLETED <u>4/15/24</u>	GROUND ELEVATION 118		TATION	829+	<u>00</u> 0 1	FFSET	_5' L	<u>T</u>
			TRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS							
			HOD 4.5" augers - CME 750 ATV	DURING DRILLING							
			OLW CHECKED BY JWB	0 hrs AFTER DRILLIN							
NO.	ΓES _.	JP# 29	9657(04)	Cave In Depth none	!						
(Щ	ST	@		TERBE LIMITS		00
ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG			SAMPLE TYPE	SLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
ΑTI	ļ H	ZAP LOC	MATERIAL DESCRIPTION			O >	TEL TEL	∃⊨	STIC		SINC
LEV		GF			MA	0	ĕŏ	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS
ш	0	7.4 7.4				В			_	곱	ш
	├ -		<u>CLAYEY SAND</u> , brown with yellowish brown to red- black, loose to very dense	dish brown with 1189	SPT	8	14	36	15	21	46.2
	‡ :		,,								
1185	5										
	"				SPT	60	15	24	16	8	29.4
	‡ :		SANDY LEAN CLAY, dark red, hard	1182	SPT	35	20	31	17	14	69.1
1180	10										
	Ι.		LEAN CLAY , light gray with red, hard	d 1179	SPT	54	13	33	15	18	94.3
	+ -										
1175		Z.XI.II.	SILTY, CLAYEY SAND, light gray with red, med		SPT	21	10	25	18	7	49.3
	1		SANDSTONE, light gray, poorly cemen Boring Termination Depth = 14 feet	ted 1175.5	TC	50/5" 50/2"					
			Boring Completed and Backfilled on 4/15/	2024		50/1.5"					
1170	1										
	-										
1165	5										
	-										
1160											
	-										
1155											
	-										
	1										
1150)										
	1										
	-										
1145	5										
	-										
	1										
1140	,										
0	1										

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-40 PAGE 1 OF 1

CONSULTING 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/15/24 COMPLETED 4/15/24 GROUND ELEVATION 1188 ft STATION 830+50 OFFSET 48' LT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY DLW CHECKED BY JWB 0 hrs AFTER DRILLING none

NOTES JP# 29657(04) Cave In Depth none

5					Щ	ည	<u> </u>	AT	TERBE LIMITS	RG	0
ELEVATION (T)	O DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC	PLASTICITY INDEX	PASSING #200
85	-		<u>CLAYEY SAND</u> , brown and yellowish red to yellowish brown, loose	1188	SPT	5	19	29	14	15	42
#	-		SILTY SAND, dark red and black, medium dense	1183	SPT	22	12	20	19	1	21
75	10		SANDSTONE, dark red to light gray and red, very well cemented to cemented	1181	SPT TC	50/0.5", 50/0.3" 50/0.1" 50/0.1" 50/1"	8	<u>, o</u>	0	NP)	
7 <u>0</u> - - 6 <u>5</u>			Boring Termination Depth = 17 feet Boring Completed and Backfilled on 4/15/2024		▼ TC	50/1.3" \50/0.8"					
60											
55 <u>0</u> 45 <u> 40</u>											
5 <u>0</u> - - 4 <u>5</u>											
40											

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RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLIE	ENT	SRB			PROJECT NAME	SH 29 C	ut - West	Phase I					
PRO	JEC	T NUN	IBER <u>18043</u>		_ PROJECT LOCATI	ON Ste	phens Cou	unty, Ok	lahoma				
DAT	E ST	ARTE	D 4/15/24	COMPLETED 4/15/24	_ GROUND ELEVAT	ION _118	33 ft S	TATION	N <u>831</u> +	00_ 0	FFSET	1' L	Γ
DRIL	LIN	G CON	ITRACTOR DSO	- Drilling Services of Oklahoma	_ GROUND WATER	LEVELS	•						
DRIL	LIN	G MET	HOD 4.5" augers	s - CME 750 ATV	_ DURING DRI	LLING _	none						
LOG	GED	BY _	DLW	CHECKED BY JWB	_ 0 hrs AFTER	DRILLIN	IG none						
NOT	ES _	JP# 2	9657(04)		_ Cave In Dept	th none							
	-				_								
Œ							Ш	ည	(9		TERBE		0
ELEVATION (ft)	Œ	9.,					SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
ATIC	DEРТН (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION			J.E	00/	IST TEN	≘⊨	ST	듣피	SING EVE
LEV	B	9					A MI	Po	8 NO	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	ASS
ш	0	. 1 . 4.						В				П	ш
			SILTY SA	AND, yellowish brown to red and yellowish medium dense	n brown with white,	1183	SPT	11	10	0	0	NP	23.0
1180													
- +	- 5		•										
		7777	CL AVE	CAND and and called in brown with	and the same of th	4477	SPT	13	15	28	15	13	35.7
1175			CLAYET	<u>Y SAND</u> , red and yellowish brown with gra hard	ay, medium stiff to	1177'							
							SPT	73	8	23	12	11	30.3
				Boring Termination Depth = 9.5 fe Boring Completed and Backfilled on 4/1	et 5/2024								
1170				Borning Completed and Basicinica Cit in	0,2021								
1165													
-													
1160													
1155													
1150													
1145													
1140													
_													
1135													

PAGE 1 OF 1

RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLIENT SRB		PROJECT NAME SH 29 C	ut - West	Phase I					
PROJECT NUMBER 180		PROJECT LOCATION Ste							
DATE STARTED 4/15/2	4 COMPLETED 4/15/24	GROUND ELEVATION _11	77 ft S	OITAT	8 34+	00 o	FFSE	Γ <u>41'</u>	LT
DRILLING CONTRACTO	R DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	:						
DRILLING METHOD 4.5	5" augers - CME 750 ATV	DURING DRILLING _	none						
LOGGED BY DLW	CHECKED BY JWB	0 hrs AFTER DRILLII	NG none	!					
NOTES _JP# 29657(04)		Cave In Depth _none	;						
		_							
(#)			Щ	2	@		TERBE LIMITS		00
ELEVATION (ft) DEPTH (ft) GRAPHIC LOG			SAMPLE TYPE	SLOW COUNTS	MOISTURE CONTENT (%)			>	PASSING #200 SIEVE (%)
ATI ATI COLLOC	MATERIAL DESCRIPTION		PE	00 >	TST	LIQUID	STIC	ASTICI'	
GF GF			NA%	O	≥ S		PLASTIC LIMIT	PLASTICI INDEX	SHS
0	OLAVEY CAND. Each house to go delich o	-U 1 4477		_				п.	
1175	CLAYEY SAND, light brown to reddish ye	ellow, loose 1177	SPT	6	19	29	15	14	43.5
	SILTY SAND , light brown and gray,	dense 1175	'						
1170	SANDSTONE, light gray with yellow, wel	I cemented / 1171	SPT	25 30	8	0	0	NP	31.7
	Boring Termination Depth = 6.3 fe	eet	TC	50/3" 50/1"					
	Boring Completed and Backfilled on 4/	15/2024		50/1"					
1165									
1160									
1155									
1150									
42									
<u>8</u> 1145									
GD									
8									
<u>الْ</u> 1140									
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1									
1									
\(\frac{1}{8} \) \(\frac{1}{135} \)									
13 LO									
180									
501									
1 RED ROCK LOG 18043 LOGS.2024.6PJ REDROCK.GDT 430/24									
				1				1	

BORING NUMBER CW-43 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	405-562-3268

CLIE	ENT	SRB	PROJEC	T NAME SH 29 C	ut - \	Vest	Phase II					
PRC	JEC	T NUN	MBER 18043 PROJEC	T LOCATION Step	ohen	ıs Coı	unty, Okl	ahoma				
DAT	E ST	ARTE	ED <u>4/15/24</u>	ELEVATION 117	7 ft	s	TATION	835+	<u>00</u> 0 I	FFSET	54' I	_T
DRII	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahoma GROUNI	WATER LEVELS:								
DRII	LLIN	G MET	THOD 4.5" augers - CME 750 ATV DU	JRING DRILLING _	none)						
LOG	GEE	BY _	DLW CHECKED BY JWB 0 h	rs AFTER DRILLIN	IG _	none						
TON	ES _	JP# 2	29657(04) Ca	ve In Depth none								
	-											
ft)						Щ	ГS	(9)		ERBE		00
ELEVATION (ft)	H (ff.)	GRAPHIC LOG				SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
ATI	DEРТН (ft)	Mari	MATERIAL DESCRIPTION			7	7 00	IST	LIQUID	STIC	듣찗	SING EVE
ILEV	В	9				Ψ	LOV	M N N	일특	PLASTIC LIMIT	PLASTICITY INDEX	ASS
ш	0	7.211.1									П	ш
1175			SILTY, CLAYEY SAND, dark brown to reddish brown, loos	se 1177'	X	SPT	7	17	23	16	7	40.5
			SILTY SAND, yellow to brown to gray and yellow, very den	se 1175'								
	- 5											
					X	SPT	79	3	0	0	NP	20.0
117 <u>0</u>	-											
_					X	SPT	63	4	0	0	NP	16.2
	10				M	SPT	20	6	0	0	NP	27.9
1165			SANDSTONE, gray and yellow, cemented to well cemented	ed 1166'		TC	40 50/2.5"					
							50/1.5" 50/0.8"					
	15											
1160					Y	TC	50/1"					
			Boring Termination Depth = 17 feet Boring Completed and Backfilled on 4/15/2024		V	TC	50/0.4"/ 50/1.3"					
			3 ** ********************************				50/0.5"					
1155												
1150												
1145												
1140												
_ 113 <u>5</u>												
1130												
		i .					1		1	Ì	i 1	

PAGE 1 OF 1

RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

CLI	ENT	SRB		PROJECT NAME SH 29 C	ut - West	Phase II					
PRC)JEC	T NUM	BER 18043	PROJECT LOCATION Ste	ohens Cou	ınty, Okl	ahoma				
DAT	E ST	ARTE	D <u>4/15/24</u> COMPLETED <u>4/15/24</u>	GROUND ELEVATION 117	<u>'4 ft</u> S	TATION	836+0	00_ 0	FFSET	. 66' I	
DRI	LLIN	G CON	TRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	:						
DRI	LLIN	G MET	HOD 4.5" augers - CME 750 ATV	DURING DRILLING	none						
LOC	GEE	BY _	DLW CHECKED BY JWB	0 hrs AFTER DRILLIN	IG none						
NOT	ES	JP# 29	9657(04)	Cave In Depth _none							
								АТ	TERBE	RG	
ELEVATION (ft)	æ	O			SAMPLE TYPE	NTS	щ [%]		LIMITS	}	(9)
é	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		Ш	l Ö	ļ Ž L	o.	<u>ల</u> .	Ë	# 9 E (%
Ϋ́	FP	L R	MATERIAL DESCRIPTION		Æ	×	SIS N	LIQUID	PLASTIC LIMIT	ST SE	SSIN
		0			SAN	BLOW COUNTS	MOISTURE CONTENT (%)		J_	PLASTICITY INDEX	PASSING #200 SIEVE (%)
	0	1111	<u>CLAYEY SAND</u> , pale red, loose	1174	SPT	6		24	44		
	_		<u>9131121 </u>		SPI	0	18	31	14	17	43.7
 1170	-										
	5		SILTY SAND, pale yellow with light brown	, dense /1170	SPT	35	3	0	0	NP	16.6
			SANDSTONE, pale yellow with light brown, poo			50/5.5"					
			Boring Termination Depth = 5 feet Boring Completed and Backfilled on 4/15	/2024							
1165			3 p								
_ 1160											
<u>1155</u>											
1150											
1145											
1140											
- 113 <u>5</u>											
1135											
1130											
 112 <u>5</u>											
1125											

BORING NUMBER CW-45 PAGE 1 OF 1



1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

	_	SRB		PROJECT NAME S								
			BER 18043	PROJECT LOCATIO	_							
			D 5/16/18	_ GROUND ELEVATION			TATION	1 <u>847+</u>	<u>·00</u> O	FFSET	Γ <u>55'</u>	RT
			TRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LE								
			HOD 4.5" augers - CME 750 ATV	_ \frac{ \text{DURING DRILLITY}}{\pi}								
		_	SAH CHECKED BY JWB	_ To hrs AFTER DE			t / Elev	1163.0	ft			
NOT	ES_	JP# 2	29657(04)	_ Cave In Depth	none							
£						Щ	ည	()	AT	TERBE		0
N N	(£)	일				SAMPLE TYPE	COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
ΔTIC	DЕРТН (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			٣	8z	ST EN	유느	흕니	들찌	N N N N
Έζ	DEF	유 _				₩ H	BLOW	<u>N</u>	LIQUID	PLASTIC LIMIT	AST IN	ASS SIE
21ELEVATION (ft)	0					S)	ᆸ	_ 0	_	۵	PLASTICITY INDEX	9
			SILTY SAND, reddish brown, mediur	n dense	1175'	SPT	30	9	0	0	NP	32.6
<u>1170</u>	5 _		SANDSTONE, reddish brown with interbedded cemented to well cemented	l light gray layers,	1171'	SPT	50/4" 50/1.3"	5	_0_/	_0_/	NP	29.6
			cernative to well cernative			V 10	50/0.8"	ł				
_ 1165	- 40											
1 102	_ 10_		$ar{\Sigma}$			TC	50/1.3" 50/1"					
			T			<u> </u>	00/1	1				
1160	 15	::::					50/0 8"	-				
						TC	50/0.8" 50/0.5"					
<u>1</u> 15 <u>5</u>	20					TC TC	50/1"	<u> </u>				
		::::				V 10	50/0.5"					
1150	_25_					ТС	50/0.8" 50/0.3"]				
		::::					50/0.5	1				
 114 <u>5</u>		::::	B : T : # D # 005				E0/0 0"					
			Boring Termination Depth = 29.5 Boring Completed and Grouted on 5	feet 11 5/16/18	145.5'	TC	50/0.8" 50/0.6"					
			9 ,									
1140												
_ 113 <u>5</u>												
1135												
- · <u>-</u>												
1125		ı				I	I	1			1	

BORING NUMBER CW-46 PAGE 1 OF 1

R				I	20	0		I	
C	0	N	S	U	L	T	1	N	G

1 DURING AFTER CAVE IN 18043 LOGS.GPJ DATA TEMPLATE.GDT 9/6/18

CLIE	ENT _	SRB						PROJECT NA	ME_SH 29 (Cut Analys	sis - We	st Phas	se I			
PRC	JECT	NUN	IBER <u>1804</u>	3				PROJECT LO	CATION St	ephens C	ounty, C	Oklahon	na			
			D 5/16/18		COMPLETED			GROUND ELE			TATION	8 49+	<u>+00</u> C	FFSE	r <u>50'</u>	RT
					illing Services of	Oklahoma		GROUND WAT	TER LEVELS:							
				augers - C	ME 750 ATV			DURING	DRILLING _	none						
		_	SAH		_ CHECKED I	BY JWB			TER DRILLIN							
NO	ES_	JP# 2	29657(04)					Cave In	Depth none			1				
ELEVATION (ft)	O DEPTH (ft)	GRAPHIC LOG			MATERI	AL DESCRIPT	TION			SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	LIQUID	PLASTIC TIMIT LIMIT		PASSING #200 SIEVE (%)
				<u>LEA</u>	N CLAY WITH S	AND , reddish b	brown, lig	ht gray, stiff	1167'	SPT	12	8	24	16	8	78.9
1165 1160	 _ 5 _			SANDS	TONE , reddish b	rown, light gra cemented	ny, cemen	ted to very well	1163'	SPT)	50/3" 50/1" 50/0.5"	4	√33_/	17/	<u> 16</u>	52.2
 1155	 _ 10 _ 									ТС	50/0.8" 50/0.5"					
	_15 _ - - - _ _20										50/0.5" 50/0.3" 50/1.3"					
 1145 	 				Boring Term	nination Depth	= 24 5 fe	et	1142.5'	▼ TC	50/1"					
1140 					Boring Complet	ted and Backfil	lled on 5/	16/18			50/0.4"					

BORING NUMBER CW-47 PAGE 1 OF 1

RED ROCK	PO Box 30591 Edmond, OK 73003
CONSULTING	

CLI	ENT	SRB		PROJECT NAME SH 29 C	ut - West	Phase II					
PRO	JEC.	T NUM	BER 18043	PROJECT LOCATION Ste	phens Co	unty, Ok	lahoma				
DA	E ST	ARTE	D 4/11/24 COMPLETED 4/11/24	GROUND ELEVATION 116	60 ft S	TATION	850+	00 O I	FFSET	10' I	т
			ITRACTOR DSO - Drilling Services of Oklahoma					<u>. </u>		10 1	
			HOD 4.5" augers - CME 750 ATV	DURING DRILLING							
			DLW CHECKED BY JWB								
NO	ES _	JP# 2	9657(04)	Cave In Depth none	!						
	_										
$\overline{}$						S	_		ΓERBE		
ELEVATION (ft)	Œ	ပ			SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)		LIMITS		PASSING #200 SIEVE (%)
₽	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		ЕТ) JO		۵.	ပ္ပ	PLASTICITY INDEX	£0,9 E(9,
Α	Ē.	ŘΖ	WATERIAL BESONI HON		/PL	×	N TE	LIQUID	AST IMI	STIC DE:	SSI
H					SAI	3.0	≥0		PLASTIC LIMIT	LAS N	PAS
1160	0	111517	CANDY I FAN OLAY and distributions	4400						Ъ	
	-		SANDY LEAN CLAY, reddish brown, i	nard 1160	SPT	69	10	25	14	11	64.8
			SANDY SILTY CLAY, reddish brown, l	hard1158							
	- <u>-</u> -		SANDSTONE, red and gray to gray, well co	emented 1157	SPT TC	50/4" 50/0.5"	17	_20_	16	_4_/	69.3
1155	_ 5 _				\ 10	50/0.5"					
	-		Boring Termination Depth = 6 feet		TC	50/1"					
			Boring Completed and Backfilled on 4/11	/2024		50/1"					
<u></u>											
1145											
1140											
440											
1135											
1130											
_ 1125											
 112 <u>0</u>											
1120											
- 											
1115											
1110											

BORING NUMBER CW-48 PAGE 1 OF 1

RED ROCK	PO Box 30591
EL FUEL CELER	Edmond, OK 73003
CONSULTING	

CLII	ENT	SRB		PROJECT NAME SH 2	29 Cut - V	Vest P	hase II					
PRC	JEC [°]	T NUN	MBER 18043	PROJECT LOCATION	Stephens	s Cour	nty, Okl	ahoma				
DAT	E ST	ARTE	ED <u>4/11/24</u> COMPLETED <u>4/11/2</u>	4 GROUND ELEVATION	1164 ft	ST	ATION	850+	00_ 0 I	FFSET	50' I	RT_
DRII	LLIN	G CON	NTRACTOR DSO - Drilling Services of Oklahom	a GROUND WATER LEV	ELS:							
DRII	LLING	G MET	THOD 4.5" augers - CME 750 ATV	DURING DRILLIN	G none							
LOG	GEE	BY _	DLW CHECKED BY JWB	0 hrs AFTER DRI	LLING _r	none						
NOT	ES _	JP# 2	9657(04)	Cave In Depth _r	one							
	_											
_							(0			ERBE		
ELEVATION (ft)	(H)	ပ				SAMPLE 1 YPE	BLOW COUNTS	MOISTURE CONTENT (%)	l	LIMITS		PASSING #200 SIEVE (%)
9	DЕРТН (ft)	GRAPHIC LOG	MATERIAL DESCI	RIPTION		<u> </u>	SOL	IN IN	□∟		E×	NG.
Ϋ́	ŒP	SR/]	<u> </u>	×	1018	LIQUID	PLASTIC LIMIT	ASTICI	SSII
					ć	8	BLO	20		PL L	PLASTICITY INDEX	A %
	0		SILTY SAND, brownish red to pale	yellow, very loose to loose 1	164	SPT	3	16	0	0	NP	40.0
					V	J						
	_ 5 _											
					X.	SPT	5	11	0	0	NP	27.5
 115 <u>5</u>												
1100	10											
			SANDSTONE, pale red and y	ellow, well cemented 11:	53.5	SPT	28 50/5.5"/	8	0	0	NP	42.2
			Boring Termination De			TC 5	50/1.5"					
1150			Boring Completed and Back	filled on 4/11/2024		\5	50/0.5"/					
_ 1145												
1140												
_ 												
1135												
1130												
-												
 112 <u>5</u>												
<u>1125</u>												
 112 <u>0</u>												

PO Box 30591 Edmond, OK 73003 BORING NUMBER CW-49 PAGE 1 OF 1

CONSULTING 405-562-3268

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

DATE STARTED 4/11/24 COMPLETED 4/11/24 GROUND ELEVATION 1155 ft STATION 852+00 OFFSET 20' LT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS:

DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none

LOGGED BY DLW CHECKED BY JWB 0 hrs AFTER DRILLING none

NOTES JP# 29657(04) Cave In Depth none

			ouve in Deptin _none							
H (ft)	HIC G			ТҮРЕ	OUNTS	TURE NT (%)	ı	LIMITS	3	G #200
o DEPTI	GRAP LO	MATERIAL DESCRIPTION		SAMPLE	BLOW C	MOIST	LIQUID	PLASTIC LIMIT	PLASTICI INDEX	PASSING #200
-		SILT with SAND, reddish brown, loose	1155'	SPT	9	17	0	0	NP	70.
5_	: 1::1::2 : : : : : : : :	SILTY SAND. light gray, medium dense SANDSTONE, yellowish red, poorly cemented	/ 1152' 1151.5'	TC	18 50/6" 50/2.3" 50/2"	10	0	0	NP	21.
		Boring Termination Depth = 6 feet Boring Completed and Backfilled on 4/11/2024		▼ TC	50/3.5" 50/1.3"					
	O DEPTH(ft)	GRAPHIC LOG	MATERIAL DESCRIPTION O SILT with SAND, reddish brown, loose SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented Boring Termination Depth = 6 feet	MATERIAL DESCRIPTION SILT with SAND, reddish brown, loose 1155 SILTY SAND, light gray, medium dense 1151.5 SANDSTONE, yellowish red, poorly cemented 1151.5 Boring Termination Depth = 6 feet	MATERIAL DESCRIPTION SILT with SAND, reddish brown, loose SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented MATERIAL DESCRIPTION HELD MATERIAL DESCRIPTION SILT with SAND, reddish brown, loose SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented Boring Termination Depth = 6 feet SANDSTONE Boring Termination Depth = 6 feet	MATERIAL DESCRIPTION SILTY SAND, light gray, medium dense 1152 SPT 18 10 SANDSTONE, yellowish red, poorly cemented 1151.5 TC 50/6" 50/2.3"	MATERIAL DESCRIPTION SILTY SAND, ight gray, medium dense 1155 SPT 18 10 0	SILTY SAND, light gray, medium dense 1155 SPT 18 10 0 0	SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILT WITCH SILTY SAND, reddish brown, loose SANDSTONE, yellowish red, poorly cemented SILTY SAND, reddish brown, loose SANDSTONE, yellowish red, poorly cemented SILTY SAND, reddish brown, loose SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, poorly cemented SILTY SAND, light gray, medium dense SANDSTONE, yellowish red, ye	

C	0 N	ISU	LTING 405-562-3268										
CLI	ENT	SRB		PROJECT NAME SH 29 C	ut - West	Phase II							
PRO	OJEC	T NUN	BER _18043	PROJECT LOCATION Step	ohens Cou	unty, Ok	lahoma						
DA	TE S	TARTE	D 4/11/24 COMPLETED 4/11/24	GROUND ELEVATION 1155 ft STATION 852+00 OFFSET 20' RT									
DRI	LLIN	G CON	TRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:	;								
DRI	LLIN	G MET	HOD 4.5" augers - CME 750 ATV	DURING DRILLING _	none								
LO	GGE	BY _	DLW CHECKED BY JWB	0 hrs AFTER DRILLIN	IG none								
NO	TES	JP# 2	9657(04)	Cave In Depth _none									
	_												
(H)	æ	U			TYPE	NTS	%) (%)		TERBE	-	3 #200 (%)		
ELEVATION (ft)	JEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE T	SLOW COUNTS	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT	ASTICITY INDEX	PASSING # SIEVE (%		
1155	-	9			SAN	BLO	CON		P.P.	PLAS	PAS SI		
-	┞ -		<u>CLAYEY SAND</u> , reddish brown, loo	se 1155'	SPT	4	17	26	14	12	36.4		
-	+ -												
1150	5		SILTY SAND, yellowish red, medium d	lense 1152'									
-	<u> </u>	• • • • • • • • • • • • • • • • • • •	SANDSTONE, light gray to red and light gray to pa cemented to well cemented	ale yellow, poorly 1149.5	SPT TC TC	20 50/6" 50/3"	7	0	0	NP	16.6		
	├ -	∤ ∷∷∷	33.113.1132 13 113.1133.1133			50/0.8"							
1145	10	 											

PAGE 1 OF 1

TC 50/1" 50/0.5" 1140 15 TC 50/0.8" 50/0.3" 1135 20 TC 50/0.5" 50/0.5" Boring Termination Depth = 21 feet Boring Completed and Grouted on 4/11/2024 1130 1125 1 RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24 [0.11] [0.

BORING NUMBER CW-51 RED ROCK PO Box 30591 Edmond, OK 73003 C O N S U L T I N G 405-562-3268

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CLIENT SRB		PROJECT NAME SH 29 C	<u>ut - We</u> st	Phase II	<u> </u>				
PROJECT NUMBER 18043		PROJECT LOCATION Stephens County, Oklahoma COMPLETED 4/11/24 GROUND ELEVATION 1146 ft STATION 854+00 OFFSET 20' Drilling Services of Oklahoma GROUND WATER LEVELS: CME 750 ATV DURING DRILLING none CHECKED BY JWB 0 hrs AFTER DRILLING none							
DATE STARTED 4/11/24	COMPLETED 4/11/24	GROUND ELEVATION 114	16 ft S	MOITAT	I <u>854</u> +	00 o	FFSET	Γ 20'	LT
DRILLING CONTRACTOR _	DSO - Drilling Services of Oklahoma	_ GROUND WATER LEVELS	:						
DRILLING METHOD 4.5" a	ugers - CME 750 ATV	_ DURING DRILLING _	none						
LOGGED BY DLW	CHECKED BY JWB	_ 0 hrs AFTER DRILLIN	NG none	!					
NOTES _JP# 29657(04)		Cave In Depthnone	!						
		_							
£			ш	ည	<u> </u>				0
ELEVATION (ff) DEPTH (ft) GRAPHIC LOG			 	S	JRE T (%				PASSING #200 SIEVE (%)
DEPTH (#) GRAPHIC LOG	MATERIAL DESCRIPTION		뿌	8	IST TEN	 	 		NE NG
CFV GF CFV			AMF	ŏ	Q N	ĕ≧	\ <u>\</u>	AST	ASS
0			Ŋ	BI	0		п.	П	۵
1145			SPT	27	16	26	18	8	84.1
	SILTY SAND, pale yellow, medium o	ense 1145							
- + + + + + + + + + + + + + + + + + + +	SANDSTONE, pale yellow, cement	ted / 1142.5			10	0	0	NP	18.7
1140	Boring Termination Depth = 4 fee	t 1/2024	V IC	50/1.3"					
	Borning Completed and Backinied on 471	1/2024		30/1					
4405									
1135									
1130									
_									
1120									
1115									
1110									
_									
1105									
_									
_									
1115 									

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CONSULTING 405-562-3268

RED ROCK LOG 18043 LOGS.2024.GPJ REDROCK.GDT 4/30/24

PROJECT NAME SH 29 Cut - West Phase II **CLIENT** SRB PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma DATE STARTED 4/11/24 COMPLETED 4/11/24 GROUND ELEVATION 1148 ft STATION 854+00 OFFSET 50' RT **DRILLING CONTRACTOR** DSO - Drilling Services of Oklahoma **GROUND WATER LEVELS:** DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none LOGGED BY DLW CHECKED BY JWB 0 hrs AFTER DRILLING none **NOTES** JP# 29657(04) Cave In Depth none **ATTERBERG** PASSING #200 SIEVE (%) **BLOW COUNTS** SAMPLE TYPE ELEVATION (ft) MOISTURE CONTENT (%) LIMITS GRAPHIC LOG DEPTH (ft) PLASTICITY INDEX PLASTIC LIMIT LIQUID MATERIAL DESCRIPTION 0 SILTY SAND, reddish brown, loose 1148' SPT 4 16 0 0 NΡ 32.4 1145 SILT with SAND, light gray, medium dense 1145' 5 18 0 SPT 0 NP 71.7 24 **SANDSTONE**, light gray to red, poorly cemented to cemented 50/6" 50/3.5' 50/1" Boring Termination Depth = 8 feet TC Boring Completed and Backfilled on 4/11/2024 50/0.8' 1135 1130 1125 1120 1115 1110 1105 1100

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PROJECT NAME SH 29 Cut - West Phase II **CLIENT** SRB PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma DATE STARTED 4/11/24 COMPLETED 4/11/24 GROUND ELEVATION 1119 ft STATION 874+00 OFFSET 3' RT **DRILLING CONTRACTOR** DSO - Drilling Services of Oklahoma **GROUND WATER LEVELS:** DRILLING METHOD 4.5" augers - CME 750 ATV DURING DRILLING none LOGGED BY DLW **CHECKED BY** JWB 0 hrs AFTER DRILLING none NOTES JP# 29657(04) Cave In Depth none **ATTERBERG BLOW COUNTS** SAMPLE TYPE ELEVATION (ft) MOISTURE CONTENT (%) PASSING #200 SIEVE (%) LIMITS GRAPHIC LOG DEPTH (ft) PLASTICITY INDEX PLASTIC LIMIT LIQUID MATERIAL DESCRIPTION 0 SILTY SAND, reddish brown to light gray, loose SPT 5 11 0 0 NΡ 33.7 34 6 0 0 NP 17.2 **SANDSTONE**, light gray with red, cemented to well cemented 1116.5 50/4.5' 1115 50/1.8' 5 50/1" Boring Termination Depth = 6 feet Boring Completed and Backfilled on 4/11/2024 TC 50/0.1" 1110 1105 1100 1095 1090

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CLIENT SRB	PROJECT NAME SH 29 Cut - West Phase II
PROJECT NUMBER 18043	PROJECT LOCATION Stephens County, Oklahoma
DATE STARTED 4/11/24 COMPLETED 4/11/24	GROUND ELEVATION 1116 ft STATION 874+00 OFFSET 46' RT

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma GROUND WATER LEVELS: ∇ DURING DRILLING 19 ft / Elev 1097 ft DRILLING METHOD 4.5" augers - CMF 750 ATV

15_ 15_ 1100	DRILLING METHOD 4.5" augers - CME 750 ATV ☐ DURING DRILLING 19 ft / Elev 1097 ft											
Cave In Depth none												
Section Sect	NOTES JP# 29657(04)	 1 2 2 4 hrs AFTER DRILL	.ING 12 f	t / Elev 1	104 ft							
MATERIAL DESCRIPTION		Cave In Depth none)									
SILTY SAND reddish brown to light yellowish gray, loose to medium 1116 SPT 6 10 0 0 NP 27.2				(0		AT	ΓERBE	RG	_			
SILTY SAND reddish brown to light yellowish gray, loose to medium 1116 SPT 6 10 0 0 NP 27.2	(±) (±) (0		YPE	N ST	₹ (%)	!	LIMITS		£200 %)			
SILTY SAND reddish brown to light yellowish gray, loose to medium 1116 SPT 6 10 0 0 NP 27.2	DE E E E E E E E E E E E E E E E E E E		<u>Г</u>	000		۵.	ပ္ပ	È×	1G # E (%			
SILTY SAND reddish brown to light yellowish gray, loose to medium 1116 SPT 6 10 0 0 NP 27.2	JEN		MPL	×	SION	lo∏	AST	STIC	SSII			
SILTY SAND reddish brown to light yellowish gray, loose to medium 1116 SPT 6 10 0 0 NP 27.2			SAI	BLC	≥0		7	ا کے ا	PA			
SANDSTONE red to light yellowish gray, poorly cemented to very well 1112.5 SI 18 7 0 0 NP 30.5		loose to medium 1116	i ept	6	10	0	0					
SANDSTONE red to light yellowish gray, poorly cemented to very well 1112.5 TC 50/5.28 50/1.3" 50/0.8"			SFI		10	0	0	INF	21.2			
SANDSTONE red to light yellowish gray, poorly cemented to very well 1112.5 TC 50/5.28 50/1.3" 50/0.8"	F + - 1988		SPT	18	7	0	0	NP	30.5			
10	L L 3 J · · · · · l cemented	nented to very well 1112.5	TC TC	50/5.5"					00.0			
15 1100	1110 - 1::::			50/2.8								
15 1100												
15 1100	- + ₄₀ - ::::		V TC	50/1 3"								
105 TC 50/0.3" TC 50/0.3" TC 50/0.5" So/0.5" So/0.5" So/0.5" TC 50/0.5" So/0.5" 1105 10-110-110-110-110-110-110-110-110-110-		V IC	50/0.8"									
100	[
100	F +											
20 V TC 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.5" 50/0.8" 50/0			V TC	50/0.3"								
Boring Termination Depth = 21 feet Boring Completed on 4/11/2024 and Grouted on 4/12/2024 Boring Completed on 4/11/2024 and Grouted on 4/12/2024	1100 - 1			30/0.3								
Boring Termination Depth = 21 feet Boring Completed on 4/11/2024 and Grouted on 4/12/2024 Boring Completed on 4/11/2024 and Grouted on 4/12/2024												
Boring Termination Depth = 21 feet Boring Completed on 4/11/2024 and Grouted on 4/12/2024 Boring Completed on 4/11/2024 and Grouted on 4/12/2024	- + ₂₀ -:: <u>▼</u>		TC	50/0.5"								
Boring Completed on 4/11/2024 and Grouted on 4/12/2024 1090 1085	1095			50/0.5"/								
1090	Boring Termination Depth = 21 feet	: n 4/12/2024	TC	50/0.5" 50/0.8"/								
108 <u>5</u>	Botting completed on 4/17/2024 and Grouted of	11 4/ 12/2024										
108 <u>5</u>	4000											
	1090											
1080 	1085											
1080 												
1080 												
1075	1080											
1075 												
1075	:											
10/5 												
1070	10/5											
107 <u>0</u>												
1070	3 											
	1070											
	<u> </u>											

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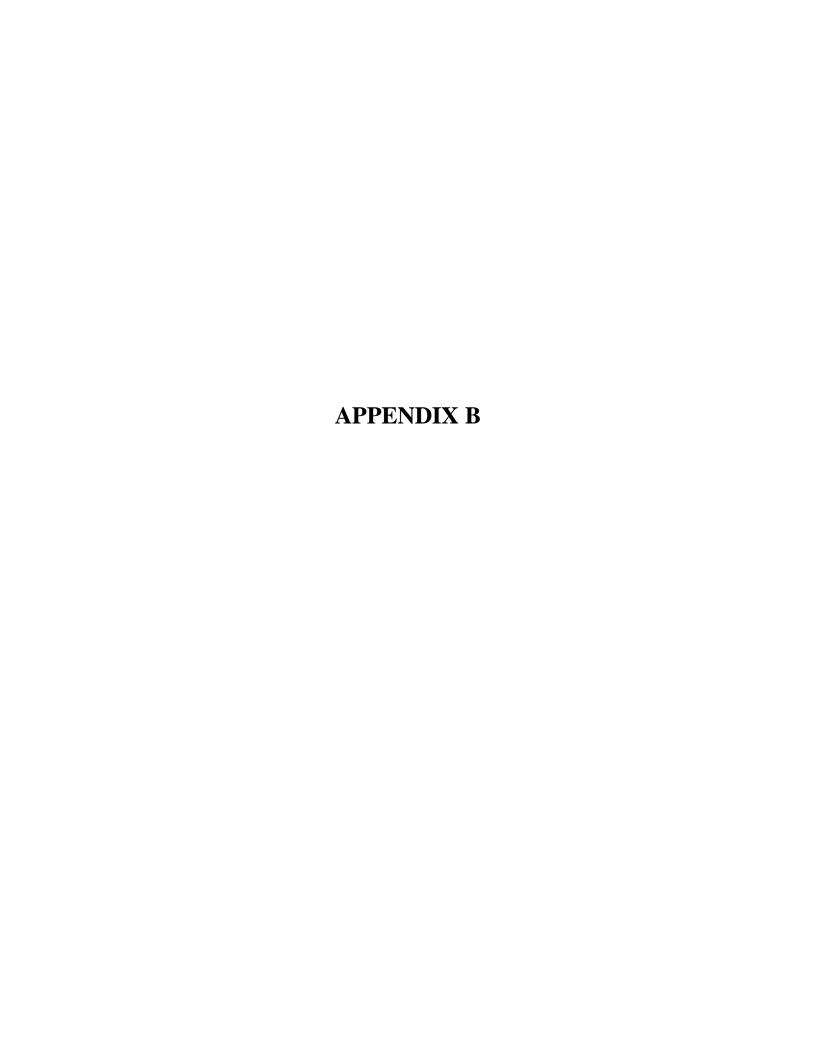
CLIENT SRB		PROJECT NAME SH 29 C	ut - West	Phase II					
PROJECT NUMBER 180	43	PROJECT LOCATION _Ste	phens Co	unty, Ok	lahoma				
DATE STARTED 4/11/24	4 COMPLETED 4/11/24	GROUND ELEVATION _112	26 ft S	TATION	876+	00 o	FFSE	r 3' L'	T
DRILLING CONTRACTOR	DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS	:						
DRILLING METHOD 4.5"	' augers - CME 750 ATV	DURING DRILLING _	none						
LOGGED BY DLW	CHECKED BY JWB	0 hrs AFTER DRILLII	NG none						
NOTES JP# 29657(04)		Cave In Depthnone)						
		_							
£			ш	ည	<u> </u>		TERBE LIMITS		0
ELEVATION (ff) DEPTH (ft) GRAPHIC LOG			TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
EVATION (DEPTH (#) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE	8	IST TEN	 	PLASTIC LIMIT	PLASTICITY INDEX	NE NE
GR GR			AMF	ŏ	Q N	LIQUID	§≧	AST	ASS
0			Ŋ	BI	0		<u> </u>	П	Ф.
1125	LEAN CLAY , reddish brown to light grayis	h yellow, stiff 1126	SPT	11	14	45	17	28	95.2
- + 5									
	ANDSTONE, light grayish yellow with dark red a	nd purple, cemented 1121		50/5"	9	0	0	NP.	20.1
- + - :::::			▼ TC	50/1" 50/1"					
1115	Boring Termination Depth = 9 for Boring Completed and Backfilled on 4/	eet 111/2024	▼ TC	50/1.8" \ 50/1"	/				
1110									
1105									
1100									
1005									
1090									
1085									
_									
1095 									

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BORING NUMBER CW-56

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CLIENT SRB			PROJECT NAME	SH 29 C	ut - West	Phase II					
PROJECT NUMBER	18043		_ PROJECT LOCATION	ON Ste	phens Cou	unty, Ok	lahoma				
DATE STARTED _4/	11/24	COMPLETED 4/11/24	_ GROUND ELEVATION	ON _112	23 ft S	TATION	876+	00_ 0	FFSE1	Γ <u>45'</u>	RT
DRILLING CONTRAC	CTOR DSO -	Drilling Services of Oklahoma	_ GROUND WATER L	EVELS	:						
DRILLING METHOD	4.5" augers -	CME 750 ATV	_ DURING DRIL	LING _	none						
LOGGED BY DLW		CHECKED BY JWB	_ 0 hrs AFTER	DRILLIN	NG none						
NOTES JP# 29657(04)		_ Cave In Dept	h none	!						
			_								
£					Ш	လှ	<u> </u>		TERBE		0
ELEVATION (ft) DEPTH (ft) GRAPHIC LOG					SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)				PASSING #200 SIEVE (%)
DEPTH (ft) GRAPHIC LOG		MATERIAL DESCRIPTION			빌	8	IST TEN	≘⊨	PLASTIC LIMIT	PLASTICITY INDEX	NS NG
GR GR					AMF	, O	Q N	LIQUID	AS	AST	ASS
<u> </u>					Ŋ	В	0		п.	П	۵
-	SILTY SAND	yellowish red to pale yellow to red, medense	edium dense to very	1123	SPT	13	9	0	0	NP	21.1
1120		351.55									
- + ₅ -											
					SPT	40	8	0	0	NP	15.8
1115											
					SPT	56	-				
<u> </u>		Boring Termination Depth = 9.5 fe	et		<i>V</i>		1				
		Boring Completed and Backfilled on 4/1	1/2024								
1110											
1105											
1100											
1005											
1095											
1090											
1085											
1000											
-											
1075											
 											



SUMMARY OF LABORATORY RESULTS

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CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

	PROJECT NUMBER	18043						LOCATION	Stephens				
	TROOLOT HOMBER	100-10								County, C	Kidrioma		
	Borehole	Depth (ft)	% Moist.	Liquid Limit	Plastic Limit	Plasticity Index	-3" Sieve	- 3/4" Sieve	-1/2" Sieve	-4 Sieve	-10 Sieve	-40 Sieve	-200 Sieve
	CW-01	0.0	16.4	33	14	19	100	100	100	100	99	98	58.8
	CW-01	5.0	16.4	25	18	7	100	100	100	100	99	98	51.1
	CW-02	0.0	8.8	27	16	11	100	100	100	96	84	71	50.8
	CW-02	4.0	9.1	24	19	5	100	100	100	95	85	72	50.5
	CW-04	0.0	21.4	30	15	15	100	100	100	100	100	100	86.3
	CW-04	5.0	10.7	28	20	8	100	100	100	100	98	96	43.5
	CW-05	0.0	18.1	29	17	12	100	100	100	100	100	100	69.1
	CW-05	5.0	10.3	NV	NP	NP	100	100	100	100	100	99	33.7
	CW-05	7.0	11.3	25	20	5	100	100	100	100	100	100	54.5
	CW-07	0.0	21.6	46	18	28	100	100	100	100	100	100	77.7
	CW-07	4.5	5.8	NV	NP	NP	100	100	100	96	95	94	34.0
	CW-08	0.0	20.5	48	21	27	100	100	100	100	99	98	89.3
	CW-08	5.0	14.5	34	13	21	100	100	100	95	94	94	88.3
	CW-08	6.5	10.9	NV	NP	NP	100	100	100	100	98	95	59.0
	CW-09	0.0	11.0	NV	NP	NP	100	100	100	100	100	99	19.9
	CW-09	5.0	9.4	NV	NP	NP	100	100	100	100	100	94	15.2
	CW-10	0.0	17.4	21	16	5	100	100	100	100	100	99	46.3
	CW-10	5.0	6.1	NV	NP	NP	100	100	100	100	100	90	13.7
	CW-11	0.0	17.1	35	15	20	100	100	100	100	100	99	51.1
	CW-11	5.0	7.3	25	19	6	100	100	100	100	100	100	56.8
	CW-12	0.0	18.3	32	15	17	100	100	100	100	100	100	70.2
	CW-12	5.0	4.8	NV	NP	NP	100	100	100	100	100	97	29.0
	CW-15	0.0	14.0	NV	NP	NP	100	100	100	99	98	96	35.7
	CW-15	5.0	14.5	NV	NP	NP	100	100	100	100	100	100	32.5
	CW-16	0.0	16.5	NV	NP	NP	100	100	100	99	97	95	38.5
	CW-16	4.0	15.1	32	13	19	100	100	100	100	100	100	93.5
	CW-17	0.0	11.2	NV	NP	NP	100	100	100	100	100	100	43.5
	CW-17	5.0	9.1	26	15	11	100	100	100	100	99	99	81.9
	CW-18	0.0	18.6	23	19	4	100	100	100	100	100	100	47.1
_	CW-18	5.0	9.9	27	14	13	100	100	100	100	100	99	70.0
4/26/24	CW-19	0.0	13.1	31	14	17	100	100	100	99	99	96	54.6
	CW-19	4.0	5.6	23	16	7	100	100	100	100	100	99	53.8
REDROCK.GDT	CW-20	0.0	13.1	NV	NP	NP -	100	100	100	100	100	96	26.9
DRO	CW-20	5.0	14.2	22	17	5	100	100	100	100	100	98	37.4
	CW-21	0.0	13.2	NV	NP	NP	100	100	100	94	91	86	30.9
4.GP,	CW-21	5.0	8.1	NV	NP	NP	100	100	100	100	100	95	22.1
18043 LOGS.2024.GPJ	CW-22	0.0	10.0	NV	NP	NP	100	100	100	100	99	96	26.4
LOG	CW-22	5.0	10.3	NV	NP	NP	100	100	100	99	97	92	35.9
8043	CW-22	10.0	3.1	NV	NP	NP	100	100	100	100	99	96	31.1
	CW-23	0.0	13.8	NV	NP	NP 10	100	100	100	100	99	95	9.7
MMAF	CW-23	5.0	7.8	27	8	19	100	100	100	100	100	99	51.0
AB SUMMARY	CW-23	10.0	8.9	28	12	16	100	100	100	95	94	92	51.1
Ĭ	CW-25	1.0	16.0	24	16	8	100	100	100	100	100	97	38.0

SUMMARY OF LABORATORY RESULTS

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CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II

CLIENT SRB						PROJECT	NAME SH	29 Cut - W	<u>/est Phase</u>	<u>II </u>		
PROJECT NUMBER	R <u>18043</u>	1				PROJECT	LOCATION	_Stephens	County, O	klahoma		
Borehole	Depth (ft)	% Moist.	Liquid Limit	Plastic Limit	Plasticity Index	-3" Sieve	- 3/4" Sieve	-1/2" Sieve	-4 Sieve	-10 Sieve	-40 Sieve	-200 Sieve
CW-25	5.0	7.9	NV	NP	NP	100	100	100	100	100	98	31.3
CW-25	8.0	6.8	23	16	7	100	100	100	100	100	99	49.6
CW-27	0.0	17.7	NV	NP	NP	100	100	100	100	100	98	29.7
CW-27	5.0	4.5	19	16	3	100	100	100	100	99	82	27.3
CW-29	0.0	19.2	25	15	10	100	100	100	100	100	99	67.2
CW-29	5.0	8.4	NV	NP	NP	100	100	100	96	95	94	33.5
CW-29	10.0	6.9	NV	NP	NP	100	100	100	100	99	98	32.1
CW-30	0.0	18.5	NV	NP	NP	100	100	100	98	97	95	56.8
CW-30	5.0	10.8	26	18	8	100	100	100	91	89	85	50.2
CW-31	0.0	8.7	22	17	5	100	100	100	96	86	73	37.9
CW-31	4.0	10.0	NV	NP	NP	100	100	100	100	100	100	28.3
CW-32	0.0	16.2	25	15	10	100	100	100	100	99	97	31.5
CW-32	5.0	9.3	21	15	6	100	100	100	100	100	100	43.1
CW-32	8.0	8.0	NV	NP	NP	100	100	100	100	100	100	56.5
CW-33	0.0	21.1	34	14	20	100	100	100	97	97	94	50.6
CW-33	5.0	10.6	21	15	6	100	100	100	100	100	100	61.0
CW-33	9.0	7.2	NV	NP	NP	100	100	100	100	100	100	25.1
CW-34	0.0	16.3	26	20	6	100	100	100	100	100	99	45.4
CW-34	5.0	8.1	NV	NP	NP	100	100	100	100	98	96	25.5
CW-35	0.0	16.9	29	16	13	100	100	100	99	99	99	39.9
CW-35	5.0	6.8	NV	NP	NP	100	100	100	100	100	99	16.7
CW-36	0.0	17.1	32	15	17	100	100	100	99	99	87	43.2
CW-36	5.0	12.4	28	16	12	100	100	100	100	100	100	75.9
CW-36	8.0	8.2	26	15	11	100	100	100	100	100	100	71.0
CW-37	0.0	12.6	NV	NP	NP	100	100	100	99	98	88	22.9
CW-37	5.0	18.4	32	14	18	100	100	100	100	99	97	87.7
CW-37	8.0	12.8	24	20	4	100	100	100	100	100	99	38.0
CW-37	10.0	11.9	24	20	4	100	100	100	100	100	100	34.8
CW-37	13.0	9.4	NV	NP	NP	100	100	100	100	100	96	24.1
CW-38	0.0	12.4	25	13	12	100	100	100	97	96	86	42.2
CW-38	5.0	13.0	26	16	10	100	100	100	98	94	68	24.8
CW-38	10.0	9.1	25	18	7	100	100	100	100	100	100	42.7
CW-39	0.0	14.0	36	15	21	100	100	100	97	95	83	46.2
CW-39 CW-39	5.0	14.5	24	16	8	100	100	100	97	90	61	29.4
	7.0	19.6	31	17	14	100	100	100	100	100	99	69.1
CW-39	10.0	12.9	33	15	18	100	100	100	100	100	99	94.3
CW-39	13.0	10.3	25	18	7	100	100	100	100	100	100	49.3
CW-40	0.0	19.4	29	14	15	100	100	100	100	99	97	42.1
CW-39 CW-40 CW-40	5.0	12.1	20	19	1	100	100	100	99	95	74	21.8
	7.0	7.8	NV	NP	NP	400	400	400	00	00	00	00.0
CW-41 CW-41 CW-41	0.0	10.5	NV	NP	NP 40	100	100	100	98	96	83	23.0
CW-41	5.0	15.0	28	15	13	100	100	100	100	99	94	35.7
CW-41	8.0	8.3	23	12	11	100	100	100	100	100	84	30.3

LAB SUMMARY 18043 LOGS.2024.GPJ REDROCK.GDT 4/26/24

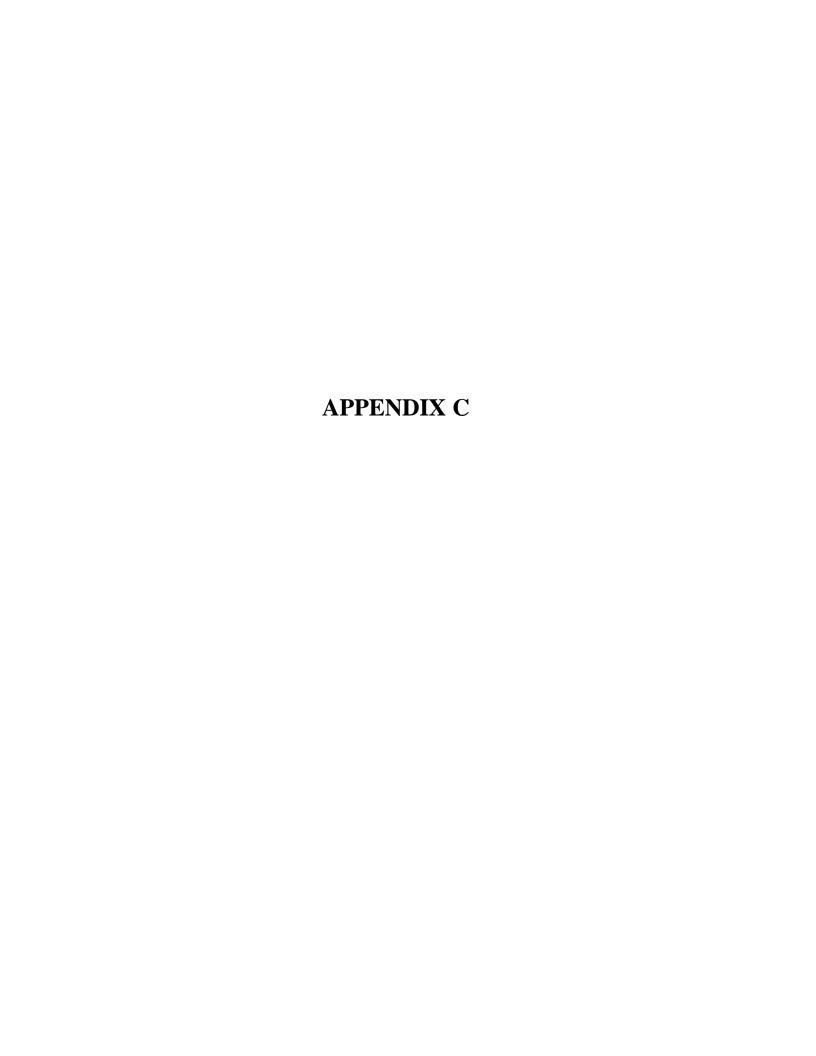
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CLIENT SRB

PROJECT NAME SH 29 Cut - West Phase II

PROJECT LOCATION Stephens County, Oklahoma PROJECT NUMBER 18043 - 3/4" -1/2" Depth Liquid **Plastic** Plasticity -3" -10 -40 -200 % Moist. Borehole Sieve Sieve Sieve Sieve Sieve (ft) Limit Limit Index Sieve Sieve CW-42 0.0 19.2 29 15 14 100 100 100 100 100 99 43.5 5.0 NV NP NP 100 100 100 100 100 97 CW-42 7.6 31.7 7 100 CW-43 0.0 17.4 23 16 100 100 100 100 100 40.5 CW-43 5.0 3.2 NV NP NP 100 100 100 100 100 95 20.0 NP CW-43 8.0 3.5 NV NP 100 100 100 100 100 95 16.2 CW-43 10.0 6.3 NV NP NP 100 100 100 100 99 83 27.9 CW-44 0.0 18.1 14 100 100 100 99 99 97 43.7 31 17 NP NP 100 CW-44 4.0 3.1 NV 100 100 100 100 98 16.6 100 CW-47 0.0 9.9 25 14 11 100 100 98 92 77 64.8 CW-47 3.0 17.4 20 16 4 100 100 100 98 96 90 69.3 CW-48 0.0 16.4 NV NP NP 100 100 100 99 99 97 40.0 NP 5.0 11.0 NV NP 100 100 100 100 100 82 27.5 CW-48 100 99 CW-48 10.0 7.8 NV NP NP 100 100 98 81 42.2 100 CW-49 0.0 16.8 NV NP NP 100 100 100 99 98 70.2 3.0 10.3 NV NP NP 100 100 100 100 21.7 CW-49 100 93 CW-50 0.0 16.5 26 14 12 100 100 100 100 100 96 36.4 NP 100 CW-50 5.0 6.7 NV NP 100 100 100 100 99 16.6 CW-51 0.0 15.8 26 18 8 100 100 100 95 94 90 84.1 CW-51 3.0 9.9 NV NP NP 100 100 100 100 100 99 18.7 0.0 15.8 NP NP 100 100 100 100 96 32.4 CW-52 NV 100 CW-52 5.0 8.9 NV NP NP 100 100 100 97 96 95 71.7 CW-53 0.0 11.0 NV NP NP 100 100 100 99 98 97 33.7 CW-53 2.0 6.0 NV NP NP 100 100 100 100 100 100 17.2 NP CW-54 0.0 NV NP 100 100 100 100 100 98 27.2 9.6 3.0 7.4 100 98 97 CW-54 NV NP NP 100 100 95 30.5 0.0 13.5 45 28 100 100 100 100 99 98 95.2 CW-55 17 CW-55 5.0 NV NP NP 100 100 100 100 100 20.1 9.1 100 100 100 CW-56 0.0 8.6 NV NP NP 100 100 100 99 21.1 CW-56 5.0 NV NP NP 100 100 100 98 8.0 100 100 15.8





GENERAL NOTES

SOIL PROPERTY ABBREVIATIONS

 $\begin{array}{ll} N & & \text{Uncorrected SPT Penetration, blows per foot} \\ N_{60} & & \text{Corrected SPT Penetration, blows per foot} \\ Q_u & & \text{Unconfined Compressive Strength, psf} \\ Mc & & \text{Moisture Content, \%} \end{array}$

LL Liquid Limit, %
PL Plastic Limit, %
PI Plasticity Index, %

DRILLING & SAMPLING ABBREVIATIONS

BS Bag Sample

SPT Split Spoon Sample
ST Shelby Tube Sample

AU Auger Sample
TC Texas Cone Penetrometer

TC Texas Cone Penetrometer

DCP Dynamic Cone Penetrometer

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487) -- used to classify all soils unless otherwise noted --

Major Divisions					
				Typical Names	
Course-Grained Soils	Gravels		GW	Well-graded gravels and gravel-sand mixtures, little or no fines	
>50% retained on #200 sieve	50% + of course fraction retained on	Clean Gravels	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	
	#4 sieve	Gravels	GM	Silty gravels, gravel-sand-silt mixtures	
		with Fines	GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands		SW	Well-graded sands and gravelly sands, little or no fines	
	50% + of course fraction passes #4 sieve	Clean Sands	SP	Poorly graded sands and gravelly sands, little or no fines	
		Sands	SM	Silty sands, sand-silt mixtures	
		with Fines	SC	Clayey sands, sand-clay mixtures	
Fine-Grained Soils	Silts and Clays		ML	Inorganic silts, very fine sands, rock four, silty or clayey fine sands	
<50% passes #200 sieve	Liquid Limit ≤ 50% Silts and Clays Liquid Limit > 50%		CL	Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
			МН	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
			СН	Inorganic clays or high plasticity, fat clays	
		ОН	Organic clays of medium to high plasticity		
Highly Organic Soils			PT	Peat, muck, and other highly organic soils	

Prefix: G = Gravel, S = Sand, M = Silt, C = Clay, O = Organic

Suffix: W = Well Graded, P = Poorly Graded, M = Silty, L = Clay, LL < 50%, H = Clay, LL > 50%

PLASTICITY OF COHESIVE SOIL

1 = 10 110 11 01 00 11 = 00 11				
Degree of Plasticity	Plasticity Index	Swell Potential		
None	0 to 4	Very Low		
Slight	5 to 9	Low		
Medium	10 to 19	Low to Medium		
High	20 to 39	Medium to High		
Very High	40+	Very High		

MOISTURE OF COHESIVE SOIL

Description	Condition	Moisture Content		
Dry, Dusty	Dry	0 to 10%		
Damp	Moist	10 to 30%		
Free Water	Wet	30 to 70%		

CONSISTENCY - COHESIVE SOILS

Consistency	SPT
Very Soft	<2
Soft	2 to 4
Medium Stiff	5 to 8
Stiff	9 to 14
Very Stiff	15 to 30
Hard	31+

DENSITY - COHESIONLESS SOILS

Relative Density	SPT
Very Loose	<4
Loose	4 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	51+

ROCK HARDNESS

SPT (in/50)	TCP (in/100)	Rock Description
6+	6+	Very Soft / Very Poorly Cemented
5 - 6	3 - 6	Soft / Poorly Cemented
4 - 5	2 - 3	Moderately Hard / Cemented
3 - 4	1 - 2	Hard / Well Cemented
<3	<1	Very Hard / Very Well Cemented

ROCK CORE QUALITY

Core Quality	RQD
Excellent Quality	90 – 100%
Good Quality	75 – 90%
Fair Quality	50 – 75%
Poor Quality	25 – 50%
Very Poor Quality	<25%