

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:

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**April 30, 2024
Project No. 18043**

RED ROCK CONSULTING

April 30, 2024

SRB
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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, EI
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

INTRODUCTION.....	1
GENERAL.....	1
PROPOSED CONSTRUCTION	1
SCOPE OF WORK	2
FIELD AND LABORATORY INVESTIGATIONS	3
FIELD EXPLORATION	3
LABORATORY TESTING.....	5
SITE DESCRIPTION.....	7
SURFACE CONDITIONS	7
SITE GEOLOGY	8
SUBSURFACE CONDITIONS	10
GROUNDWATER CONDITIONS	12
RIPPABILITY OF BEDROCK.....	13
MAXIMUM CUT SLOPES.....	17
CLOSURE.....	18

APPENDICES

APPENDIX A – Field Investigation
APPENDIX B – Laboratory Results
APPENDIX C – General Notes

REPORT OF GEOTECHNICAL INVESTIGATION

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

29657(04)

PROJECT NO. 18043

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

Boring	Station	CRL Offset (feet)	Proposed Cut Depth (feet)	Boring Depth (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

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

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 section 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)	Type
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

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

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	50' LT	6	1121	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	15' RT	4.5	1150.5	Sandstone
CW-27	768+00	50' LT	6	1150	Sandstone
	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-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-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-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

Boring	Station	CRL Offset (feet)	During Drilling		Hours After	After Drilling	
			Depth (feet)	Elevation (feet)		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
					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)	Type	TCP Value (in/100 blows)	Hardness	Rippability*
CW-1	652+70	50' LT	6-10	1218-1214	Sandstone	2.3	Cemented	Rippable
			10-13	1214-1211	Sandstone	1.3-1.8	Well cemented	Non-rippable
CW-2	652+70	9' RT	5-9	1221-1217	Sandstone	6	Poorly cemented	Rippable
			9-12	1217-1214	Sandstone	9	Very poorly cemented	Rippable
			12	1214	Sandstone	3.5	Poorly cemented	Rippable
CW-3	654+00	50' LT	0.5-16	1227.5-1212	Sandstone	6.8-10.8	Very poorly cemented	Rippable
			16-21	1212-1207	Sandstone	1.3	Well cemented	Non-rippable
			21-26	1207-1202	Sandstone	0.9	Very well cemented	Non-rippable
			26-31	1202-1197	Sandstone	1-1.1	Well cemented	Non-rippable
CW-4	655+00	50' LT	5.5-10	1224.5-1220	Sandstone	6	Poorly cemented	Rippable
			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
CW-5	655+00	9' RT	7.5-13	1224.5-1219	Sandstone	4.4	Poorly cemented	Rippable
			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
CW-7	657+00	46' LT	5.5-10	1216.5-1212	Sandstone	2.9	Cemented	Rippable
			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
			10-20	1195-1185	Sandstone	1.1-1.8	Well cemented	Non-rippable

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

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
CW-13	676+00	50' LT	10.5-15	1203.5-1199	Sandstone	2.4	Cemented	Rippable
			15-20	1199-1194	Sandstone	2	Well cemented	Rippable
			20-25	1194-1189	Sandstone	0.8-0.9	Very well cemented	Non-rippable
CW-14	682+59	95' LT	20-25.5	1171.5-1166	Sandstone	1.4	Well cemented	Non-rippable
			25.5	1166	Sandstone	0.4	Very well cemented	Non-rippable
CW-15	718+00	54' LT	5.5-9	1127.5-1124	Sandstone	1.8	Well cemented	Non-rippable
			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
CW-24	770+00	50' LT	6-10	1135-1131	Sandstone	5.1	Poorly cemented	Rippable
			10-15	1131-1126	Sandstone	2.8	Cemented	Rippable
			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
CW-25	770+30	15' RT	8.5-15	1134.5-1128	Sandstone	2.8	Cemented	Rippable
			15-20	1128-1123	Sandstone	0.6	Very well cemented	Non-rippable
			20	1123	Sandstone	2.5	Cemented	Rippable
CW-26	772+00	50' LT	4.5-10	1150-1144.5	Sandstone	5	Poorly cemented	Rippable
			10-15	1144.5-1139.5	Sandstone	2.8	Cemented	Rippable
			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
CW-27	772+00	0	6-10	1150-1146	Sandstone	6.5	Very poorly cemented	Rippable
			10-15	1146-1141	Sandstone	1	Well cemented	Non-rippable
			15-20	1141-1136	Sandstone	0.8	Very well cemented	Non-rippable
			20-25	1136-1131	Sandstone	2.5	Cemented	Rippable
			25-30	1131-1126	Sandstone	0.6	Very well cemented	Non-rippable
			30-36	1126-1120	Sandstone	1-1.5	Well cemented	Non-rippable
			36-40	1120-1116	Shale	1.3	Hard	Non-rippable
CW-28	774+00	50' LT	5-10	1137.5-1132.5	Sandstone	2.1	Cemented	Rippable
			10-20	1132.5-1122.5	Sandstone	1.3-1.8	Well cemented	Non-rippable
			20-25	1122.5-1117.5	Sandstone	2.5	Cemented	Rippable
			25-30	1117.5-1112.5	Sandstone	1.4	Well cemented	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
CW-29	774+00	10' RT	10-15	1133-1128	Sandstone	1.3	Well cemented	Non-rippable
			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
			12	1160	Sandstone	3.4	Poorly cemented	Rippable
CW-34	825+25	55' LT	5.5-10	1175.5-1171	Sandstone	3.3	Poorly cemented	Rippable
			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
			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	830+50	48' LT	7-12	1181-1176	Sandstone	0.4	Very well cemented	Non-rippable
			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
			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
			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
			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
			8	1140	Sandstone	2.1	Cemented	Rippable
CW-53	874+00	3' RT	2.5-6	1116.5-1113	Sandstone	2.8	Cemented	Rippable
			6	1113	Sandstone	1.1	Well cemented	Non-rippable
CW-54	874+00	46' RT	3.5-9	1112.5-1107	Sandstone	4.1	Poorly cemented	Rippable
			9-14	1107-1102	Sandstone	2.1	Cemented	Rippable
			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

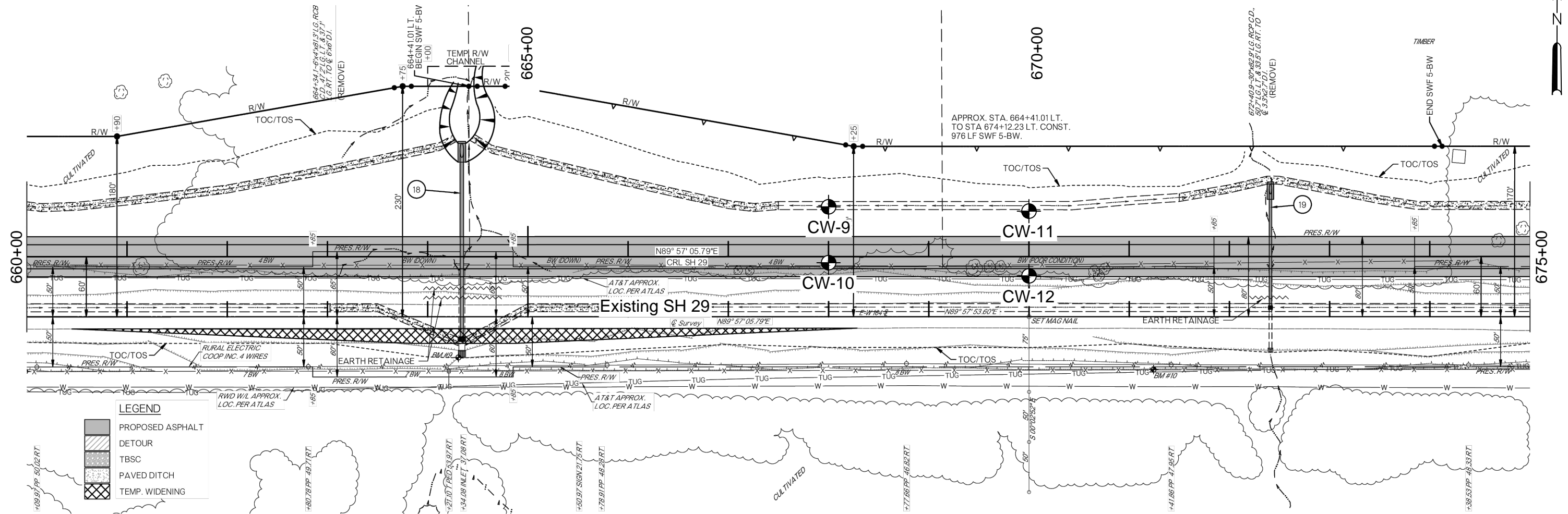
Cut Section	Station Extents	CRL Offset	Maximum Soil Slope	Maximum Rock Slope
1	652+00 to 661+00	LT	3:1	2 ½:1
2	668+00 to 682+59	LT	3:1	2 ½:1
3	718+00 to 723+00	LT	3:1	3:1
4	766+00 to 776+17	LT	3:1	3:1
5	823+00 to 836+00	LT	3:1	2 ½:1
6	842+00 to 855+00	RT	3:1	3:1
7	873+50 to 876+00	RT	3:1	3:1

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.

APPENDIX A



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'

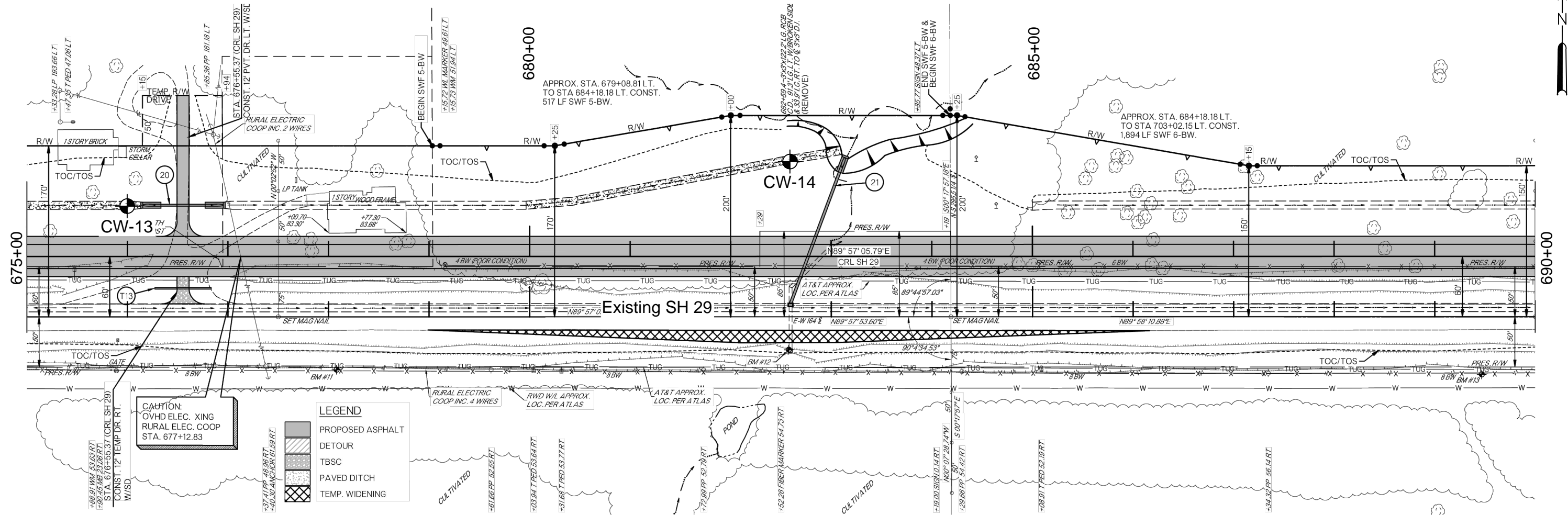
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BORING LOCATION DIAGRAM
CUT ANALYSIS - WEST PHASE II
STATE HIGHWAY 29
STEPHENS COUNTY, OKLAHOMA
29657(04)

Project Mngr:	EDC	Project No.	18043
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Approved By:	JWB	Page No:	2/10



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'

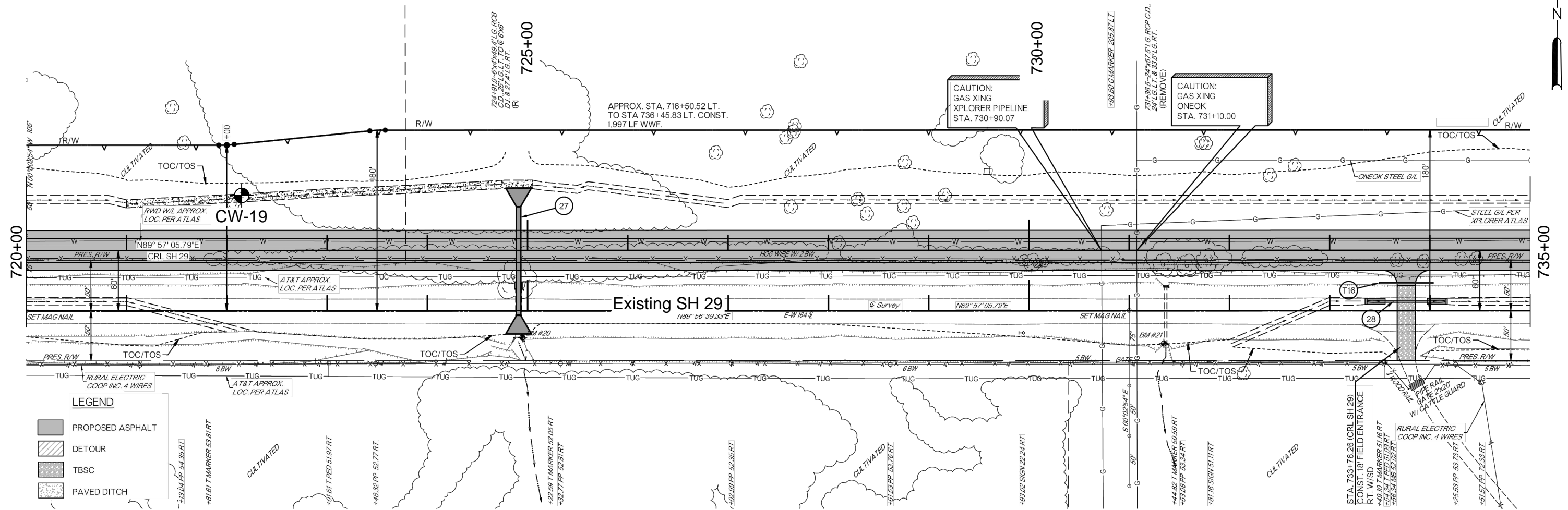
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Approved By:	JWB	Page No:	3/10



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

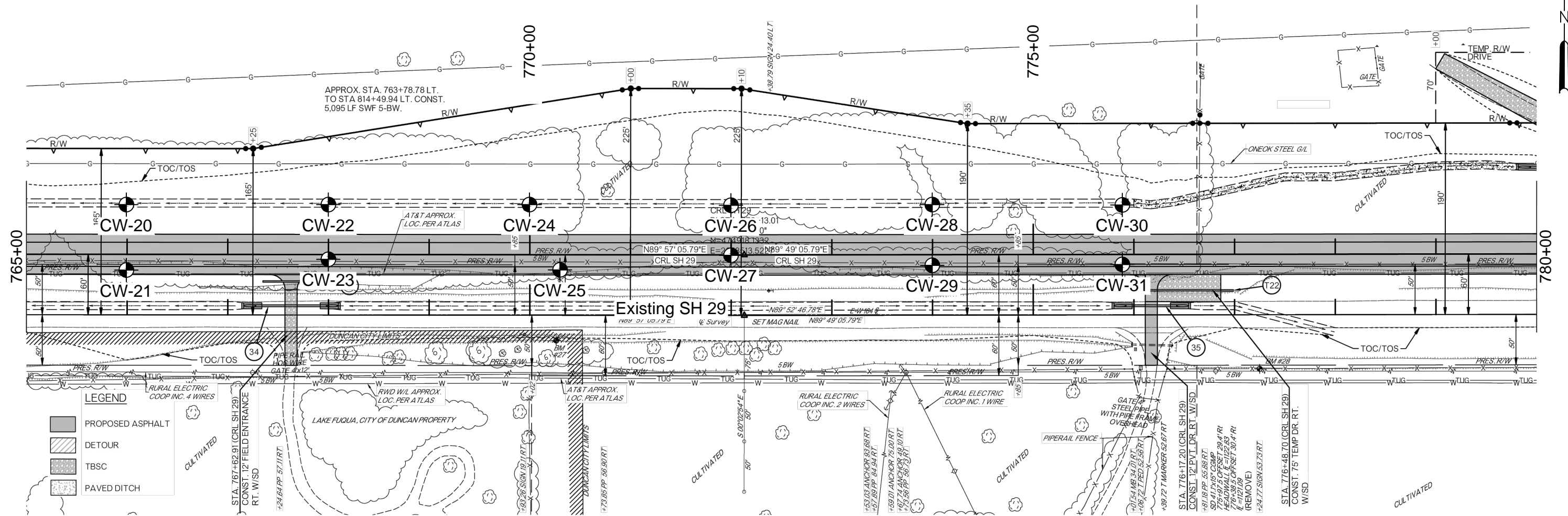
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Approved By:	JWB	Page No:	5/10



BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-20	766+00	50' left	1115'
CW-21	766+00	15' right	1116'
CW-22	768+00	50' left	1127'
CW-23	768+00	5' right	1128'
CW-24	770+00	50' left	1141'
CW-25	770+30	15' right	1143'
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'
CW-30	775+89	50' left	1127'
CW-31	775+89	9' right	1127'

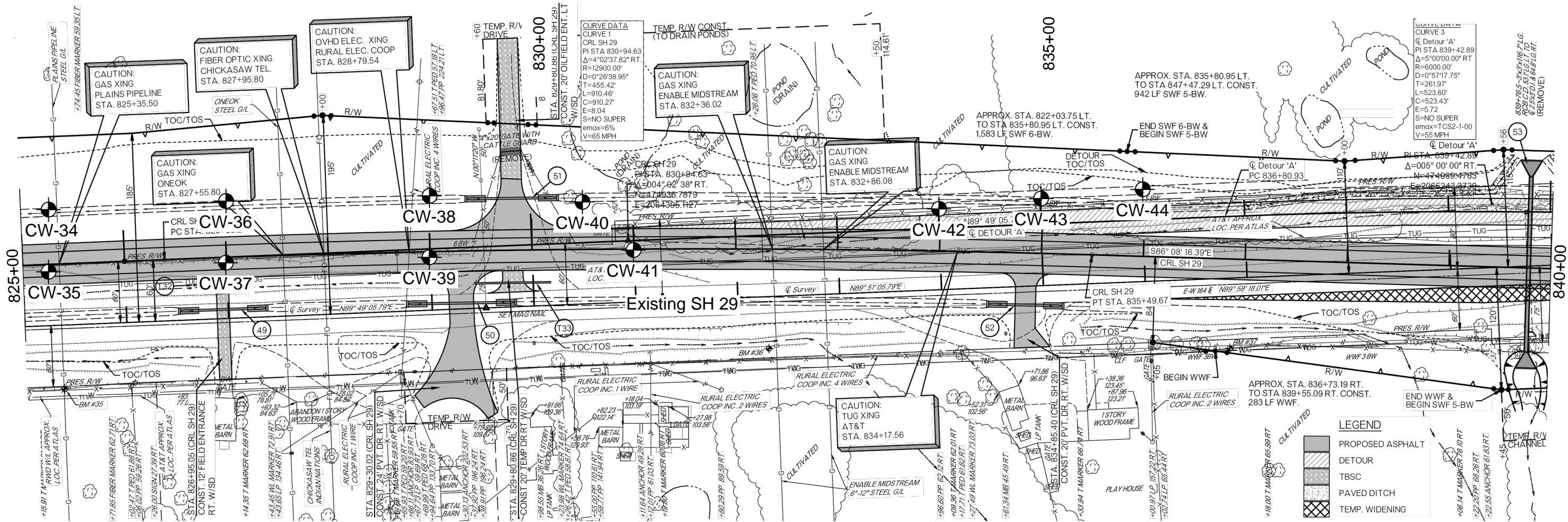
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Checked By:	JWB	Date:	4/9/2024
Approved By:	JWB	Page No:	6/10



BORING LOCATIONS AND ELEVATIONS			
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'

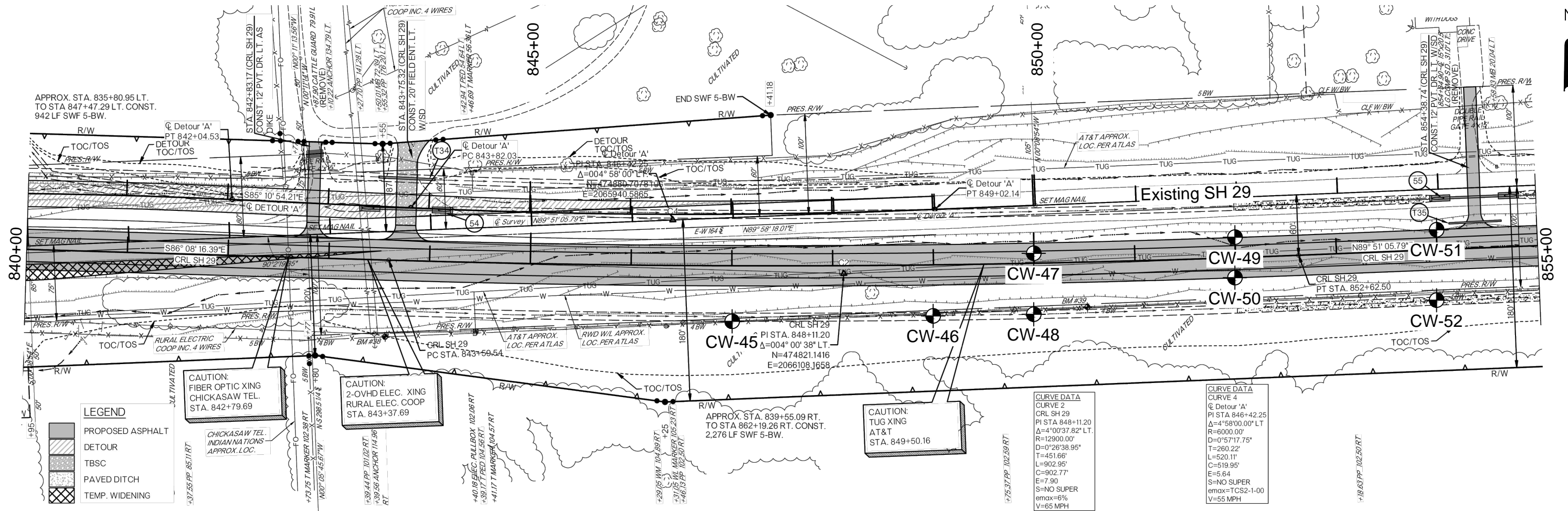
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Approved By:	JWB	Page No:	8/10



BORING LOCATIONS AND ELEVATIONS			
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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BORING LOCATION DIAGRAM

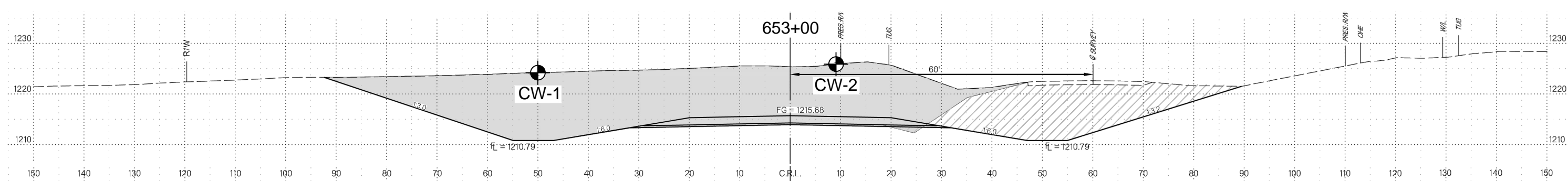
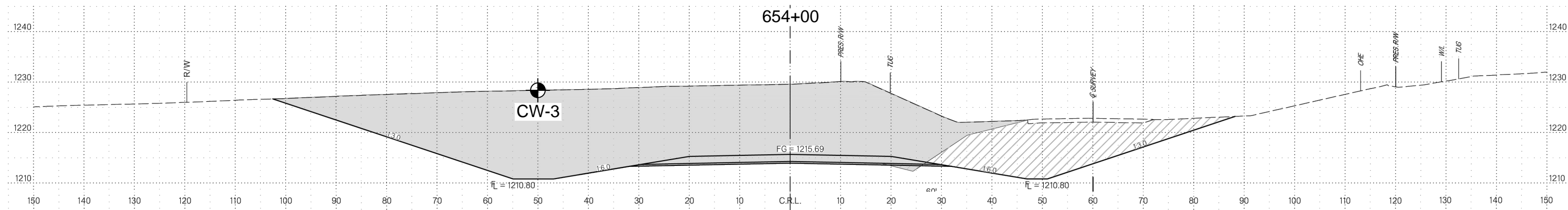
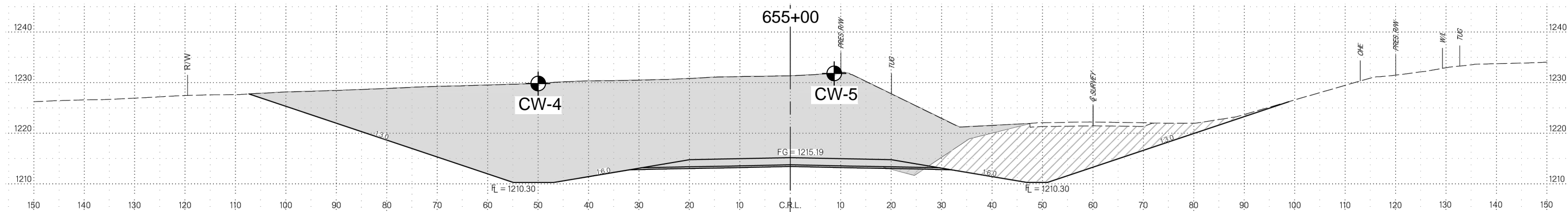
CUT ANALYSIS - WEST PHASE II

STATE HIGHWAY 29

STEPHENS COUNTY, OKLAHOMA

29657(04)

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Checked By:	JWB	Date:	4/9/2024
Approved By:	JWB	Page No:	9/10



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'

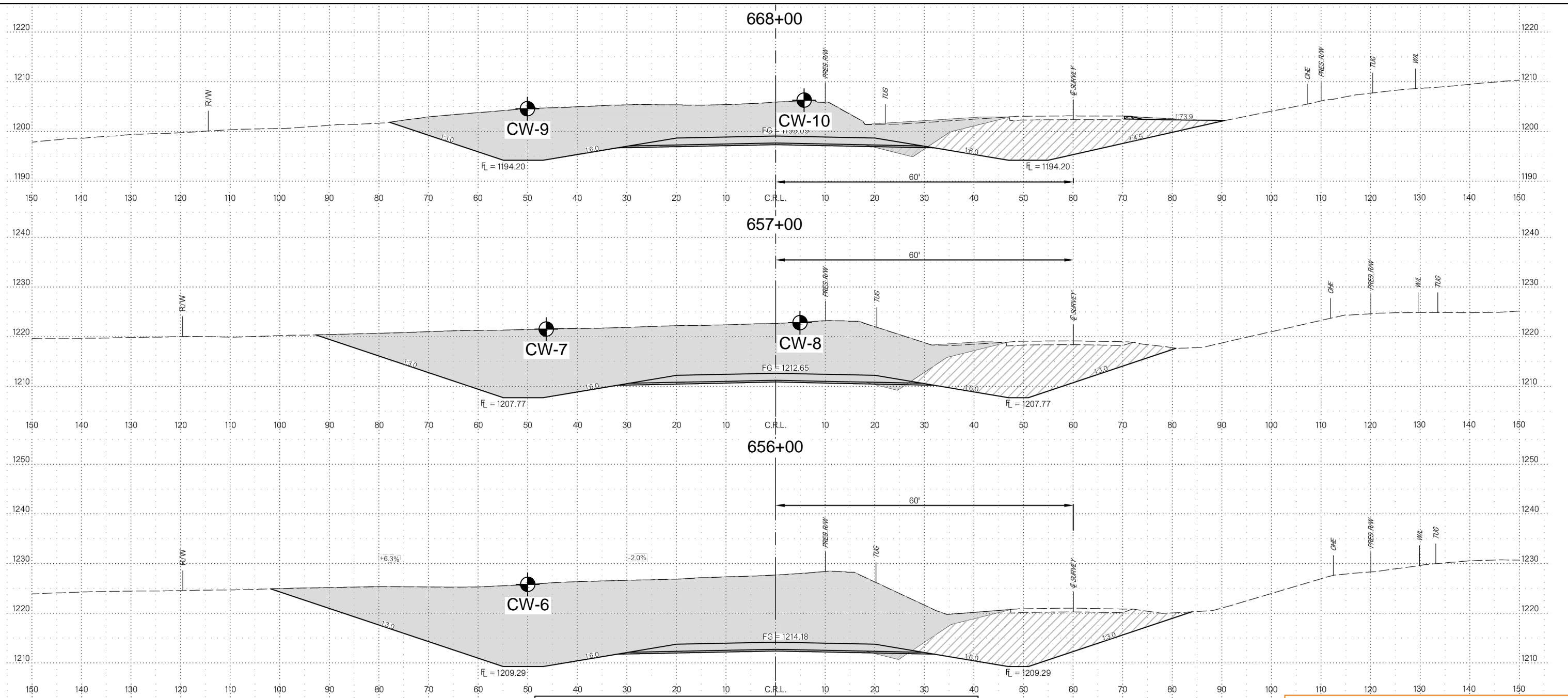
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BORING LOCATION DIAGRAM - CROSS SECTIONS
CUT ANALYSIS - WEST PHASE II
STATE HIGHWAY 29
STEPHENS COUNTY, OKLAHOMA
29657(04)

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Checked By:	JWB	Date:	4/9/2024
Approved By:	JWB	Page No:	1/12



BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-6	656+00	50' left	1226'
CW-7	657+00	46' left	1222'
CW-8	657+00	5' right	1223'
CW-9	668+00	50' left	1205'
CW-10	668+00	6' right	1206'

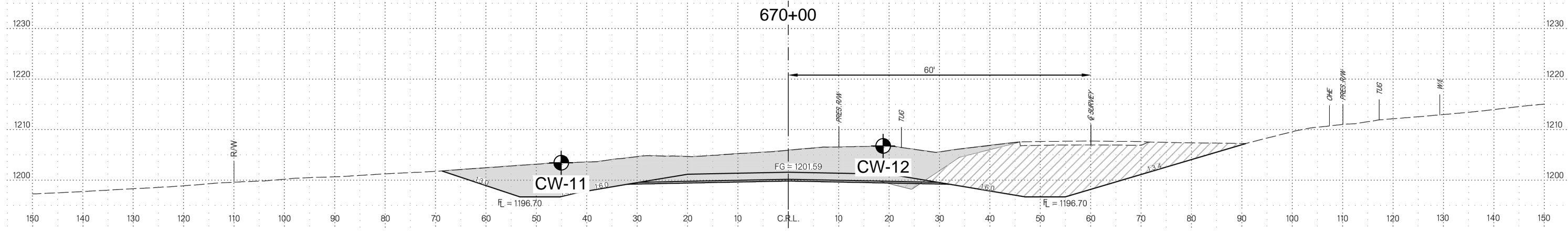
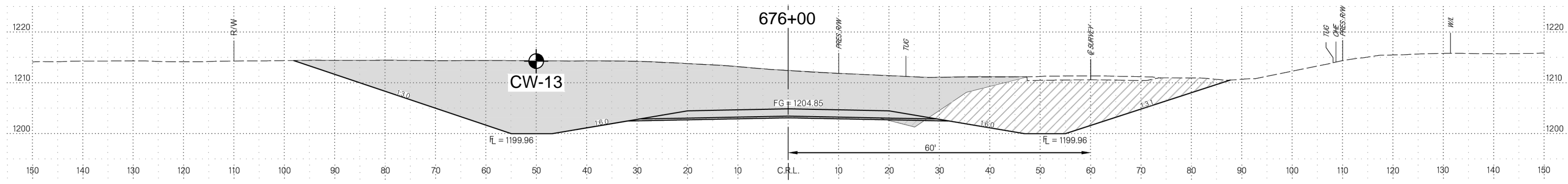
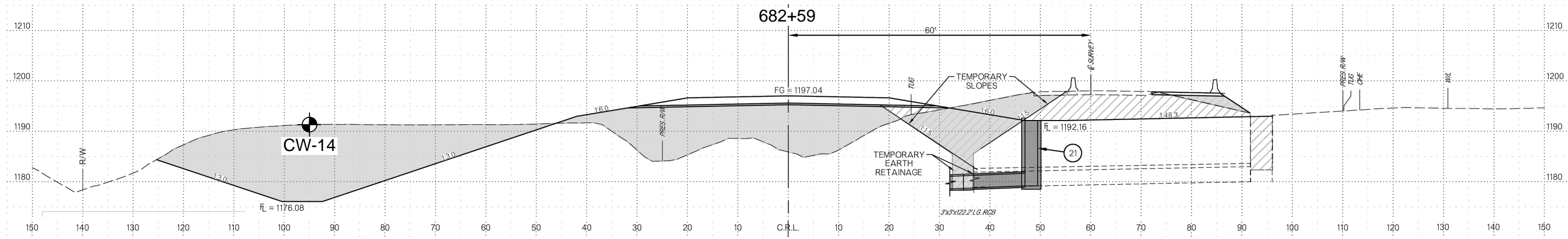
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BORING LOCATION DIAGRAM - CROSS SECTIONS
CUT ANALYSIS - WEST PHASE II
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STEPHENS COUNTY, OKLAHOMA
29657(04)

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:	2/12



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'

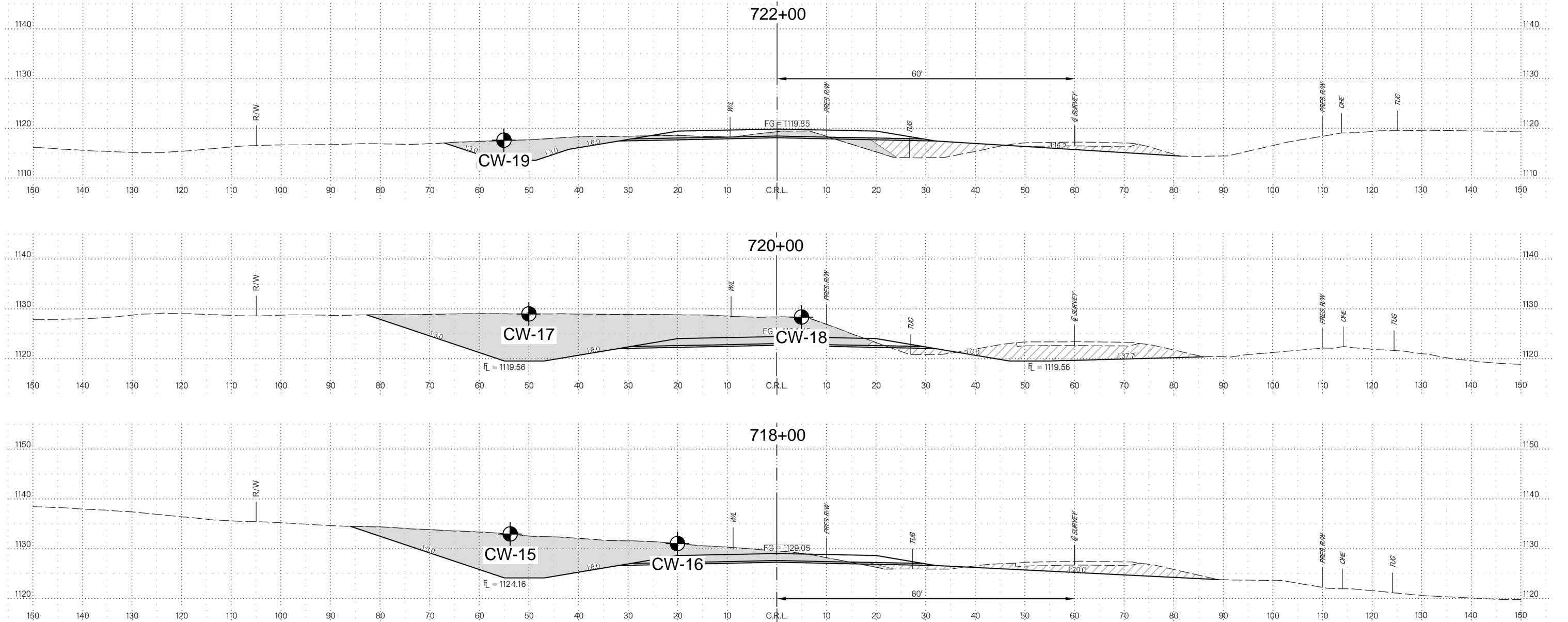
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Approved By:	JWB	Page No:	3/12



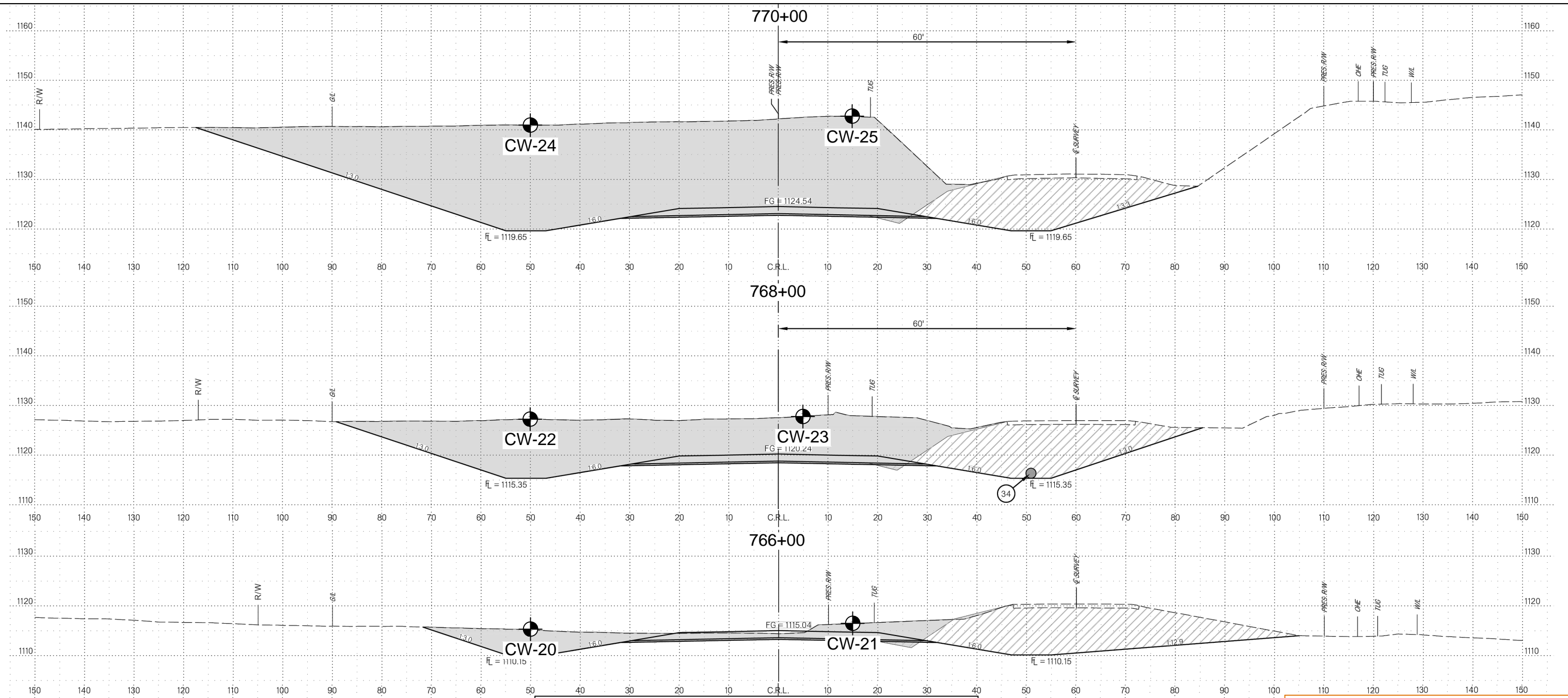
BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-15	718+00	54' left	1133'
CW-16	718+00	20' left	1131'
CW-17	720+00	50' left	1129'
CW-18	720+00	5' right	1127'
CW-19	722+15	55' left	1118'

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(405) 562-3328

BORING LOCATION DIAGRAM - CROSS SECTIONS	
CUT ANALYSIS - WEST PHASE II	
STATE HIGHWAY 29	
STEPHENS COUNTY, OKLAHOMA	
29657(04)	
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:	4/12



BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-20	766+00	50' left	1115'
CW-21	766+00	15' right	1116'
CW-22	768+00	50' left	1127'
CW-23	768+00	5' right	1128'
CW-24	770+00	50' left	1141'
CW-25	770+30	15' right	1143'

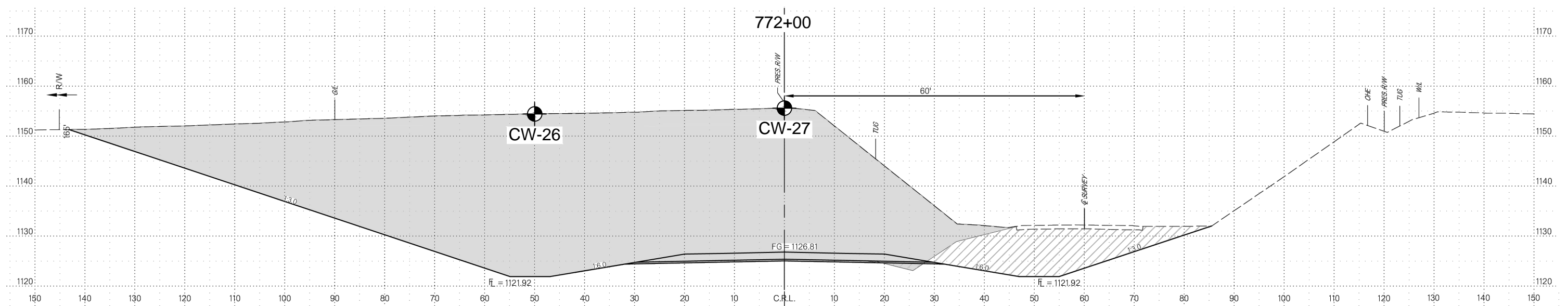
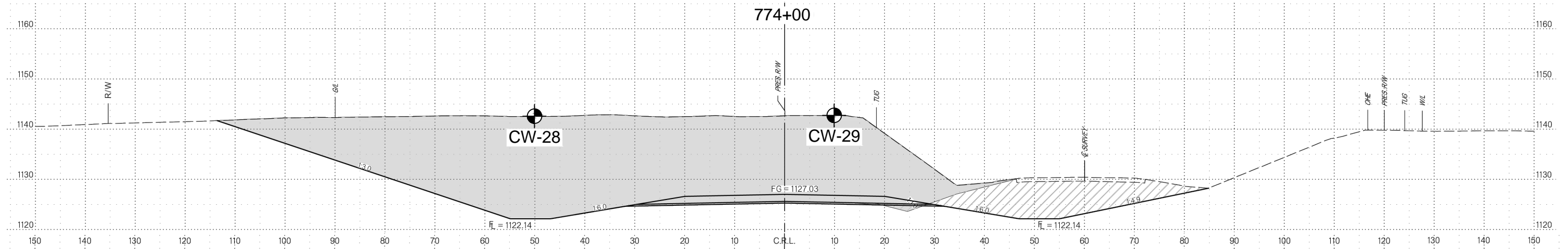
Stations, offsets and elevations estimated from plans provided by SRB

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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-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'

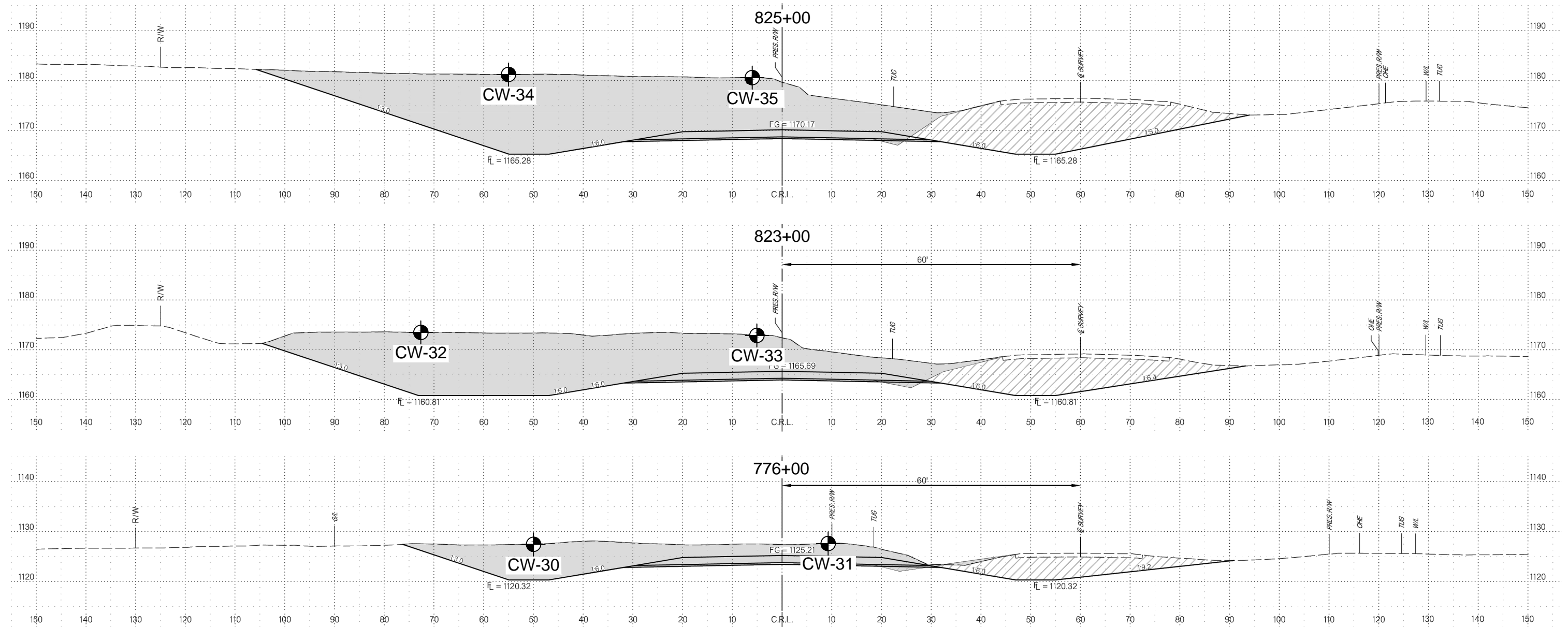
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CUT ANALYSIS - WEST PHASE II
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29657(04)

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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'

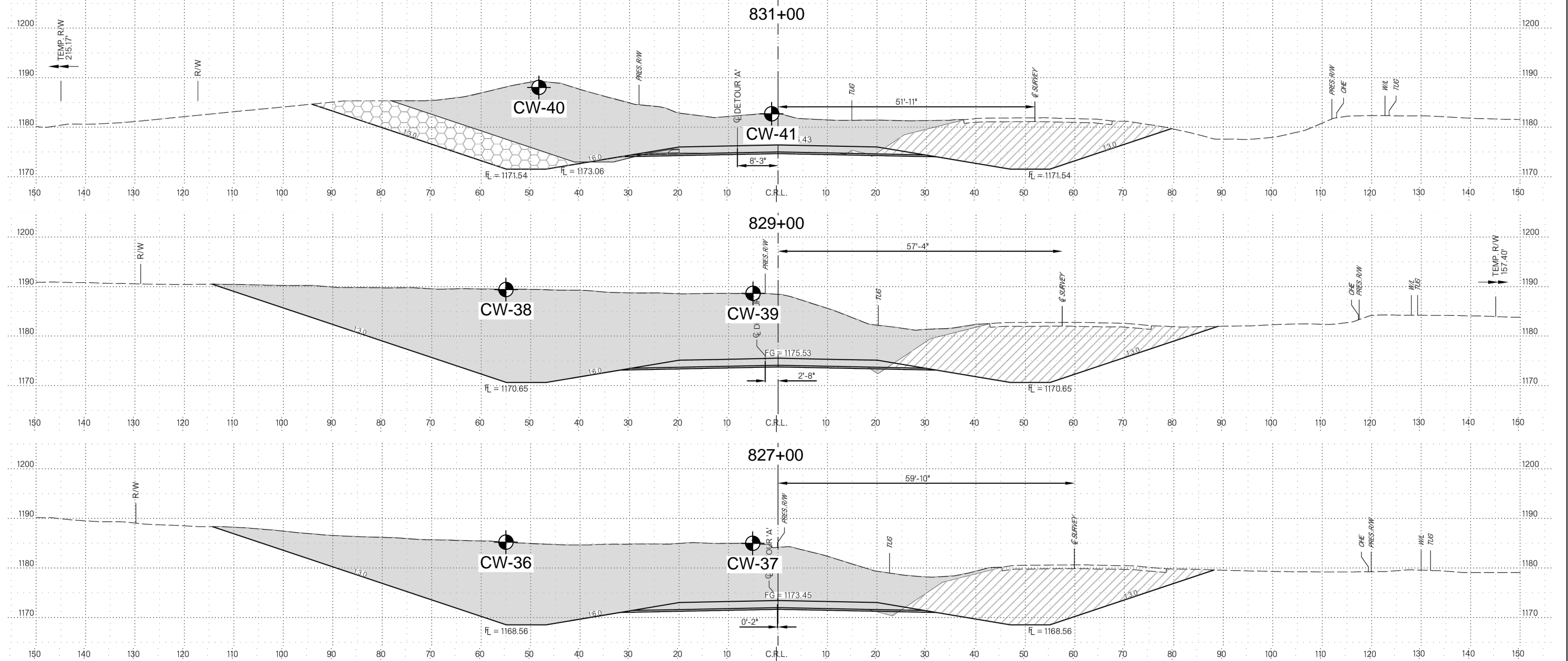
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STATE HIGHWAY 29
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29657(04)

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Approved By:	JWB	Page No:	7/12



BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	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'
CW-41	831+00	1' left	1183'

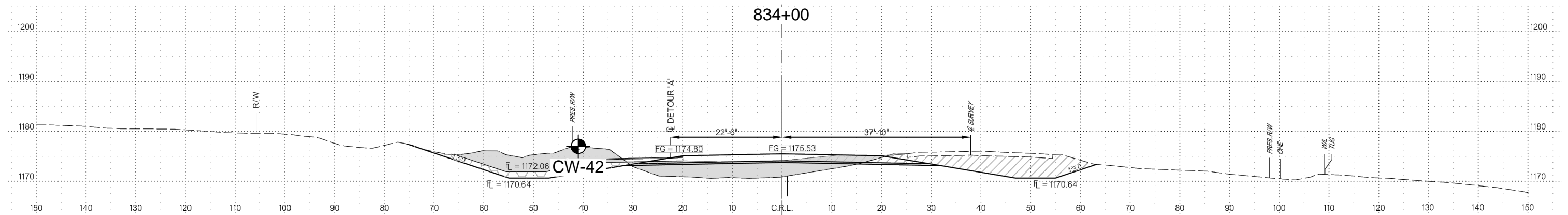
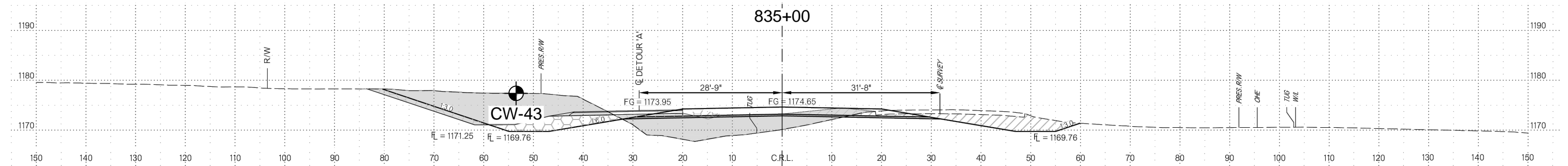
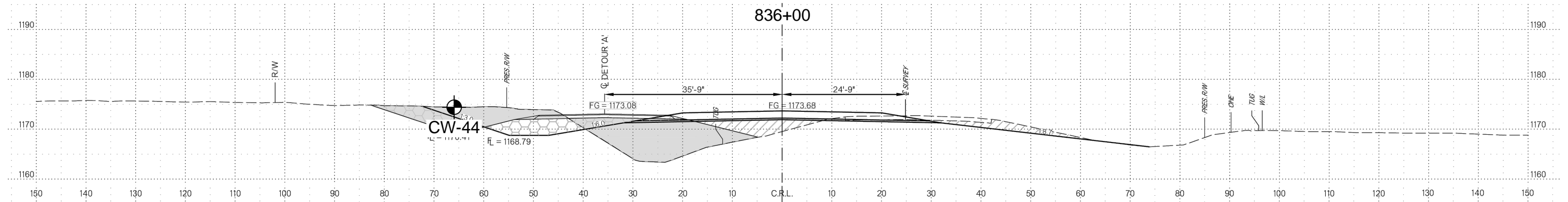
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CUT ANALYSIS - WEST PHASE II
STATE HIGHWAY 29
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Approved By:	JWB	Page No:	8/12



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'

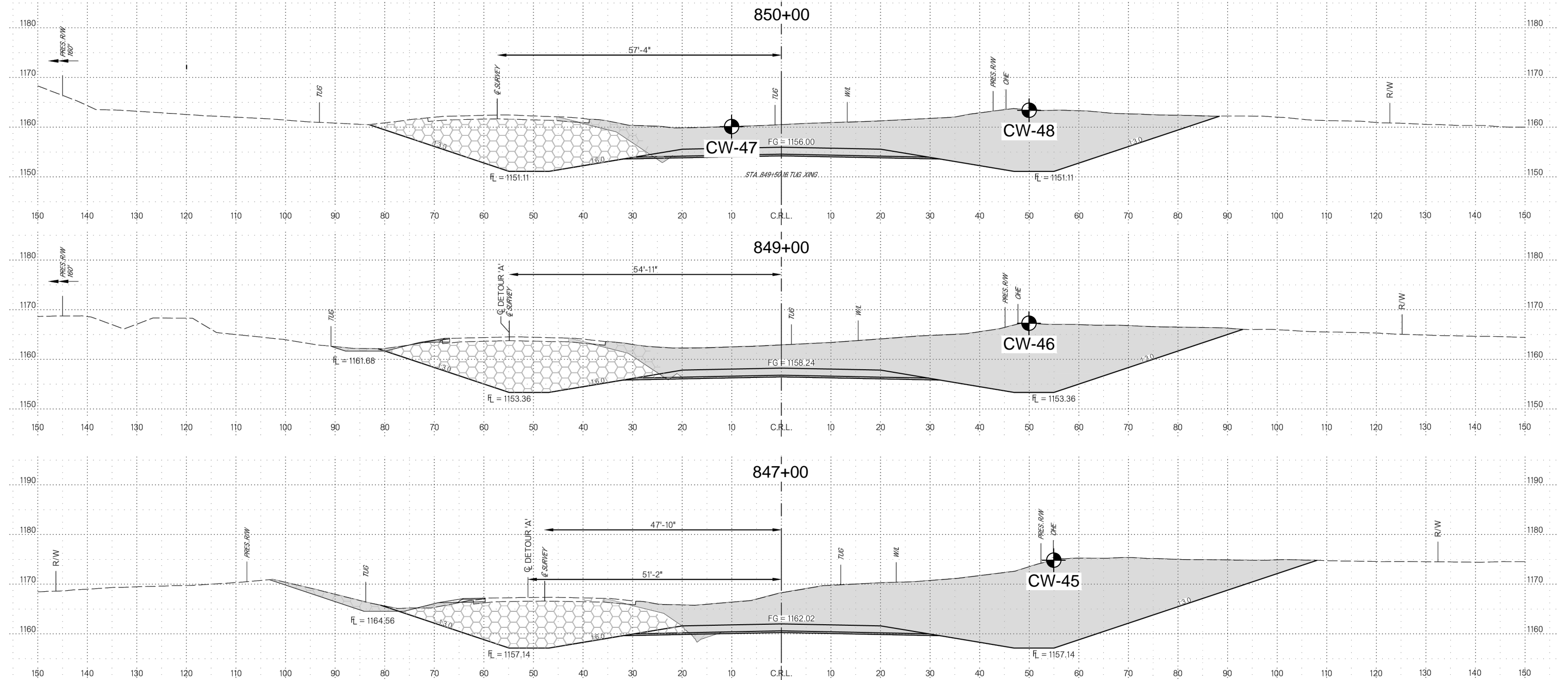
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STATE HIGHWAY 29
STEPHENS COUNTY, OKLAHOMA
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BORING LOCATIONS AND ELEVATIONS			
Boring	Station	CRL Survey Offset	Elevation
CW-45	847+00	55' right	1175'
CW-46	849+00	50' right	1167'
CW-47	850+00	10' left	1160'
CW-48	850+00	50' right	1164'

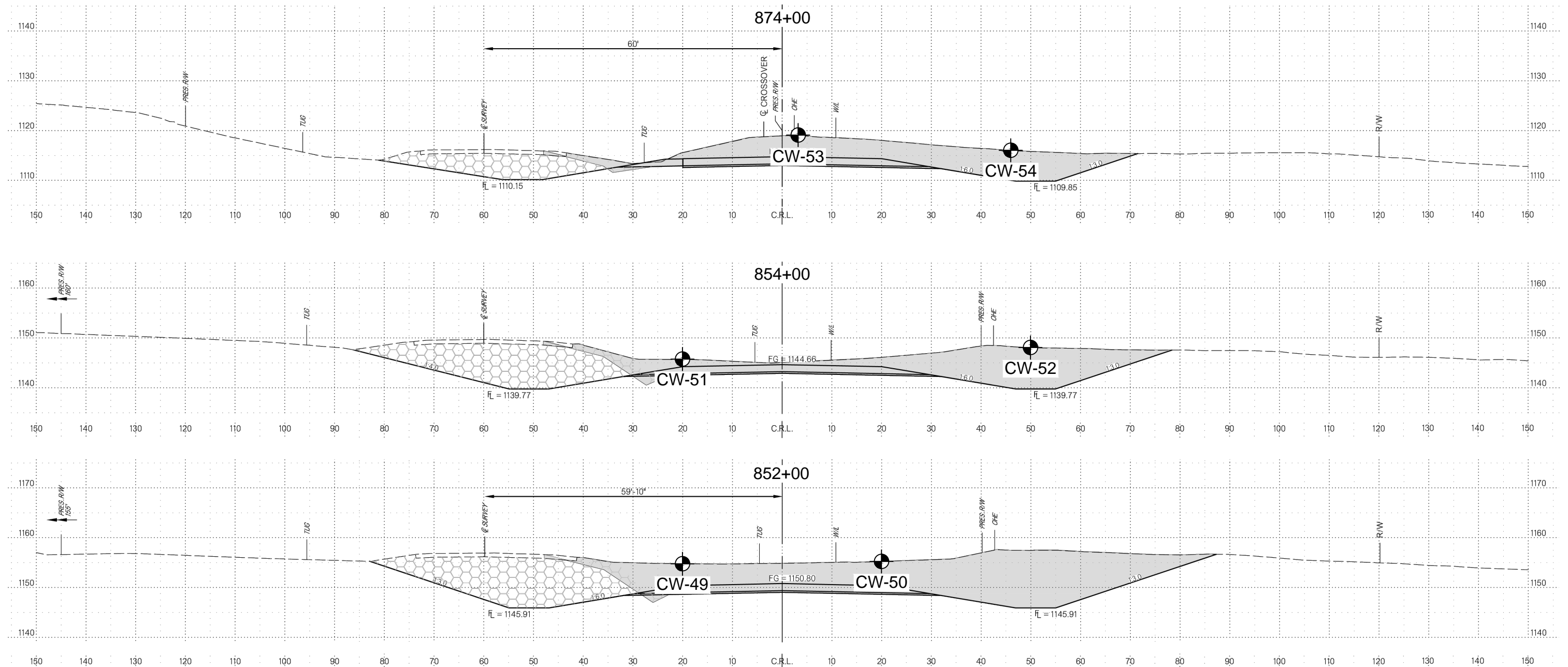
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Approved By:	JWB	Page No:	10/12



BORING LOCATIONS AND ELEVATIONS			
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'

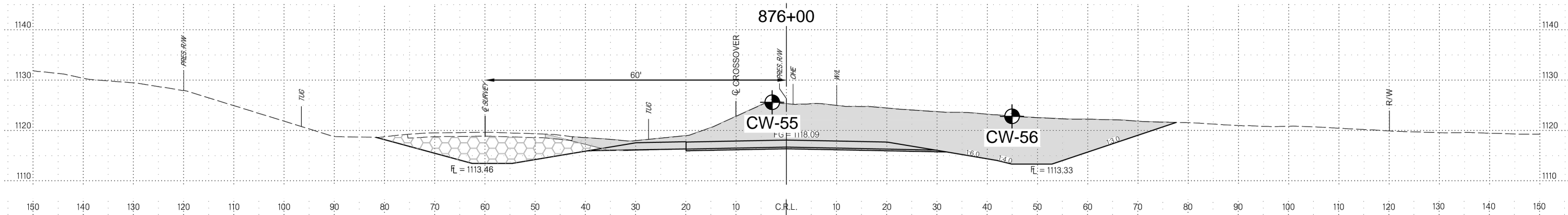
Stations, offsets and elevations estimated from plans provided by SRB

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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
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

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

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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			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'							
				✕ SPT	16					
				▼ TC	40	16	25	18	7	51.1
1215	10		SANDSTONE , yellow, purplish red and gray to medium reddish brown, cemented to well cemented 1218'		50/6"					
					50/1.5"					
					50/0.8"					
				▼ TC	50/1"					
					50/0.8"					
1210			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										
1180										
1175										

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	1226 ft	STATION	652+70	OFFSET	9' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1225	0		SANDY LEAN CLAY , brown to red, medium stiff	1226' X SPT	6	9	27	16	11	50.8
			SANDY SILTY CLAY , purplish red, light gray and light brown, hard	1224'						
1220	5		SANDSTONE , light gray and light brown to medium reddish brown, very poorly cemented to poorly cemented	1221' X SPT TC	21 36 50/4" 50/4" 50/2"	9	24	19	5	50.5
				TC	50/5.5" 50/3.5"					
	10			TC	50/2" 50/1.5"					
			Boring Termination Depth = 12 feet Boring Completed and Backfilled on 4/3/2024							
1210										
1205										
1200										
1195										
1190										
1185										
1180										

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>5/16/18</u> COMPLETED <u>5/16/18</u>	GROUND ELEVATION <u>1228 ft</u> STATION <u>654+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>





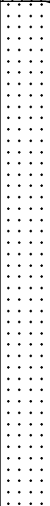





ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
			SANDY LEAN CLAY , reddish brown with white, soft	1228'	×	SPT	4"			
			SANDSTONE , light gray with purple, very poorly cemented to very well cemented	1227.5'	▼	TC	50/6" 50/4.3" 50/2.8"			
1225	5									
1220	10				▼	TC	50/4.3" 50/2.5"			
1215	15				▼	TC	32/6" 50/4.8"			
1210	20				▼	TC	50/0.8" 50/0.5"			
1205	25				▼	TC	50/0.6" 50/0.3"			
1200	30				▼	TC	50/0.8" 50/0.3"			
1195			Boring Termination Depth = 31 feet Boring Completed and Backfilled on 5/16/18	1197'	▼	TC	50/0.6" 50/0.4"			
1190										
1185										
1180										

Cave In Depth none

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

Cave In Depth none

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>5/16/18</u> COMPLETED <u>5/16/18</u>	GROUND ELEVATION <u>1226 ft</u> STATION <u>656+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)	
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
1225	0		LEAN CLAY WITH SAND , reddish brown, medium stiff	1226'	 SPT	5	21	47	19	28	72.6
	5										
1220			SANDY LEAN CLAY , light brown, hard	1221'	 SPT	10 27	5	25	12	13	61.8
			SANDSTONE , light gray, very poorly cemented to well cemented	1220'	 TC	50/5.5" 50/3.5" 50/4.5"					
	10										
1215			 TC	50/0.8" 50/0.5"							
	15										
1210			 TC	50/0.8" 50/0.5"							
	20										
1205			 TC	50/0.6" 50/0.4"							
	25										
1200			Boring Termination Depth = 25 feet Boring Completed and Backfilled on 5/16/18	1201'	 TC	50/0.8" 50/0.4"					
1195											
1190											
1185											
1180											






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	1222 ft	STATION	657+00	OFFSET	46' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1220			<u>LEAN CLAY with SAND</u> , reddish brown to red, stiff	1222' <input checked="" type="checkbox"/> SPT	10	22	46	18	28	77.7
			<u>SILTY SAND</u> , pale red, medium dense	1220'						
5										
1215			<u>SANDSTONE</u> , pale reddish purple to light gray, poorly cemented to well cemented	1216.5' <input checked="" type="checkbox"/> SPT	18	6	0	0	NP	34.0
				<input checked="" type="checkbox"/> TC	23					
					50/6"					
					50/1.8"					
					50/1.1"					
10										
1210				<input checked="" type="checkbox"/> TC	50/0.8"					
					50/0.3"					
			Boring Termination Depth = 13 feet Boring Completed and Backfilled on 4/3/2024	<input checked="" type="checkbox"/> TC	50/4"					
					50/1.3"					
1205										
1200										
1195										
1190										
1185										
1180										
1175										

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	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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1220			LEAN CLAY , red to reddish purple with orange, medium stiff to hard	1223' X SPT	8	21	48	21	27	89.3
5			shaley after 2 feet							
1215			SANDY SILT , red and gray, dense	1216.5' X SPT	52	15	34	13	21	88.3
10			SANDSTONE , gray to light purplish brown, poorly cemented to cemented	1216' TC	32	11	0	0	NP	59.0
					50/3"					
					50/2.5"					
					50/1.8"					
1210			Boring Termination Depth = 12 feet Boring Completed and Backfilled on 4/3/2024	TC	50/1.5"					
					50/1"					
1205										
1200										
1195										
1190										
1185										
1180										
1175										

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	1205 ft	STATION	668+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	0 hrs AFTER DRILLING					none
NOTES	JP# 29657(04)			Cave In Depth					none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1205	0		SILTY SAND , brown to red to light brown and purplish red, loose to medium dense	1205'  SPT	4	11	0	0	NP	19.9
1200	5		SANDSTONE , purplish red to light reddish brown, well cemented	1199.5'  TC	15 50/6" 50/1.5" 50/0.5"	9	0	0	NP	15.2
1195	10			 TC	50/1" 50/0.3"					
1190	15			 TC	50/0.8" 50/0.3"					
1185	20		Boring Termination Depth = 20 feet Boring Completed and Grouted on 4/4/2024	 TC	50/1.5" 50/0.3"					
1180										
1175										
1170										
1165										
1160										
1155										

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	1206 ft	STATION	668+00	OFFSET	6' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1205	0		<u>SILTY, CLAYEY SAND</u> , red with purple, loose	1206' <input checked="" type="checkbox"/> SPT	4	17	21	16	5	46.3
			<u>SILTY SAND</u> , gray with purple and orange, dense	1204'						
1200	5		<u>SANDSTONE</u> , gray and purple, well cemented	1200' <input checked="" type="checkbox"/> SPT TC	17 37 50/3.5"	6	0	0	NP	13.7
				TC	50/1"					
				TC	50/0.8"					
				TC	50/1"					
				TC	50/0.5"					
1195			Boring Termination Depth = 9 feet Boring Completed and Backfilled on 4/4/2024							
1190										
1185										
1180										
1175										
1170										
1165										
1160										

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	1203 ft	STATION	670+00	OFFSET	45' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			SANDY LEAN CLAY , red to red and gray, medium stiff	1203' <input checked="" type="checkbox"/> SPT	7	17	35	15	20	51.1
1200			SILTY SAND , gray with red and orange	1201'						
5										
			SANDY SILTY CLAY , gray, very stiff	1198' <input checked="" type="checkbox"/> SPT	21	7	25	19	6	56.8
			SANDSTONE , gray, well cemented	1197.5'	50/6"					
1195			Boring Termination Depth = 7 feet Boring Completed and Backfilled on 4/4/2024	<input checked="" type="checkbox"/> TC	50/1.5" 50/0.5"					
1190										
1185										
1180										
1175										
1170										
1165										
1160										
1155										

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	1207 ft	STATION	670+00	OFFSET	19' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
1205			LEAN CLAY with SAND , red to red with gray, stiff 1207'	<input checked="" type="checkbox"/> SPT	11	18	32	15	17	70.2
			SILTY SAND , gray and purple, dense 1205'							
1200	5		SANDSTONE , light reddish gray, well cemented 1201'	<input checked="" type="checkbox"/> SPT	20 37	5	0	0	NP	29.0
			Boring Termination Depth = 7 feet Boring Completed and Backfilled on 4/4/2024	<input checked="" type="checkbox"/> TC	50/5" 50/0.5" 50/0.5"					
1195										
1190										
1185										
1180										
1175										
1170										
1165										
1160										

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>5/16/18</u> COMPLETED <u>5/16/18</u>	GROUND ELEVATION <u>1214 ft</u> STATION <u>676+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
	0									
			<u>CLAYEY SAND</u> , reddish brown, very loose 1214'	⊗ SPT	3	13	32	12	20	48.4
1210	5		<u>LEAN CLAY WITH SAND</u> , reddish brown, very stiff 1209'	⊗ SPT	25	10	43	15	28	81.1
1205	10		<u>SANDY SILT</u> , reddish brown, very dense 1204'	⊗ SPT	30	7	0	0	NP	53.9
			<u>SANDSTONE</u> , light gray with reddish brown, cemented to very well cemented 1203.5'	▼ TC	50/6" 50/1.4" 50/1"					
1200	15			▼ TC	50/1.5" 50/0.5"					
1195	20			▼ TC	50/0.5" 50/0.4"					
1190	25			▼ TC	50/0.5" 50/0.3"					
			Boring Termination Depth = 25 feet Boring Completed and Backfilled on 5/16/18 1189'	▼ TC	50/0.5" 50/0.3"					
1185										
1180										
1175										
1170										
1165										

CLIENT SRB	PROJECT NAME SH 29 Cut Analysis - West Phase I
PROJECT NUMBER 18043	PROJECT LOCATION Stephens County, Oklahoma
DATE STARTED 7/13/18 COMPLETED 7/13/18	GROUND ELEVATION 1191.5 ft STATION 682+59 OFFSET 95' LT
DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:
DRILLING METHOD 4.5" augers - CME 750 ATV	▽ DURING DRILLING 23.0 ft / Elev 1168.5 ft
LOGGED BY SAH CHECKED BY JWB	▼ 0 hrs AFTER DRILLING 21.0 ft / Elev 1170.5 ft
NOTES JP# 29657(04)	Cave In Depth none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1190			<u>SANDY LEAN CLAY</u> , orangish brown, stiff 1191.5'	⊗ SPT	14	8	27	13	14	50.5
5										
1185			<u>SILTY SAND</u> , orangish brown, medium dense 1186.5'	⊗ SPT	17	7	0	0	NP	42.5
10										
1180				⊗ SPT	16	4	0	0	NP	30.0
15										
1175			<u>SILTY, CLAYEY SAND</u> , light gray, medium dense 1176.5'	⊗ SPT	22	4	23	17	6	28.6
20										
1170		▼	<u>SANDSTONE</u> , orangish brown, well cemented to very well cemented 1171.5'	⊗ SPT	50/5.8"	10	21	15	6	40.5
		▽		TC	50/1"					
25										
1165			Boring Termination Depth = 25.5 feet Boring Completed and Grouted on 7/13/18 1166'	▼ TC	50/0.3"					
1160										
1155										
1150										
1145										

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				▽ DURING DRILLING 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				

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
1130	5		SILTY SAND , red to light gray with purplish red, loose to medium dense 1133'	✕ SPT	9	14	0	0	NP	35.7
1125			SANDSTONE , purplish red with light brown, well cemented to very well cemented 1127.5'	✕ SPT ▼ TC	22 50/6" 50/1" 50/0.8"	14	0	0	NP	32.5
1120			Boring Termination Depth = 9 feet Boring Completed and Grouted on 4/4/2024	▼ TC	50/0.5" 50/0.1"					
1115										
1110										
1105										
1100										
1095										
1090										
1085										

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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1130	0		SILTY SAND , brown to red, medium dense	1131' X SPT	12	17	0	0	NP	38.5
1125	5		LEAN CLAY , shaley, red with gray, hard	1127' X SPT	44	15	32	13	19	93.5
1120			Boring Termination Depth = 5.5 feet Boring Completed and Backfilled on 4/4/2024							
1115										
1110										
1105										
1100										
1095										
1090										
1085										

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	0 hrs AFTER DRILLING					none
NOTES	JP# 29657(04)			Cave In Depth					none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			SILTY SAND , gray with purple and orange, loose	1129' X SPT	7	11	0	0	NP	43.5
1125	5		LEAN CLAY with SAND , red, purple and gray	1125'						
			SANDSTONE , red, purple and gray to light reddish brown, poorly cemented to well cemented	1124' ▼ SPT TC	50/5" 50/2.5" 50/0.5"	9	26	15	11	81.9
1120	10			▼ TC	50/1.8" 50/1.5"					
1115	15			▼ TC	50/0.8" 50/0.5"					
1110			Boring Termination Depth = 19 feet Boring Completed and Backfilled on 4/4/2024	▼ TC	50/1" 50/0.3"					
1105										
1100										
1095										
1090										
1085										
1080										

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	1127 ft	STATION	720+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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1125			SILTY, CLAYEY SAND , brown to red, loose	1127' X SPT	6	19	23	19	4	47.1
5										
1120			SANDY LEAN CLAY , shaley, red and purple with gray, very stiff	1122' X SPT	9	10	27	14	13	70.0
			SANDSTONE , gray, poorly cemented	1121' TC	21					
			Boring Termination Depth = 6.5 feet Boring Completed and Backfilled on 4/4/2024		50/5" 50/2.5" 50/1"					
1115										
1110										
1105										
1100										
1095										
1090										
1085										
1080										

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	1118 ft	STATION	722+15	OFFSET	55' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1115			SANDY LEAN CLAY , shaley, red and purple with gray, medium stiff 1118'	X SPT	7	13	31	14	17	54.6
5			SANDY SILTY CLAY , light brown, very stiff 1114'	X SPT	18	6	23	16	7	53.8
1110			Boring Termination Depth = 5.5 feet Boring Completed and Backfilled on 4/4/2024							
1105										
1100										
1095										
1090										
1085										
1080										
1075										
1070										

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	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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1115	0		<u>SILTY SAND</u> , brown, very loose	1115 <input checked="" type="checkbox"/> SPT	3	13	0	0	NP	26.9
1110	5		<u>SILTY, CLAYEY SAND</u> , red, medium dense	1110 <input checked="" type="checkbox"/> SPT	11	14	22	17	5	37.4
			Boring Termination Depth = 6.5 feet Boring Completed and Backfilled on 4/5/2024							
1105										
1100										
1095										
1090										
1085										
1080										
1075										
1070										
1065										

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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1115	0		<u>SILTY SAND</u> , reddish brown to light reddish brown, loose	1116' <input checked="" type="checkbox"/> SPT	4	13	0	0	NP	30.9
1110	5			<input checked="" type="checkbox"/> SPT	8	8	0	0	NP	22.1
1105			Boring Termination Depth = 6.5 feet Boring Completed and Backfilled on 4/5/2024							
1100										
1095										
1090										
1085										
1080										
1075										
1070										

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	1127 ft	STATION	768+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		0 hrs AFTER DRILLING				none
NOTES	JP# 29657(04)				Cave In Depth					none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0											
1125			SILTY SAND , brown to reddish brown to red to purplish gray, very loose to medium dense	1127	<input checked="" type="checkbox"/> SPT	2	10	0	0	NP	26.4
5											
1120					<input checked="" type="checkbox"/> SPT	7	10	0	0	NP	35.9
10											
1115			SANDSTONE , gray and purple, poorly cemented	1116.5	<input checked="" type="checkbox"/> SPT	12 50/6"	3	0	0	NP	31.1
			Boring Termination Depth = 12 feet Boring Completed and Backfilled on 4/5/2024		<input checked="" type="checkbox"/> TC	50/3" 50/0.8"					
1110											
1105											
1100											
1095											
1090											
1085											
1080											

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	1128 ft	STATION	768+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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1125			<u>POORLY-GRADED SAND with SILT</u> , red and brown, very loose	1128' <input checked="" type="checkbox"/> SPT	2	14	0	0	NP	9.7
5										
1120			<u>SANDY LEAN CLAY</u> , red to red with white, very stiff	1123' <input checked="" type="checkbox"/> SPT	21	8	27	8	19	51.0
10										
1115				<input checked="" type="checkbox"/> SPT	24	9	28	12	16	51.1
			Boring Termination Depth = 11.5 feet Boring Completed and Backfilled on 4/5/2024							
1110										
1105										
1100										
1095										
1090										
1085										
1080										

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>7/11/18</u> COMPLETED <u>7/11/18</u>	GROUND ELEVATION <u>1141 ft</u> STATION <u>770+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	▽ DURING DRILLING <u>15.0 ft / Elev 1126.0 ft</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	▼ 0 hrs AFTER DRILLING <u>16.5 ft / Elev 1124.5 ft</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1140			<u>SILTY SAND</u> , brown, loose	1141' X SPT	8	4	0	0	NP	22.6
1135	5		<u>SANDY SILTY CLAY</u> , reddish brown, very stiff	1136' X SPT	13	8	22	15	7	55.8
			<u>SANDSTONE</u> , light gray, poorly cemented to well cemented	1135' ▼ TC	50/5" 50/3.3" 50/1.8"					
1130	10			▼ TC	50/1.8" 50/1"					
1125	15	▽		▼ TC	50/0.8" 50/0.4"					
1120	20			▼ TC	50/2.5" 50/1"					
1115	25			▼ TC	50/1" 50/0.5"					
1110	30		Boring Termination Depth = 30 feet Boring Completed and Grouted on 7/11/18	1111' ▼ TC	50/0.8" 50/0.4"					
1105										
1100										
1095										

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	1143 ft	STATION	770+30	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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			<u>SILTY SAND</u> , brown, very loose	1143' X SPT	3	16	24	16	8	38.0
1140			<u>CLAYEY SAND</u> , red, loose	1142'						
5										
			<u>SILTY SAND</u> , light gray and red, medium dense	1138' X SPT	16	8	0	0	NP	31.3
1135										
			<u>SILTY, CLAYEY SAND</u> , gray, dense	1135' X SPT	33	7	23	16	7	49.6
10			<u>SANDSTONE</u> , gray to light reddish brown, cemented to very well cemented	1134.5' TC	50/3"					
					50/2"					
					50/0.8"					
1130										
15										
1125										
20										
			Boring Termination Depth = 20 feet Boring Completed and Grouted on 4/5/2024	TC	50/2"					
						50/0.5"				
1120										
1115										
1110										
1105										
1100										
1095										

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>7/12/18</u> COMPLETED <u>7/12/18</u>	GROUND ELEVATION <u>1154.5 ft</u> STATION <u>772+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>wet rotary - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
			<u>SILTY, CLAYEY SAND</u> , light brown, medium dense 1154.5'	⊗ SPT	20	5	23	16	7	30.4
1150	5		<u>SILTY SAND</u> , light brown, very dense 1150.5'	⊗ SPT	30	8	0	0	NP	23.0
			<u>SANDSTONE</u> , light gray, poorly cemented to very well cemented 1150'	▼ TC	50/4" 50/3" 50/2"					
1145	10			▼ TC	50/1.8" 50/1"					
1140	15			▼ TC	50/0.3" 50/0.3"					
1135	20			▼ TC	50/0.4" 50/0.3"					
1130	25			▼ TC	50/0.5" 50/0.3"					
1125	30			▼ TC	50/0.4" 50/0.1"					
1120	35			▼ TC	50/1" 50/0.4"					
1115	40			▼ TC	50/0.8" 50/0.4"					
1110	45		Boring Termination Depth = 45 feet Boring Completed and Backfilled on 7/12/18 1109.5'	▼ TC	50/0.8" 50/0.5"					
1105										

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	1156 ft	STATION	772+00	OFFSET	0
DRILLING CONTRACTOR	DSO - Drilling Services of Oklahoma			GROUND WATER LEVELS:					
DRILLING METHOD	HSA - CME 750 ATV			▽ DURING DRILLING 38 ft / Elev 1118 ft					
LOGGED BY	EDC			▼ 0 hrs AFTER DRILLING 20 ft / Elev 1136 ft					
CHECKED BY	JWB			Cave In Depth none					
NOTES	JP# 29657(04)								

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1155	0		SILTY SAND , brown to reddish brown to light gray and purple, loose to medium dense	1156'	✕ SPT	4	18	0	0	NP	29.7
1150	5		SANDSTONE , light gray and purple to light reddish brown to light gray, very poorly cemented to very well cemented	1150'	✕ SPT	14	5	19	16	3	27.3
					▼ TC	27					
						50/3.3"					
						50/4"					
						50/2.5"					
1145	10				▼ TC	50/0.5"					
						50/0.5"					
1140	15				▼ TC	50/0.5"					
						50/0.3"					
1135	20	▼			▼ TC	50/1.5"					
						50/1"					
1130	25				▼ TC	50/0.3"					
						50/0.3"					
1125	30				▼ TC	50/0.5"					
						50/0.5"					
1120	35				▼ TC	50/1"					
			SHALE , red, hard	1120'		50/0.5"					
1115	40	▽	Boring Termination Depth = 40 feet Boring Completed and Grouted on 4/5/2024		▼ TC	50/0.8"					
						50/0.5"					
1110											

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>7/11/18</u> COMPLETED <u>7/11/18</u>	GROUND ELEVATION <u>1142.5 ft</u> STATION <u>774+00</u> OFFSET <u>50' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1140	0		<u>SANDY LEAN CLAY</u> , reddish brown, stiff	1142.5' X SPT	11	11	25	16	9	51.3
1135	5		<u>SANDSTONE</u> , light gray with reddish brown, cemented to very well cemented	1137.5' SPT	50/5"	4	0	0	NP	24.1
				TC	50/1.3"					
					50/0.8"					
1130	10			TC	50/1.3"					
					50/0.5"					
1125	15			TC	50/1"					
					50/0.3"					
1120	20			TC	50/1.5"					
					50/1"					
1115	25			TC	50/1"					
					50/0.4"					
1110	30		Boring Termination Depth = 30 feet Boring Completed and Backfilled on 7/11/18	1112.5' TC	50/0.4"					
					50/0.4"					
1105										
1100										
1095										

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	1143 ft	STATION	774+00	OFFSET	10' 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			0 hrs AFTER DRILLING					none
CHECKED BY	JWB			Cave In Depth					none
NOTES	JP# 29657(04)								

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
1140	5		SANDY LEAN CLAY , reddish brown and gray, soft	1143' X SPT	4	19	25	15	10	67.2
1135	10		SILTY SAND , light gray and reddish purple, dense	1138' X SPT	47	8	0	0	NP	33.5
1130	15		SANDSTONE , gray and reddish purple, poorly cemented to well cemented	1133' SPT TC	50/5" 50/1" 50/0.3"	7	0	0	NP	32.1
1125				TC	50/2" 50/2"					
1120			Boring Termination Depth = 18 feet Boring Completed and Backfilled on 4/5/2024	TC	50/0.5" 50/0.5"					
1115										
1110										
1105										
1100										
1095										

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	1127 ft	STATION	775+89	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				0 hrs AFTER DRILLING					none
CHECKED BY	JWB				Cave In Depth					none
NOTES	JP# 29657(04)									

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1125			SANDY SILT , brown to red, very loose 1127'	<input checked="" type="checkbox"/> SPT	3	18	0	0	NP	56.8
5			SANDY LEAN CLAY , purple, red and gray, very stiff 1123'	<input checked="" type="checkbox"/> SPT	18	11	26	18	8	50.2
1120			SANDSTONE , gray to light reddish brown, well cemented 1121'	<input checked="" type="checkbox"/> SPT	24					
			Boring Termination Depth = 7 feet Boring Completed and Backfilled on 4/4/2024	<input checked="" type="checkbox"/> TC	50/6" 50/0.5" 50/0.5"					
1115										
1110										
1105										
1100										
1095										
1090										
1085										
1080										

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	1127 ft	STATION	775+89	OFFSET	9' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1125			4" TOPSOIL							
			SILTY, CLAYEY SAND, gray and red, medium dense	X SPT	17	9	22	17	5	37.9
5			SILTY SAND, light purplish red and gray, medium dense	X SPT	19	10	0	0	NP	28.3
			SANDSTONE, light purplish red and gray, poorly cemented	TC	27					
1120			Boring Termination Depth = 5.5 feet		50/5.5"					
			Boring Completed and Backfilled on 4/4/2024		50/3"					
					50/2.5"					
1115										
1110										
1105										
1100										
1095										
1090										
1085										
1080										

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	1172 ft	STATION	823+00	OFFSET	73' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1170			CLAYEY SAND, red, loose	1172' X SPT	5	16	25	15	10	31.5
	5		SILTY, CLAYEY SAND, red to brown to light gray and red, very dense	1170'						
1165				X SPT	54	9	21	15	6	43.1
			SANDY SILT, light gray and red, medium dense	1165'						
1160	10		SANDSTONE, light gray and dark red, poorly cemented to well cemented	1163.5' X SPT TC	30 50/5.5" 50/1" 50/0.5"	8	0	0	NP	56.5
			Boring Termination Depth = 12 feet Boring Completed and Backfilled on 4/15/2024	TC	50/2" 50/1.4"					
1155										
1150										
1145										
1140										
1135										
1130										
1125										

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	1172 ft	STATION	823+00	OFFSET	5' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0											
1170			SANDY LEAN CLAY , red to red with yellow, medium stiff	1172'	<input checked="" type="checkbox"/> SPT	8	21	34	14	20	50.6
5											
1165			SANDY SILTY CLAY , dark red, hard	1168'	<input checked="" type="checkbox"/> SPT	67	11	21	15	6	61.0
10											
1160			SILTY SAND , red and light gray and red, dense	1163'	<input checked="" type="checkbox"/> SPT	23 21 50/4"	7	0	0	NP	25.1
			SANDSTONE , red and light gray, cemented	1162'							
			Boring Termination Depth = 10.3 feet Boring Completed and Backfilled on 4/15/2024								
1155											
1150											
1145											
1140											
1135											
1130											
1125											

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut - West Phase II</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>4/15/24</u> COMPLETED <u>4/15/24</u>	GROUND ELEVATION <u>1181 ft</u> STATION <u>825+25</u> OFFSET <u>55' LT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>DLW</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1180	0		SILTY, CLAYEY SAND , dark reddish brown to light brown, medium dense	1181' X SPT	18	16	26	20	6	45.4
1175	5		SILTY SAND , light brown, medium dense	1176' X SPT	15	8	0	0	NP	25.5
			SANDSTONE , dark red and purple, poorly cemented to cemented	1175.5' ▼ TC	50/4.5" 50/2" 50/1.3"					
1170	10			▼ TC	50/1.8" 50/0.8"					
1165	15		Boring Termination Depth = 15 feet Boring Completed and Backfilled on 4/15/2024	▼ TC	50/3" 50/1.5"					
1160										
1155										
1150										
1145										
1140										
1135										

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	1180 ft	STATION	825+25	OFFSET	6' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1180	0		<u>CLAYEY SAND</u> , red, loose	1180' X SPT	5	17	29	16	13	39.9
1175	5		<u>SILTY SAND</u> , light gray to brown, medium dense	1175' X SPT	7	7	0	0	NP	16.7
			<u>SANDSTONE</u> , light gray and red, poorly cemented to cemented	1174' ▼ TC	27					
					50/3.5"					
					50/1.3"					
					50/1"					
1170	10		Boring Termination Depth = 11 feet Boring Completed and Backfilled on 4/15/2024	▼ TC	50/3"					
					50/1.3"					
1165										
1160										
1155										
1150										
1145										
1140										
1135										
1130										

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	1185 ft	STATION	827+00	OFFSET	55' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1185	0		<u>CLAYEY SAND</u> , red to dark brown, loose	1185' X SPT	8	17	32	15	17	43.2
1180	5		<u>LEAN CLAY with SAND</u> , gray and red, hard	1180' X SPT	85	12	28	16	12	75.9
1175	10		<u>SANDSTONE</u> , gray and red, well cemented	1176.5' TC	35	8	26	15	11	71.0
					50/2.5"					
					50/0.6"					
					50/0.4"					
1170	15			TC	50/0.8"					
					50/0.5"					
			Boring Termination Depth = 16 feet Boring Completed and Backfilled on 4/15/2024	TC	50/0.8"					
					50/0.4"					
1165										
1160										
1155										
1150										
1145										
1140										
1135										

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	1185 ft	STATION	827+00	OFFSET	5' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1185	0		SILTY SAND , light gray to brown, very loose	1185' <input checked="" type="checkbox"/> SPT	3	13	0	0	NP	22.9
1180	5		LEAN CLAY , brown to reddish brown, very stiff	1180' <input checked="" type="checkbox"/> SPT	23	18	32	14	18	87.7
1175	10		SILTY, CLAYEY SAND , light gray and yellow, very dense	1177' <input checked="" type="checkbox"/> SPT	52	13	24	20	4	38.0
				<input checked="" type="checkbox"/> SPT	68	12	24	20	4	34.8
1170			SILTY SAND , red and gray, medium dense	1172' <input checked="" type="checkbox"/> SPT	14	9	0	0	NP	24.1
			SANDSTONE , red and gray with purple, poorly cemented	1171.5'	50/6"					
			Boring Termination Depth = 14 feet Boring Completed and Backfilled on 4/15/2024							
1165										
1160										
1155										
1150										
1145										
1140										
1135										

Cave In Depth none

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	4/15/24	COMPLETED	4/15/24	GROUND ELEVATION	1189 ft	STATION	829+00	OFFSET	5' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
			CLAYEY SAND , brown with yellowish brown to reddish brown with black, loose to very dense	1189' <input checked="" type="checkbox"/> SPT	8	14	36	15	21	46.2
1185	5			<input checked="" type="checkbox"/> SPT	60	15	24	16	8	29.4
			SANDY LEAN CLAY , dark red, hard	1182' <input checked="" type="checkbox"/> SPT	35	20	31	17	14	69.1
1180	10			<input checked="" type="checkbox"/> SPT	54	13	33	15	18	94.3
			LEAN CLAY , light gray with red, hard	1179' <input checked="" type="checkbox"/> SPT						
1175			SILTY, CLAYEY SAND , light gray with red, medium dense	1176' <input checked="" type="checkbox"/> SPT	21	10	25	18	7	49.3
			SANDSTONE , light gray, poorly cemented	1175.5' <input checked="" type="checkbox"/> TC	50/5" 50/2" 50/1.5"					
			Boring Termination Depth = 14 feet Boring Completed and Backfilled on 4/15/2024							
1170										
1165										
1160										
1155										
1150										
1145										
1140										

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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
1185	5		<u>CLAYEY SAND</u> , brown and yellowish red to yellowish brown, loose	1188' X SPT	5	19	29	14	15	42.1
1180	10		<u>SILTY SAND</u> , dark red and black, medium dense	1183' X SPT	22	12	20	19	1	21.8
1175	15		<u>SANDSTONE</u> , dark red to light gray and red, very well cemented to cemented	1181' SPT TC	50/0.5" 50/0.3" 50/0.1"	8	0	0	NP	
1170				TC	50/1" 50/0.8"					
1165										
1160										
1155										
1150										
1145										
1140										
			Boring Termination Depth = 17 feet Boring Completed and Backfilled on 4/15/2024	TC	50/1.3" 50/0.8"					

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	1183 ft	STATION	831+00	OFFSET	1' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
1180			SILTY SAND , yellowish brown to red and yellowish brown with white, medium dense	1183' <input checked="" type="checkbox"/> SPT	11	10	0	0	NP	23.0
5										
1175			CLAYEY SAND , red and yellowish brown with gray, medium stiff to hard	1177' <input checked="" type="checkbox"/> SPT	13	15	28	15	13	35.7
				<input checked="" type="checkbox"/> SPT	73	8	23	12	11	30.3
1170			Boring Termination Depth = 9.5 feet Boring Completed and Backfilled on 4/15/2024							
1165										
1160										
1155										
1150										
1145										
1140										
1135										

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	1177 ft	STATION	834+00	OFFSET	41' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1175			<u>CLAYEY SAND</u> , light brown to reddish yellow, loose	1177' <input checked="" type="checkbox"/> SPT	6	19	29	15	14	43.5
			<u>SILTY SAND</u> , light brown and gray, dense	1175'						
5										
1170			<u>SANDSTONE</u> , light gray with yellow, well cemented	1171' <input checked="" type="checkbox"/> SPT 1171' <input checked="" type="checkbox"/> TC	25 30 50/3" 50/1" 50/1"	8	0	0	NP	31.7
			Boring Termination Depth = 6.3 feet Boring Completed and Backfilled on 4/15/2024							
1165										
1160										
1155										
1150										
1145										
1140										
1135										
1130										

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	1177 ft	STATION	835+00	OFFSET	54' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0											
1175			SILTY, CLAYEY SAND , dark brown to reddish brown, loose	1177'	<input checked="" type="checkbox"/> SPT	7	17	23	16	7	40.5
			SILTY SAND , yellow to brown to gray and yellow, very dense	1175'							
5											
1170					<input checked="" type="checkbox"/> SPT	79	3	0	0	NP	20.0
10					<input checked="" type="checkbox"/> SPT	63	4	0	0	NP	16.2
1165			SANDSTONE , gray and yellow, cemented to well cemented	1166'	<input checked="" type="checkbox"/> SPT	20 40	6	0	0	NP	27.9
					<input checked="" type="checkbox"/> TC	50/2.5" 50/1.5" 50/0.8"					
15											
1160					<input checked="" type="checkbox"/> TC	50/1" 50/0.4" 50/1.3" 50/0.5"					
			Boring Termination Depth = 17 feet Boring Completed and Backfilled on 4/15/2024		<input checked="" type="checkbox"/> TC						
1155											
1150											
1145											
1140											
1135											
1130											

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	1174 ft	STATION	836+00	OFFSET	66' 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


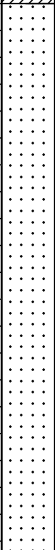
ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			<u>CLAYEY SAND</u> , pale red, loose	1174' <input checked="" type="checkbox"/> SPT	6	18	31	14	17	43.7
1170	5		<u>SILTY SAND</u> , pale yellow with light brown, dense	1170' <input checked="" type="checkbox"/> SPT	35	3	0	0	NP	16.6
			<u>SANDSTONE</u> , pale yellow with light brown, poorly cemented	1169.5'	50/5.5"					
			Boring Termination Depth = 5 feet							
			Boring Completed and Backfilled on 4/15/2024							
1165										
1160										
1155										
1150										
1145										
1140										
1135										
1130										
1125										

CLIENT SRB	PROJECT NAME SH 29 Cut Analysis - West Phase I
PROJECT NUMBER 18043	PROJECT LOCATION Stephens County, Oklahoma
DATE STARTED 5/16/18 COMPLETED 5/16/18	GROUND ELEVATION 1175 ft STATION 847+00 OFFSET 55' RT
DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma	GROUND WATER LEVELS:
DRILLING METHOD 4.5" augers - CME 750 ATV	▽ DURING DRILLING 10.0 ft / Elev 1165.0 ft
LOGGED BY SAH CHECKED BY JWB	▼ 0 hrs AFTER DRILLING 12.0 ft / Elev 1163.0 ft
NOTES JP# 29657(04)	Cave In Depth none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1175	0		<u>SILTY SAND</u> , reddish brown, medium dense	1175' X SPT	30	9	0	0	NP	32.6
1170	5		<u>SANDSTONE</u> , reddish brown with interbedded light gray layers, cemented to well cemented	1171' SPT	50/4"	5	0	0	NP	29.6
				TC	50/1.3"					
					50/0.8"					
1165	10	▽		TC	50/1.3"					
		▼			50/1"					
1160	15			TC	50/0.8"					
					50/0.5"					
1155	20			TC	50/1"					
					50/0.5"					
1150	25			TC	50/0.8"					
					50/0.3"					
1145			Boring Termination Depth = 29.5 feet Boring Completed and Grouted on 5/16/18	1145.5' TC	50/0.8"					
					50/0.6"					
1140										
1135										
1130										
1125										

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

CLIENT <u>SRB</u>	PROJECT NAME <u>SH 29 Cut Analysis - West Phase I</u>
PROJECT NUMBER <u>18043</u>	PROJECT LOCATION <u>Stephens County, Oklahoma</u>
DATE STARTED <u>5/16/18</u> COMPLETED <u>5/16/18</u>	GROUND ELEVATION <u>1167 ft</u> STATION <u>849+00</u> OFFSET <u>50' RT</u>
DRILLING CONTRACTOR <u>DSO - Drilling Services of Oklahoma</u>	GROUND WATER LEVELS:
DRILLING METHOD <u>4.5" augers - CME 750 ATV</u>	DURING DRILLING <u>none</u>
LOGGED BY <u>SAH</u> CHECKED BY <u>JWB</u>	0 hrs AFTER DRILLING <u>none</u>
NOTES <u>JP# 29657(04)</u>	Cave In Depth <u>none</u>

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS N	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
0							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1165			<u>LEAN CLAY WITH SAND</u> , reddish brown, light gray, stiff 1167'	⊗ SPT	12	8	24	16	8	78.9
5			<u>SANDSTONE</u> , reddish brown, light gray, cemented to very well cemented 1163'	⬇ SPT TC	50/3" 50/1" 50/0.5"	4	33	17	16	52.2
10				⬇ TC	50/0.8" 50/0.5"					
15				⬇ TC	50/0.5" 50/0.3"					
20				⬇ TC	50/1.3" 50/1"					
1142.5'			Boring Termination Depth = 24.5 feet Boring Completed and Backfilled on 5/16/18	⬇ TC	50/1" 50/0.4"					

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	1160 ft	STATION	850+00	OFFSET	10' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1160	0		<u>SANDY LEAN CLAY</u> , reddish brown, hard	1160' X SPT	69	10	25	14	11	64.8
			<u>SANDY SILTY CLAY</u> , reddish brown, hard	1158'						
1155	5		<u>SANDSTONE</u> , red and gray to gray, well cemented	1157' SPT TC	50/4" 50/0.5" 50/0.5"	17	20	16	4	69.3
			Boring Termination Depth = 6 feet Boring Completed and Backfilled on 4/11/2024	TC	50/1" 50/1"					
1150										
1145										
1140										
1135										
1130										
1125										
1120										
1115										
1110										

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	1164 ft	STATION	850+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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	0									
			SILTY SAND , brownish red to pale yellow, very loose to loose 1164'	⊗ SPT	3	16	0	0	NP	40.0
1160	5			⊗ SPT	5	11	0	0	NP	27.5
1155	10			⊗ SPT	28	8	0	0	NP	42.2
			SANDSTONE , pale red and yellow, well cemented 1153.5'	⊗ SPT	50/5.5"					
1150			Boring Termination Depth = 12 feet Boring Completed and Backfilled on 4/11/2024	▼ TC	50/1.5" 50/0.5"					
1145										
1140										
1135										
1130										
1125										
1120										
1115										

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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1155	0		<u>SILT with SAND</u> , reddish brown, loose	1155' X SPT	9	17	0	0	NP	70.2
1150	5		<u>SILTY SAND</u> , light gray, medium dense	1152' X SPT	18	10	0	0	NP	21.7
			<u>SANDSTONE</u> , yellowish red, poorly cemented	1151.5' TC	50/6"					
					50/2.3"					
					50/2"					
					50/3.5"					
					50/1.3"					
			Boring Termination Depth = 6 feet							
			Boring Completed and Backfilled on 4/11/2024							
1145										
1140										
1135										
1130										
1125										
1120										
1115										
1110										
1105										

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' RT	
DRILLING CONTRACTOR		DSO - Drilling Services of Oklahoma				
DRILLING METHOD		4.5" augers - CME 750 ATV				
LOGGED BY		DLW	CHECKED BY	JWB		
NOTES		JP# 29657(04)				
		DURING DRILLING				none
		0 hrs AFTER DRILLING				none
		Cave In Depth				none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1155	0		<u>CLAYEY SAND</u> , reddish brown, loose	1155' <input checked="" type="checkbox"/> SPT	4	17	26	14	12	36.4
1150	5		<u>SILTY SAND</u> , yellowish red, medium dense	1152'						
1145	10		<u>SANDSTONE</u> , light gray to red and light gray to pale yellow, poorly cemented to well cemented	1149.5' <input checked="" type="checkbox"/> SPT <input checked="" type="checkbox"/> TC	20 50/6" 50/3" 50/0.8"	7	0	0	NP	16.6
1140	15			<input checked="" type="checkbox"/> TC	50/1" 50/0.5"					
1135	20			<input checked="" type="checkbox"/> TC	50/0.8" 50/0.3"					
1130			Boring Termination Depth = 21 feet Boring Completed and Grouted on 4/11/2024	<input checked="" type="checkbox"/> TC	50/0.5" 50/0.5"					
1125										
1120										
1115										
1110										
1105										

CLIENT SRB

PROJECT NUMBER 18043

DATE STARTED 4/11/24

COMPLETED 4/11/24

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma

DRILLING METHOD 4.5" augers - CME 750 ATV

LOGGED BY DLW

CHECKED BY JWB

NOTES JP# 29657(04)

PROJECT NAME SH 29 Cut - West Phase II

PROJECT LOCATION Stephens County, Oklahoma

GROUND ELEVATION 1146 ft

STATION 854+00

OFFSET 20' LT

GROUND WATER LEVELS:

DURING DRILLING none

0 hrs AFTER DRILLING none

Cave In Depth none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1145	0									
			<u>LEAN CLAY</u> , reddish brown, medium stiff	1146						
			<u>SILTY SAND</u> , pale yellow, medium dense	1145						
			<u>SANDSTONE</u> , pale yellow, cemented	1142.5						
			Boring Termination Depth = 4 feet							
			Boring Completed and Backfilled on 4/11/2024							
1140										
1135										
1130										
1125										
1120										
1115										
1110										
1105										
1100										

CLIENT SRB

PROJECT NUMBER 18043

DATE STARTED 4/11/24 COMPLETED 4/11/24

DRILLING CONTRACTOR DSO - Drilling Services of Oklahoma

DRILLING METHOD 4.5" augers - CME 750 ATV

LOGGED BY DLW CHECKED BY JWB

NOTES JP# 29657(04)

PROJECT NAME SH 29 Cut - West Phase II

PROJECT LOCATION Stephens County, Oklahoma

GROUND ELEVATION 1148 ft STATION 854+00 OFFSET 50' RT

GROUND WATER LEVELS:
DURING DRILLING none
0 hrs AFTER DRILLING none
Cave In Depth none

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1145	5		<u>SILTY SAND</u> , reddish brown, loose 1148'	<input checked="" type="checkbox"/> SPT	4	16	0	0	NP	32.4
			<u>SILT with SAND</u> , light gray, medium dense 1145'							
1140			<u>SANDSTONE</u> , light gray to red, poorly cemented to cemented 1142'	<input checked="" type="checkbox"/> SPT	18	9	0	0	NP	71.7
				<input checked="" type="checkbox"/> TC	24					
				<input checked="" type="checkbox"/> TC	50/6"					
				<input checked="" type="checkbox"/> TC	50/3.5"					
				<input checked="" type="checkbox"/> TC	50/1"					
				<input checked="" type="checkbox"/> TC	50/1.3"					
				<input checked="" type="checkbox"/> TC	50/0.8"					
			Boring Termination Depth = 8 feet Boring Completed and Backfilled on 4/11/2024							
1135										
1130										
1125										
1120										
1115										
1110										
1105										
1100										

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	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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)	
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
	0										
			<u>SILTY SAND</u> , reddish brown to light gray, loose	1119	<div><div></div><div>SPT</div></div>	5	11	0	0	NP	33.7
					<div><div></div><div>SPT</div></div>	34					
1115	5		<u>SANDSTONE</u> , light gray with red, cemented to well cemented	1116.5	<div><div></div><div>TC</div></div>	50/4.5"	6	0	0	NP	17.2
						50/1.8"					
						50/1"					
			Boring Termination Depth = 6 feet Boring Completed and Backfilled on 4/11/2024		<div><div></div><div>TC</div></div>	50/1"					
						50/0.1"					
1110											
1105											
1100											
1095											
1090											
1085											
1080											
1075											
1070											

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:				
DRILLING METHOD	4.5" augers - CME 750 ATV				▽ DURING DRILLING 19 ft / Elev 1097 ft				
LOGGED BY	DLW	CHECKED BY	JWB	▼ 0 hrs AFTER DRILLING 19 ft / Elev 1097 ft					
NOTES	JP# 29657(04)				▼ 24 hrs AFTER DRILLING 12 ft / Elev 1104 ft				
				Cave In Depth none					

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
								LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1115	0		SILTY SAND , reddish brown to light yellowish gray, loose to medium dense	1116	✕ SPT	6	10	0	0	NP	27.2
1110	5		SANDSTONE , red to light yellowish gray, poorly cemented to very well cemented	1112.5	✕ SPT ▼ TC	18 50/5.5" 50/2.8" 50/1.3"	7	0	0	NP	30.5
1105	10				▼ TC	50/1.3" 50/0.8"					
1100	15				▼ TC	50/0.3" 50/0.3"					
1095	20				▼ TC	50/0.5" 50/0.5"					
			Boring Termination Depth = 21 feet Boring Completed on 4/11/2024 and Grouted on 4/12/2024		▼ TC	50/0.5" 50/0.8"					
1090											
1085											
1080											
1075											
1070											

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	1126 ft	STATION	876+00	OFFSET	3' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
1125	0		<u>LEAN CLAY</u> , reddish brown to light grayish yellow, stiff	1126' X SPT	11	14	45	17	28	95.2
1120	5		<u>SANDSTONE</u> , light grayish yellow with dark red and purple, cemented	1121' SPT TC	50/5" 50/1" 50/1"	9	0	0	NP	20.1
1115			Boring Termination Depth = 9 feet Boring Completed and Backfilled on 4/11/2024	TC	50/1.8" 50/1"					
1110										
1105										
1100										
1095										
1090										
1085										
1080										

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	1123 ft	STATION	876+00	OFFSET	45' 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

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	MOISTURE CONTENT (%)	ATTERBERG LIMITS			PASSING #200 SIEVE (%)
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0										
1120			SILTY SAND , yellowish red to pale yellow to red, medium dense to very dense	1123' <input checked="" type="checkbox"/> SPT	13	9	0	0	NP	21.1
5				<input checked="" type="checkbox"/> SPT	40	8	0	0	NP	15.8
1115				<input checked="" type="checkbox"/> SPT	56					
			Boring Termination Depth = 9.5 feet Boring Completed and Backfilled on 4/11/2024							
1110										
1105										
1100										
1095										
1090										
1085										
1080										
1075										

APPENDIX B

SUMMARY OF LABORATORY RESULTS

PAGE 1 OF 3

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

CLIENT SRB **PROJECT NAME** SH 29 Cut - West Phase II
PROJECT NUMBER 18043 **PROJECT LOCATION** Stephens County, Oklahoma

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
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
CW-20	0.0	13.1	NV	NP	NP	100	100	100	100	100	96	26.9
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
CW-21	5.0	8.1	NV	NP	NP	100	100	100	100	100	95	22.1
CW-22	0.0	10.0	NV	NP	NP	100	100	100	100	99	96	26.4
CW-22	5.0	10.3	NV	NP	NP	100	100	100	99	97	92	35.9
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	100	100	100	100	99	95	9.7
CW-23	5.0	7.8	27	8	19	100	100	100	100	100	99	51.0
CW-23	10.0	8.9	28	12	16	100	100	100	95	94	92	51.1
CW-25	1.0	16.0	24	16	8	100	100	100	100	100	97	38.0

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

SUMMARY OF LABORATORY RESULTS

CLIENT SRB

PROJECT NAME SH 29 Cut - West Phase II

PROJECT NUMBER 18043

PROJECT LOCATION Stephens County, Oklahoma

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	5.0	14.5	24	16	8	100	100	100	97	90	61	29.4
CW-39	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-40	5.0	12.1	20	19	1	100	100	100	99	95	74	21.8
CW-40	7.0	7.8	NV	NP	NP							
CW-41	0.0	10.5	NV	NP	NP	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

SUMMARY OF LABORATORY RESULTS

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

CLIENT SRB PROJECT NAME SH 29 Cut - West Phase II
PROJECT NUMBER 18043 PROJECT LOCATION Stephens County, Oklahoma

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-42	0.0	19.2	29	15	14	100	100	100	100	100	99	43.5
CW-42	5.0	7.6	NV	NP	NP	100	100	100	100	100	97	31.7
CW-43	0.0	17.4	23	16	7	100	100	100	100	100	100	40.5
CW-43	5.0	3.2	NV	NP	NP	100	100	100	100	100	95	20.0
CW-43	8.0	3.5	NV	NP	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	31	14	17	100	100	100	99	99	97	43.7
CW-44	4.0	3.1	NV	NP	NP	100	100	100	100	100	98	16.6
CW-47	0.0	9.9	25	14	11	100	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
CW-48	5.0	11.0	NV	NP	NP	100	100	100	100	100	82	27.5
CW-48	10.0	7.8	NV	NP	NP	100	100	100	99	98	81	42.2
CW-49	0.0	16.8	NV	NP	NP	100	100	100	100	99	98	70.2
CW-49	3.0	10.3	NV	NP	NP	100	100	100	100	100	93	21.7
CW-50	0.0	16.5	26	14	12	100	100	100	100	100	96	36.4
CW-50	5.0	6.7	NV	NP	NP	100	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
CW-52	0.0	15.8	NV	NP	NP	100	100	100	100	100	96	32.4
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
CW-54	0.0	9.6	NV	NP	NP	100	100	100	100	100	98	27.2
CW-54	3.0	7.4	NV	NP	NP	100	100	100	98	97	95	30.5
CW-55	0.0	13.5	45	17	28	100	100	100	100	99	98	95.2
CW-55	5.0	9.1	NV	NP	NP	100	100	100	100	100	100	20.1
CW-56	0.0	8.6	NV	NP	NP	100	100	100	100	100	99	21.1
CW-56	5.0	8.0	NV	NP	NP	100	100	100	100	100	98	15.8

APPENDIX C

GENERAL NOTES

SOIL PROPERTY ABBREVIATIONS

N	Uncorrected SPT Penetration, blows per foot
N ₆₀	Corrected SPT Penetration, blows per foot
Q _u	Unconfined Compressive Strength, psf
Mc	Moisture Content, %
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
DCP	Dynamic Cone Penetrometer

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

-- used to classify all soils unless otherwise noted --

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

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

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+

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

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%

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 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%