

SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION

STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4729A	1	52

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- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

ROADWAY  
SUBSURFACE INVESTIGATION

COUNTY POLK  
PROJECT DESCRIPTION REALIGNMENT OF I-26 AND  
US 74 INTERCHANGE NORTH OF NC 108

INVENTORY

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REFERENCE: I-4729A

PROJECT: 34343

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DATE AUGUST 2017

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## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

### SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

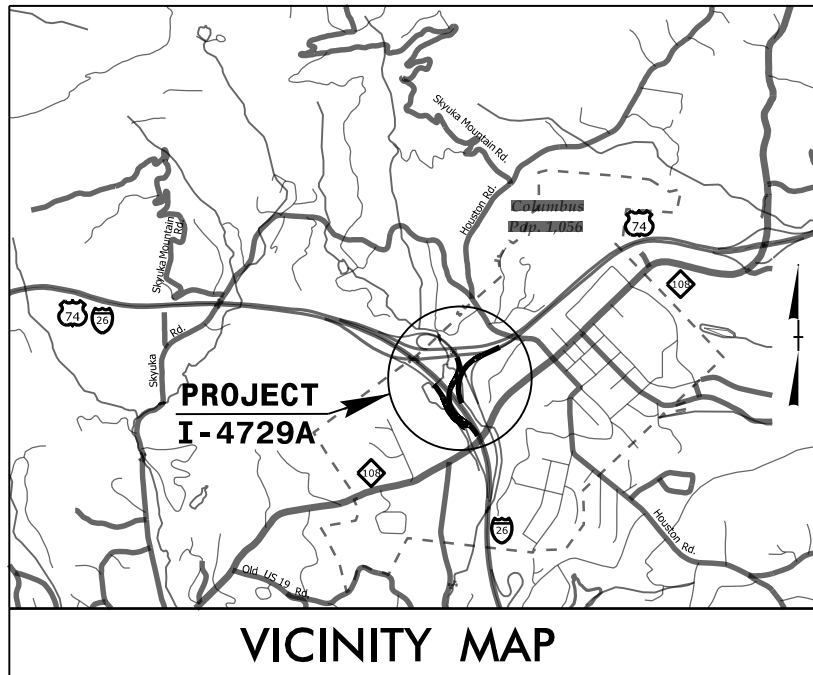
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																															
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <b>SLICKENISE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																															
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 wdfields AT W8E-70013825

**TIP PROJECT: I-4729A**

**CONTRACT: 34343**



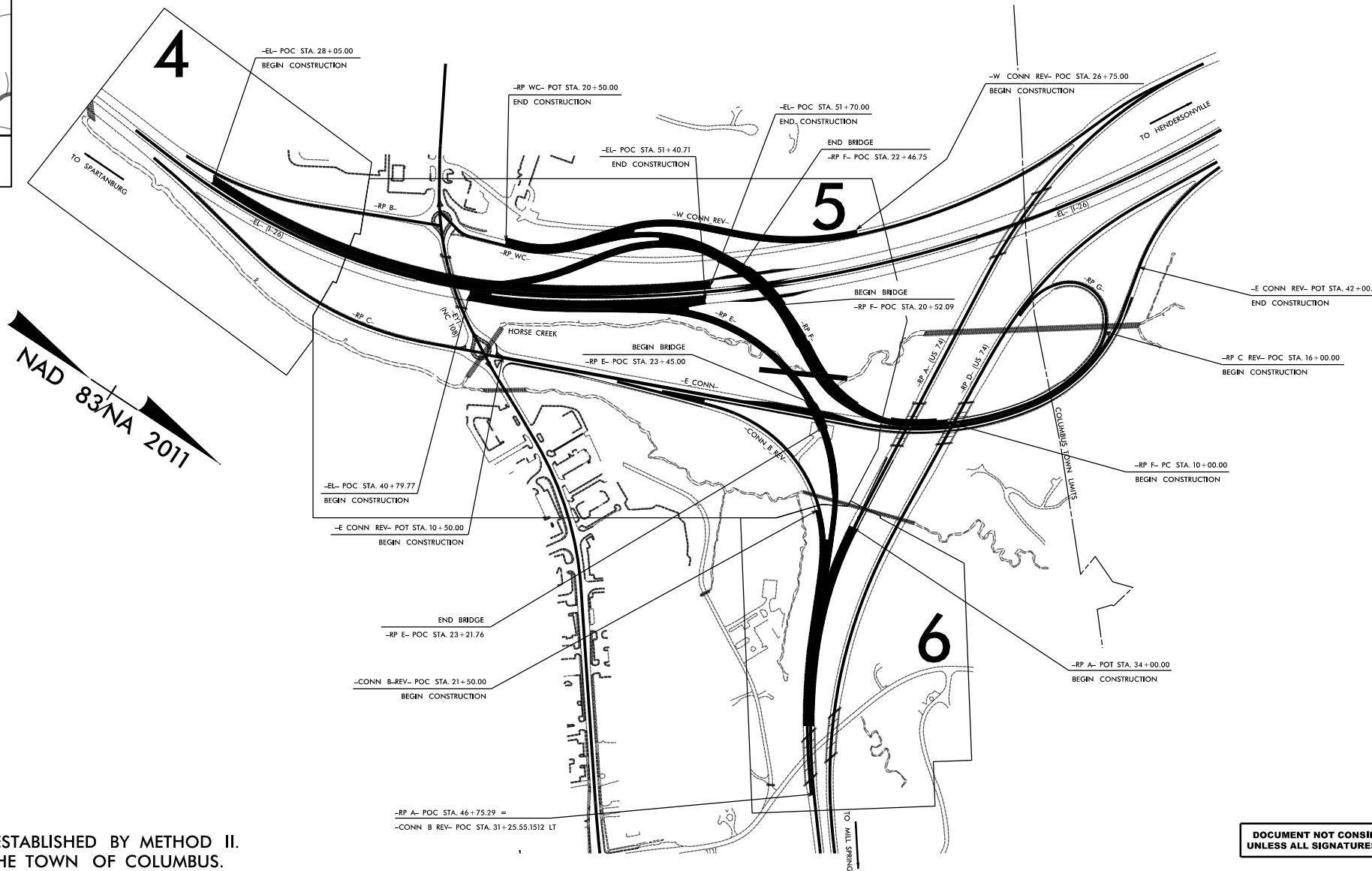
STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

**POLK COUNTY**

**LOCATION: I-26 / US 74 INTERCHANGE MODIFICATION IN THE TOWN OF COLUMBUS**

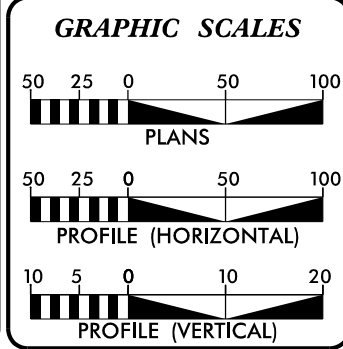
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4729A	3	52
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34343.1.4		PE	



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II. THIS PROJECT IS LOCATED WITHIN THE MUNICIPAL BOUNDRIES OF THE TOWN OF COLUMBUS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

ADT 2017 =	XXXX
ADT 2037 =	XXXX
K =	XX %
D =	XX %
T =	X % *
V =	70 MPH
* TTST =	X% DUAL=X%
FUNC CLASS =	RURAL
INTERSTATE	

**PROJECT LENGTH**

LENGTH OF ROADWAY TIP PROJECT I-4729A =	XXXX MI.
LENGTH OF STRUCTURE TIP PROJECT I-4729A =	XXXX MI.
TOTAL LENGTH OF TIP PROJECT I-4729A =	XXXX MI.

Prepared for the North Carolina Department of Transportation in the office of:

**PARSONS** SUNGATE DESIGN GROUP, P.A.

2012 STANDARD SPECIFICATIONS

**RIGHT OF WAY DATE:** JULY XX, 2017

**LETTING DATE:** SEPTEMBER XX, 2017

DAVID L. WILVER, PE  
PROJECT ENGINEER

J. MATTHEW PICKENS, PE  
PROJECT DESIGN ENGINEER

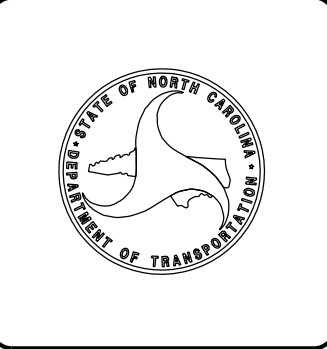
**HYDRAULICS ENGINEER**

**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

SIGNATURE: \_\_\_\_\_ P.E.  
ROADWAY DESIGN ENGINEER

**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

SIGNATURE: \_\_\_\_\_ P.E.





PROJECT REFERENCE NO.	SHEET NO.
I-4729A	3A

Date: August 9, 2017

WBS Number: 34343.1.4  
 TIP Number: I-4729A  
 County: Polk  
 Description: I-26 / US 74 Interchange Modification in the Town of Columbus

**Subject: Roadway Geotechnical Report - Inventory**

### Project Description

The project is located along the existing I-26 corridor between NC 108 and US 74 just west of Columbus, North Carolina in Polk County. The total length of the project is 0.448 miles and consists of new roadway alignments and roadway realignments with free standing walls in cut sections and MSE walls within fill sections along the roadways. A culvert will be constructed along the relocation of Horse Creek and two (2) new bridge structures with MSE wall abutments will be constructed over I-26 and a connector ramp. The project corridor is in a rural setting and much of the surrounding land is undeveloped. The project will require maximum cuts of about 43 feet and maximum fill placement of about 53 feet.

The geotechnical subsurface investigation was performed from March to July of 2017. Standard penetration test (SPT) borings were advanced using a Diedrich D-50 rotary drill rig equipped with a recently calibrated automatic hammer. Borings were advanced utilizing wash boring and hollow stem auger drilling techniques to the necessary depths. In addition to soil test borings coring was performed at the interior bent, in the median of I-26, for the proposed bridge on -RP\_F-. One Shelby tube sample was obtained near the proposed bridge structure on -RPE- for consolidation testing and four Shelby tubes were obtained along the cut slope south of -W\_CONN\_REV- to determine in-situ shear strength properties. Bulk bag samples were collected of representative soil samples to perform compaction moisture-density curves and California Bearing Ratio (CBR) testing to evaluate subgrade support values to be used in pavement design. Representative soil samples were collected in the field for visual classification and selected samples were submitted for laboratory analysis by Terracon's soil testing laboratory. Laboratory testing was performed in accordance with the AASHTO Soil Classification System.

The following alignments were investigated by soil testing and visual reconnaissance:

<u>Alignment</u>	<u>Stations(±)</u>
-EL-	28+05 to 51+41
-CONN_B_REV-	21+50 to 31+33
-RP_E-	10+00 to 33+60
-RP_F-	10+00 to 36+28
-RP_WC-	10+00 to 20+50
-W_CONN_REV-	26+75 to 40+85

### Physiography and Geology

The site is located within the western Piedmont Physiographic Province just west of Columbus, North Carolina. Topography in the area is rolling to moderately steep. The Piedmont Province is characterized by gently to steeply sloping topography with well-rounded hills and along rolling ridges with a northeast-southwest trend dissected by a moderate to well developed (mature) dendritic-type drainage system consisting of drainage swales, hollows, tributaries, streams and rivers.

The project is in a rural area west of the Town of Columbus and is comprised of wooded undeveloped areas along interstate I-26. A partially cleared and wooded hillside is located to the west and drains to Horse Creek which flows to the southeast. A park and ride is located to the north on the connector ramp to US 74.

Geologically, the site is located within the Piedmont Inner Block. As mapped on the North Carolina Geologic Map 1985, the underlying rock formations at this site consist of metamorphic rocks. Based on the recovered rock samples, previous mapping and our knowledge of the local geology, the parent rock is interpreted to be biotite gneiss. These rocks typically weather in an irregular pattern with deep residual soils overlying saprolite to bedrock. The typical residual profile consists of finer grain clays and silts near the ground surface which gradually transition to coarser and denser material with depth and contain varying amounts of mica.

### Soil Properties

Soils encountered during this investigation are separated into four categories based on their origin. The soils encountered consist of roadway embankment fill, artificial fill, alluvial soils and residual soil and rock materials.

Roadway embankment soils were encountered along the existing roadway shoulders with up to about 20 feet along the east downhill side of I-26. The roadway embankment soils appear to be reworked near-by residual soils. The remaining fill depths extend to about 1 foot to at least 10 feet beneath the ground surface or to termination depths of the borings. The roadway embankment soils consist of moderately to highly plastic soft to very stiff, moist, silty clay (A-7-6, A-7-5), sandy clay (A-6), sandy silt (A-4) and highly micaceous clayey silt (A-5). Layers of loose to medium dense clayey fine to coarse sands (A-2-6) and silty fine to coarse sand and gravel (A-2-4, A-1-b) were also encountered within the roadway embankments.

Artificial fill materials were encountered along the existing roadway shoulders at the north end of -RP\_E- where the alignment connects to -CONN\_B\_REV- and US 74 and northwest of -RPF- just south of -E\_CONN\_REV- and adjacent to the floodplain of Horse Creek. Broken concrete and debris was exposed at the ground surface north and west of the -RP\_F- alignment. These areas are listed in "Areas of Special Geotechnical Interest." The artificial fill soils extend to depths of about 5 feet beneath the ground surface





PROJECT REFERENCE NO.	SHEET NO.
I-4729A	3B

and appear to be underlain by alluvial soils. These soils consist of medium stiff to very stiff, moist, silty clay (A-7-6) and highly micaceous clayey silt (A-5).

Alluvial soils are present adjacent to Horse Creek between I-26 and -E\_CONN\_REV- and along the existing roadway shoulders at the north end of -RP\_E- where the alignment connects to -CONN\_B\_REV- as indicated by the alluvial boundary area shown on the plan sheets. Approximately 5 to 8 feet alluvial soils are present below the ground surface adjacent to Horse Creek. Alluvial soils were also encountered beneath artificial soils at the north end of -RPE-. These soils consist primarily of soft to stiff, moist to wet, fine sandy silt (A-4) and sandy to silty clay (A-6, A-7-6) underlain by very loose to medium dense, wet to saturated silty to clayey fine to coarse sand (A-2-4, A-2-6 and A-1-b) with trace amounts of organic material and small quartz gravel.

Residual soils are present at the surface along the south, east and west boundaries of the project and beneath the roadway embankment soils and asphalt pavement sections. Residual soils underlie the embankment fill, artificial fill and alluvial soils in the remaining portions of the project. The residual soils have weathered irregularly ranging in depths from less than a foot to greater than boring termination depths of 50 feet. The residual soils can be generalized as about 5 to 30 feet of moderate to highly plastic, medium stiff to very stiff, dry to moist, silty clay (A-7-6, A-7-5) with a trace of mica to highly micaceous, at the surface, underlain by low to non-plastic silts and sands. These clays exhibit moderate to high plastic indices of 20 to 40 percent. The highly plastic residual soils are indicated on the attached cross section graphics. The low to non-plastic silts and sands consist of soft to stiff, dry to moist, fine sandy to clayey silts (A-4, A-5) and loose to dense silty to clayey fine to coarse sands (A-2-4, A-2-5) with varying amounts of mica.

### **Rock Properties**

Weathered rock was encountered during the roadway investigation. It originates from the underlying crystalline rock (biotite gneiss). Weathered rock is present at depths of one foot to greater than 50 feet beneath the ground surface, on the south side of alignments -W\_CONN\_REV-, -RP\_WC- and -RP\_F-, at elevations of approximately 1032 to 1067 feet.

Crystalline rock was encountered during the roadway investigation and consists of biotite gneiss. Refer to the "Areas of Geotechnical Interest" for areas of rock which may impact grading operations. Crystalline rock is present at depths of 17 feet to greater than 50 feet beneath the ground surface, on the south side of alignments -W\_CONN\_REV-, -RP\_WC- and -RP\_F-, at elevations of approximately 1024 to 1065 feet. No outcrops of crystalline rock were observed during drilling operations.

### **Groundwater**

In general, the corridor drains to Horse Creek and an unnamed jurisdictional stream that both run southeast out of the corridor. Groundwater was encountered during drilling and sampling along southern and eastern portions of the alignments and adjacent to Horse Creek. In these areas groundwater was encountered at depths as shallow as 4 to 21 feet below the existing ground surface, approximately elevations 1018 to 1033 feet. Groundwater was not encountered above boring termination depths of 50 feet beneath the ground surface along the hillside in the western portion of the site. The depth of groundwater, beneath the ground

surface, will fluctuate with seasonal precipitation and may occur at higher levels at other times of the year above less permeable clayey soils.

### **Culvert at -RP F- Station 16+47**

Based on the Culvert Survey and Hydraulic Design Report, a dual 10'X7' RCBC is proposed beneath -RP\_F- along Horse Creek at station 16+74. Borings performed along the culvert encountered about 5 to 8 feet of alluvial soils consisting of soft to stiff, moist to saturated, fine sandy silt (A-4) and very loose silty fine to coarse sand with gravel and rock fragments (A-2-4, A-1-b). The alluvial soils are underlain by residual soils consisting of very loose to very dense silty to clayey fine to coarse sand (A-2-4, A-2-7 and A-2-5) with a trace of mica to highly micaceous. Groundwater was encountered at depths of about 4 to 5 feet beneath the ground surface.

### **Areas of Special Geotechnical Interest**

- 1) Plastic Soils – Moderate to high plasticity soils occur throughout the upland portions of the project and may impact grading at the following locations:

<u>Alignment</u>	<u>Stations(±)</u>
-W_CONN_REV-	28+75 to 36+25
-RP_F-	24+25 to 27+00
-RP_WC-	11+00 to 14+00

A discussion of these plastic soils is located above in the section titled "Soil Properties".

- 2) Soft Wet Alluvial Soils- Soft wet near surface soils which have the potential to cause embankment stability/settlement problems occur through the following sections:

<u>Alignment</u>	<u>Station (±)</u>
-RP_F-	15+50 to 19+75
-RP_E-	15+50 to 21+50
-RP_E-	25+25 to 26+75

A discussion of these soft wet alluvial near surface soils is located above in the section titled "Soil Properties".

- 3) Artificial Fill- Artificial fill was encountered at the following locations.

<u>Alignment</u>	<u>Station (±)</u>
-RP_F-	14+70 to 15+50
-RP_E-	26+75 to 28+00

PROJECT REFERENCE NO.	SHEET NO.
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- 4) Crystalline Rock- Crystalline rock was encountered near the exiting ground surface at the following locations.

<u>Alignment</u>	<u>Station (±)</u>
-W_CONN_REV-	37+00 to 40+00
-RP_F-	28+50 to 31+50

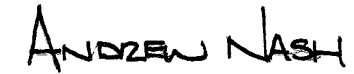
- 5) Groundwater- High water tables, seasonal high ground water, as well as potential perched groundwater were encountered at the following locations.

<u>Alignment</u>	<u>Station (±)</u>
-RP_F-	10+00 to 12+00
-RP_F-	31+00 to 33+00

Sincerely,  
Terracon Consultants, Inc.



Abner F. Riggs, Jr., P.E.  
Senior Geotechnical Engineer



Andrew A. Nash, P.E.  
Geotechnical Department Manager

#### BULK SAMPLES

The following bulk samples were taken for tests to determine the engineering properties of the soil for compaction and pavement subgrade support.

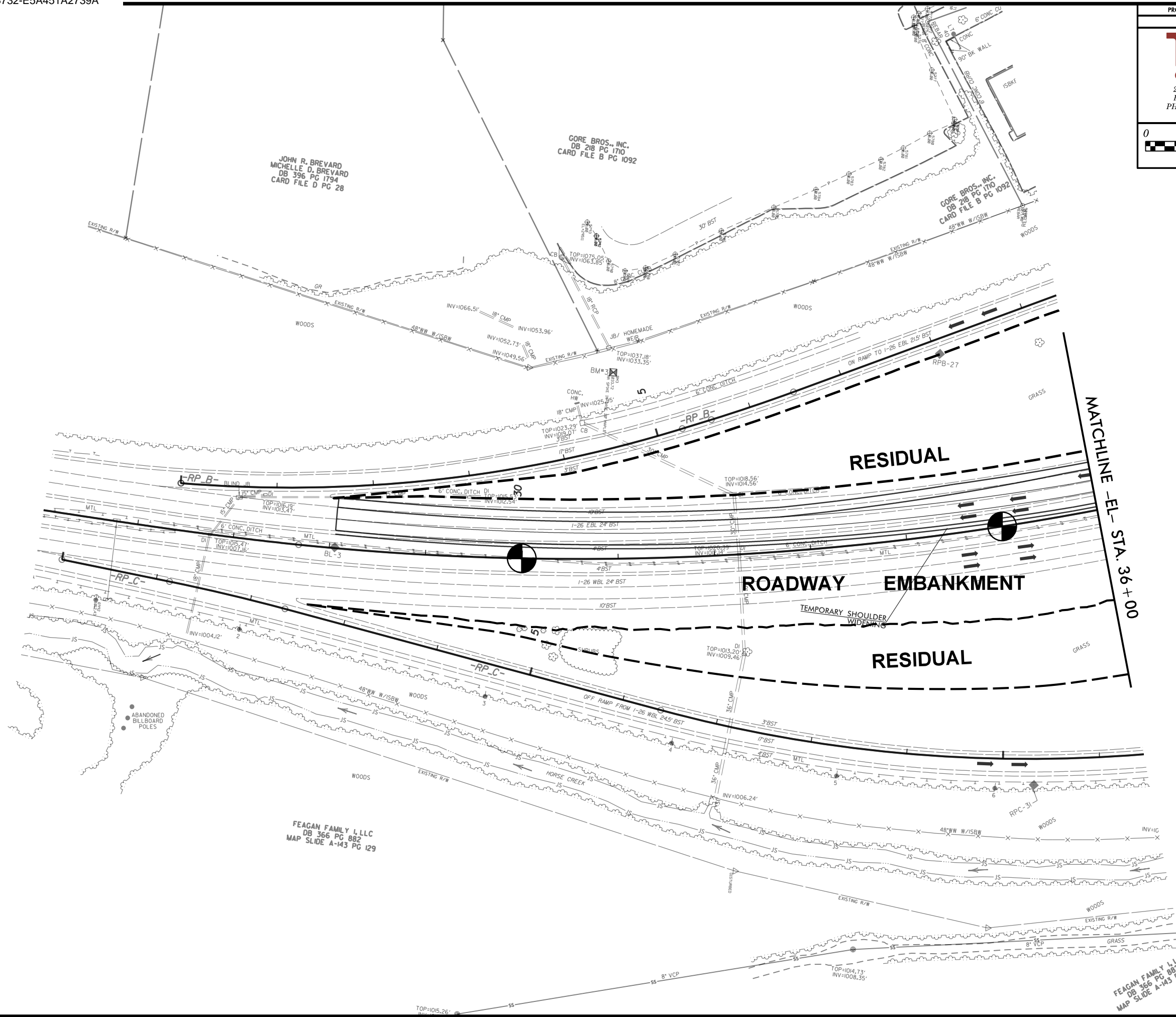
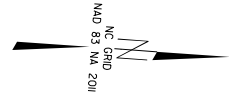
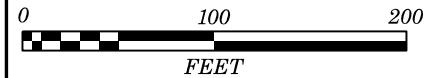
<u>Sample No.</u>	<u>Location</u>	<u>Depth (ft.)</u>	<u>Test</u>
S-1	32+40 -W_CONN_REV- 30' RT	1.0-5.0	Proctor and CBR
S-2	14+00 -RP_WC- CL	1.0-13.0	Proctor and CBR

#### UNDISTURBED SAMPLES

The following "Shelby" tube samples were taken to provide data for consolidation and in-situ strength of the soil.

<u>Sample No.</u>	<u>Location</u>	<u>Depth (ft.)</u>	<u>Test</u>
ST-1	22+98 -RP_E- 63' RT	13.5-15.5	Consolidation
ST-2	28+00 -RP_F- 25' RT	13.0-15.0	Triaxial Shear Strength
ST-3	34+00 -W_CONN_REV- 70' RT	10.0-12.0	Triaxial Shear Strength
ST-4	37+00 -W_CONN_REV- 75' RT	23.0-25.0	Triaxial Shear Strength
ST-5	14+00 -RP_WC- CL	23.0-25.0	Triaxial Shear Strength

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MATCHLINE - EL- STA. 36+00

JOHN R. BREVARD  
MICHELLE D. BREVARD  
DB 396 PG 1794  
CARD FILE D PG 28

CORE BROS., INC.  
DB 218 PG 1710  
CARD FILE B PG 1092

CORE BROS., INC.  
DB 218 PG 1710  
CARD FILE B PG 1092

FEAGAN FAMILY I, LLC  
DB 366 PG 882  
MAP SLIDE A-143 PG 129

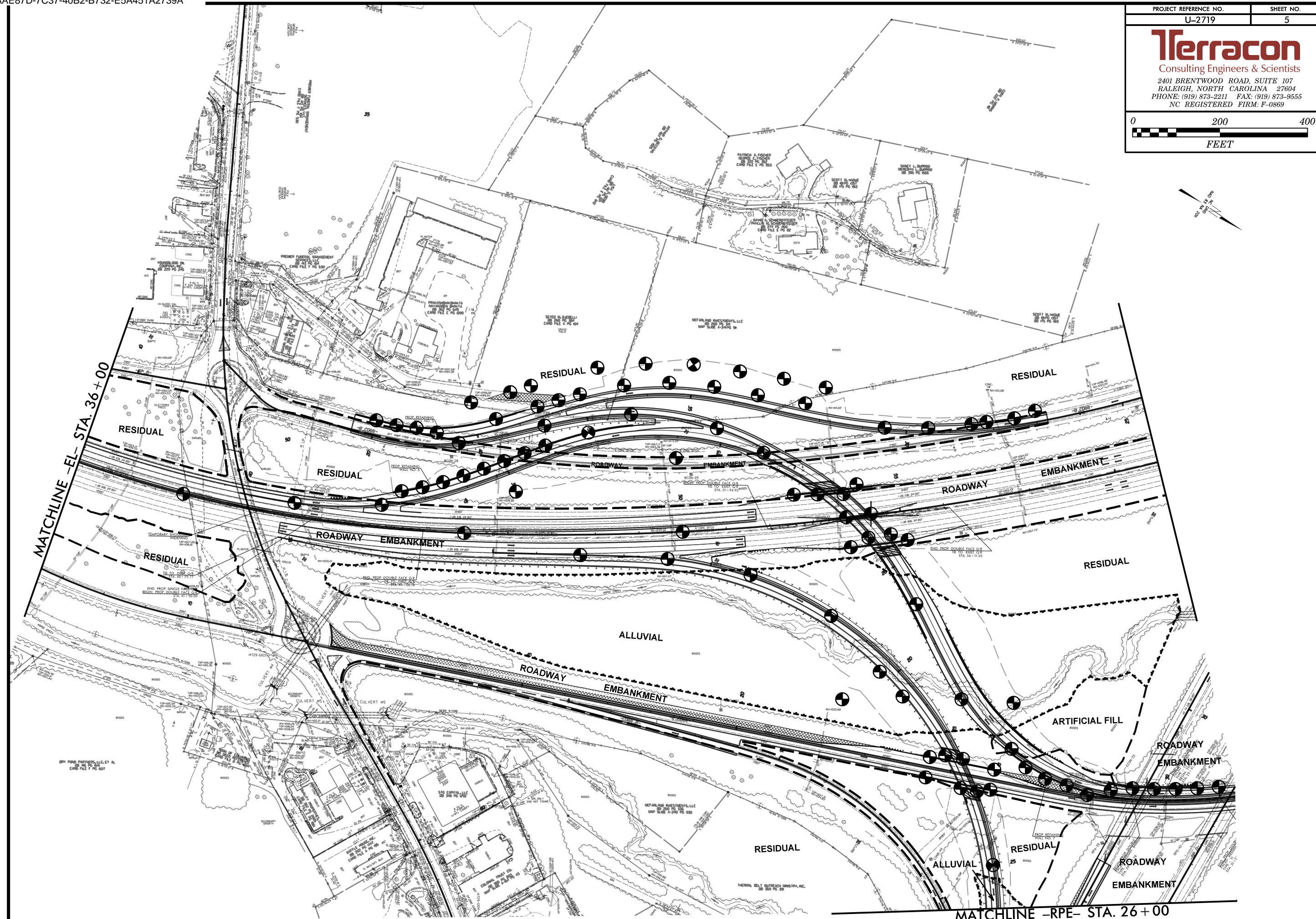
FEAGAN FAMILY I, LLC  
DB 366 PG 882  
MAP SLIDE A-143 PG



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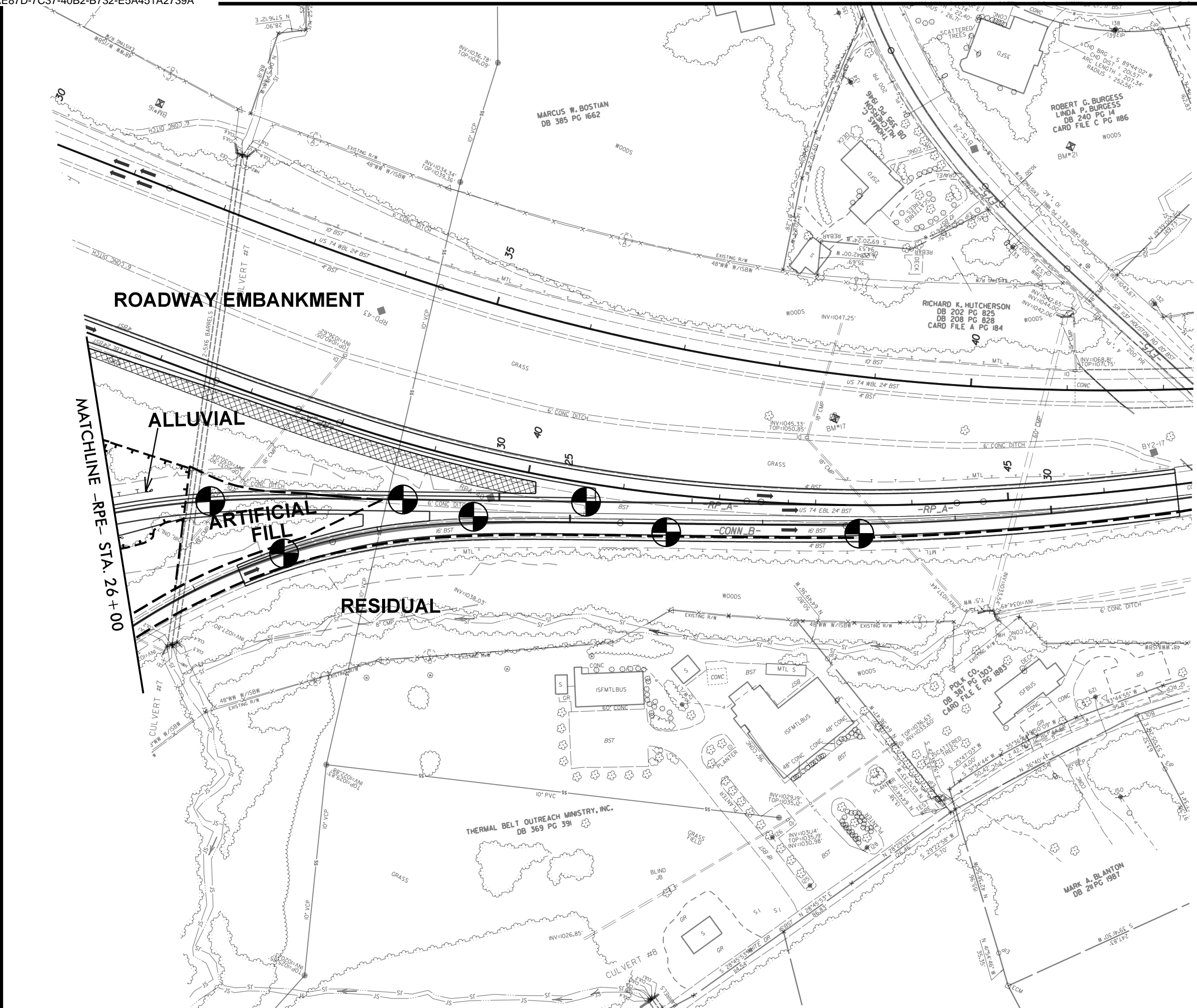
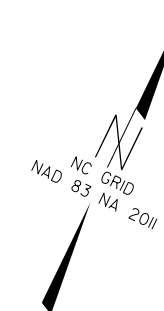
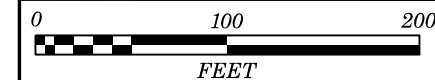
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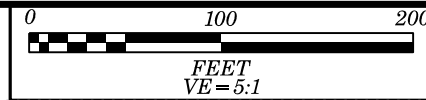
MATCHLINE -EL- STA. 36+00

MATCHLINE -RPE- STA. 26+00



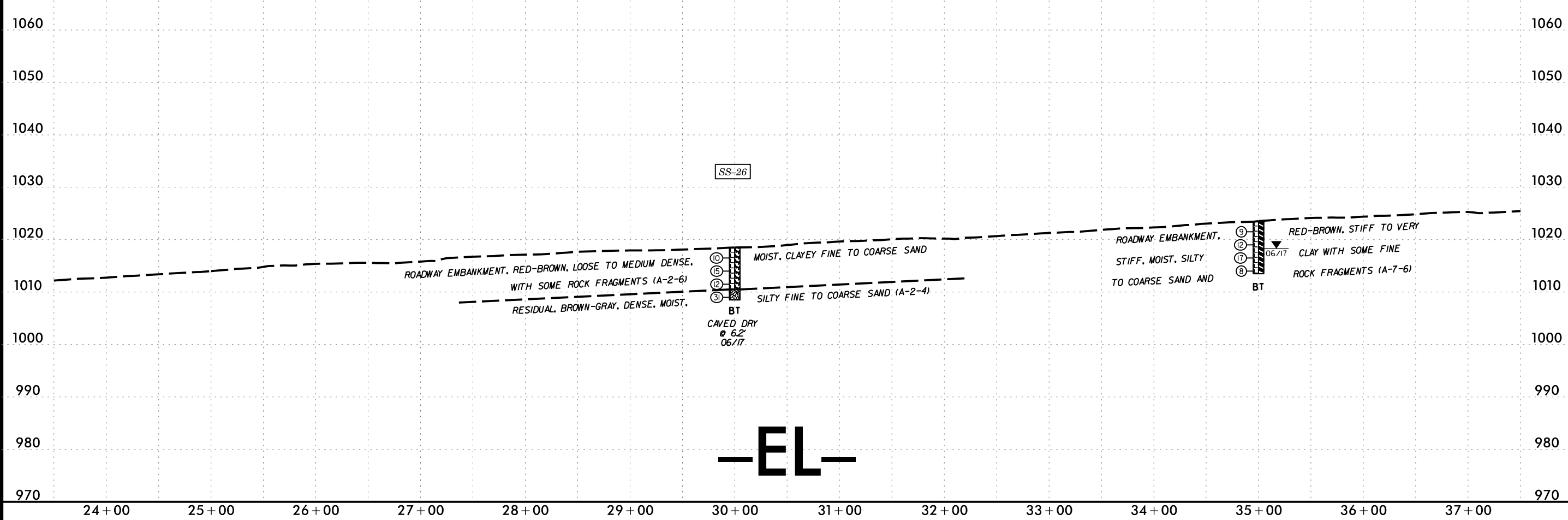
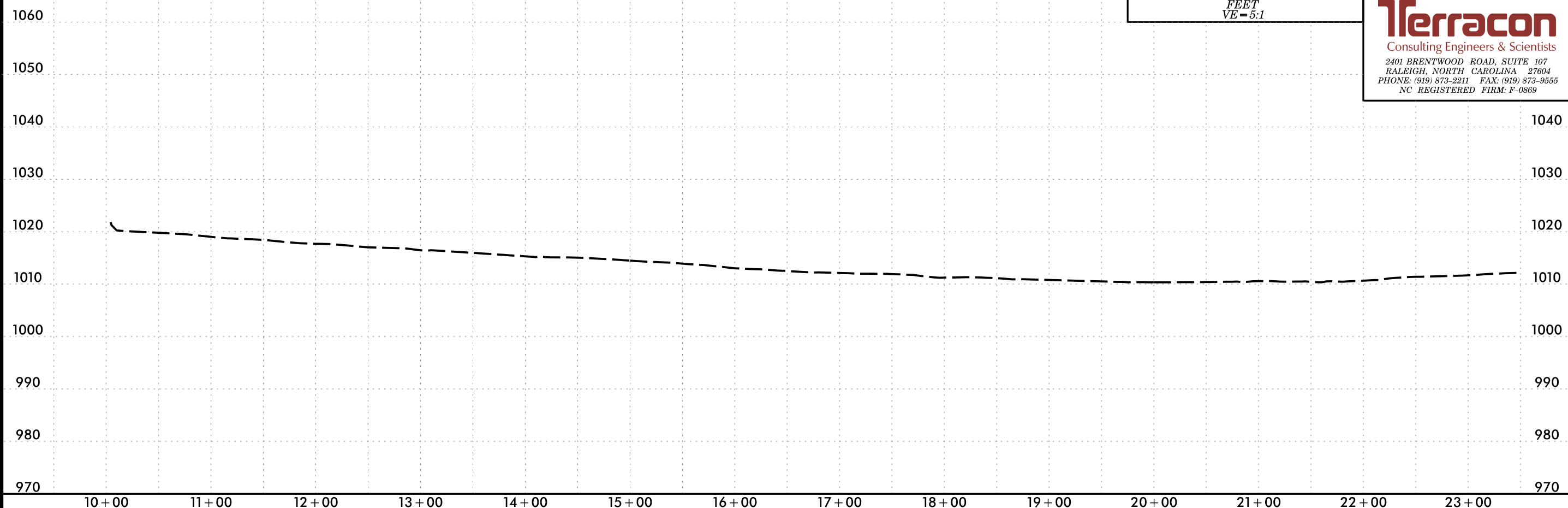




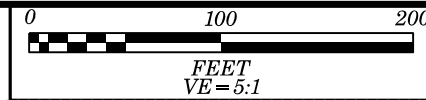


PROJECT REFERENCE NO. I-4729A	SHEET NO. 7
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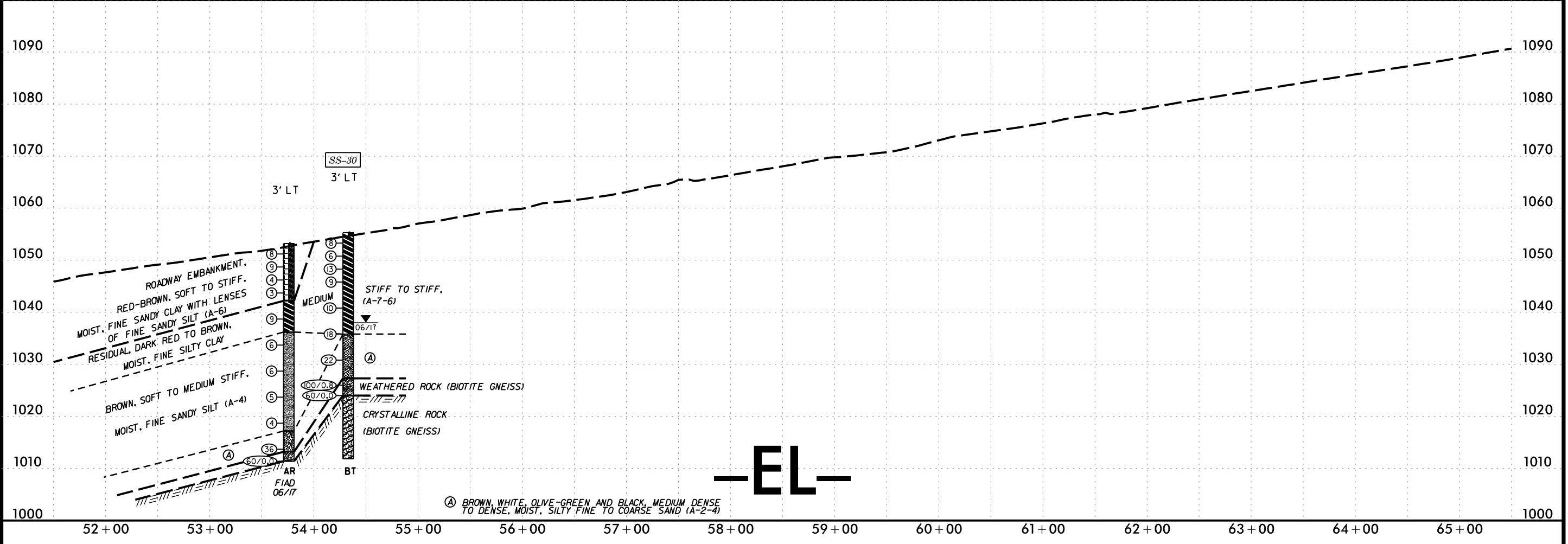
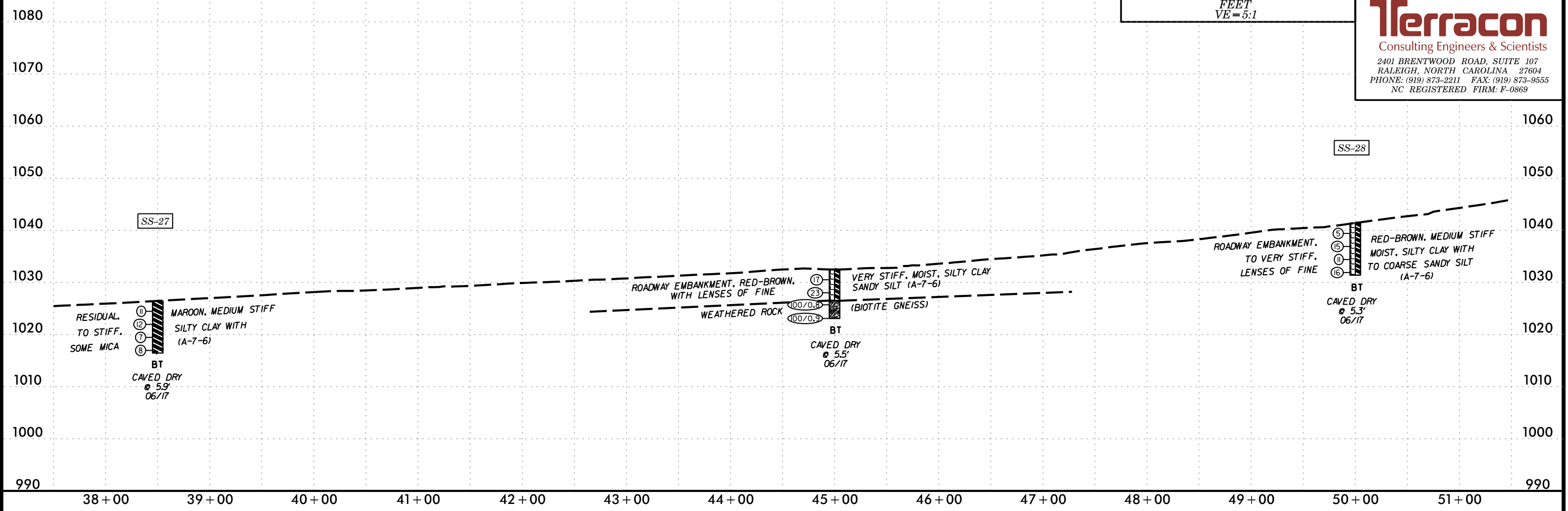


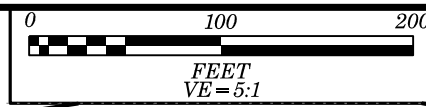
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PROJECT REFERENCE NO.	SHEET NO.
I-4729A	8

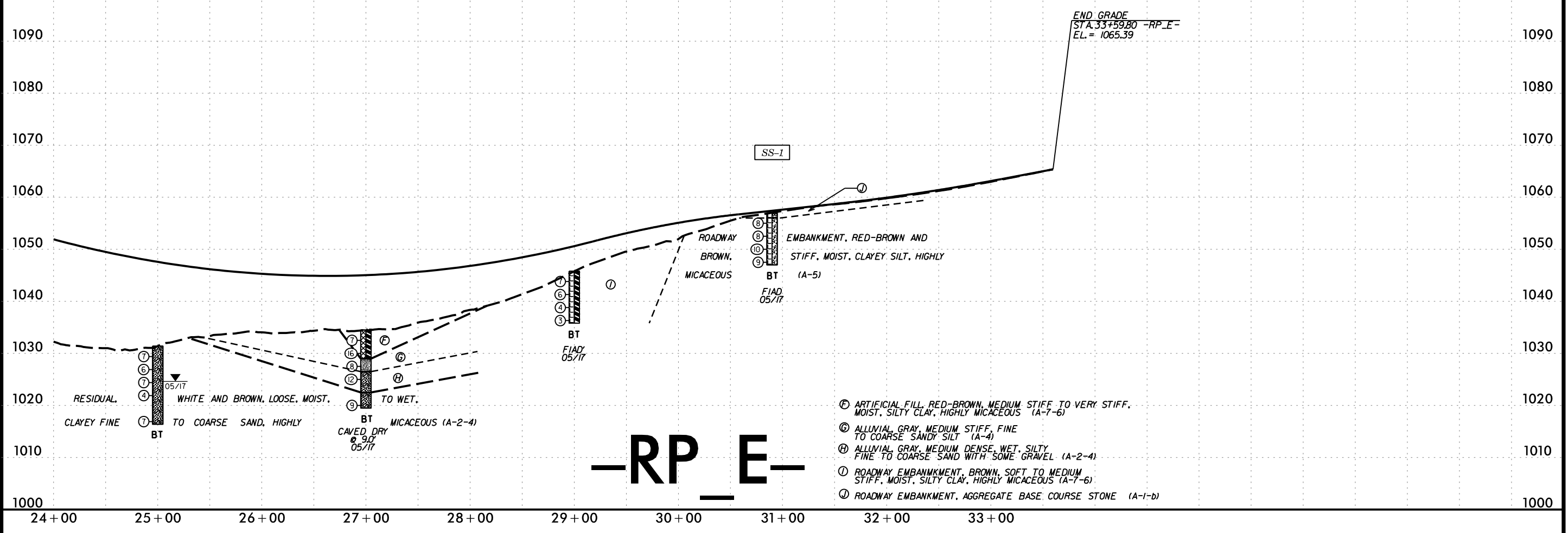
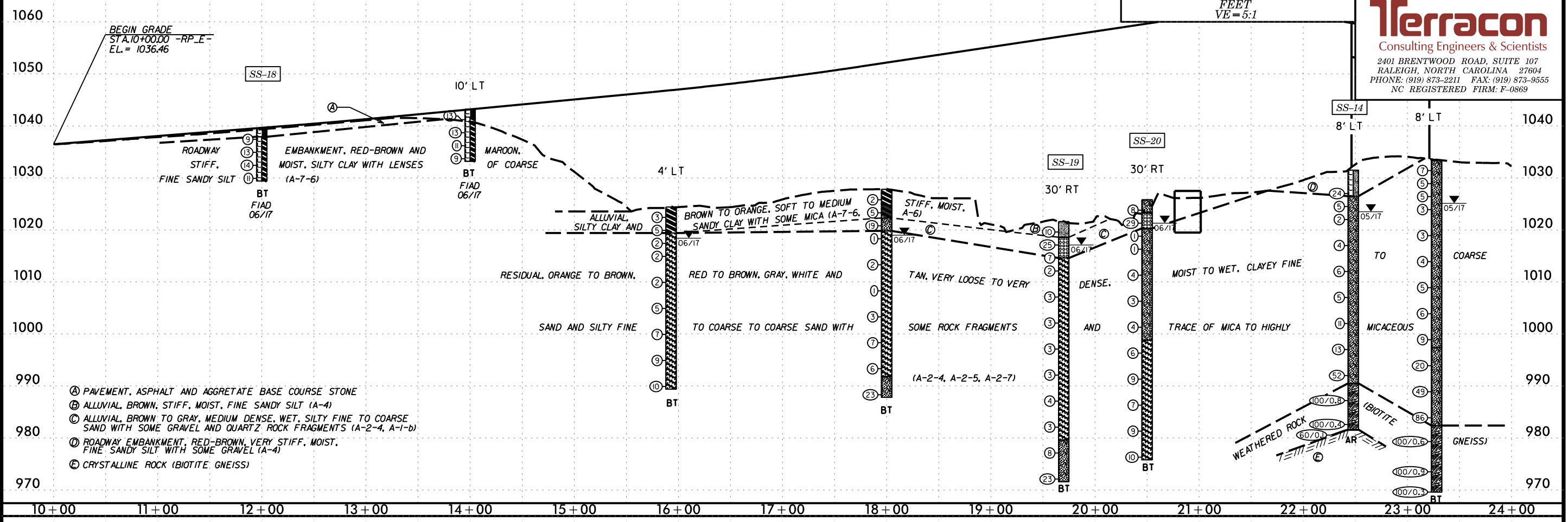
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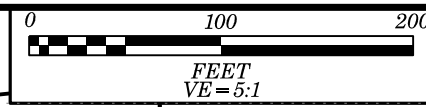


PROJECT REFERENCE NO.	SHEET NO.
L-4729A	9

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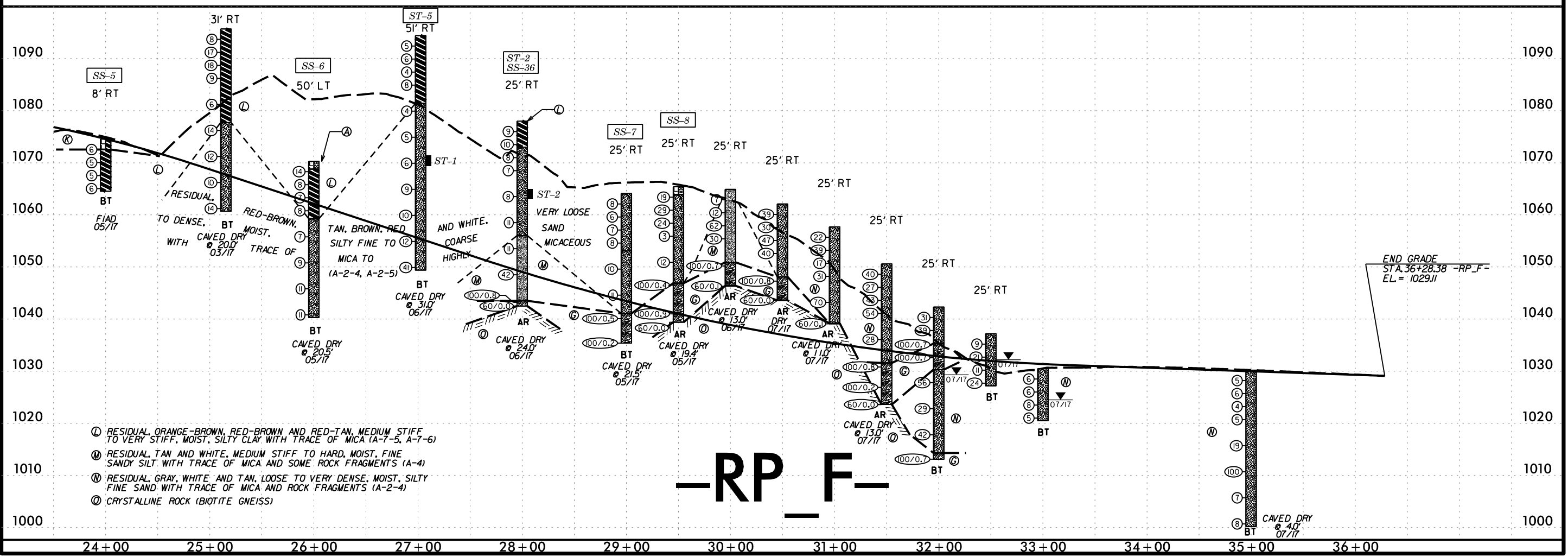
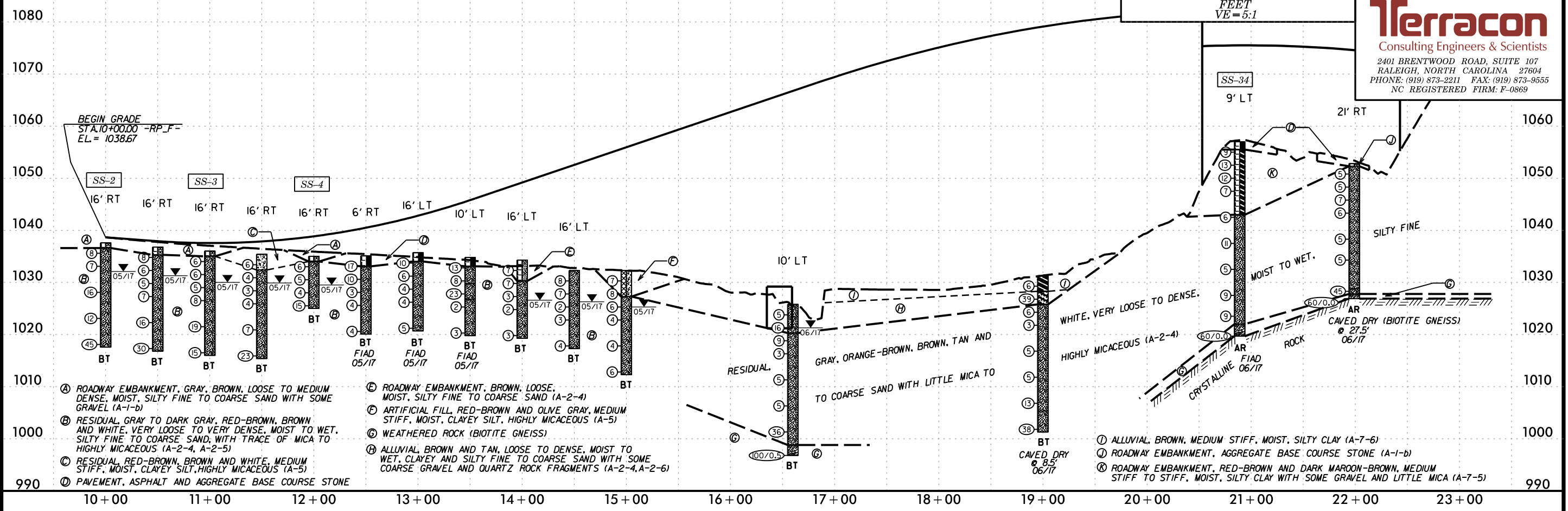


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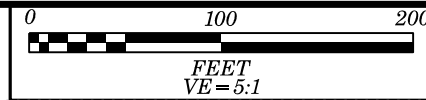


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I-4729A	10

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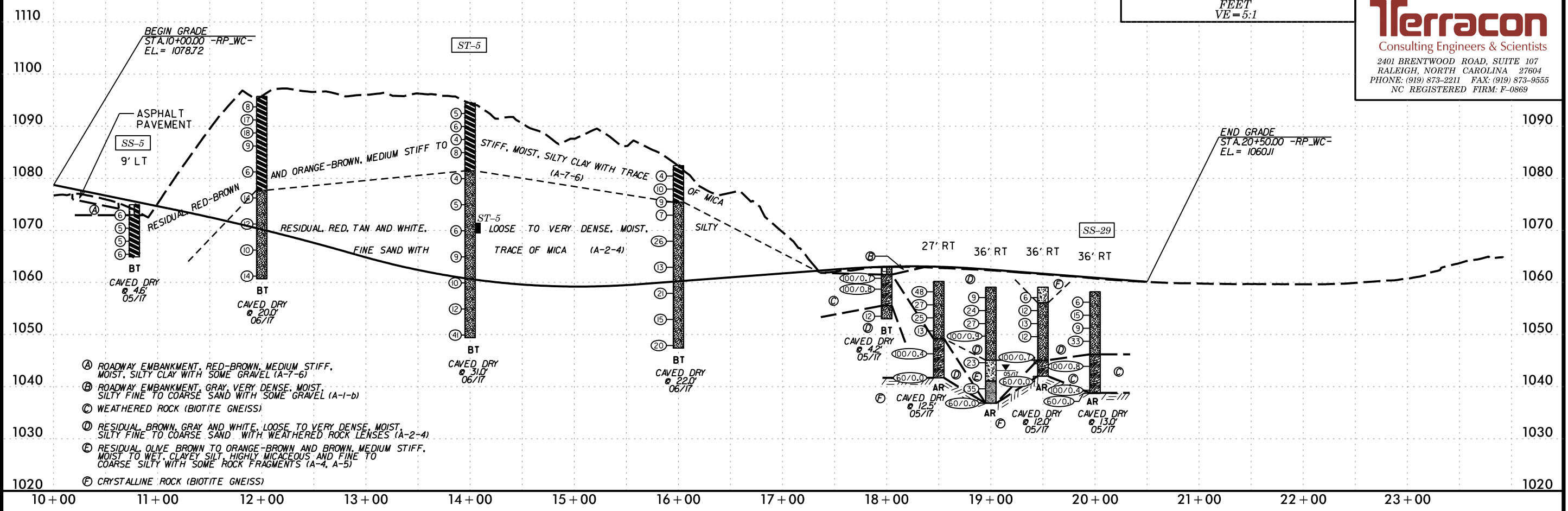


-RP\_F-



PROJECT REFERENCE NO.	SHEET NO.
I-4729A	11

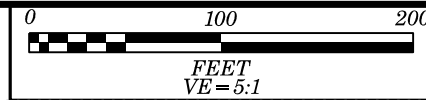
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-RP\_WC-

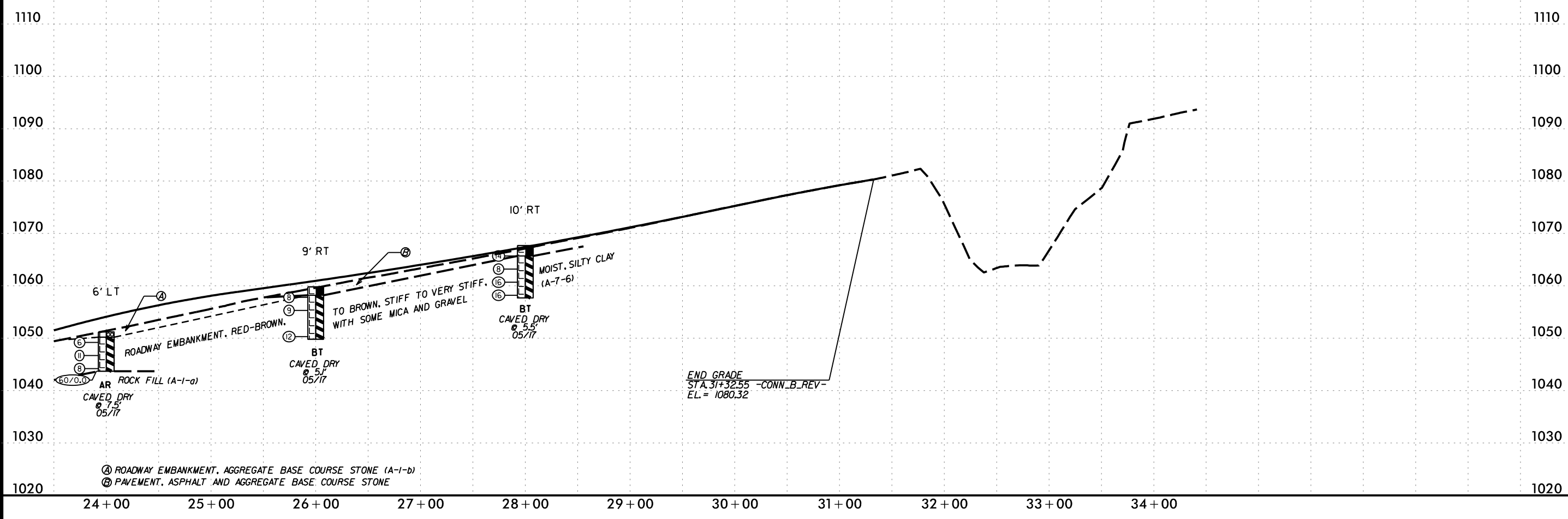
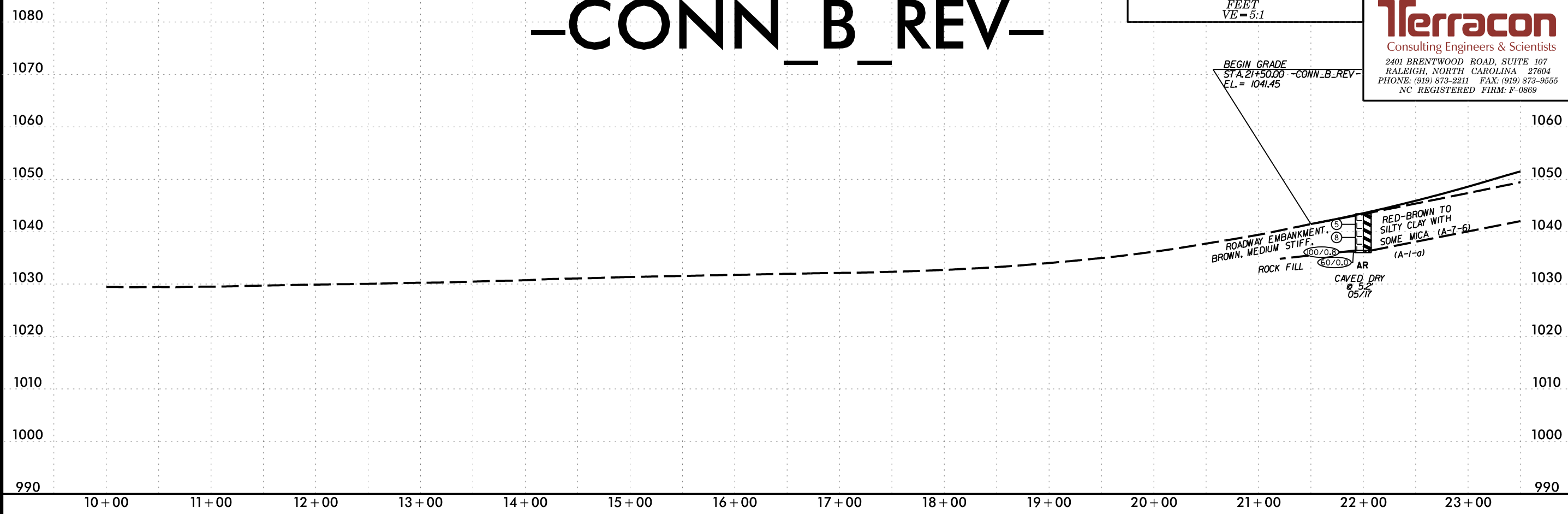


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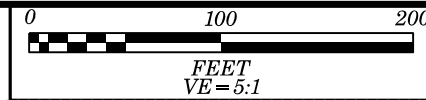


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I-4729A	12

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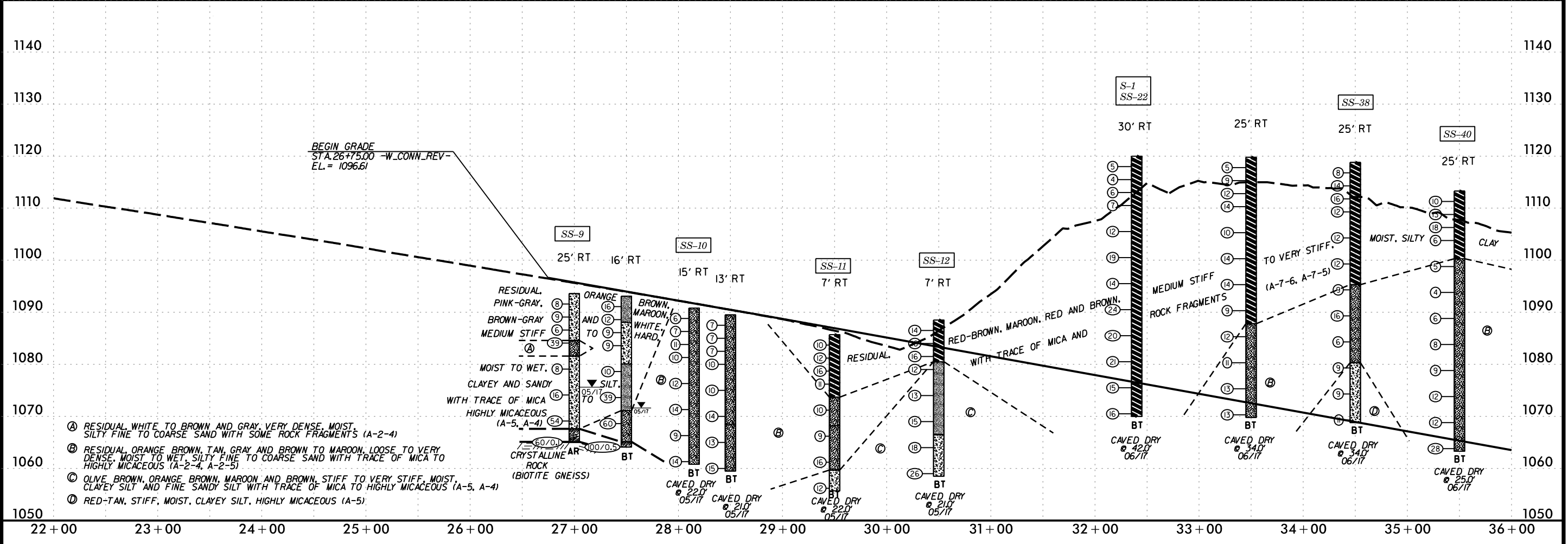
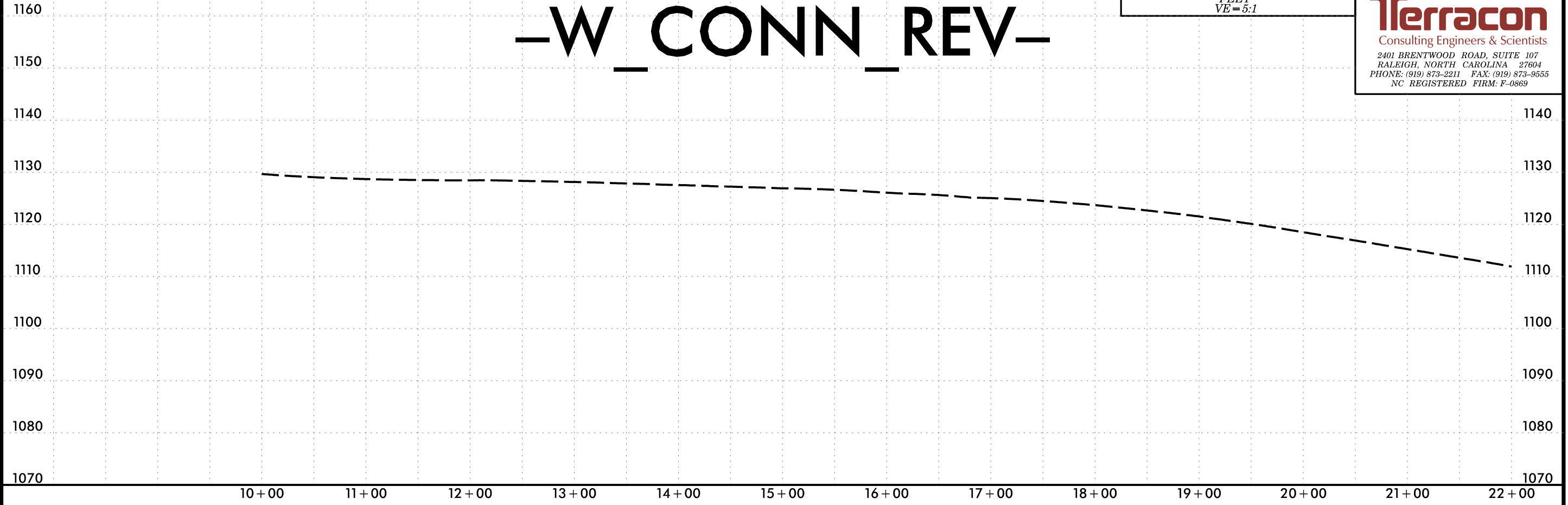
- Ⓐ ROADWAY EMBANKMENT, AGGREGATE BASE COURSE STONE (A-1-b)
- Ⓑ PAVEMENT, ASPHALT AND AGGREGATE BASE COURSE STONE

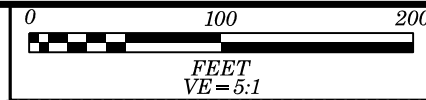


PROJECT REFERENCE NO.	SHEET NO.
I-4729A	13

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# -W\_CONN\_REV-

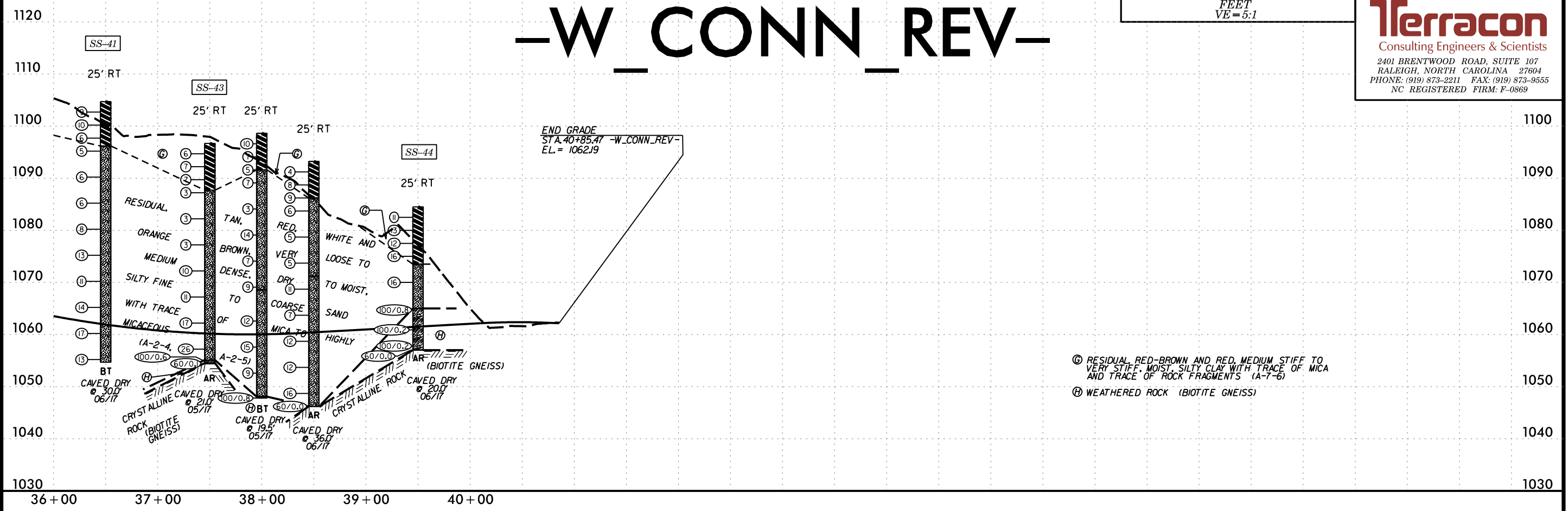


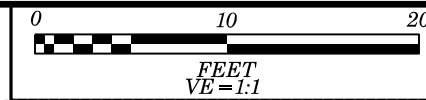


PROJECT REFERENCE NO.	SHEET NO.
I-4729A	14

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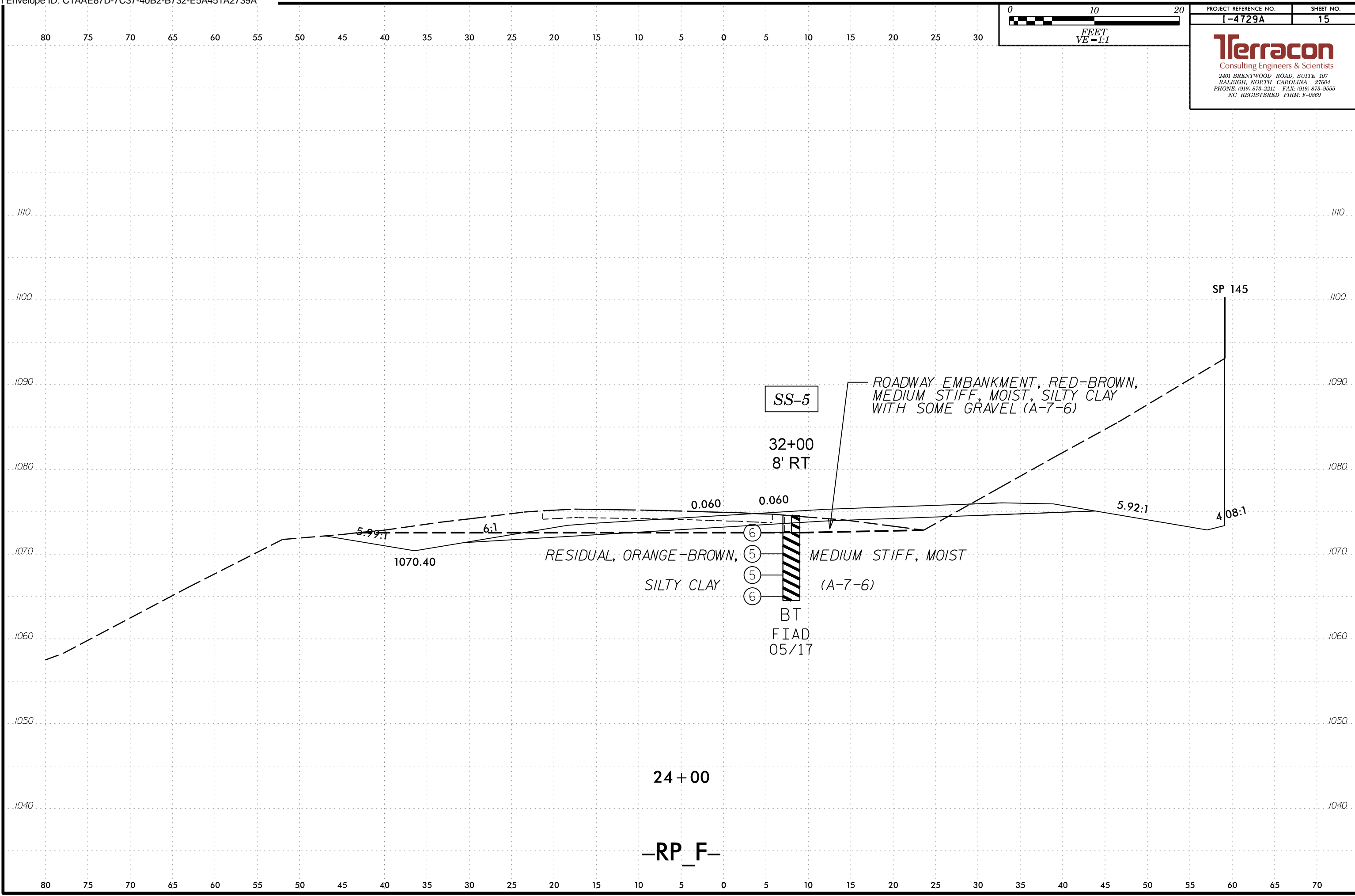
# -W\_CONN\_REV-





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I-4729A	15

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SS-5

32+00  
8' RT

ROADWAY EMBANKMENT, RED-BROWN,  
MEDIUM STIFF, MOIST, SILTY CLAY  
WITH SOME GRAVEL (A-7-6)

0.060

0.060

5.92:1

4.08:1

5.99:1

6:1

1070.40

RESIDUAL, ORANGE-BROWN,  
SILTY CLAY

6

5

5

6

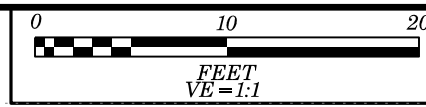
MEDIUM STIFF, MOIST  
(A-7-6)

BT  
FIAD  
05/17

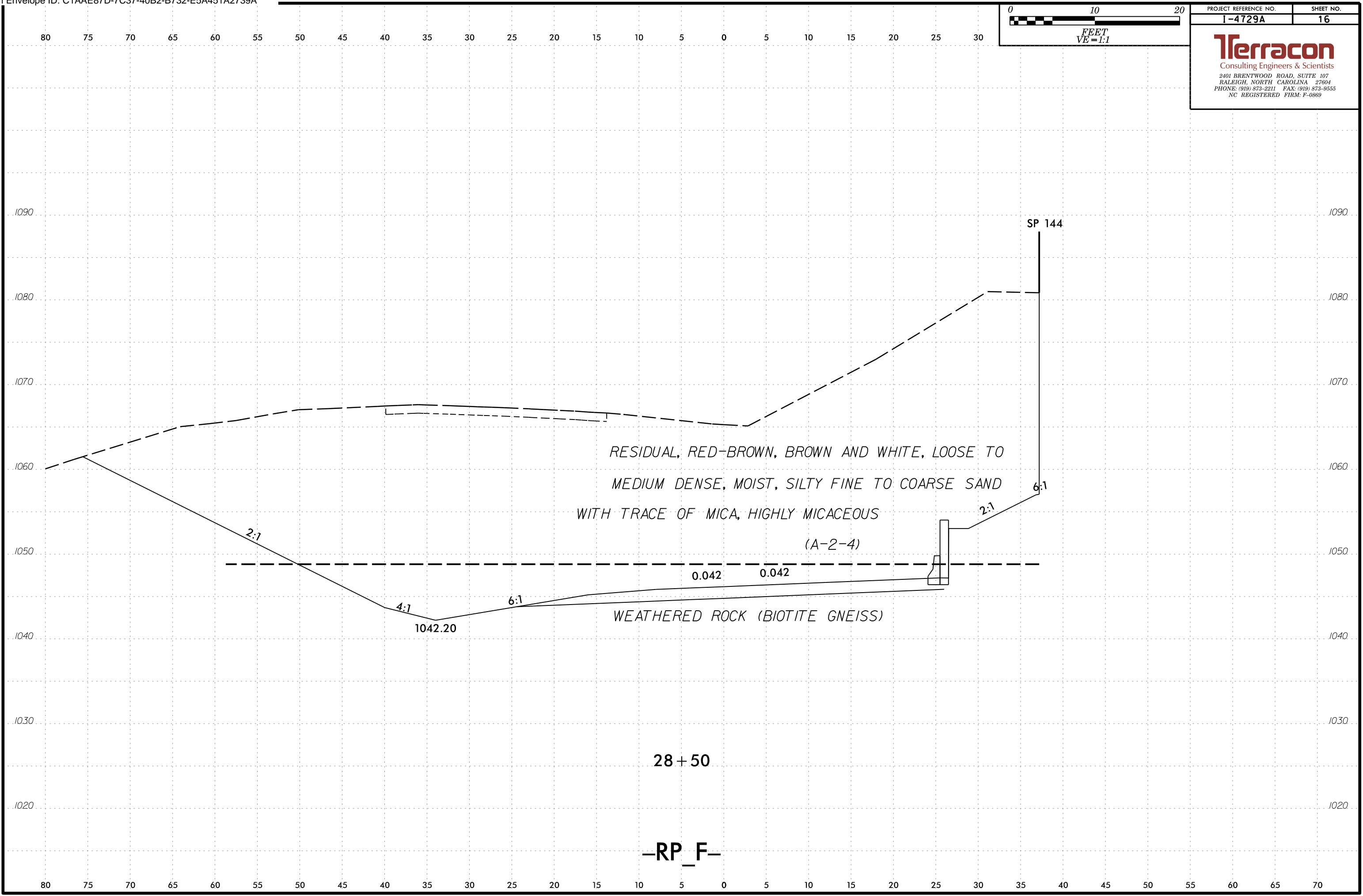
SP 145

24+00

-RP\_F-



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I-4729A	16
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RESIDUAL, RED-BROWN, BROWN AND WHITE, LOOSE TO  
 MEDIUM DENSE, MOIST, SILTY FINE TO COARSE SAND  
 WITH TRACE OF MICA, HIGHLY MICACEOUS

(A-2-4)

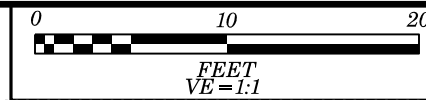
WEATHERED ROCK (BIOTITE GNEISS)

1042.20

28+50

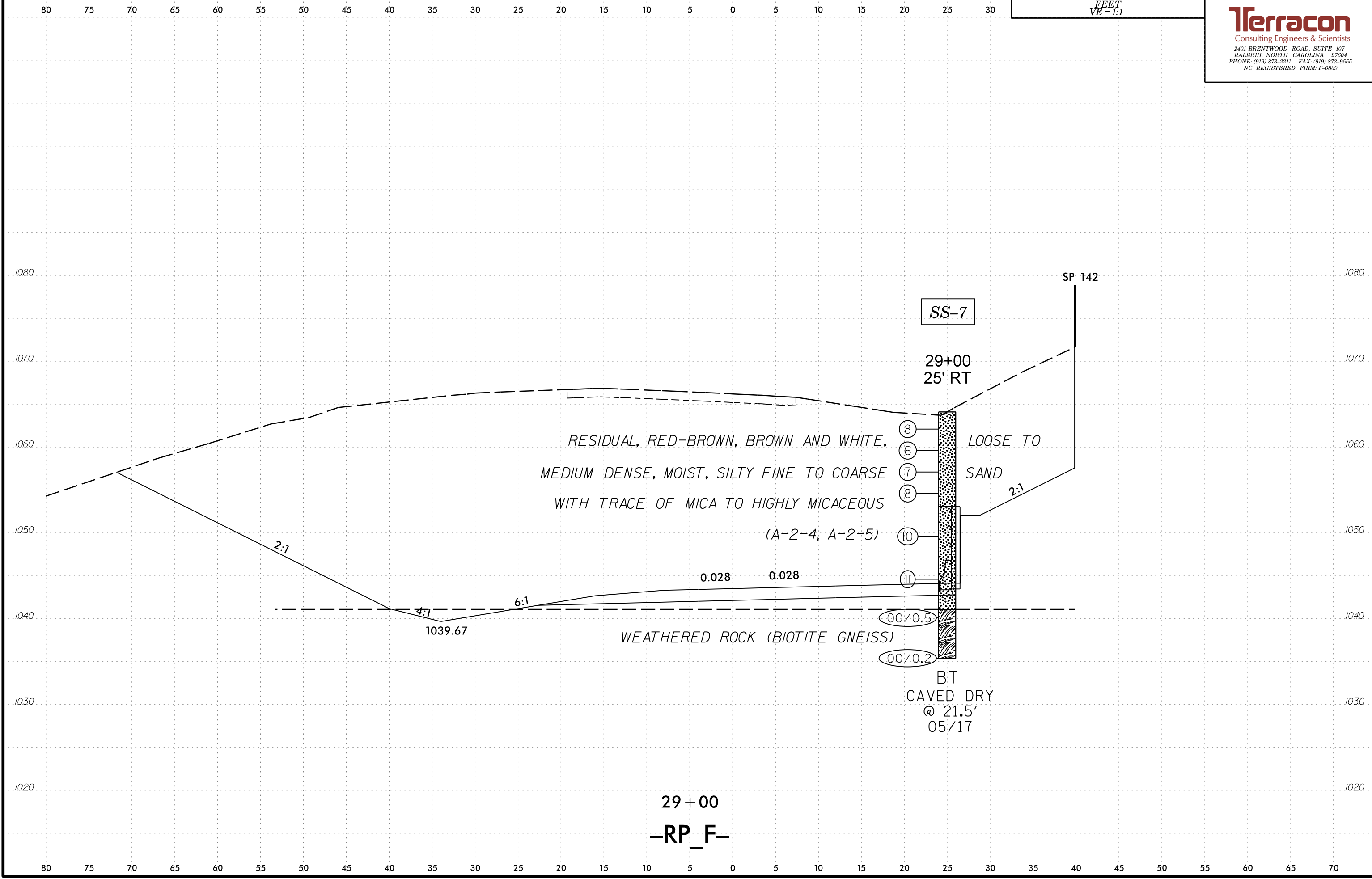
-RP\_F-





PROJECT REFERENCE NO.	SHEET NO.
I-4729A	17

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RESIDUAL, RED-BROWN, BROWN AND WHITE,  
 MEDIUM DENSE, MOIST, SILTY FINE TO COARSE  
 WITH TRACE OF MICA TO HIGHLY MICACEOUS

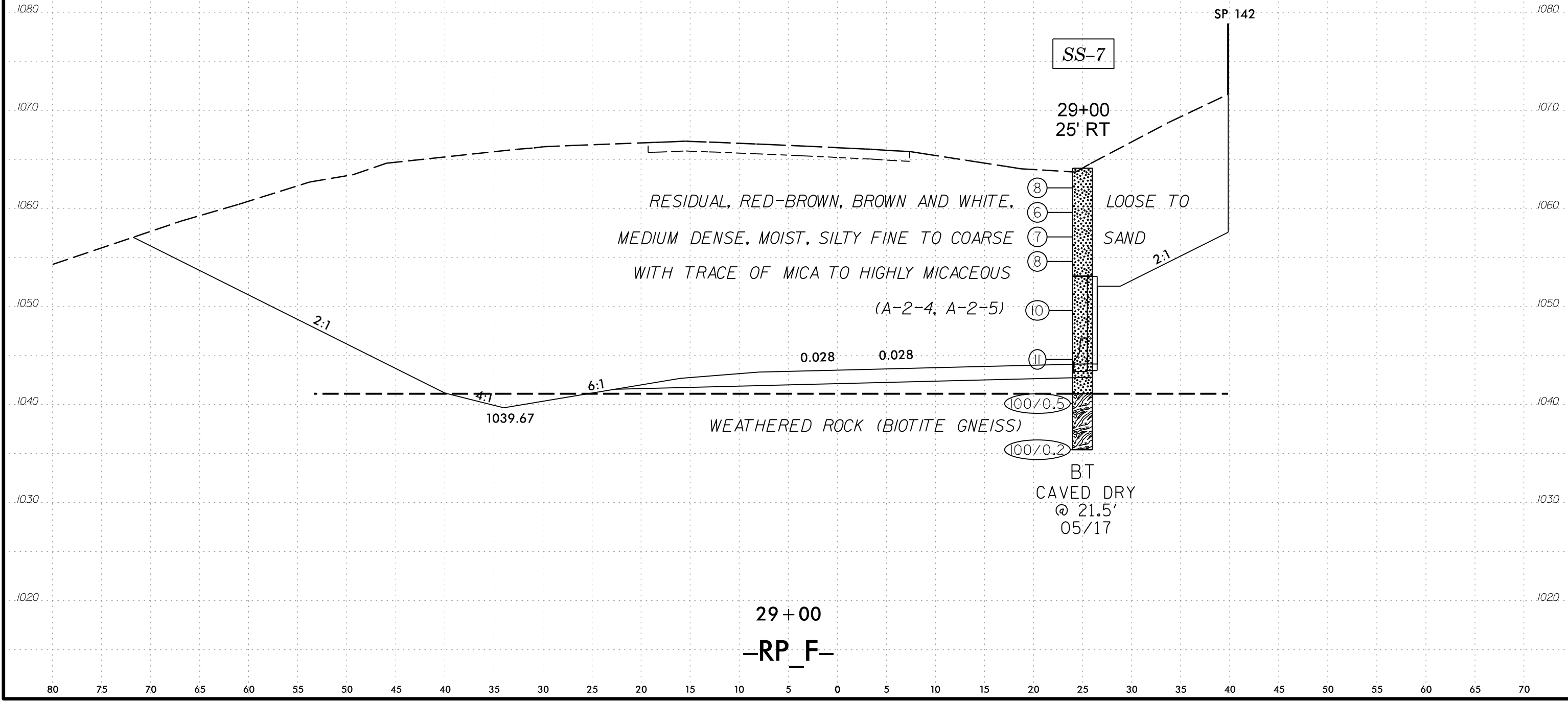
- ⑧
- ⑥
- ⑦
- ⑧
- ⑩
- ⑪

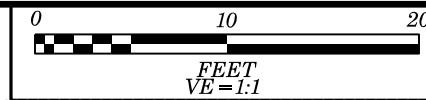
LOOSE TO  
 SAND

WEATHERED ROCK (BIOTITE GNEISS)

BT  
 CAVED DRY  
 @ 21.5'  
 05/17

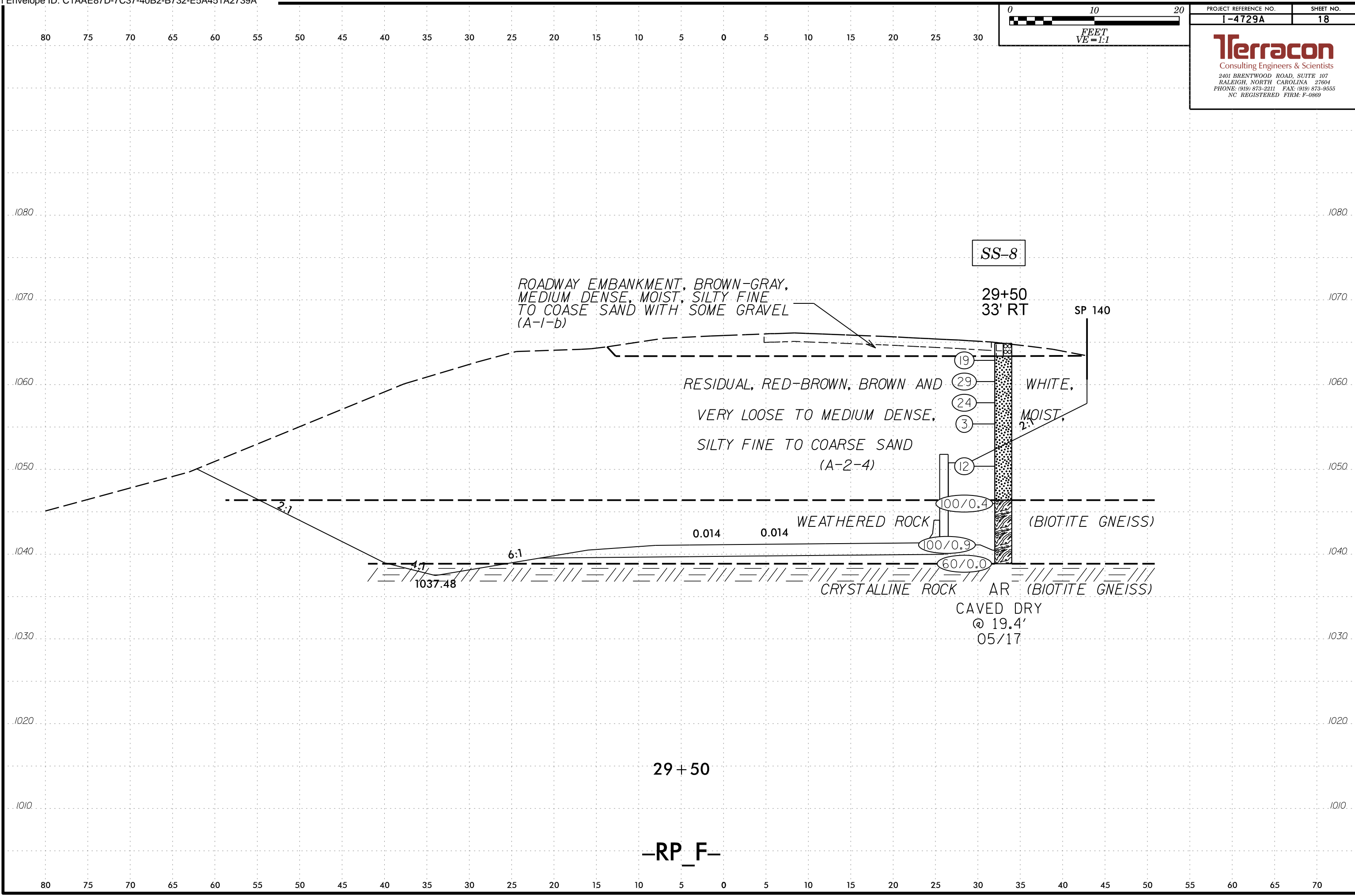
29 + 00  
 -RP\_F-





PROJECT REFERENCE NO. <b>I-4729A</b>	SHEET NO. <b>18</b>
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ROADWAY EMBANKMENT, BROWN-GRAY,  
MEDIUM DENSE, MOIST, SILTY FINE  
TO COARSE SAND WITH SOME GRAVEL  
(A-1-b)

SS-8

29+50  
33' RT

SP 140

RESIDUAL, RED-BROWN, BROWN AND  
VERY LOOSE TO MEDIUM DENSE,  
SILTY FINE TO COARSE SAND  
(A-2-4)

WHITE,  
MOIST,  
2:1

- 19
- 29
- 24
- 3

WEATHERED ROCK

(BIOTITE GNEISS)

0.014 0.014

CRYSTALLINE ROCK

AR (BIOTITE GNEISS)

CAVED DRY  
@ 19.4'  
05/17

- 100/0.4
- 100/0.9
- 60/0.0

2:1

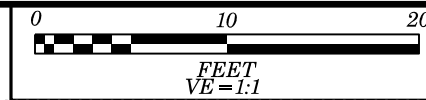
4:1

6:1

1037.48

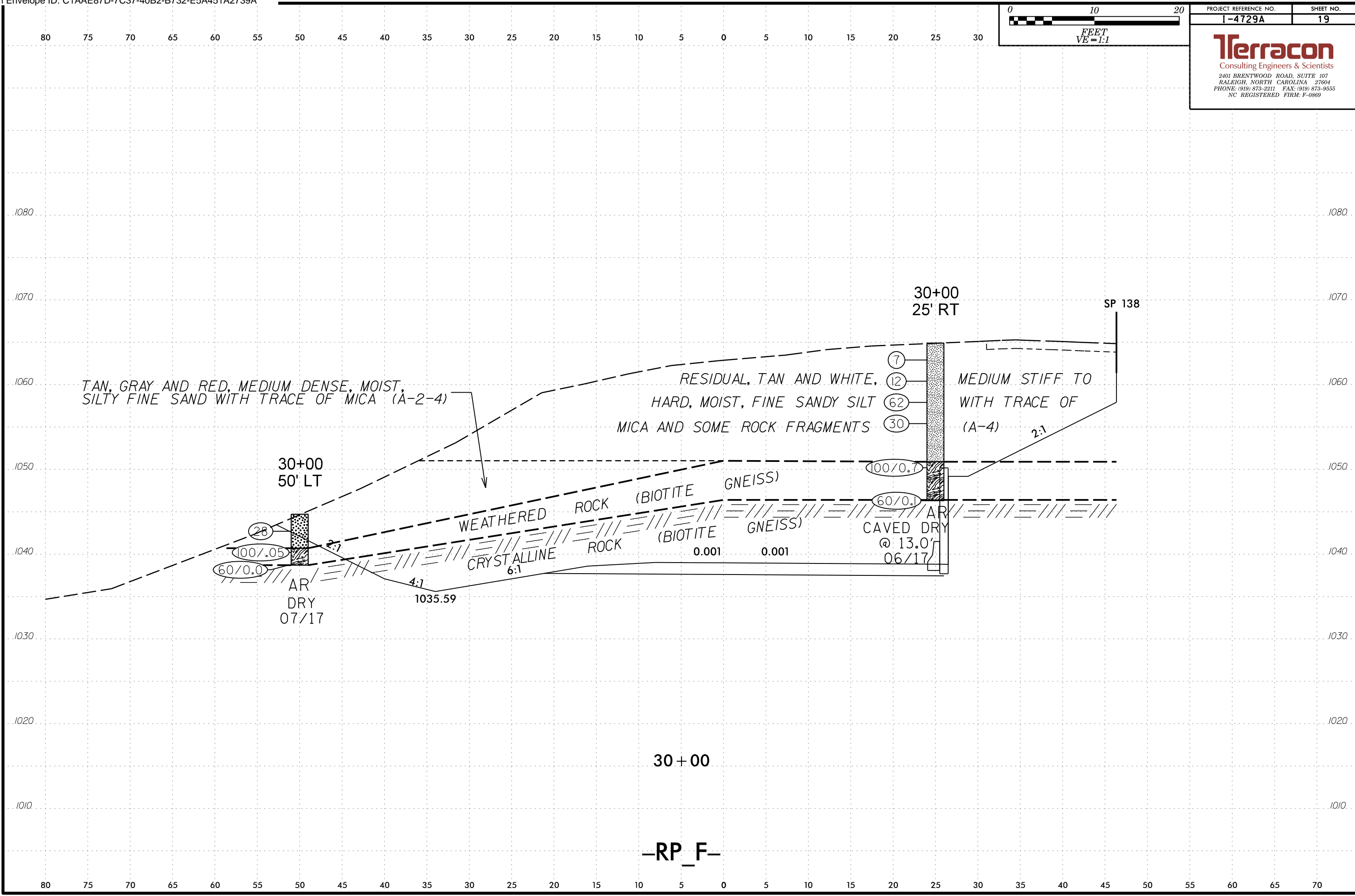
29 + 50

-RP\_F-



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I-4729A	19

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TAN, GRAY AND RED, MEDIUM DENSE, MOIST, SILTY FINE SAND WITH TRACE OF MICA (A-2-4)

RESIDUAL, TAN AND WHITE, HARD, MOIST, FINE SANDY SILT MICA AND SOME ROCK FRAGMENTS

MEDIUM STIFF TO WITH TRACE OF (A-4)

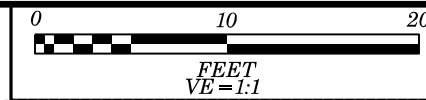
WEATHERED ROCK (BIOTITE GNEISS)  
CRYSTALLINE ROCK (BIOTITE GNEISS)

30+00  
50' LT  
AR  
DRY  
07/17

CAVED DRY @ 13.0' 06/17

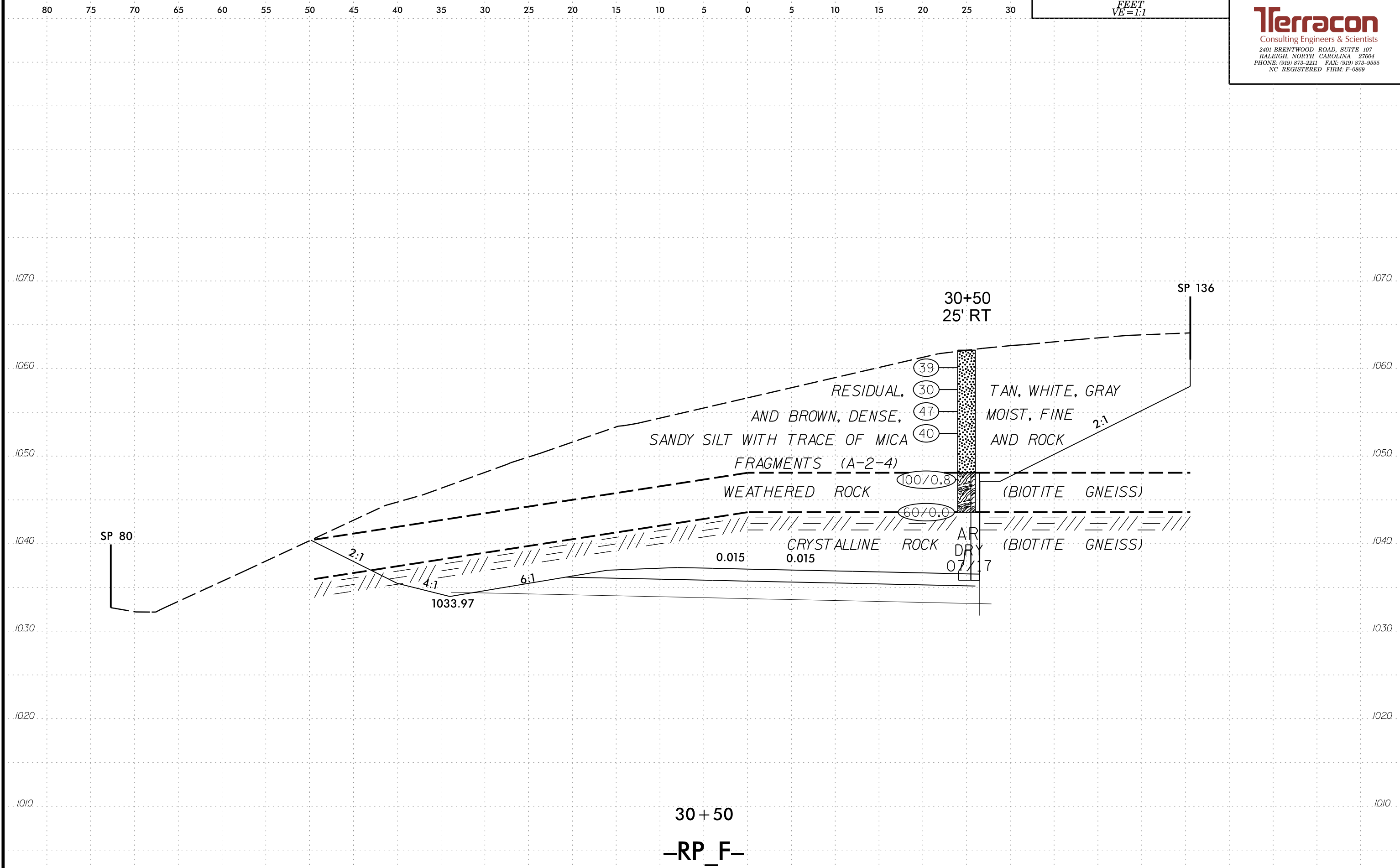
30+00

-RP\_F-

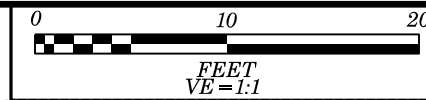


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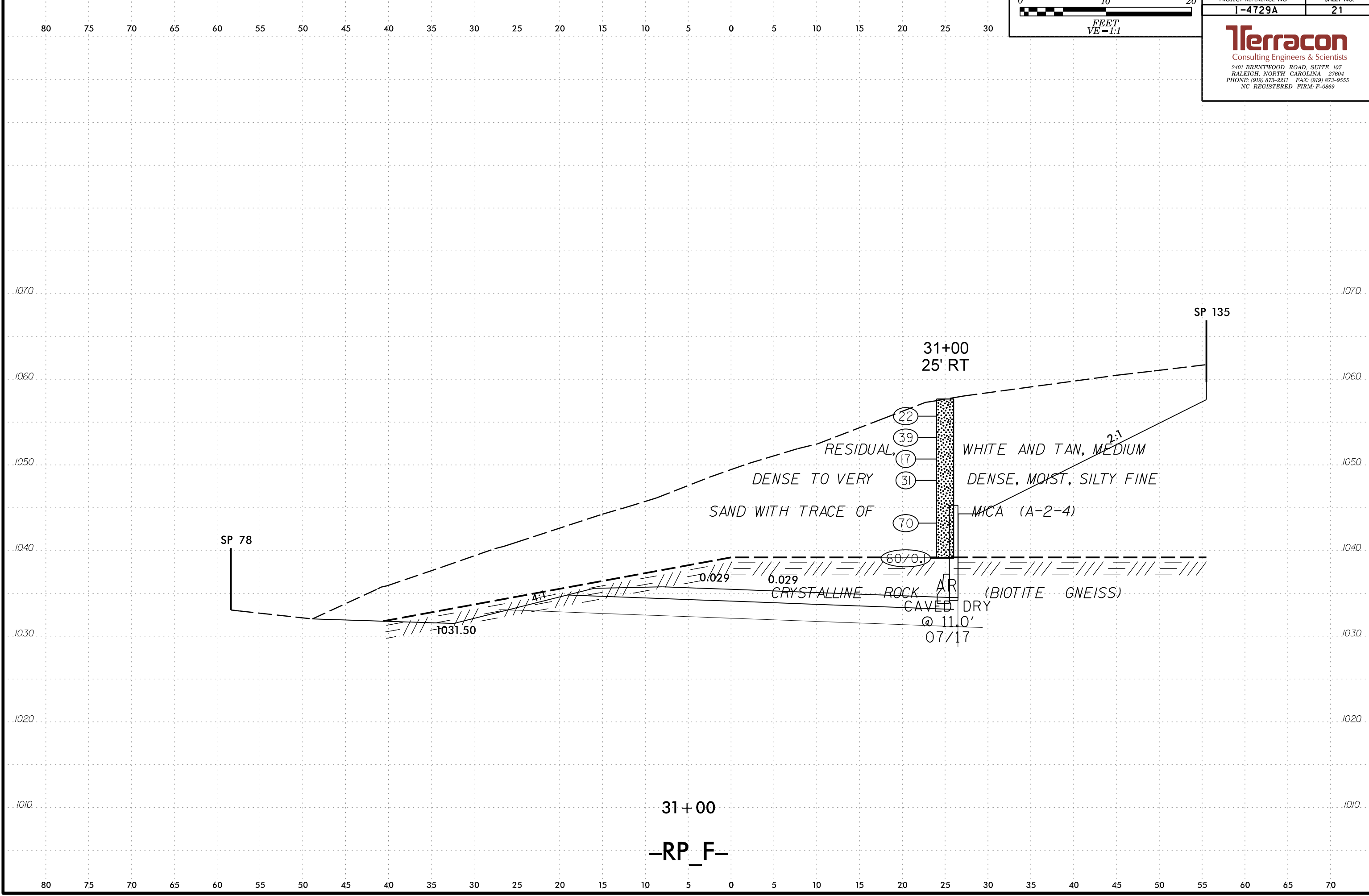


30 + 50  
 -RP\_F-



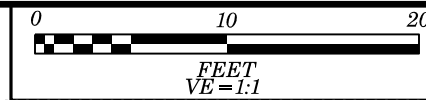
PROJECT REFERENCE NO.	SHEET NO.
I-4729A	21

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 Consulting Engineers & Scientists  
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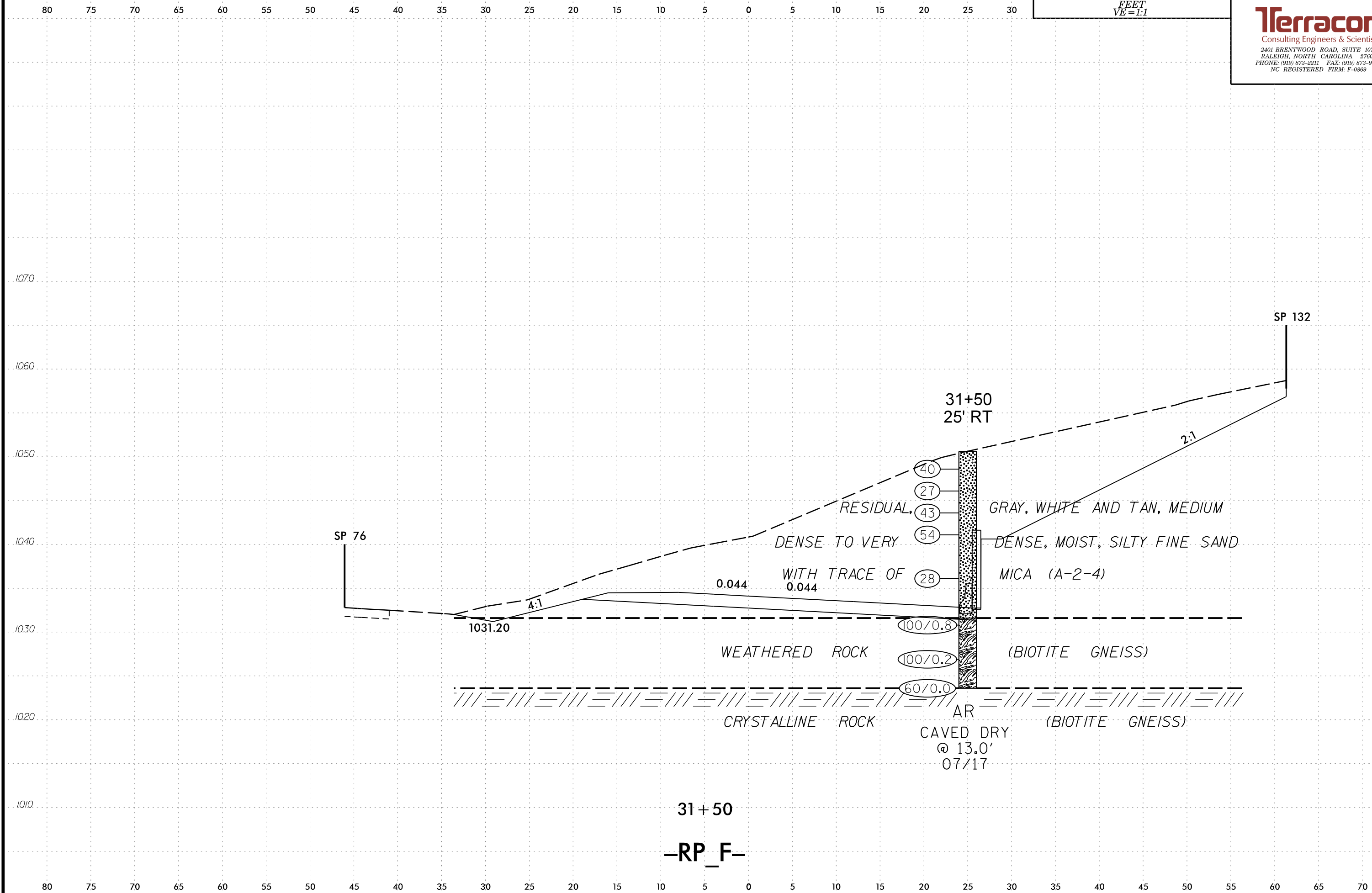
31+00  
 -RP\_F-

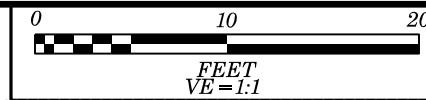




PROJECT REFERENCE NO.	SHEET NO.
I-4729A	22

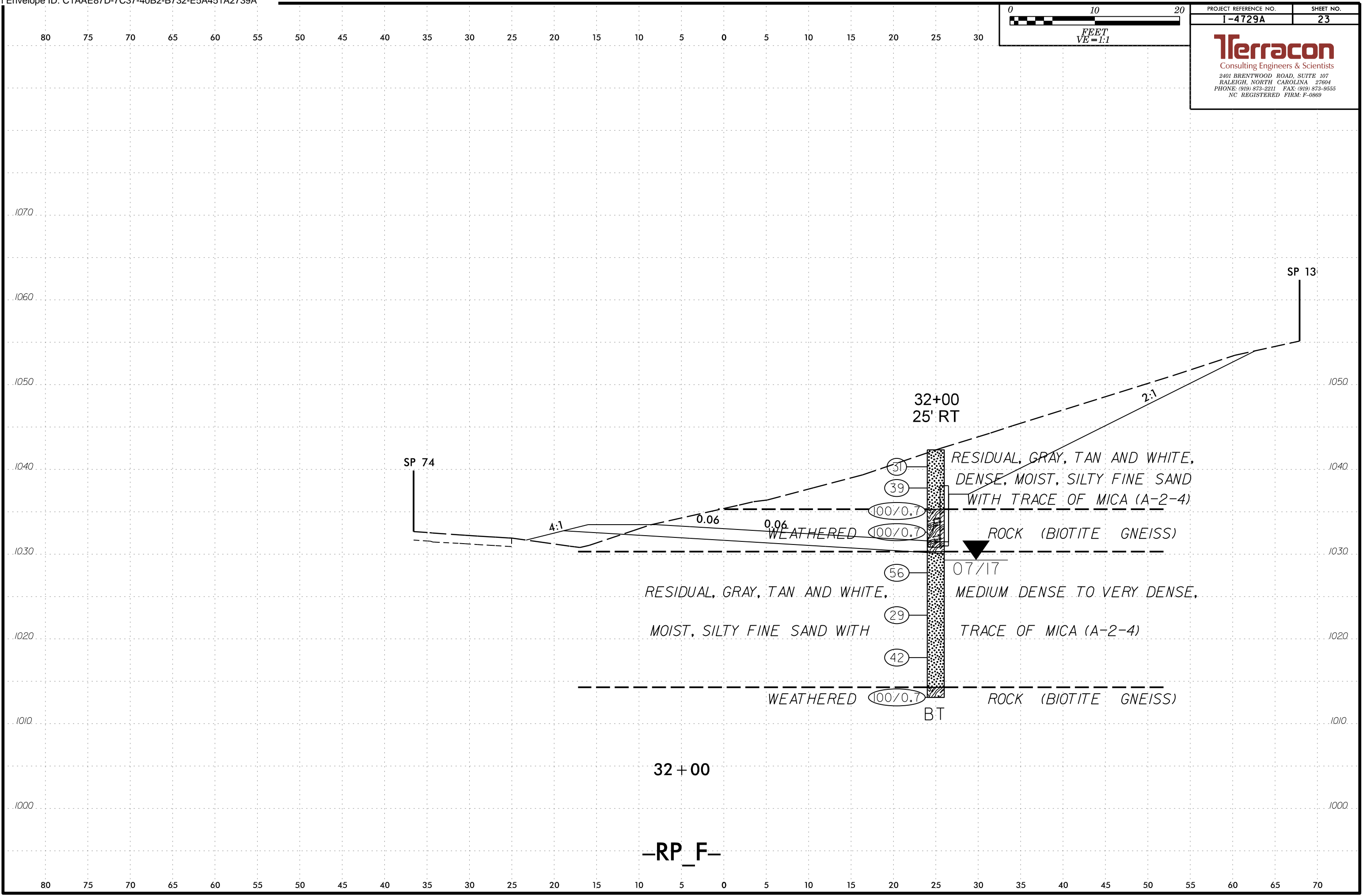
**Terracon**  
 Consulting Engineers & Scientists  
 2401 BRENTWOOD ROAD, SUITE 107  
 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869

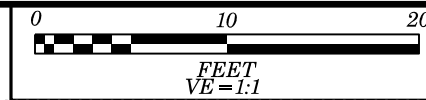




PROJECT REFERENCE NO.	SHEET NO.
1-4729A	23

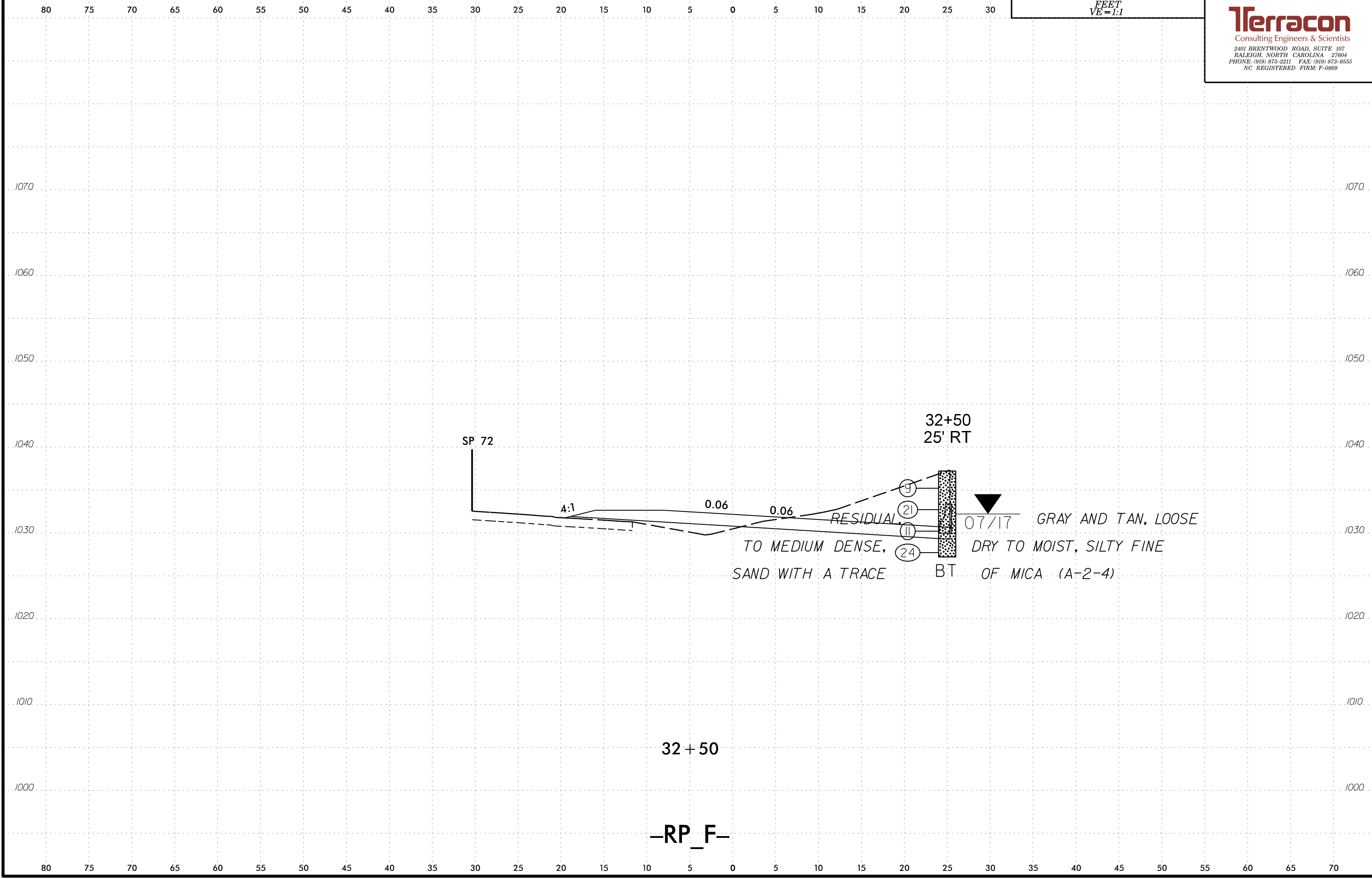
**Terracon**  
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 RALEIGH, NORTH CAROLINA 27604  
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PROJECT REFERENCE NO.	SHEET NO.
I-4729A	24

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NC REGISTERED FIRM: P-0869



SP 72

4:1

0.06

0.06

32+50  
25' RT

RESIDUAL

TO MEDIUM DENSE,  
SAND WITH A TRACE

07/17

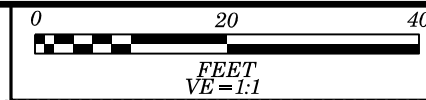
GRAY AND TAN, LOOSE

DRY TO MOIST, SILTY FINE

BT OF MICA (A-2-4)

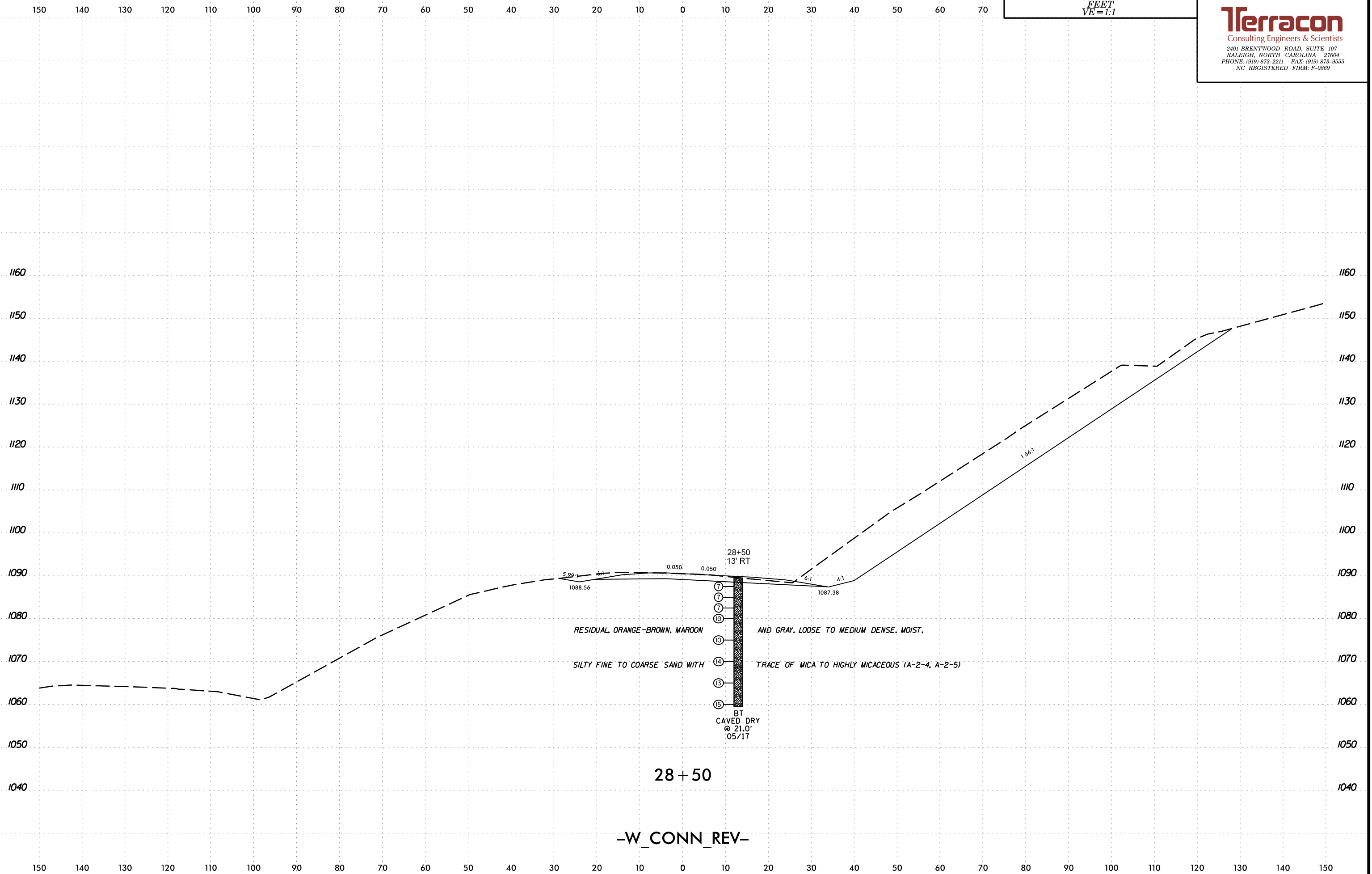
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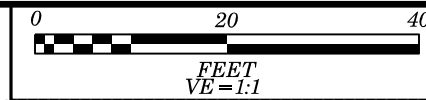
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	25

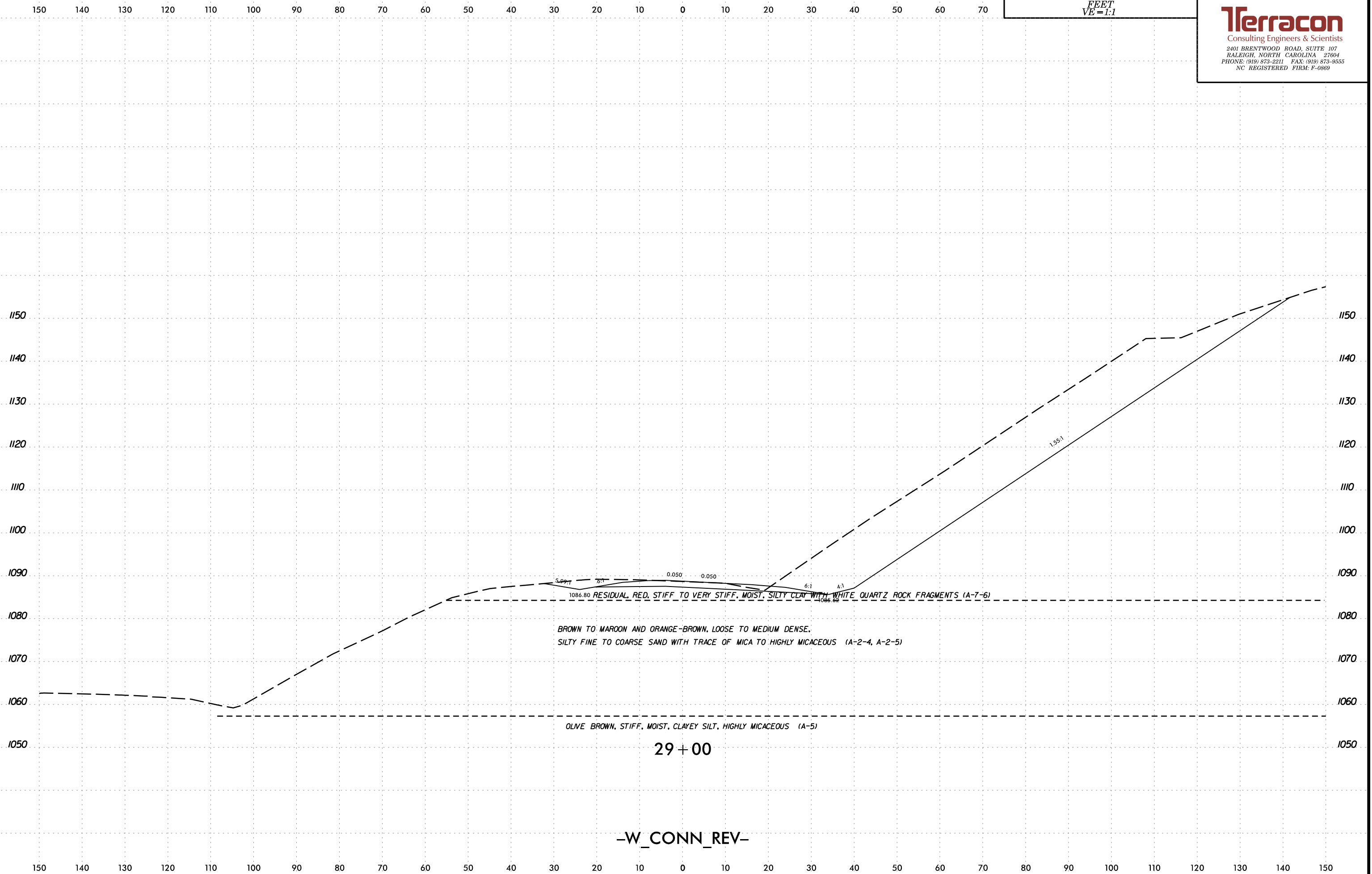
**Terracon**  
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RALEIGH, NORTH CAROLINA 27604  
PHONE: (919) 873-2211 FAX: (919) 873-9555  
NC REGISTERED FIRM: P-0869



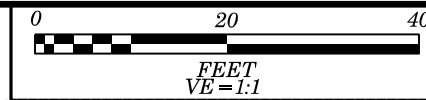


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	26

**Terracon**  
Consulting Engineers & Scientists  
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RALEIGH, NORTH CAROLINA 27604  
PHONE: (919) 873-2211 FAX: (919) 873-9555  
NC REGISTERED FIRM: P-0869

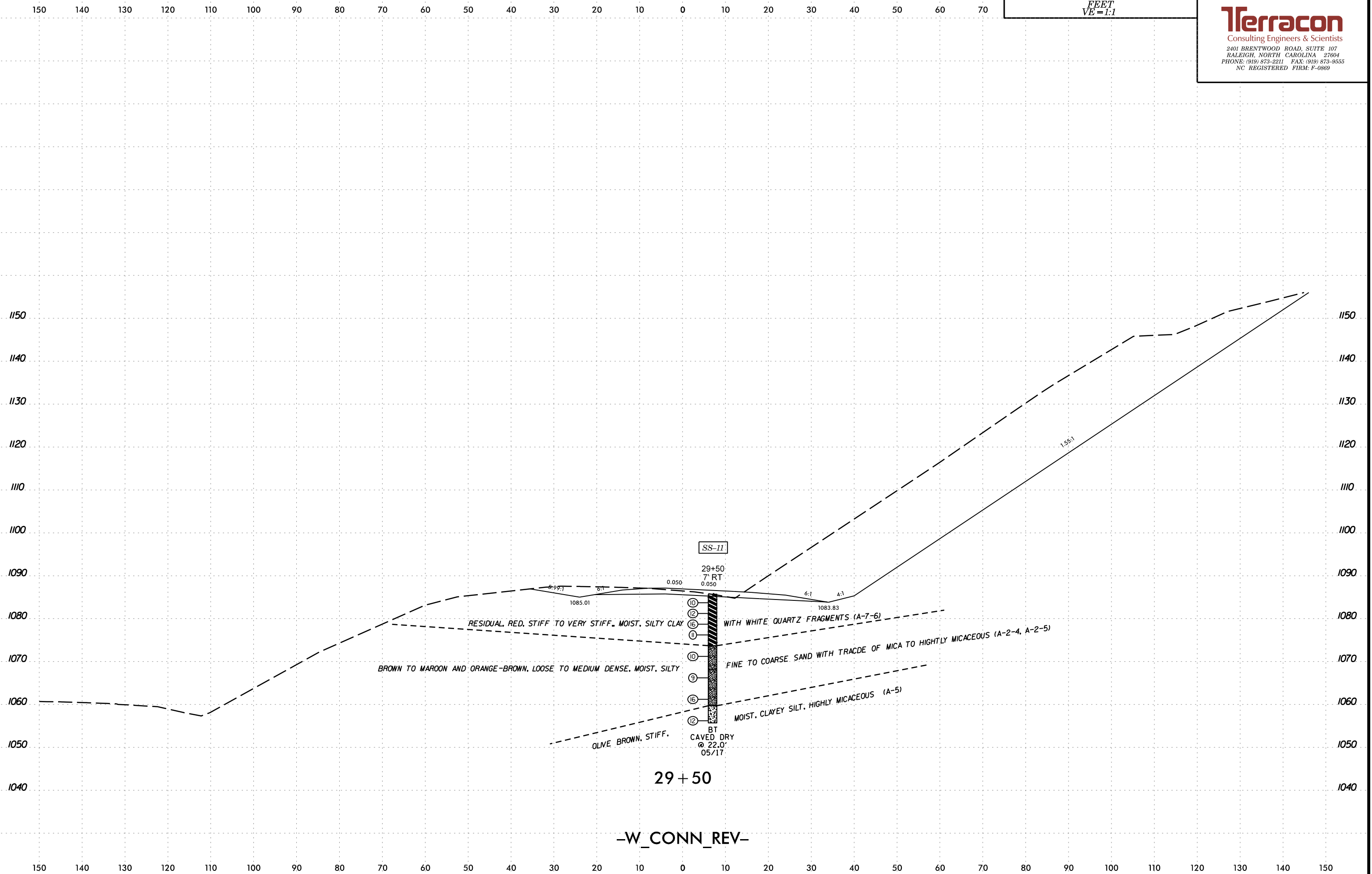




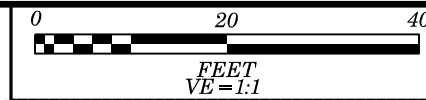


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	27

**Terracon**  
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 PHONE: (919) 873-2211 FAX: (919) 873-9555  
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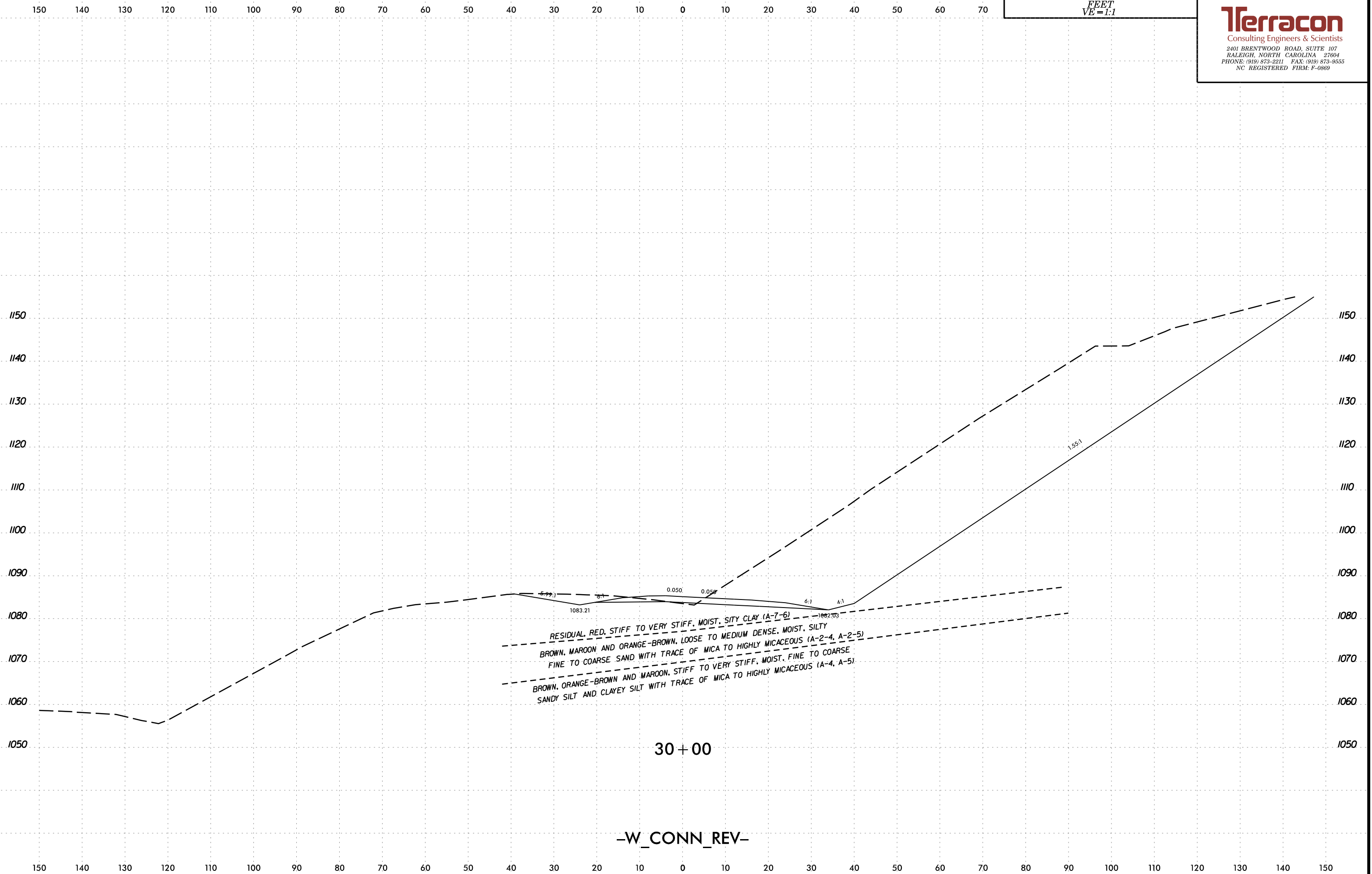


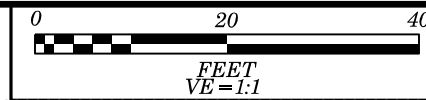
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	28

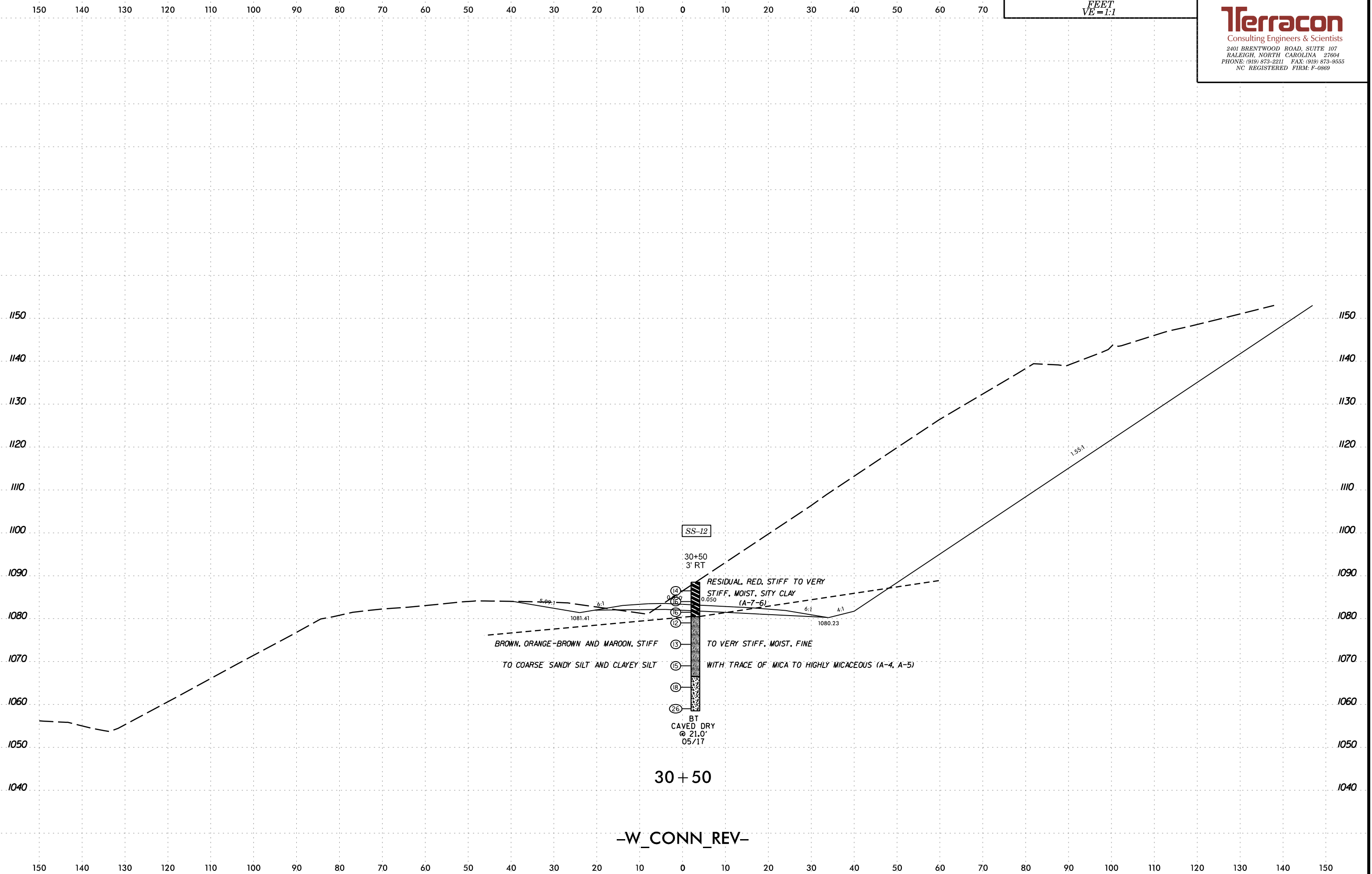
**Terracon**  
Consulting Engineers & Scientists  
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RALEIGH, NORTH CAROLINA 27604  
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NC REGISTERED FIRM: P-0869





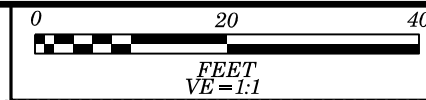
PROJECT REFERENCE NO.	SHEET NO.
1-4729A	29

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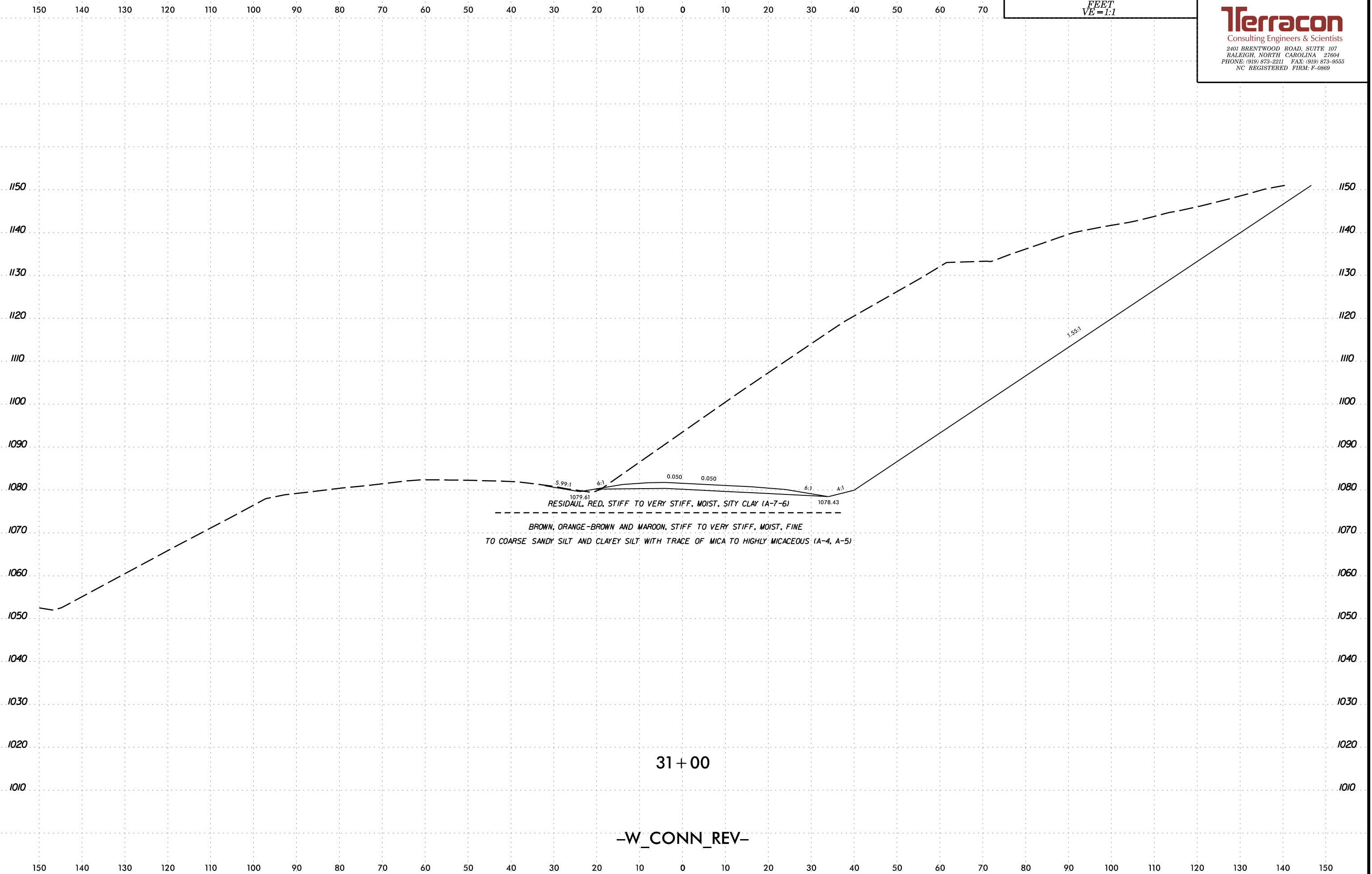
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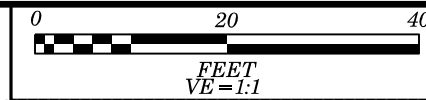
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	30

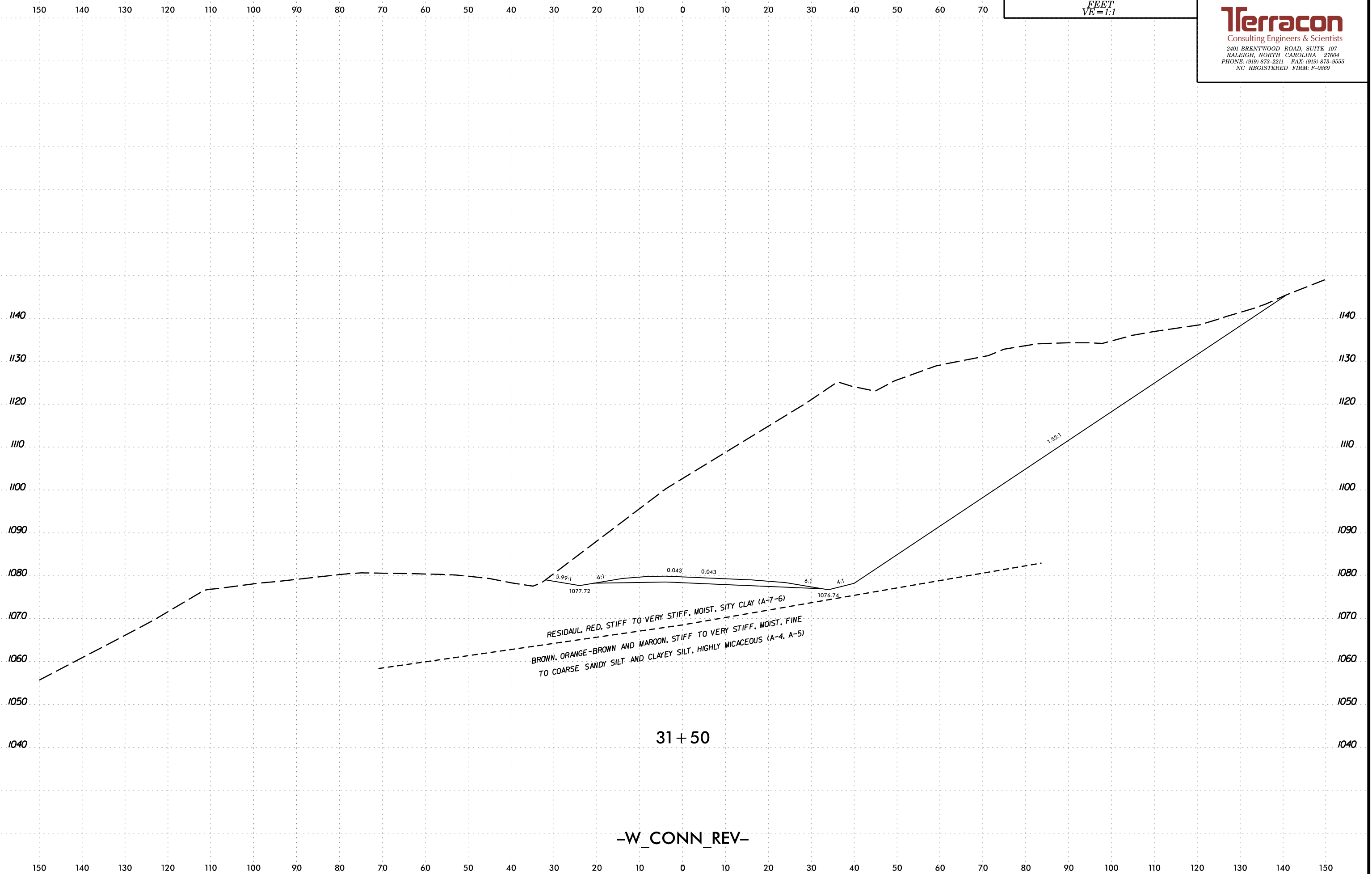
**Terracon**  
Consulting Engineers & Scientists  
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RALEIGH, NORTH CAROLINA 27604  
PHONE: (919) 873-2211 FAX: (919) 873-9555  
NC REGISTERED FIRM: P-0869



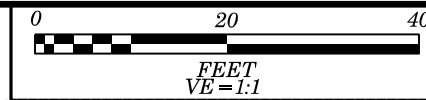


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	31

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NC REGISTERED FIRM: P-0869

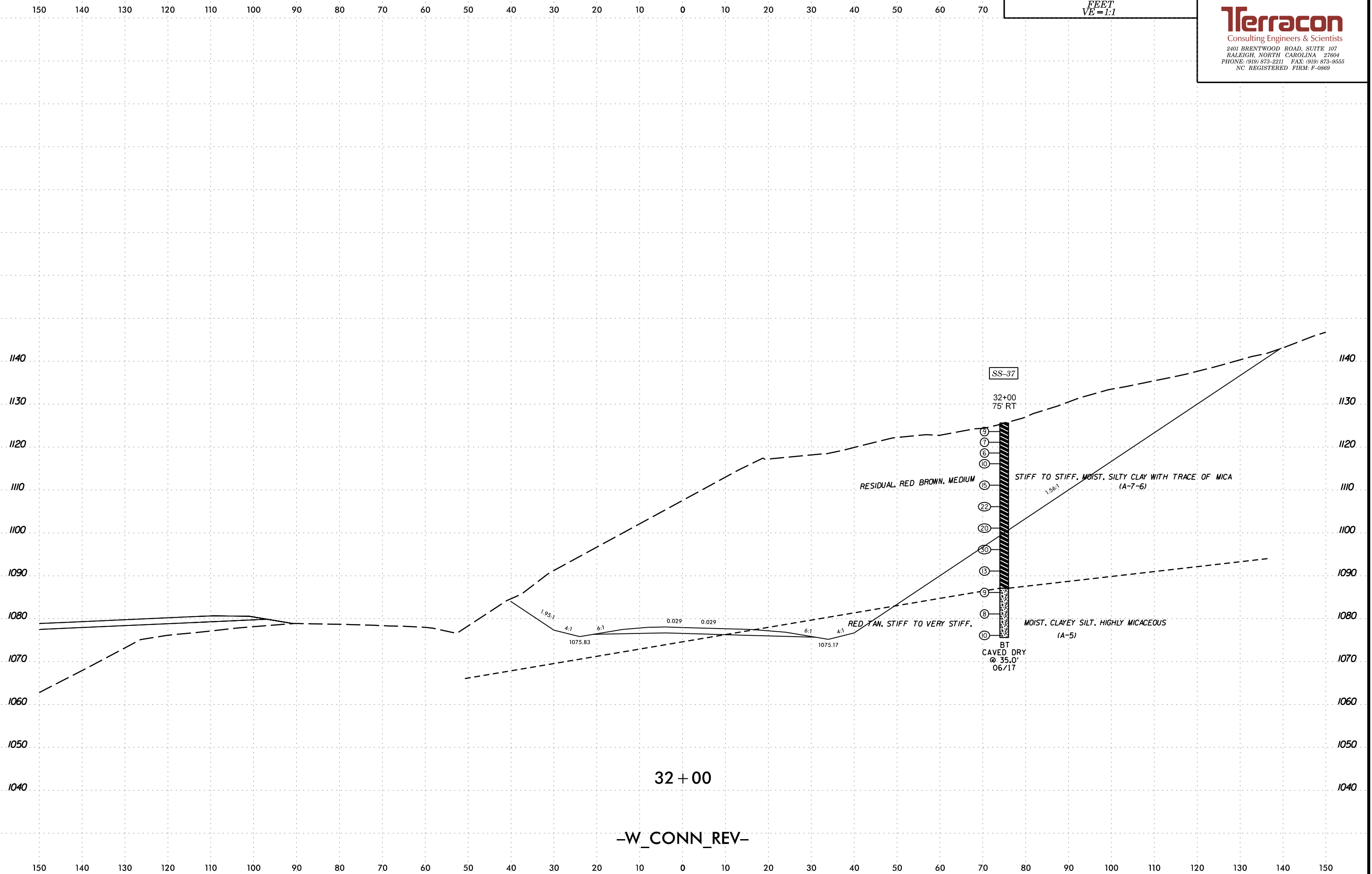


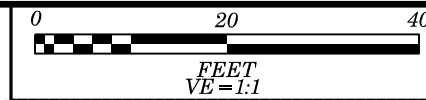




PROJECT REFERENCE NO.	SHEET NO.
1-4729A	32

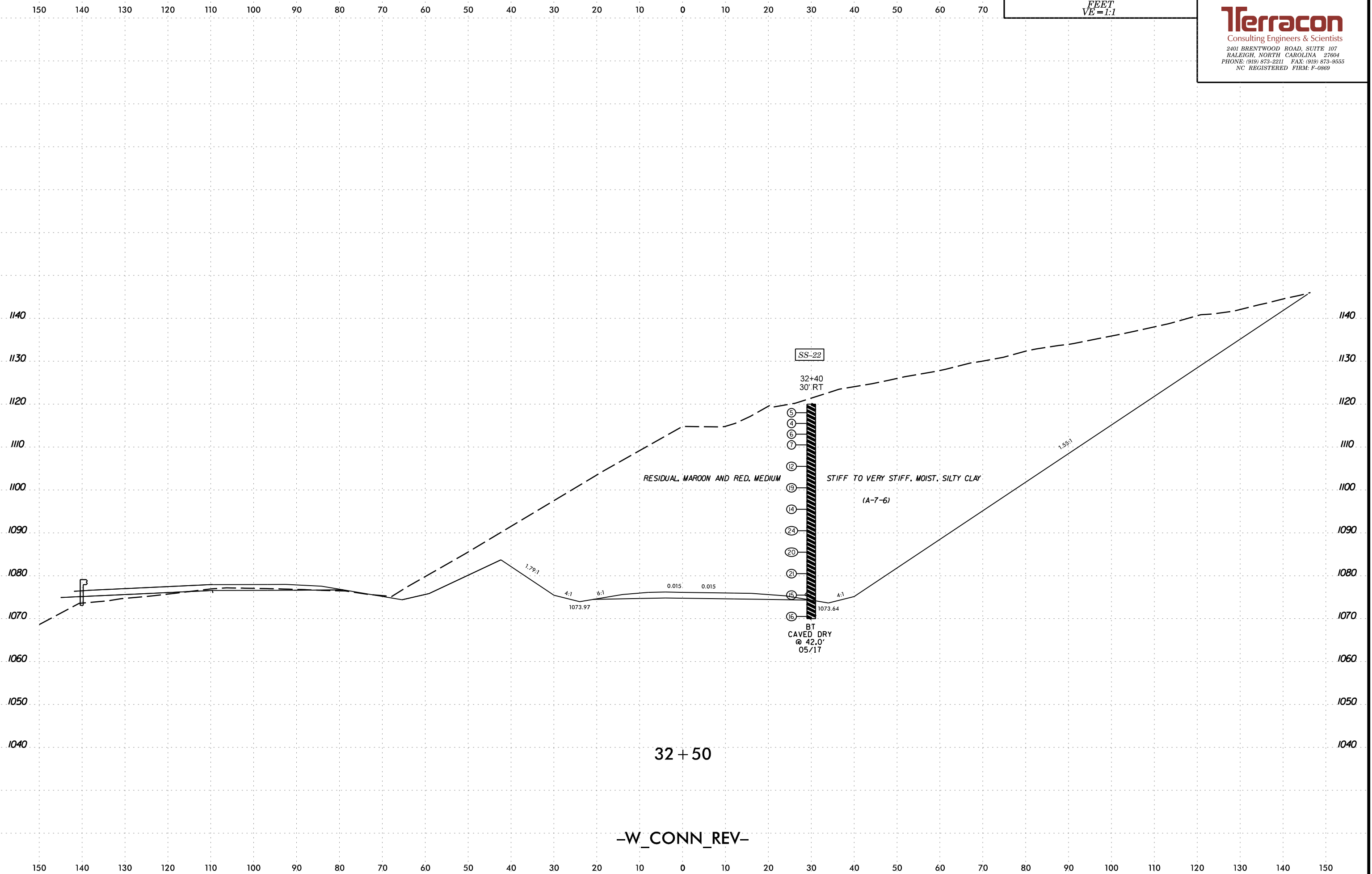
**Terracon**  
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 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869

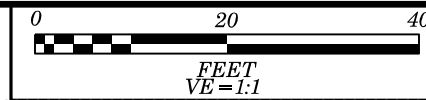




PROJECT REFERENCE NO. <b>1-4729A</b>	SHEET NO. <b>33</b>
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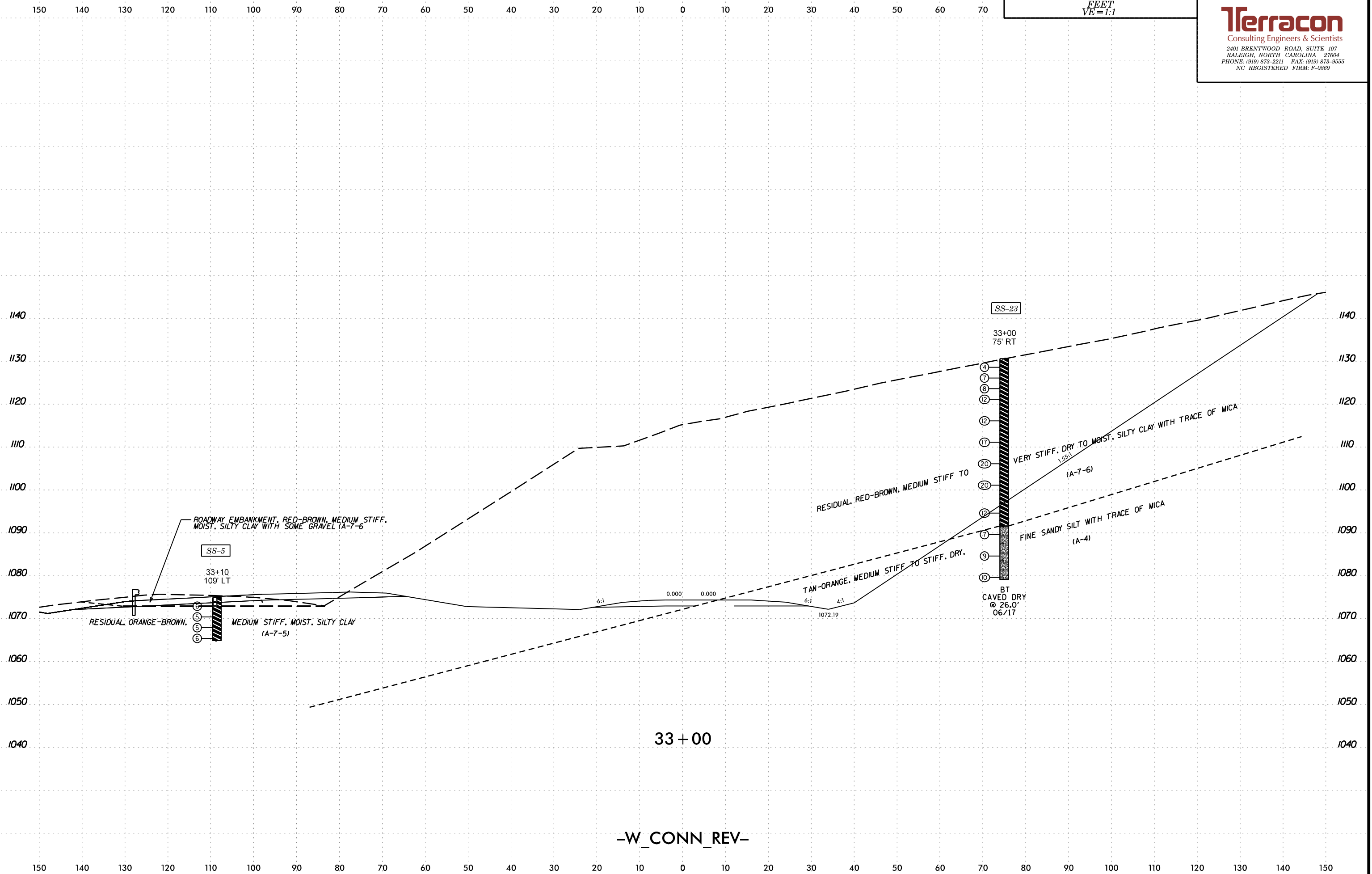
**Terracon**  
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RALEIGH, NORTH CAROLINA 27604  
PHONE: (919) 873-2211 FAX: (919) 873-9555  
NC REGISTERED FIRM: P-0869



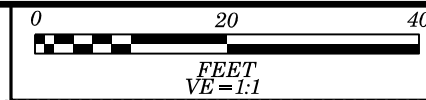


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	34

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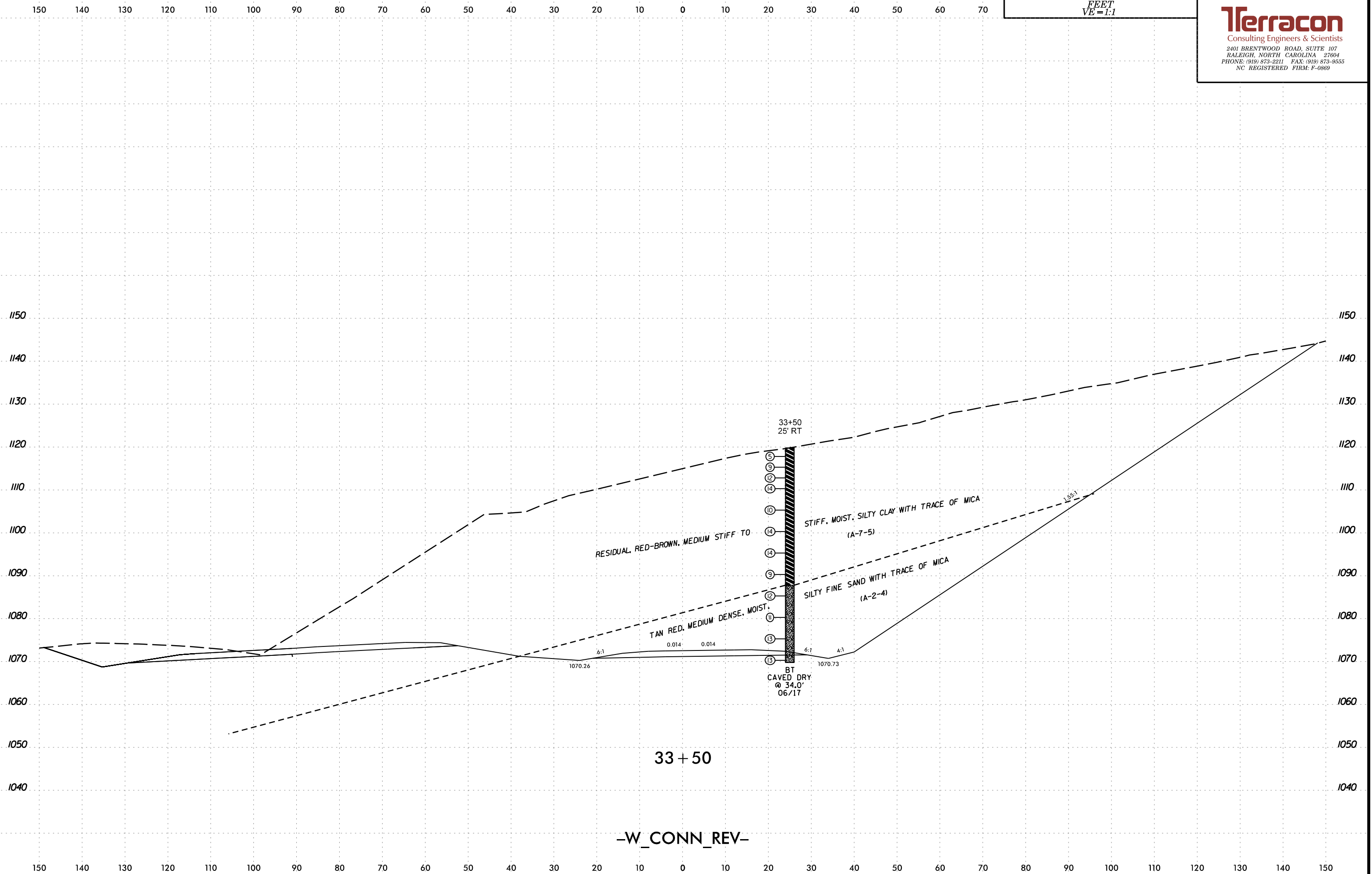


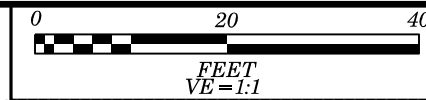
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PROJECT REFERENCE NO. <b>1-4729A</b>	SHEET NO. <b>35</b>
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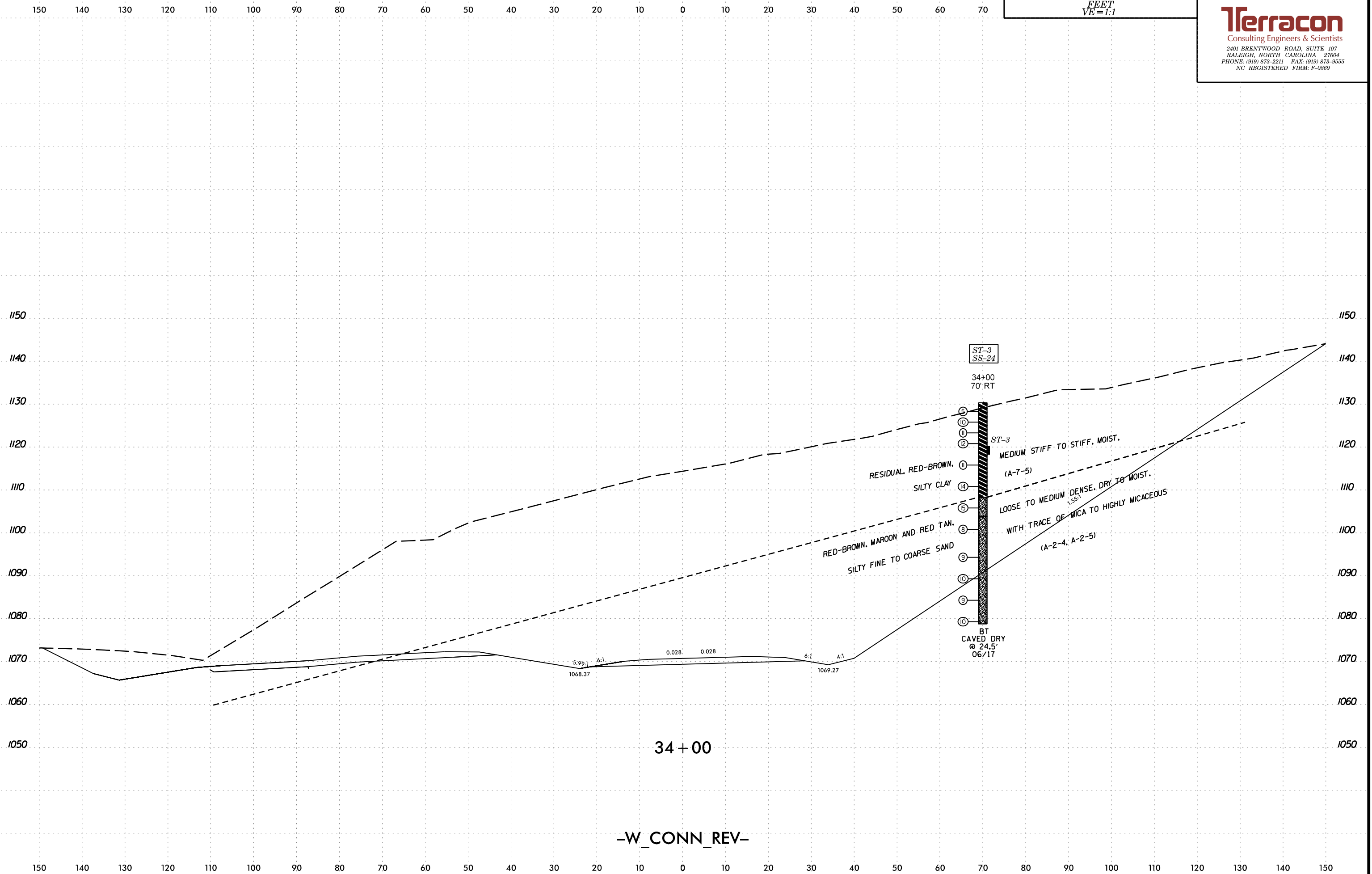
**Terracon**  
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	36

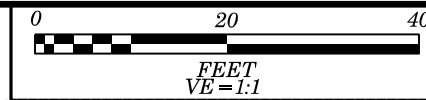
**Terracon**  
 Consulting Engineers & Scientists  
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 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869



34 + 00

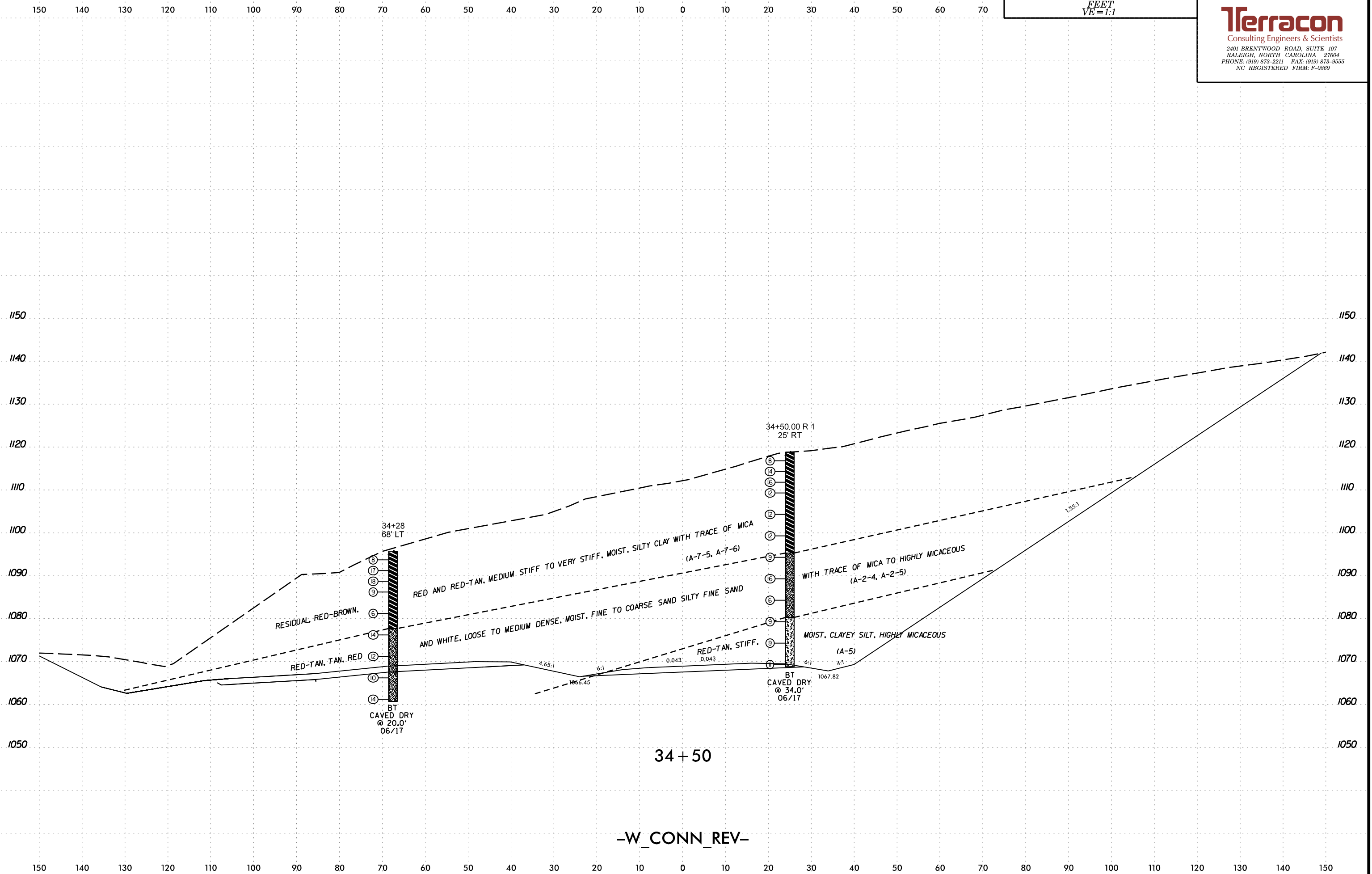
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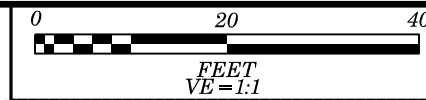
PROJECT REFERENCE NO.	SHEET NO.
1-4729A	37

**Terracon**  
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 2401 BRENTWOOD ROAD, SUITE 107  
 RALEIGH, NORTH CAROLINA 27604  
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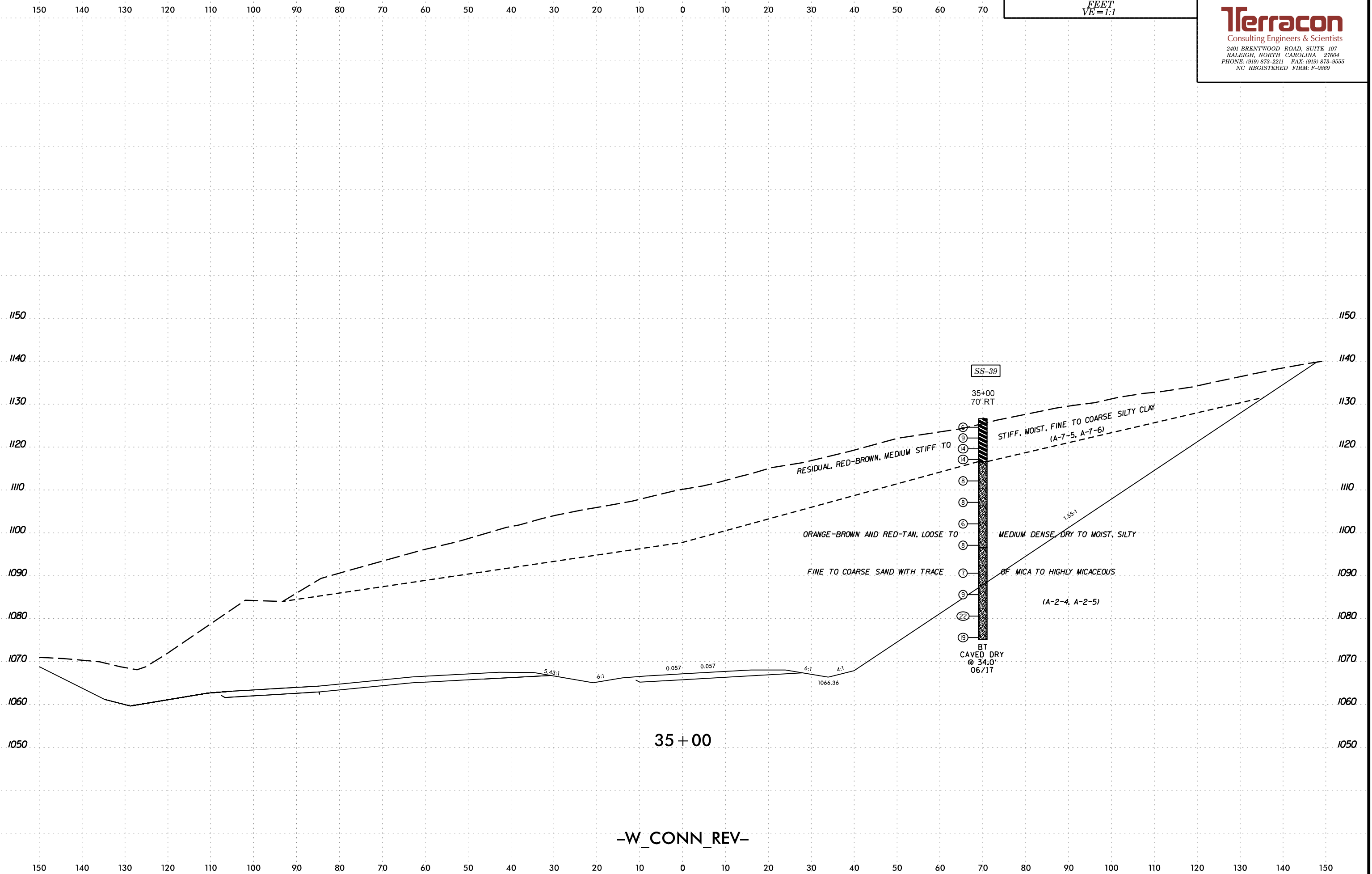
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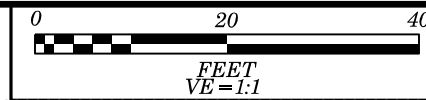
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	38

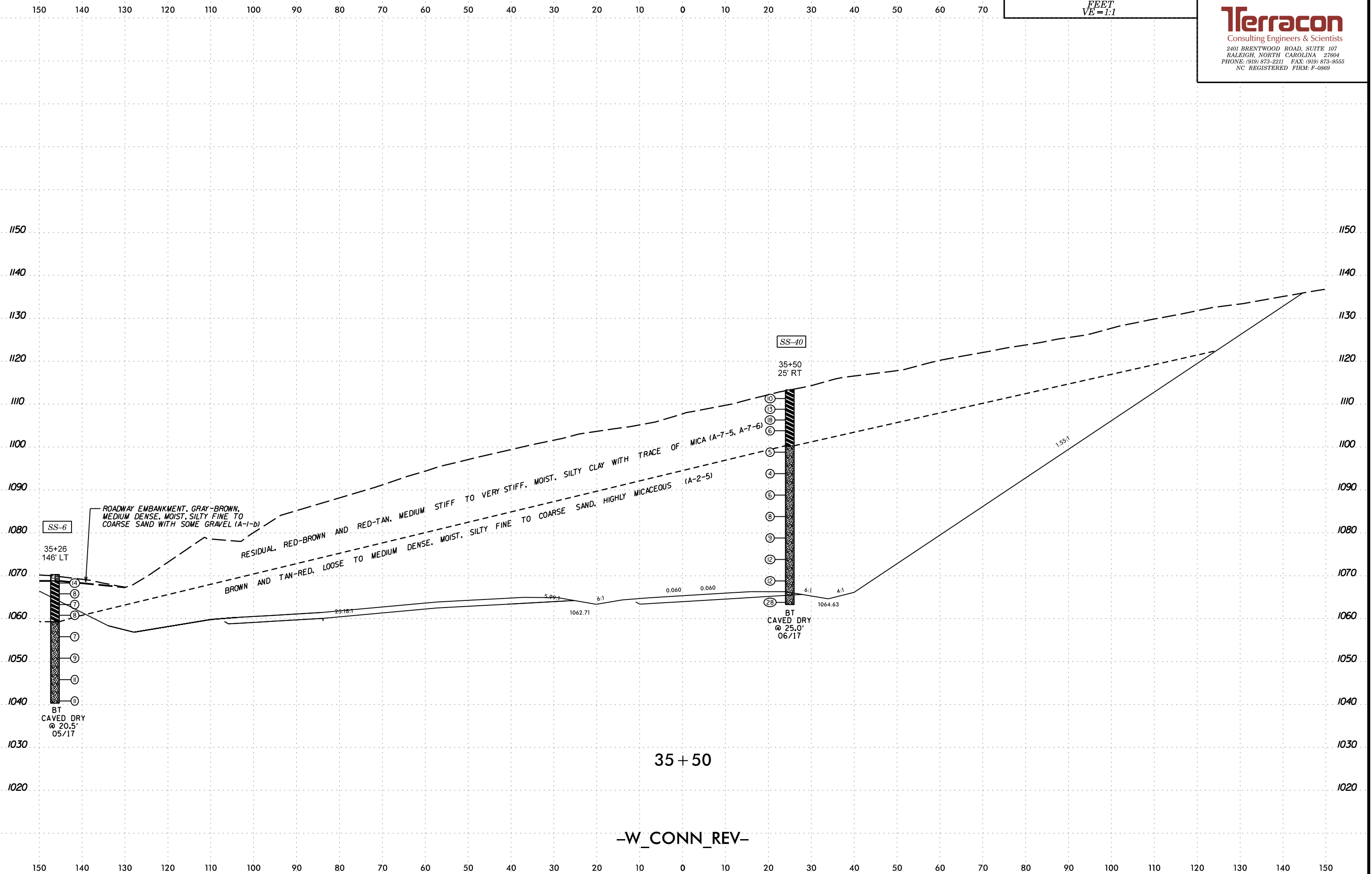
**Terracon**  
 Consulting Engineers & Scientists  
 2401 BRENTWOOD ROAD, SUITE 107  
 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869





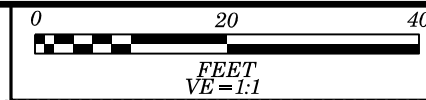
PROJECT REFERENCE NO.	SHEET NO.
1-4729A	39

**Terracon**  
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 RALEIGH, NORTH CAROLINA 27604  
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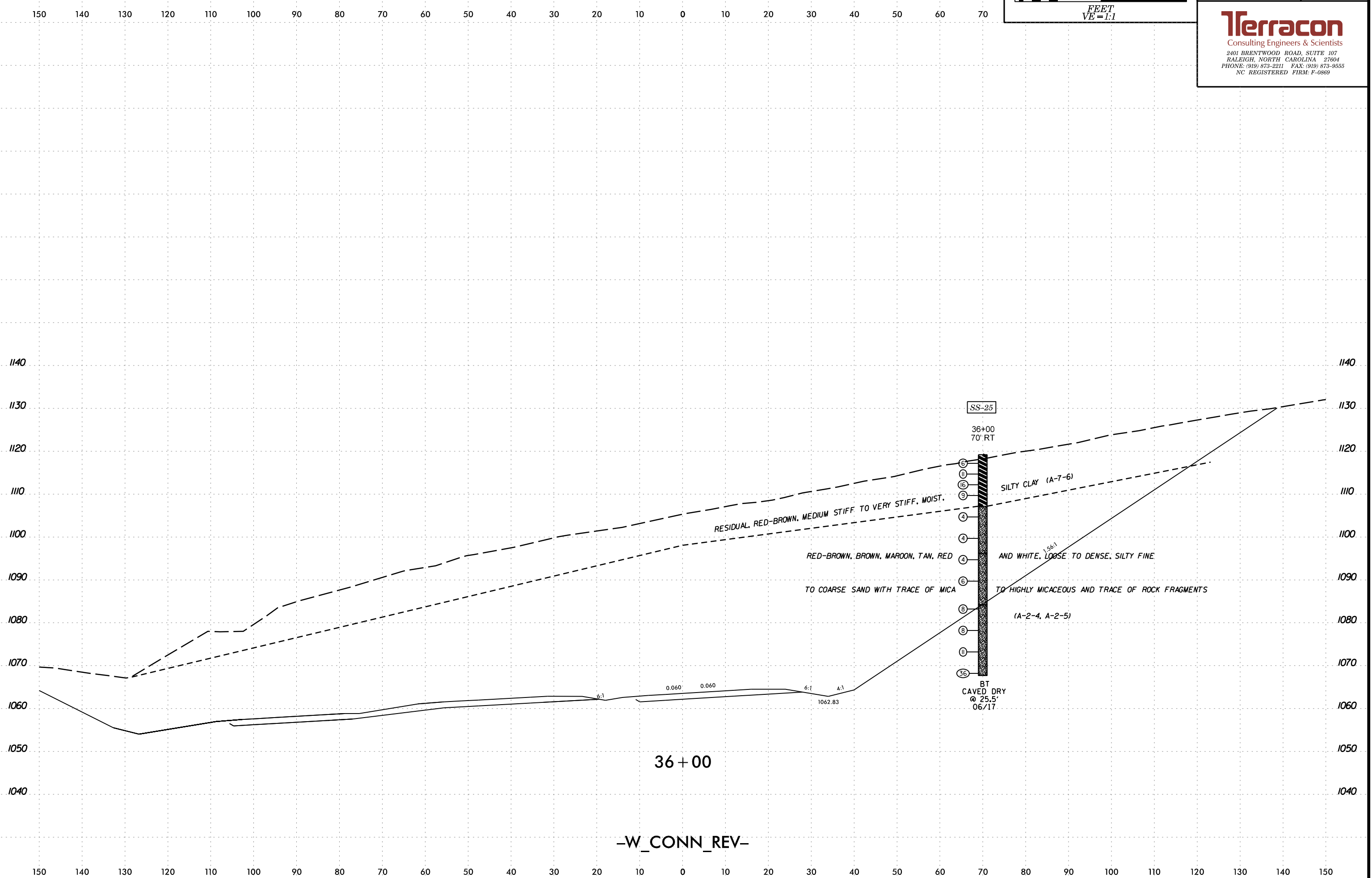
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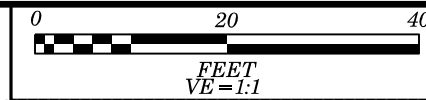
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PROJECT REFERENCE NO. <b>1-4729A</b>	SHEET NO. <b>40</b>
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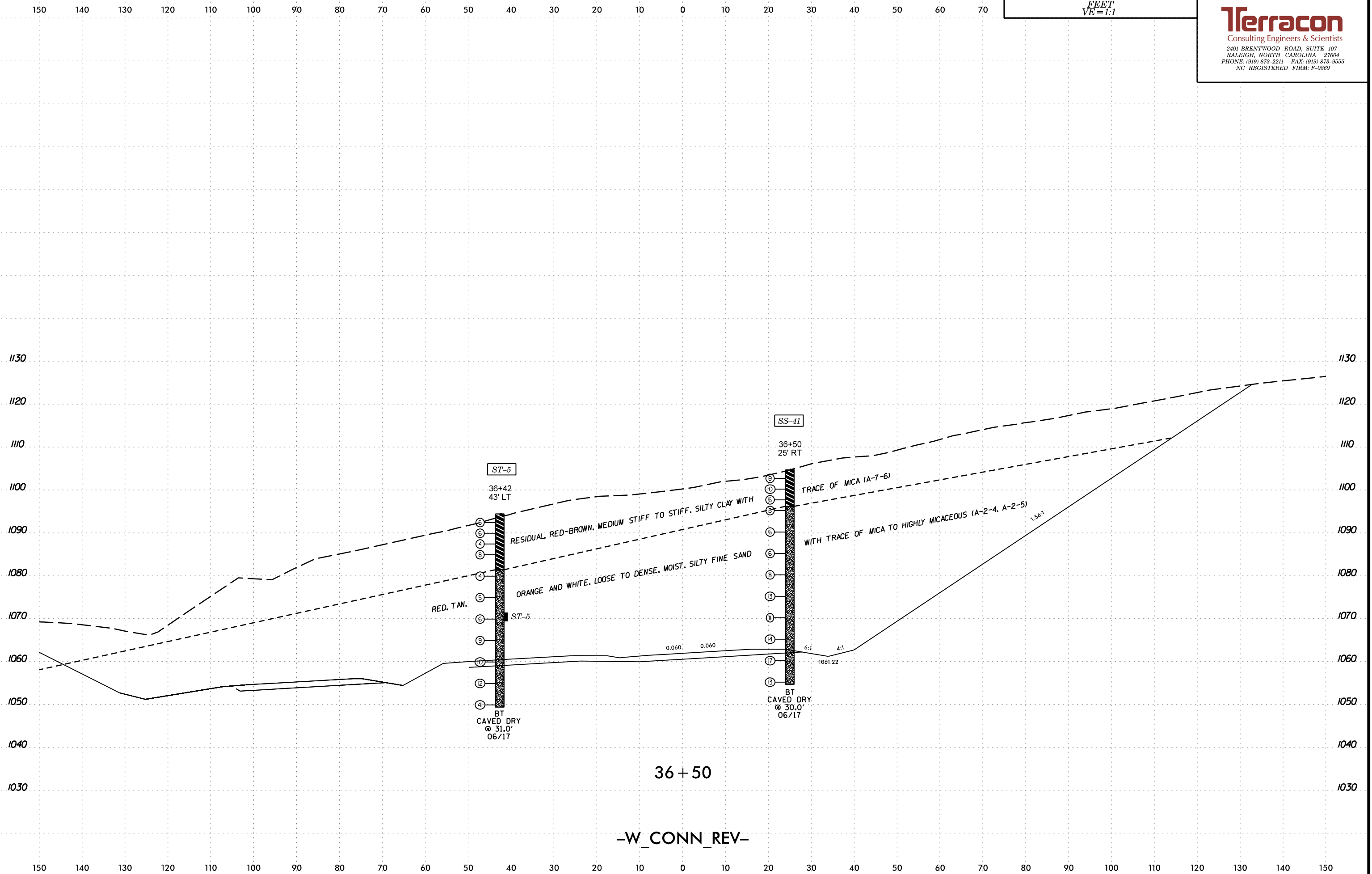
**Terracon**  
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RALEIGH, NORTH CAROLINA 27604  
PHONE: (919) 873-2211 FAX: (919) 873-9555  
NC REGISTERED FIRM: P-0869



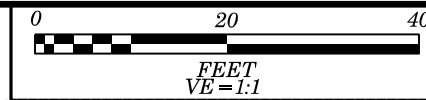


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	41

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 NC REGISTERED FIRM: P-0869

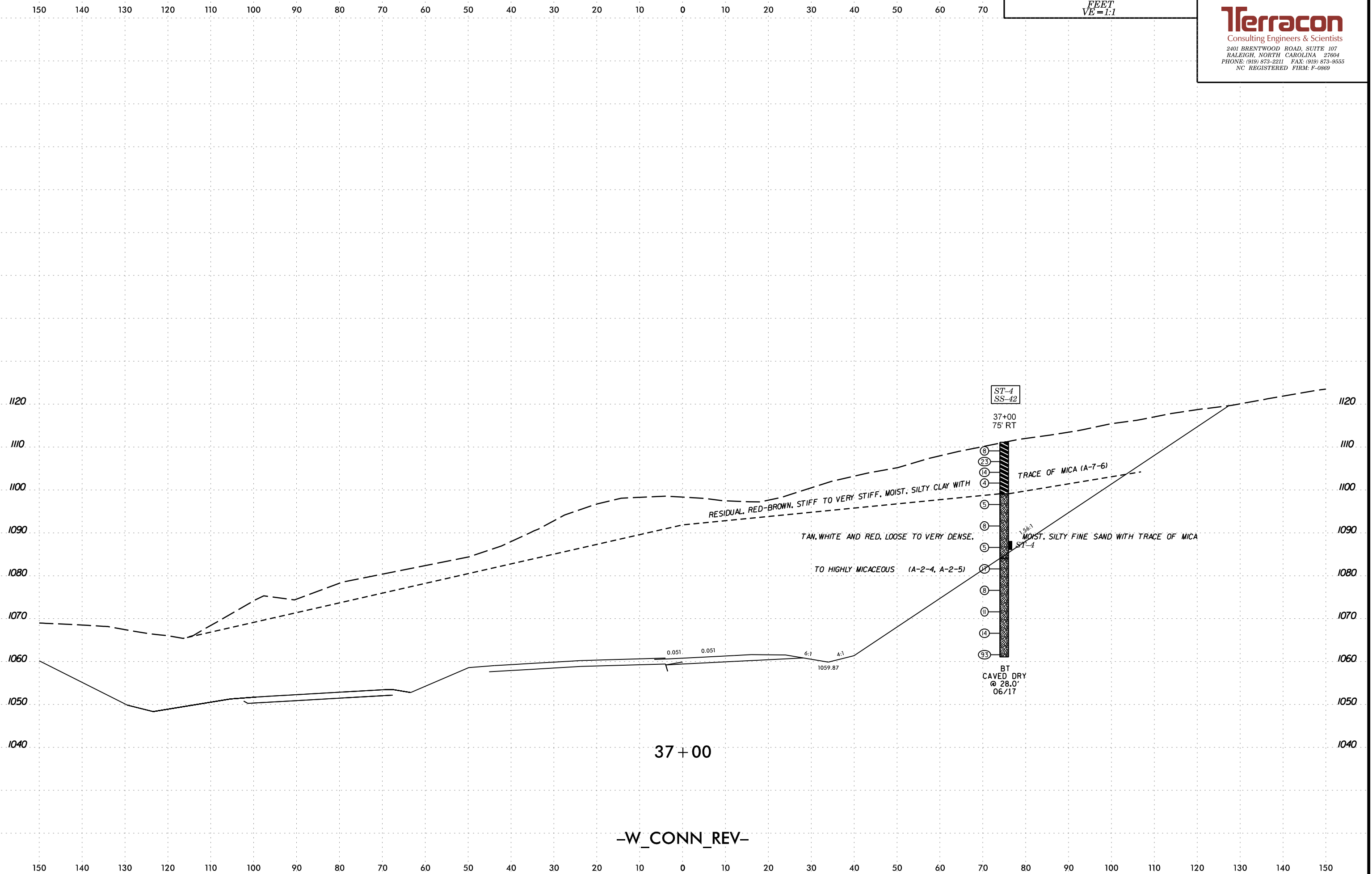




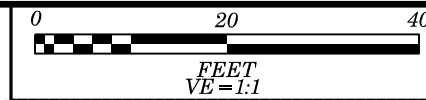


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	42

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 NC REGISTERED FIRM: P-0869

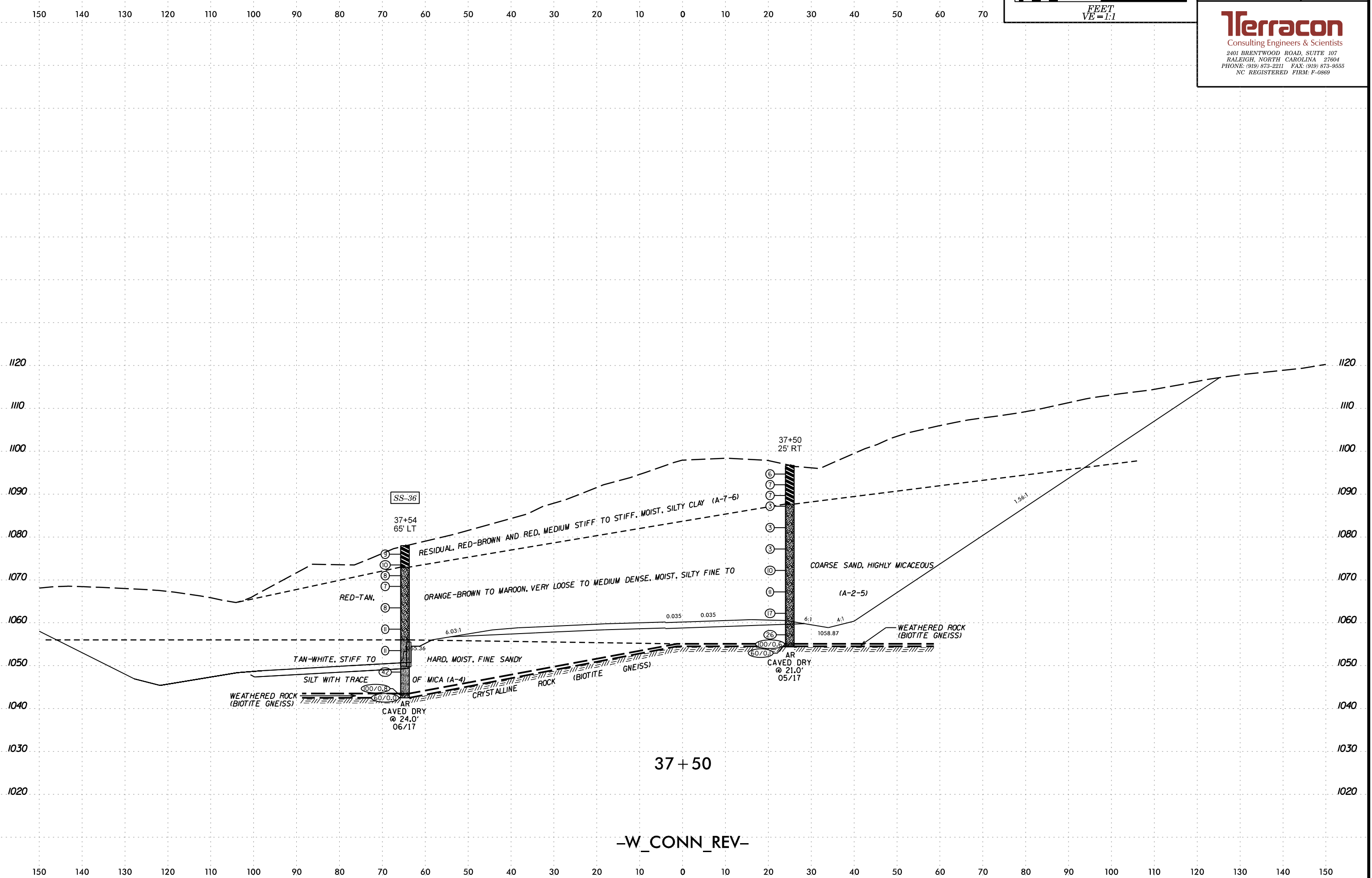


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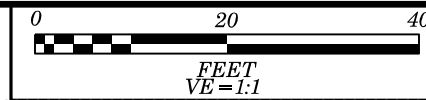
PROJECT REFERENCE NO.	SHEET NO.
I-4729A	43

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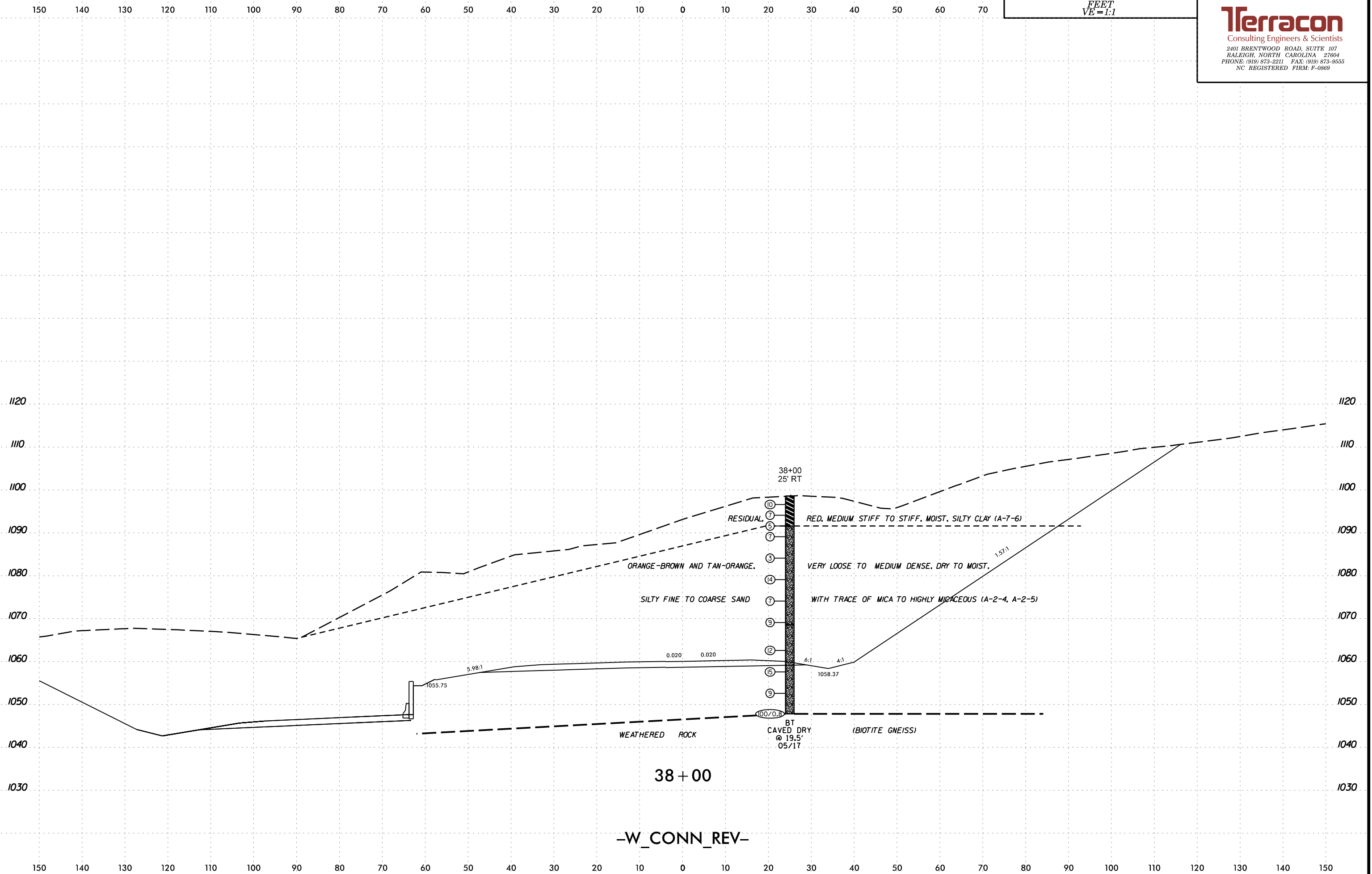
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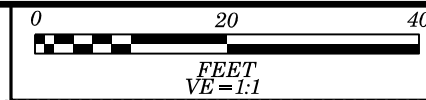
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	44

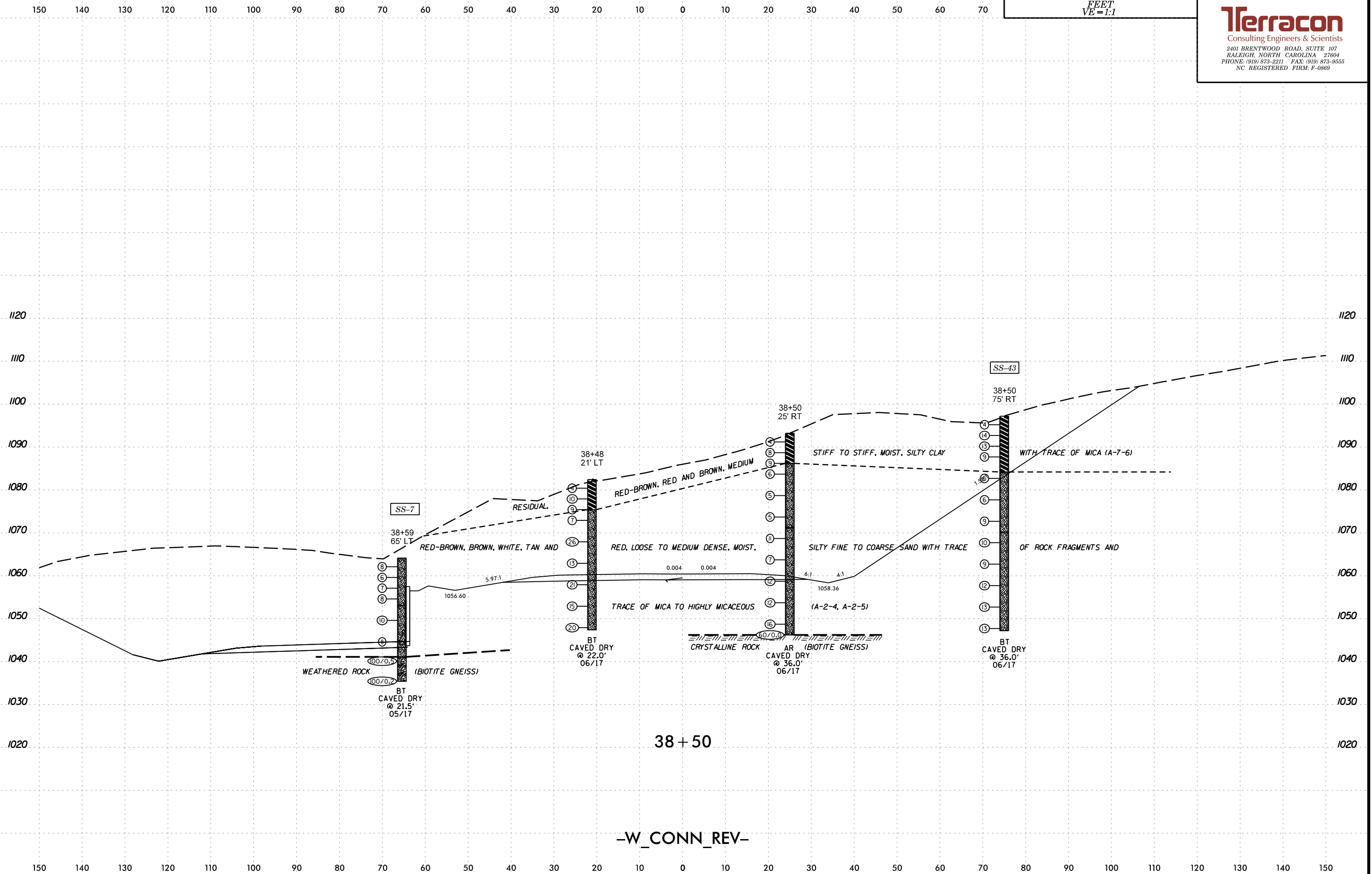
**Terracon**  
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 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869



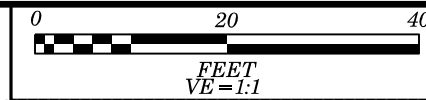


PROJECT REFERENCE NO.	SHEET NO.
1-4729A	45

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 RALEIGH, NORTH CAROLINA 27604  
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 NC REGISTERED FIRM: P-0869

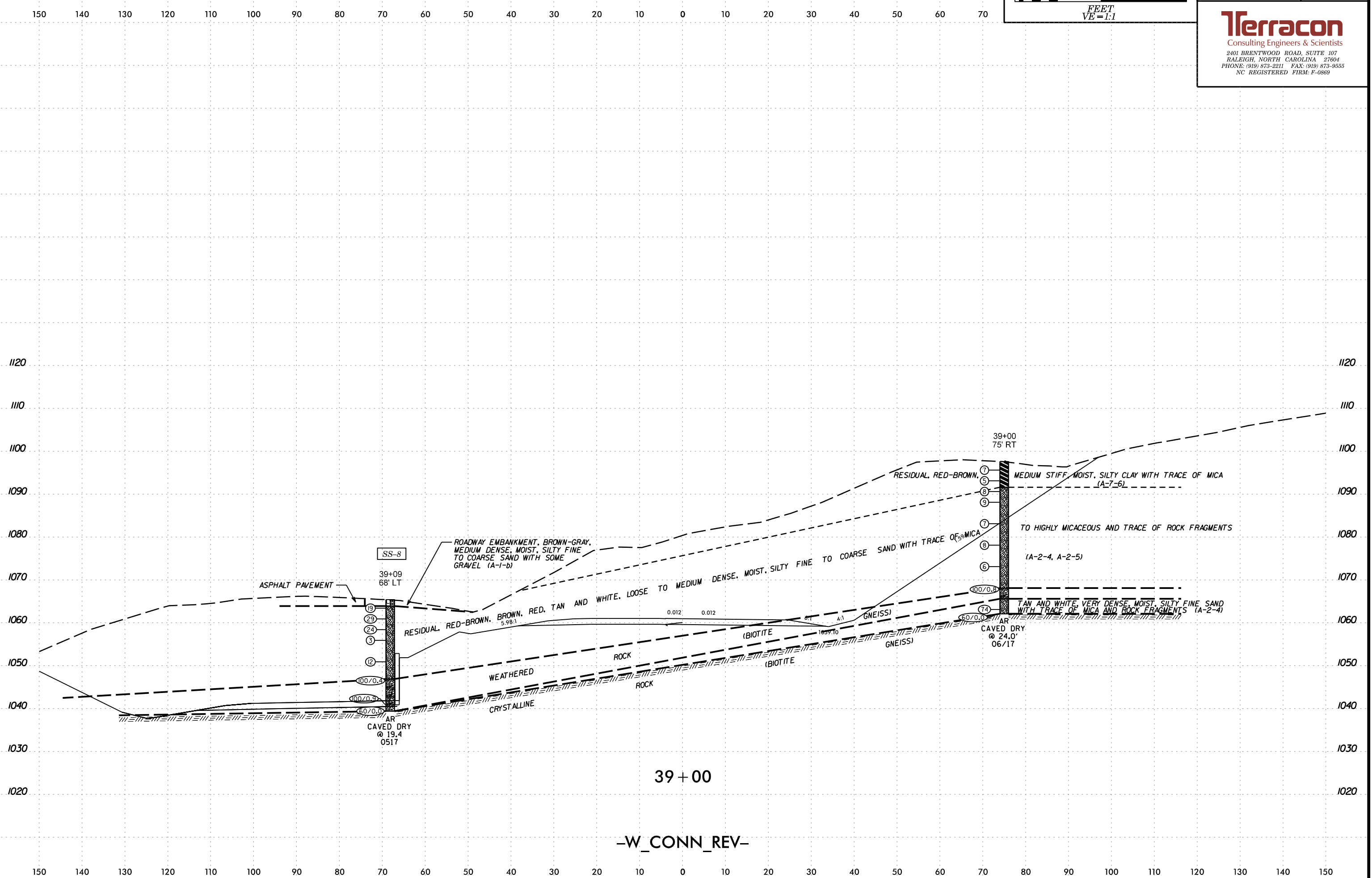


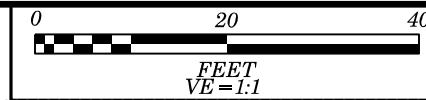
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	46

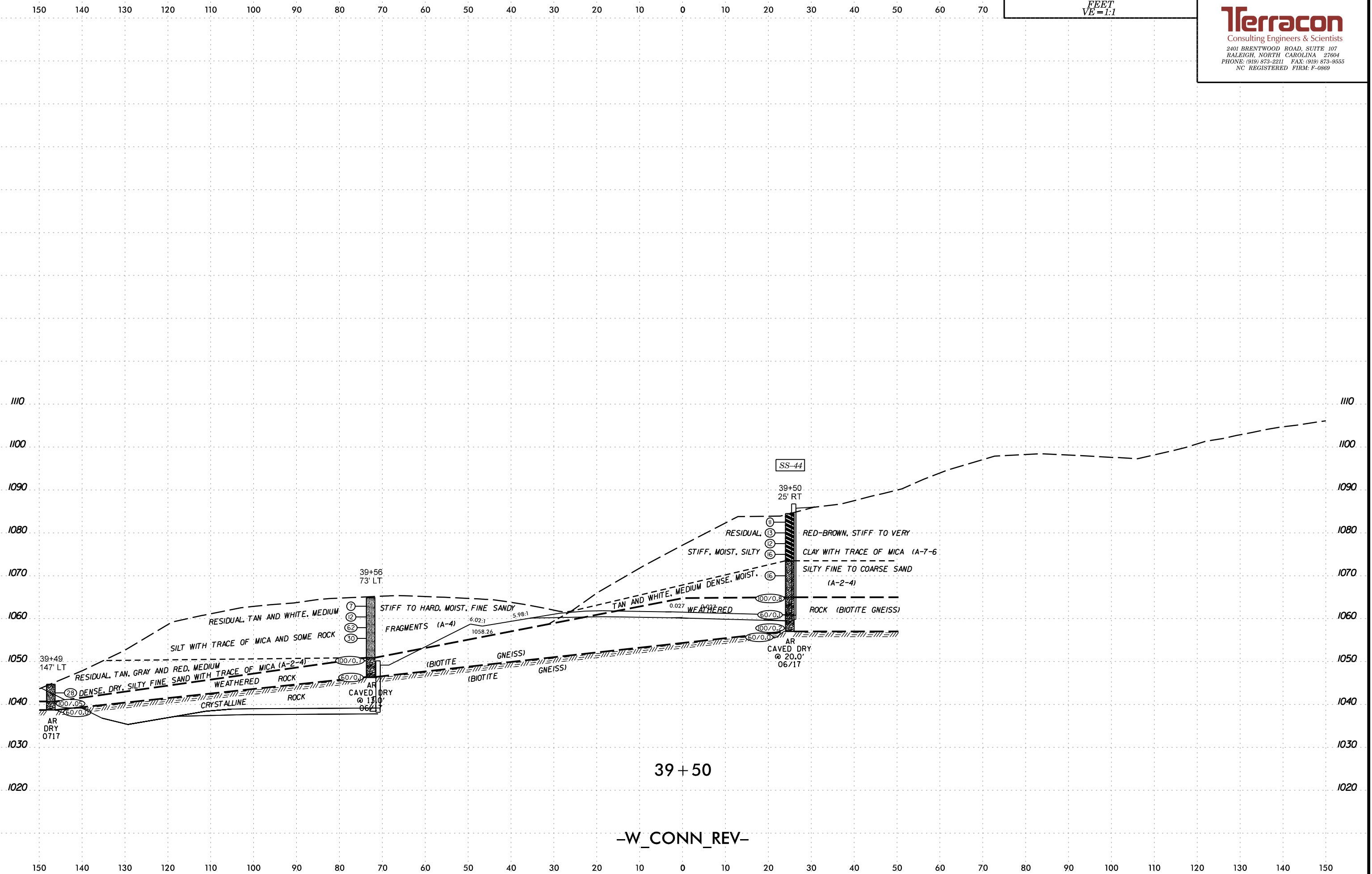
**Terracon**  
 Consulting Engineers & Scientists  
 2401 BRENTWOOD ROAD, SUITE 107  
 RALEIGH, NORTH CAROLINA 27604  
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 NC REGISTERED FIRM: P-0869





PROJECT REFERENCE NO.	SHEET NO.
1-4729A	47

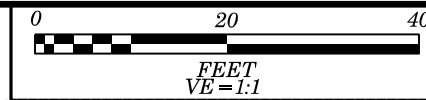
**Terracon**  
 Consulting Engineers & Scientists  
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 RALEIGH, NORTH CAROLINA 27604  
 PHONE: (919) 873-2211 FAX: (919) 873-9555  
 NC REGISTERED FIRM: P-0869



39 + 50

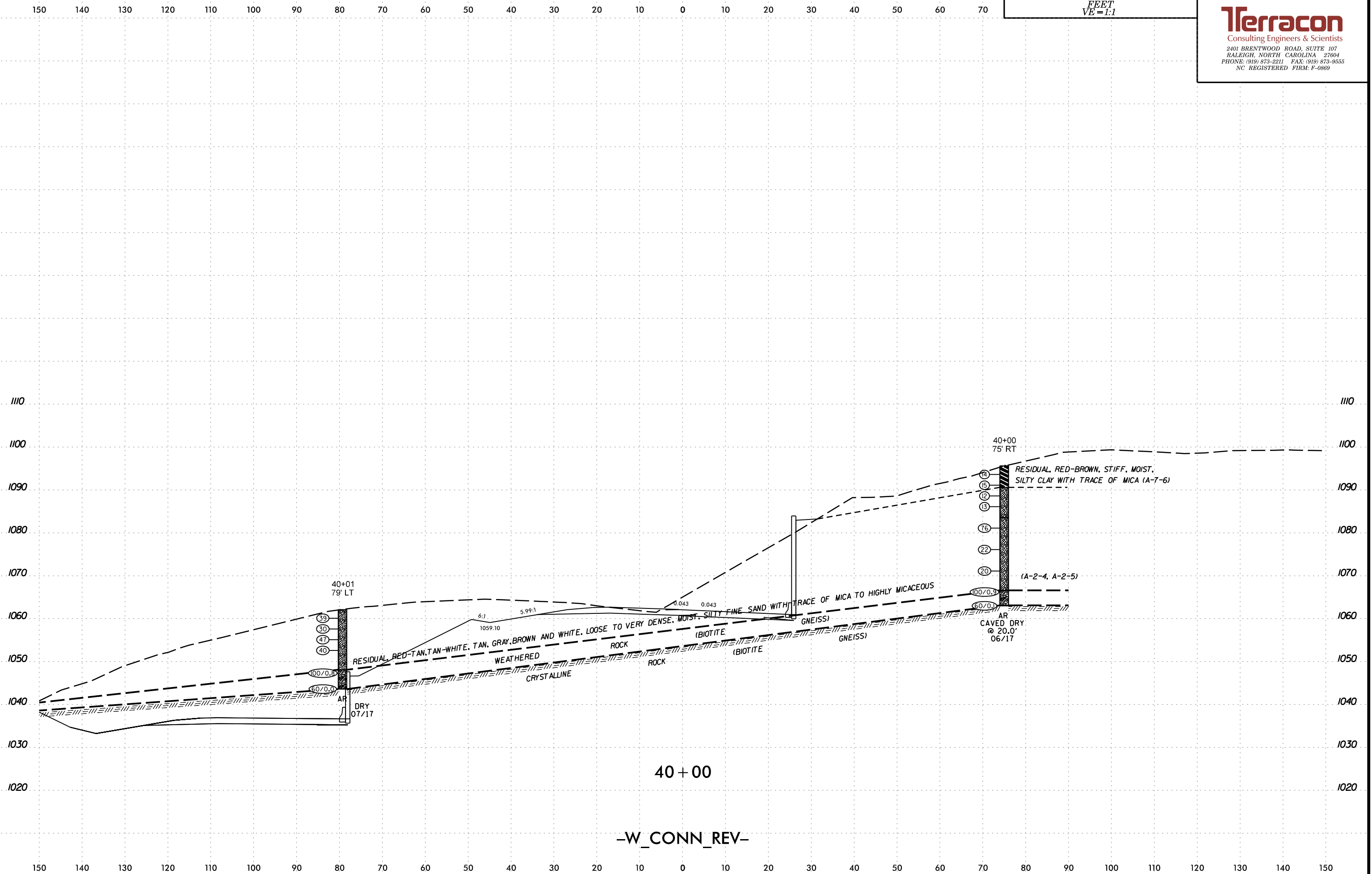
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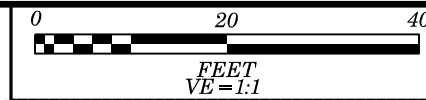




PROJECT REFERENCE NO.	SHEET NO.
1-4729A	48

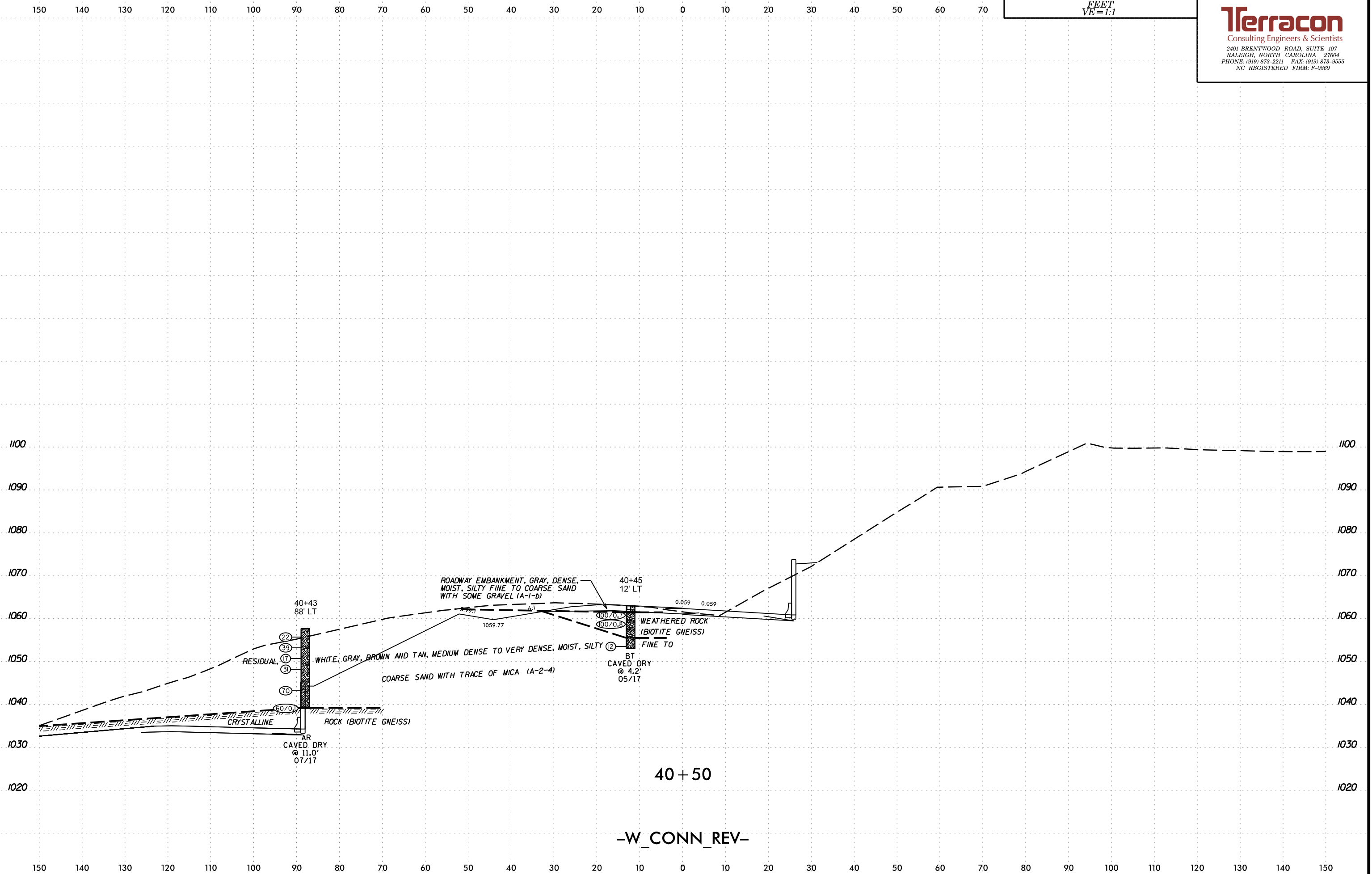
**Terracon**  
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 RALEIGH, NORTH CAROLINA 27604  
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PROJECT REFERENCE NO.	SHEET NO.
I-4729A	49

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 NC REGISTERED FIRM: P-0869



LABORATORY TESTING SUMMARY

PROJECT NUMBER: 34343.1.4

TIP: I-4729A

COUNTY: POLK

DESCRIPTION: I-26 / US 74 Interchange Modifications in The Town of Columbus

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (φ)	Effective Cohesion (psf)	Effective Friction (φ)
SS-1	-RP E-	30+90	0'	3.5-5.0	A-5 (1)	53	9	37.6	28.3	15.1	19.0	0	98	75	38	24.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-2	-RP F-	10+00	16' RT	1.0-2.5	A-2-5 (0)	45	NP	50.9	31.5	10.2	7.4	0	99	69	21	25.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-3	-RP F-	11+00	16' RT	6.0-7.5	A-2-5 (0)	47	NP	45.7	33.5	14.4	6.4	0	100	72	26	38.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-4	-RP F-	12+00	16' RT	6.0-7.5	A-2-5 (0)	44	NP	51.7	26.9	15.0	6.4	0	99	63	26	46.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-5	-RP F-	24+00	8' RT	3.5-5.0	A-7-5 (8)	67	15	28.1	23.7	24.3	23.9	0	100	81	54	41.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-6	-RP F-	26+00	50' LT	3.5-5.0	A-7-6 (18)	50	28	19.2	14.3	9.3	57.2	0	100	89	68	25.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-7	-RP F-	29+00	25' RT	3.5-5.0	A-2-4 (0)	33	NP	56.6	22.3	6.3	14.8	0	99	60	24	24.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-8	-RP F-	29+50	25' RT	8.5-10.0	A-2-4 (0)	38	NP	64.4	23.9	6.4	5.3	0	99	54	14	16.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-9	-W_CONN_REV-	27+00	25' RT	6.0-7.5	A-5 (0)	52	NP	29.7	33.2	25.1	12.0	0	100	82	44	46.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-10	-W_CONN_REV-	28+15	15' RT	3.5-5.0	A-2-5 (0)	41	NP	43.3	32.7	15.4	8.6	0	100	72	29	27.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-11	-W_CONN_REV-	29+50	7' RT	3.5-5.0	A-7-6 (12)	60	32	34.7	16.1	5.4	43.8	1	98	75	50	23.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-12	-W_CONN_REV-	30+50	3' RT	1.0-2.5	A-7-5 (16)	69	35	31.7	16.2	7.0	45.1	0	100	79	54	25.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-13	-RP_WC-	19+50	36' RT	3.5-5.0	A-2-4 (0)	35	NP	56.2	29.5	7.6	6.7	0	99	64	18	21.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-14	-RP E-	22+48	8' LT	8.5-10.0	A-2-5 (0)	56	NP	53.6	31.5	8.4	6.5	0	100	68	19	57.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-15	-RP E-	22+08	57' RT	18.5-20.0	A-2-5 (0)	46	NP	52.8	33.0	8.1	6.1	0	99	68	18	40.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-16	-RP E-	23+07	24' RT	23.5-25.0	A-2-5 (0)	51	NP	50.3	29.3	13.2	7.2	0	98	65	25	44.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-17	-RP E-	23+35	38' LT	6.0-7.5	A-2-5 (0)	49	NP	52.4	30.9	10.3	6.4	0	99	66	21	31.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-18	-RP E-	12+00	0'	8.5 - 10.0'	A-7-6 (7)	49	24	35.4	21.4	9.4	33.8	0	99	76	46	22.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-19	-RP E-	19+70	30' RT	13.5 - 15.0'	A-2-7 (0)	60	12	40.4	36.5	13.9	9.2	1	98	71	28	49.3	N/D	N/D	N/D	N/D	N/D	N/D
SS-20	-RP E-	20+50	30' RT	28.5 - 30.0'	A-2-7 (0)	52	13	44.4	32.4	14.7	8.5	0	98	69	28	40.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-21	-RP F-	16+60	10' LT	13.5 - 15.0	A-2-4 (0)	40	NP	56.8	32.5	5.7	5.0	0	97	61	14	40.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-22	-W_CONN_REV-	32+40	30' RT	48.5 - 50.0	A-7-5 (22)	73	39	26.0	15.8	10.8	47.4	0	100	83	60	28.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-23	-W_CONN_REV-	33+00	75' RT	23.5 - 25.0'	A-7-5 (23)	65	34	20.9	12.9	3.0	63.2	0	100	87	67	26.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-24	-W_CONN_REV-	34+00	70' RT	13.5 - 15.0'	A-7-5 (21)	63	33	21.3	13.3	1.2	64.2	0	100	87	66	26.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-25	-W_CONN_REV-	36+00	70' RT	18.5 - 20.0'	A-2-4 (0)	31	NP	46.2	28.6	12.4	12.8	0	100	71	30	21.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-26	-EL-	30+00	0'	6.0 - 7.5'	A-2-7 (0)	44	11	25.8	41.7	14.3	18.2	5	91	79	35	18.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-27	-EL-	38+50	0'	3.5 - 5.0'	A-7-6 (19)	61	33	26.7	13.8	10.4	49.1	0	100	83	61	22.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-28	-EL-	5+00	0'	1.0 - 2.5'	A-7-6 (10)	55	27	27.1	21.6	14.1	37.2	9	90	75	49	23.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-29	-RP_WC-	20+00	36' RT	1.0 - 2.5'	A-2-5 (0)	43	NP	62.2	26.6	6.3	4.9	0	99	58	14	22.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-30	-RP F-	21+25	31' RT	1.0 - 2.5'	A-7-6 (28)	63	40	18.1	13.5	7.9	60.5	0	100	89	70	27.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-31	-RP F-	22+92	46' RT	3.5 - 5.0'	A-7-5 (4)	57	19	38.7	24.7	12.1	24.5	0	99	74	40	40.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-32	-RP F-	22+92	46' LT	8.5 - 10.0'	A-2-4 (0)	37	4	49.4	24.8	11.2	14.6	12	82	52	25	29.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-33	-RP F-	20+63	35' RT	13.5 - 15.0'	A-7-5 (27)	75	40	23.9	11.4	7.5	57.2	0	100	83	66	27.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-34	-RP F-	20+89	9' LT	8.5 - 10.0'	A-7-5 (23)	73	35	20.4	17.9	13.4	48.3	0	99	87	64	31.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-35	-RP F-	20+99	54' LT	3.5 - 5.0'	A-7-6 (22)	65	38	22.0	15.0	9.8	53.2	5	95	82	62	24.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-36	-RP F-	28+00	25' RT	8.5-10	A-2-4 (0)	39	NP	44.1	26.1	13.6	16.2	1	97	67	33	22.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-37	-W_CONN_REV-	32+00	75' RT	38.5-40.0	A-5 (0)	52	NP	42.5	27.5	19.3	10.7	0	100	72	36	23.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-38	-W_CONN_REV-	34+50	25' RT	38.5-40.0	A-5 (0)	47	NP	31.7	28.5	22.4	17.4	0	100	80	46	31.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-39	-W_CONN_REV-	35+00	70' RT	40.0-41.5	A-2-4 (0)	35	NP	46.9	24.3	14.4	14.4	0	99	67	33	18.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-40	-W_CONN_REV-	35+50	25' RT	33.5-35.0	A-2-5 (0)	46	NP	44.5	31.7	14.3	9.5	0	99	73	28	24.5	N/D	N/D	N/D	N/D	N/D	N/D
SS-41	-W_CONN_REV-	36+50	25' RT	6.0-7.5	A-7-6 (5)	46	20	38.4	21.1	10.8	29.7	0	100	73	44	27.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-42	-W_CONN_REV-	37+00	75' RT	33.5-35.0	A-2-5 (0)	52	NP	43.8	33.3	13.3	9.6	0	100	73	29	28.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-43	-W_CONN_REV-	38+50	75' RT	6.0-7.5	A-7-6 (8)	44	22	33.7	19.3	10.7	36.3	0	100	76	50	25.5	N/D	N/D	N/D	N/D	N/D	N/D
SS-44	-W_CONN_REV-	39+50	25' RT	13.5-15.0	A-2-4 (0)	30	NP	44.2	26.9	20.1	8.8	7	87	60	30	19.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-45	-W_CONN_REV-	18+50	77' RT	28.5 - 30.0	A-2-4 (0)	31	NP	58.2	27.7	8.6	5.5	0	97	59	17	10.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-46	-W_CONN_REV-	19+50	77' RT	6.0 - 7.5	A-7-6 (3)	41	14	36.6	24.0	11.4	28.0	0	100	76	43	18.7	N/D	N/D	N/D	N/D	N/D	N/D
S-1	-W_CONN_REV-	32+40	30' RT	1.0-5.0	N/D	55	31	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D
S-2	-RP_WC-	14+00	0'	1.0-13.0	A-7-6 (8)	47	15	26.8	15.6	10.1	47.5	0	100	82	60	N/D	N/D	N/D	N/D	N/D	N/D	N/D
ST-1	-RP E-	22+98	63' LT	13.5-15.5	A-5 (0)	60	NP	28.7	42.1	23.0	6.2	0	99	80	37	34.4	N/D	N/D	N/D	N/D	N/D	N/D
ST-2	-RP F-	28+00	25' RT	13.0-15.0	A-2-5 (0)	44	NP	42.7	34.3	17.9	5.1	5	91	68	26	18.8	N/D	79.6	312.5	16.3	172.8	36.0
ST-3	-W_CONN_REV-	34+00	70' RT	10.0-12.0	A-7-5 (14)	60	24	24.2	16.1	13.4	46.3	0	99	96	61	23.5	N/D	116.6	0.0	25.4	97.9	41.3
ST-4	-W_CONN_REV-	37+00	75' RT	23.0-25.0	A-2-4 (0)	36	6	39.8	33.1	18.4	8.7	0	99	76	33	30.7	N/D	93.4	689.8	14.3	316.8	33.5
ST-5	-RP_WC-	14+00	0'	23.0-25.0	A-2-5 (0)	45	4	39.0	30.0	20.0	11.0	0	97	74	34	24.9	N/D	80.6	301.0	12.3	74.9	36.1

N/D - NOT DETERMINED  
LABORATORY TESTING OF SHELBY TUBE SAMPLE ST-1 PERFORMED BY GEOTECHNICS

*Stephanie H. Huffman*

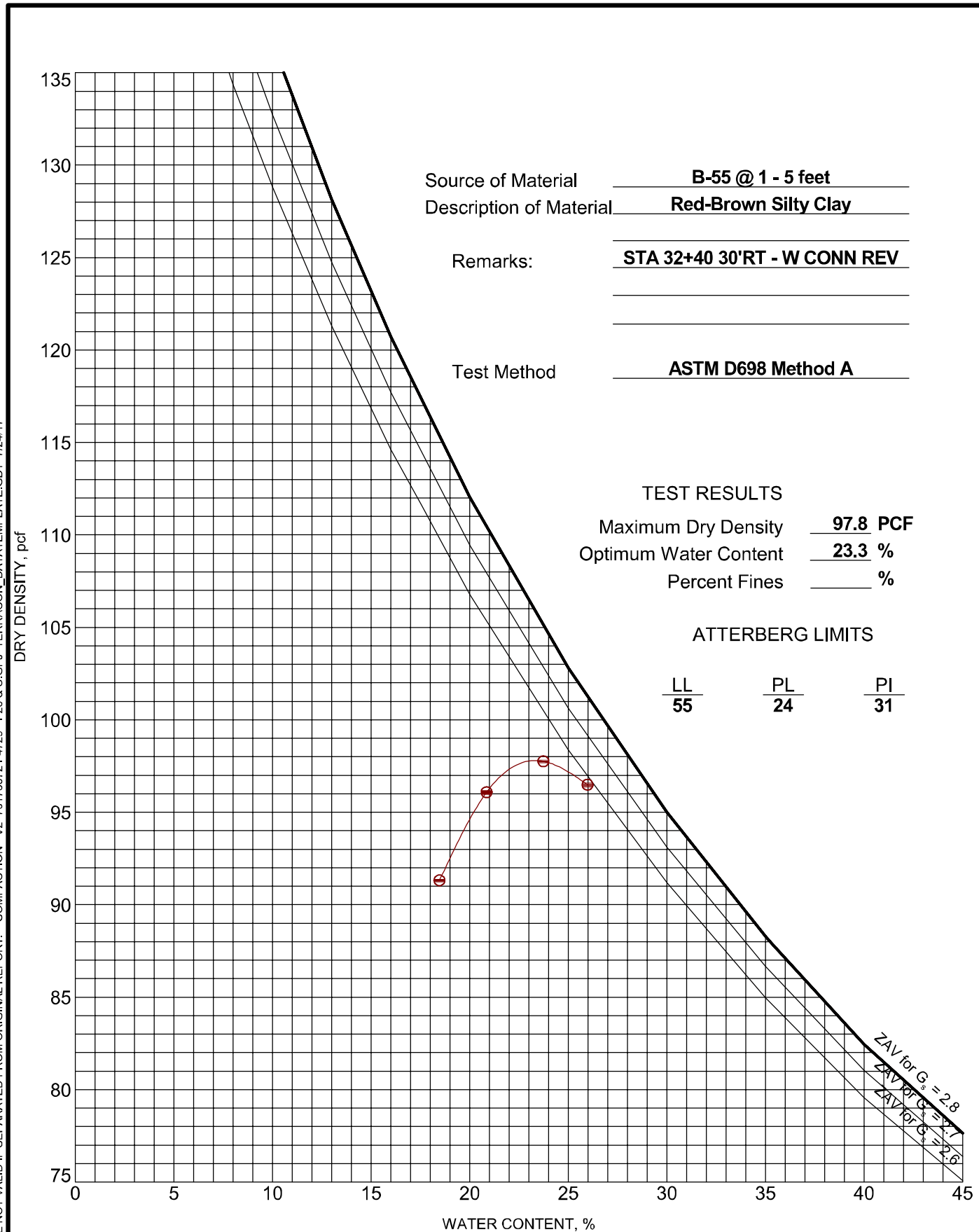
Certified Lab Technician Signature

114-01-1203

Certification Number

# MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: B-55 @ 1 - 5 feet  
 Description of Material: Red-Brown Silty Clay  
 Remarks: STA 32+40 30'RT - W CONN REV  
 Test Method: ASTM D698 Method A

**TEST RESULTS**  
 Maximum Dry Density 97.8 pcf  
 Optimum Water Content 23.3 %  
 Percent Fines %

**ATTERBERG LIMITS**

LL	PL	PI
55	24	31

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 70175072 I-4729 - I-26 & U.G.P.I. TERRACON\_DATATEMPLATE.GDT 7/24/17

PROJECT: I-4729 A- I-26 & US74 Interchange

SITE: E Mills Street  
Columbus, NC



PROJECT NUMBER: 34343.1.4

CLIENT: Parsons  
5540 Centerview Drive, Suite 217

# REPORT FOR CALIFORNIA BEARING RATIO



2401 Brentwood Road, Suite 107  
Raleigh, NC 27604  
919-873-2211

Service Date: 07/07/17

Report Date: 07/19/17

## Client

NCDOT - Parsons  
5540 Centerview Drive  
Raleigh, NC 27605

## Project

I-26/ US74 Interchange Modifications  
Columbus, North Carolina

Project No. 34343.1.4

## SAMPLE INFORMATION

Sample Number:	S-1	Proctor Method:	AASHTO T99 - Method A
Boring Number:	B-55	Maximum Dry Density (pcf):	97.8
Sample Location:	STA 32+40 30' RT -W_CONN_REV-	Optimum Moisture:	23.3
Depth:	1 - 5.0'	Liquid Limit:	55
Material Description:	Red-Brown Silty Clay	Plasticity Index:	31

## CBR TEST DATA

CBR Value at 0.100 inch 6.9  
 CBR Value at 0.200 inch 7.5

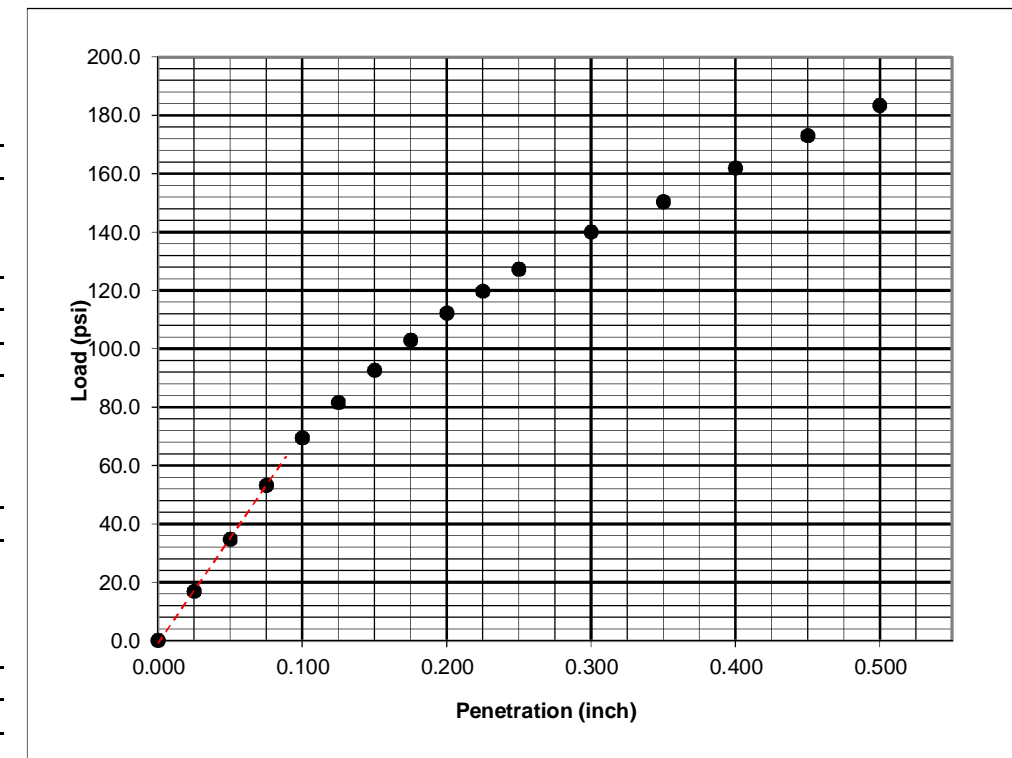
Surcharge Weight (lbs) 10  
 Soaking Condition Soaked  
 Length of Soaking (hours) 96  
 Swell (%) 0.2

## DENSITY DATA

Dry Density Before Soaking (pcf) 98.2  
 Compaction of Proctor (%) 100.4

## MOISTURE DATA

Before Compaction (%) 24.9  
 After Compaction (%) 25.4  
 Top 1" After Soaking (%) 26.1  
 Average After Soaking (%) 25.8



## Comments:

Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Daryl Lee

Reported To: Buddy Riggs

Contractor:

Report Distribution

Reviewed by:

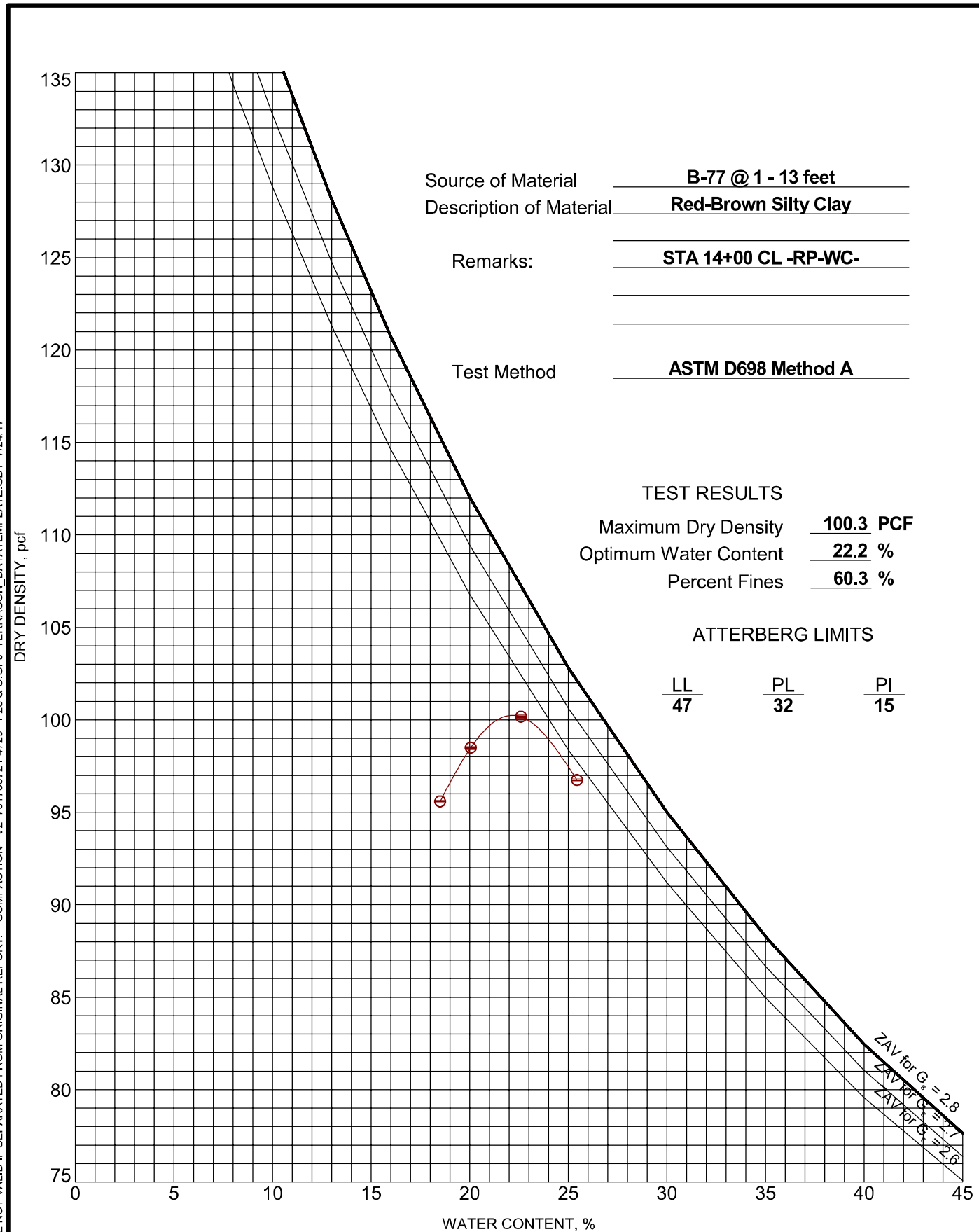
Buddy Riggs PE  
Geotechnical Project Manager

Test Methods: AASHTO T193

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

# MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: B-77 @ 1 - 13 feet  
 Description of Material: Red-Brown Silty Clay  
 Remarks: STA 14+00 CL -RP-WC-  
 Test Method: ASTM D698 Method A

**TEST RESULTS**  
 Maximum Dry Density: 100.3 PCF  
 Optimum Water Content: 22.2 %  
 Percent Fines: 60.3 %

**ATTERBERG LIMITS**  
 LL: 47    PL: 32    PI: 15

PROJECT: I-4729A - I-26 & US74 Interchange	<p>2401 Brentwood Rd Ste 107 Raleigh, NC</p>	PROJECT NUMBER: 34343.1.4
SITE: E Mills Street Columbus, NC		CLIENT: Parsons 5540 Centerview Drive, Suite 217

# REPORT FOR CALIFORNIA BEARING RATIO



2401 Brentwood Road, Suite 107  
 Raleigh, NC 27604  
 919-873-2211

Service Date: 07/11/17  
 Report Date: 07/19/17

<b>Client</b> NCDOT - Parsons 5540 Centerview Drive Raleigh, NC 27605	<b>Project</b> I-26/ US74 Interchange Modifications Columbus, North Carolina
Project No. 34343.1.4	

## SAMPLE INFORMATION

Sample Number: <u>S-2</u>	Proctor Method: <u>AASHTO T99 - Method A</u>
Boring Number: <u>B-77</u>	Maximum Dry Density (pcf): <u>100.3</u>
Sample Location: <u>14+00 CL -RP_WC-</u>	Optimum Moisture: <u>22.2</u>
Depth: <u>1-13.0'</u>	Liquid Limit: <u>47</u>
Material Description: <u>Red-Brown Silty Clay</u>	Plasticity Index: <u>15</u>

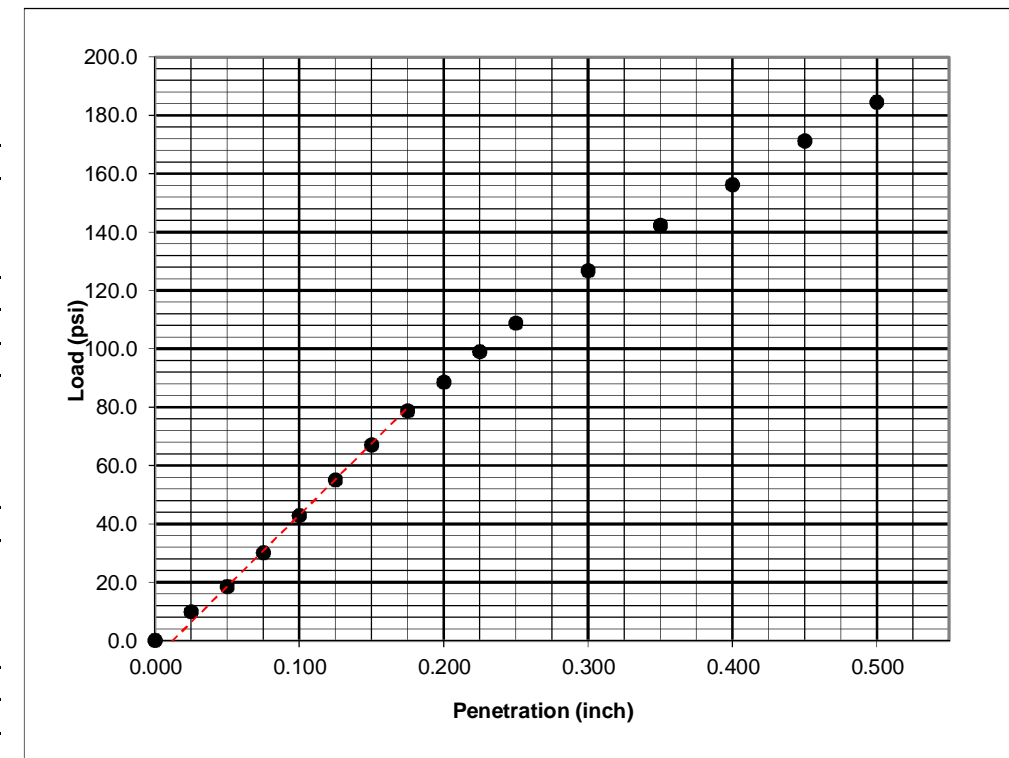
## CBR TEST DATA

CBR Value at 0.100 inch: 4.9  
 CBR Value at 0.200 inch: 6.3

Surcharge Weight (lbs): 10  
 Soaking Condition: Soaked  
 Length of Soaking (hours): 96  
 Swell (%): 0.2

**DENSITY DATA**  
 Dry Density Before Soaking (pcf): 98.7  
 Compaction of Proctor (%): 98.4

**MOISTURE DATA**  
 Before Compaction (%): 24.5  
 After Compaction (%): 23.8  
 Top 1" After Soaking (%): 26.3  
 Average After Soaking (%): 25.3



**Comments:**  
 Services: Obtain soil sample and test for California Bearing Ratio

Terracon Rep: Daryl Lee  
 Reported To: Buddy Riggs  
 Contractor:  
 Report Distribution

Reviewed by: Buddy Riggs PE  
 Geotechnical Project Manager

**Test Methods:** AASHTO T193  
 The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written approval of Terracon. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 70175072 I-4729 - I-26 & U.G.P.I. TERRACON\_DATA\_TEMPLATE.GDT 7/24/17