

NOTE: SEE SHEET 2A 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.	R-5527	1	93
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
17BP.14.R.84	NA	P.E.	
		RAW & UTIL.	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	10+00.00 - 38+16.63	4-6		
-L-	10+00.00 - 38+00.00			7-54

INVENTORY TEXT	3-30
BORING & CORE LOGS	55-84
CORE PHOTOS	85-86
ROCK TEST SUMMARY	87

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.14.R.84 F.A. PROJ. NA
COUNTY Cherokee
PROJECT DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI
TRIBAL BOUNDARY IN CHEROKEE COUNTY

INVENTORY

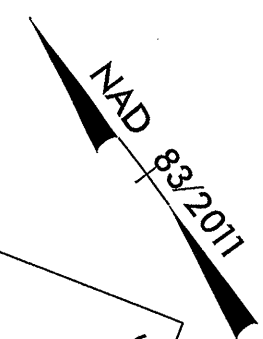
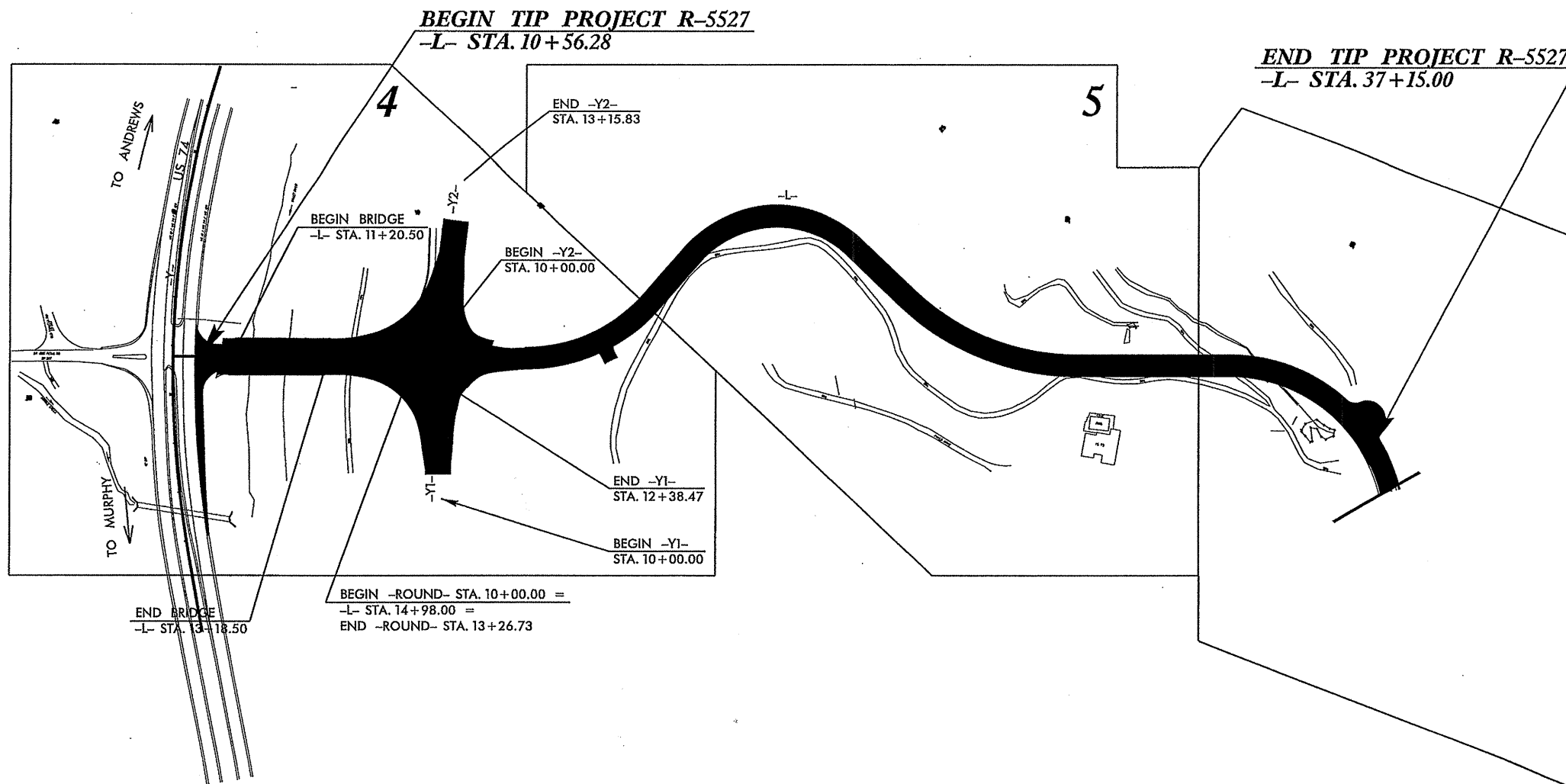
CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACED) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

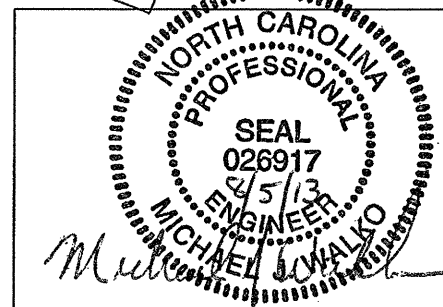
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

CONTRACT: 17BP.14.R.84 ID: R-5527



- PERSONNEL
- R. Kral, E.I.T.
 - M. Brewer, E.I.T.
 - C. Boyce
 - S. Joyner
 - M. Walko, P.E.
 - M. Grabski

INVESTIGATED BY F&R, Inc.
CHECKED BY M. Walko, P.E.
SUBMITTED BY F&R, Inc.
DATE August 2013



DRAWN BY: M. Brewer, E.I.T.

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

02-AUG-2013 11:20 F:\Projects\63R\0047\New Casino Access Rd - Vaughn Melton\Roadway CADD Files\CADD_GEO\TECH\PlanProj\R5527_Geo_inv_tsh.dgn mbrewer AT B3ENG05-LT

CONTRACT: 17BP.14.R.84 TIP PROJECT: R-5527

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

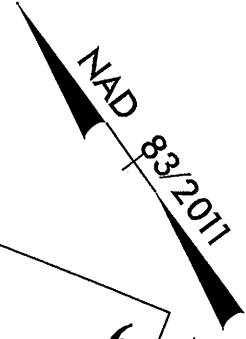
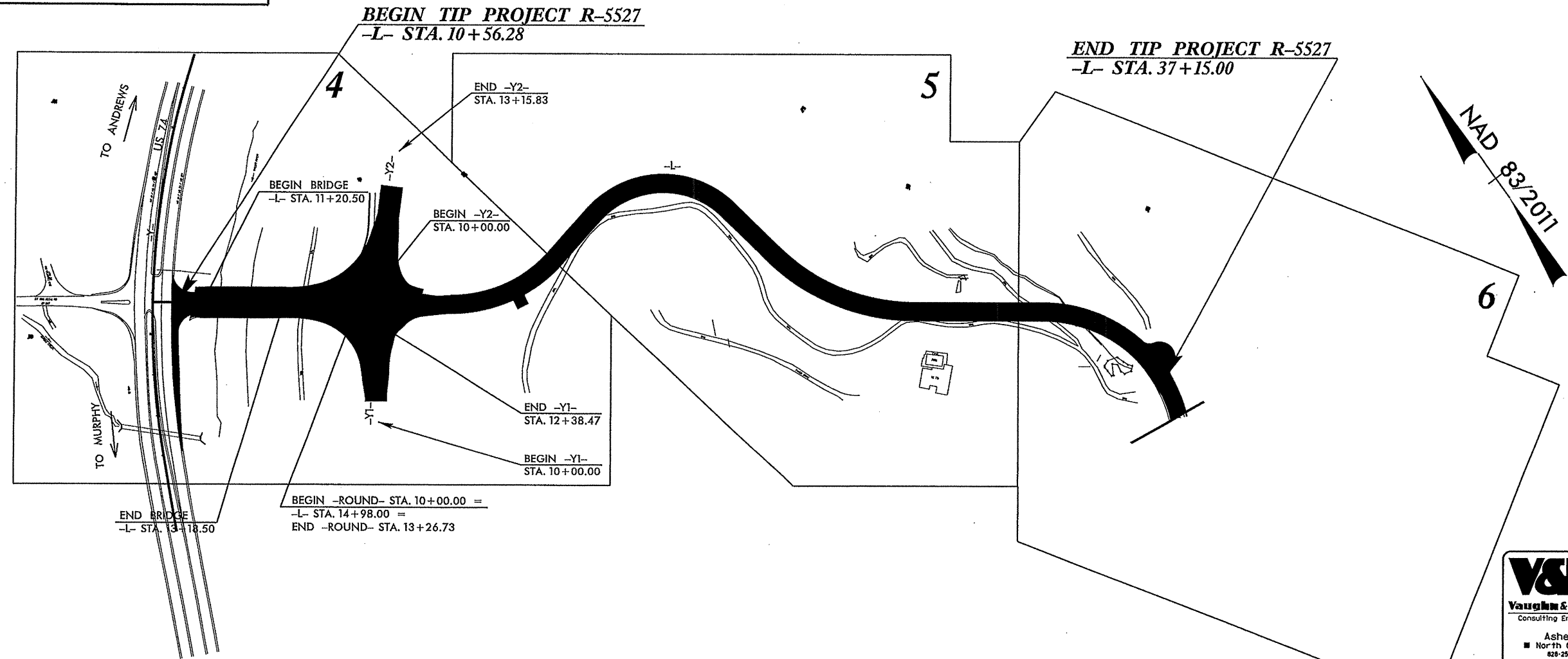
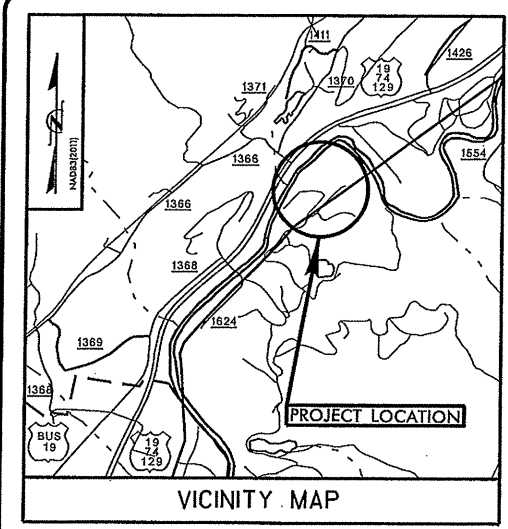
CHEROKEE COUNTY

LOCATION: NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY
IN CHEROKEE COUNTY

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5527	2A	93
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
17BP.14.R.84	NA	P.E.	

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

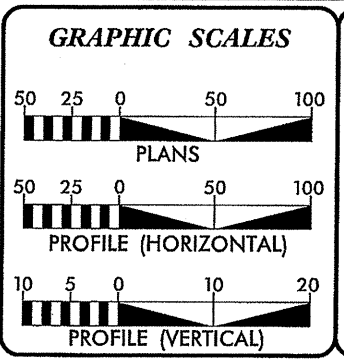


THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ???

V&M
Vaughn & Melton
Consulting Engineers

Charlotte, North Carolina 704-251-0488
Tri-Cities, Tennessee 423-421-8100
Knoxville, Tennessee 865-546-5800
Asheville, North Carolina 828-253-2796
Middlesboro, Kentucky 606-218-6600
Spartanburg, South Carolina 854-534-4715

Copyright © 1994 Vaughn & Melton, Inc. All Rights Reserved.



DESIGN DATA

ADT 2015 = 8000
ADT 2035 = 20400

DHV = 10 %
D = 65 %
T = 9 %
V = 35 MPH

* (TTST 2% + DUALS 7%)

FUNC CLASS =
RURAL ARTERIAL
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5527 = 0.494 MI.
LENGTH STRUCTURES TIP PROJECT R-5527 = 0.038 MI.
TOTAL LENGTH OF TIP PROJECT R-5527 = 0.532 MI.

Prepared in the Office of:
VAUGHN & MELTON
1318-F PATTON AVE.
ASHEVILLE, NC, 28806
FOR NCDOT DIVISION OF HIGHWAYS

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: _____

LETTING DATE:
DECEMBER 15, 2015

HARDY WILLIS, PE
PROJECT ENGINEER

REECE SCHULER, PE
PROJECT DESIGN ENGINEER

NCDOT CONTACT:
BRENDA MOORE, PE
MANAGER OF THE PRIORITY PROJECTS OFFICE

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





Engineering Stability Since 1881

2505 Hutchison-McDonald Road
 Charlotte, North Carolina 28269 | USA
 T 704.596.2889 | F 704.596.3784
 NC Engineering License # F-0266

FROEHLING & ROBERTSON, INC.

August 5, 2013

WBS No.: 17BP.14.R.84
 TIP No.: R-5527
 F.A. Number: N/A
 County: Cherokee

Description: New Route from US 74/19/129 to EBCI Tribal Boundary

SUBJECT: Geotechnical Report – Inventory

Project Description

The project will consist of the construction of a new single span bridge and approximately ½-mile long two lane entrance road to the Eastern Bank of the Cherokee Indians’ second casino near the existing intersection of US Highway 74/19/129 and Regal Road in Murphy, North Carolina. Based on the cross sections and profiles provided to us by Vaughn & Melton, the project will begin at approximate Station 10+00 (-L-) and end at approximate Station 37+15 (-L-) for a total length of approximately 2,816 feet. A roundabout will be constructed at approximate Station 15+50 to provide access to future routes, -Y1- & -Y2-. The proposed roadway generally extends through rolling terrain that is mostly wooded.

In the relatively flat areas of the site between approximate Station 13+50 to Station 17+00, proposed cut and fill depths are generally less than 10 feet. This relatively flat area is composed of existing artificial fill at the ground surface ranging in depths from approximately 40 feet at Station 13+50 to 5 feet at Station 17+00. From approximate Station 17+00 to 37+00, proposed embankment heights are on the order of 10 to 35 feet in height while proposed cut depths are on the order of 20 to 60 feet in height. A soldier pile retaining wall is planned approximately 25 feet right of the proposed center line to be used to retain the toe of the proposed cut slope from Station 29+87 to Station 32+97. Mechanically stabilized earth (MSE) walls will be used to retain fill soils from approximate Station 31+00 to Station 33+27 and from Station 35+00 to Station 37+00 and are located approximately 55 to 93 feet left and 40 to 74 feet right of the centerline, respectively. Soldier pile walls will generally be less than 12 feet high, while MSE wall heights will be on the order of 12 to 25 feet high.

A geotechnical field investigation was performed by F&R between June 20 and July 24, 2013. During this time period, a total of thirty-eight (38) standard penetration test (SPT) borings were advanced with an ATV-mounted CME 550X drill rig with an automatic hammer. In addition, eleven (11) rock sounding borings were completed in order to delineate areas of shallow rock or potentially unsuitable soils. Representative soil samples were collected for visual classification in the field and for laboratory analysis by F&R’s testing laboratory.

The following alignments were investigated:

<u>Line</u>	<u>Station (±)</u>
-L-	10+00 to 37+15
-Y1-	10+00 to 12+38
-Y2-	10+00 to 13+16

Areas of Special Geotechnical Interest

1) Crystalline Rock: Multiple borings performed on this project encountered rock above or within six feet of the proposed grade. At other borings, crystalline rock was not encountered above or within six feet of the proposed grade, but dependent upon the trend of the rock-line, crystalline rock could be encountered above or within six feet of the proposed grade in adjacent slope areas. The following area was found to contain or may contain crystalline rock above or within six feet of the proposed grade and will likely require ripping or blasting for removal:

<u>Line</u>	<u>Station (±)</u>
-L-	19+25 to 24+75

2) Weathered Rock: Multiple borings performed on this project encountered weathered rock above or within six feet of the proposed grade. At other borings, weathered rock was not encountered above or within six feet of the proposed grade, but dependent upon the trend of the rock-line, weathered rock could be encountered above or within six feet of the proposed grade in adjacent slope areas. The following areas were found to contain or may contain weathered rock above or within six feet of the proposed grade and have a potential to require ripping or blasting for removal:

<u>Line</u>	<u>Station (±)</u>
-L-	18+75 to 26+00
-L-	33+50 to 35+75, left

3) Soft and Loose Soils: The following areas contain relatively soft and/or loose soils that have the potential to cause subgrade problems and embankment stability problems during construction:

<u>Line</u>	<u>Station (±)</u>
-L-	27+00 to 29+50
-L-	29+50 to 33+50, left
-L-	33+50 to 37+15

4) Groundwater: Several borings performed on this project encountered groundwater within six feet of the proposed grade. At other borings, groundwater was not encountered within six feet of the proposed grade, but dependent upon the actual groundwater level, groundwater could be encountered within six feet of the proposed grade in adjacent slope areas. The following areas exhibited or may exhibit groundwater within six feet of the proposed grade, or within 6 feet of the bottom of the anticipated undercut locations:

<u>Line</u>	<u>Station (±)</u>
-L-	35+00 to 37+00

The following areas exhibited groundwater within three feet of existing grade, which has the potential to cause subgrade problems during construction:

<u>Line</u>	<u>Station (±)</u>
-L-	37+00, right

5) Organic Soils: The following locations were found to contain organic-laden soils, which have the potential to cause subgrade problems during construction, embankment instability or long-term settlement problems:

<u>Line</u>	<u>Station (±)</u>
-L-	21+00 to 25+00
-L-	27+00
-L-	33+00 to 36+50

6) Artificial Fill: The following areas encountered artificial fill. It is possible that unsuitable soils within the artificial fill may be encountered that could require undercutting or remedial repairs:

<u>Line</u>	<u>Station (±)</u>
-L-	13+50 to 18+00
-L-	21+00
-L-	25+00 to 27+00
-L-	30+00 to 33+00
-L-	35+00 to 37+00

Physiography and Geology

The project site is located within the Murphy Belt of the Blue Ridge physiographic province of North Carolina. More specifically, it is located near the boundary of the Murphy Marble/Andrews Formation (Zman) and the Mineral Bluff Formation (Zmb). Predominant rock types in these areas are mapped as calcareous to dolomitic biotite schist, quartz schist, and phyllite. Weathered and crystalline rock samples recovered from our borings exhibited the characteristics of all these units. The virgin soils are the residual product of in-place chemical weathering of rock that was similar to the rock presently underlying the site.

The proposed route for the alignment typically runs northwest to southeast. The existing ground surface along the alignment generally slopes upward from an elevation of +/- 1575 feet at the intersection with US HWY 74 to maximum elevation of +/- 1750 feet at proposed Station 21+00. The alignment then generally begins to slope downward from proposed Station 26+50, at an elevation of +/- 1749 to Station 34+00 at an elevation of +/- 1640 feet. The ground surface then generally slopes upward to an elevation of +/- 1675 near the end of the project.

Based on a review of the cross sections provided, cut and fill depths are relatively shallow from approximate Station 13+50 to Station 17+00 where the existing topography is relatively flat. Beyond approximate Station 17+00, the terrain becomes rolling with maximum cut and fill depths on the order of approximately 60 feet and 35 feet, respectively. In general, proposed fill slopes are on the order of 2:1 (H:V) or flatter and cut slopes are typically 2:1 (H:V) at most locations.

The proposed route crosses the Valley River from approximate Station 11+00 to 13+50. The river then diverges away from the site until approximate Station 21+00 where the river runs adjacent to the left side of the alignment until diverging away near the end of the project. In addition, a small stream starts in a wetland area at approximate Station 36+50 right of the alignment and feeds into the Valley River. An additional wetland area is noted at approximate Station 34+50. The stream runs through the middle of the alignment and ends left of the alignment at Station 31+00.

Soils Properties

The subsurface conditions discussed below and those shown on the attached drawings, represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the plan views and cross sections. Sometimes the relatively small sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Soils within the area of this project have been divided into four categories: surficial materials (topsoil), artificial fill, alluvial, and residual soils.

Surficial Materials: Organic laden soils (topsoil/rootmat) were encountered at the surface of all the borings and ranged in thickness from approximately 0.1 to 1.0 feet. Note that a majority of our borings were performed on existing trails along the proposed alignment; therefore, some of the surficial organic laden soils may have been previously removed. Surficial organic laden soil depths in the wooded areas are expected to be greater than the above reported range.

Artificial Fill: Artificial fill (A. F.) soils were encountered below the surficial organic laden soil at borings EB1-A, EB1-B, EB2-A, EB2-B, L_1500, L_1550L, L_1550R, L_1700, L_1800, L_2100R, L_2100R3, L_2500, L_2700R, L_3000R, L_3050R, L_3100R, L_3150R, L_3200R, L_3250R, L_3300R, L_3500R2, L_3600R, L_3660R, and L-3700R. The artificial fill soils generally consisted of sandy or clayey SILT (AASHTO classification A-4, A-5), and silty SAND (A-2-4) with varying amounts of gravel, mica and clay throughout. The SPT N-values in the artificial fill ranged from 2 to 33 blows per foot (bpf) with a majority of the N-values ranging from 3 to 8 bpf. A majority of the lower blow counts were located within the upper 5 feet of the boring. The artificial fill extended to depths ranging from approximately 2 to 37 feet below existing grades.

Alluvial: Alluvial soils were not encountered in the roadway borings performed during this investigation. However, alluvial soils were encountered in the bridge Borings EB2-A and EB2-B. The alluvial soils consisted of sandy SILT (A-4) and silty sandy GRAVEL (A-1-a) with SPT N-values ranging from 5 to 33 bpf. These alluvial soils were encountered at approximate elevations +/- 1533 feet and +/- 1548 feet at depths ranging from 37 to 52 feet below the existing ground surface.

Residual Soils: A majority of the soils encountered on the project were residual soils, and generally consisted of sandy SILT (A-4) and silty SAND (A-2-4) with SPT N-values ranging from 1 to 94 bpf. The N-values generally increased with depth and a majority of the N-values ranged from 10 to 40 bpf. Residual soils with N-values less than 10 bpf were typically encountered within the upper 10 feet of the boring.

Rock Properties

Weathered rock (WR) and/or Crystalline Rock (CR) was encountered at more than half of the boring locations. The weathered rock and crystalline rock was generally sampled as BIOTITE SCHIST. The depth to top of weathered rock/weathered rock lenses varied across the site ranging from approximately 3.5 to 53.5 feet below existing grades. Weathered rock is defined as residual material exhibiting an SPT N-value of at least 100 blows per foot. The SPT N-values in the weathered rock ranged from 100/1.0' to 100/0.2'.

Crystalline Rock (CR) was encountered in 21 borings (L_1965R, L_2100R, L_2300R, L_2500R2, L_3200R, L_3223L, L_3250L, L_3250R, L_3327L, L_3600R, and L_3700) at elevations from approximately 3.5 to 68.5 feet below existing grades. Crystalline rock is defined by SPT refusal (i.e., 60/0.1' or 60/0.0'). In addition to the Crystalline Rock, auger refusal was also encountered at 10 borings L_1800, L_2900, L_3150L, L_3150R, L_3200L, L_3300L, L_3500R2, L_3550R, L_3660R, and L_3700R. Auger refusal is a designation applied to any material that cannot be penetrated by the soil auger, and is typically caused by encountering boulders, hard rock lenses/ledges or bedrock. The nature of the materials causing auger refusal was not explored in these borings, but is anticipated to represent the bedrock surface.

An additional 11 rock soundings were performed to further delineate rock in areas where crystalline rock was encountered within 6 feet of proposed grade. Eight of the rock sounding borings encountered auger refusal (L_2000L, L_2100L, L_2200L, L_2300, L_2400L, L_2400R, L_2200R and L-2250R). The rock soundings that auger refused on Crystalline Rock above or within six feet of the proposed grade were L_2000L, L_2200L, L_2200R, L_2250R, and L_2300.

Rock coring was performed at borings EB1-A and EB1-B after encountering auger refusal. The coring extended from 6.2 to 25.2 feet and 4.4 to 25.4 feet below the existing ground surface after SPT refusal was achieved. The rock consisted of moderately hard to hard, moderately to slightly weathered, Dolomitic Marble with interlayered Quartzite. Isolated zones of lost core recovery were noted within the upper several feet, which may be indicative of the presence of relatively thin soil seams or weathered rock. The Recovery of each core run and the Rock Quality Designation (RQD) of each core run were measured by F&R staff. The strata recovery and RQD are indicated on the cross section. For Boring EB1-A from 6.2 to 25.2 feet, the recovery and RQD were measured to be 95% and 37%, respectively. For Boring EB1-B from 4.4 to 25.4, the recovery and RQD were measured to be 99% and 18%, respectively.

Groundwater Properties

Groundwater levels were measured in the borings both immediately after drilling and after a stabilization period of approximately 24 hours. Stabilized groundwater was encountered in 9 borings (L_1500, L_1700, L_1800, L_3500R2, L_3550R, L_3600R, L_3660R, L_3700, L_3700R) at depths ranging from approximately 1.0 to 12.3 feet below existing grades. The recovered soil samples were generally described as dry or moist above the groundwater level and moist to wet below the groundwater level.

Geotechnical Descriptive Analysis of the Project

Section 1: Section 10+00 to 13+50 (+/-):

Section 1 of the project will consist of a new single-span bridge crossing the Valley River. A separate report titled "Subsurface Investigation and Bridge Foundation Design Recommendations" was issued by F&R on July 22, 2013. Foundation design recommendations were provided in that report.

Section 2: Section 13+50 to 18+50 (+/-):

Section 2 of the project will extend through an area that is relatively flat. Cut depths in this section are anticipated to be 5 feet or less and fill depths are generally on the order of 15 feet or less. The proposed embankments will be designed at a 4:1 (H:V) side slope. The subgrade within the areas of proposed fills is anticipated to consist mainly of firm to stiff sandy silts.

Section 3: Section 18+50 to 27+00 (+/-):

Section 3 of the project will extend through an area that will require deep cuts, on the order of 20 to 60 feet, to reach proposed elevations. The cut slopes on the right side of the alignment are proposed to be a 2:1 (H:V). Cut slopes along the left side of the alignment are generally proposed to be a 6:1 (H:V). However, from approximate Station 26+50 to 27+00, the cut slope steepens to either a 3:1 (H:V) or a 4:1 (H:V), depending on the location. A sliver fill will be required to tie into the existing slope on the left side of the alignment at approximate Station 26+00.

A majority of the excavated soil in the cuts is anticipated to consist mainly of residual sandy silts and silty sands. Very loose and/or very soft near-surface sands/silts are anticipated to be encountered at isolated locations along this section. However; please note that some areas along this section of the alignment encountered weathered rock and crystalline rock within 6 feet of proposed grades. Additional effort to excavate, rip, or blast may be required to reach design elevations.

Section 4: Section 27+00 to 29+50 (+/-):

Section 4 of the project will consist of embankment fill up to approximately 35 feet in height. Embankment slopes will be designed at a 2:1, 3:1, or 4:1. The subgrade within the areas of the proposed fills is anticipated to mainly consist of sandy silts and silty sands. Very soft near-surface sandy silts are anticipated to be encountered in the vicinity of approximate Station 29+00.

Section 5: Section 29+50 to 33+50 (+/-):

Section 5 of this project will consist of cuts on the order of approximately 15 feet and fills up to approximately 25 feet. A soldier pile wall to retain the cut soils will be constructed on the right side of the alignment from Station 29+87 to Station 32+97. The maximum height of the wall will be approximately 12.5 feet. Excavation in the cuts is anticipated to consist mainly of artificial fill and residual soils consisting of sandy silts and silty sands. In this section, very loose/soft near-surface sands/silts were encountered along the right side of the alignment. Shallow weathered rock or crystalline rock within six feet of the proposed grade is not anticipated to be encountered in this section.


Along the left side of the alignment, a mechanically stabilized earth (MSE) wall is proposed to retain fill soils from approximate Station 31+00 to Station 33+27. Wall heights in this section will be approximately 20 feet or less. The slopes above the wall are proposed at a 2:1 (H:V). The subgrade within the areas of the proposed MSE walls is anticipated to mainly consist of very soft/soft sandy silts and very loose/loose silty sands.


Section 6: Section 33+50 to 37+15 (+/-):

Section 6 of this project will consist of fills up to approximately 35 feet in height. The embankment slopes will be designed at a 2:1 (H:V) or flatter. A mechanically stabilized earth (MSE) wall will be used to retain fill soils from approximate Station 35+00 to Station 37+00. Wall heights in this section will be approximately 25 feet or less. The embankments from the top of the wall to subgrade elevations will be designed at a 2:1 (H:V). Shallow cuts on the order of 3 to 6 feet in depth are proposed along the left side of the alignment in this section. The embankments for the cut portions of this section are typically designed at a 2:1 (H:V). The subgrade within the areas of proposed fills is anticipated to consist mainly of very soft to soft sandy silts and very loose to loose silty sands.

Please do not hesitate to contact us if you have any questions regarding this report or if you need additional services.

Sincerely,
FROEHLING & ROBERTSON, INC.


D. Matthew Brewer, E.I.
Transportation Staff Professional


Michael J. Walko, P.E.
Senior Geotechnical Engineer
NC License No. 26917
8/5/13

Appendix A**Bulk Samples**

The following bulk samples were obtained and transported to our laboratory for potential testing to determine the engineering properties of the soil:

Sample No.	Boring No.	Line	Station	Offset	Depth (ft)	Test(s) Performed
CBR-1	L_1500	-L-	15+00	CL	1.0 – 4.0	California Bearing Ratio
CBR-2	L_2100R	-L-	21+00	7' Rt	2.0 – 5.0	California Bearing Ratio
CBR-3	L_2500	-L-	25+00	CL	2.0 – 5.0	California Bearing Ratio
RT-1	L_2500	-L-	25+00	CL	2.0 – 5.0	Remolded Triaxial Shear Testing

Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: R-5527B

COUNTY: Cherokee

DATE: 11/26/2013

COMPILED BY: RMS

SHEET 1 OF 1 SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE				
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +15%		ROCK	SUITABLE	UNSUIT.	TOTAL	
-L- 10+56.28	-L- 10+96.52	113				113							113			113
-Y- 27+00	-Y- 30+00	73				73					60					
	SUBTOTAL	186				186	116		116	133	60			113		113
-L- 13+42.48	-L- 38+06.67	264,779	10,243	3,800		254,536	86,568	10,243	76,325	98,017			166,762	3,800		170,562
-Y1- 11+05.00	-Y1- 12+38.47						718		718	826	826					
-Y2- 10+50	-Y2- 11+10.00						822		822	945	945					
-ROUND- 10+00	-ROUND- 13+26.73						4,924		4,924	5,663	5,663					
	SUBTOTAL	264,779	10,243	3,800		254,536	93,032	10,243	82,789	105,451	7,434			166,762	3,800	170,562
	SUBTOTAL															
	SUBTOTAL															
	TOTAL	264,965	10,243	3,800		254,722	93,148	10,243	82,905	105,584	7,494			166,875	3,800	170,675
LOSS DUE TO CLEARING & GRUBBING		-2,450				-2,450								-2,450		-2,450
ADDITIONAL UNDERCUT				2,100			2,100		2,100	2,415	2,415			2,100		2,100
WASTE IN LIEU OF BORROW											-9,909			-9,909		-9,909
	PROJECT TOTAL	262,515	10,243	5,900		252,272	95,248	10,243	85,005	107,999				154,516	5,900	160,416
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT																
	GRAND TOTAL	262,515	10,243	5,900		252,272	95,248	10,243	85,005	107,999				154,516	5,900	160,416
	SAY	262,600		5,900												

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

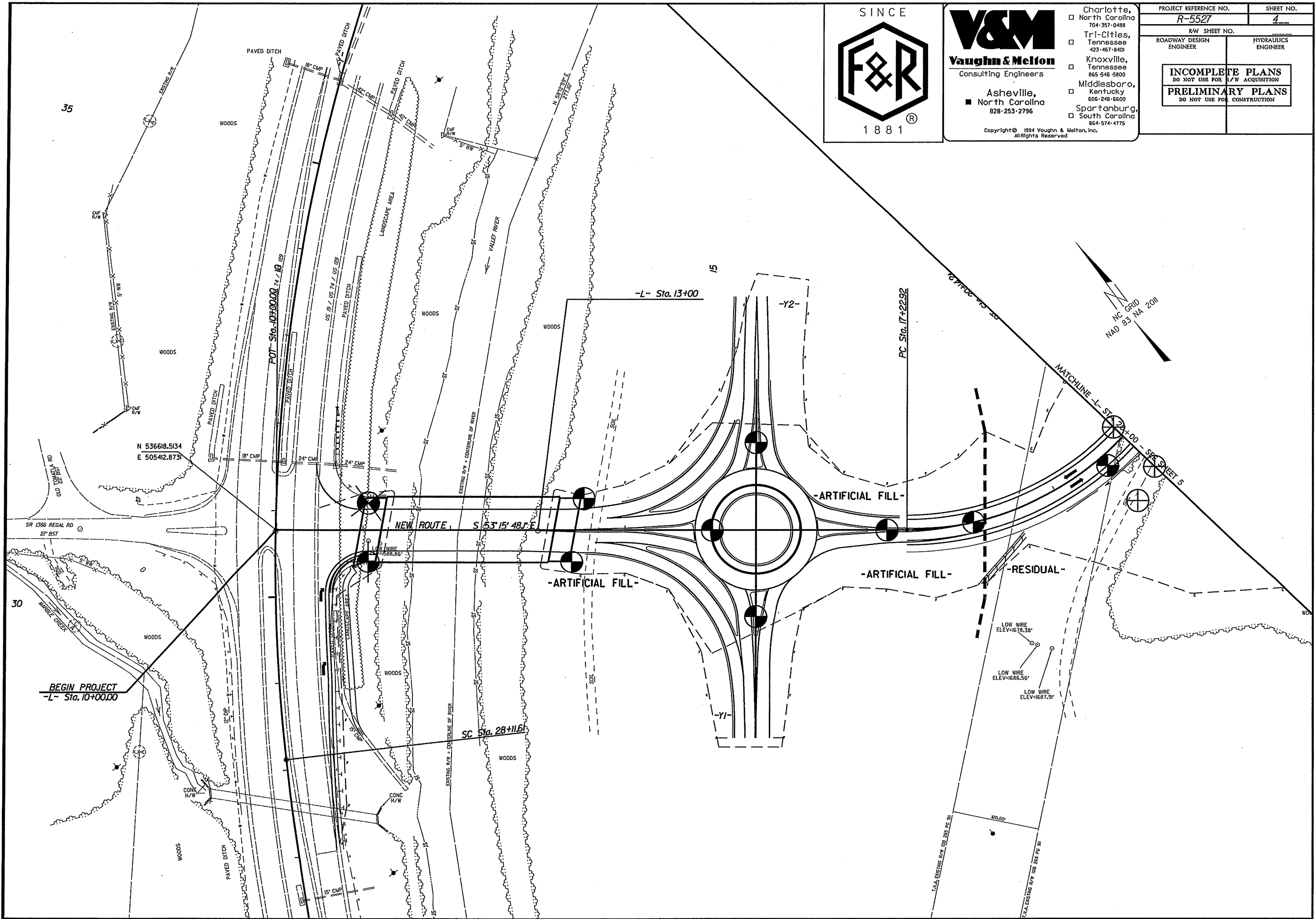
EST. DDE = 30 CUBIC YARDS

CLASS IV SUBGRADE STABILIZATION = 400 TONS

SELECT GRANULAR MATERIAL = 4,000 CUBIC YARDS

GEOTEXTILE FOR SOIL STABILIZATION = 2,300 SY

PER GEOTECH RECOMMENDATION, ESTIMATED 200 CUBIC YARDS OF SHALLOW UNDERCUT TO USED AT THE DISCRETION OF THE ENGINEER.



V&M
Vaughn & Melton
 Consulting Engineers

Asheville,
 North Carolina
 828-253-2795

Charlotte,
 North Carolina
 704-357-0488
 Tri-Cities,
 Tennessee
 423-467-8401
 Knoxville,
 Tennessee
 865-546-5800
 Middlesboro,
 Kentucky
 606-248-6600
 Spartanburg,
 South Carolina
 864-574-4775

Copyright © 1994 Vaughn & Melton, Inc.
 All Rights Reserved

PROJECT REFERENCE NO. R-5527	SHEET NO. 4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



V&M
Vaughn & Melton
 Consulting Engineers

Charlotte, North Carolina 704-357-0488
 Tri-Cities, Tennessee 423-467-8401
 Knoxville, Tennessee 865-546-9800
 Middlesboro, Kentucky 606-248-6600
 Spartanburg, South Carolina 854-574-4715

Asheville, North Carolina 828-253-2796

Copyright © 1994 Vaughn & Melton, Inc. All Rights Reserved

PROJECT REFERENCE NO. R-5527	SHEET NO. 5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

HUBERT WELLS, JONATHAN WELLS &
 BRIAN WELLS
 DB 720 PG 199

HUBERT WELLS, JONATHAN WELLS &
 BRIAN WELLS
 DB 720 PG 199

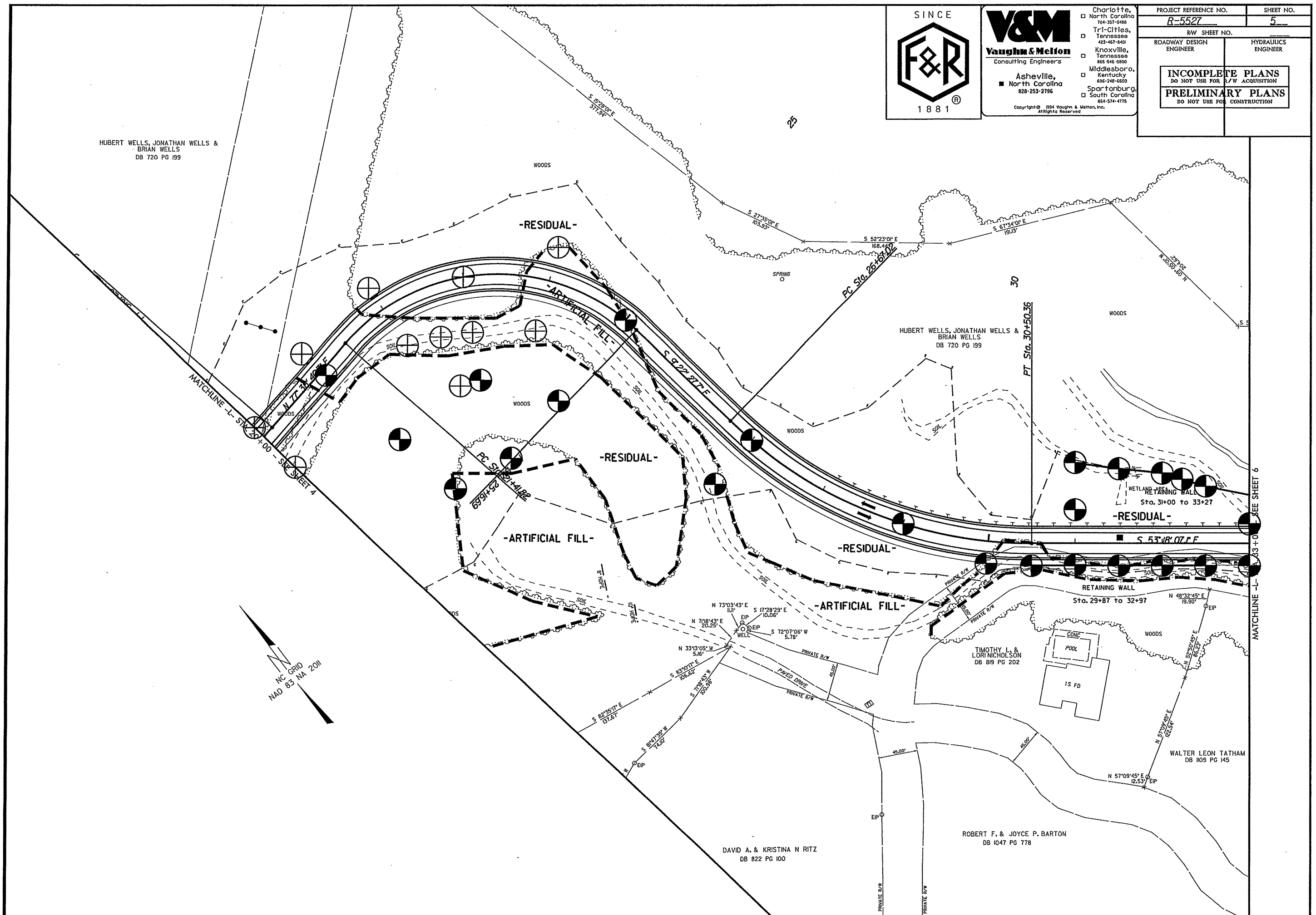
TIMOTHY L. &
 LORIN NICHOLSON
 DB 819 PG 202

WALTER LEON TATHAM
 DB 809 PG 145

ROBERT F. & JOYCE P. BARTON
 DB 1047 PG 778

DAVID A. & KRISTINA N RITZ
 DB 822 PG 100

NC GRID
 NAD 83 NA 2011



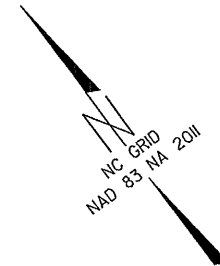
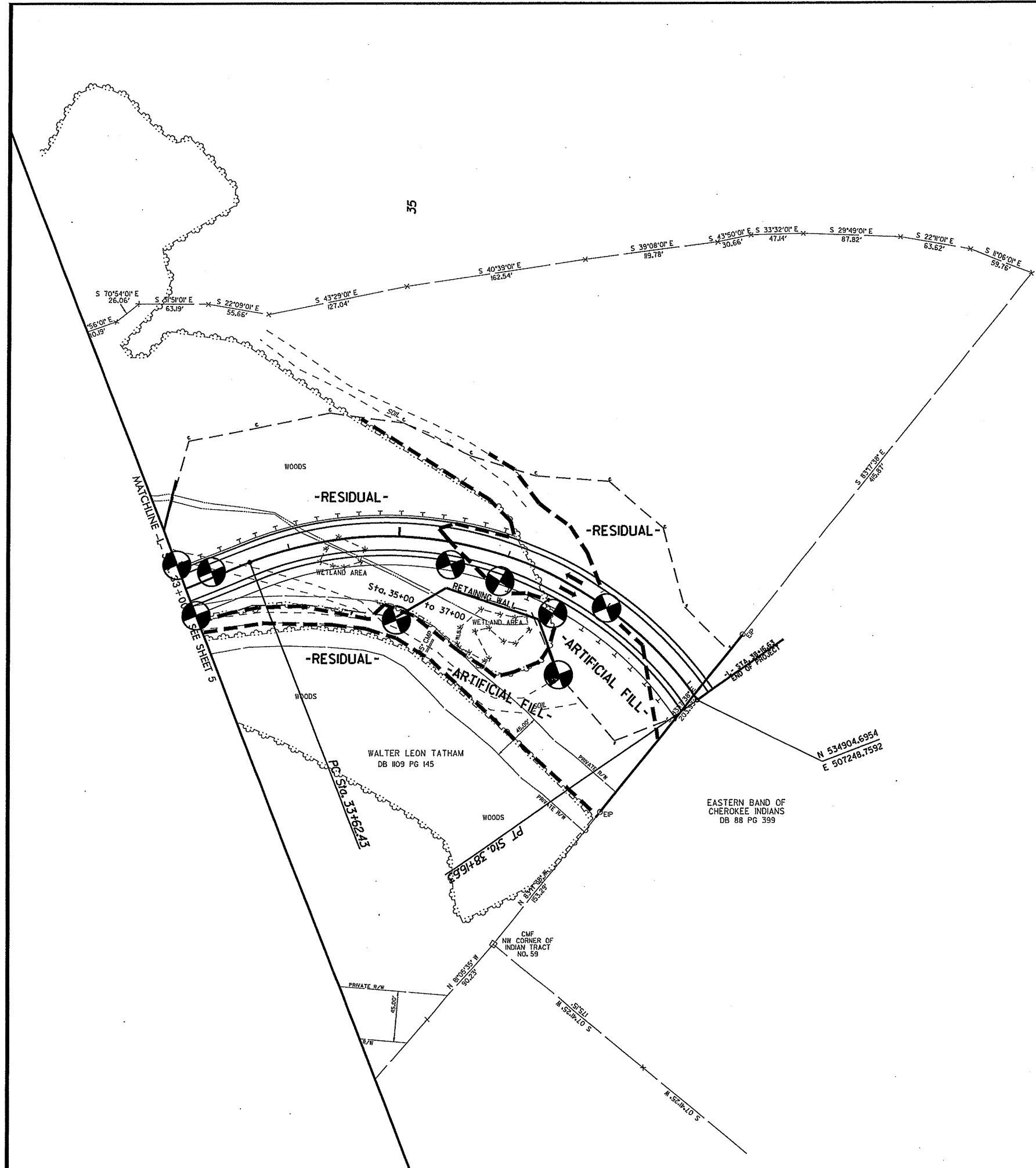


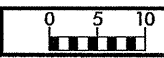
Asheville,
North Carolina
828-253-2796

Copyright © 1994 Vaughn & Melton, Inc.
All Rights Reserved

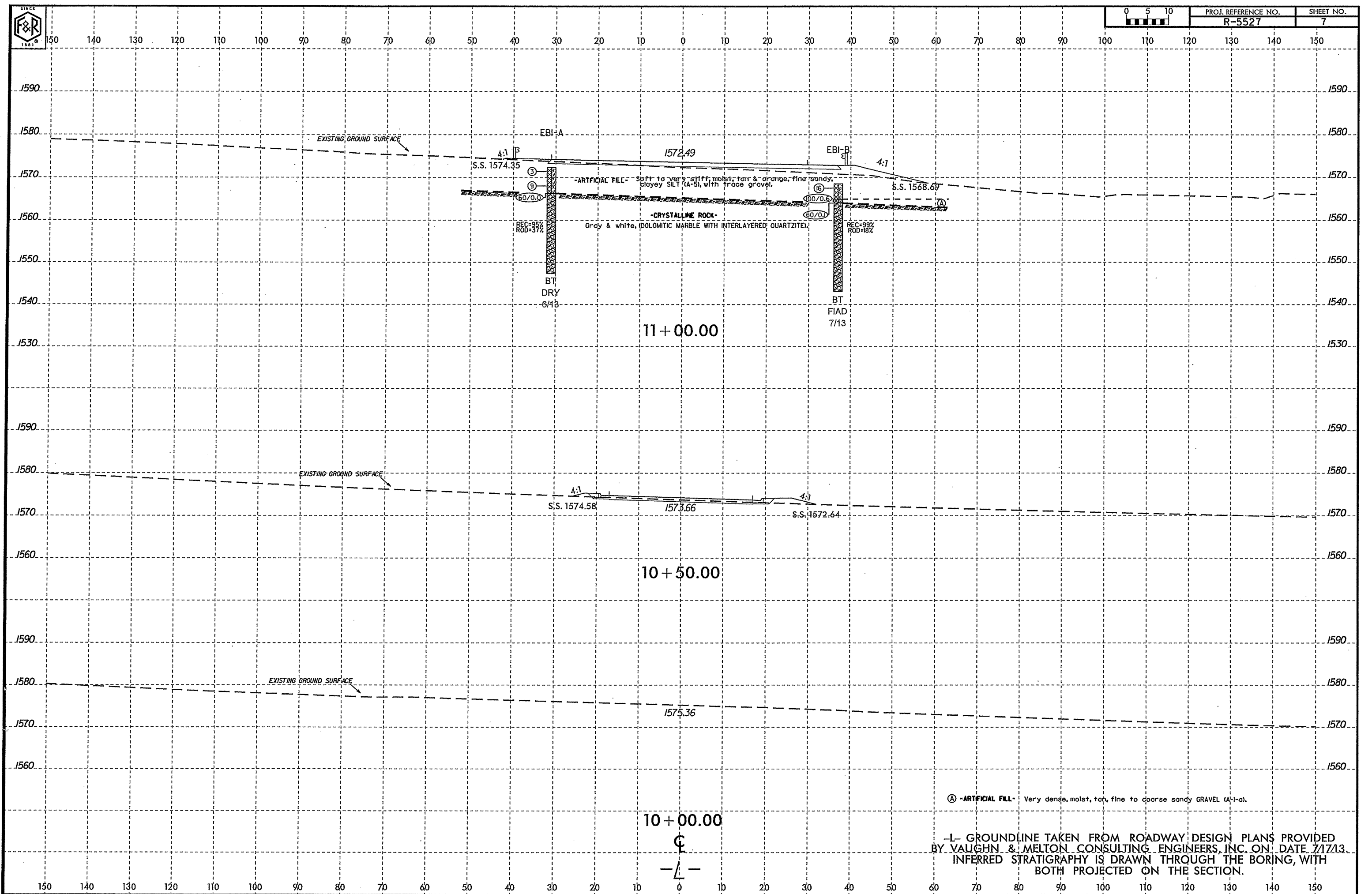
Charlotte,
North Carolina
704-357-0488
Tri-Cities,
Tennessee
423-467-8401
Knoxville,
Tennessee
865-546-5800
Middlesboro,
Kentucky
606-248-6600
Spartanburg,
South Carolina
864-574-4775

PROJECT REFERENCE NO. R-5527	SHEET NO. 6
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	





PROJ. REFERENCE NO.	SHEET NO.
R-5527	7



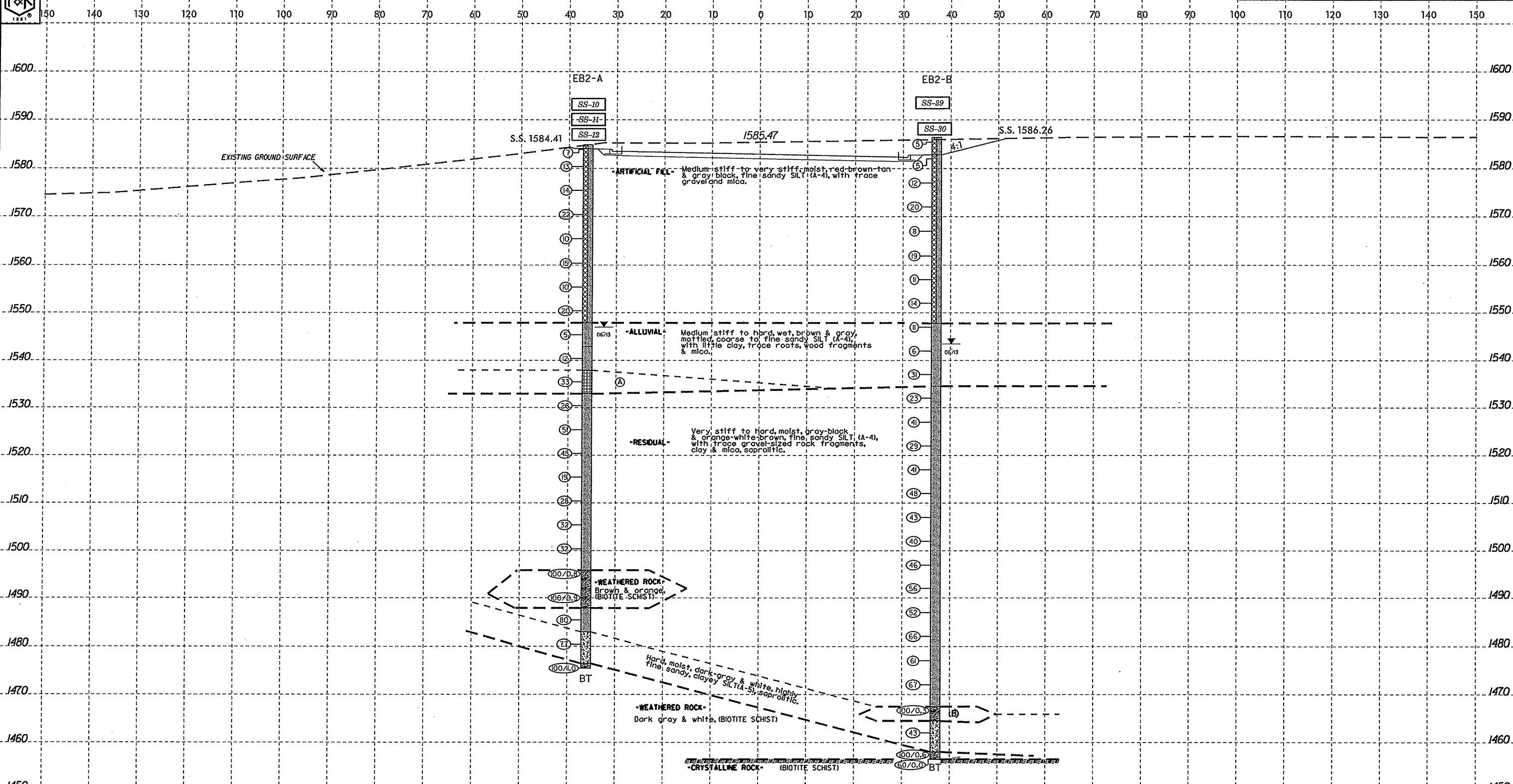
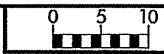
11 + 00.00

10 + 50.00

10 + 00.00

(A) -ARTIFICIAL FILL- Very dense, moist, tan, fine to coarse sandy GRAVEL (A-1-a).

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

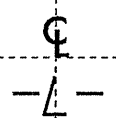


SOIL TEST RESULTS

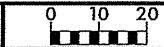
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	36' LT.	13+53	38.5'-40.0'	A-4(A)	36	10	11.0	40.7	28.0	20.3	100.0	96.7	66.3	32.7	NT
SS-11	36' LT.	13+53	43.5'-45.0'	A-4(6)	35	8	1.4	32.7	43.7	22.2	100.0	99.6	76.2	28.0	NT
SS-12	36' LT.	13+53	48.5'-50.0'	A-1-a(0)	25	3	57.8	22.4	16.3	3.5	48.9	24.5	12.8	14.7	NT
SS-29	37' RT.	13+39	43.5'-45.0'	A-4(0)	25	1	4.8	56.1	60.9	8.2	100.0	99.7	52.0	25.5	NT
SS-30	37' RT.	13+39	48.5'-50.0'	A-4(0)	18	1	17.4	39.5	32.6	10.5	75.2	67.0	42.5	13.4	NT

- Ⓐ -ALLUVIAL- Dense, wet, gray, silty, fine to highly coarse sandy GRAVEL (A-1-a), with trace clay.
- Ⓑ -RESIDUAL- Hard, moist, brown & orange, fine sandy SILT (A-4), with trace mica, saprolitic.

13+50.00



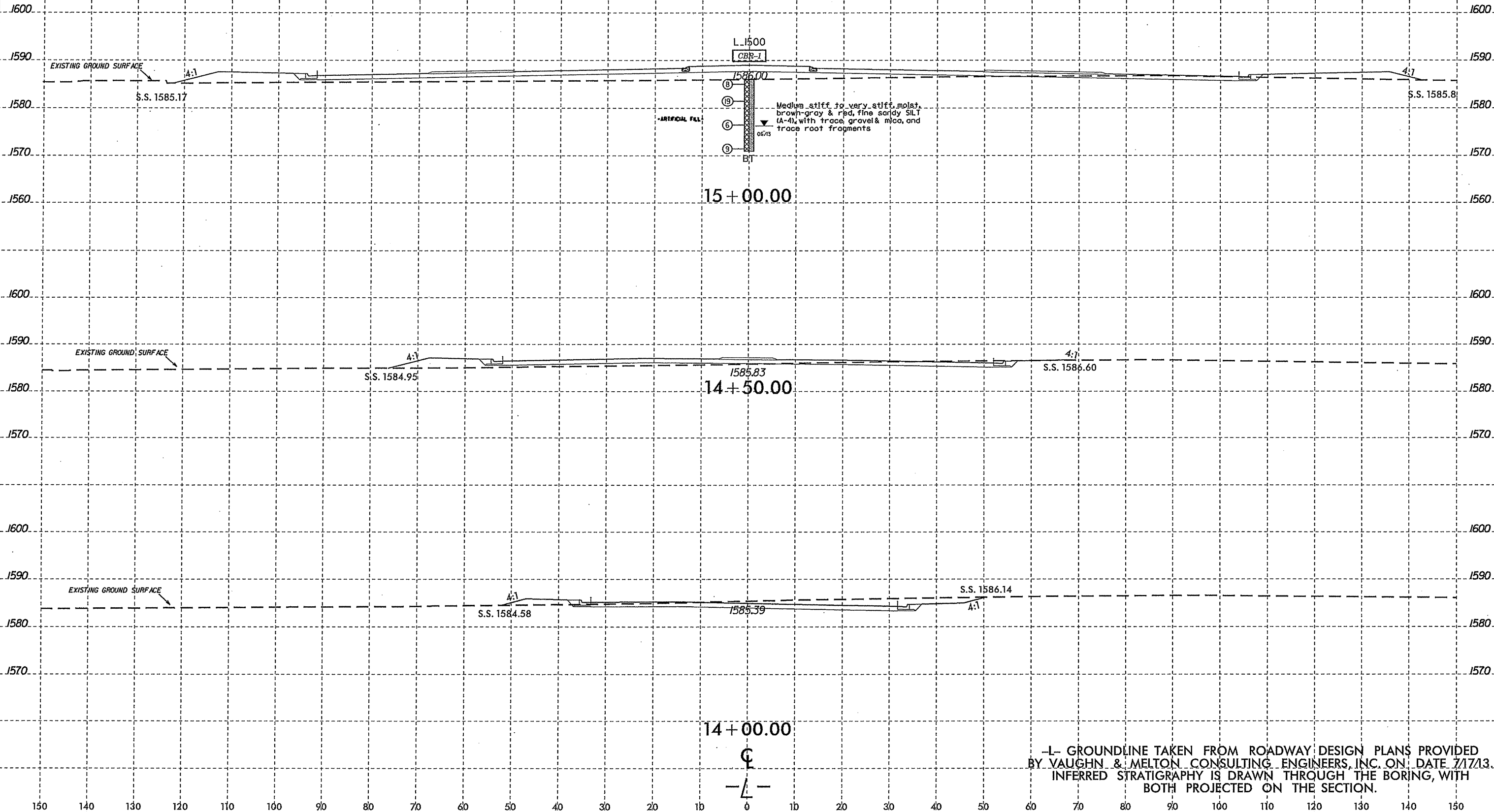
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



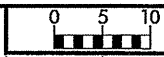
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

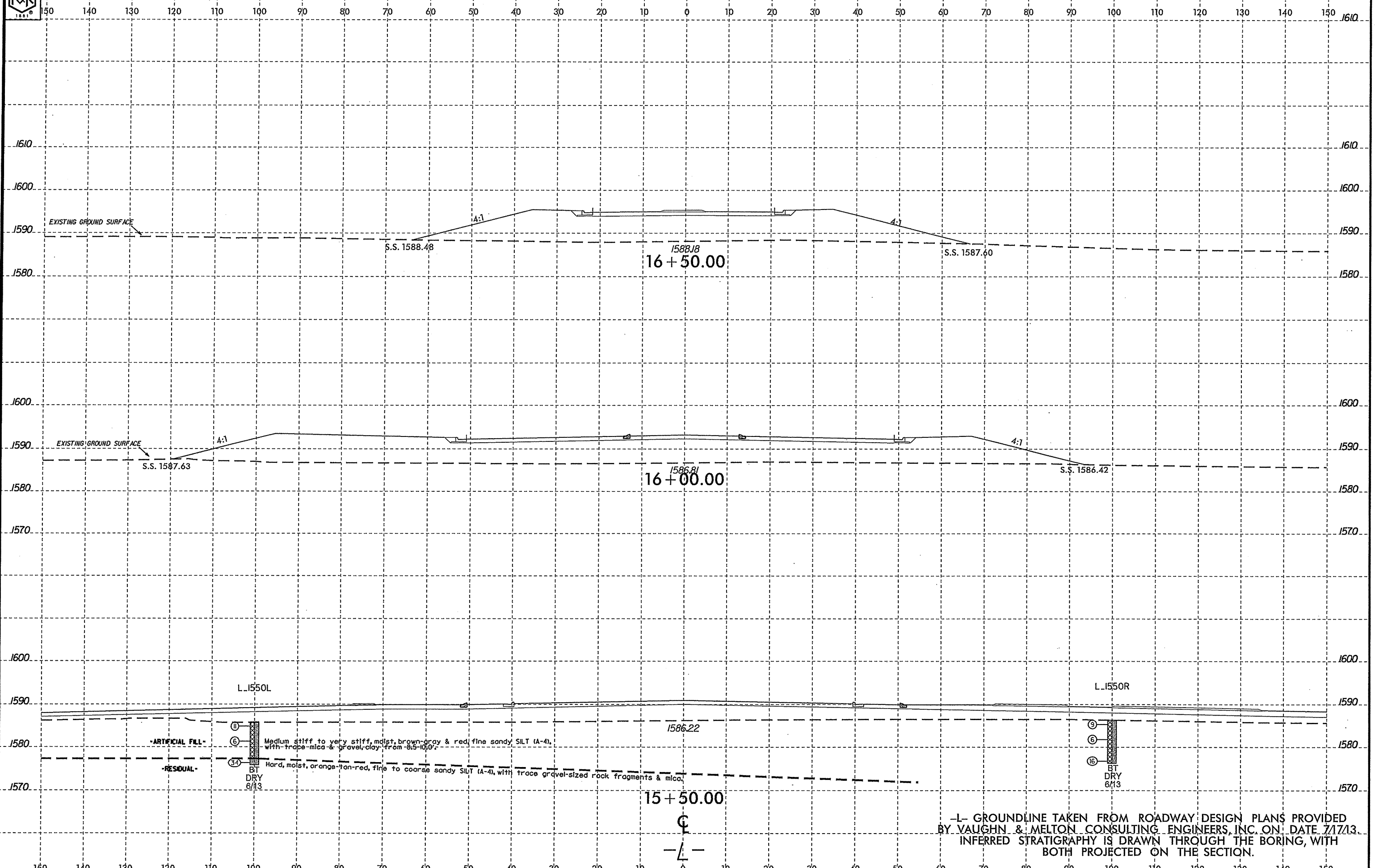
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	-10-	-40-	-200-		
CBR-1	CL	15+00	1.0'-4.0'	A-4(0)	32	1	19.9	41.4	27.0	11.7	86.5	76.8	48.6	18.3	NT



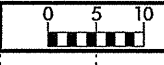
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



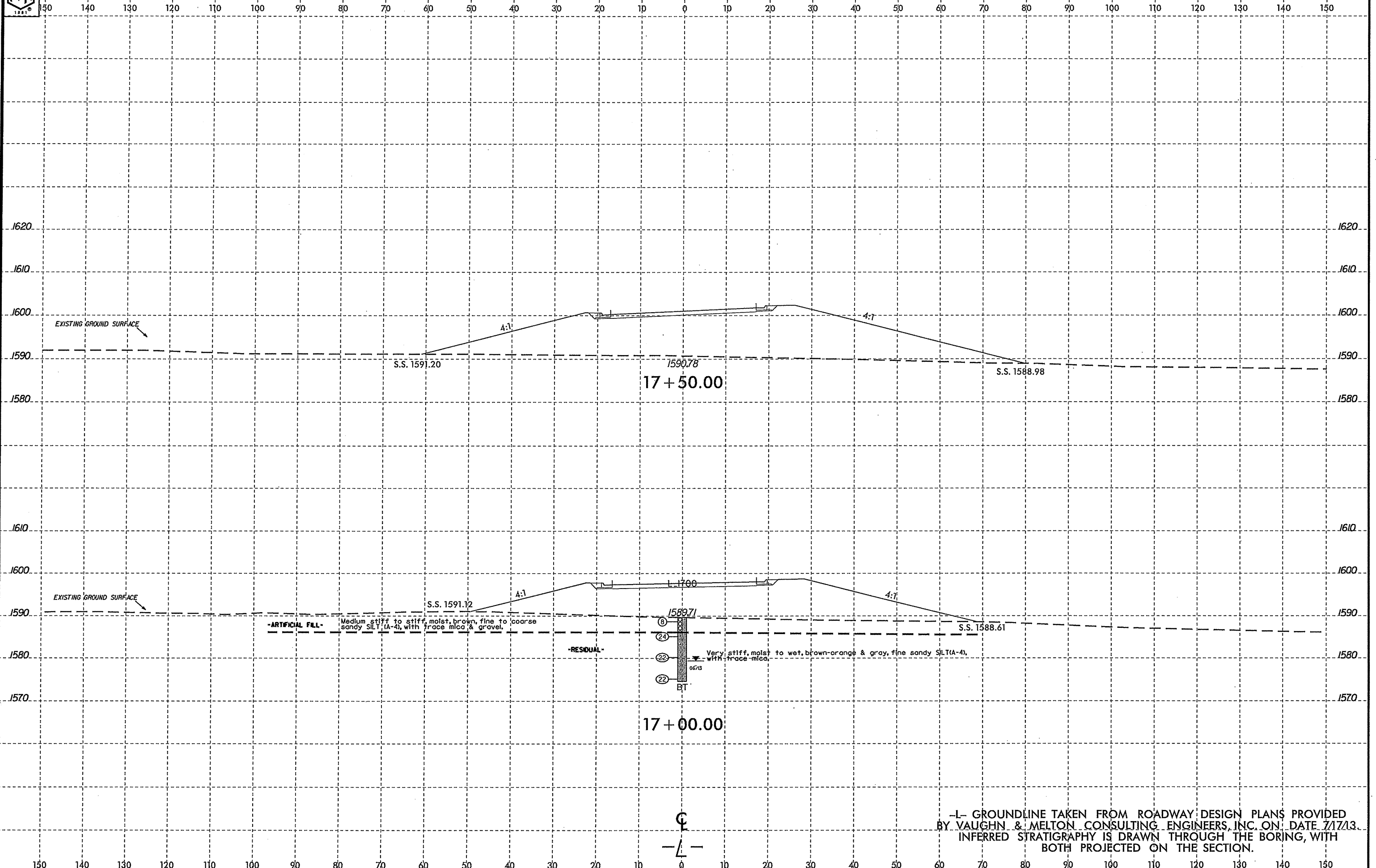
PROJ. REFERENCE NO.	SHEET NO.
R-5527	10



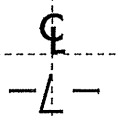
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

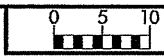


PROJ. REFERENCE NO.	SHEET NO.
R-5527	11



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

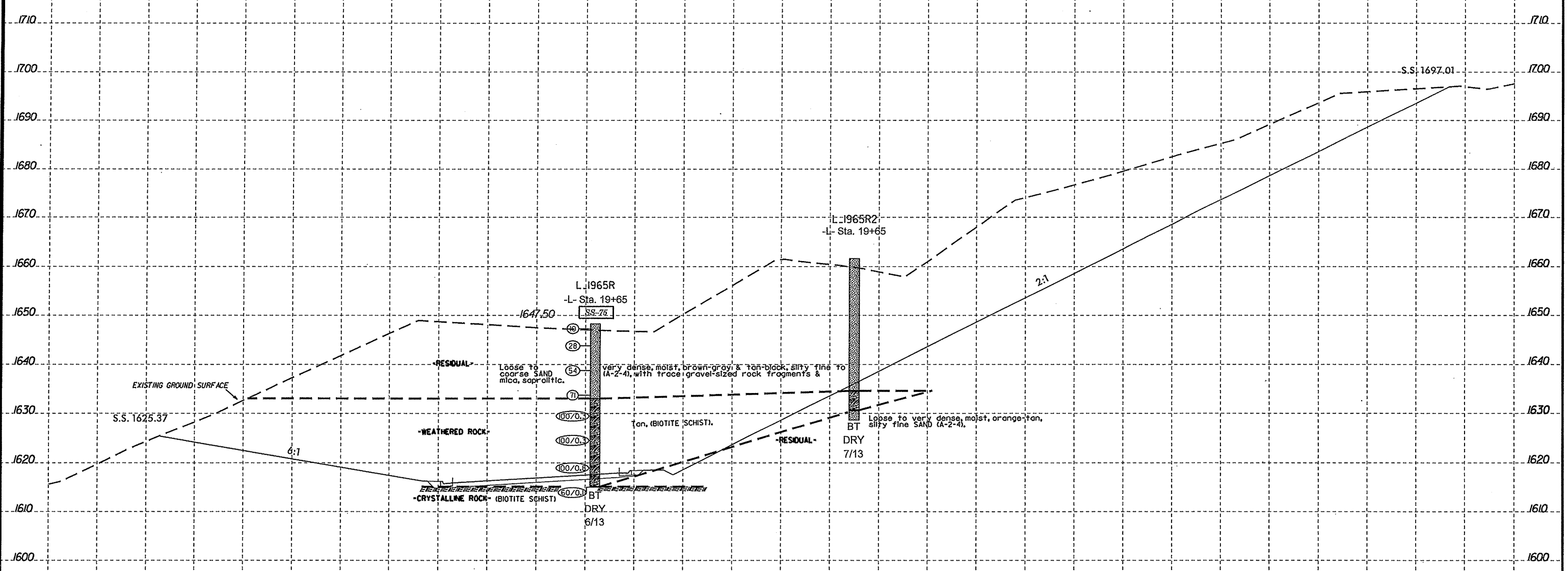




100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

SOIL TEST RESULTS

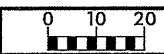
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-75	12' RT.	19+65	3.5'-5.0'	A-2-4(0)	30	3	18.0	50.0	23.1	8.9	71.1	62.4	32.4	16.0	NT



19+50.00
C
-L-

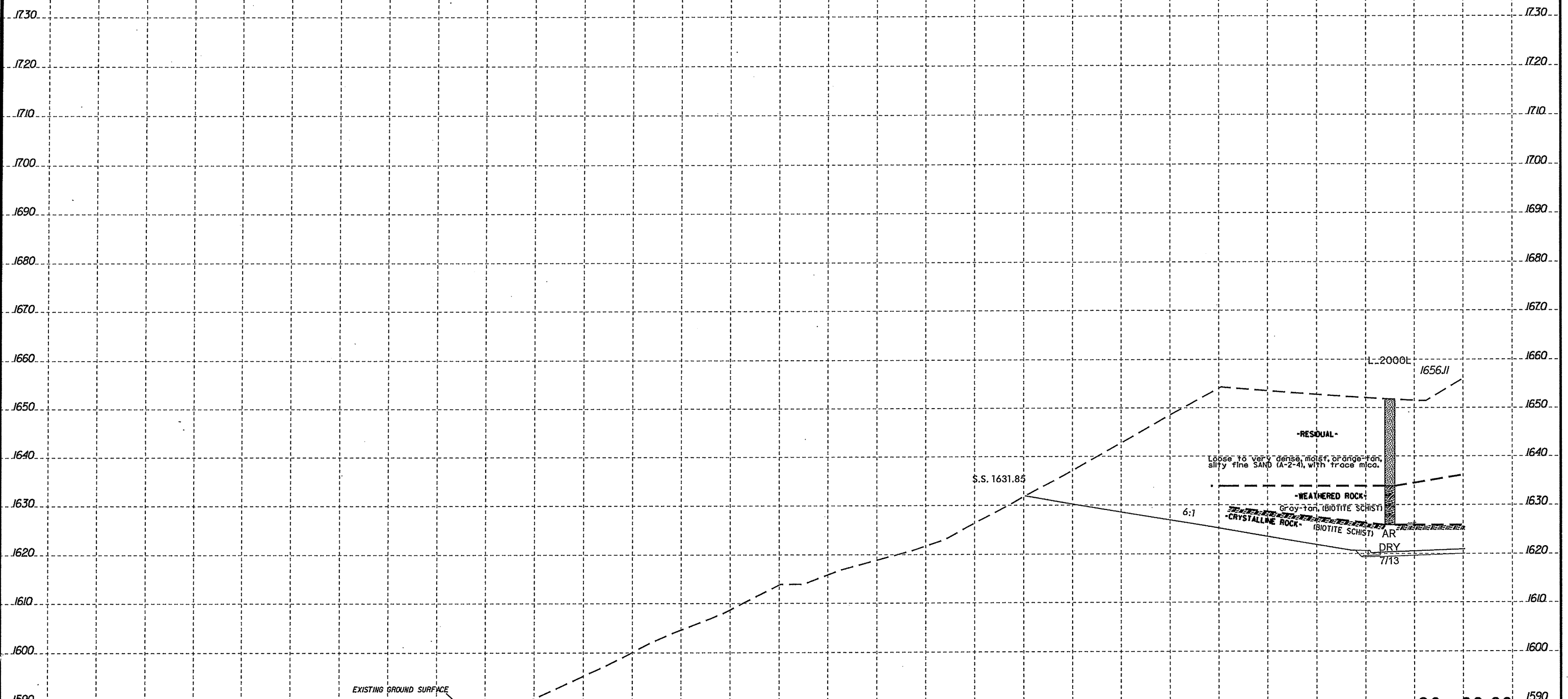
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200



PROJ. REFERENCE NO.	SHEET NO.
R-5527	14

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



EXISTING GROUND SURFACE

S.S. 1631.85

-RESIDUAL-
Loose to very dense, moist, orange-buff, silty fine SAND (A-2-4), with trace mica.

-WEATHERED ROCK-
Gray-ton, BIOTITE SCHIST

-CRYSTALLINE ROCK-
BIOTITE SCHIST

6:1

L-2000L

1656.11

DRY

77.13

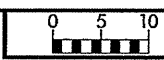
20+00.00

⊕

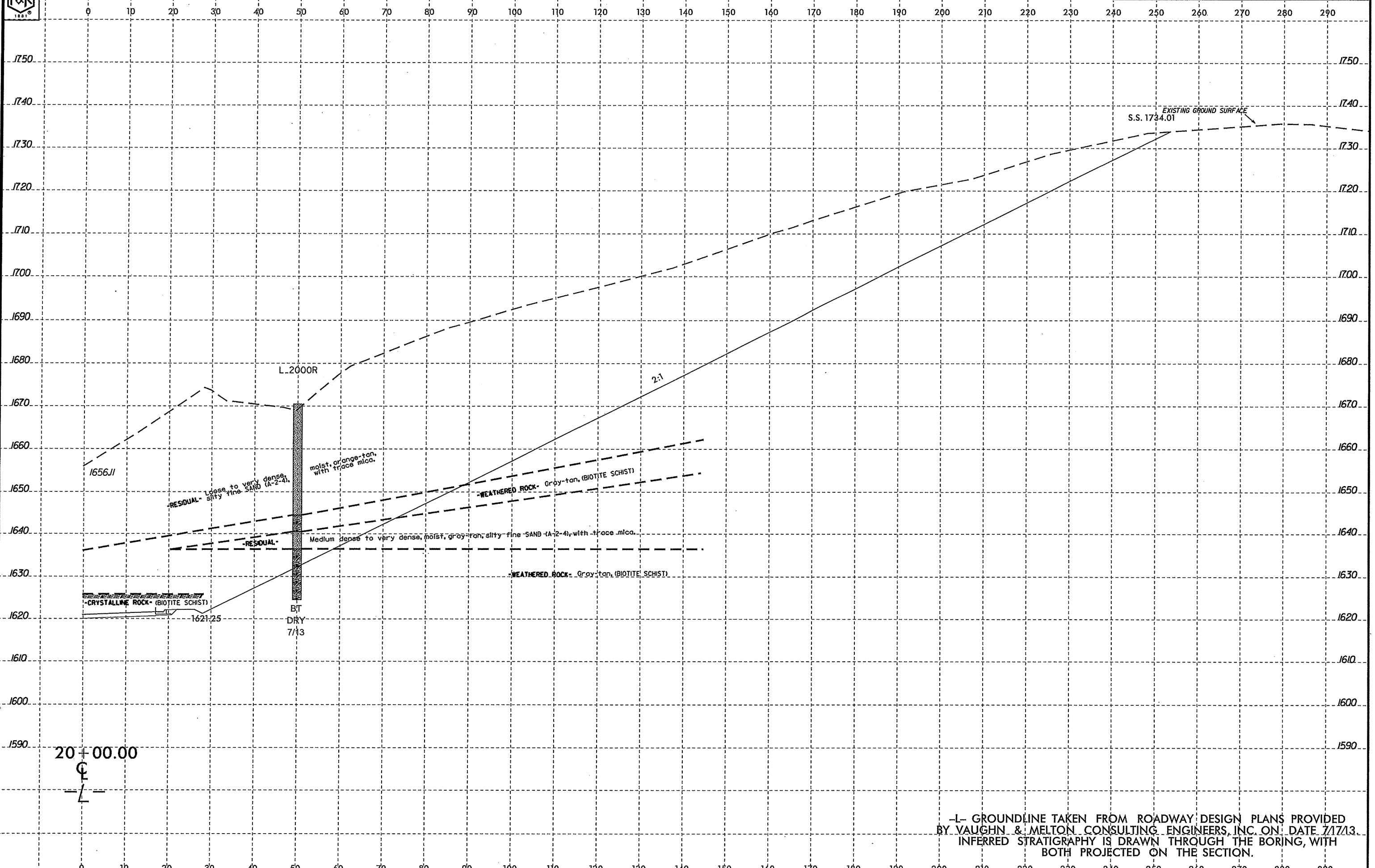
-L-

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



PROJ. REFERENCE NO.	SHEET NO.
R-5527	15

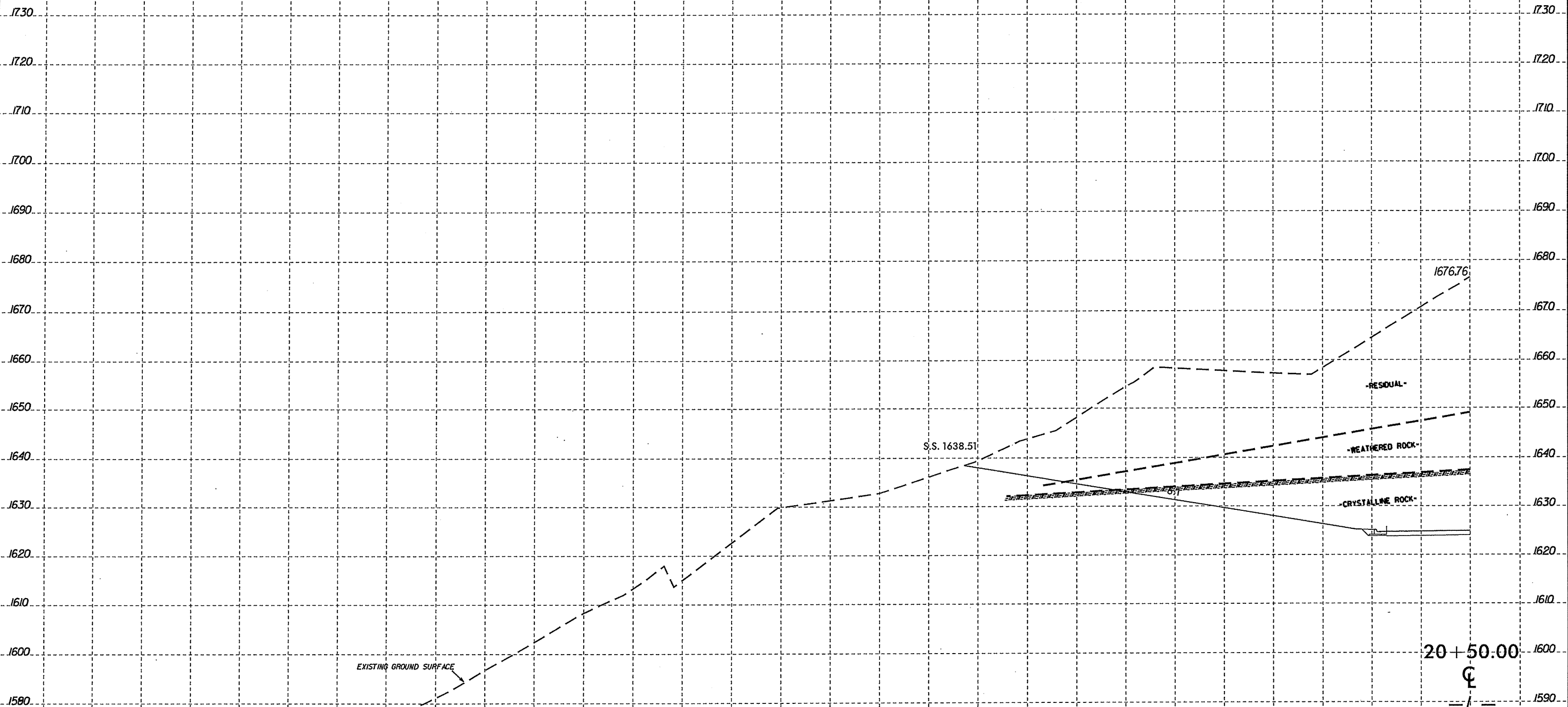


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



PROJ. REFERENCE NO.	SHEET NO.
R-5527	16

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



EXISTING GROUND SURFACE

S.S. 1638.51

RESIDUAL

WEATHERED ROCK

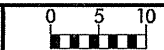
CRYSTALLINE ROCK

20+50.00

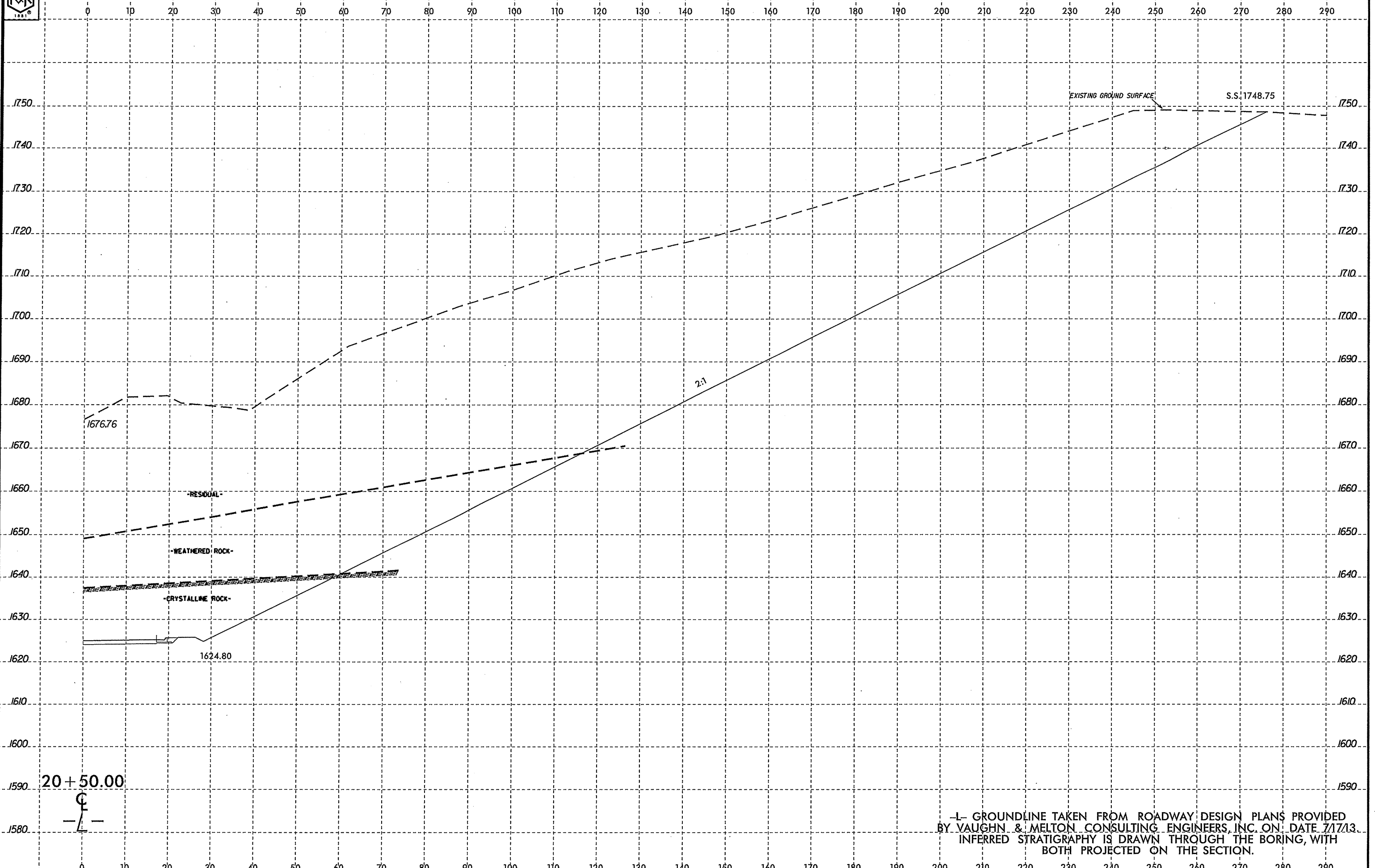
C

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



PROJ. REFERENCE NO.	SHEET NO.
R-5527	17



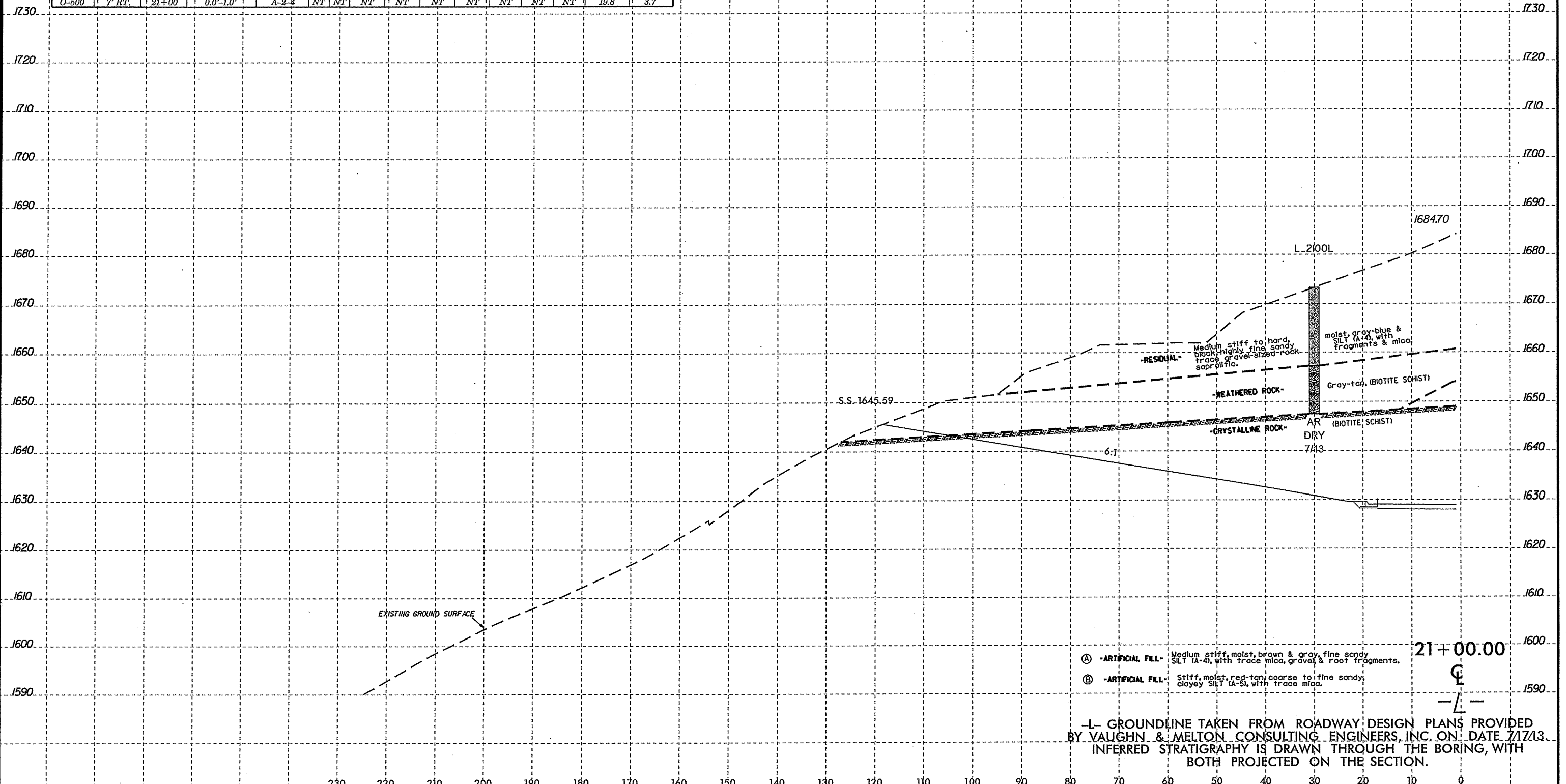
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

SOIL TEST RESULTS

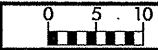
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
CBR-2	7' RT.	21+00	2.0'-5.0'	A-4(0)	31	3	15.9	41.8	34.6	7.7	86.5	76.8	48.8	15.2	NT
SS-129	205' RT.	21+00	38.5'-40.0'	A-5(6)	42	6	8.0	27.8	42.7	21.5	100.0	95.3	75.3	15.1	NT
SS-133	205' RT.	21+00	43.5'-45.0'	A-4(0)	36	2	16.8	49.8	23.5	9.9	79.4	72.4	38.4	24.4	NT
O-500	7' RT.	21+00	0.0'-1.0'	A-2-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	19.8	3.7



- (A) -ARTIFICIAL FILL- Medium stiff, moist, brown & gray, fine sandy SILT (A-4), with trace mica, gravel & root fragments.
- (B) -ARTIFICIAL FILL- Stiff, moist, red-tan, coarse to fine sandy, clayey SILT (A-5), with trace mica.

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

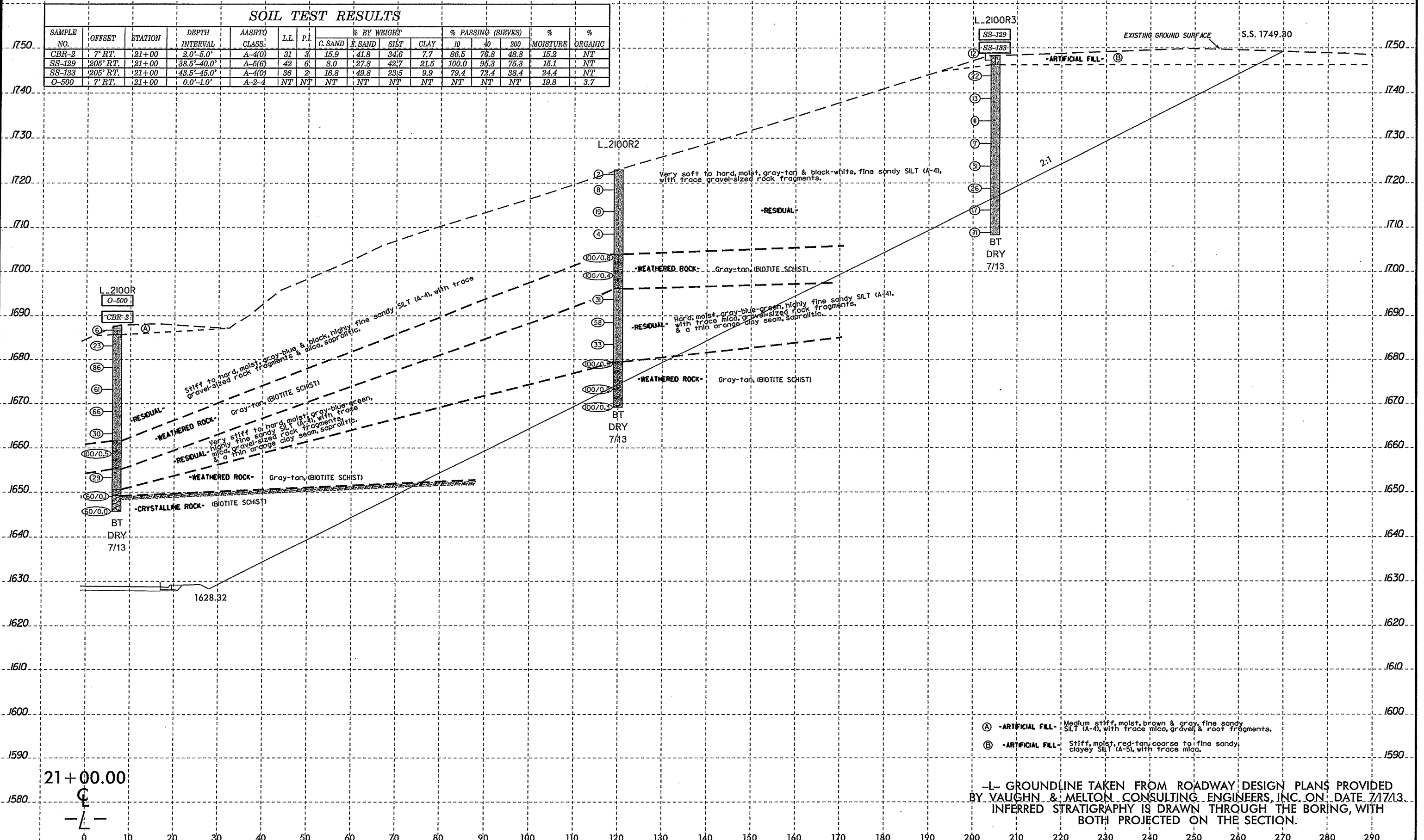
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							G. SAND	F. SAND	SILT	CLAY	10	40	200		
CBR-2	7' RT.	21+00	2.0'-5.0'	A-4(0)	31	3	15.9	41.8	34.6	7.7	86.5	76.8	48.8	15.2	NT
SS-129	1205' RT.	21+00	38.5'-40.0'	A-5(6)	42	6	8.0	27.8	42.7	21.5	100.0	96.3	75.3	16.1	NT
SS-133	1205' RT.	21+00	43.5'-45.0'	A-4(0)	36	2	16.8	49.8	23.5	9.9	79.4	72.4	38.4	24.4	NT
O-500	7' RT.	21+00	0.0'-1.0'	A-2-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	19.8	3.7



- Ⓐ -ARTIFICIAL FILL- Medium stiff, moist, brown & gray, fine sandy SILT (A-4), with trace mica, gravel & root fragments.
- Ⓑ -ARTIFICIAL FILL- Stiff, moist, red-tan, coarse to fine sandy, clayey SILT (A-5), with trace mica.

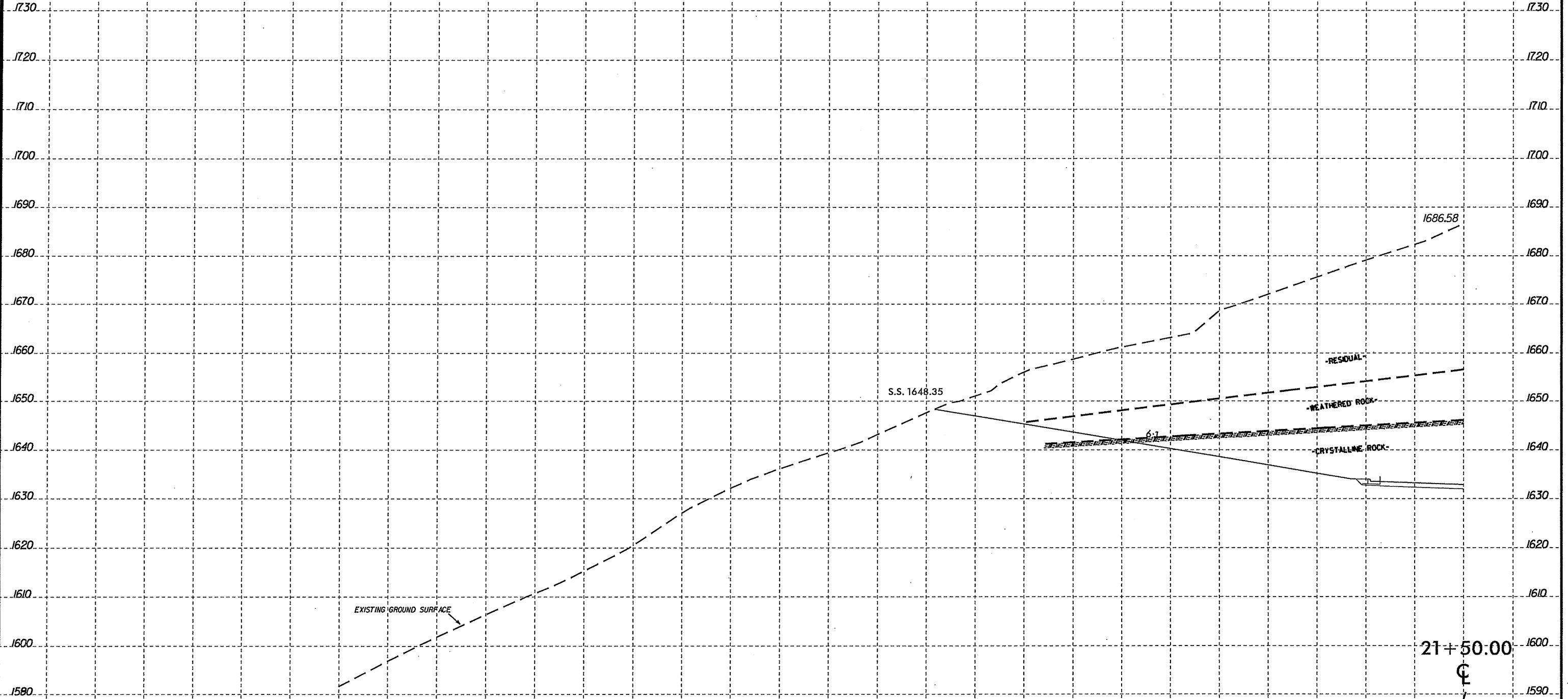
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

21+00.00



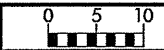
PROJ. REFERENCE NO.	SHEET NO.
R-5527	20

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

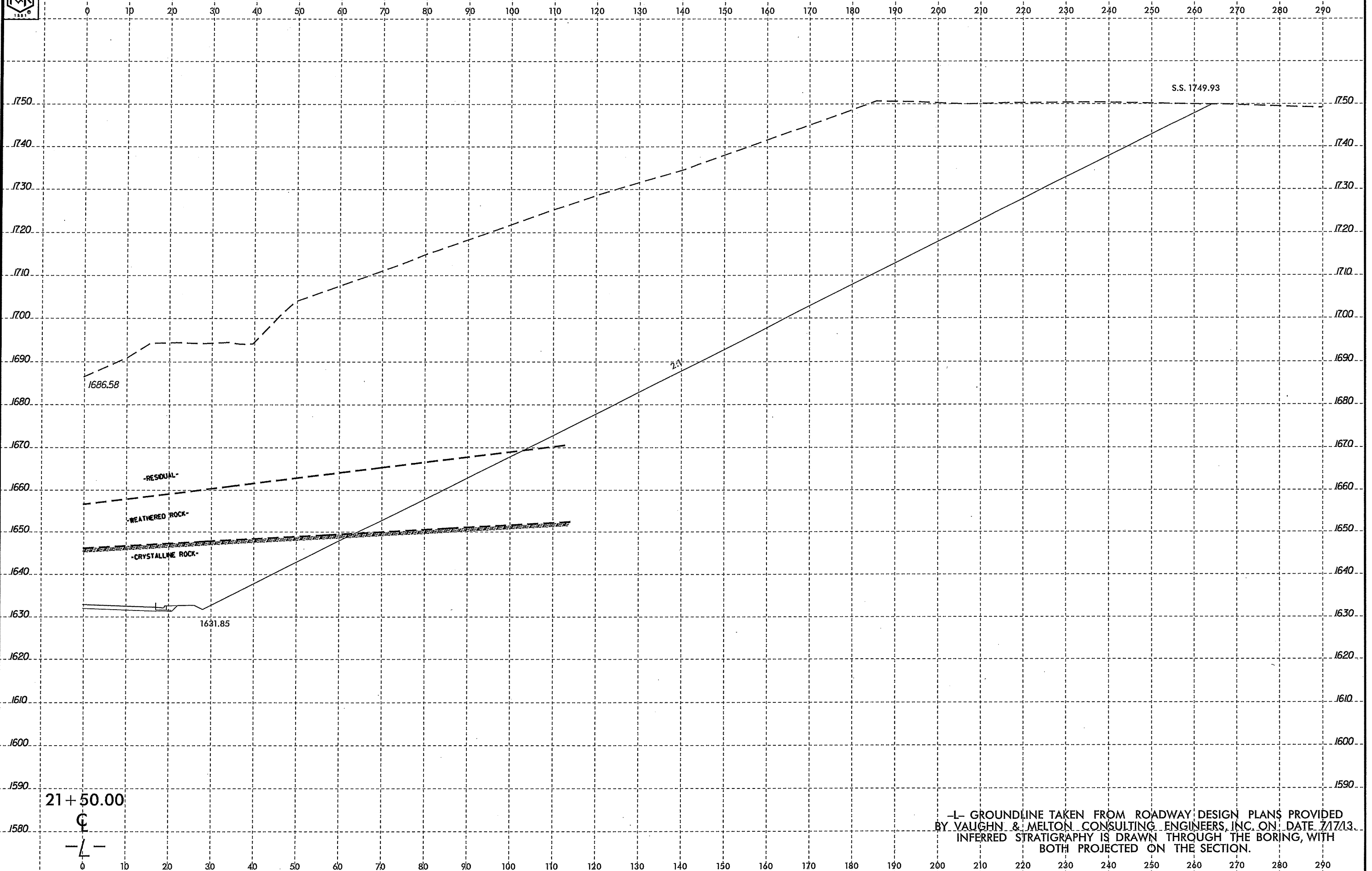


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

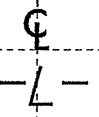
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



PROJ. REFERENCE NO.	SHEET NO.
R-5527	21



21+50.00



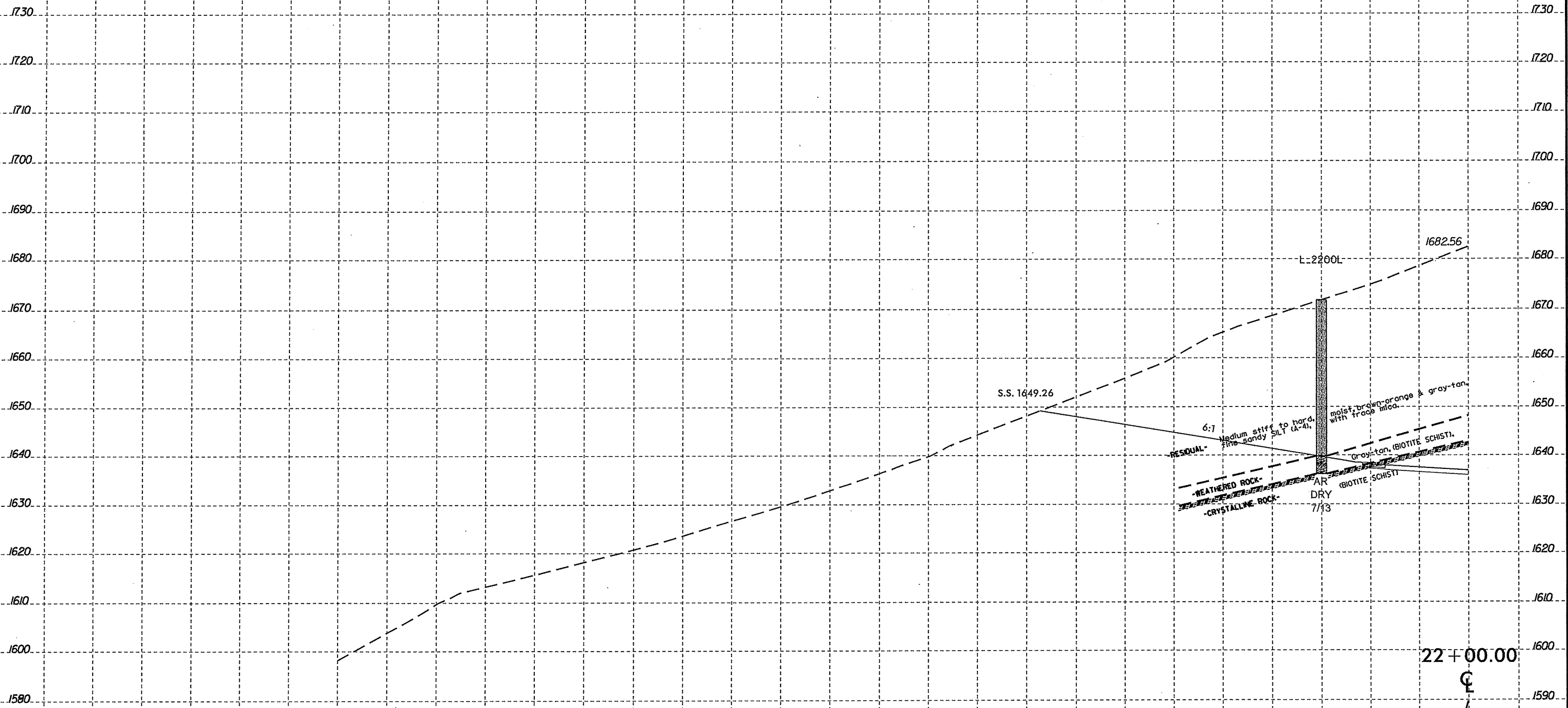
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



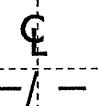
PROJ. REFERENCE NO.
R-5527

SHEET NO.
22

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

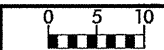


22+00.00

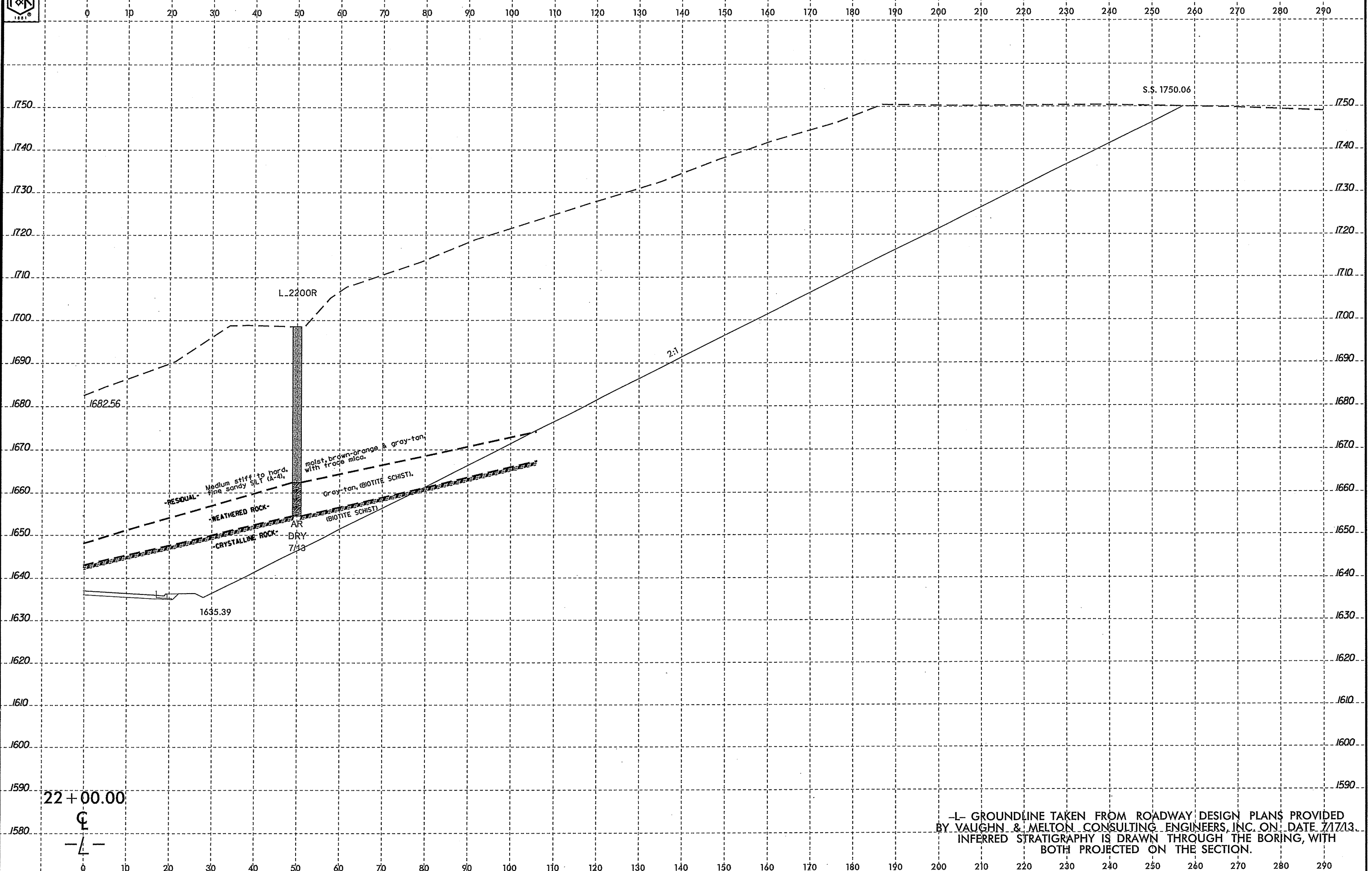


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



PROJ. REFERENCE NO.	SHEET NO.
R-5527	23

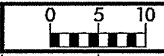


22 + 00.00

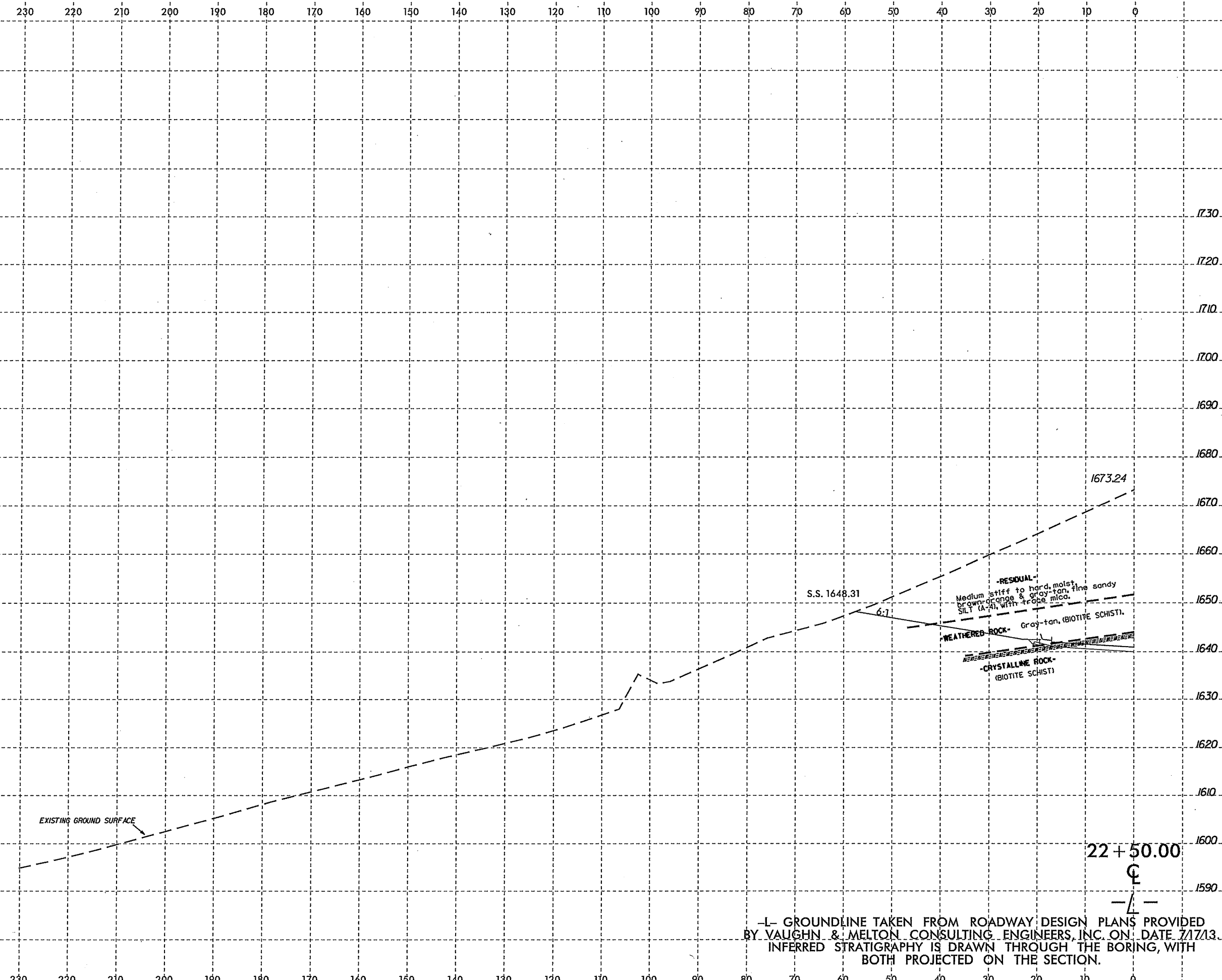
CL

— L —

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



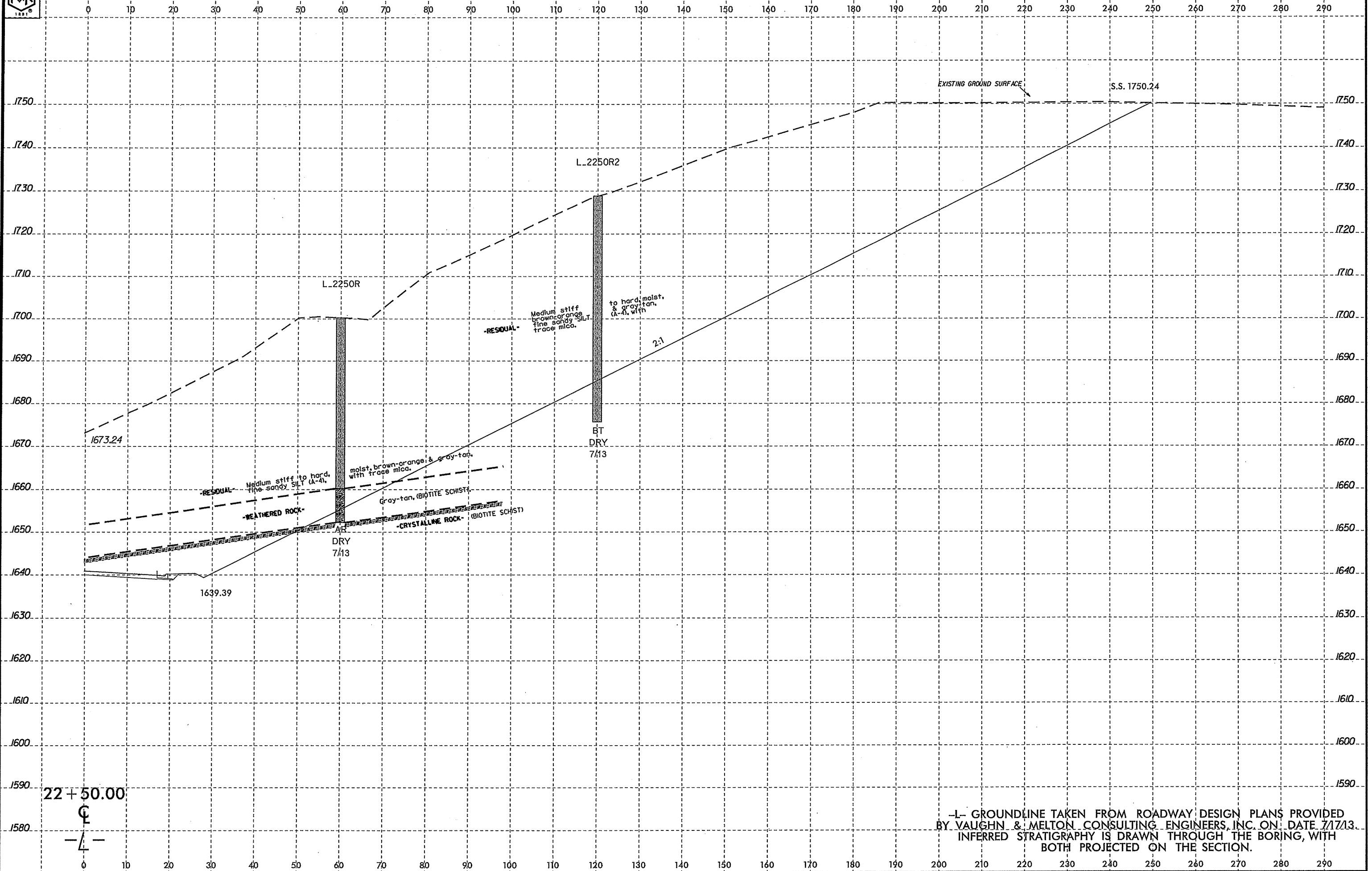
PROJ. REFERENCE NO.	SHEET NO.
R-5527	24



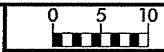
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



PROJ. REFERENCE NO.	SHEET NO.
R-5527	25

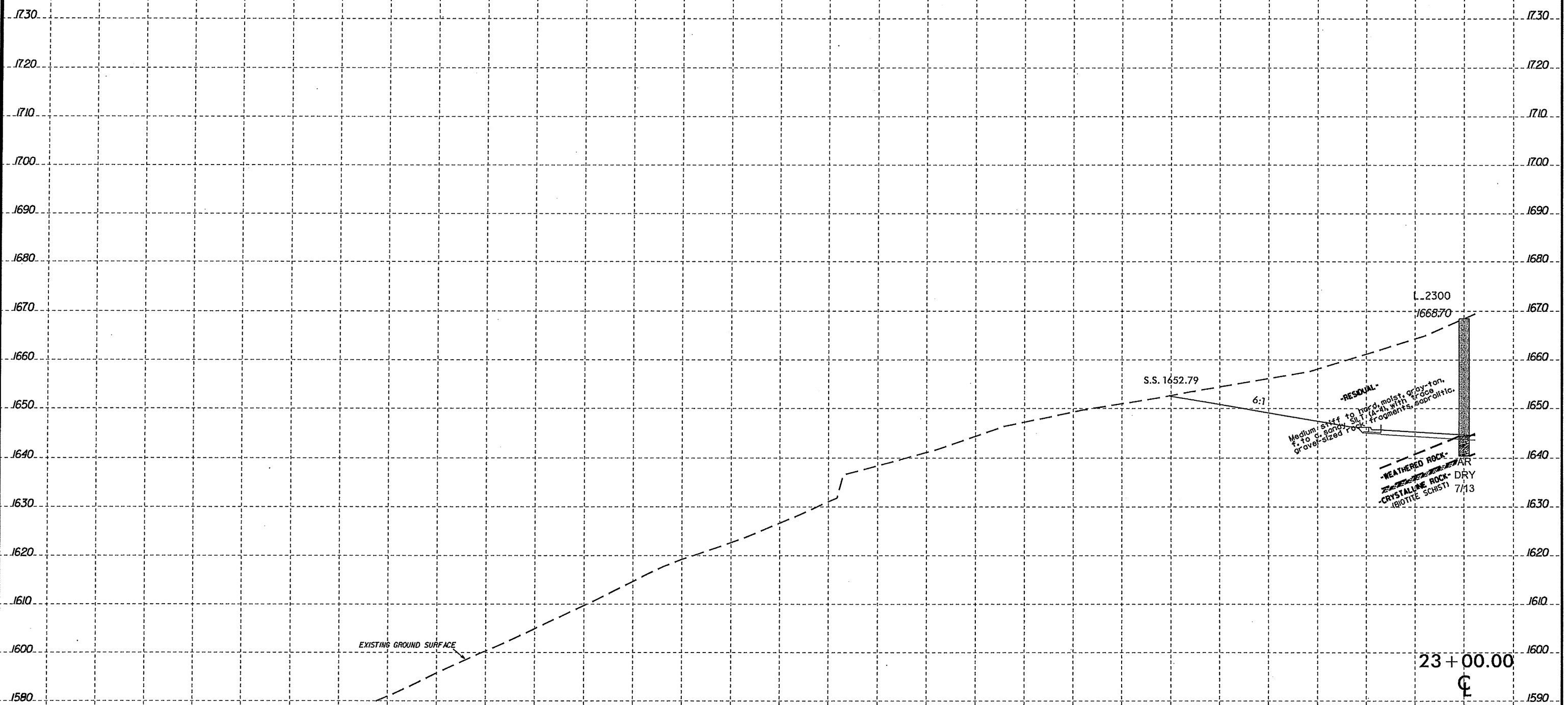


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



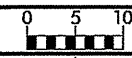
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
O-501	205' RT.	23+00	0.0'-0.7'	A-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	42.6	20.7



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

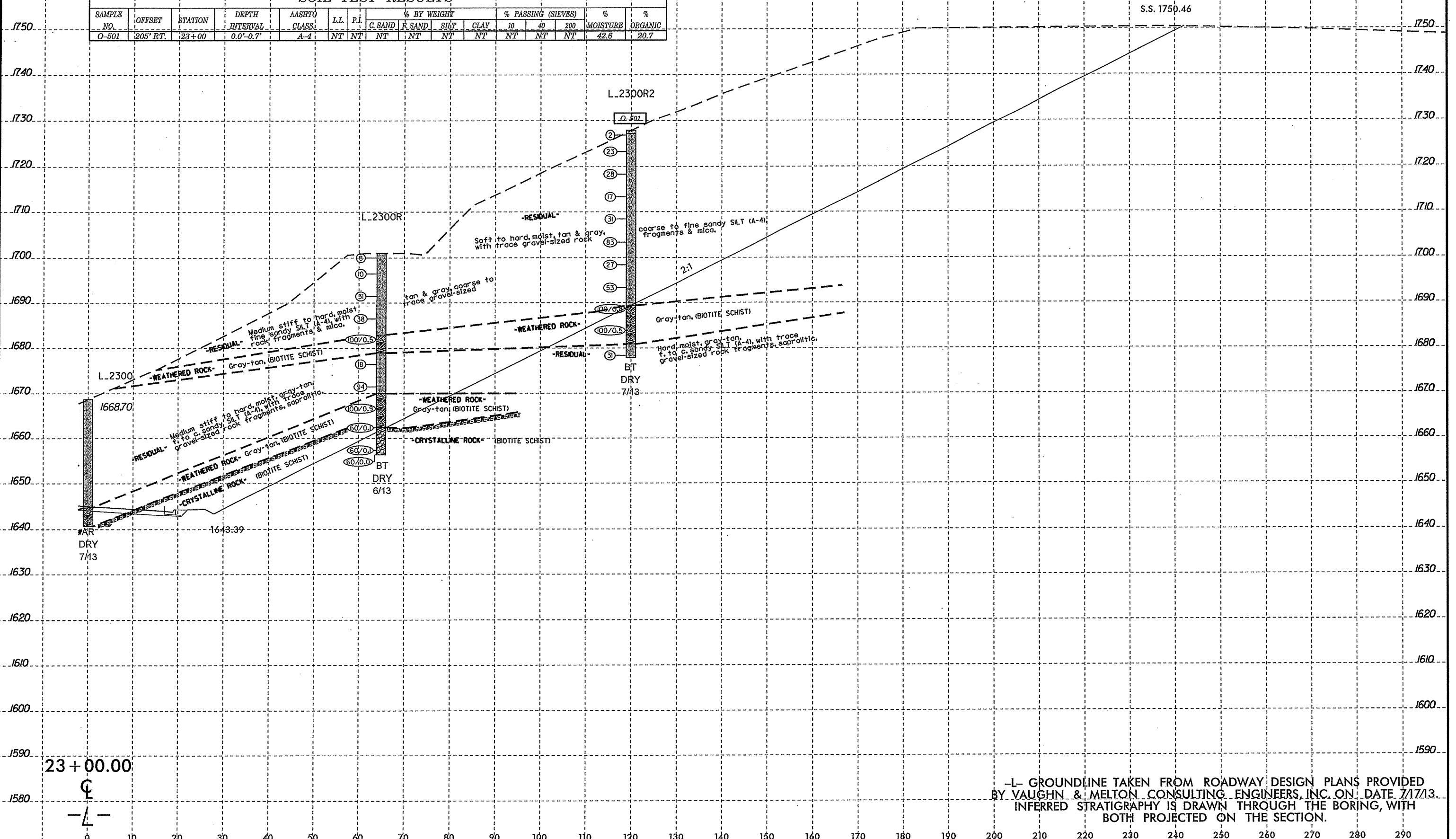
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



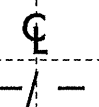
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC		
							C. SAND	F. SAND	SILT	CLAY	10	40	200				
O-501	205' RT.	23+00	0.0'-0.7'	A-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	42.6	20.7



23+00.00



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

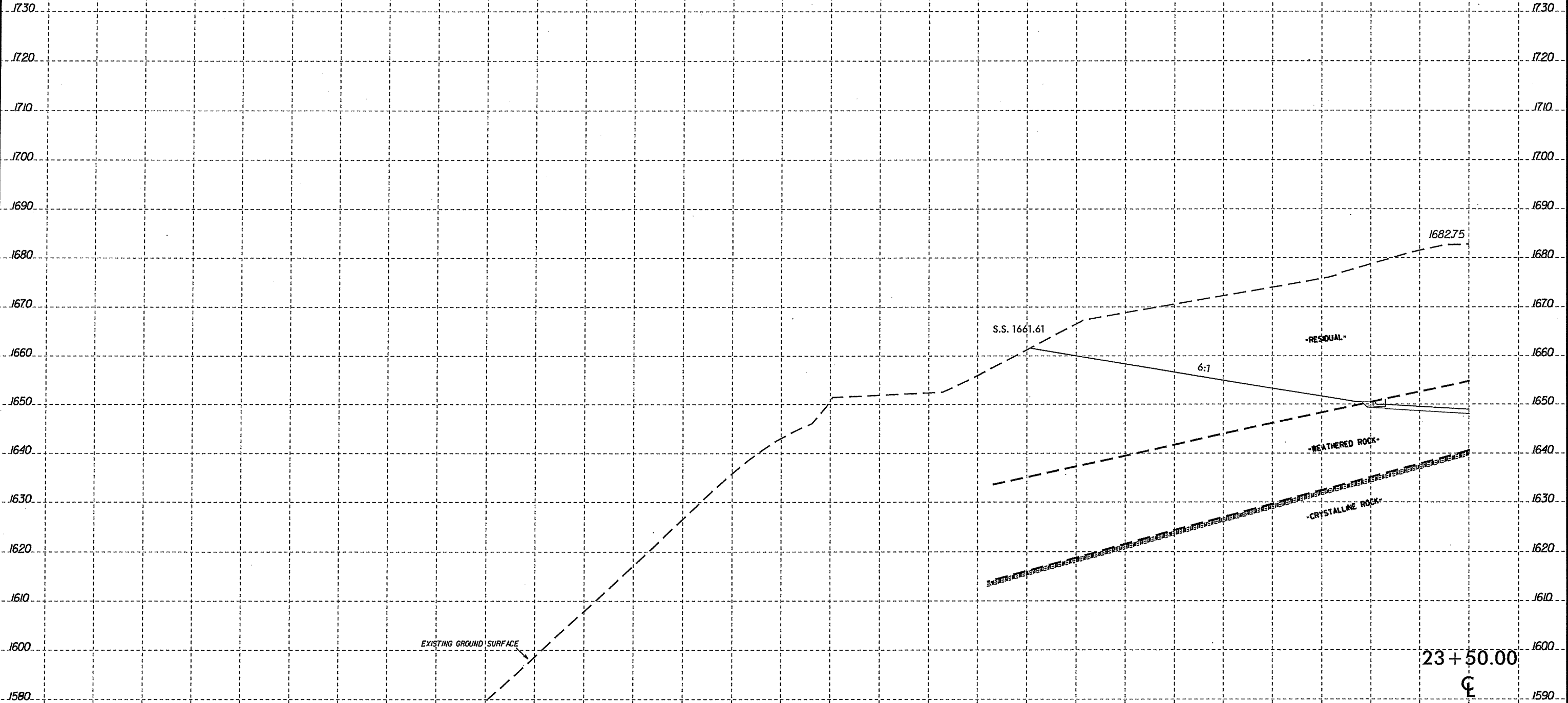
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290



PROJ. REFERENCE NO.
R-5527

SHEET NO.
28

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



EXISTING GROUND SURFACE

S.S. 1661.61

6:1

RESIDUAL

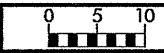
WEATHERED ROCK

CRYSTALLINE ROCK

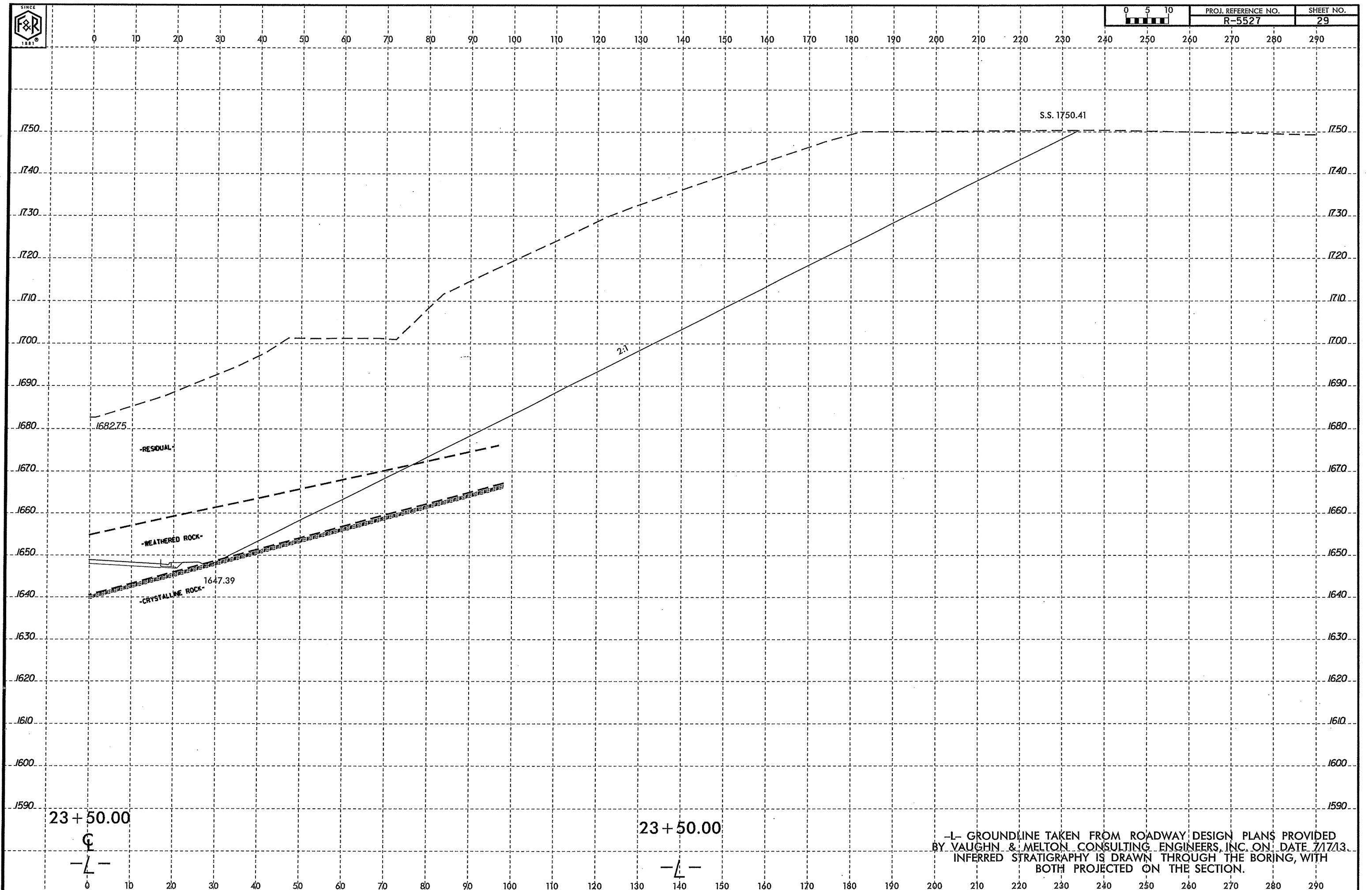
23+50.00

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

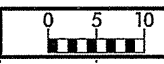
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



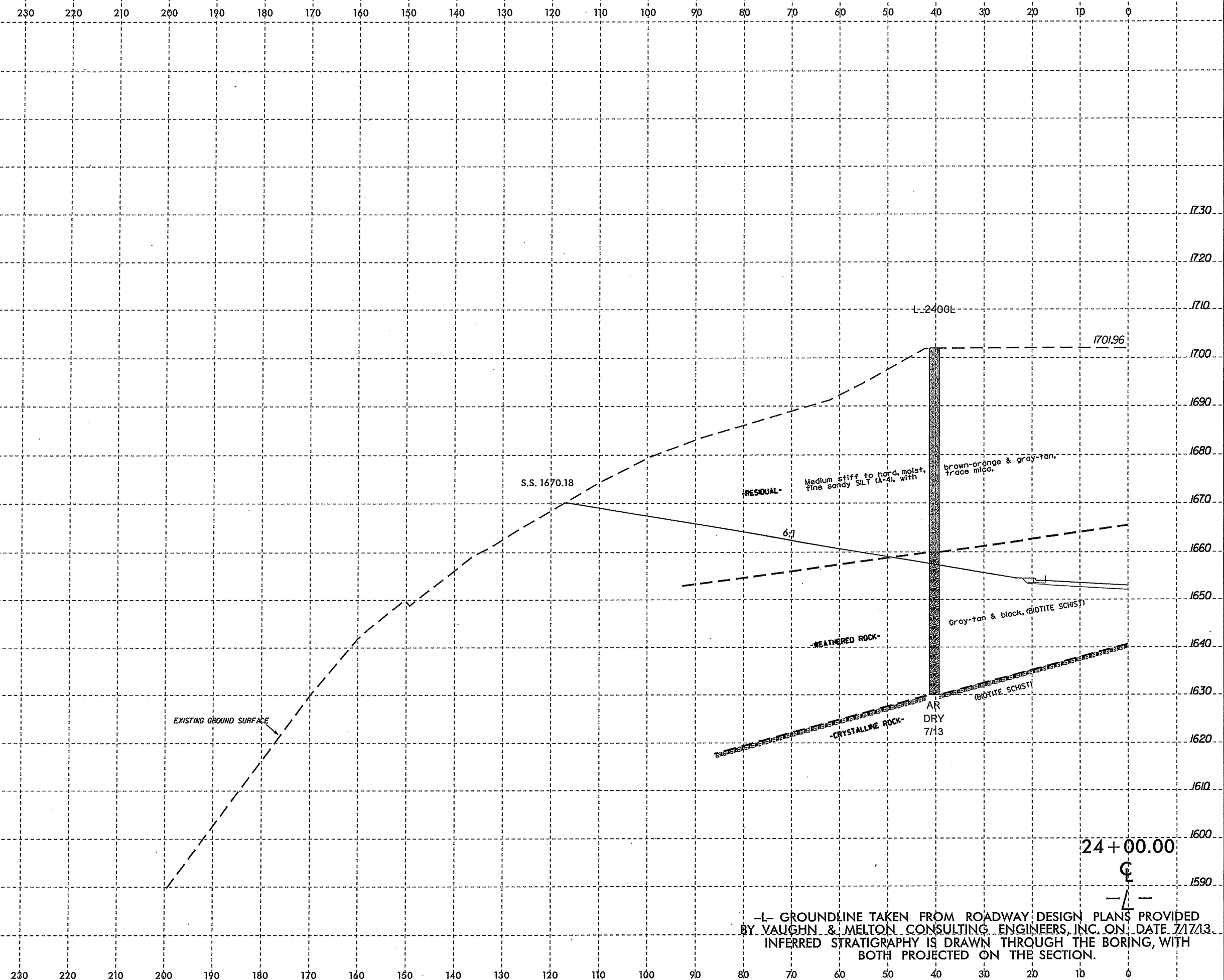
PROJ. REFERENCE NO.	SHEET NO.
R-5527	29



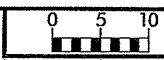
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



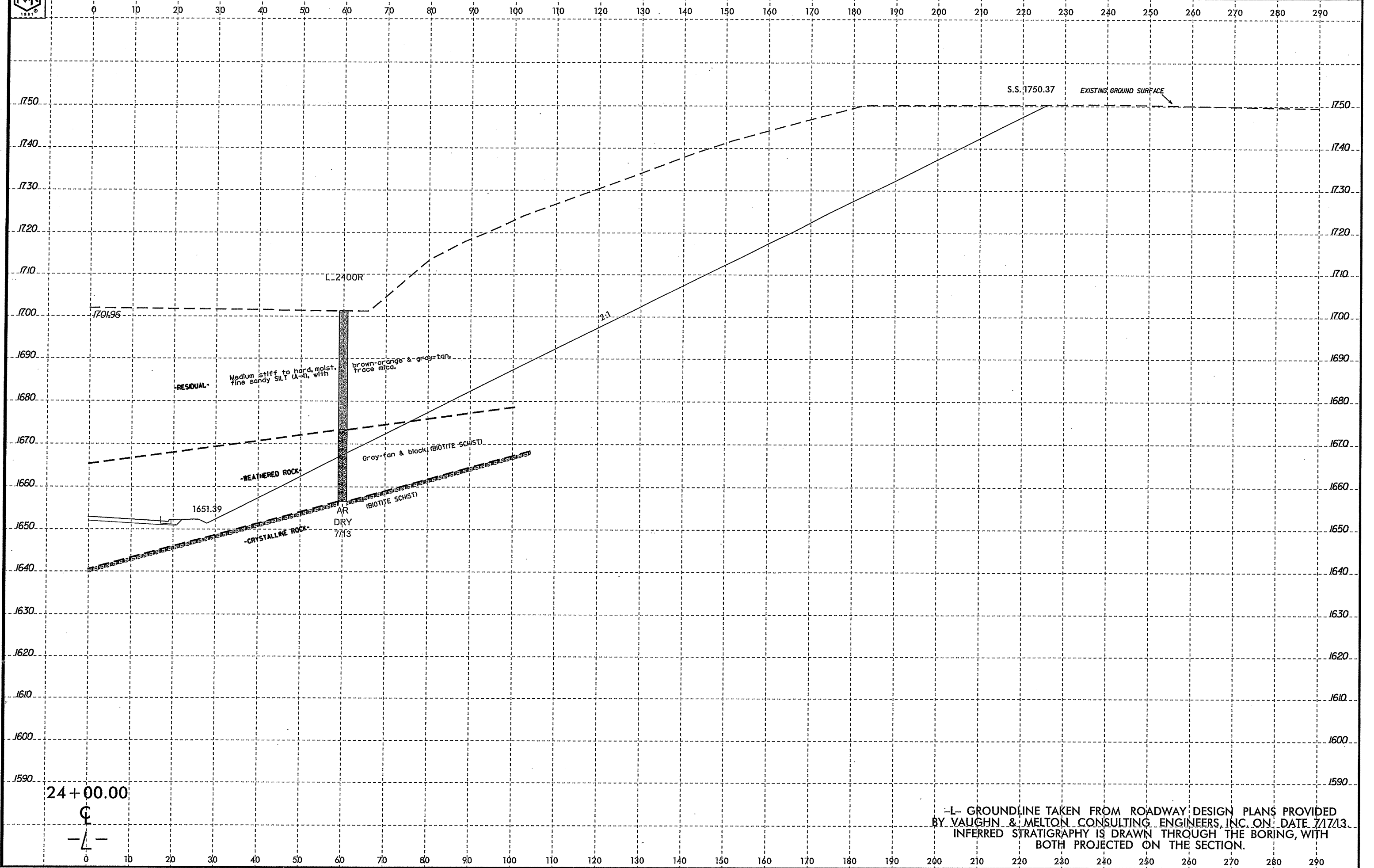
PROJ. REFERENCE NO.	SHEET NO.
R-5527	30



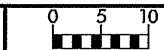
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



PROJ. REFERENCE NO.	SHEET NO.
R-5527	31



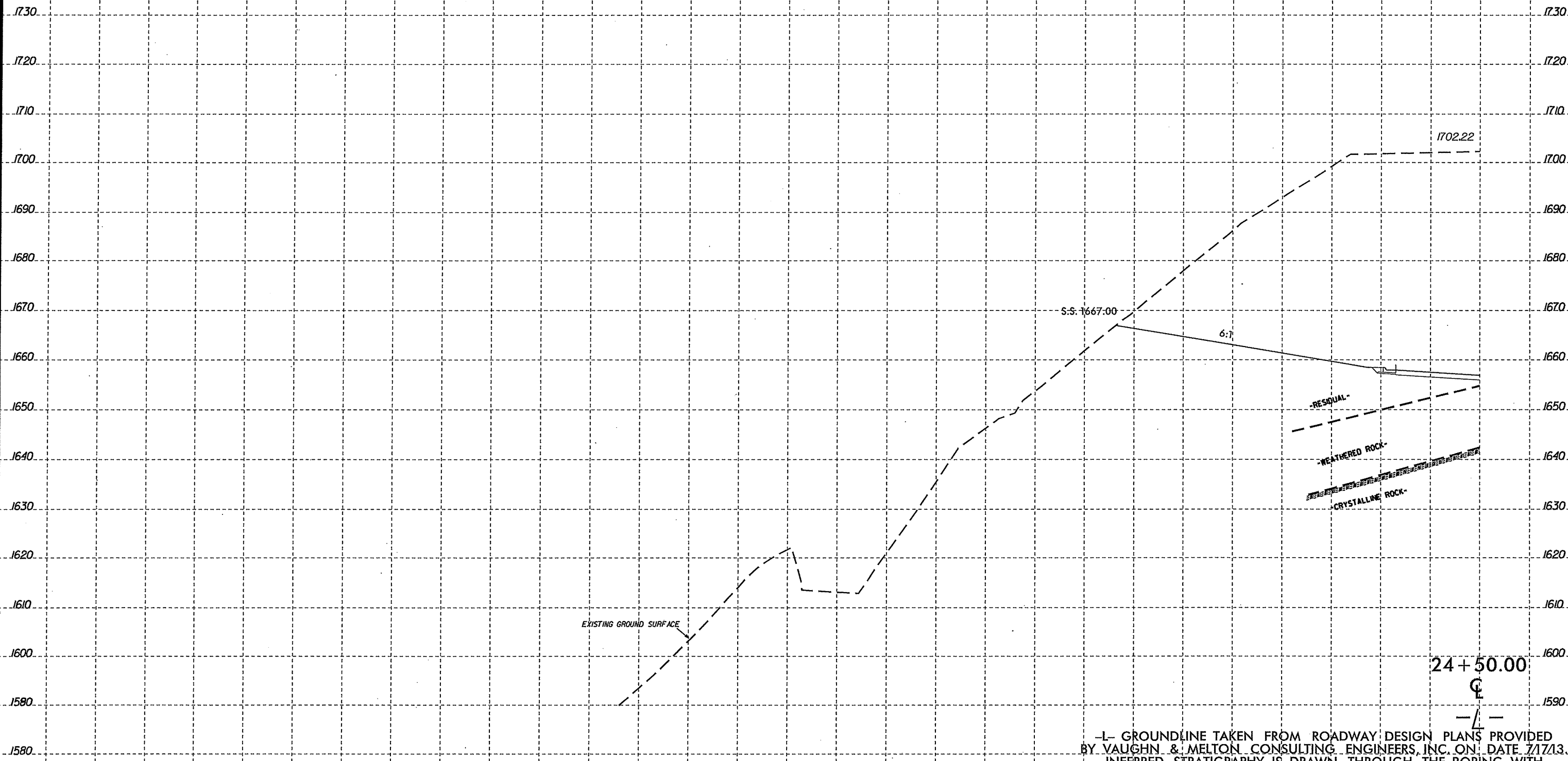
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



PROJ. REFERENCE NO.
R-5527

SHEET NO.
32

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



EXISTING GROUND SURFACE

S.S. 1667.00

6:1

RESIDUAL

WEATHERED ROCK

CRYSTALLINE ROCK

24+50.00

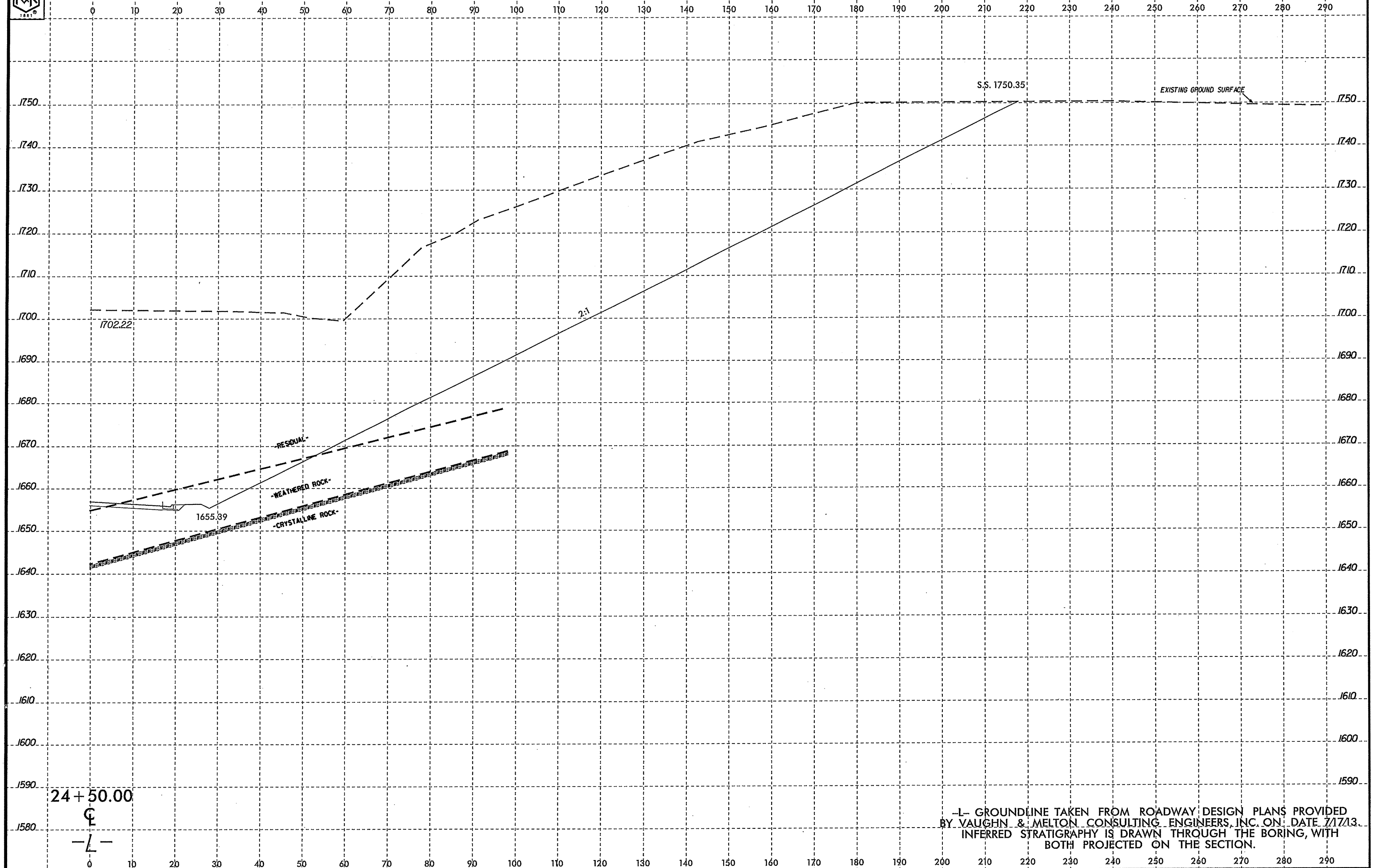
CL

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



PROJ. REFERENCE NO.	SHEET NO.
R-5527	33



24+50.00
C
-L-

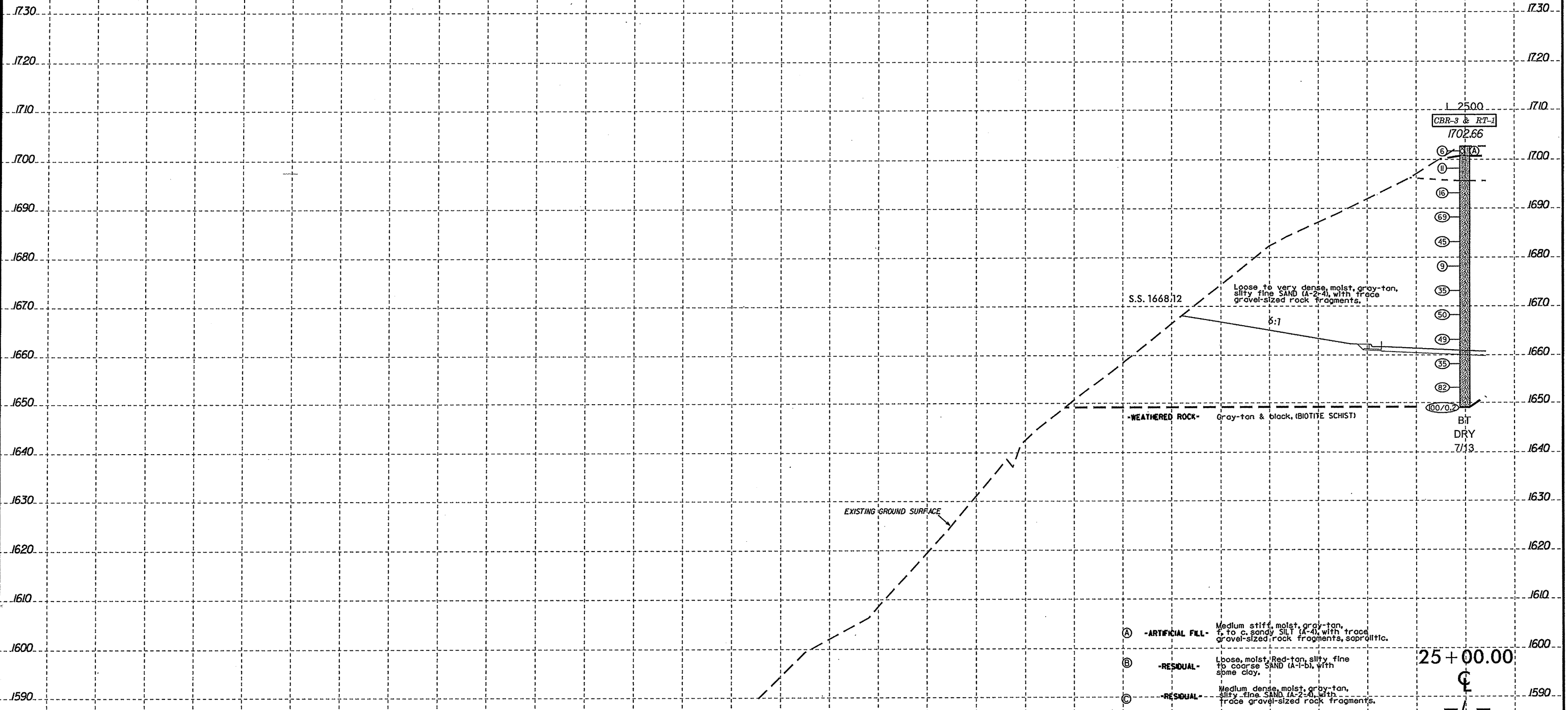
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
CBR-3	CL	25+00	2.0'-5.0'	A-4(C)	30	3	9.8	42.8	31.6	15.8	92.4	86.8	58.1	18.0	NT
SS-148	120' RT	25+00	0.0'-1.5'	A-1-b(0)	34	5	18.2	42.3	20.3	19.2	41.0	36.1	21.8	21.2	NT
SS-168	205' RT	25+00	58.5'-60.0'	A-1-b(0)	32	3	34.1	39.1	20.6	6.2	41.4	30.8	16.0	15.8	NT
O-502	120' RT	25+00	0.0'-0.5'	A-2-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	25.1	7.9

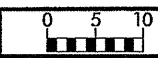


- Ⓐ -ARTIFICIAL FILL- Medium stiff, moist, gray-tan, f. to c. sandy SILT (A-4), with trace gravel-sized rock fragments, saprolitic.
- Ⓑ -RESIDUAL- Loose, moist, red-tan, silty fine to coarse SAND (A-1-b), with some clay.
- Ⓒ -RESIDUAL- Medium dense, moist, gray-tan, silty fine SAND (A-2-4), with trace gravel-sized rock fragments.

25 + 00.00

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

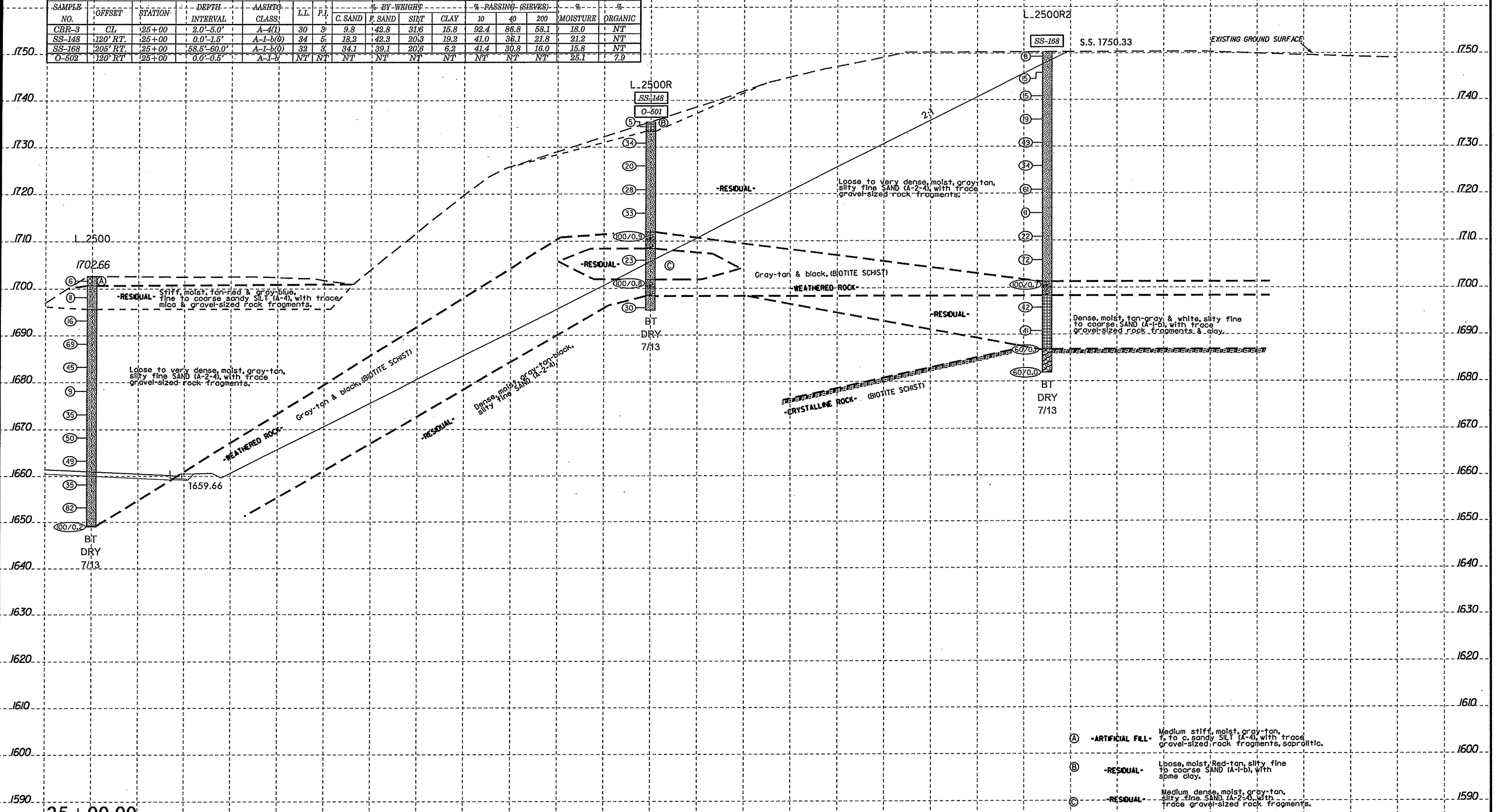
230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0



0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
CBR-3	CL	25+00	2.0'-5.0'	A-4(1)	30	3	9.8	42.8	31.6	15.8	92.4	86.8	58.1	18.0	NT
SS-148	120' RT	25+00	0.0'-1.5'	A-1-b(0)	34	5	18.2	42.3	20.3	19.2	41.0	36.1	21.8	21.2	NT
SS-168	120.5' RT	25+00	58.5'-60.0'	A-1-b(0)	32	3	34.1	39.1	20.6	6.2	41.4	30.8	16.0	15.8	NT
O-502	120' RT	25+00	0.0'-0.5'	A-1-b	NT	NT	NT	NT	NT	NT	NT	NT	NT	25.1	7.9



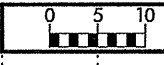
25+00.00



- (A) -ARTIFICIAL FILL- Medium stiff, moist, gray-tan, f. to c. sandy SILT (A-4), with trace gravel-sized rock fragments, spherulitic.
- (B) -RESIDUAL- Loose, moist, Red-tan, silty fine to coarse SAND (A-1-b), with some clay.
- (C) -RESIDUAL- Medium dense, moist, gray-tan, silty-fine SAND (A-2-4), with trace gravel-sized rock fragments.

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

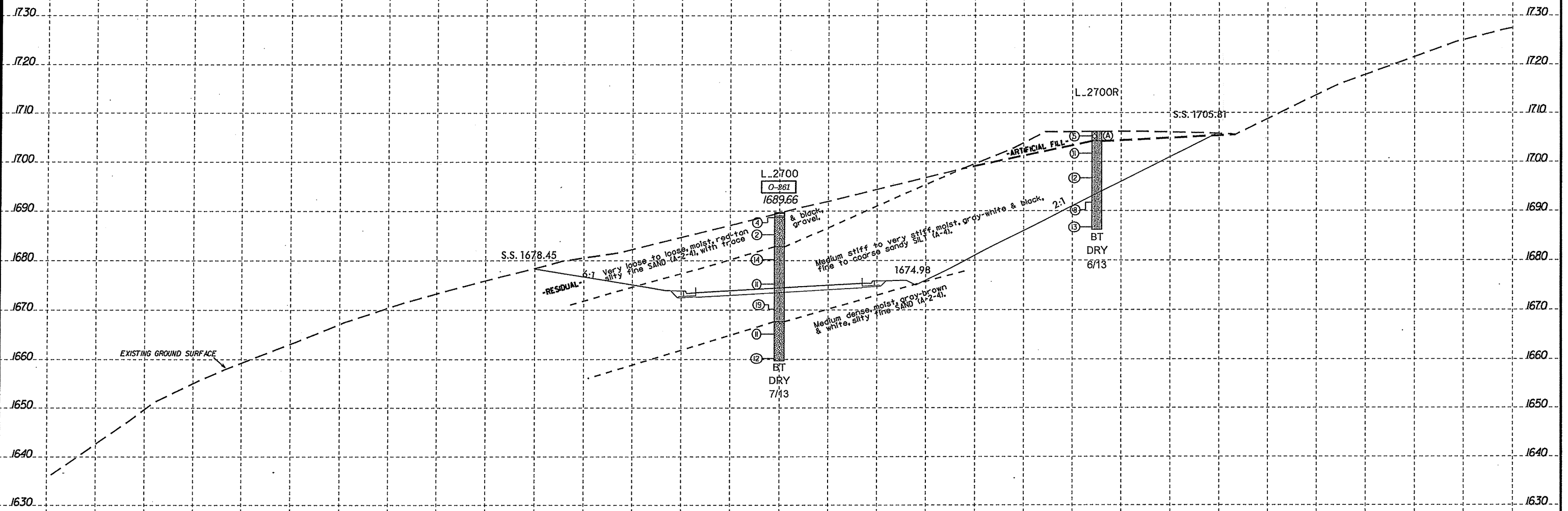
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290



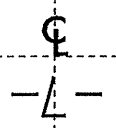
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	L.L.	P.L.	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
O-261	CL	27+00	0.0'-0.9'	A-2-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	29.4	5.0



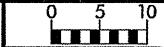
27 + 00.00



(A) -ARTIFICIAL FILL- Medium stiff, moist, tan-gray, fine to coarse sandy SILT (A-4).

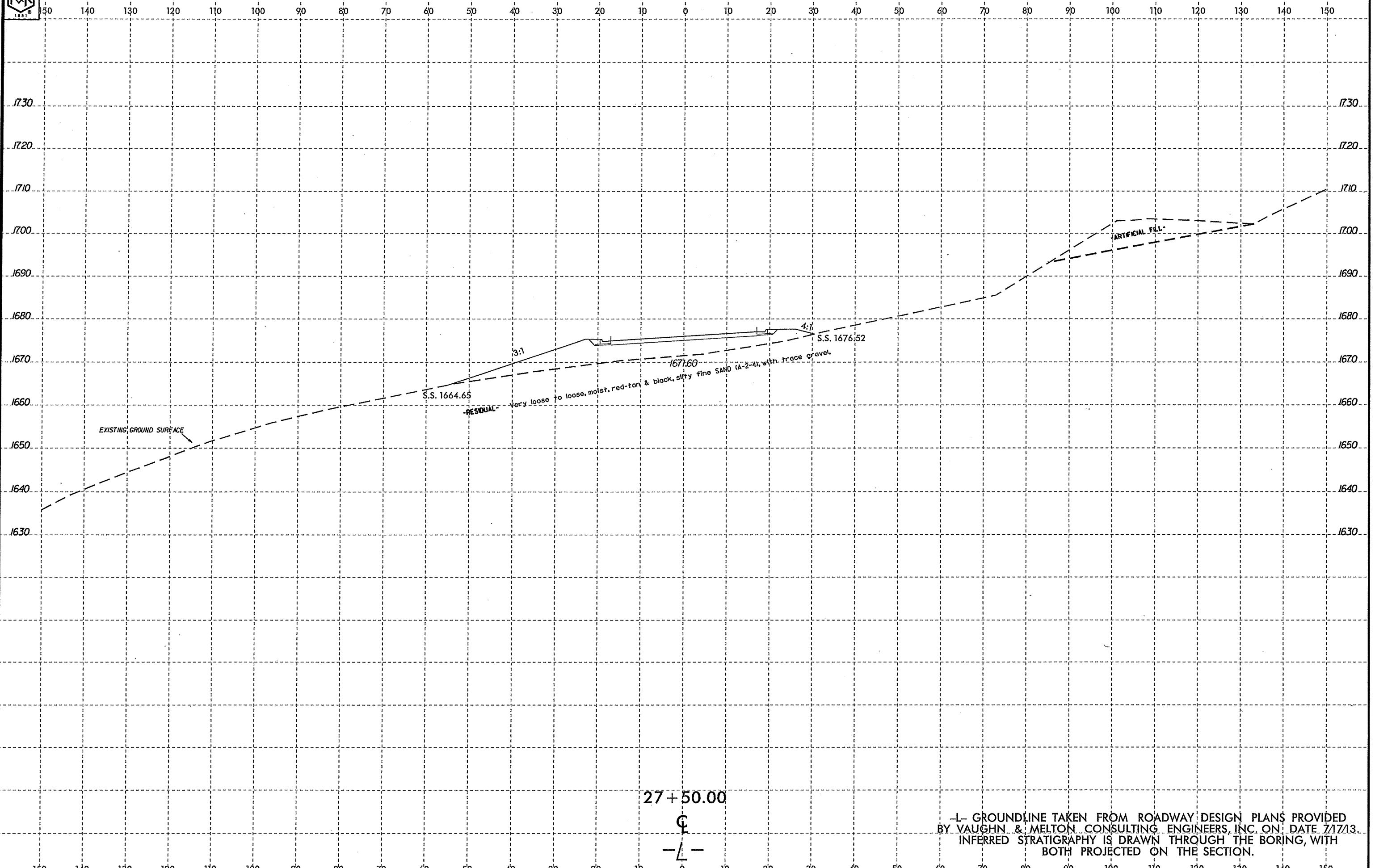
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

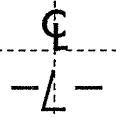


PROJ. REFERENCE NO.
R-5527

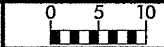
SHEET NO.
37



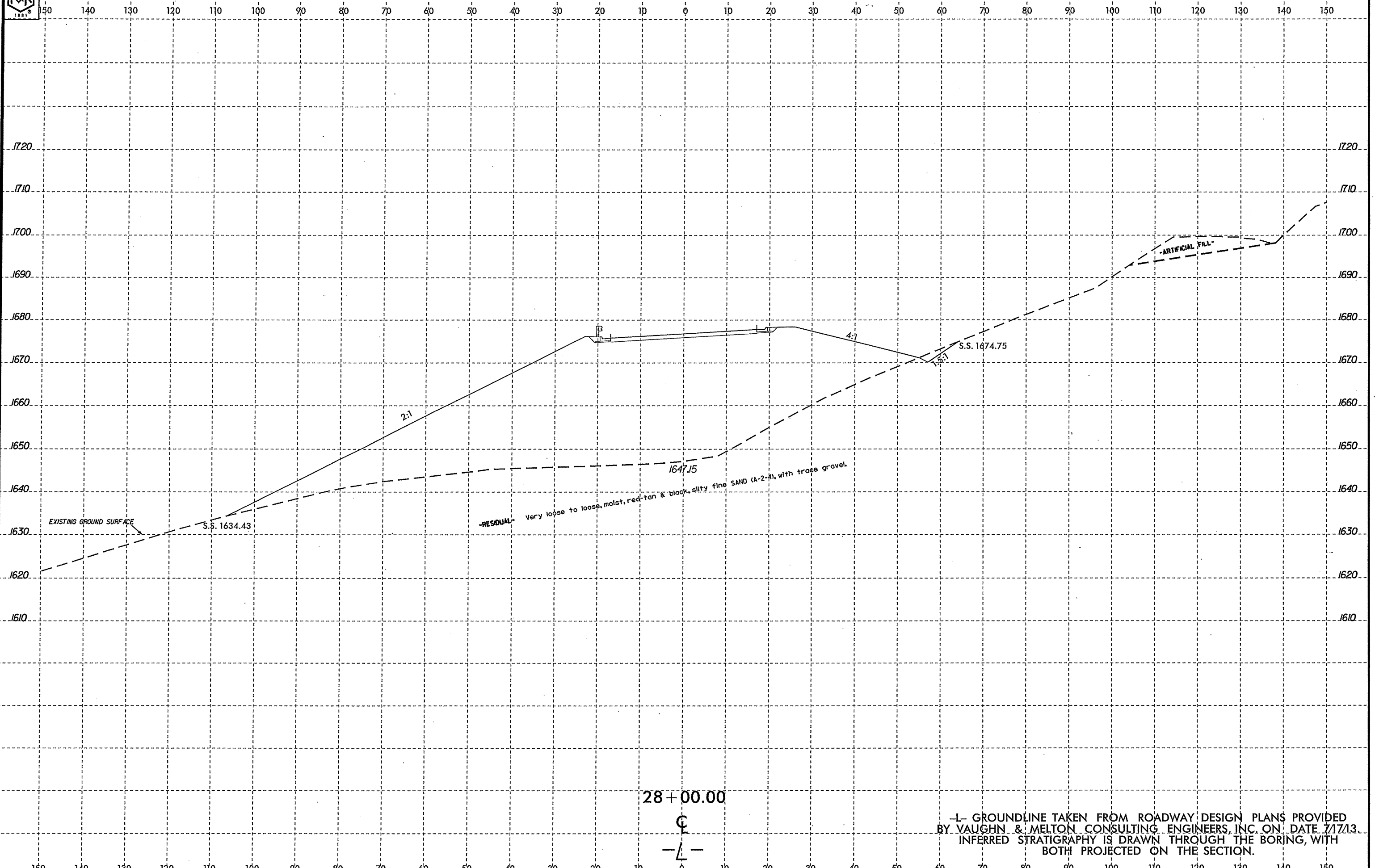
27+50.00



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



PROJ. REFERENCE NO.	SHEET NO.
R-5527	38

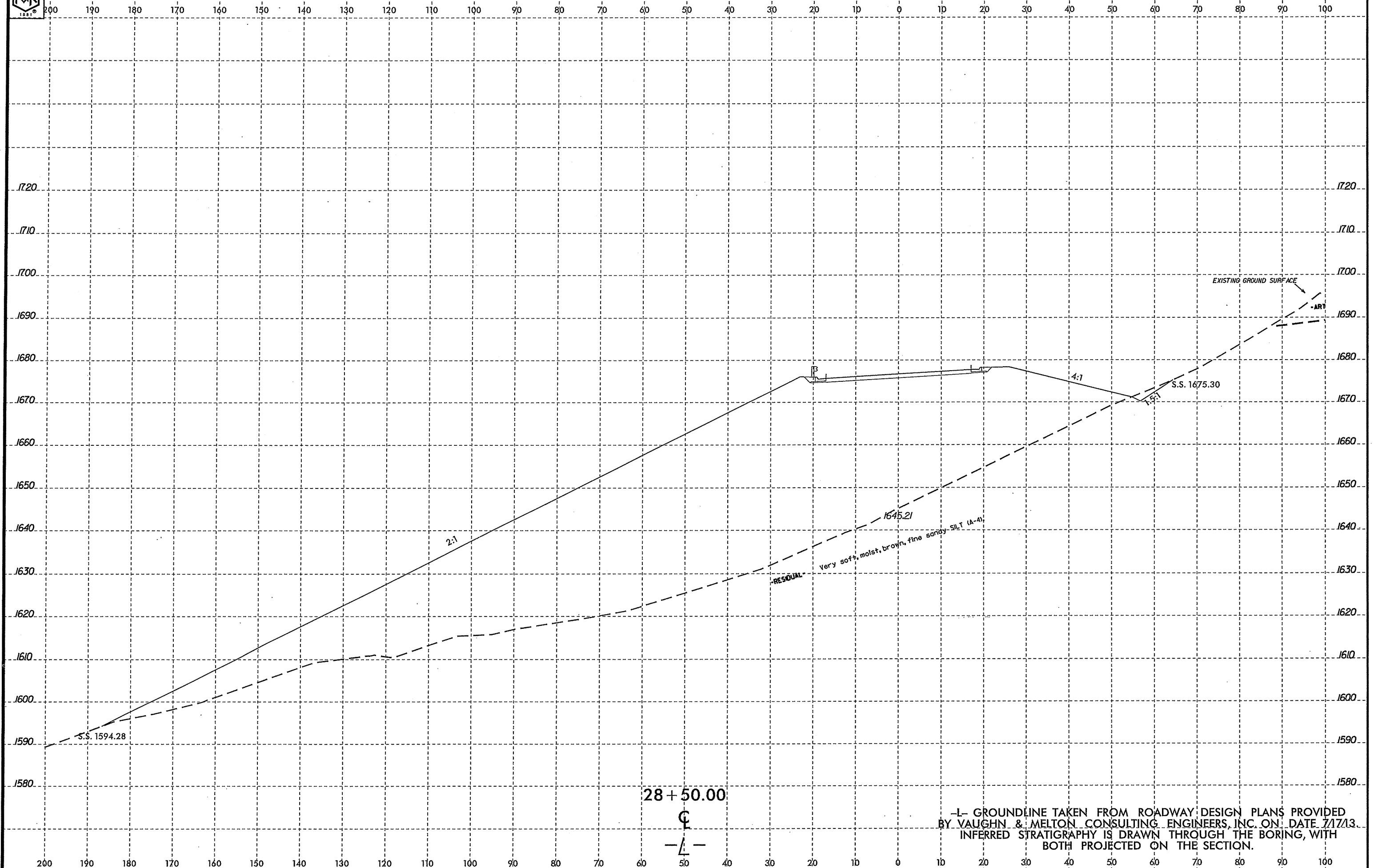


28+00.00
C
-L-

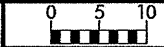
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



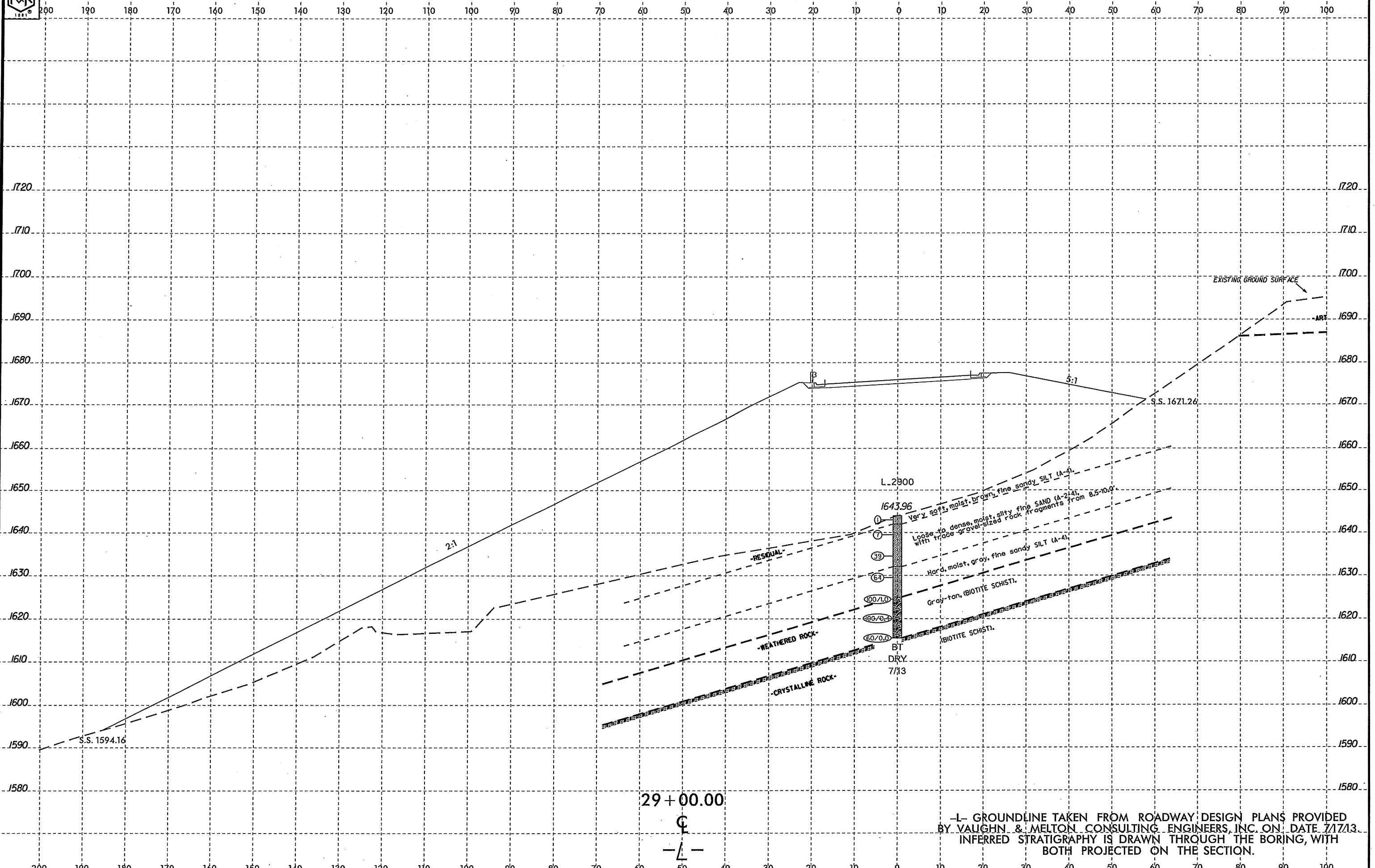
PROJ. REFERENCE NO.	SHEET NO.
R-5527	39



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

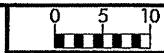


PROJ. REFERENCE NO.	SHEET NO.
R-5527	40

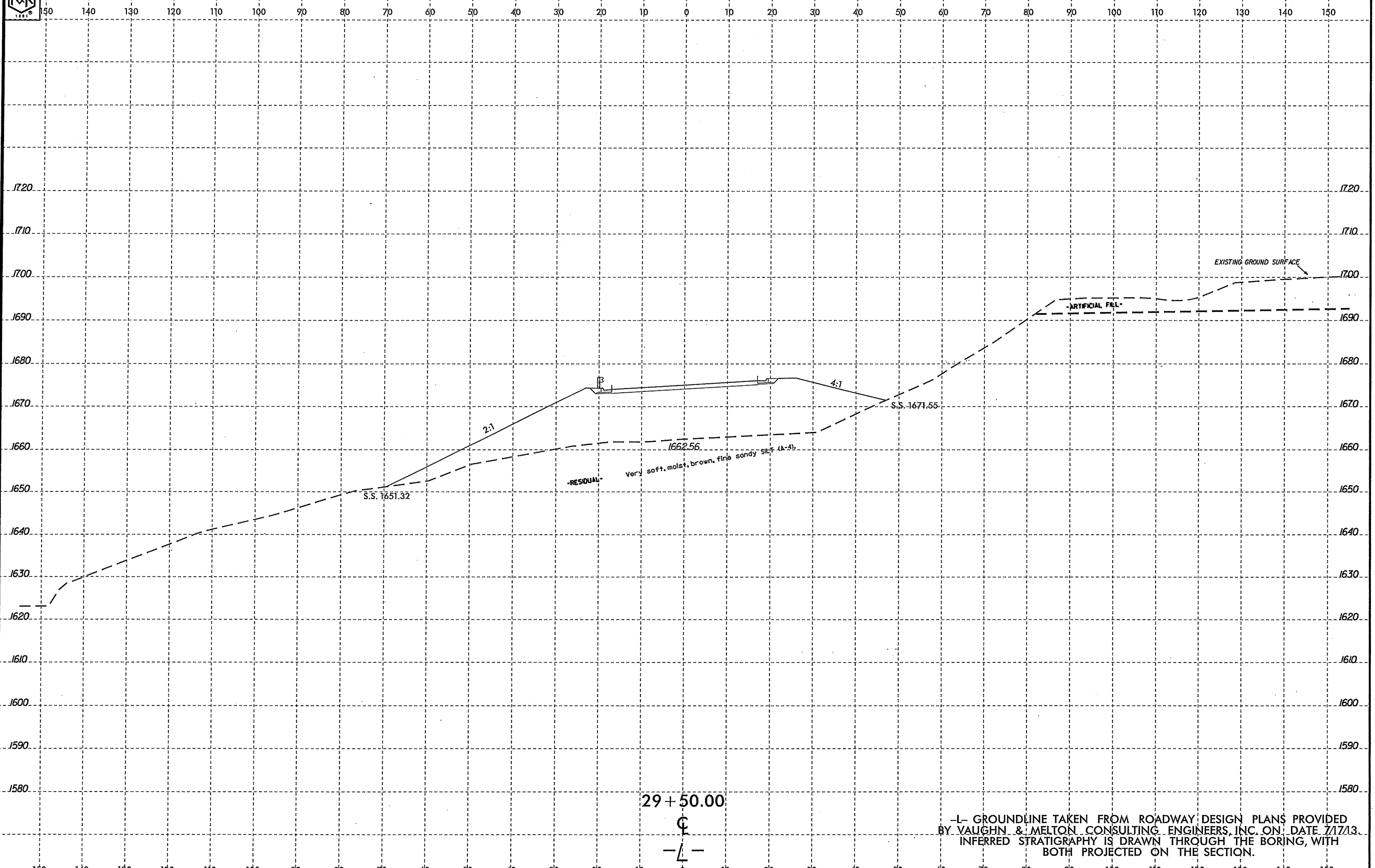


29 + 00.00
 C
 -L-

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

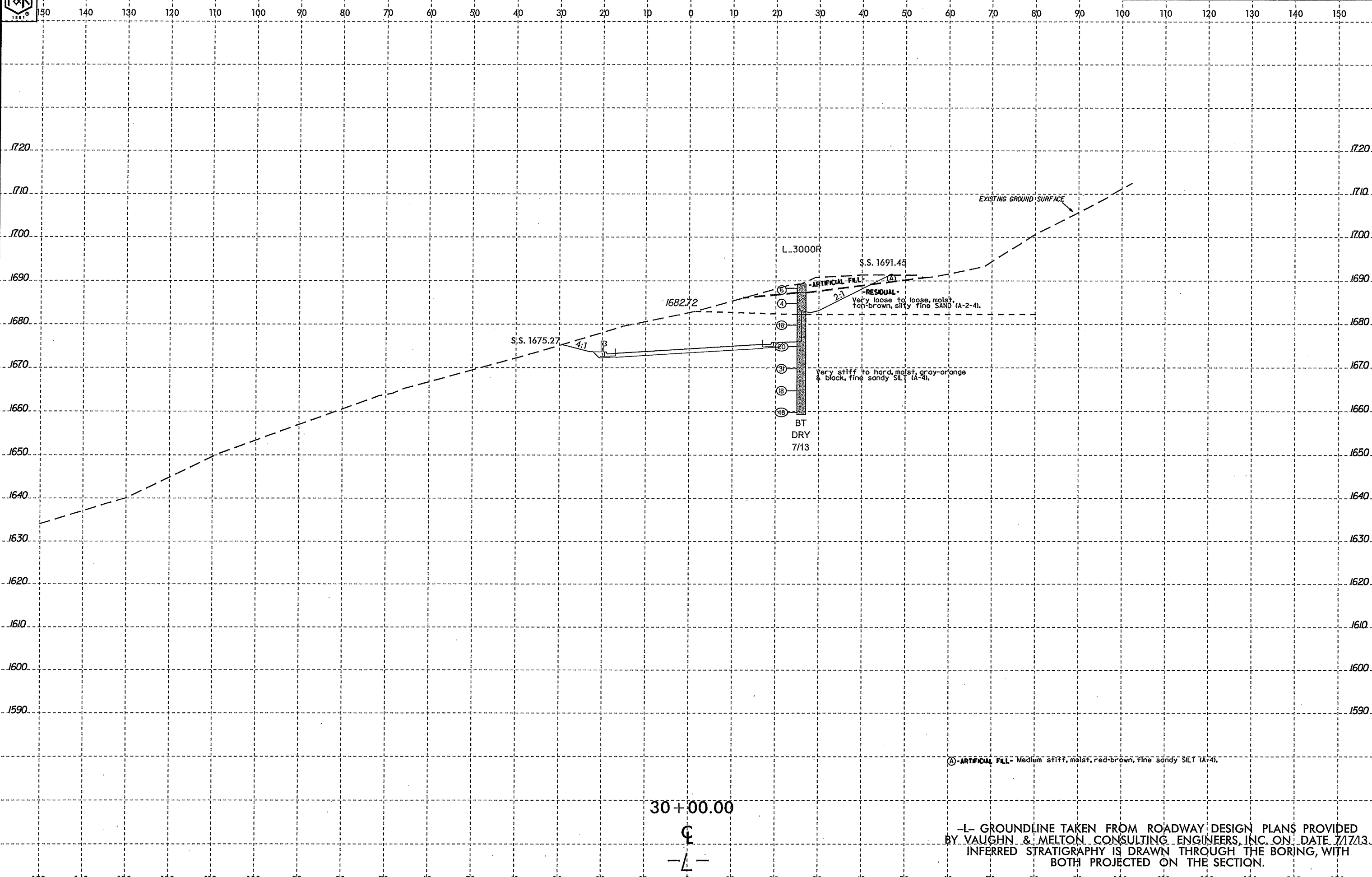
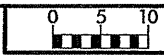


PROJ. REFERENCE NO.	SHEET NO.
R-5527	41



29+50.00
C
-L-

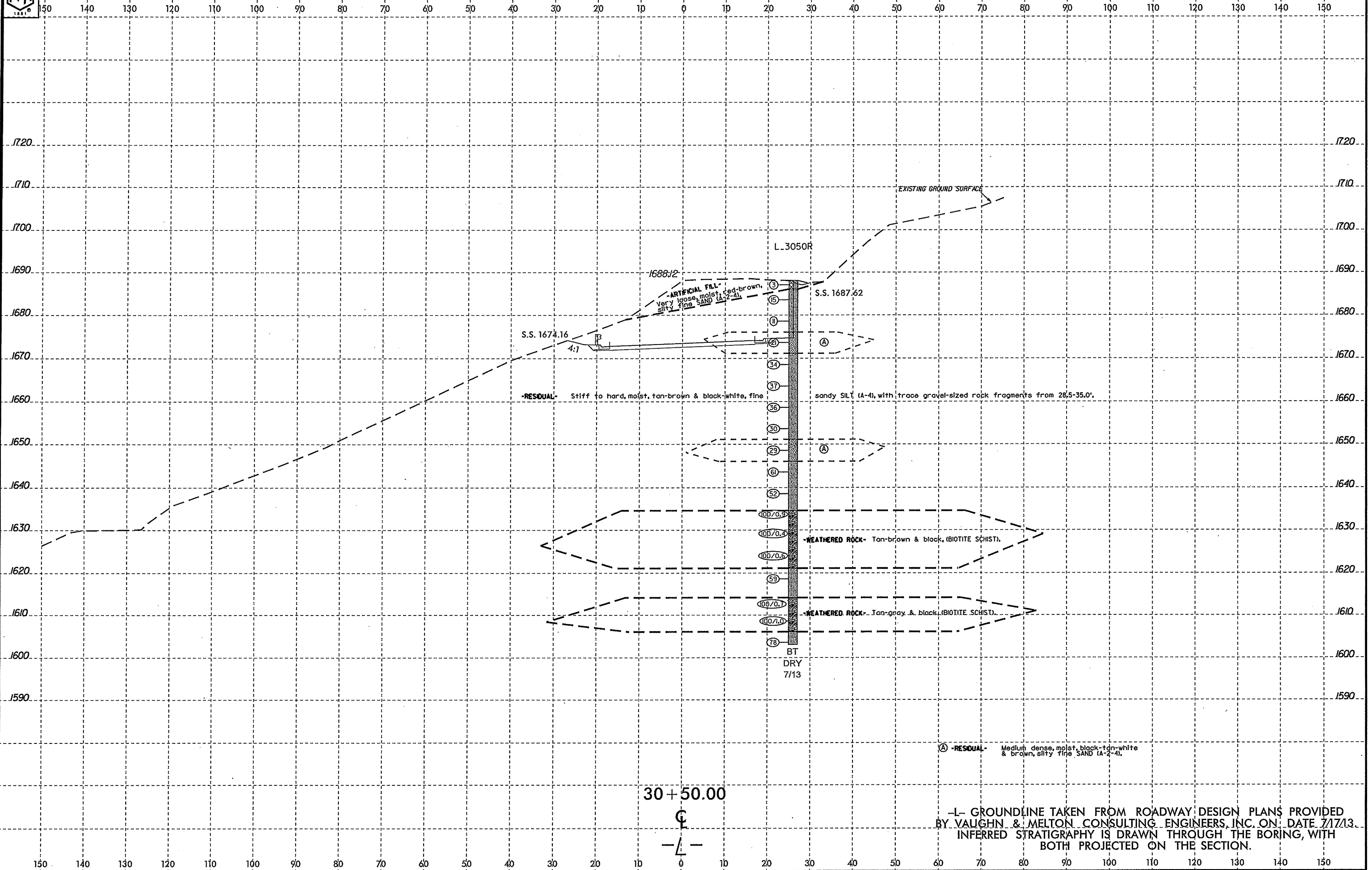
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



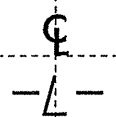
④ - ARTIFICIAL FILL - Medium stiff, moist, red-brown, fine sandy SILT (A-4).

30+00.00
 C
 -L-

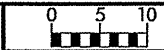
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



30+50.00



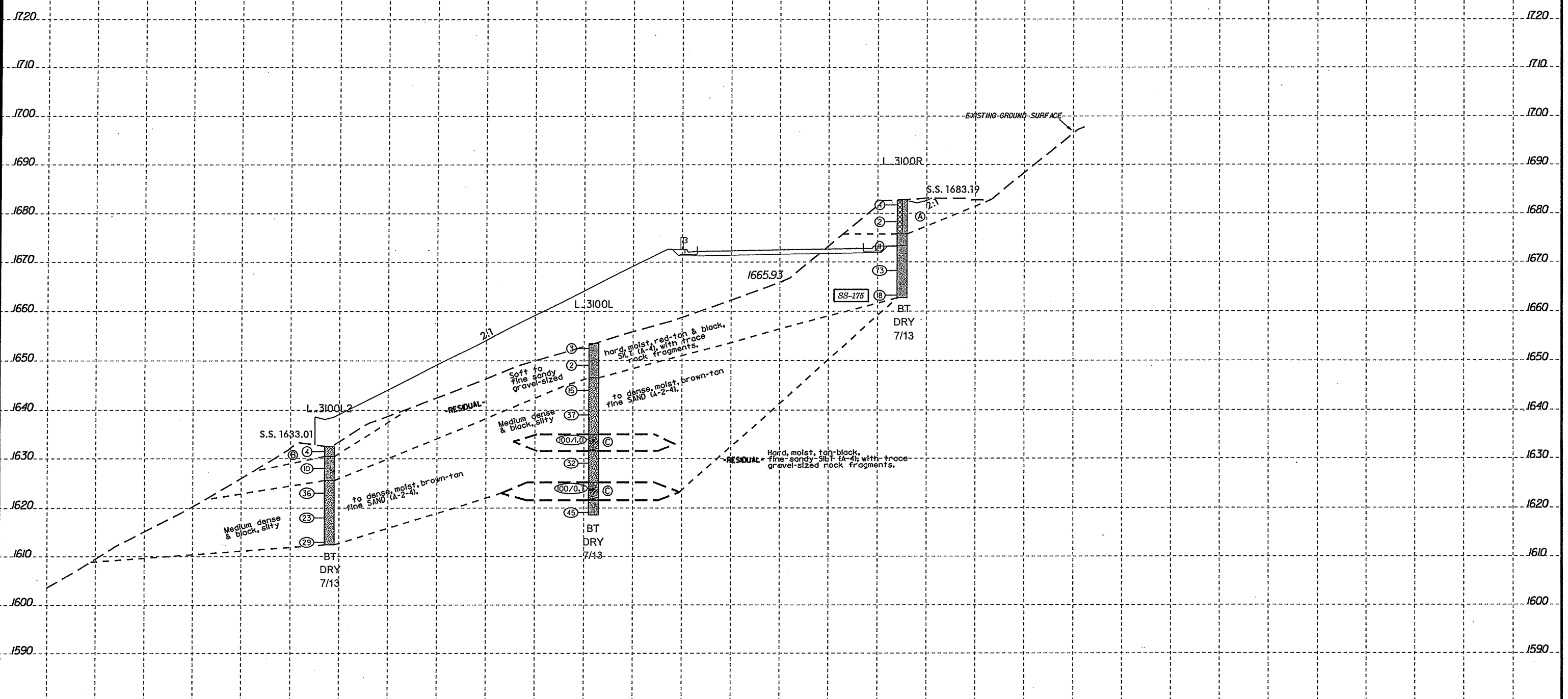
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



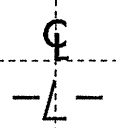
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-175	25' RT.	31+00	18.5'-20.0'	A-4(0)	32	1	19.9	41.9	28.0	10.2	100.0	90.3	49.4	30.6	NT



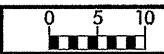
31+00.00



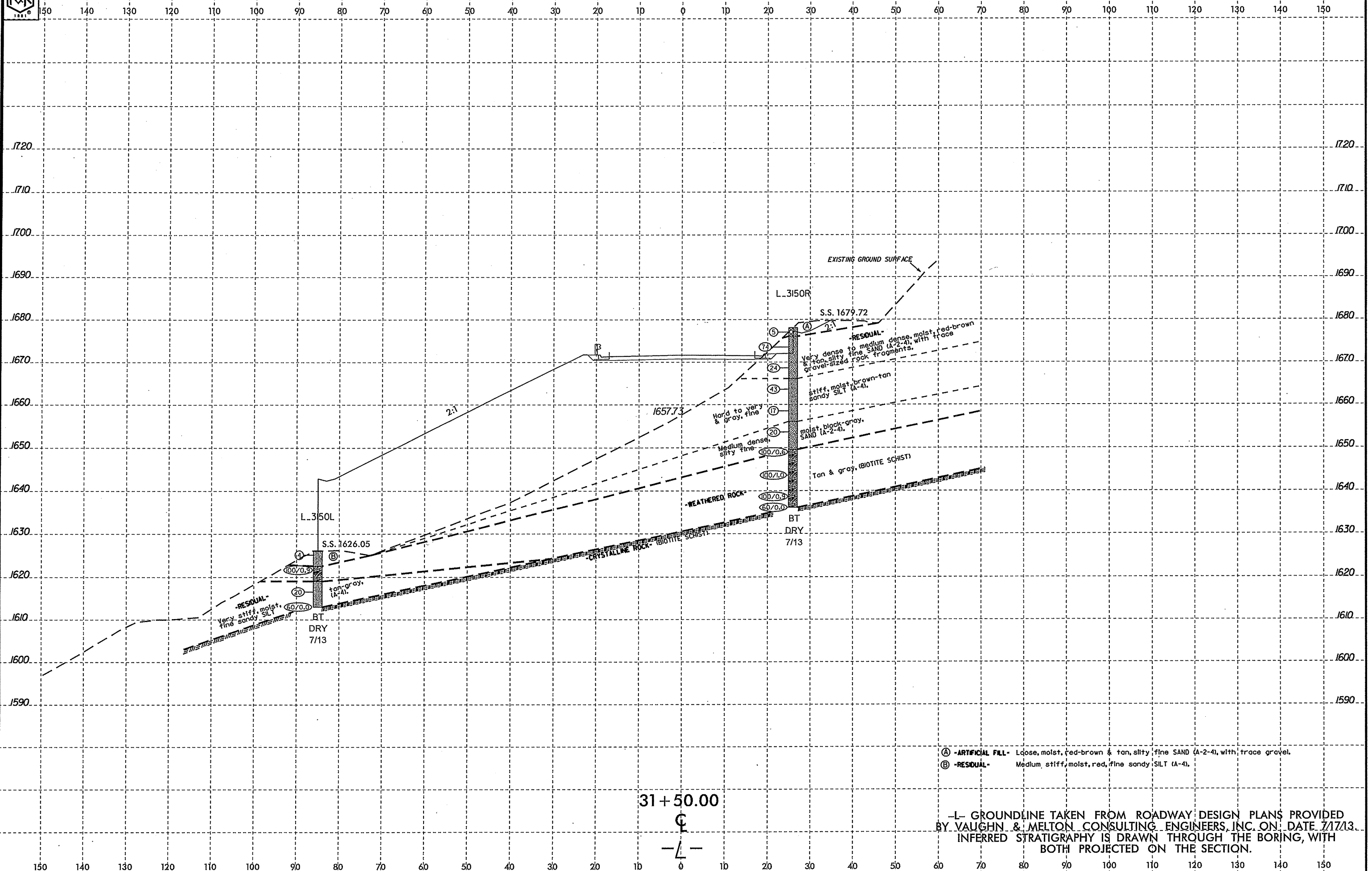
- Ⓐ -ARTIFICIAL FILL- Very loose to loose, moist, red-brown & tan, silty fine SAND (A-2-4), with trace gravel.
- Ⓑ -RESIDUAL- Very loose to loose, moist, red-brown, silty fine SAND (A-2-4).
- Ⓒ -WEATHERED ROCK- Red-tan-gray, (BIOTITE SCHIST).

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

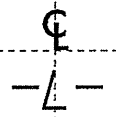
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



PROJ. REFERENCE NO.	SHEET NO.
R-5527	45

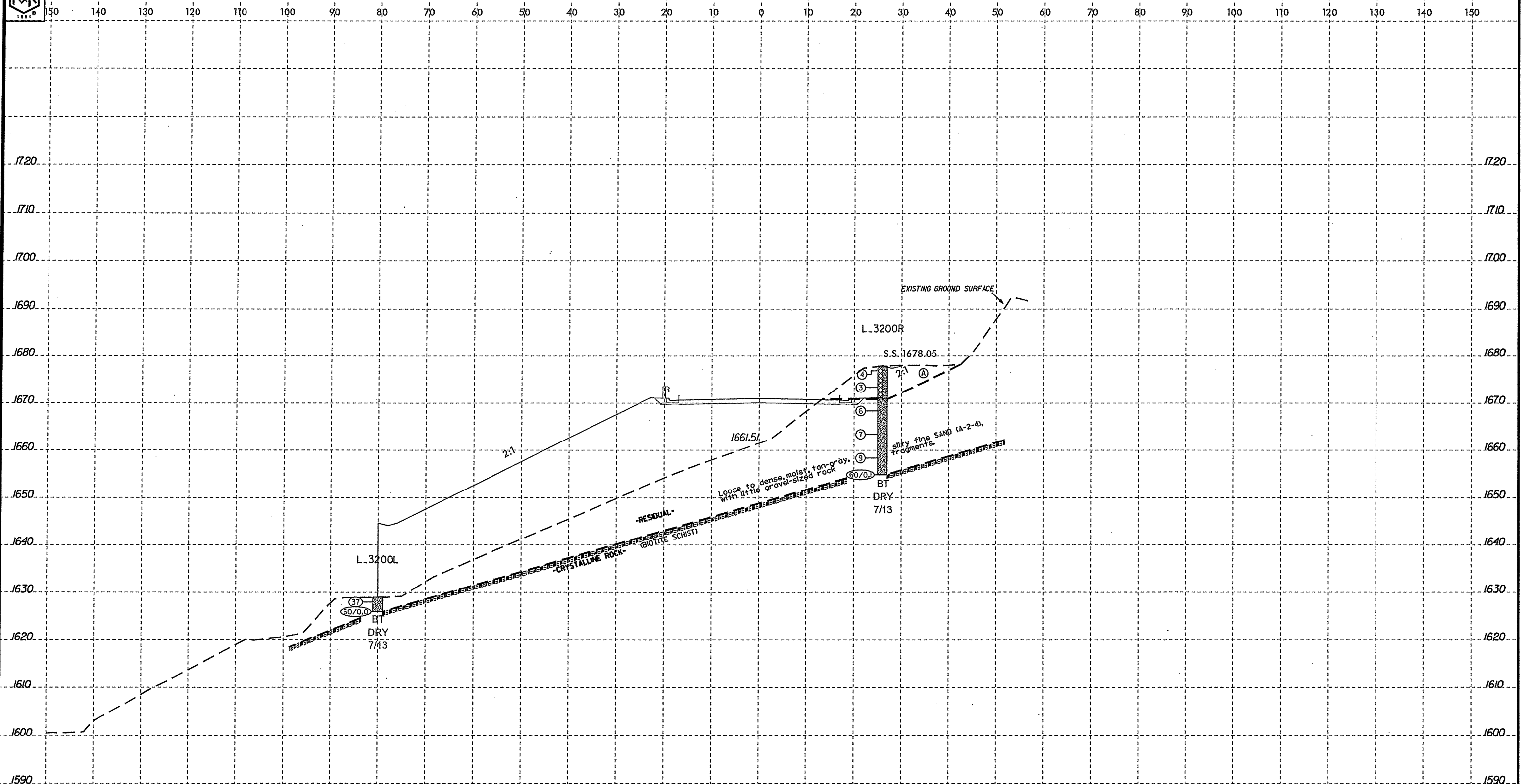


31+50.00



- Ⓐ -ARTIFICIAL FILL- Loose, moist, red-brown & tan, silty, fine SAND (A-2-4), with trace gravel.
- Ⓑ -RESIDUAL- Medium, stiff, moist, red, fine sandy SILT (A-4).

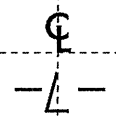
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



(A) -ARTIFICIAL FILL- Very loose to loose, moist, red, silty, fine SAND (A-2-4), with trace gravel-sized rock fragments.

NOTE: Boring L.3223L shown with Boring Logs on SHEET

32 + 00.00

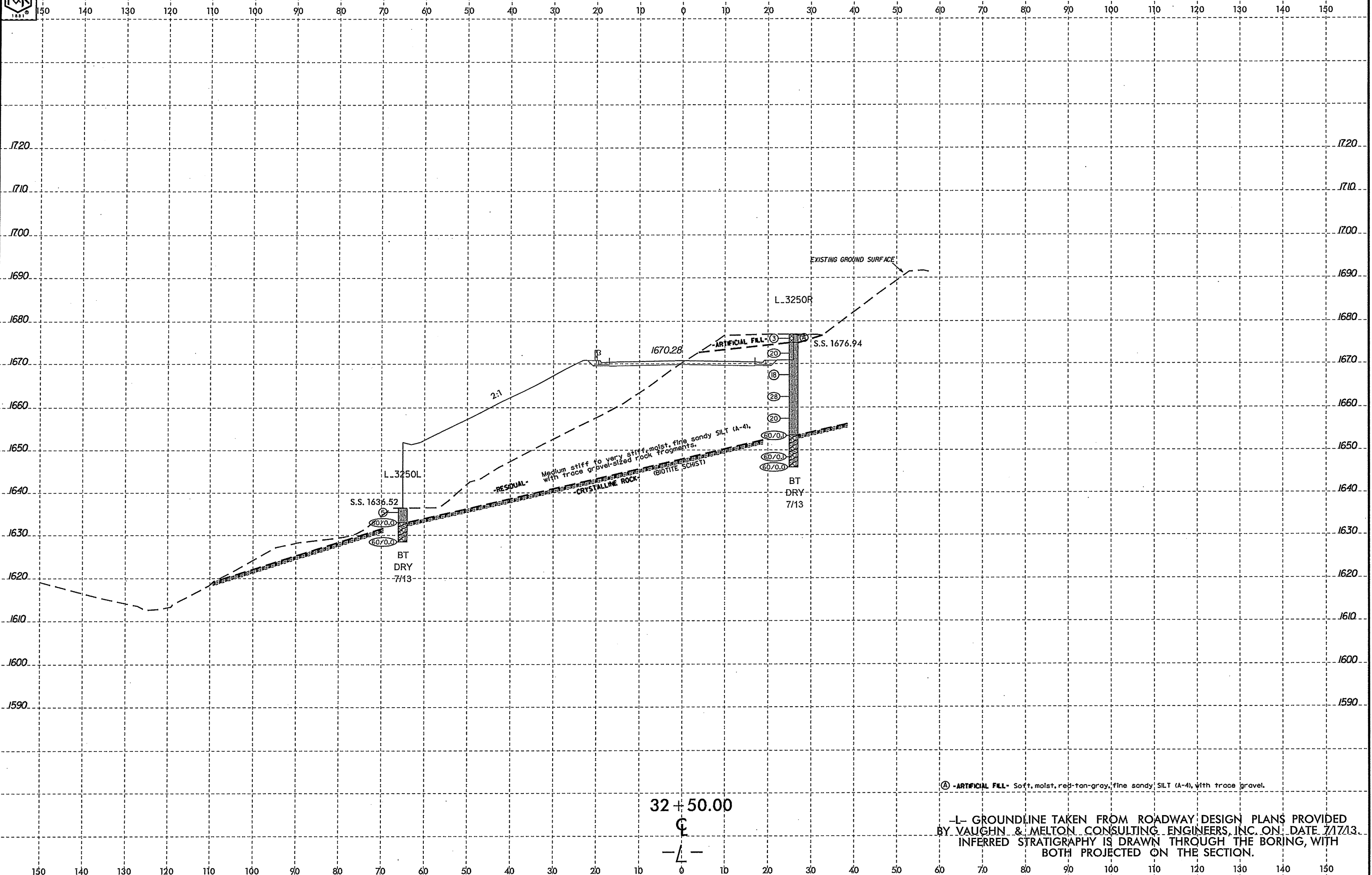


-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

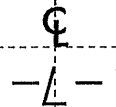


PROJ. REFERENCE NO.
R-5527

SHEET NO.
47



32 + 50.00



(A) -ARTIFICIAL FILL- Soft, moist, red-tan-gray, fine sandy SILT (A-4), with trace gravel.

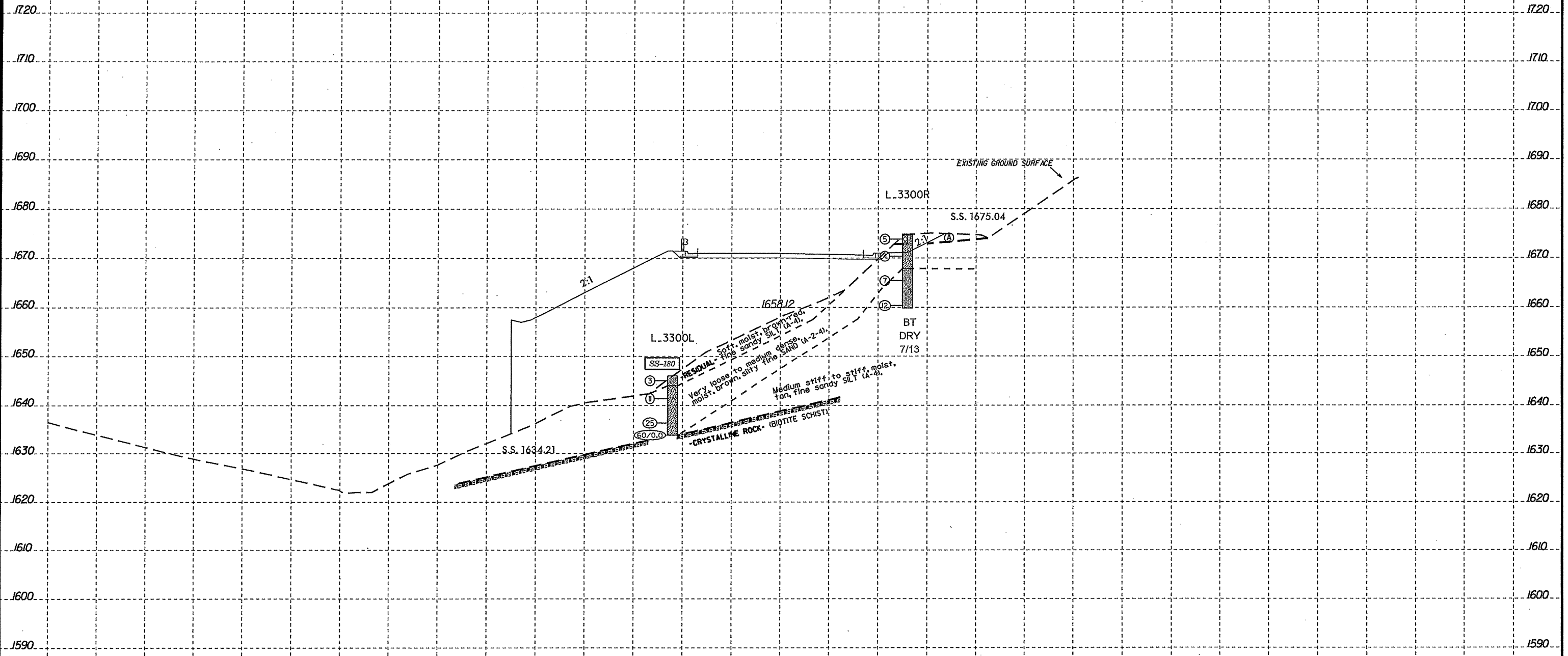
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

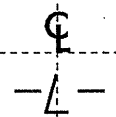
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-180	22' LT.	33+00	3.5'-5.0'	A-2-4(0)	36	5	19.2	40.2	27.1	13.5	47.0	40.5	26.2	22.2	NT



Ⓐ -ARTIFICIAL FILL- Medium stiff, moist, brown-red, fine sandy SILT (A-4).

33 + 00.00



L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

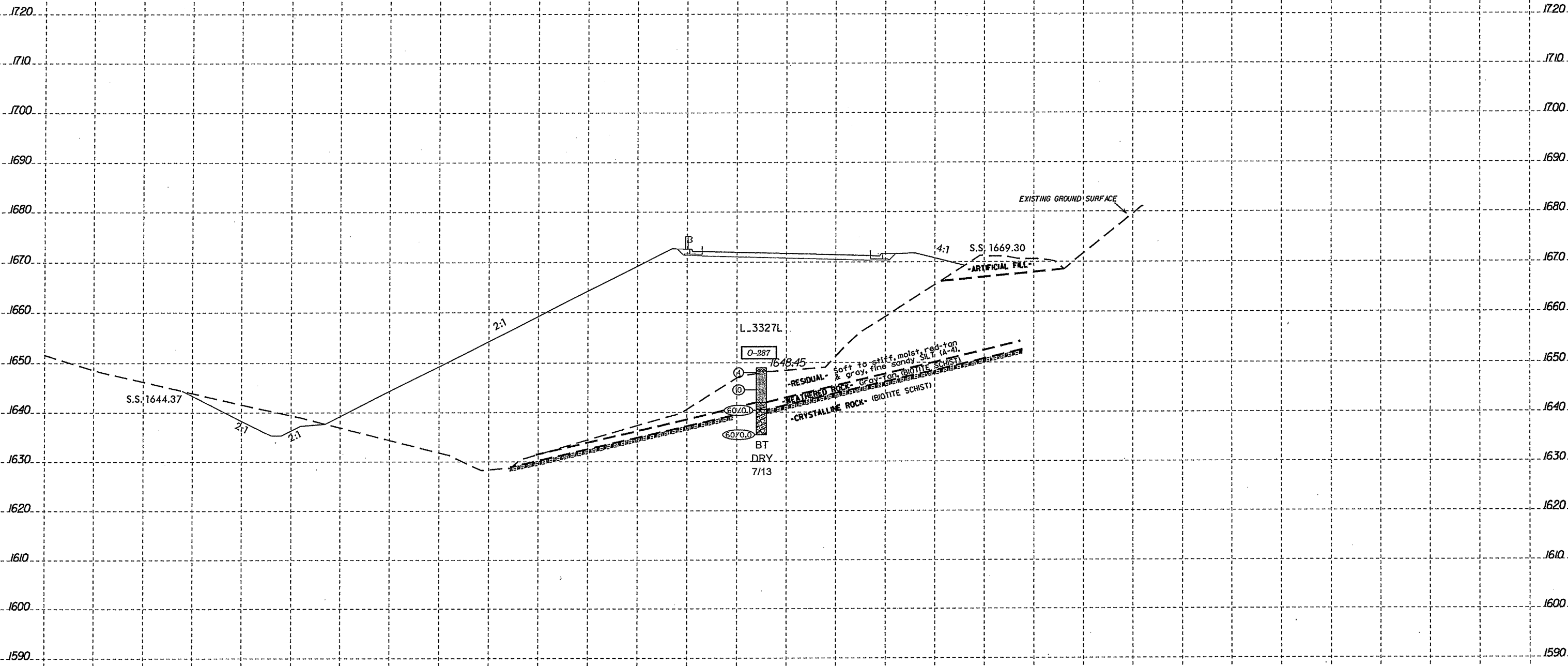
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



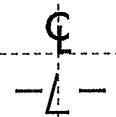
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
O-287	5' LT.	33+27	0.0'-0.7'	A-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	127.8	24.0

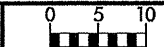


33 + 50.00

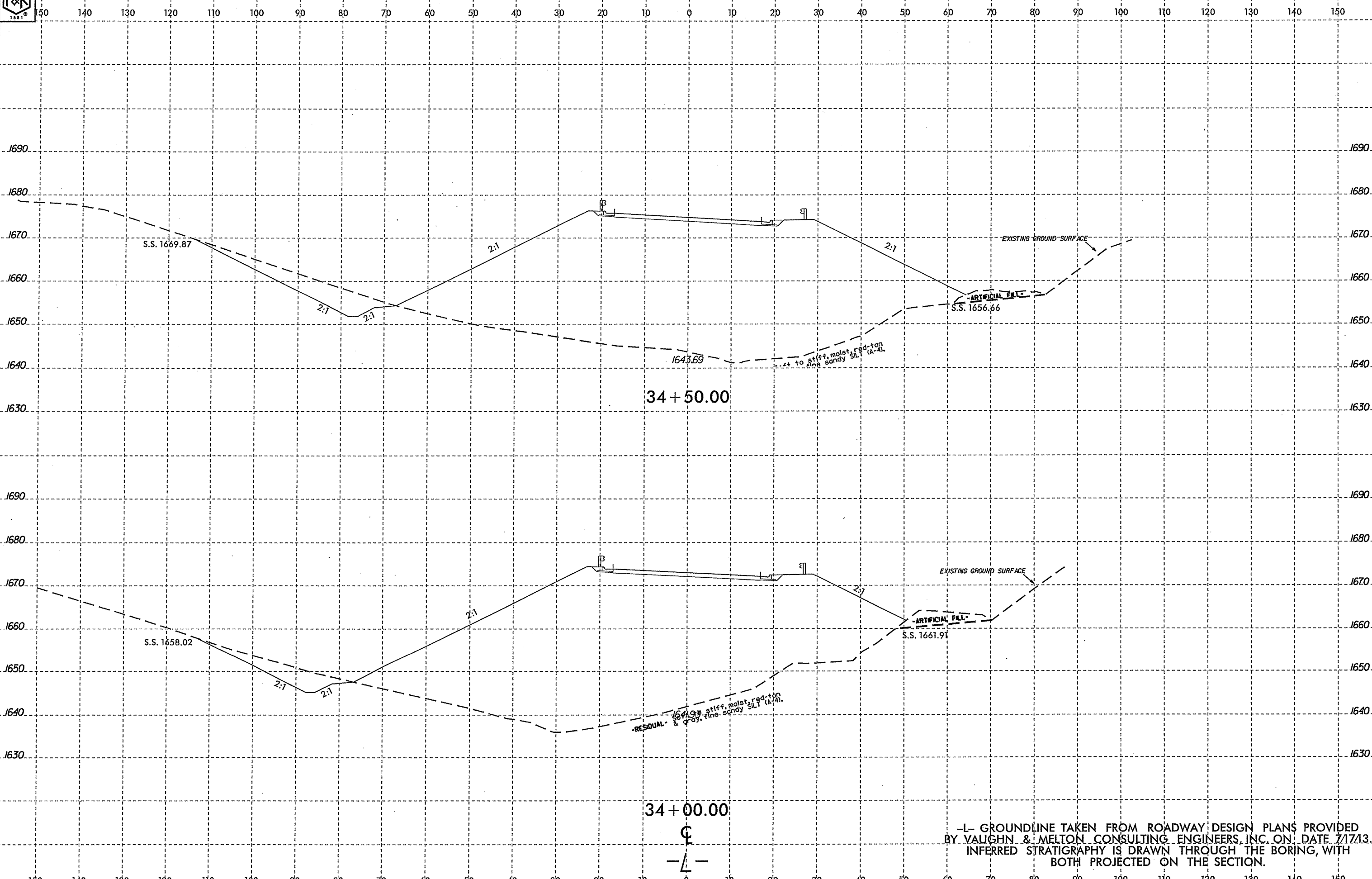


L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

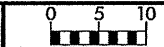
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



PROJ. REFERENCE NO.	SHEET NO.
R-5527	50



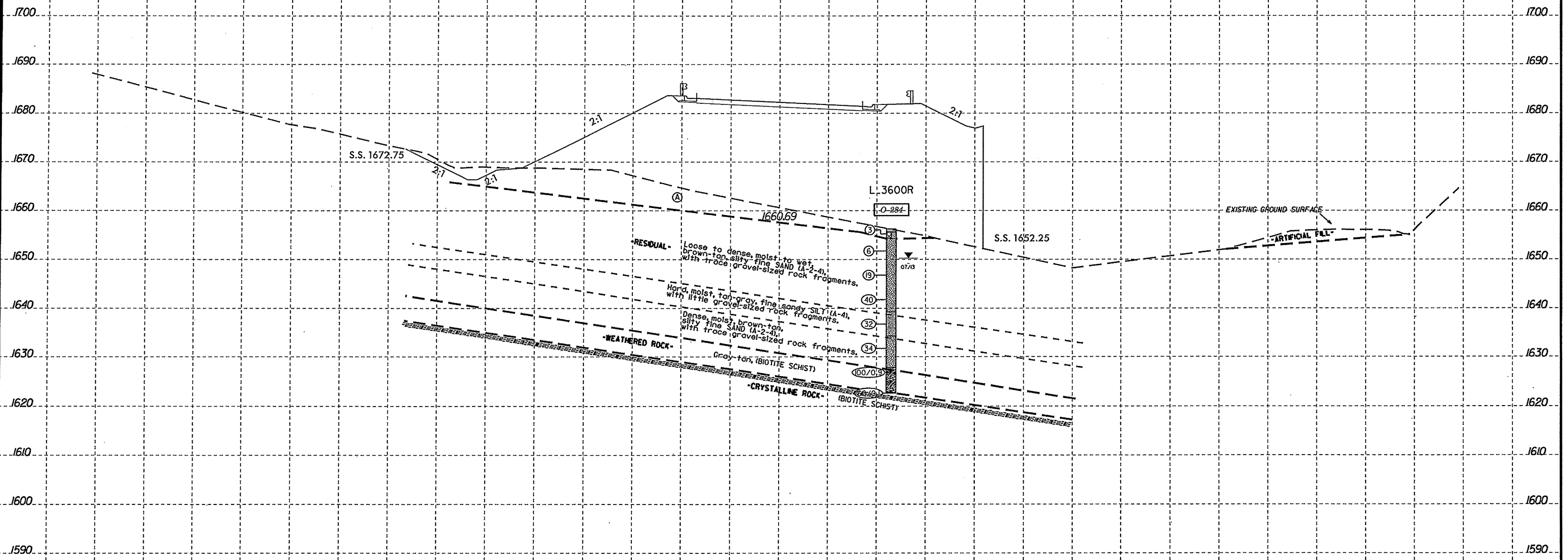
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.



150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
O-284	23' LT.	36+00	0.0'-0.7'	A-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	49.6	10.4



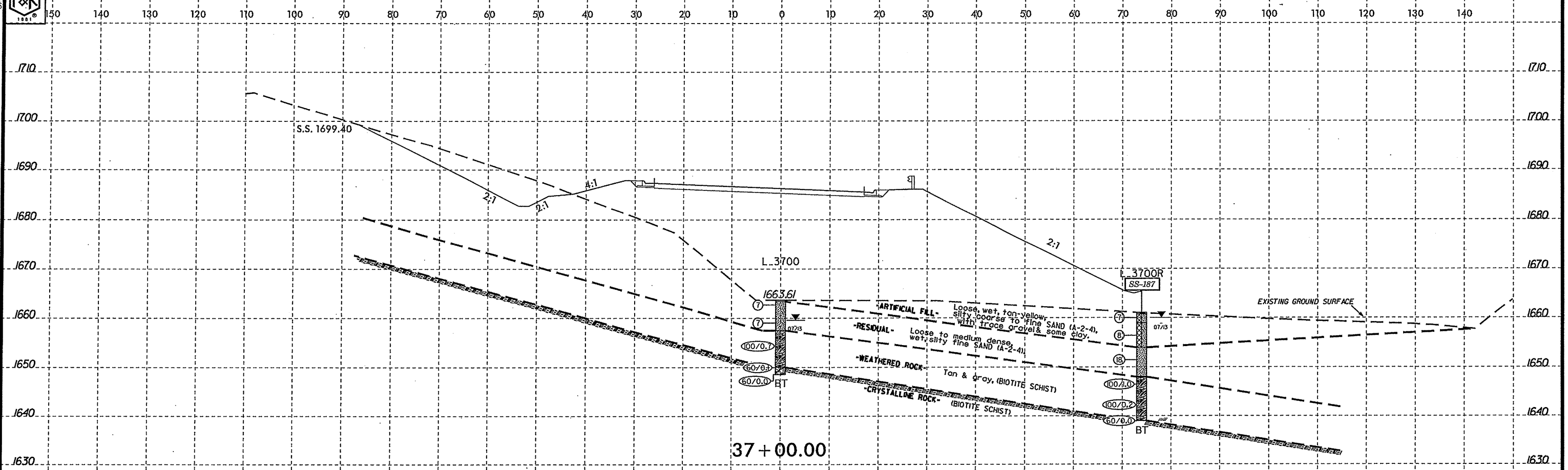
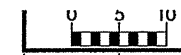
36 + 00.00
C
-L-

(A) -ARTIFICIAL FILL- Soft, moist, red-tan, fine sandy SILT (A-4).

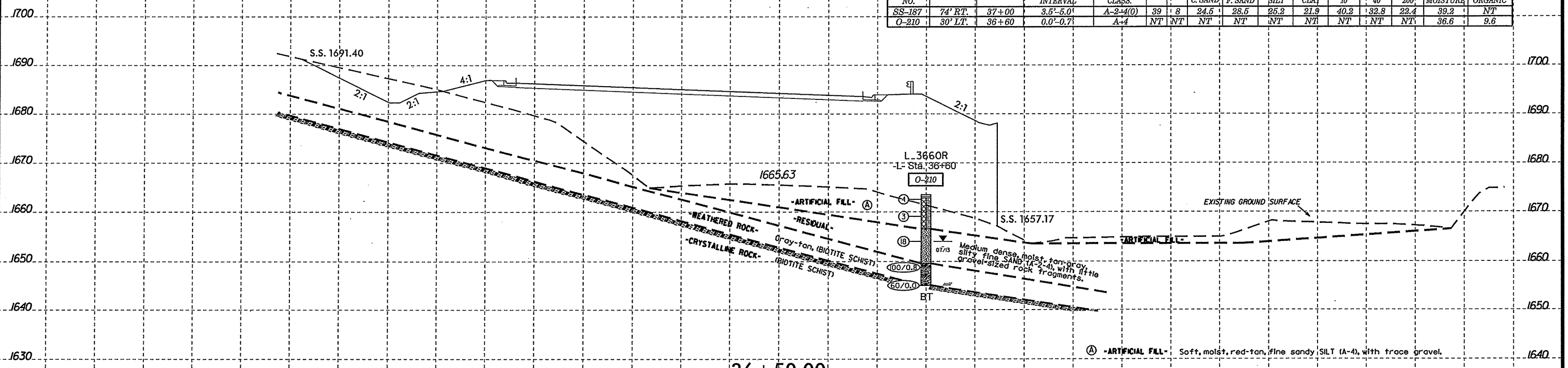
-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

8/23/79

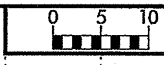


SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							G. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-187	74' RT.	37+00	3.5'-5.0'	A-2-4(0)	39	8	24.5	28.5	25.2	21.9	40.2	32.8	22.4	39.2	NT
O-210	30' LT.	36+60	0.0'-0.7'	A-4	NT	NT	NT	NT	NT	NT	NT	NT	NT	36.6	9.6

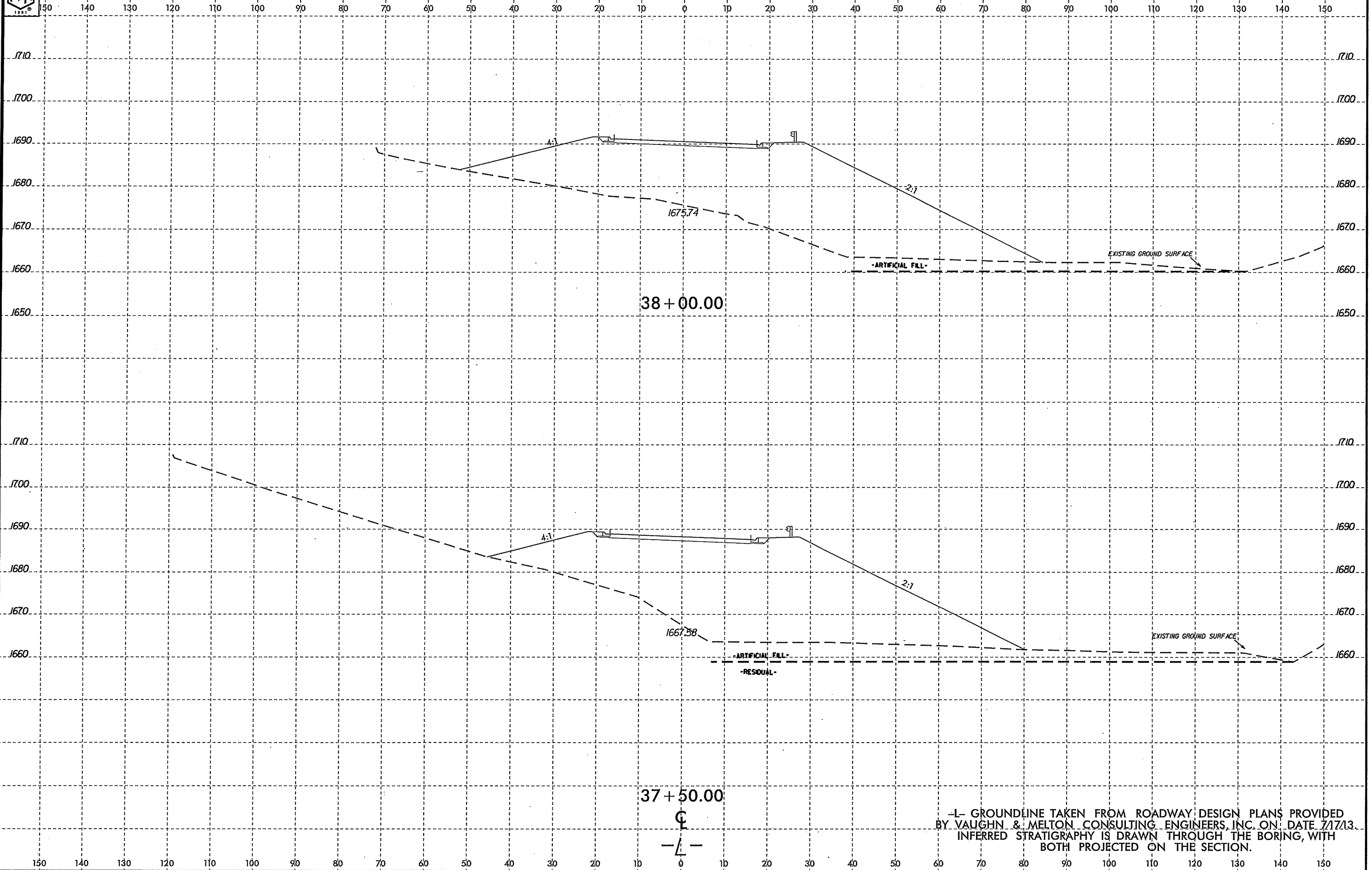


Ⓐ -ARTIFICIAL FILL- Soft, moist, red-tan, fine sandy SILT (A-4), with trace gravel.

-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

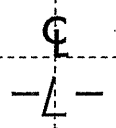


PROJ. REFERENCE NO.	SHEET NO.
R-5527	54



38 + 00.00

37 + 50.00



-L- GROUNDLINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY VAUGHN & MELTON CONSULTING ENGINEERS, INC. ON DATE 7/17/13. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE SECTION.

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION Bridge on New Route over Valley River							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 11+06		OFFSET 37 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,568.5 ft		TOTAL DEPTH 25.4 ft		NORTHING 536,525		EASTING 505,476									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic											
DRILLER C. Boyce		START DATE 06/26/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1570	1,568.5	0.0	7	7	9									1,568.5	0.0
1565	1,565.0	3.5												1,565.0	3.5
	1,564.1	4.4	38	62/0.1						100/0.6				1,564.1	4.4
			60/0.1							60/0.1					
1560															
1555															
1550															
1545															
														1,543.1	25.4
Boring Terminated at Elevation 1,543.1 ft IN CRYSTALLINE ROCK (DOLOMITIC MARBLE WITH INTERLAYERED QUARTZITE)															
1) Auger refusal at 4.4, began coring. 2) 0-hr water level not measured due to water introduced for coring.															

NCDOT BORE SINGLE 63R0047_BORELOGS_SUB.GPJ_NC_DOT.GDT 8/2/13

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral						
SITE DESCRIPTION Bridge on New Route over Valley River							GROUND WTR (ft)					
BORING NO. EB1-B		STATION 11+06		OFFSET 37 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 1,568.5 ft		TOTAL DEPTH 25.4 ft		NORTHING 536,525		EASTING 505,476						
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER C. Boyce		START DATE 06/26/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
1564.1	1,564.1	4.4	5.0	N=60/0.1 2:20/1.0 6:58/1.0 10:42/1.0 14:32/1.0 18:36/1.0	(4.8)	(0.3)		(20.7)	(3.8)		1,564.1	4.4
1560	1,559.1	9.4			96%	6%		99%	18%		Gray & white, slightly to moderately weathered, hard to moderately hard, (DOLOMITIC MARBLE WITH INTERLAYERED QUARTZITE), with very close to close fracture spacing.	
1555	1,554.1	14.4	5.0	4:08/1.0 6:36/1.0 4:30/1.0 3:51/1.0 15:08/1.0	(4.9)	(1.3)	RS-2				RS-2: 10.4'-10.8' q _u = 8,240 psi RMR ₂ = 7 + 3 + 5 + 6 + 7 = 28	
1550	1,549.1	19.4	5.0	4:00/1.0 5:55/1.0 5:00/1.0 7:32/1.0 31:07/1.0	(5.0)	(0.4)						
1545	1,544.1	24.4	5.0	10:01/1.0 22:34/1.0 16:15/1.0 9:49/1.0 6:53/1.0	(5.0)	(1.8)						
	1,543.1	25.4	1.0	10:43/1.0	(1.0)	(0.0)						25.4
Boring Terminated at Elevation 1,543.1 ft IN CRYSTALLINE ROCK (DOLOMITIC MARBLE WITH INTERLAYERED QUARTZITE)												
1) Auger refusal at 4.4, began coring. 2) 0-hr water level not measured due to water introduced for coring.												

NCDOT CORE SINGLE 63R0047_BORELOGS_SUB.GPJ_NC_DOT.GDT 8/2/13

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge on New Route over Valley River							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	49.0								
EB2-A	13+53	36 ft LT	-L			24 HR.	37.9								
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING												
1,584.9 ft	109.5 ft	536,436	505,717												
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 06/11/13	COMP. DATE 06/18/13	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		MOI			
1585	1,584.9	0.0	2	3	4							M	1,584.9	GROUND SURFACE	0.0
			ARTIFICIAL FILL												
			Red-brown-tan & gray black, fine sandy SILT (A-4), with trace gravel and mica.												
1580	1,581.4	3.5	5	6	7							M			
1575	1,576.4	8.5	10	6	8							M			
1570	1,571.4	13.5	10	9	13							M			
1565	1,566.4	18.5	3	4	6							M			
1560	1,561.4	23.5	7	8	7							M			
1555	1,556.4	28.5	4	5	5							M			
1550	1,551.4	33.5	8	8	12							M			
1545	1,546.4	38.5	2	3	2							SS-10	33%	1,547.9	37.0
			ALLUVIAL												
			Brown & gray, mottled, coarse to fine sandy SILT (A-4(4)), with little clay, trace roots, wood fragments & mica.												
1540	1,541.4	43.5	4	5	7							SS-11	28%	1,542.9	42.0
			Brown & gray, mottled, coarse to fine sandy SILT (A-4(6)), with little clay, trace roots, wood fragments & mica.												
1535	1,536.4	48.5	17	18	15							SS-12	15%	1,537.9	47.0
			Gray, silty, fine to highly coarse sandy GRAVEL (A-1-a(0)), with trace clay.												
1530	1,531.4	53.5	9	12	14							M		1,532.9	52.0
			RESIDUAL												
			Gray-black & orange-white-brown, fine sandy SILT (A-4), with trace gravel-sized rock fragments, clay & mica, saprolitic.												
1525	1,526.4	58.5	10	13	38							M			
1520	1,521.4	63.5	14	22	23							M			
1515	1,516.4	68.5	8	8	11							M			
1510	1,511.4	73.5	10	13	15							M			
1505	1,506.4	78.5	10	14	18							M			

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer									
SITE DESCRIPTION Bridge on New Route over Valley River							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	49.0								
EB2-A	13+53	36 ft LT	-L			24 HR.	37.9								
COLLAR ELEV.	TOTAL DEPTH	NORTHING	EASTING												
1,584.9 ft	109.5 ft	536,436	505,717												
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 06/11/13	COMP. DATE 06/18/13	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		MOI			
1505			Match Line												
1500	1,501.4	83.5	8	10	22							M			
			RESIDUAL												
			Gray-black & orange-white-brown, fine sandy SILT (A-4), with trace gravel-sized rock fragments, clay & mica, saprolitic. (continued)												
1495	1,496.4	88.5	19	71	29/0.3									1,495.9	89.0
			WEATHERED ROCK												
			Brown & orange, (BIOTITE SCHIST)												
1490	1,491.4	93.5	33	43	57/0.4									1,487.9	97.0
			RESIDUAL												
			Brown & orange, fine sandy SILT (A-4), with trace mica, saprolitic												
1485	1,486.4	98.5	16	30	50							M		1,482.9	102.0
			Dark-gray & white, fine to coarse sandy, clayey SILT (A-5), saprolitic												
1480	1,481.4	103.5	14	24	53							M			
			WEATHERED ROCK												
			Dark-gray & white, (BIOTITE SCHIST)												
			Boring Terminated at Elevation 1,475.4 ft IN WEATHERED ROCK (BIOTITE SCHIST)												
			Surficial Organic Soils from 0.0-0.1'.												
			Bulk Sample obtained for CBR-1 from 1.0-4.0'.												
	1,476.4	108.5	24	76/0.5	100/1.0									1,475.4	109.5

NCDOT BORE DOUBLE 63R0047 BORELOGS SUB.GPJ NC.DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_1500		STATION 15+00		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,586.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 536,319		EASTING 505,814										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 06/20/13		COMP. DATE 06/20/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1590																
1585	1,586.0	0.0	2	4	4										1,586.0	0.0
	1,582.5	3.5	7	10	9											
1580	1,577.5	8.5	2	4	2											
1575	1,572.5	13.5	4	4	5										1,571.0	15.0
Boring Terminated at Elevation 1,571.0 ft IN ARTIFICIAL FILL (SILT) Surficial Organic Soils from 0.0-0.1'. Other Samples: CBR-1 (1.0 - 4.0)																

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_1550L		STATION 15+50		OFFSET 100 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,585.8 ft		TOTAL DEPTH 10.0 ft		NORTHING 536,370		EASTING 505,914										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 06/20/13		COMP. DATE 06/20/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1590																
1585	1,585.8	0.0	3	4	7										1,585.8	0.0
	1,582.3	3.5	4	3	3											
1580	1,577.3	8.5	7	9	25										1,575.8	8.5
															1,575.8	10.0
ARTIFICIAL FILL Brown & gray, fine sandy SILT (A-4), with trace gravel & mica. RESIDUAL Orange-tan-red, fine to coarse sandy SILT (A-4), with trace gravel-sized rock fragments & mica. Boring Terminated at Elevation 1,575.8 ft IN RESIDUAL (SILT) Surficial Organic Soils from 0.0-0.1'.																

NCDOT BORE DOUBLE 69R0047_BORELOGS.SUB.GPJ NC_DOT_GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_1550R		STATION 15+50		OFFSET 100 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,586.3 ft		TOTAL DEPTH 10.0 ft		NORTHING 536,209		EASTING 505,794										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 06/20/13		COMP. DATE 06/20/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1590																
	1,586.3	0.0	4	5	4										1,586.3	0.0
1585																
	1,582.8	3.5	2	2	4											
1580																
	1,577.8	8.5	4	6	10											

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_1700		STATION 17+00		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,589.7 ft		TOTAL DEPTH 15.0 ft		NORTHING 536,200		EASTING 505,974										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 06/20/13		COMP. DATE 06/20/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1590																
	1,589.7	0.0	3	4	4										1,589.7	0.0
1585																
	1,586.2	3.5	8	11	13										1,586.2	3.5
1580																
	1,581.2	8.5	5	9	13											
	1,576.2	13.5	6	10	12											
1575																

NCDOT BORE DOUBLE 63R0047_BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO.	L_1800	STATION	18+00	OFFSET	CL	ALIGNMENT	-L-									
COLLAR ELEV.	1,591.4 ft	TOTAL DEPTH	14.2 ft	NORTHING	536,147	EASTING	506,059									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE	06/20/13	COMP. DATE	06/20/13	SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT				BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1595																
	1,591.4	0.0	1	2	3									1,591.4	0.0	GROUND SURFACE
1590	1,587.9	3.5	9	16	12									1,589.4	2.0	ARTIFICIAL FILL Brown & orange, fine sandy SILT (A-4), with trace gravel & mica.
1585	1,582.9	8.5	68	32/0.3										1,586.2	5.2	RESIDUAL Brown, orange & black, fine to coarse sandy SILT (A-4), with trace gravel-sized rock fragments & mica.
1580	1,577.9	13.5												1,577.2	14.2	WEATHERED ROCK Brown, orange & gray, (BIOTITE SCHIST).
	1,577.2	14.2														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,577.2 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)
																Surficial Organic Soils from 0.0-0.1'

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO.	L_1965R	STATION	19+65	OFFSET	12 ft RT	ALIGNMENT	-L-									
COLLAR ELEV.	1,648.3 ft	TOTAL DEPTH	33.2 ft	NORTHING	536,107	EASTING	506,220									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE	06/20/13	COMP. DATE	06/20/13	SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1650																
	1,648.3	0.0	4	4	6									1,648.3	0.0	GROUND SURFACE
1645	1,644.8	3.5	17	12	16											RESIDUAL Brown-gray & tan-black, silty fine to coarse SAND (A-2-4(0)), with trace gravel-sized rock fragments & mica, saprolitic.
1640	1,639.8	8.5	21	35	19											
1635	1,634.8	13.5	55	41	30											
1630	1,629.8	18.5	100/0.3													
1625	1,624.8	23.5	100/0.3													
1620	1,619.8	28.5	20	80/0.3												
	1,615.2	33.1	60/0.1													
	1,615.1	33.2														CRYSTALLINE ROCK (BIOTITE SCHIST). Boring Terminated with Standard Penetration Test Refusal at Elevation 1,615.1 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)
																Surficial Organic Soils from 0.0-0.2'

NCDOT BORE DOUBLE 63R0047 BORELOGS SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_1965R2		STATION 19+65		OFFSET 65 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,661.7 ft		TOTAL DEPTH 33.0 ft		NORTHING 536,055		EASTING 506,224										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/16/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1665															1,661.7	0.0
1660																
1655																
1650																
1645																
1640																
1635																
1630																
															1,634.7	27.0
															1,630.7	31.0
															1,628.7	33.0
WEATHERED ROCK Tan, (BIOTITE SCHIST). RESIDUAL Dense to very dense, moist, orange-tan, silty fine SAND (A-2-4). Boring Terminated at Elevation 1,628.7 ft IN RESIDUAL (SILT) Surficial Organic Soils from 0.0-0.2'.																

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2000L		STATION 20+00		OFFSET 15 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,651.8 ft		TOTAL DEPTH 26.0 ft		NORTHING 536,138		EASTING 506,252										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/24/13		COMP. DATE 07/24/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1655															1,651.8	0.0
1650																
1645																
1640																
1635																
1630																
															1,633.8	18.0
															1,625.8	26.0
WEATHERED ROCK Gray-tan, (BIOTITE SCHIST). RESIDUAL Loose to very dense, moist, orange-tan & gray-tan, silty fine to coarse SAND (A-2-4). Boring Terminated by Auger Refusal at Elevation 1,625.8 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)																

NCDOT BORE DOUBLE 63R0047 BORELOGS SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST M. Brewer										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2100R		STATION 21+00		OFFSET 7 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,687.7 ft		TOTAL DEPTH 42.0 ft		NORTHING 536,138		EASTING 506,353										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 06/27/13		COMP. DATE 06/27/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1690	1,687.7	0.0	2	3	3										1,687.7	0.0
1685	1,684.2	3.5	6	9	14										1,686.7	1.0
1680	1,679.2	8.5	39	50	36										1,685.7	2.0
1675	1,674.2	13.5	18	26	35											
1670	1,669.2	18.5	28	33	33											
1665	1,664.2	23.5	20	16	14											
1660	1,659.2	28.5	100/0.5												1,661.6	28.1
1655	1,654.2	33.5	5	9	20										1,655.2	32.5
1650	1,649.2	38.5	60/0.1												1,650.6	37.1
	1,645.7	42.0	60/0.0												1,649.2	38.5
															1,645.7	42.0

GROUND SURFACE 0.0
 Brown, silty fine SAND (A-2-4), with trace organics.
ARTIFICIAL FILL 1.0 - 2.0
 Brown & black, fine sandy SILT (A-4).
RESIDUAL
 Gray-blue & black, highly fine sandy SILT (A-4(0)), with trace gravel-sized rock fragments & mica, saprolitic.
WEATHERED ROCK 28.1
 Gray-blue, (BIOTITE SCHIST).
RESIDUAL 32.5
 Gray-blue-green, highly fine sandy SILT (A-4), with trace mica, gravel-sized rock fragments, & a thin orange clay seam, saprolitic.
WEATHERED ROCK 37.1 - 38.5
 (BIOTITE SCHIST).
CRYSTALLINE ROCK 42.0
 (BIOTITE SCHIST).
 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,645.7 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)

Other Samples:
 O-500 (0.0 - 1.0)
 CBR-2 (2.0 - 5.0)

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2100R2		STATION 21+00		OFFSET 120 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,723.0 ft		TOTAL DEPTH 53.8 ft		NORTHING 536,028		EASTING 506,377										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/01/13		COMP. DATE 07/01/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1725	1,723.0	0.0	2	1	1										1,723.0	0.0
1720	1,719.5	3.5	2	3	5											
1715	1,714.5	8.5	6	11	8											
1710	1,709.5	13.5	5	2	2											
1705	1,704.5	18.5	31	65	35/0.3										1,704.0	19.0
1700	1,699.5	23.5	100/0.4												1,696.0	27.0
1695	1,694.5	28.5	9	12	19											
1690	1,689.5	33.5	22	34	24											
1685	1,684.5	38.5	9	16	17											
1680	1,679.5	43.5	100/0.5												1,679.5	43.5
1675	1,674.5	48.5	35	60	40/0.3											
1670	1,669.5	53.5	100/0.3												1,669.2	53.8

GROUND SURFACE 0.0
RESIDUAL
 Gray-tan & red, fine to coarse sandy SILT (A-4), with trace gravel-sized rock fragments & mica.
WEATHERED ROCK 19.0
 Gray-tan-red, (BIOTITE SCHIST).
RESIDUAL 27.0
 Gray-tan, fine to coarse sandy SILT (A-4), with trace gravel-sized rock fragments & mica.
WEATHERED ROCK 43.5
 Tan-gray & black, (BIOTITE SCHIST).
 Boring Terminated at Elevation 1,669.2 ft IN WEATHERED ROCK (BIOTITE SCHIST)
 Surficial Organic Soils from 0.0-0.2'.

NCDOT BORE DOUBLE 63R0047 BORELOGS, SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2200R		STATION 22+00		OFFSET 50 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,698.5 ft		TOTAL DEPTH 44.0 ft		NORTHING 536,109		EASTING 506,449										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/16/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1700															1,698.5	0.0
1695																
1690																
1685																
1680																
1675																
1670																
1665																
1660															1,662.5	36.0
1655															1,654.5	44.0

GROUND SURFACE
RESIDUAL
 Medium stiff to hard, moist, brown-orange & gray-tan, fine sandy SILT (A-4), with trace mica.

WEATHERED ROCK
 Gray, (BIOTITE SCHIST).

Boring Terminated by Auger Refusal at Elevation 1,654.5 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)

Surficial Organic Soils from 0.0-0.2'.

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2250R		STATION 22+50		OFFSET 60 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,700.3 ft		TOTAL DEPTH 48.0 ft		NORTHING 536,094		EASTING 506,485										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/16/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1705															1,700.3	0.0
1700																
1695																
1690																
1685																
1680																
1675																
1670																
1665																
1660															1,660.3	40.0
1655															1,652.3	48.0

GROUND SURFACE
RESIDUAL
 Medium stiff to hard, moist, red-orange & gray-tan, fine sandy SILT (A-4), with trace mica.

WEATHERED ROCK
 Gray-tan, (BIOTITE SCHIST).

Boring Terminated by Auger Refusal at Elevation 1,652.3 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)

Surficial Organic Soils from 0.0-0.2'.

NCDOT BORE DOUBLE 63R0047_BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2250R2		STATION 22+50		OFFSET 120 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,728.8 ft		TOTAL DEPTH 53.0 ft		NORTHING 536,036		EASTING 506,470										
0 HR. Dry		24 HR. Dry														
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/16/13		COMP. DATE 07/16/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1730															1,728.8	0.0
1725																
1720																
1715																
1710																
1705																
1700																
1695																
1690																
1685																
1680																
															1,675.8	53.0
Boring Terminated at Elevation 1,675.8 ft IN RESIDUAL (SILT)																
Surficial Organic Soils from 0.0-0.2'																

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2300		STATION 23+00		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,668.7 ft		TOTAL DEPTH 28.0 ft		NORTHING 536,134		EASTING 506,547										
0 HR. Dry		24 HR. Dry														
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/24/13		COMP. DATE 07/24/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1670															1,668.7	0.0
1665																
1660																
1655																
1650																
1645																
															1,644.7	24.0
WEATHERED ROCK Gray-tan, (BIOTITE SCHIST).																
															1,640.7	28.0
Boring Terminated by Auger Refusal at Elevation 1,640.7 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)																

NCDOT BORE DOUBLE 63R0047_BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY						GROUND WTR (ft)									
BORING NO. L_2300R		STATION 23+00		OFFSET 65 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,701.0 ft		TOTAL DEPTH 44.6 ft		NORTHING 536,076		EASTING 506,518									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 06/28/13		COMP. DATE 06/28/13		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1705															
1700	1,701.0	0.0	4	4	4									1,701.0	GROUND SURFACE
	1,697.5	3.5	4	5	5										RESIDUAL Tan & gray, coarse to fine sandy SILT (A-4), with trace gravel-sized rock fragments & mica.
1695	1,692.5	8.5	8	14	17										
1690	1,687.5	13.5	8	19	19										
1685	1,682.5	18.5	100/0.5											1,683.0	WEATHERED ROCK Tan & gray, (BIOTITE SCHIST).
1680	1,677.5	23.5	5	7	11									1,679.0	RESIDUAL Gray-tan & black, fine to coarse sandy SILT (A-4), with trace gravel-sized rock fragments, saprolitic.
1675	1,672.5	28.5	12	14	80									1,670.0	WEATHERED ROCK Gray-tan & black, (BIOTITE SCHIST).
1670	1,667.5	33.5	18	82/0.4										1,662.5	CRYSTALLINE ROCK Gray, (BIOTITE SCHIST).
1665	1,662.5	38.5	60/0.1											1,656.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,656.4 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST) Surficial Organic Soils from 0.0-0.2'.
1660	1,657.5	43.5	60/0.1												
	1,656.4	44.6	60/0.0												

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY						GROUND WTR (ft)									
BORING NO. L_2300R2		STATION 23+00		OFFSET 120 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,727.9 ft		TOTAL DEPTH 50.0 ft		NORTHING 536,028		EASTING 506,494									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 07/01/13		COMP. DATE 07/01/13		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1730															
	1,727.9	0.0	2	1	1									1,727.9	GROUND SURFACE
1725	1,724.4	3.5	5	9	14									1,727.2	Brown, fine sandy SILT (A-4), with some organics.
1720	1,719.4	8.5	13	16	12										RESIDUAL Red-tan & gray, fine sandy SILT (A-4), with trace gravel-sized rock fragments from 23.5-30.0'.
1715	1,714.4	13.5	7	7	10										
1710	1,709.4	18.5	22	16	15										
1705	1,704.4	23.5	18	50	33										
1700	1,699.4	28.5	19	17	10										
1695	1,694.4	33.5	50	28	25										
1690	1,689.4	38.5	57	43/0.3										1,689.4	WEATHERED ROCK Gray-tan, (BIOTITE SCHIST).
1685	1,684.4	43.5	100/0.5											1,680.9	RESIDUAL Gray-tan, fine sandy SILT (A-4).
1680	1,679.4	48.5	7	12	19									1,677.9	Boring Terminated at Elevation 1,677.9 ft IN RESIDUAL (SILT) Other Samples: O-501 (0.0 - 0.7)

NCDOT BORE DOUBLE 63R0047_BORELOGS_SUB.GPJ NC_DOT_GDT_8/2/13



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2400L	STATION 24+00	OFFSET 40 ft LT	ALIGNMENT -L-			0 HR. Dry										
COLLAR ELEV. 1,701.9 ft	TOTAL DEPTH 72.0 ft	NORTHING 536,096	EASTING 506,655			24 HR. Dry										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/24/13	COMP. DATE 07/24/13	SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1705															1,701.9	0.0
1700														RESIDUAL Medium stiff to hard, moist, brown-orange & gray-tan, fine sandy SILT (A-4), with trace mica.		
1695																
1690																
1685																
1680																
1675																
1670																
1665																
1660														WEATHERED ROCK Gray-tan, (BIOTITE SCHIST).	42.0	
1655																
1650																
1645																
1640																
1635																
1630														Boring Terminated by Auger Refusal at Elevation 1,629.9 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)	72.0	

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2400R	STATION 24+00	OFFSET 60 ft RT	ALIGNMENT -L-			0 HR. Dry										
COLLAR ELEV. 1,701.3 ft	TOTAL DEPTH 44.7 ft	NORTHING 536,034	EASTING 506,577			24 HR. Dry										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/24/13	COMP. DATE 07/24/13	SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1705															1,701.3	0.0
1700														RESIDUAL Medium stiff to hard, moist, brown-orange & gray-tan, fine sandy SILT (A-4), with trace mica.		
1695																
1690																
1685																
1680																
1675																
1670																
1665																
1660														WEATHERED ROCK Gray-tan, (BIOTITE SCHIST).	28.0	
1655																
1650																
1645																
1640																
1635																
1630														Boring Terminated by Auger Refusal at Elevation 1,656.6 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)	44.7	

NCDOT BORE DOUBLE 63R0047 BORELOGS, SUB.GPJ, NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_2500	STATION 25+00	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 1,702.7 ft	TOTAL DEPTH 53.7 ft	NORTHING 535,982	EASTING 506,667
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/01/13	COMP. DATE 07/01/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1705	1,702.7	0.0	2	3	3										1,702.7	0.0
1700	1,699.2	3.5	8	6	5										1,700.7	2.0
1695	1,694.2	8.5	2	4	12										1,695.7	7.0
1690	1,689.2	13.5	11	35	34											
1685	1,684.2	18.5	7	13	32											
1680	1,679.2	23.5	5	5	4											
1675	1,674.2	28.5	13	16	19											
1670	1,669.2	33.5	20	24	26											
1665	1,664.2	38.5	38	28	21											
1660	1,659.2	43.5	16	20	15											
1655	1,654.2	48.5	29	52	30											
1650	1,649.2	53.5	100/0.2												1,649.2	53.5
															1,649.0	53.7

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_2500R	STATION 25+00	OFFSET 120 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,735.4 ft	TOTAL DEPTH 40.0 ft	NORTHING 535,955	EASTING 506,551
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/01/13	COMP. DATE 07/01/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1740	1,735.4	0.0	2	2	3										1,735.4	0.0
1735	1,731.9	3.5	12	13	21										1,733.4	2.0
1730	1,726.9	8.5	10	11	9											
1725	1,721.9	13.5	8	13	15											
1720	1,716.9	18.5	21	19	14											
1715	1,711.9	23.5	39	61/0.4											1,711.9	23.5
1710	1,706.9	28.5	13	13	10										1,708.4	27.0
1705	1,701.9	33.5	32	68/0.3											1,701.9	33.5
1700	1,696.9	38.5	21	16	14										1,698.4	37.0
															1,695.4	40.0

NCDOT BORE DOUBLE 63R0047_BORELOGS_SUB.GPJ_NC_DOT.GDT_8/2/13



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)								
BORING NO. L_2500R2		STATION 25+00		OFFSET 205 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 1,750.3 ft		TOTAL DEPTH 68.5 ft		NORTHING 535,937		EASTING 506,470									
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER C. Boyce		START DATE 07/02/13		COMP. DATE 07/02/13		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1755															
1750	1,750.3	0.0	2	3	5								M	1,750.3 GROUND SURFACE	0.0
	1,746.8	3.5	4	7	8								M	RESIDUAL Gray-tan-red, silty fine SAND (A-2-4).	
1745	1,741.8	8.5	5	6	9								M		
1740	1,736.8	13.5	4	9	10								M		
1735	1,731.8	18.5	9	21	28								M		
1730	1,726.8	23.5	7	13	21								M		
1725	1,721.8	28.5	22	33	28								M		
1720	1,716.8	33.5	5	5	6								M		
1715	1,711.8	38.5	9	9	13								M		
1710	1,706.8	43.5	11	33	39								M		
1705	1,701.8	48.5	10	53	47/0.2								M		
1700	1,698.8	53.5	21	18	24								M		
1695	1,691.8	58.5	11	16	25								M		
1690	1,686.8	63.5	60/0.1										M		
1685	1,681.8	68.5	60/0.0										M		
														1,701.3 WEATHERED ROCK Gray-white & black, (BIOTITE SCHIST).	49.0
														RESIDUAL Tan-gray & white, silty fine to coarse SAND (A-1-b(0)), with trace gravel-sized rock fragments & clay.	52.0
														CRYSTALLINE ROCK Gray, (BIOTITE SCHIST).	63.5
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,681.8 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)	68.5
														Surficial Organic Soils from 0.0-0.2'	

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_2700		STATION 27+00		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 1,689.7 ft		TOTAL DEPTH 30.0 ft		NORTHING 535,785		EASTING 506,701										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/11/13		COMP. DATE 07/11/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1690	1,689.7	0.0	3	2	2									1,689.7 GROUND SURFACE	0.0	
	1,688.2	3.5	1	1	1									29% M Brown, silty fine SAND (A-2-4), with trace organics.	0.9	
1685	1,682.7	7.0												RESIDUAL Red-tan & black, silty fine SAND (A-2-4), with trace gravel.		
1680	1,681.2	8.5	8	7	7									M Gray-white & black, fine to coarse sandy SILT (A-4).	7.0	
1675	1,676.2	13.5	5	6	5									M		
1670	1,671.2	18.5	7	9	10									M		
1665	1,666.2	23.5	10	6	5									M		
1660	1,661.2	28.5	7	6	6									M		
															1,667.7 Gray-brown & white, silty fine SAND (A-2-4).	22.0
															Boring Terminated at Elevation 1,659.7 ft IN RESIDUAL (SAND)	30.0
															Other Samples: O-261 (0.0 - 0.9)	

NCDOT BORE DOUBLE 63R0047 BORELOGS. SUB.GPJ NC_DOT.GDT 8/2/13

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_2700R	STATION 27+00	OFFSET 65 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,706.2 ft	TOTAL DEPTH 20.0 ft	NORTHING 535,770	EASTING 506,638
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 06/28/13	COMP. DATE 06/28/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1710															
1705	1,706.2	0.0	4	3	2									1,706.2	GROUND SURFACE
														1,704.2	ARTIFICIAL FILL Tan-gray, fine to coarse sandy SILT (A-4).
1700	1,702.7	3.5	4	4	7										RESIDUAL Tan-gray & black, fine to coarse sandy SILT (A-4), with trace mica & gravel-sized rock fragments.
1695	1,697.7	8.5	3	5	7										
1690	1,692.7	13.5	4	4	4										
	1,687.7	18.5	5	6	7										

Boring Terminated at Elevation 1,686.2 ft IN RESIDUAL (SILT)
 Surficial Organic Soils from 0.0-0.2'.

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_2900	STATION 29+00	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 1,644.0 ft	TOTAL DEPTH 28.5 ft	NORTHING 535,604	EASTING 506,784
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1645	1,644.0	0.0												1,644.0	GROUND SURFACE
														1,642.0	RESIDUAL Brown, fine sandy SILT (A-4). Gray-tan, silty fine SAND (A-2-4), with trace gravel-sized rock fragments from 8.5-10.0'.
1640	1,640.5	3.5	1	2	5										
1635	1,635.5	8.5	6	8	31										
1630	1,630.5	13.5	26	28	36										
1625	1,625.5	18.5	6	9	91/0.5									1,625.0	WEATHERED ROCK Gray-tan, (BIOTITE SCHIST).
1620	1,620.5	23.5	100/0.4												
	1,615.5	28.5	60/0.0											1,615.5	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,615.5 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST) Surficial Organic Soils from 0.0-0.2'.

NCDOT BORE DOUBLE 63R0047_BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3100R	STATION 31+00	OFFSET 25 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,682.8 ft	TOTAL DEPTH 20.0 ft	NORTHING 535,448	EASTING 506,914
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/02/13	COMP. DATE 07/02/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1685	1,682.8	0.0												GROUND SURFACE	0.0
1680	1,679.3	3.5	WOH	1	1									ARTIFICIAL FILL Red-tan & black, fine sandy SILT (A-4), with trace gravel.	
1675	1,674.3	8.5		3	3	8								RESIDUAL Red-tan & black, coarse to fine sandy SILT (A-4(0)), with little clay & trace gravel-sized rock fragments from 8.5-15.0'.	7.0
1670	1,669.3	13.5		17	38	35									
1665	1,664.3	18.5		11	8	10									

Boring Terminated at Elevation 1,662.8 ft IN RESIDUAL (SILT)

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3150L	STATION 31+50	OFFSET 85 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,626.1 ft	TOTAL DEPTH 13.0 ft	NORTHING 535,507	EASTING 507,020
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1630	1,626.1	0.0												GROUND SURFACE	0.0
1625	1,622.6	3.5	WOH	1	3									RESIDUAL Red, fine sandy SILT (A-4).	3.5
1620	1,617.6	8.5		53	47/0.4									WEATHERED ROCK Tan-gray, (BIOTITE SCHIST).	7.0
1615	1,613.1	13.0		13	11	9								RESIDUAL Tan-gray, fine sandy SILT (A-4).	13.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 1,613.1 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)

Surficial Organic Soils from 0.0-0.2'.



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY						GROUND WTR (ft)										
BORING NO. L_3150R		STATION 31+50		OFFSET 26 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,678.1 ft		TOTAL DEPTH 42.0 ft		NORTHING 535,418		EASTING 507,020										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/09/13		COMP. DATE 07/09/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1680	1,678.1	0.0														1,678.1
			2	3	2											0.0
1675	1,674.6	3.5														2.0
			24	33	41											2.0
1670	1,669.6	8.5														7.4
			7	11	13											7.4
1665	1,664.6	13.5														12.0
			10	22	21											12.0
1660	1,659.6	18.5														17.0
			8	8	9											17.0
1655	1,654.6	23.5														20.0
			8	6	14											20.0
1650	1,649.6	28.5														28.5
			38	62/0.1												28.5
1645	1,644.6	33.5														100/0.6
			42	62	38/0.5											100/1.0
1640	1,639.6	38.5														100/0.9
			23	77/0.4												100/0.9
	1,636.1	42.0														60/0.0
			60/0.0													60/0.0

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY						GROUND WTR (ft)										
BORING NO. L_3200L		STATION 32+00		OFFSET 80 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,629.0 ft		TOTAL DEPTH 3.0 ft		NORTHING 535,473		EASTING 507,058										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Boyce		START DATE 07/11/13		COMP. DATE 07/11/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1630	1,629.0	0.0														1,629.0
			7	18	19											0.0
	1,626.0	3.0														3.0
			60/0.0													60/0.0

NCDOT BORE DOUBLE 63R0047 BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3200R	STATION 32+00	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,677.9 ft	TOTAL DEPTH 23.0 ft	NORTHING 535,388	EASTING 506,994
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1680	1,677.9	0.0												GROUND SURFACE	0.0
1675	1,674.4	3.5	2	2	2	4						M		ARTIFICIAL FILL Red, silty fine SAND (A-2-4), with trace gravel-sized rock fragments.	
1670	1,669.4	8.5	2	1	2	3						M		RESIDUAL Tan-brown & gray, silty fine SAND (A-2-4).	7.0
1665	1,664.4	13.5	3	3	3	4						M			
1660	1,659.4	18.5	4	3	4	9	6	3				M			
1655	1,655.0	22.9										M		CRYSTALLINE ROCK (BIOTITE SCHIST)	22.9

1,654.9
CRYSTALLINE ROCK (BIOTITE SCHIST)
 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,654.9 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)
 Surficial Organic Soils from 0.0-0.2'

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3223L	STATION 32+23	OFFSET 73 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,633.6 ft	TOTAL DEPTH 4.0 ft	NORTHING 535,453	EASTING 507,071
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/10/13	COMP. DATE 07/10/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1635	1,633.6	0.0												GROUND SURFACE	0.0
1630	1,630.1	3.5	3	2	2	4						M		RESIDUAL Red-brown, silty fine SAND (A-2-4), with trace gravel-sized rock fragments.	3.5
	1,629.6	4.0				60/0.1								CRYSTALLINE ROCK Gray, (BIOTITE SCHIST).	4.0

1,629.6
CRYSTALLINE ROCK (BIOTITE SCHIST)
 Boring Terminated with Standard Penetration Test Refusal at Elevation 1,629.6 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)
 Surficial Organic Soils from 0.0-0.2'



WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3250L	STATION 32+50	OFFSET 65 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,636.5 ft	TOTAL DEPTH 8.0 ft	NORTHING 535,431	EASTING 507,088
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1640															
1635	1,636.5	0.0	1	2	3	5						M	GROUND SURFACE	0.0	
													RESIDUAL		
													Brown-tan & gray, fine sandy SILT (A-4).		
1630	1,633.0	3.5	60/0.0										CRYSTALLINE ROCK	3.5	
													Gray, (BIOTITE SCHIST).		
	1,628.5	8.0	60/0.0										Boring Terminated with Standard Penetration Test Refusal at Elevation 1,628.5 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)	8.0	
													Surficial Organic Soils from 0.0-0.2'.		

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3250R	STATION 32+50	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,677.0 ft	TOTAL DEPTH 31.0 ft	NORTHING 535,358	EASTING 507,034
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/09/13	COMP. DATE 07/09/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1680															
1675	1,677.0	0.0	2	2	1	3						M	GROUND SURFACE	0.0	
													ARTIFICIAL FILL		
													Red-tan-gray, fine sandy SILT (A-4), with trace gravel.	2.0	
1670	1,673.5	3.5	2	10	10							M	RESIDUAL		
													Red-tan-gray, fine sandy SILT (A-4), with trace gravel-sized rock fragments.		
1665	1,668.5	8.5	10	12	6							M			
1660	1,663.5	13.5	18	17	11							M			
1655	1,658.5	18.5	3	5	15							M			
1650	1,653.5	23.5	60/0.1									M	CRYSTALLINE ROCK	23.5	
													Gray, (BIOTITE SCHIST).		
	1,648.5	28.5	60/0.1												
	1,646.0	31.0	60/0.0										Boring Terminated with Standard Penetration Test Refusal at Elevation 1,646.0 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)	31.0	
													Surficial Organic Soils from 0.0-0.2'.		



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3300L	STATION 33+00	OFFSET 22 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,645.9 ft	TOTAL DEPTH 12.0 ft	NORTHING 535,366	EASTING 507,103
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/02/13	COMP. DATE 07/02/13	SURFACE WATER DEPTH N/A

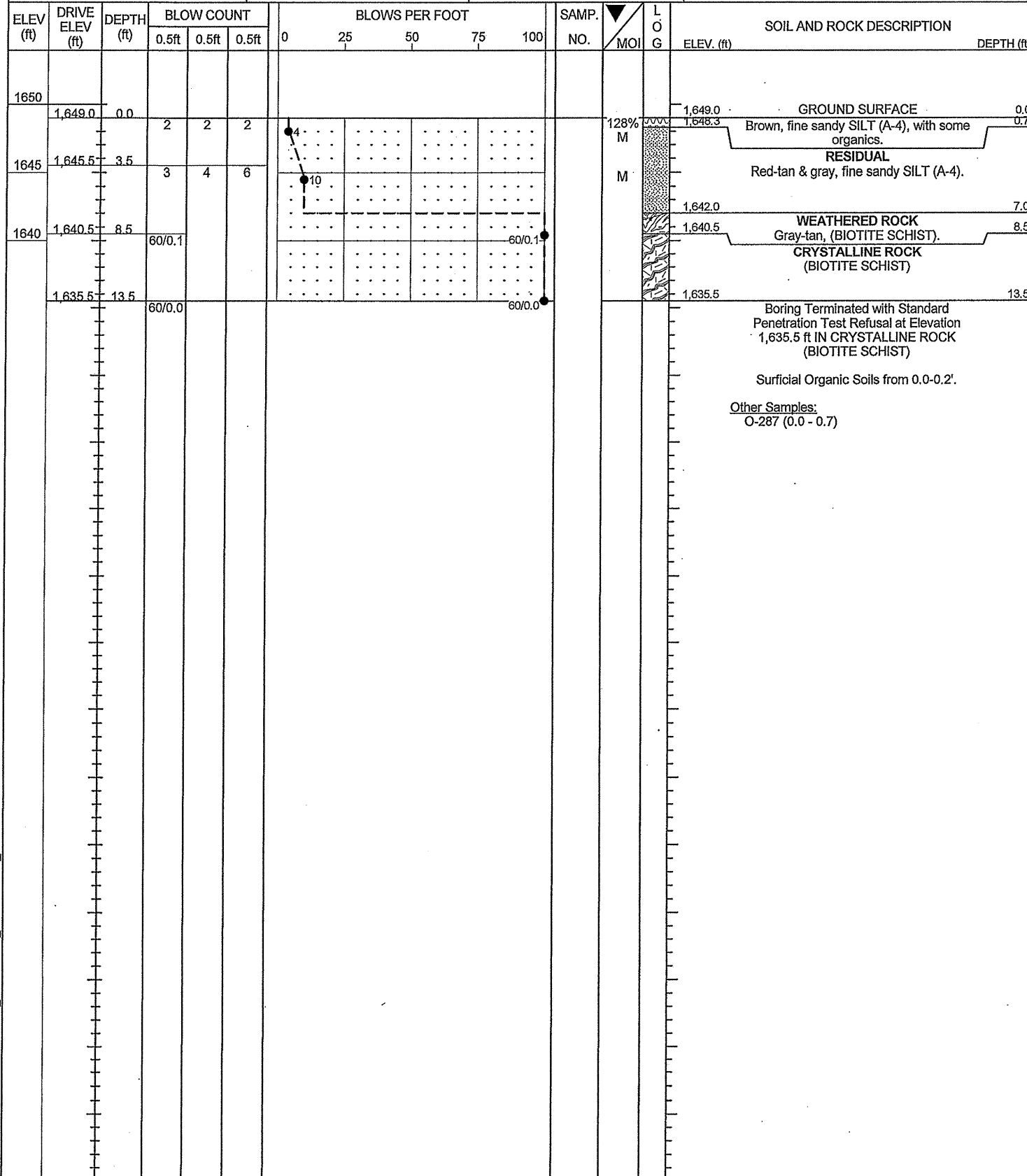
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1650																
1645	1,645.9	0.0	2	1	2								M	GROUND SURFACE	0.0	
	1,642.4	3.5	4	5	6									RESIDUAL Red-brown, fine sandy SILT (A-4). Tan-black, silty fine to coarse SAND (A-2-4(0)), with little gravel-sized rock fragments & clay.	2.0	
1640	1,637.4	8.5	46	11	14								SS-180 22%			
1635	1,633.9	12.0											D			
			60/0.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 1,633.9 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)	12.0	
														Surficial Organic Soils from 0.0-0.2'		

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3300R	STATION 33+00	OFFSET 26 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,674.9 ft	TOTAL DEPTH 15.0 ft	NORTHING 535,328	EASTING 507,074
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/02/13	COMP. DATE 07/02/13	SURFACE WATER DEPTH N/A

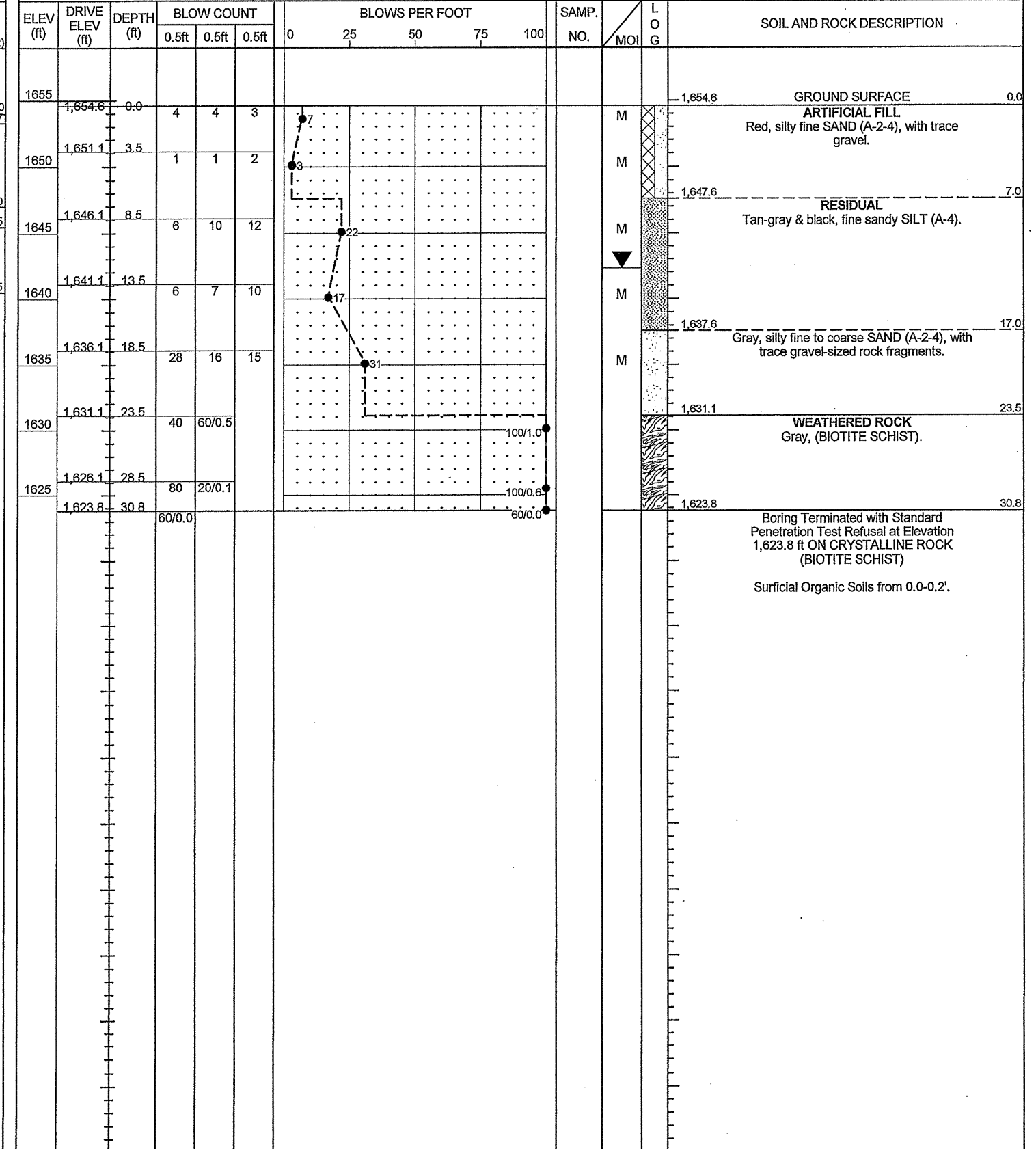
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1675	1,674.9	0.0	5	2	3									GROUND SURFACE	0.0
	1,671.4	3.5	2	2	2									ARTIFICIAL FILL Brown-red, fine sandy SILT (A-4).	2.0
1670														RESIDUAL Brown, silty fine SAND (A-2-4).	
	1,667.9	7.0												Tan, fine sandy SILT (A-4).	7.0
1665	1,666.4	8.5	3	3	4										
	1,661.4	13.5	9	7	5										
1660															
														Boring Terminated at Elevation 1,659.9 ft IN RESIDUAL (SILT)	15.0
														Surficial Organic Soils from 0.0-0.2'	



WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3327L	STATION 33+27	OFFSET 5 ft LT	ALIGNMENT -L-
COLLAR ELEV. 1,649.0 ft	TOTAL DEPTH 13.5 ft	NORTHING 535,337	EASTING 507,114
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A



WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3500R2	STATION 35+00	OFFSET 74 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,654.6 ft	TOTAL DEPTH 30.8 ft	NORTHING 535,172	EASTING 507,166
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/09/13	COMP. DATE 07/09/13	SURFACE WATER DEPTH N/A





WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	8.0								
L_3550R	35+50	20 ft RT	-L-			24 HR.	4.0								
COLLAR ELEV. 1,651.9 ft		TOTAL DEPTH 18.5 ft	NORTHING 535,157	EASTING 507,234											
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1655															
	1,651.9	0.0	1	2	1									1,651.9	0.0
1650														1,649.9	2.0
	1,648.4	3.5	8	15	14										
1645															
	1,643.4	8.5	10	6	5										
1640														1,638.4	13.5
	1,638.4	13.5	8	35	65/0.4										
1635														1,633.4	18.5
	1,633.4	18.5	60/0.0												60/0.0

WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral									
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)								
BORING NO.	STATION	OFFSET	ALIGNMENT			0 HR.	13.0								
L_3600R	36+00	23 ft RT	-L-			24 HR.	6.0								
COLLAR ELEV. 1,656.3 ft		TOTAL DEPTH 33.6 ft	NORTHING 535,112	EASTING 507,245											
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Boyce		START DATE 07/09/13	COMP. DATE 07/09/13	SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1660															
	1,656.3	0.0	2	1	2									1,656.3	0.0
1655														1,654.3	2.0
	1,652.8	3.5	3	3	3										
1650															
	1,647.8	8.5	6	7	12										
1645															
	1,642.8	13.5	6	16	24										
1640														1,639.3	17.0
	1,637.8	18.5	8	15	17										
1635														1,634.3	22.0
	1,632.8	23.5	28	21	13										
1630															
	1,627.8	28.5	34	66/0.4											
1625														1,622.8	33.5
	1,622.8	33.5	60/0.1												60/0.1

NCDOT BORE DOUBLE 63R0047_BORELOGS.SUB.GPJ NC_DOT.GDT 8/2/13

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3660R	STATION 36+60	OFFSET 30 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,663.6 ft	TOTAL DEPTH 18.5 ft	NORTHING 535,056	EASTING 507,246
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/11/13	COMP. DATE 07/11/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
1665	1,663.6	0.0											GROUND SURFACE	0.0
			1	2	2								Brown, fine sandy SILT (A-4), with little organics.	0.7
1680	1,660.1	3.5	1	1	2								ARTIFICIAL FILL	
													Red-tan, fine sandy SILT (A-4), with trace gravel.	
1655	1,655.1	8.5	6	7	11								RESIDUAL	7.0
													Tan-gray, silty fine SAND (A-2-4), with little gravel-sized rock fragments.	
1650	1,650.1	13.5	25	43	57/0.3								WEATHERED ROCK	14.0
													Gray-tan, (BIOTITE SCHIST).	
	1,645.1	18.5											WEATHERED ROCK	18.5
													Gray-tan, (BIOTITE SCHIST).	
													Boring Terminated with Standard Penetration Test Refusal at Elevation 1,645.1 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)	
													Other Samples: O-284 (0.0 - 0.7)	

WBS 34518.1.2	TIP R-5527	COUNTY CHEROKEE	GEOLOGIST R. Kral
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY			GROUND WTR (ft)
BORING NO. L_3700	STATION 37+00	OFFSET CL	ALIGNMENT -L-
COLLAR ELEV. 1,663.6 ft	TOTAL DEPTH 15.0 ft	NORTHING 535,018	EASTING 507,276
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER C. Boyce	START DATE 07/02/13	COMP. DATE 07/02/13	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
1665	1,663.6	0.0											GROUND SURFACE	0.0
			2	3	4								RESIDUAL	
1660	1,660.1	3.5	2	3	4								Tan-gray, silty fine SAND (A-2-4).	
													WEATHERED ROCK	6.0
													Gray-tan, (BIOTITE SCHIST).	
1655	1,655.1	8.5											WEATHERED ROCK	
													Gray-tan, (BIOTITE SCHIST).	
1650	1,650.1	13.5											CRYSTALLINE ROCK	13.5
													Gray-tan, (BIOTITE SCHIST).	
	1,648.6	15.0											Boring Terminated with Standard Penetration Test Refusal at Elevation 1,648.6 ft IN CRYSTALLINE ROCK (BIOTITE SCHIST)	
													Surficial Organic Soils from 0.0-0.2'.	



WBS 34518.1.2		TIP R-5527		COUNTY CHEROKEE		GEOLOGIST R. Kral										
SITE DESCRIPTION NEW ROUTE FROM US 74/19/129 TO EBCI TRIBAL BOUNDARY IN CHEROKEE COUNTY							GROUND WTR (ft)									
BORING NO. L_3700R		STATION 37+00		OFFSET 74 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,661.0 ft		TOTAL DEPTH 22.0 ft		NORTHING 535,023		EASTING 507,201										
DRILL RIG/HAMMER EFF./DATE F&R3763 CME-550X 82% 10/5/2012		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER C. Boyce		START DATE 07/02/13		COMP. DATE 07/02/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1665																
1660	1,661.0	0.0	2	4	3									1,661.0	GROUND SURFACE	0.0
														1,659.0	Surficial Organic Soils (0.3')	2.0
1655	1,657.5	3.5	4	3	5									1,654.0	ARTIFICIAL FILL Brown, fine sandy SILT (A-2-4), with trace gravel.	
															Tan-yellow, silty coarse to fine SAND (A-2-4(0)), with trace gravel & some clay.	7.0
1650	1,652.5	8.5	7	10	8										RESIDUAL Brown-tan, silty fine SAND (A-2-4).	
1645	1,647.5	13.5	12	88/0.5										1,648.0	WEATHERED ROCK Tan-gray, (BIOTITE SCHIST).	13.0
1640	1,642.5	18.5														
	1,639.0	22.0												1,639.0	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,639.0 ft ON CRYSTALLINE ROCK (BIOTITE SCHIST)	22.0

NCDOT BORE SINGLE 63R0047_BORELOGS_SUB.GPJ_NC_DOT.GDT 8/2/13



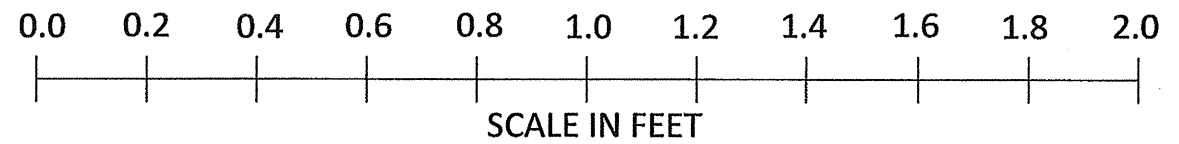
New Route from US 74/19/129 to EBCI Tribal Boundary
CORE PHOTOGRAPHS: EB1-A: Station 11+06

Begin Run 1
6.2 feet

Begin Run 2
11.2 feet



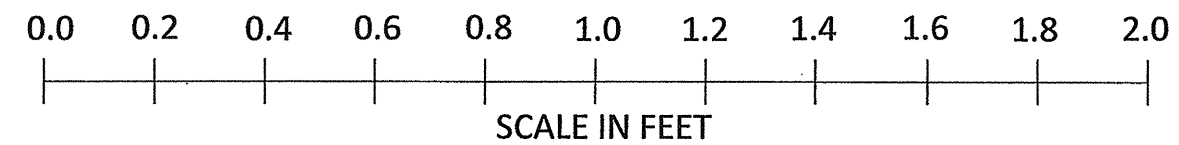
15.7 feet



Begin Run 3
16.2 Feet

Begin Run 4
21.2 Feet

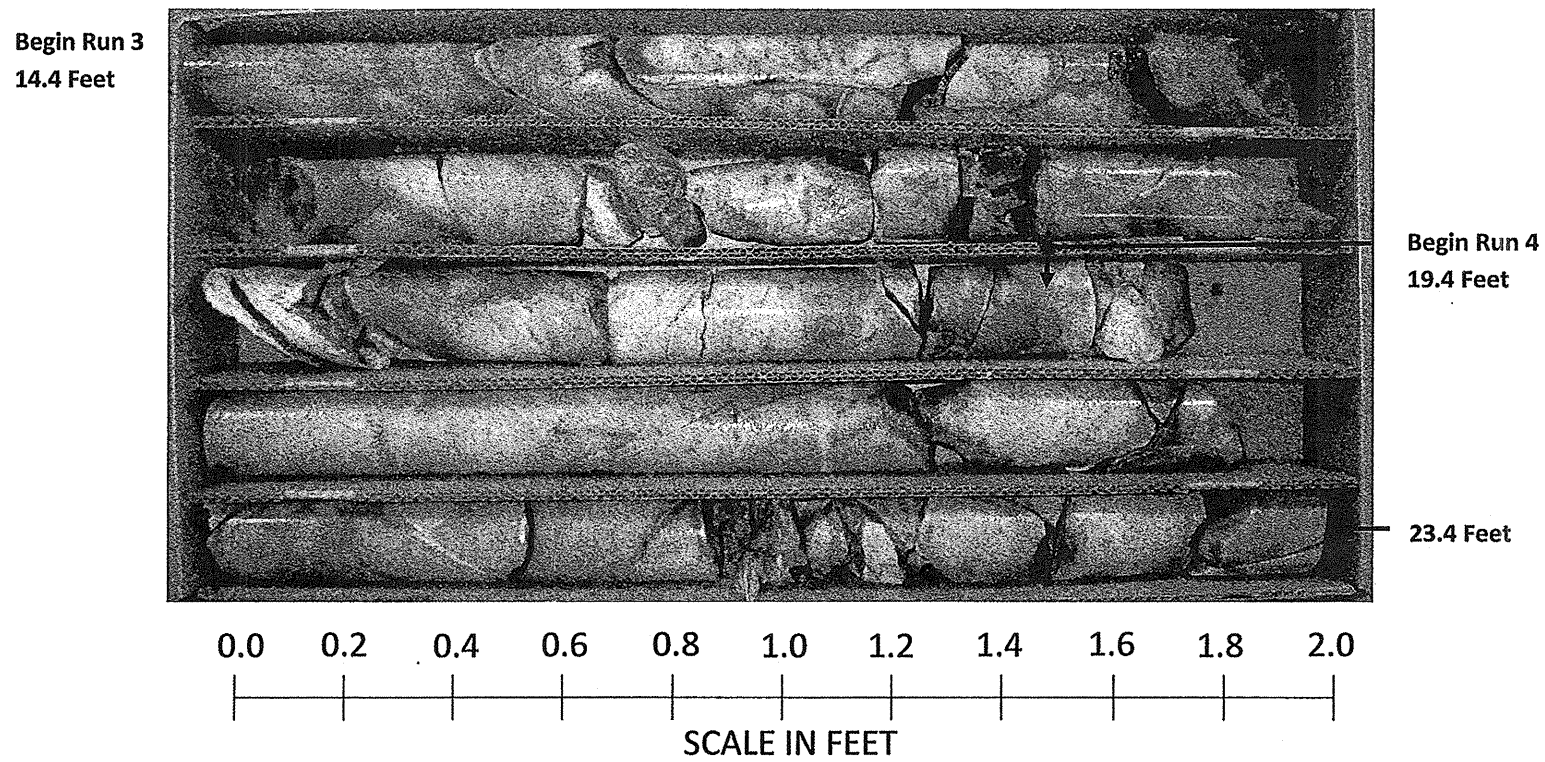
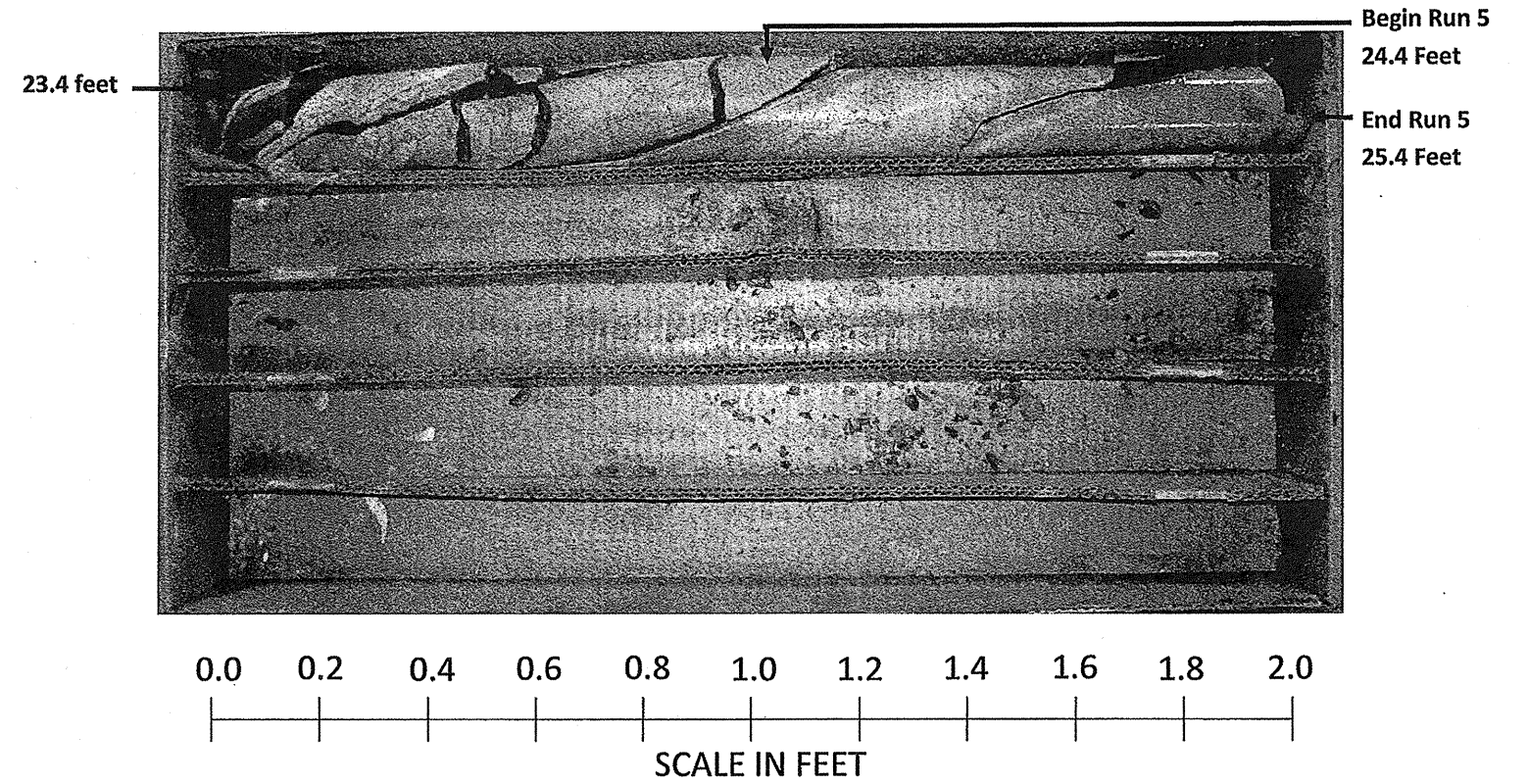
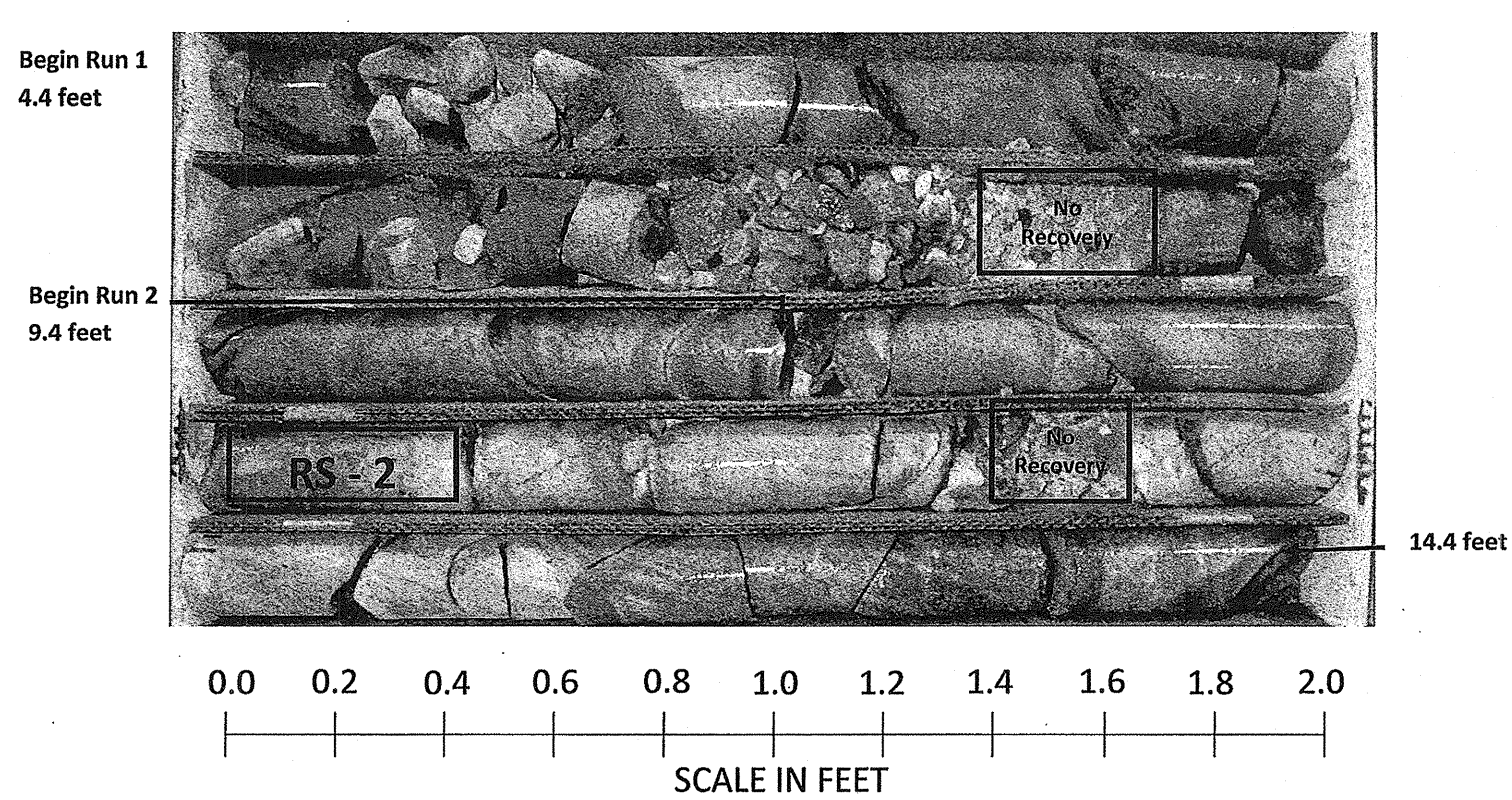
End Run 4
25.2





New Route from US 74/19/129 to EBCI Tribal Boundary

CORE PHOTOGRAPHS: EB1-B: Station 11+06



LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

WBS NO.: 17BP.14.R.84

TIP NO.: R-5527

COUNTY: Cherokee

DESCRIPTION: New Route from US 74/19/129 to EBCI Tribal Boundary

Sample ID	Boring No.	Depth (feet)	Rock Type	Run RQD (%)	Length (inches)	Diameter (inches)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-1	EB1-A	12.5-12.9	Quartzite	32	3.86	2.00	160.0	3,580	5.85 x 10 ⁴	33
RS-2	EB1-B	10.4-10.8	Quartzite	26	4.48	2.00	159.1	8,240	8.94 x 10 ⁴	28
RS-3	EB1-A	15.3-15.7	Quartzite	32	4.92	2.00	161.2	15,005	1.75 x 10 ⁵	43

Earthwork Balance Sheet

Volumes in Cubic Yards

PROJECT: R-5527B

COUNTY: Cherokee

DATE: 11/25/2013

COMPILED BY: WCC

SHEET__ OF __ SHEETS

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +15%		ROCK	SUITABLE	UNSUIT.	TOTAL
-L- 10+56.28	-L- 10+96.52	257,395	10,243	7,697		239,455	87,841		87,841	101,017		10,243	138,438	7,697	156,378
SUBTOTAL		257,395	10,243	7,697		239,455	87,841		87,841	101,017		10,243	138,438	7,697	156,378
-Y- 27+50	-Y- 30+00	68				68	108		108	124	56				
SUBTOTAL		68				68	108		108	124	56				
-Y1- 10+50	-Y1- 12+00						1,426		1,426	1,640	1,640				
SUBTOTAL							1,426		1,426	1,640	1,640				
-Y2- 10+50	-Y2- 12+31.51						1,178		1,178	1,355	1,355				
SUBTOTAL							1,178		1,178	1,355	1,355				
TOTAL		257,463	10,243	7,697		239,523	90,553		90,553	104,136	3,051	10,243	138,438	7,697	156,378
MATERIAL FOR SHOULDER CONSTRUCTION															
LOSS DUE TO CLEARING & GRUBBING		-2,450													
ADDITIONAL UNDERCUT															
ROCK WASTE TO REPLACE BORROW								3,051	-3,051		-3,051	-3,051			-3,051
ADJUST FOR ROCK WASTE										-458	-458				
WASTE IN LIEU OF BORROW											458	458			458
PROJECT TOTAL		255,013	10,243	7,697		239,523	90,553	3,051	87,502	103,678		7,192	138,895	7,697	153,785
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT															
GRAND TOTAL			10,243	7,697		239,523	90,553	3,051	87,502	103,678		7,192	138,895	7,697	153,785
SAY						239,600									

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.