

REFERENCE: B-4484

PROJECT: 33723

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4484	1	66

CONTENTS

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>	<u>PROFILE</u>
-LI-	17+00-24+00	4	8
-LI-	24+00-35+00	5	8-9
-LI-	35+00-48+00	6	9-10
-LI-	48+00-54+00	7	10
-DWI-	10+00-14+37	6	10

CROSS SECTIONS

<u>LINE</u>	<u>STATION</u>	<u>SHEETS</u>
-LI-	19+50-22+50	11-18
-LI-	28+00-34+00	19-32
-LI-	38+00-39+45	33-35
-LI-	43+46-53+50	36-47

<u>TITLE</u>	<u>SHEETS</u>
SOIL TEST RESULTS	48-49
TRIAxIAL TEST RESULTS	50-52
CONSOLIDATION TEST RESULTS	53-66

ROADWAY SUBSURFACE INVESTIGATION

COUNTY CRAVEN

PROJECT DESCRIPTION BRIDGE NOS. 138 AND 139 ON
SR 1470 (MAPLE CYPRESS RD.) OVER NEUSE RIVER
AND NEUSE RIVER OVERFLOW

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. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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-PLACE) 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 THE 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.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. 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.

PERSONNEL

MID-ATLANTIC
DRILLING, INC.

J.R. SWARTLEY

E. BLONSHINE

J. MILLWOOD

INVESTIGATED BY S&ME, Inc.

DRAWN BY J.R. SWARTLEY

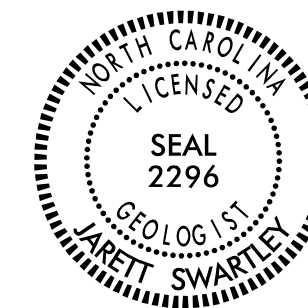
CHECKED BY S.S. LANEY

SUBMITTED BY S.S. LANEY

DATE JULY 2019



3201 SPRING FOREST ROAD
RALEIGH, NC 27616
(919) 872-2660



DocuSigned by:

Jarett Swartley

10/31/2019

919459487833723

SIGNATURE

DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

09/08/19

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

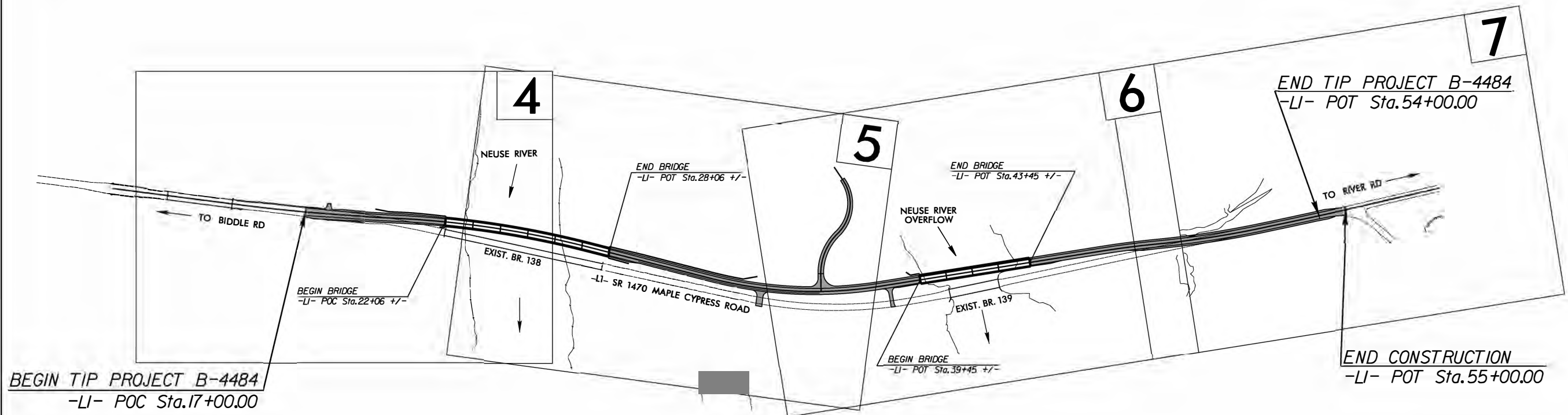
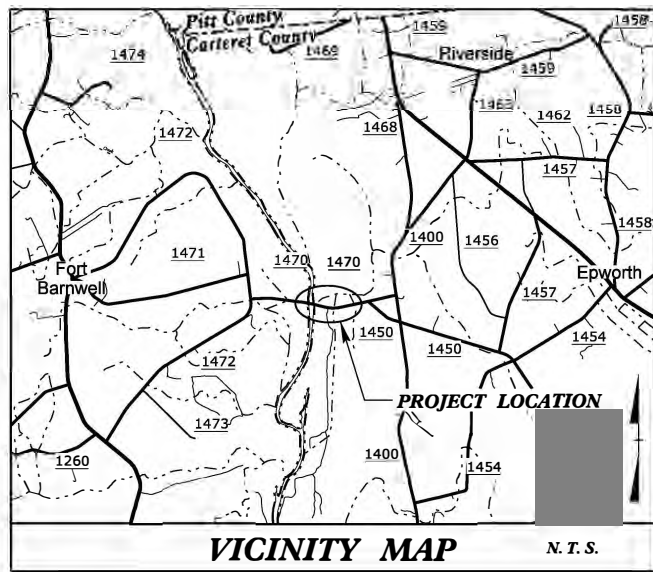
CRAVEN COUNTY

LOCATION: REPLACE BRIDGES NO. 138 & 139 OVER NEUSE RIVER AND NEUSE RIVER OVERFLOW ON SR 1470 (MAPLE CYPRESS ROAD)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4484	3	66
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33723.1.2	NA	PE	

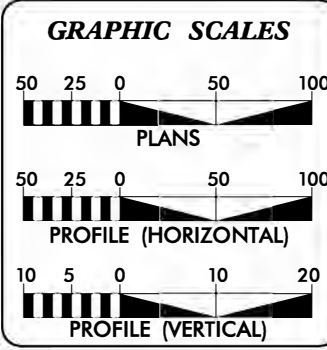
PROJECT: B-4484



THERE IS NO CONTROL OF ACCESS ON THIS PROJECT.
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:



DESIGN DATA

ADT 2019 =	1,863
ADT 2039 =	2,279
K =	12 %
D =	60 %
T =	10 % *
V =	60 MPH
*(TTST=3% + DUAL=7%)	
FUNC CLASS =	MAJOR COLLECTOR
SUB-REGIONAL TIER	

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4484	=	0.515 MILE +/-
LENGTH STRUCTURE TIP PROJECT B-4484	=	0.186 MILE +/-
TOTAL LENGTH TIP PROJECT B-4484	=	0.701 MILE +/-

PLANS PREPARED BY:

RS&H 8521 SIX FORKS RD, SUITE 400
RALEIGH, NC 27615
919-926-4100

FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 20, 2018

LETTING DATE:
JUNE 18, 2019

JOHN TOWNSEND, PE
PROJECT ENGINEER

DREW MORROW, PE
PROJECT DESIGN ENGINEER

HON YEUNG, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



29-MAY-2018 15:53 R:\Roadway\Proj\B4484_Rdy_+tsn.dgn



March 1, 2019

STATE PROJECT: 33723.1.2 (B-4484)
 FEDERAL PROJECT: N/A
 COUNTY: Craven
 DESCRIPTION: Replace Bridge No. 138 and 139 on SR 1470 over Neuse River and Neuse River Overflow

SUBJECT: Geotechnical Report – Inventory

S&ME, Inc. has completed a reconnaissance and subsurface investigation for the above roadway project and presents the following inventory. Plans, profiles and cross-sections are included in this report.

Project Description

The project corridor is located in Craven County near the town of Ft. Barnwell. The project consists of the realignment of Maple Cypress Rd. Maple Cypress Rd. (-L1-) will be realigned to the northwest of existing so the new structures over the Neuse River and Neuse River Overflow can be constructed with no off-site detour. There are four retaining walls associated with these bridges that were investigated during this Roadway Investigation. The mainline (-L1-) starts at the southern end of the project and continues northeast for approximately 0.71 miles. There is one secondary alignment (-DW1-) that intersects with Maple Cypress Rd. This is a partial new alignment that will tie into the existing boat ramp driveway. The boat ramps and gravel driveway currently belong to the NC Wildlife Resources Commission.

The geotechnical field investigation was conducted during the period of November 2018 through February 2019. One Mid-Atlantic drill crew and one S&ME drill crew were used to drill, sample, and log the borings in this report. Mid-Atlantic rigs used for the drilling include a truck-mounted CME-45C drill machine and a D-25 drill machine mounted on an amphibious carrier equipped with tracks. The S&ME rig used was a truck-mounted D-50. All rigs were equipped with automatic hammers. Standard Penetration Tests were performed at selected locations and additional borings were advanced using hand augers and sampling probes. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by the S&ME soils lab. Soil results are referenced back to the original alignment the boring was assigned to during layout and drilling.

The following alignments, excluding the bridges, totaling 0.59 miles, were investigated. Subsurface profiles and/or cross-sections of these alignments are included in this report.

<u>Line</u>	<u>Station</u>
-L1-	17+00 to 54+00
-DW1-	10+00 to 14+37

Areas of Special Geotechnical Interest

1) The following station ranges encountered soft, cohesive soils which have the potential to cause embankment stability and/or long term settlement problems:

<u>Line</u>	<u>Station</u>
-L1-	20+00 to 22+06
-L1-	28+06 to 33+50
-L1-	38+50 to 39+45
-L1-	43+45 to 50+00

2) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following station ranges:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L1-	17+00 to 21+00	9' LT to 38' LT

3) High Groundwater: High groundwater within 6' of grade or less was encountered at the following station ranges:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-DW1-	10+11 to 14+37	LT & RT

4) Organic Soils: Soils with varying degrees of organic matter were encountered at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L1-	47+00 to 48+50	40' LT to 40' RT
-L1-	49+60 to 50+42	25' LT to 30 RT

Physiography and Geology

The project corridor is located in eastern North Carolina in the Coastal Plain Physiographic Province of North Carolina. A mixture of fields, wooded areas and swamp lie within the project corridor. The project corridor is predominately rural with few single family homes and farm fields. Topography along the project is flat to gently sloping. Elevations along the project range from -5± to 27± feet above sea level.

Geologically the surficial soils in the area are generally classified as alluvial sediments. These soils were transported by the fluvial processes in this area and are of recent depositional timelines. They were deposited and transported during fluctuating periods of river elevation rise and fall and channel migration. The soils underlying these deposits are formational Coastal Plain soils belonging to the Duplin Formation and Castle Hayne Formation. The Duplin Formation is Tertiary in age and consists of glauconitic and/or calcareous, sands, silts and clays with or without shells. Varying degrees of cementation are possible in the older stratas of the Duplin Formation. This formation can be intercalated with sedimentary rock in some locations. The Castle Hayne Formation is also Tertiary in age and are older sediments than the Duplin. These soils consist of limestone, sandy limestone, calcareous sands and phosphate conglomerates. Some sedimentary rock including limestone and sandstone were encountered minimally during this investigation.

Water Bodies

There are some rivers and streams that run through the project corridor. All the water bodies flow from left to right underneath Maple Cypress Road. Starting from the southern part of the project, the Neuse River passes underneath a 14-span bridge on Maple Cypress Rd at -L1- Sta. 25+00. Towards the northern end of the project, the Neuse River Overflow passes underneath a 4-span Bridge on Maple Cypress Rd at -L1- Sta. 41+50. These two structures are state bridge nos. 138 and 139 respectively. At -L1- Sta. 49+00 there is a stream that passes underneath Maple Cypress Rd. through an 84" corrugated pipe. All of these structures will be replaced or improved at the time of this investigation and were investigated with additional SPT borings. A separate inventory report will be submitted for each.

The Neuse River Overflow contains a substantial floodplain in the form of a cypress swamp between -L- Sta. 42+00 and 52+00. Three feet or less of water resides in this swamp during most of the year. These water bodies have had some major impacts from hurricanes in the recent past. In 1999, Hurricane Floyd inundated most of the corridor with a recorded water elevation of 21.6 feet. In 2016, Hurricane Matthew did the same with a recorded water elevation of 19.2 feet. In 2018, Hurricane Florence caused a water level of approximately ± 17 to ± 18 feet according to local interviews. There is a USGS river gauge attached to Bridge No. 138 that can be monitored throughout the year. During this investigation water elevations ranged from approximately $7\pm$ to $10\pm$ feet. Water elevation is variable at this site.

Soil Properties

Soils encountered during this investigation are separated into 3 categories: Roadway Embankment, Alluvial and Coastal Plain soils.

Roadway Embankment soils are granular in nature and may be derived from nearby sources. These soils consist of gray, tan and brown, very loose to med. dense, clayey sand (A-2-6), silty sand (A-2-4) and sand (A-3) soft to stiff, sandy silt (A-4) and sandy clay (A-6).

Alluvial soils are found near the channels and floodplains from the nearby rivers and streams in the area. These soils consist of gray, brown, tan, orange and green, very loose to dense, sand (A-3), silty sand (A-2-4) and clayey sand (A-2-6) and very soft to stiff, sandy clay (A-6), silty clay (A-7-6), sandy silt (A-4) and muck.

Coastal Plain formational soils of the Duplin Formation underlie the alluvial soils. These soils consist of gray and green, very loose to very dense, sand (A-3), silty sand (A-2-4) and clayey sand (A-2-6) and very soft to stiff, sandy silt (A-4) and sandy clay (A-6).

Coastal Plain formational soils of the Castle Hayne Formation underlie the Duplin Formation. These soils consist of med. dense to very dense, gray, dark gray and black, sand (A-1-b/A-3) and silty sand (A-2-4) and moderately weathered, sandy limestone.

Groundwater

Groundwater measurements were taken in November and December of 2018 and February and March of 2019 during average to above average rainfall conditions. Groundwater is typically between 1 foot and 7 feet below the ground surface in upland areas and at or near the surface in low lying areas. Ground water is expected to cause some impacts during construction depending on rainfall conditions at the time.

Respectfully Submitted,



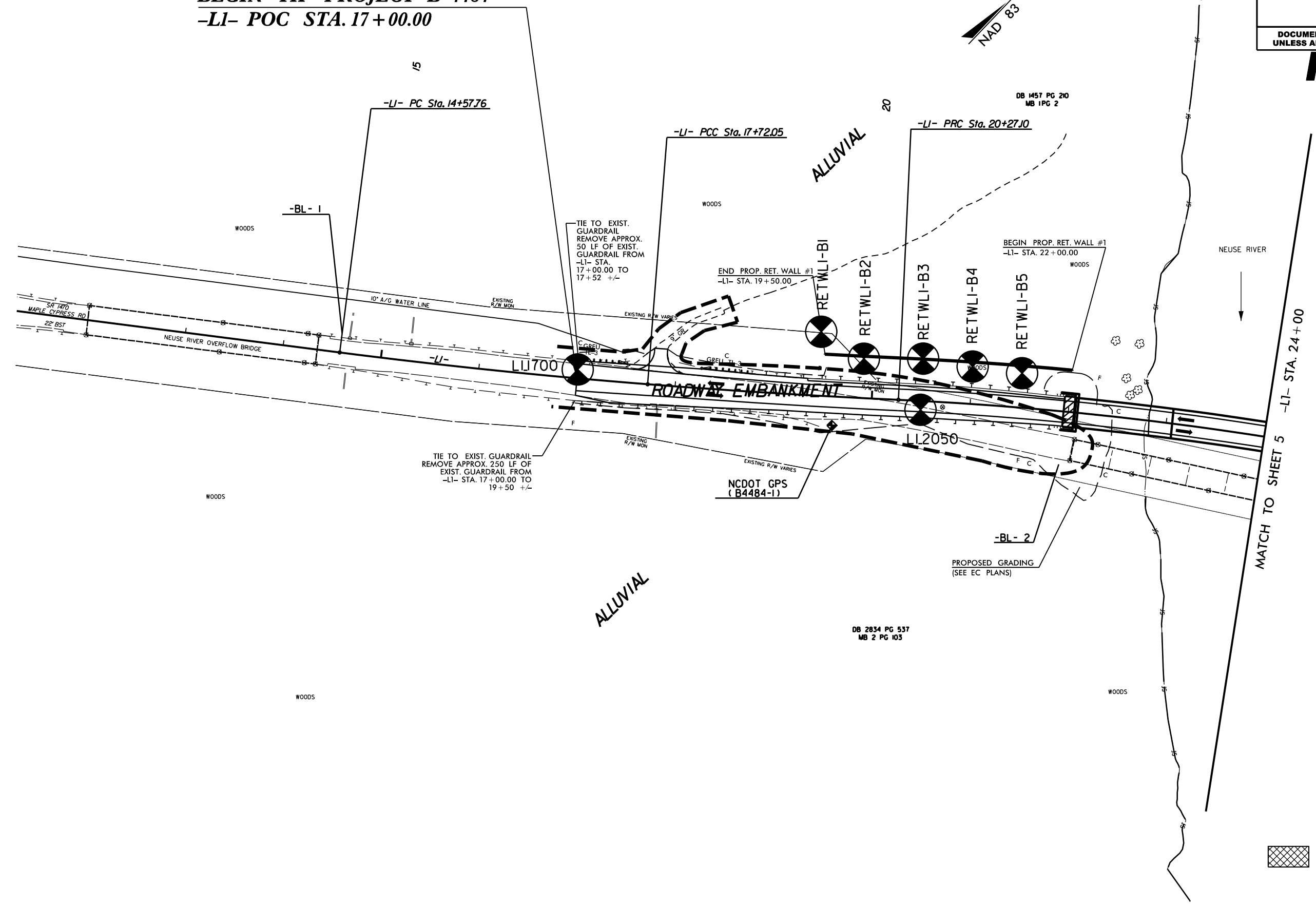
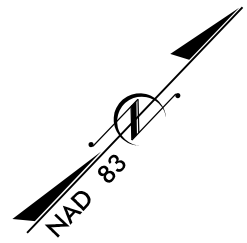
Jarett Swartley, PG
Senior Geologist

8/17/99

PROJECT REFERENCE NO. B-4484		SHEET NO. 4	
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INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED			



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MATCH TO SHEET 5 -LI- STA. 24+00

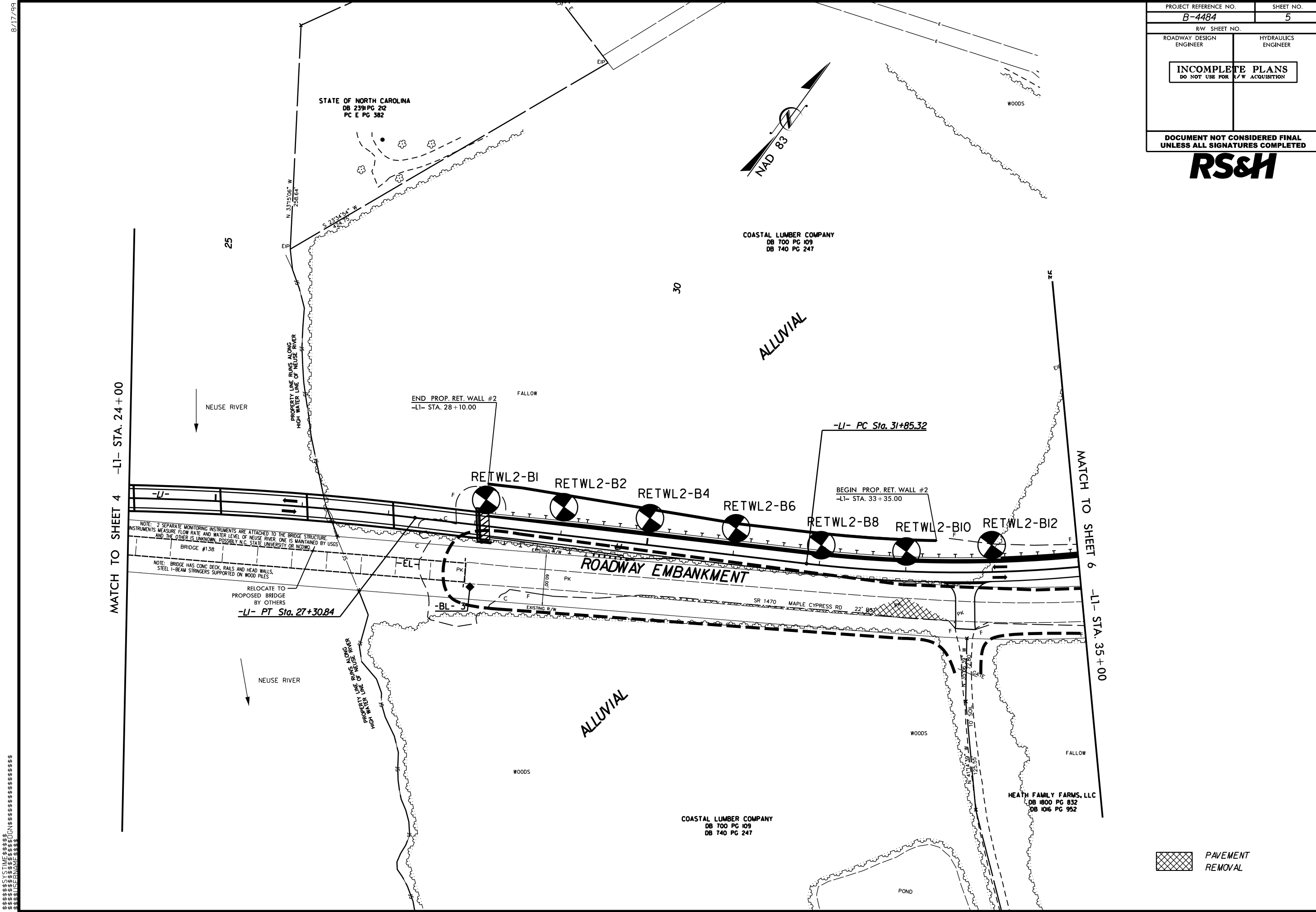
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MB 2 PG 103

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

RS&H



PAVEMENT REMOVAL

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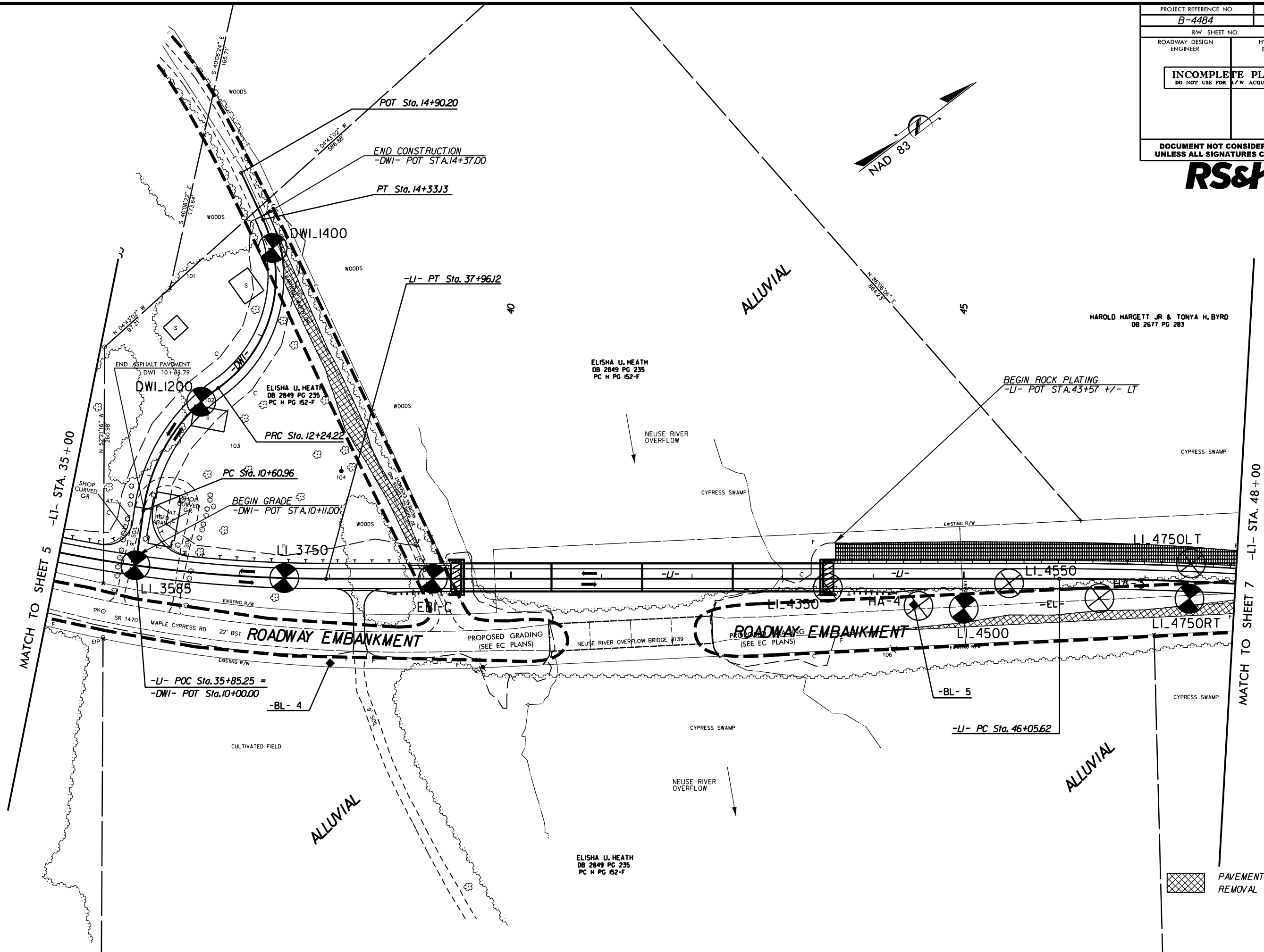
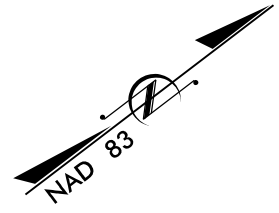
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



HAROLD HARGETT JR & TONYA H. BYRD
DB 2677 PG 283



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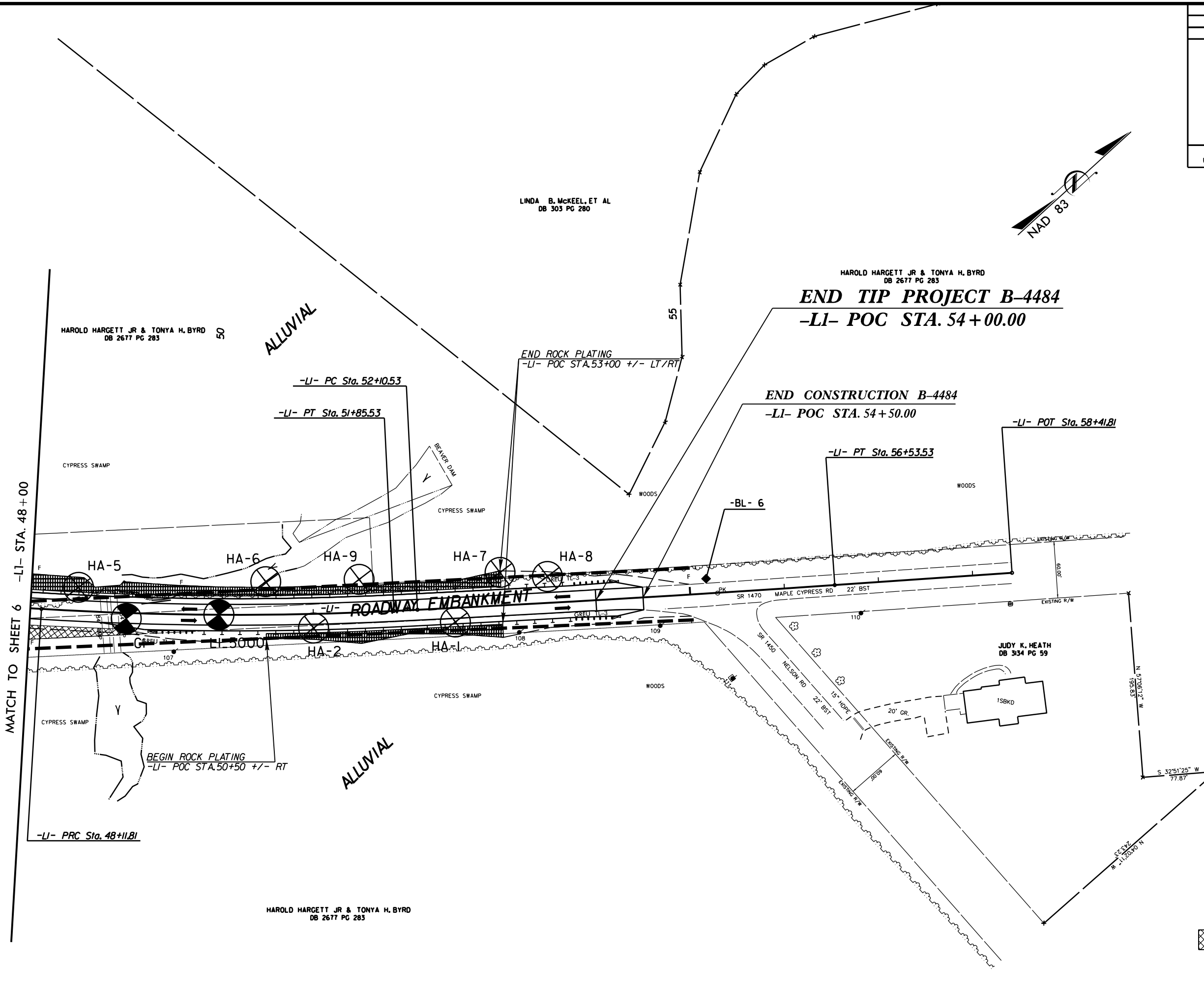
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RS&H



8/17/99
TIME DESIGN



LINDA B. McKEEL, ET AL
DB 303 PG 280

HAROLD HARGETT JR & TONYA H. BYRD
DB 2677 PG 283

END TIP PROJECT B-4484
-LI- POC STA. 54+00.00

HAROLD HARGETT JR & TONYA H. BYRD
DB 2677 PG 283

END CONSTRUCTION B-4484
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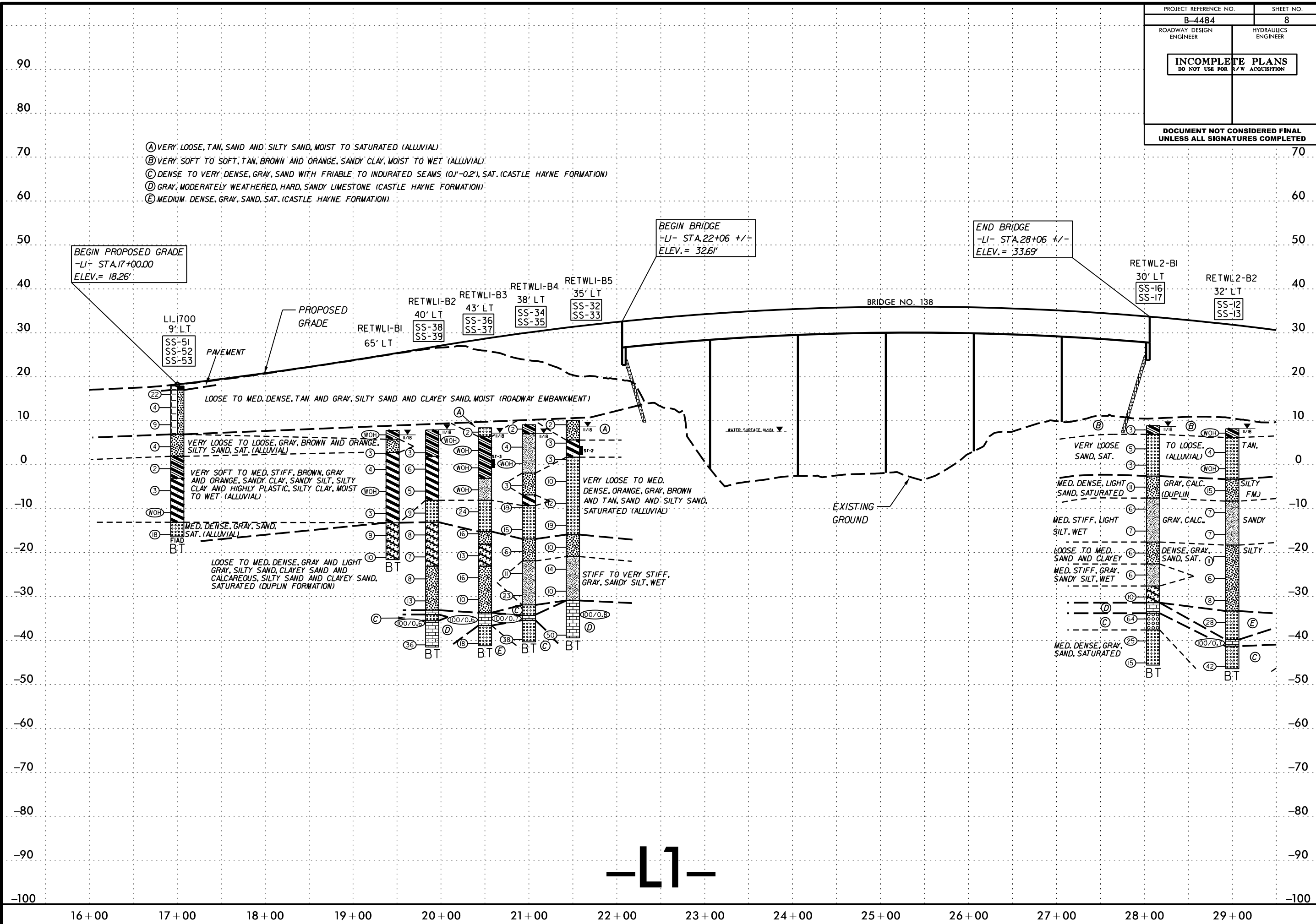
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-BL- 6

JUDY K. HEATH
DB 3134 PG 59

HAROLD HARGETT JR & TONYA H. BYRD
DB 2677 PG 283

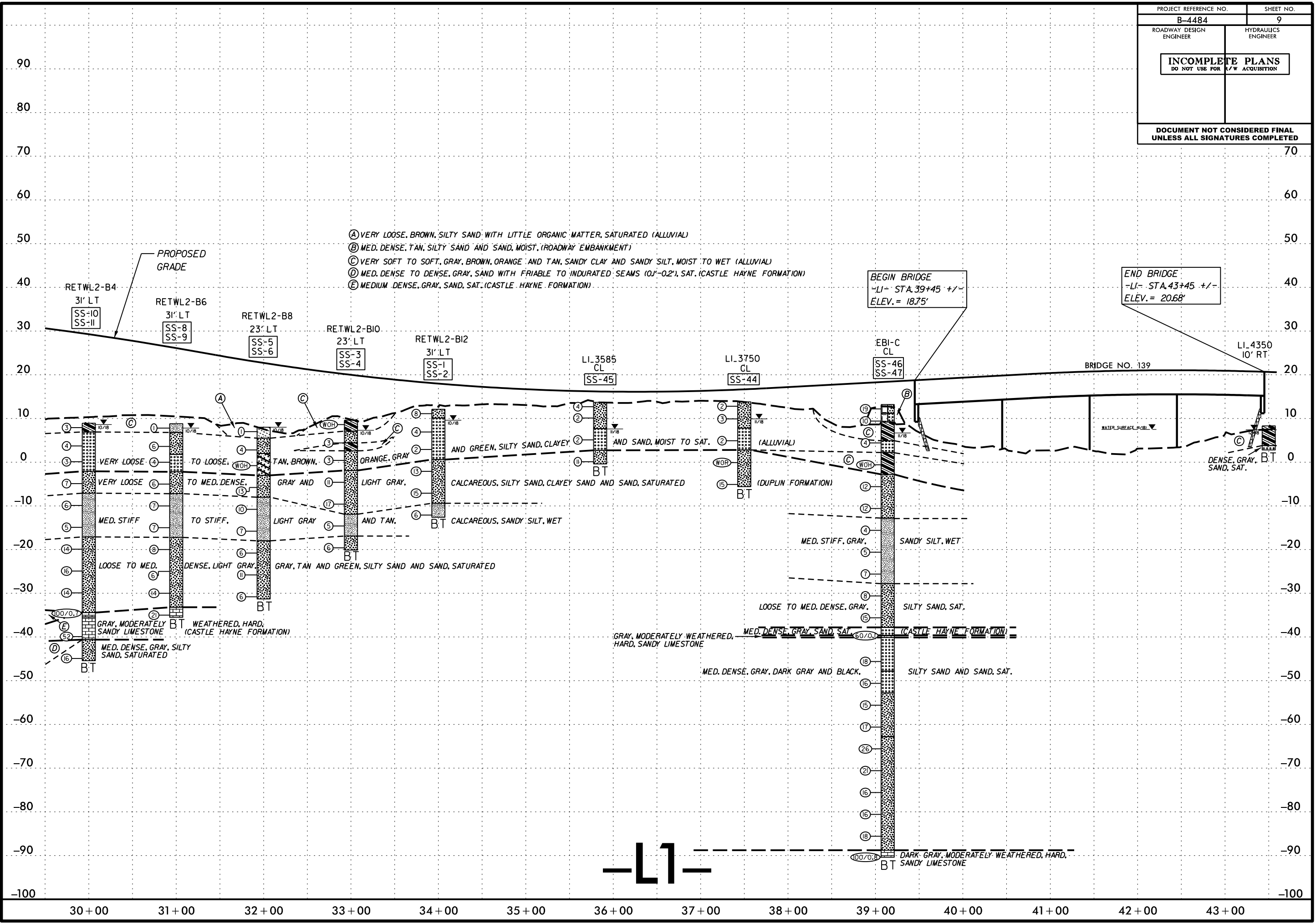
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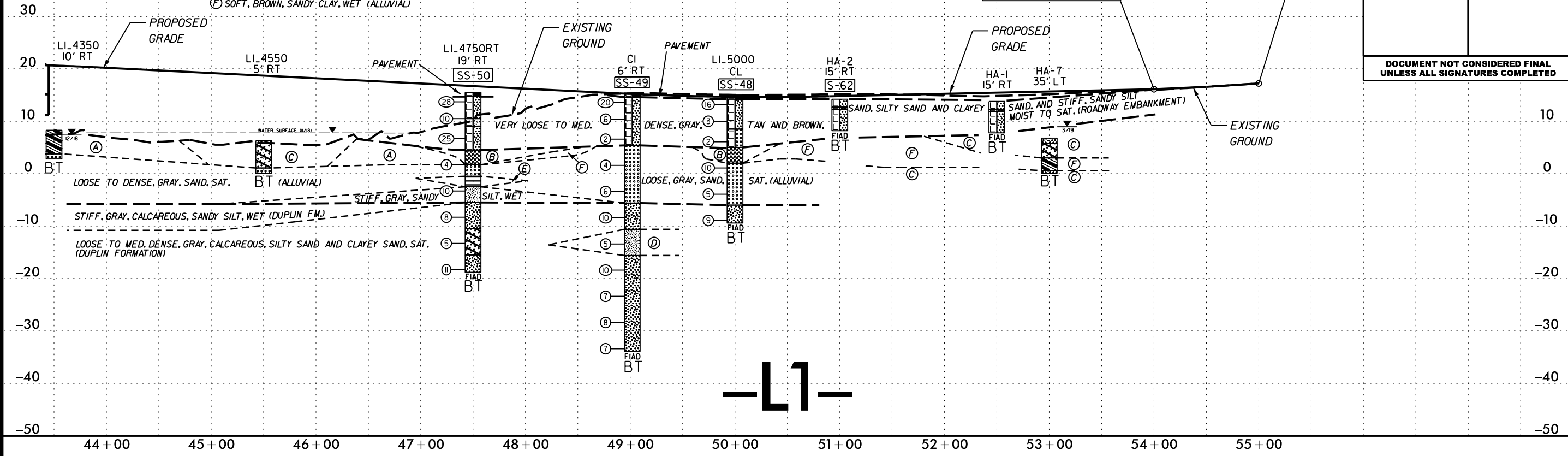
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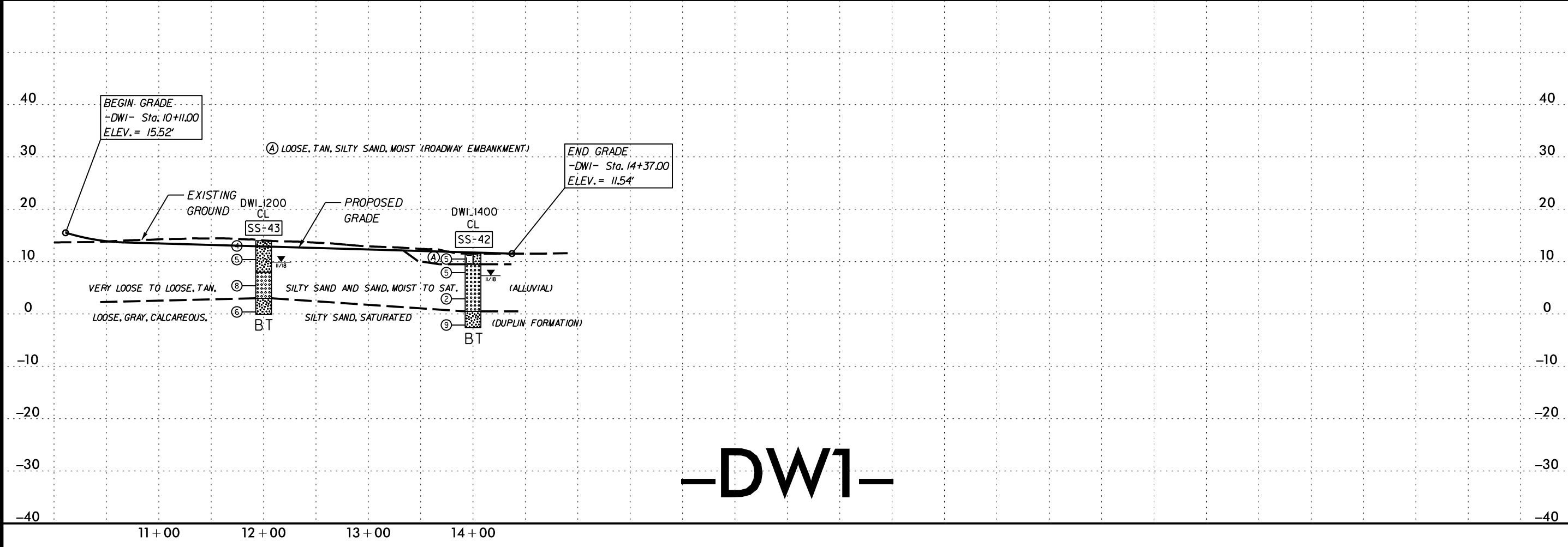
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- (A) VERY SOFT TO SOFT, GRAY, SANDY CLAY, MOIST TO WET (ALLUVIAL)
- (B) SOFT, BROWN, MUCK, SAT. (ALLUVIAL)
- (C) VERY LOOSE TO MED. DENSE, BROWN, GRAY, GREEN AND TAN, CLAYEY SAND AND SILTY SAND, SATURATED (ALLUVIAL)
- (D) MED. STIFF, GRAY AND GREEN, SANDY SILT, WET (DUPLIN FORMATION)
- (E) VERY SOFT, BROWN, SANDY SILT WITH MODERATE ORGANIC MATTER, WET (ALLUVIAL)
- (F) SOFT, BROWN, SANDY CLAY, WET (ALLUVIAL)

PROJECT REFERENCE NO. B-4484	SHEET NO. 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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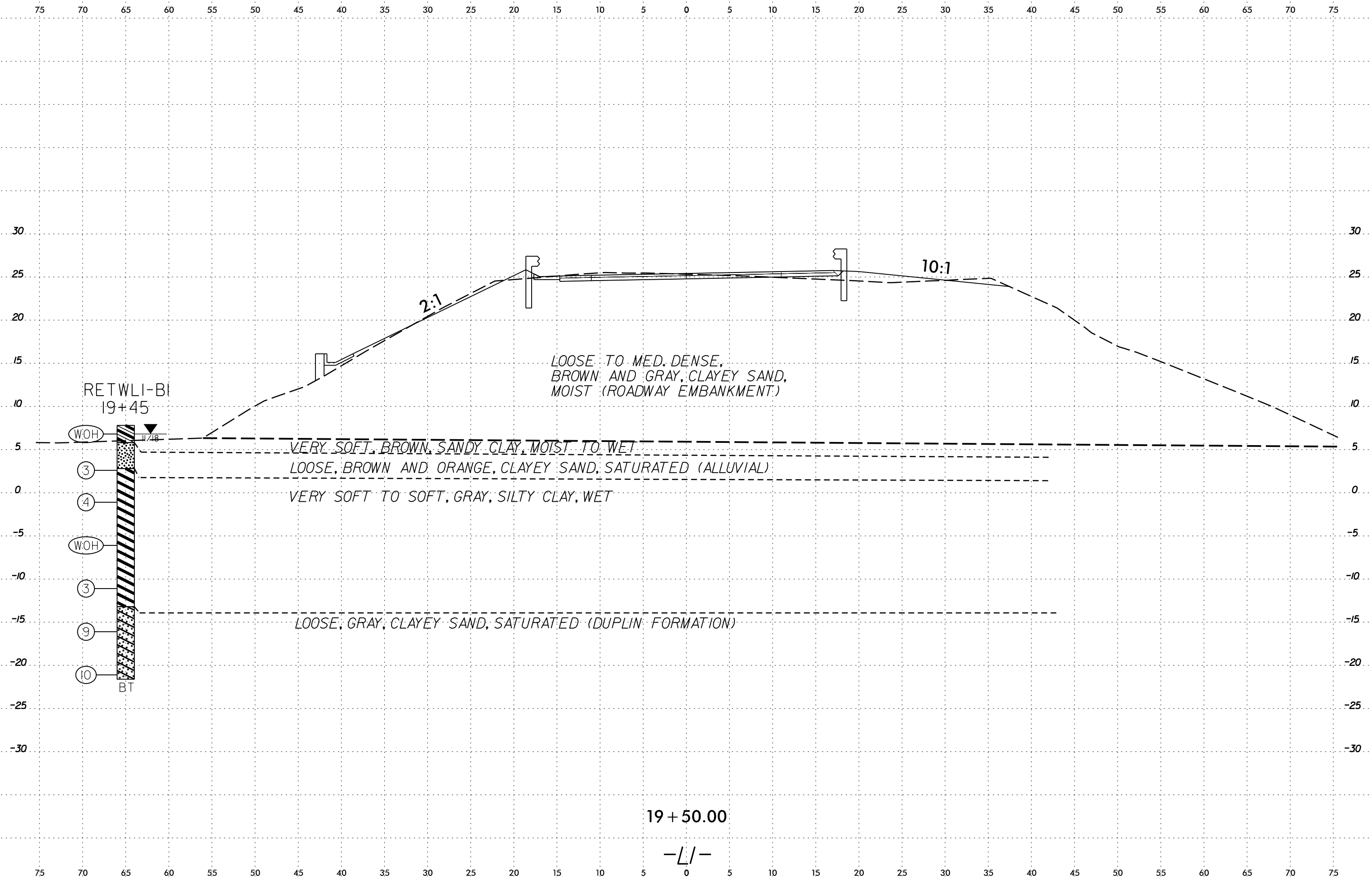


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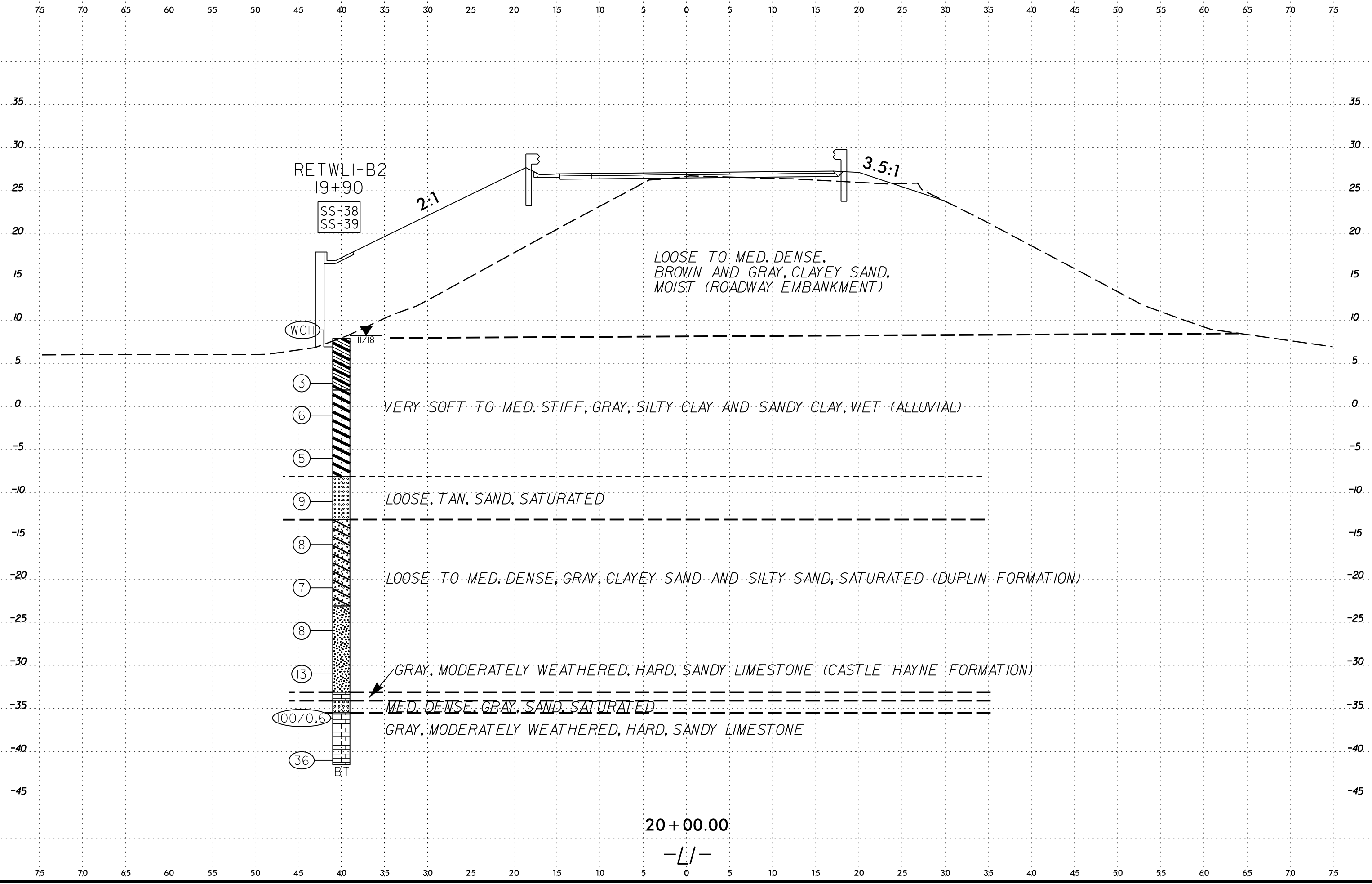


-DW1-

5/28/99



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LOOSE TO MED. DENSE,
BROWN AND GRAY, CLAYEY SAND,
MOIST (ROADWAY EMBANKMENT)

VERY SOFT TO MED. STIFF, GRAY, SILTY CLAY AND SANDY CLAY, WET (ALLUVIAL)

LOOSE, TAN, SAND, SATURATED

LOOSE TO MED. DENSE, GRAY, CLAYEY SAND AND SILTY SAND, SATURATED (DUPLIN FORMATION)

GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)

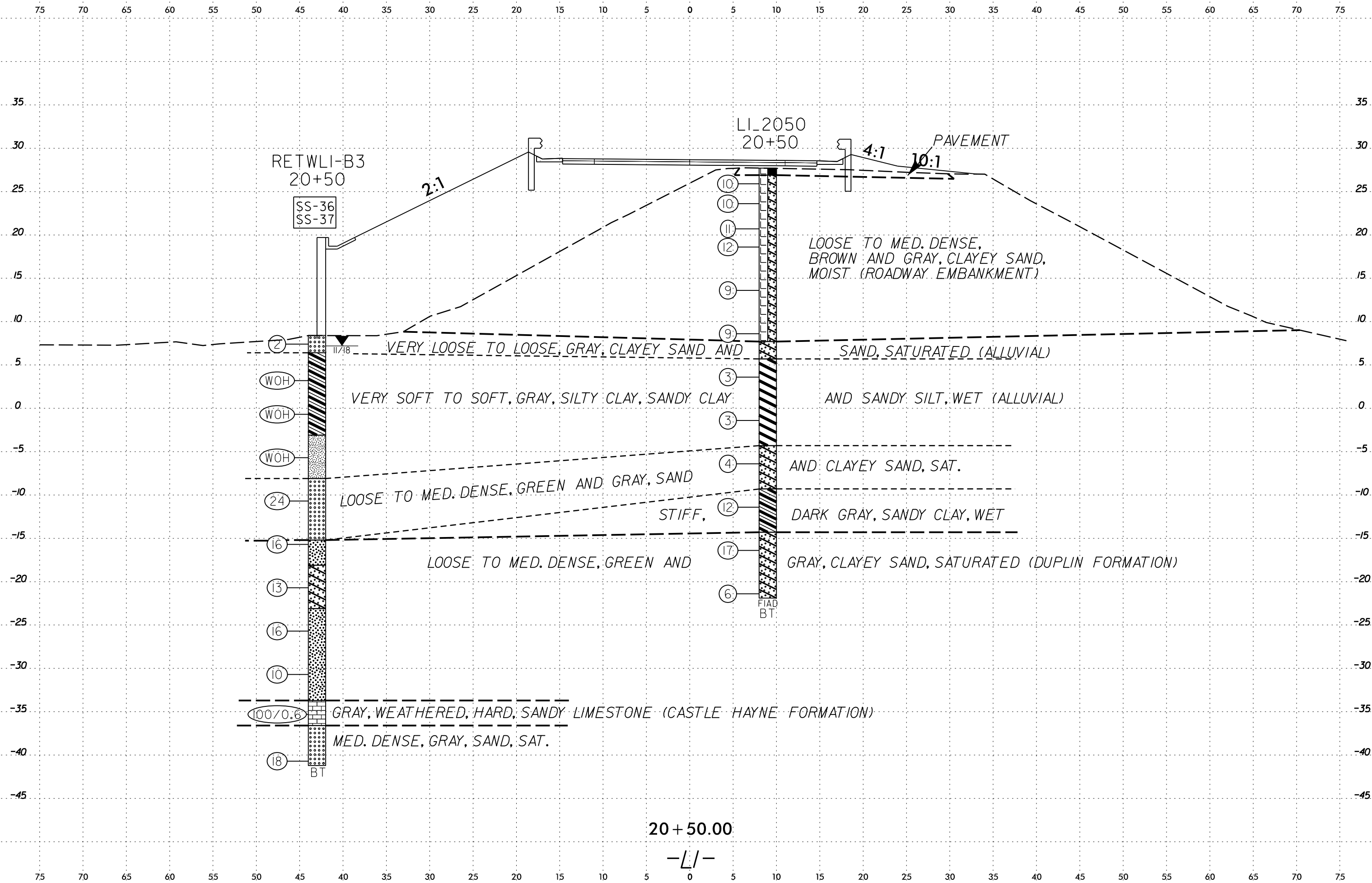
MED. DENSE, GRAY, SAND, SATURATED

GRAY, MODERATELY WEATHERED, HARD, SANDY LIMESTONE

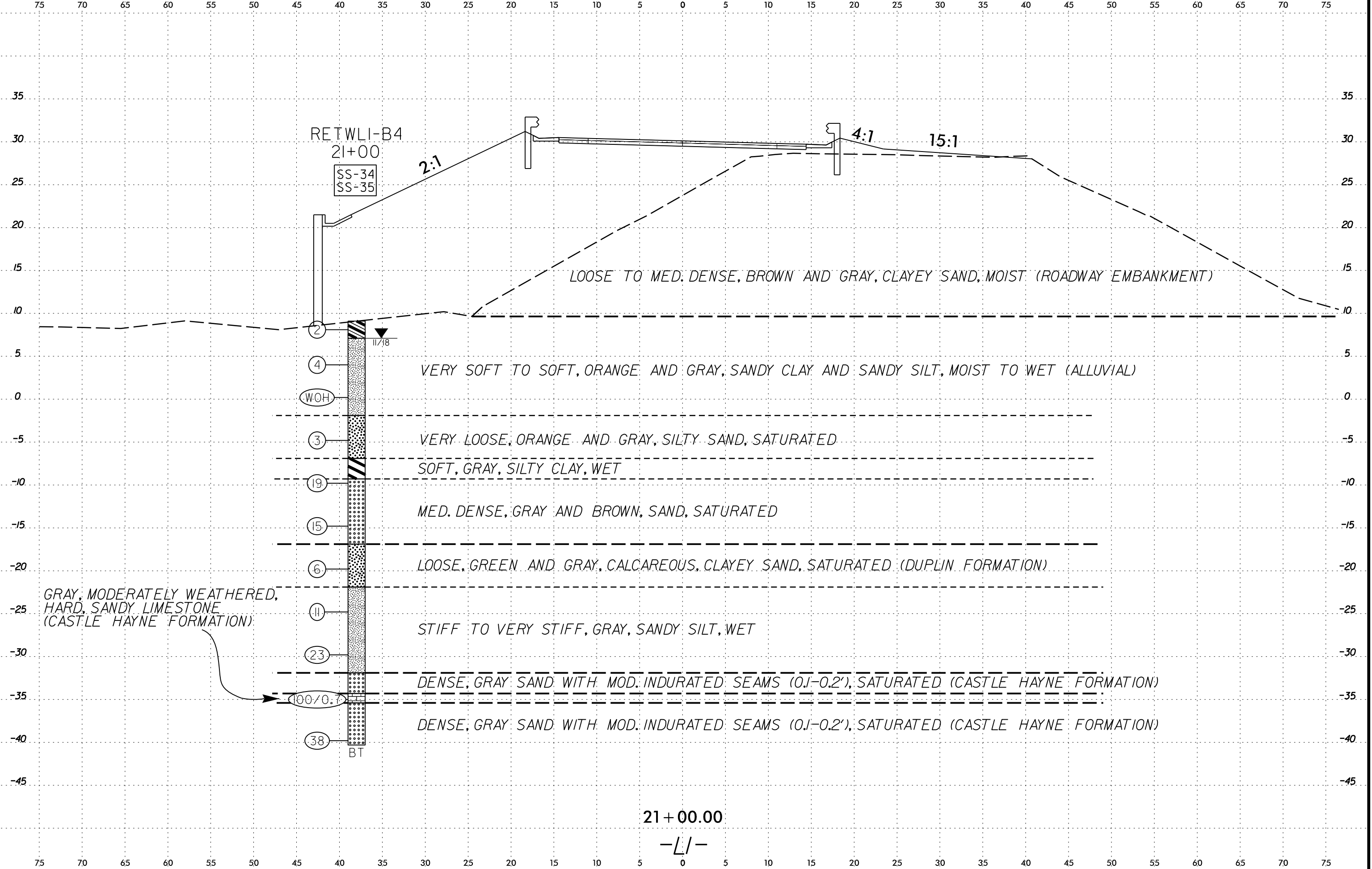
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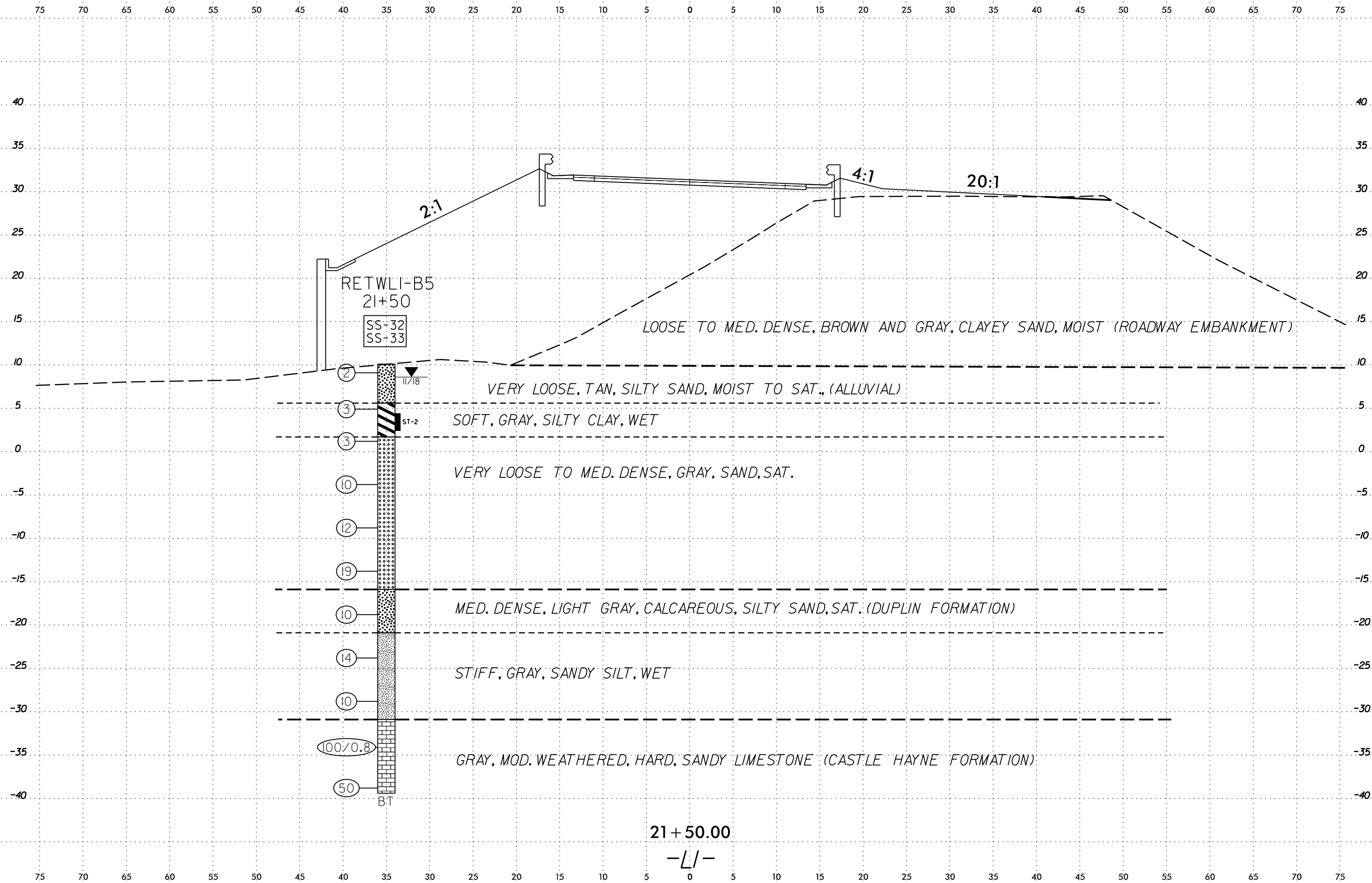
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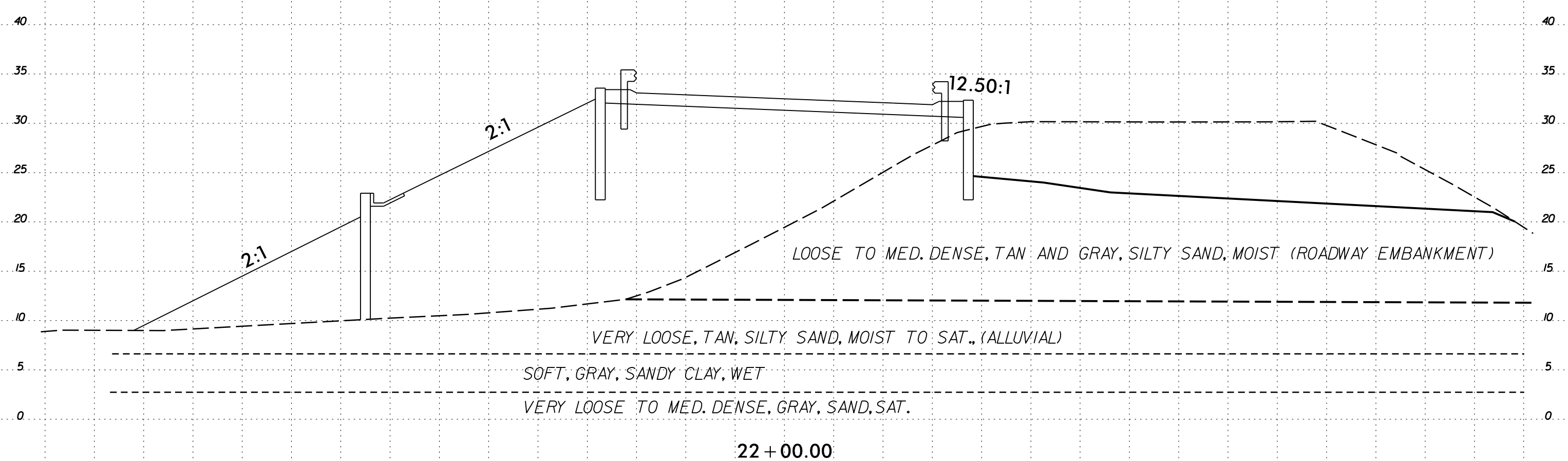
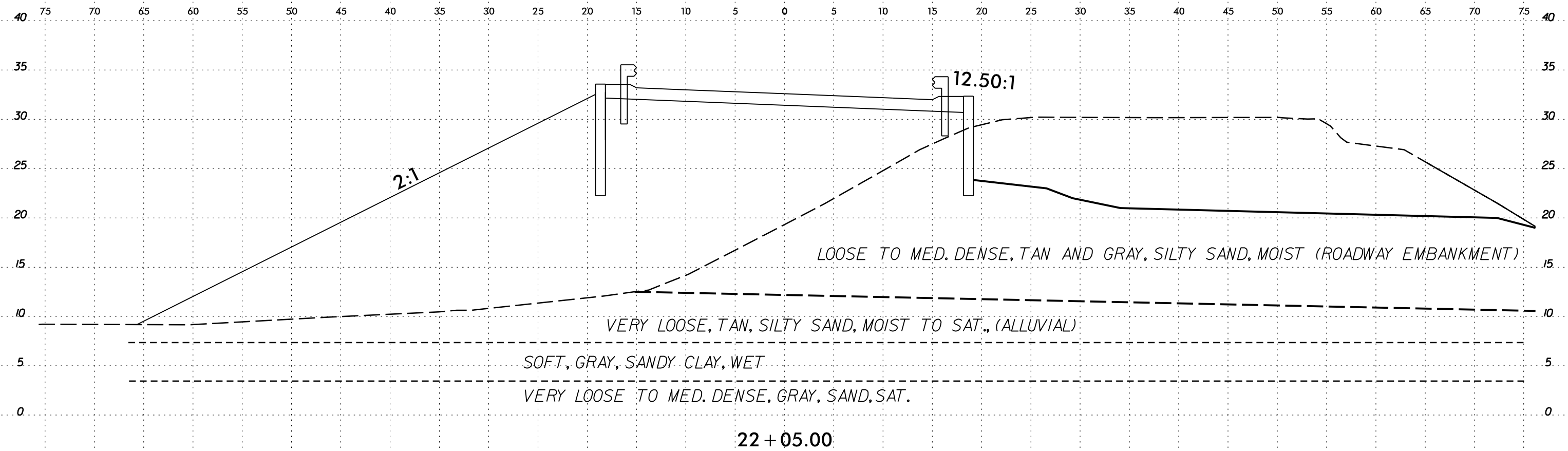


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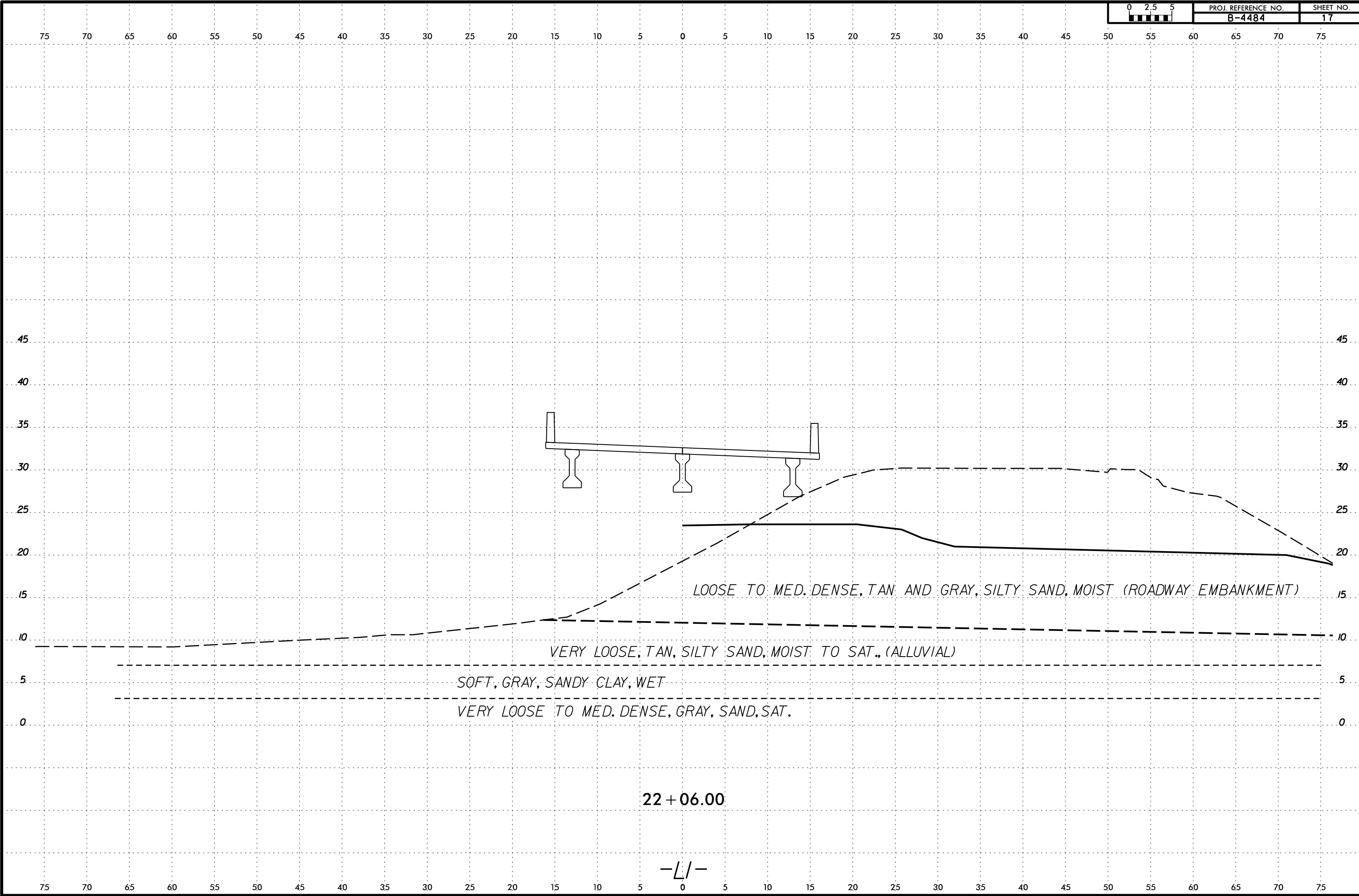


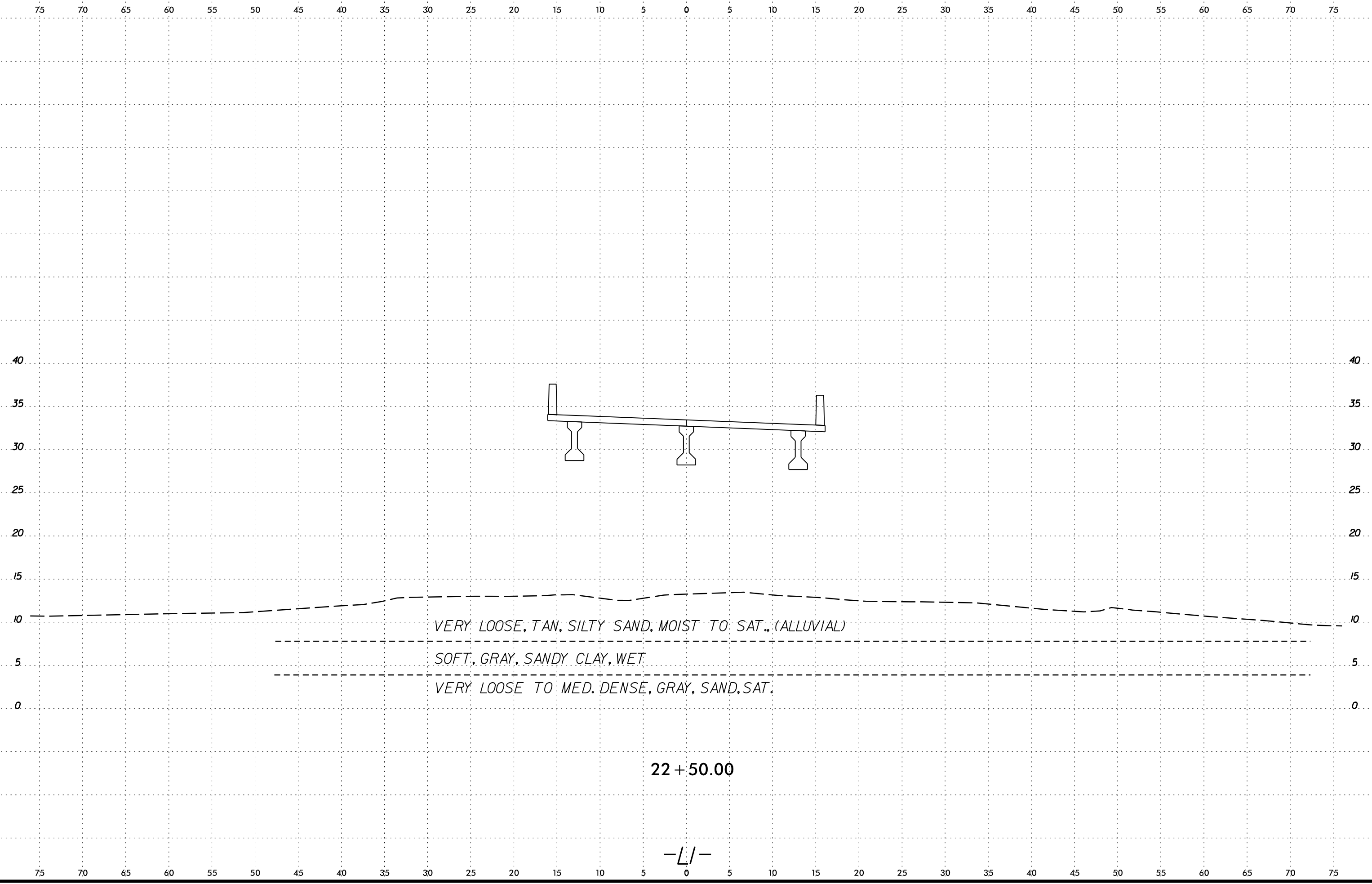


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DATE: 6/23/16
SCALE: AS SHOWN
DRAWN BY: J. BRYAN





VERY LOOSE, TAN, SILTY SAND, MOIST TO SAT., (ALLUVIAL)

SOFT, GRAY, SANDY CLAY, WET

VERY LOOSE TO MED. DENSE, GRAY, SAND, SAT.

22 + 50.00

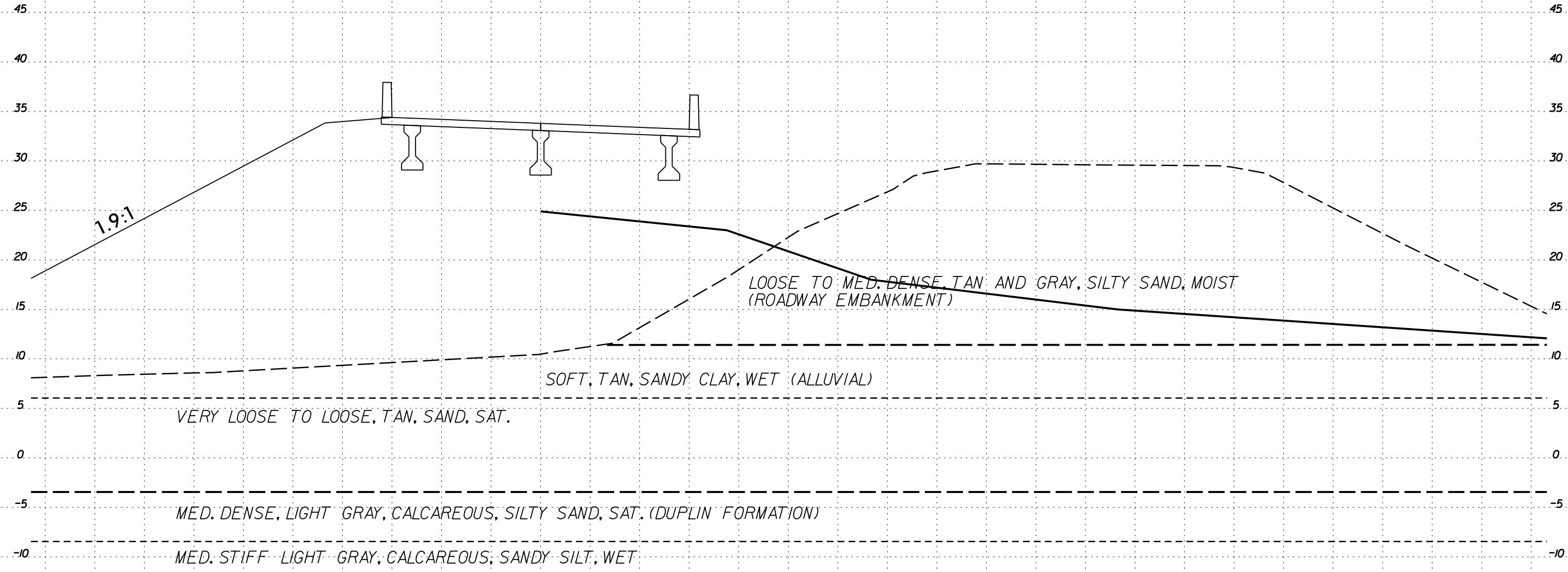
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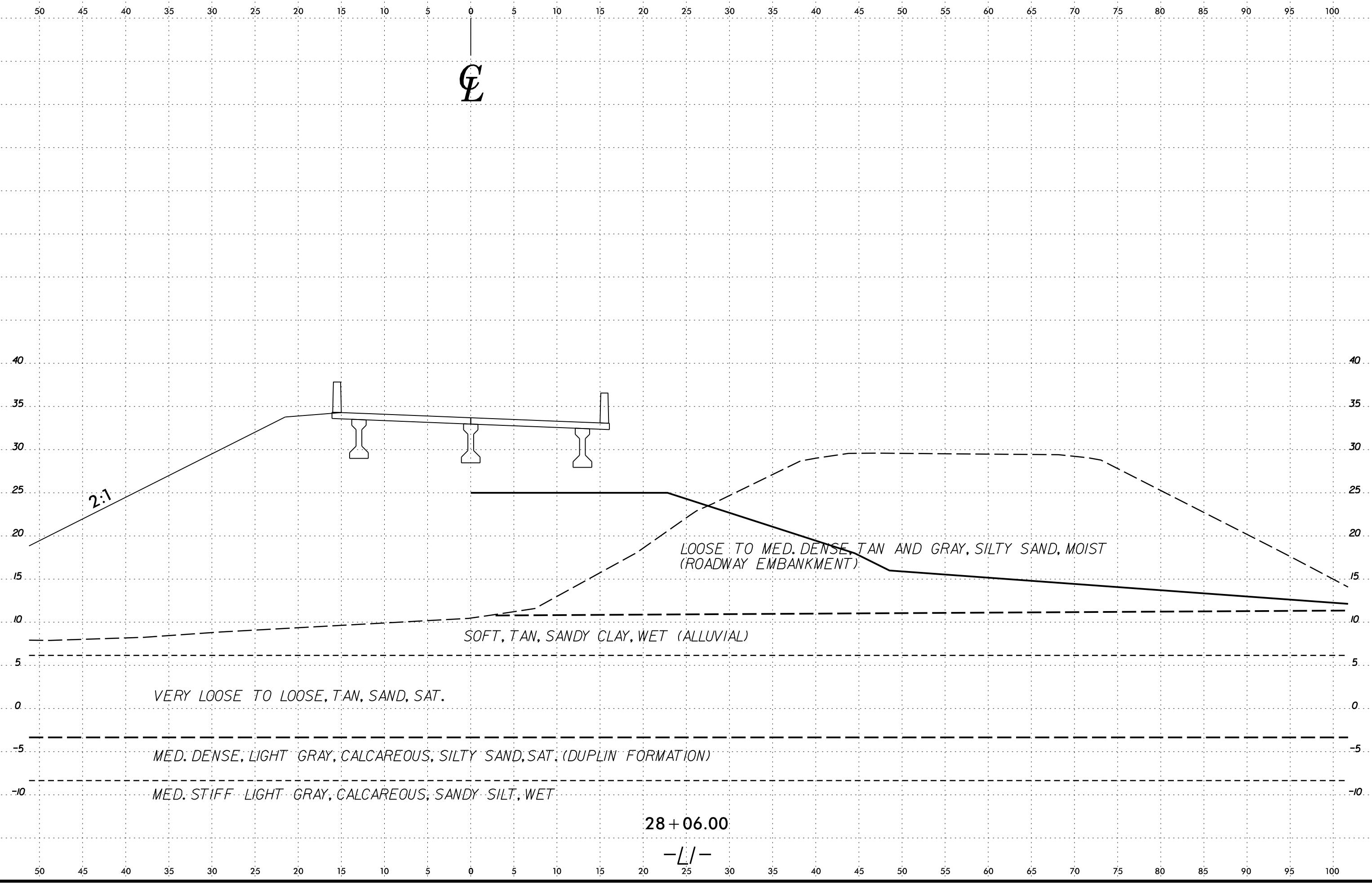


28 + 00.00

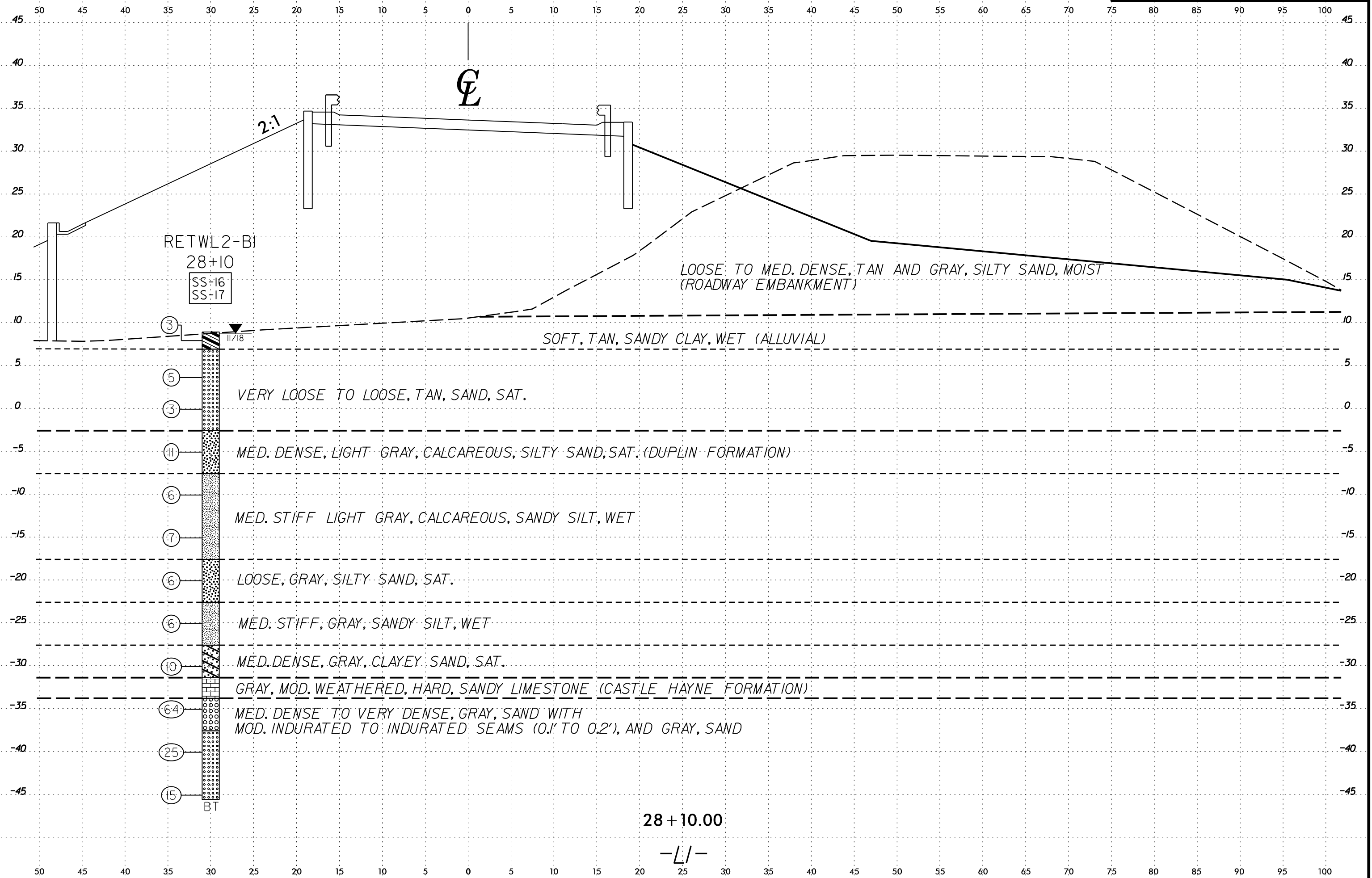
-L/-

50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

DATE: 6/23/16
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SCALE: AS SHOWN



6/23/16



RETWL2-B1
28+10
SS-16
SS-17

LOOSE TO MED. DENSE, TAN AND GRAY, SILTY SAND, MOIST
(ROADWAY EMBANKMENT)

SOFT, TAN, SANDY CLAY, WET (ALLUVIAL)

3
5
3
VERY LOOSE TO LOOSE, TAN, SAND, SAT.

11
6
7
MED. DENSE, LIGHT GRAY, CALCAREOUS, SILTY SAND, SAT. (DUPLIN FORMATION)

6
7
MED. STIFF LIGHT GRAY, CALCAREOUS, SANDY SILT, WET

6
6
LOOSE, GRAY, SILTY SAND, SAT.

6
6
MED. STIFF, GRAY, SANDY SILT, WET

10
10
MED. DENSE, GRAY, CLAYEY SAND, SAT.

64
25
15
GRAY, MOD. WEATHERED, HARD, SANDY LIMESTONE (CASTLE HAYNE FORMATION)

64
25
15
MED. DENSE TO VERY DENSE, GRAY, SAND WITH MOD. INDURATED TO INDURATED SEAMS (0.1' TO 0.2'), AND GRAY, SAND

28+10.00

-L/-

SYSTEMS CONNECTIONS
 10000 W. BIRCHMOUNT DRIVE
 SUITE 100
 GREENWOOD VILLAGE, CO 80120
 TEL: 303.751.1000
 WWW.SCM-CONNECTIONS.COM

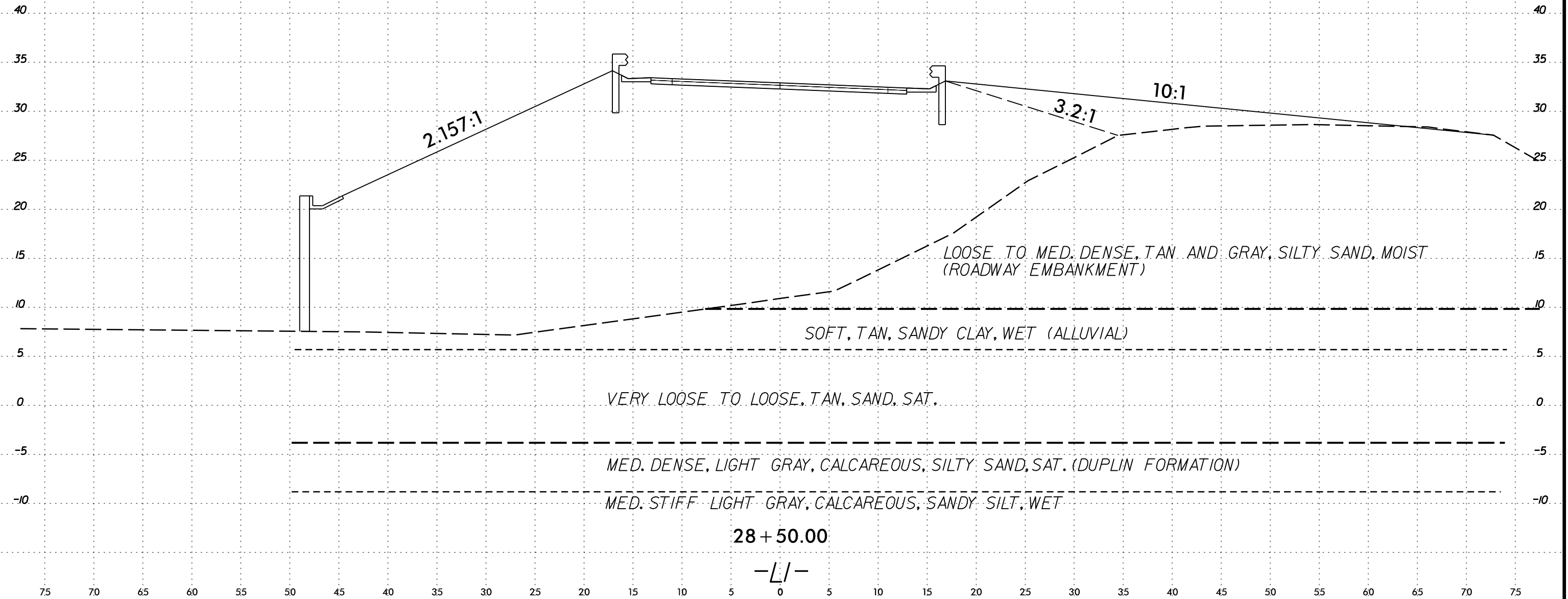
6/23/16



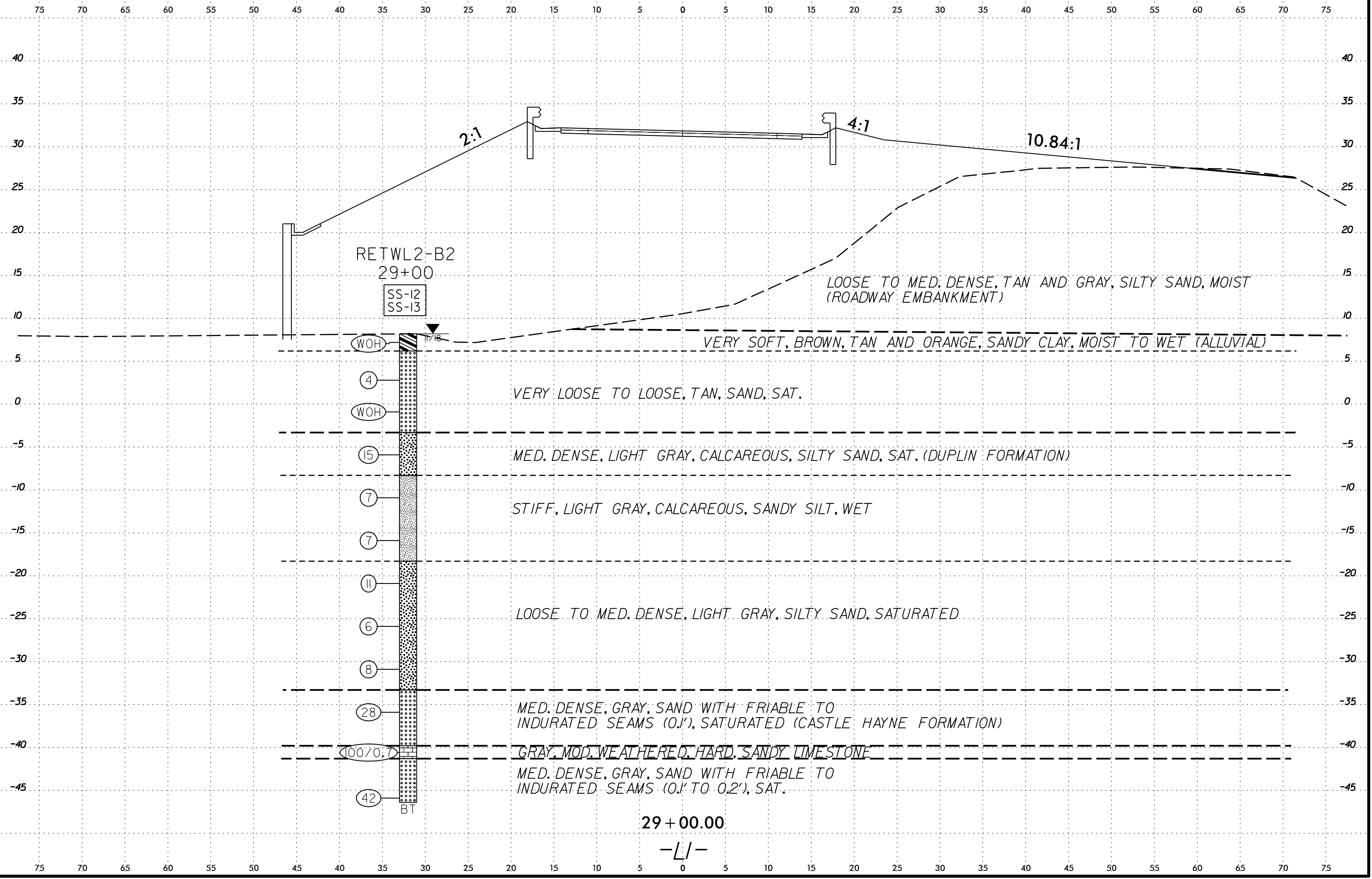
PROJ. REFERENCE NO.
B-4484

SHEET NO.
22

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



6/23/16
SY-C-T-M-E
D-C-N
J-U-L-I-E
S-E-R-I-A-L
N-U-M-B-E-R



RETWL2-B2
29+00
SS-12
SS-13

LOOSE TO MED. DENSE, TAN AND GRAY, SILTY SAND, MOIST
(ROADWAY EMBANKMENT)

VERY SOFT, BROWN, TAN AND ORANGE, SANDY CLAY, MOIST TO WET (ALLUVIAL)

VERY LOOSE TO LOOSE, TAN, SAND, SAT.

MED. DENSE, LIGHT GRAY, CALCAREOUS, SILTY SAND, SAT. (DUPLIN FORMATION)

STIFF, LIGHT GRAY, CALCAREOUS, SANDY SILT, WET

LOOSE TO MED. DENSE, LIGHT GRAY, SILTY SAND, SATURATED

MED. DENSE, GRAY, SAND WITH FRIABLE TO
INDURATED SEAMS (0.1'), SATURATED (CASTLE HAYNE FORMATION)

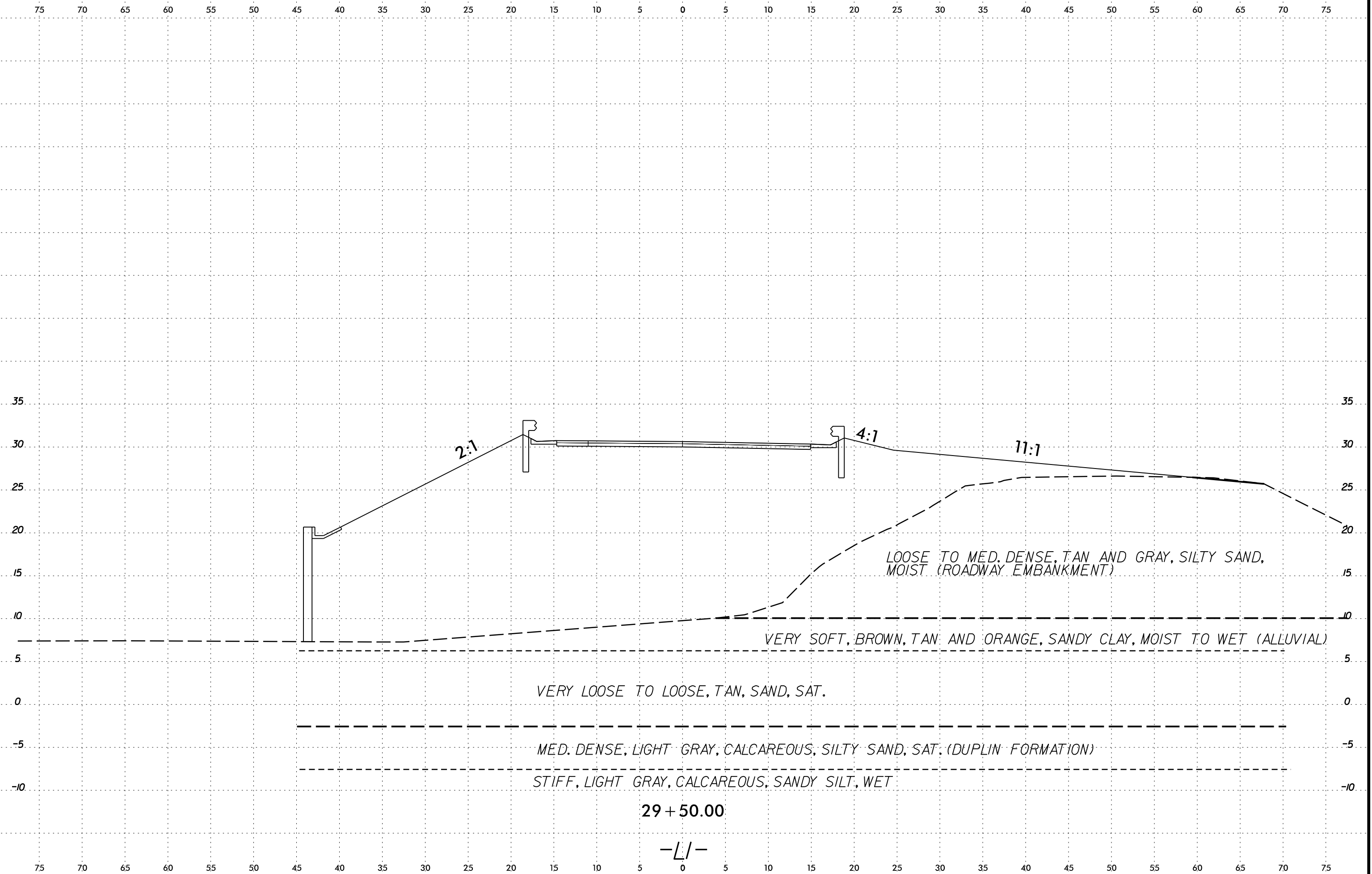
GRAY, MOD. WEATHERED, HARD, SANDY LIMESTONE

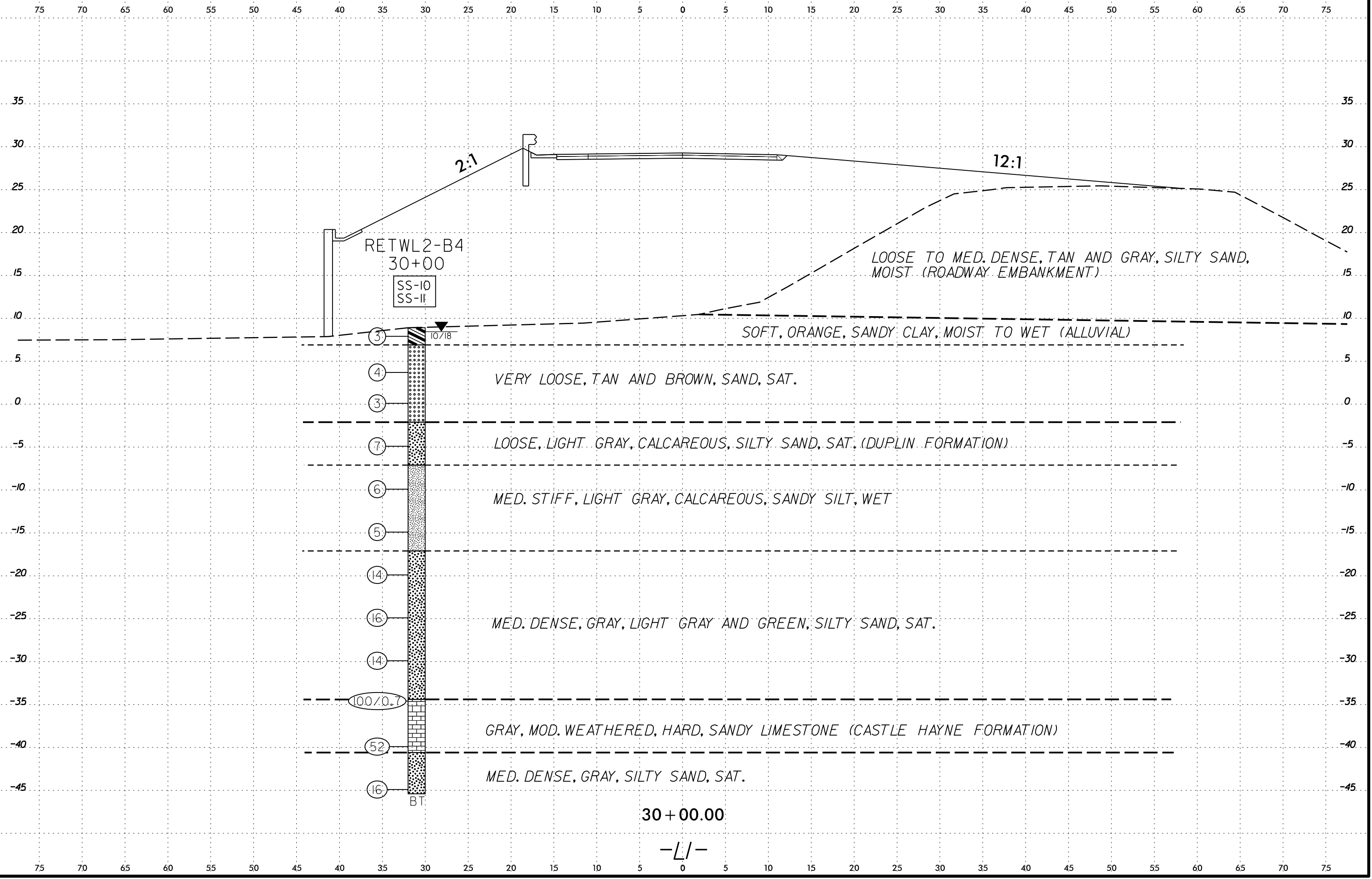
MED. DENSE, GRAY, SAND WITH FRIABLE TO
INDURATED SEAMS (0.1' TO 0.2'), SAT.

29 + 00.00

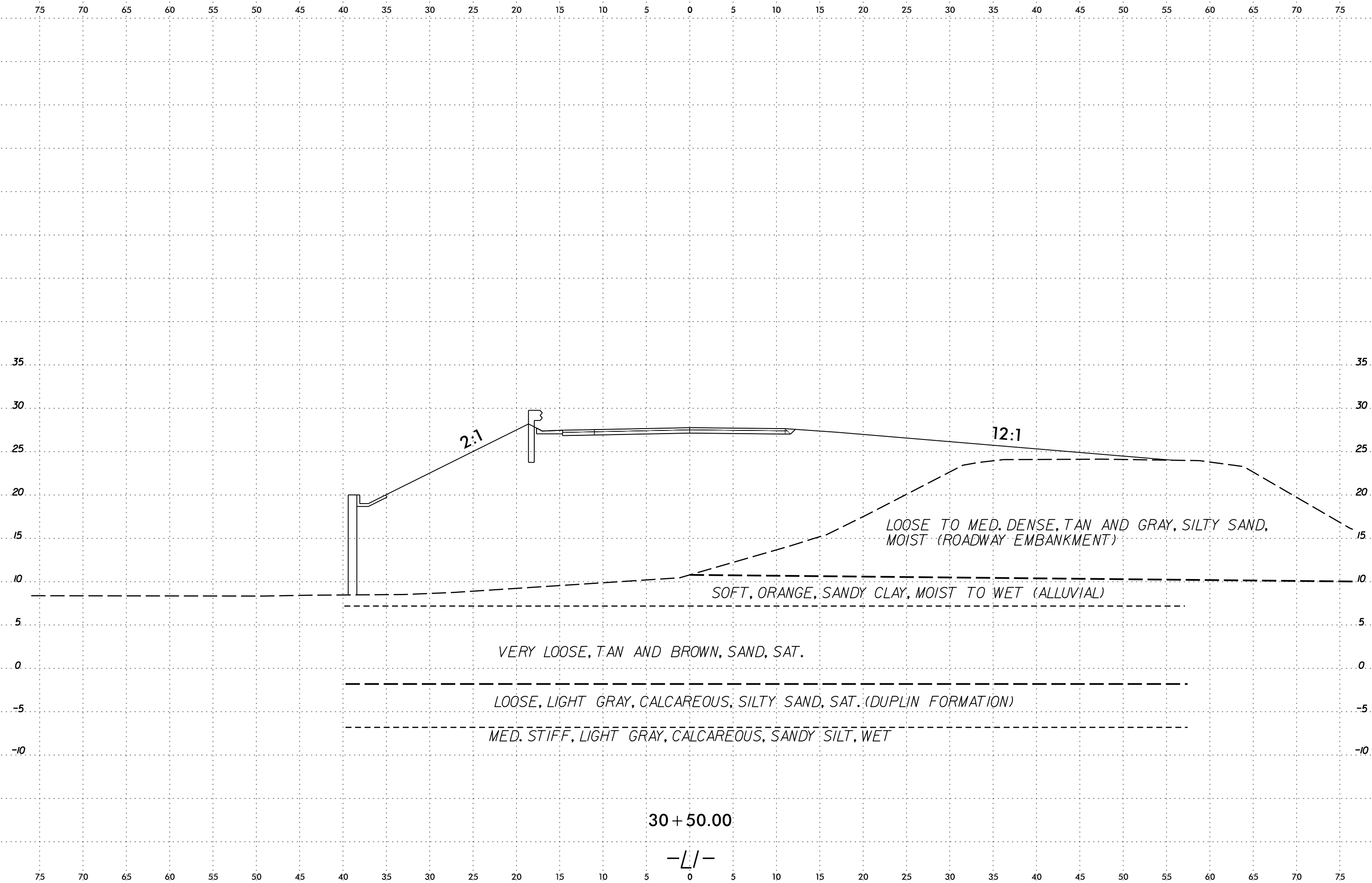
-L/-

6/23/16
SECTION
DUPLIN
ROADWAY



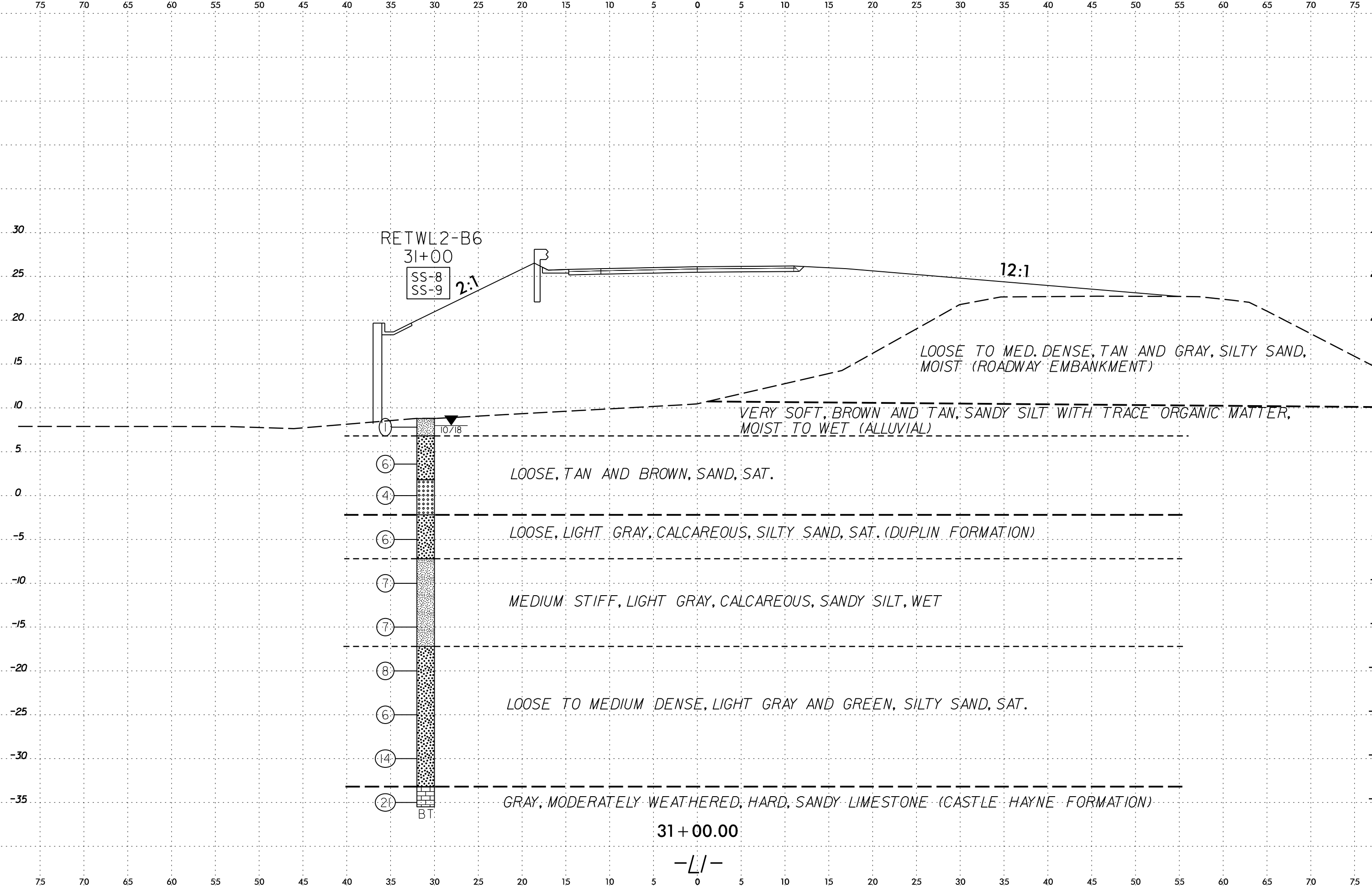


SCHEMATIC CROSS SECTION OF RETWL 2-B4



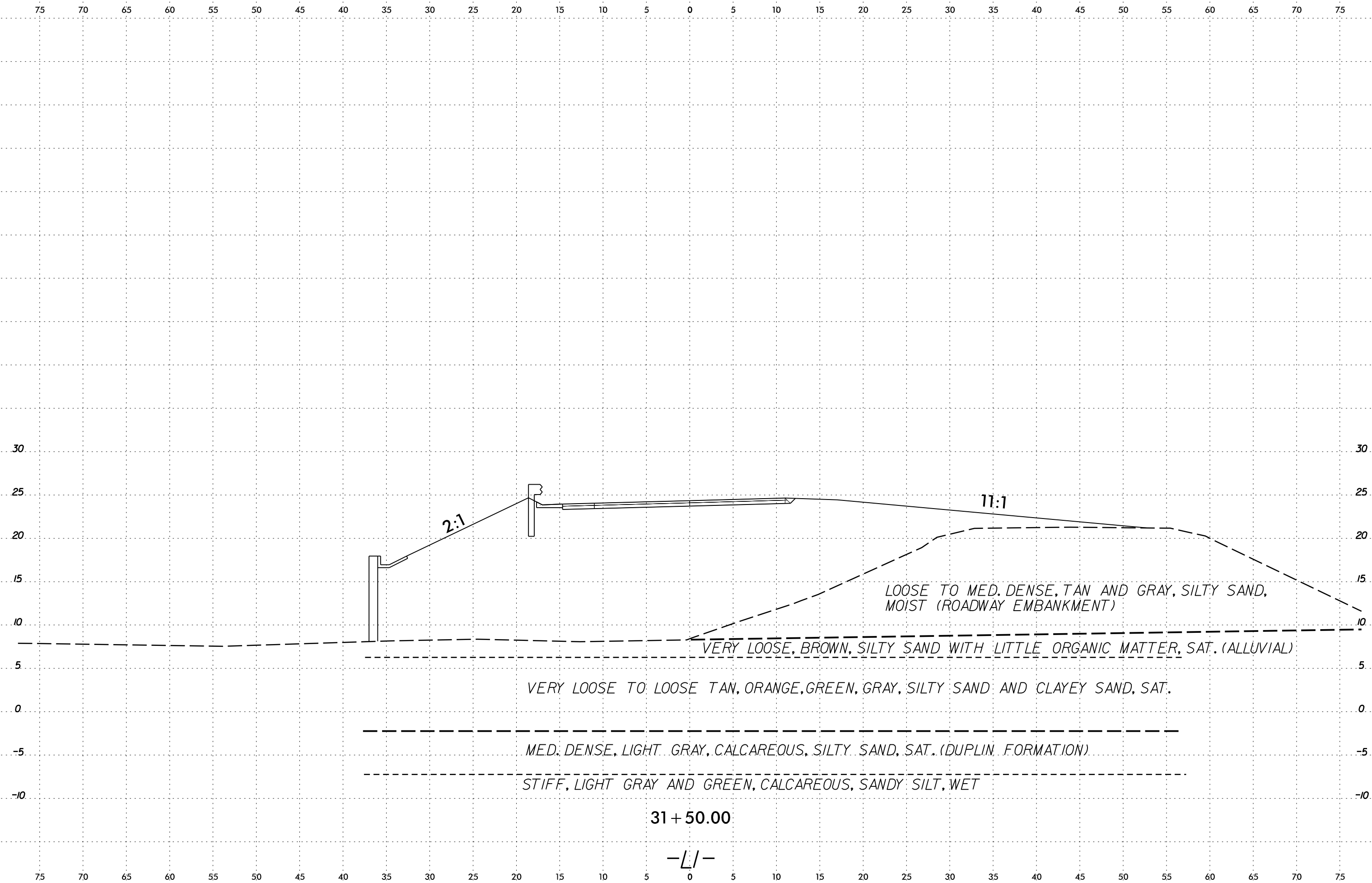
DATE: 6/23/16
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SCALE: AS SHOWN

6/23/16



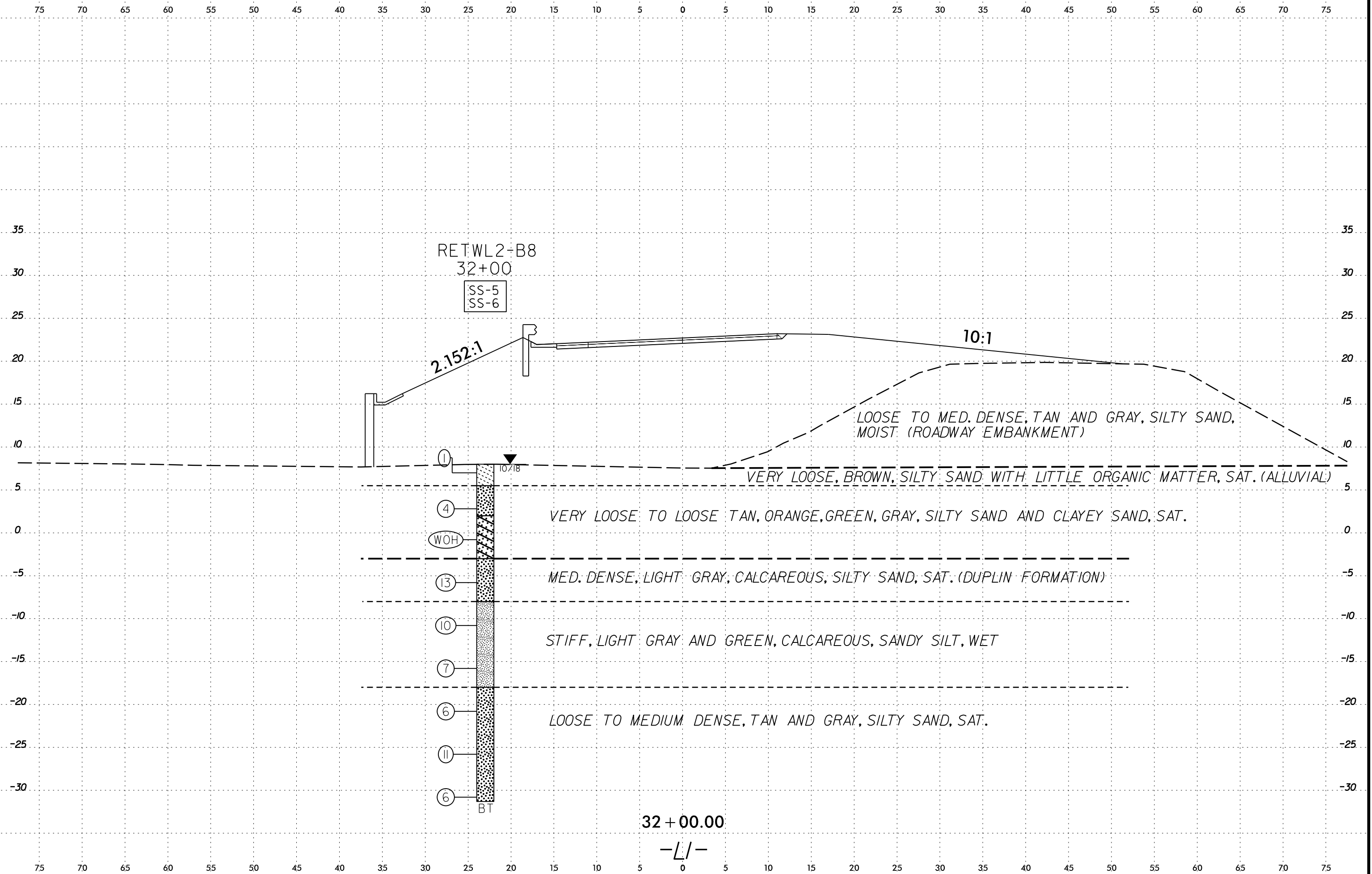
SCALE

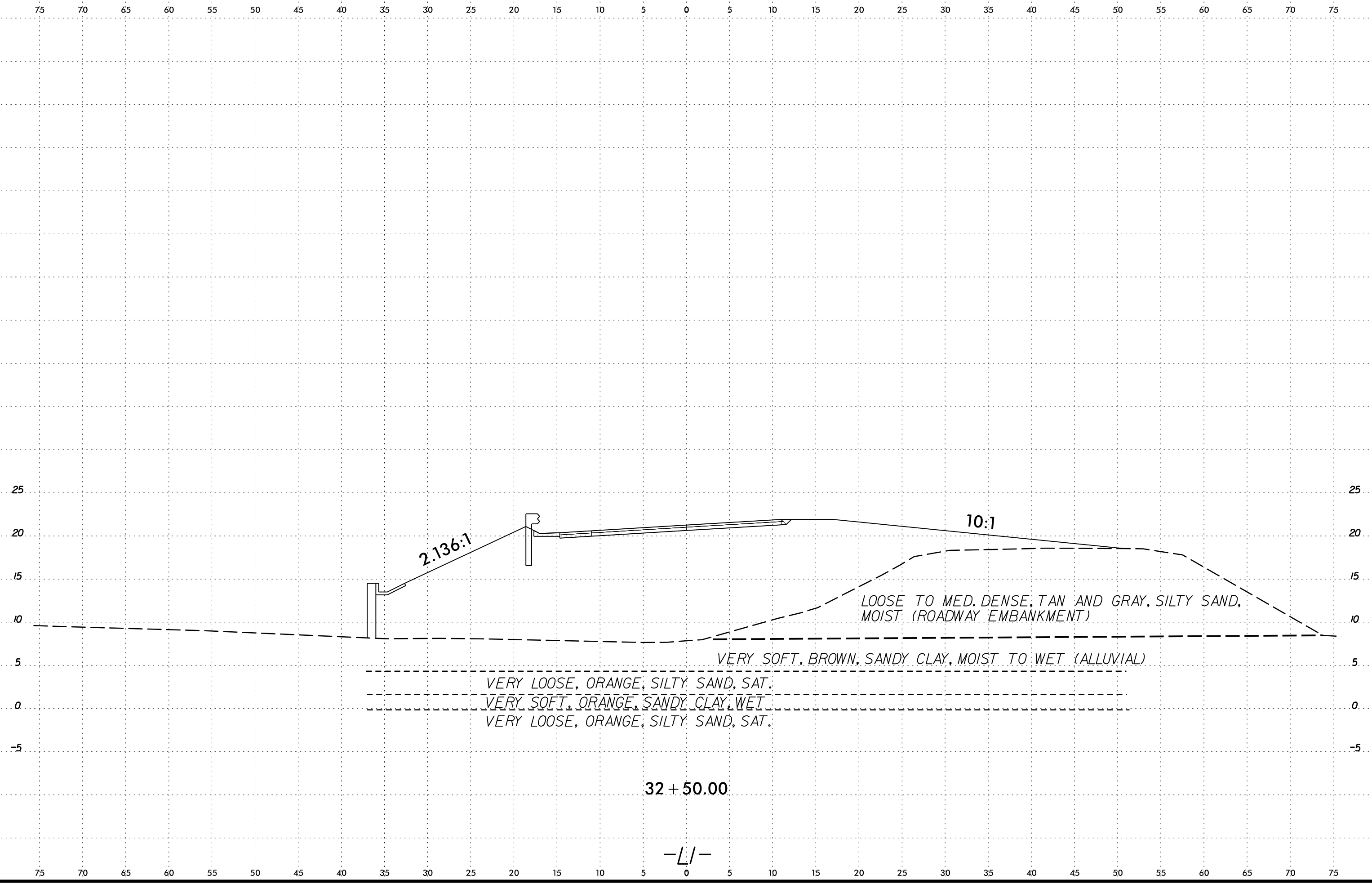
6/23/16



DATE: 6/23/16
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SCALE: 1" = 10'

6/23/16
SOUTH PLANTATION ROAD
DUPLIN COUNTY, GEORGIA





2.136:1

10:1

LOOSE TO MED. DENSE, TAN AND GRAY, SILTY SAND, MOIST (ROADWAY EMBANKMENT)

VERY SOFT, BROWN, SANDY CLAY, MOIST TO WET (ALLUVIAL)

VERY LOOSE, ORANGE, SILTY SAND, SAT.

VERY SOFT, ORANGE, SANDY CLAY, WET

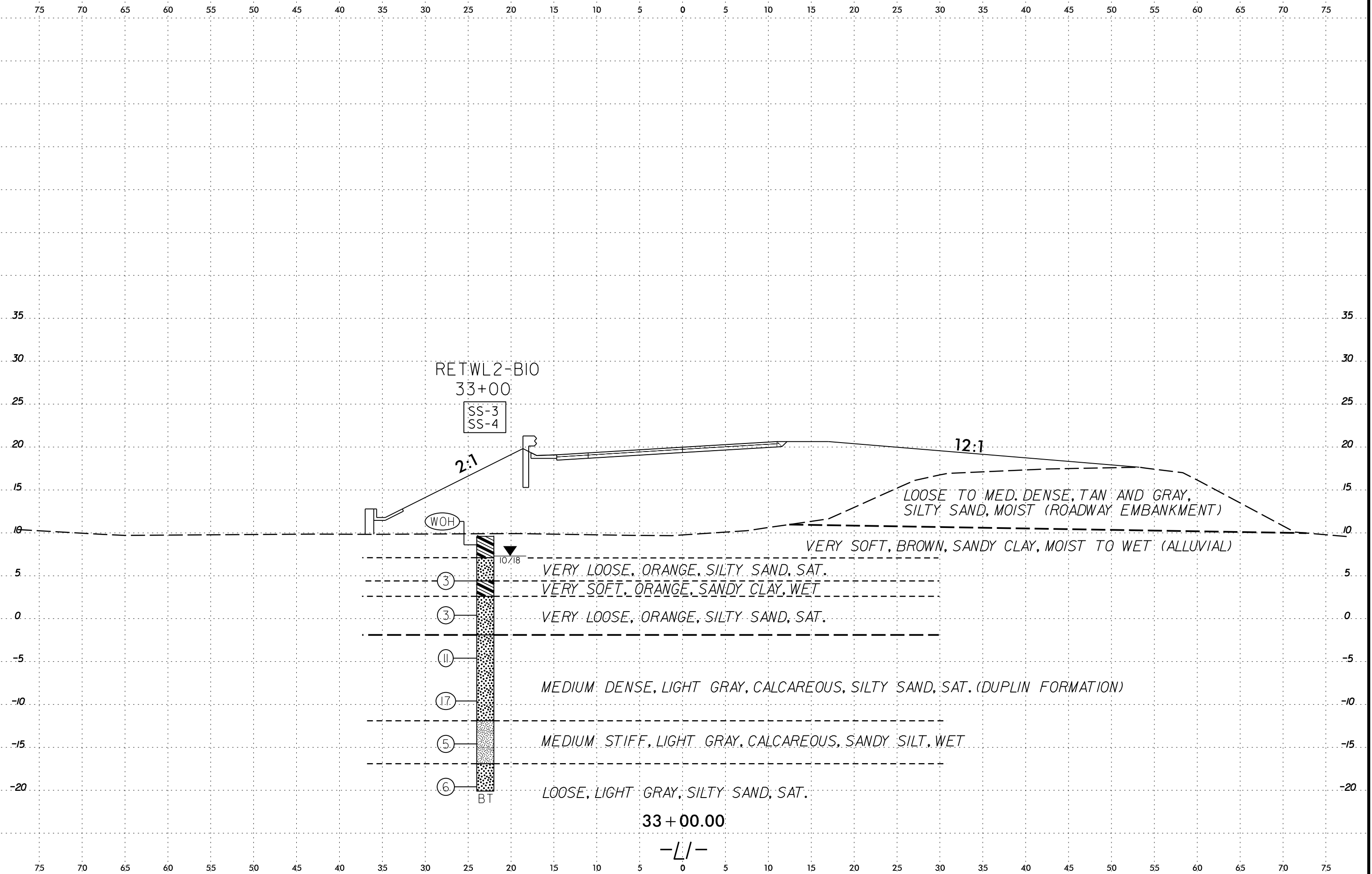
VERY LOOSE, ORANGE, SILTY SAND, SAT.

32 + 50.00

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DATE: 6/23/16
DRAWN BY: [illegible]
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SCALE: AS SHOWN

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SOUTH
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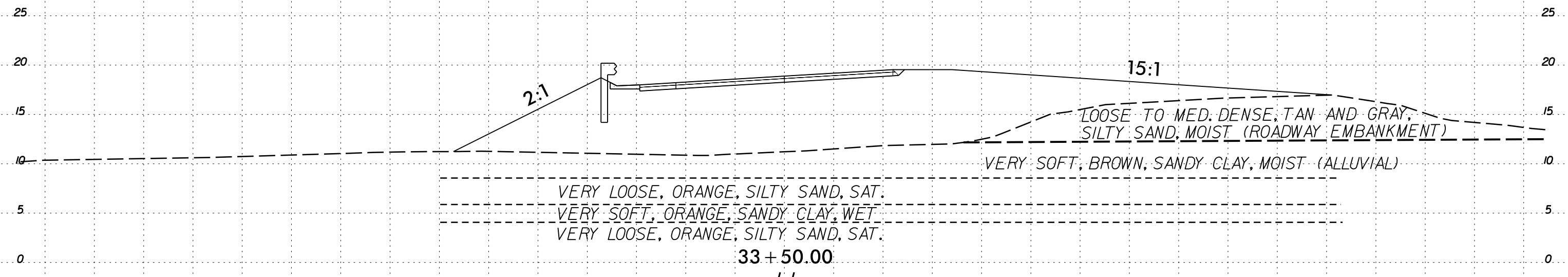
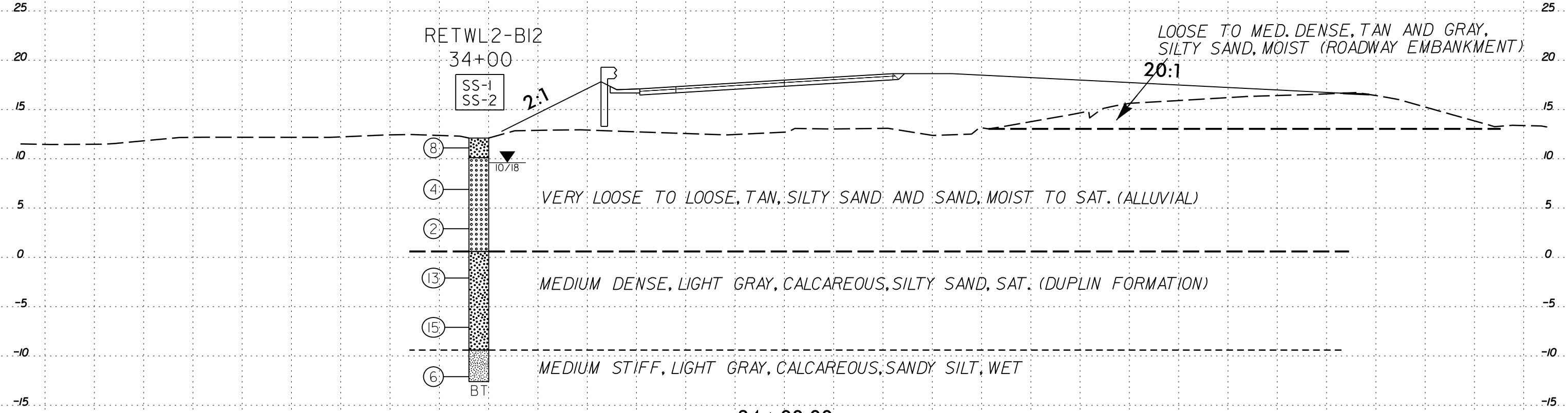


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PROJ. REFERENCE NO.	SHEET NO.
B-4484	32

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

34 + 00.00

33 + 50.00

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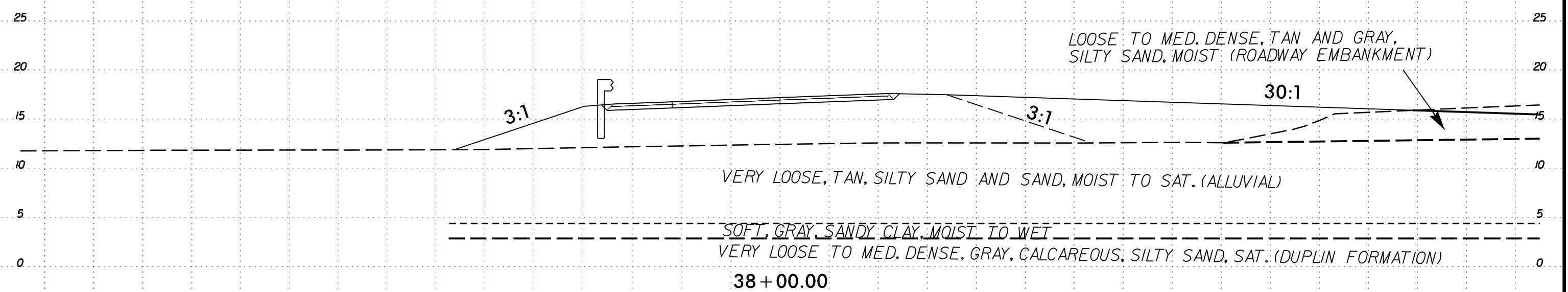
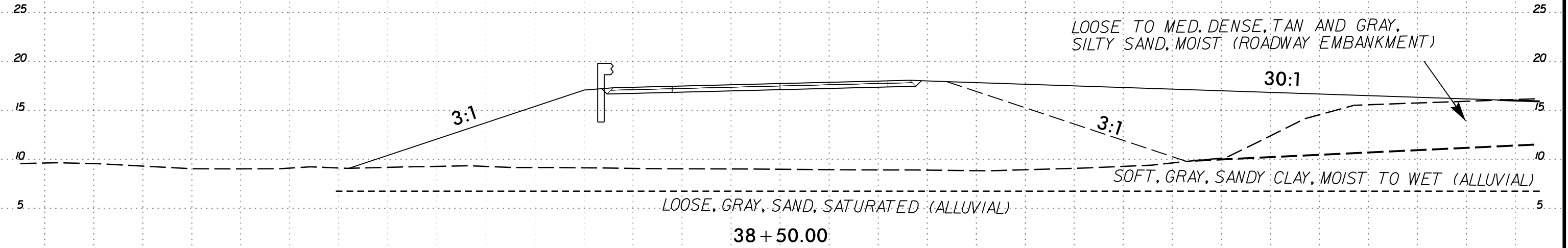
6/23/16



PROJ. REFERENCE NO.
B-4484

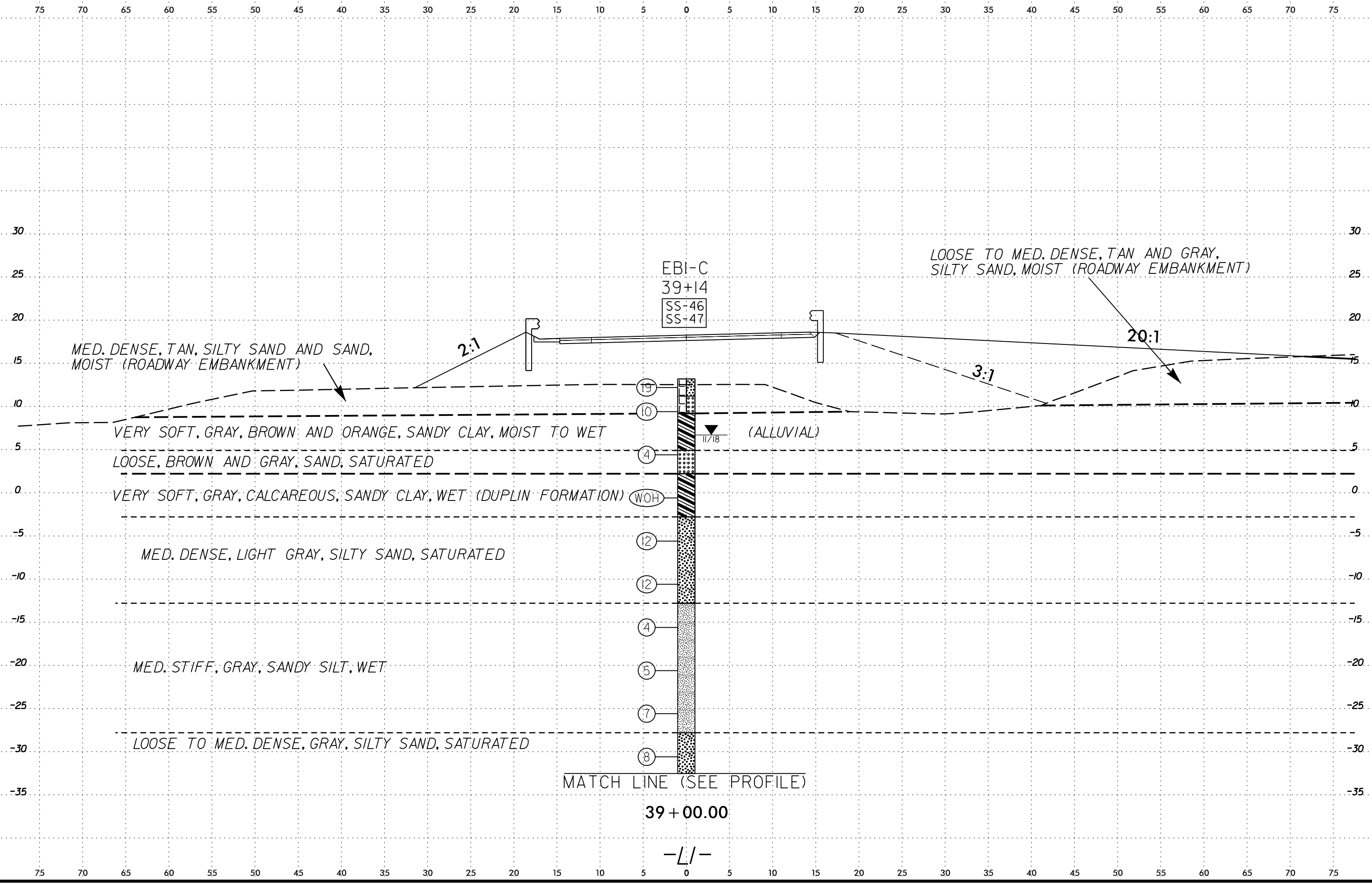
SHEET NO.
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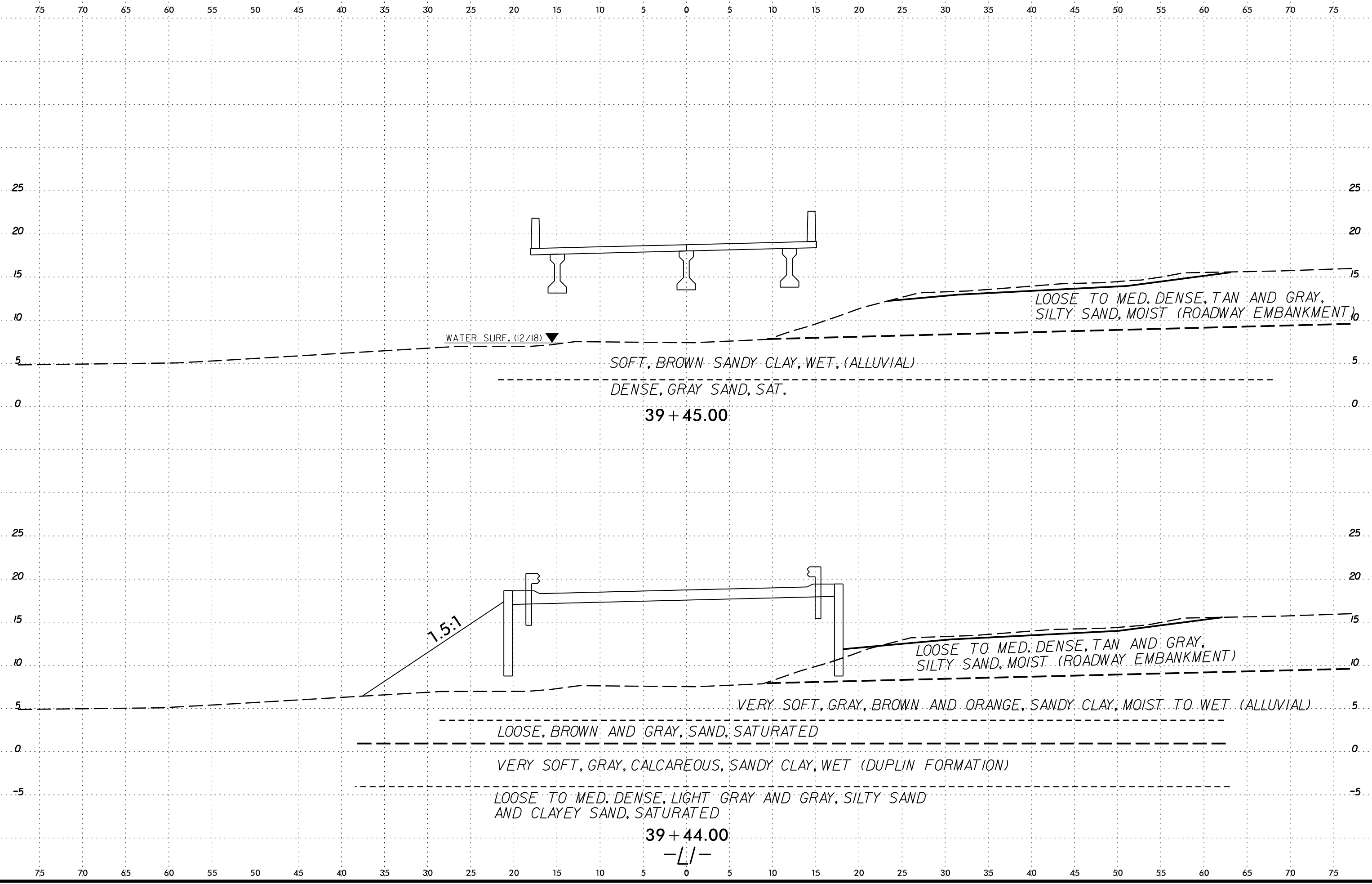
-L/-

DATE: 6/23/16
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SCALE: AS SHOWN
SHEET NO.: 33
PROJECT NO.: B-4484



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6/23/16



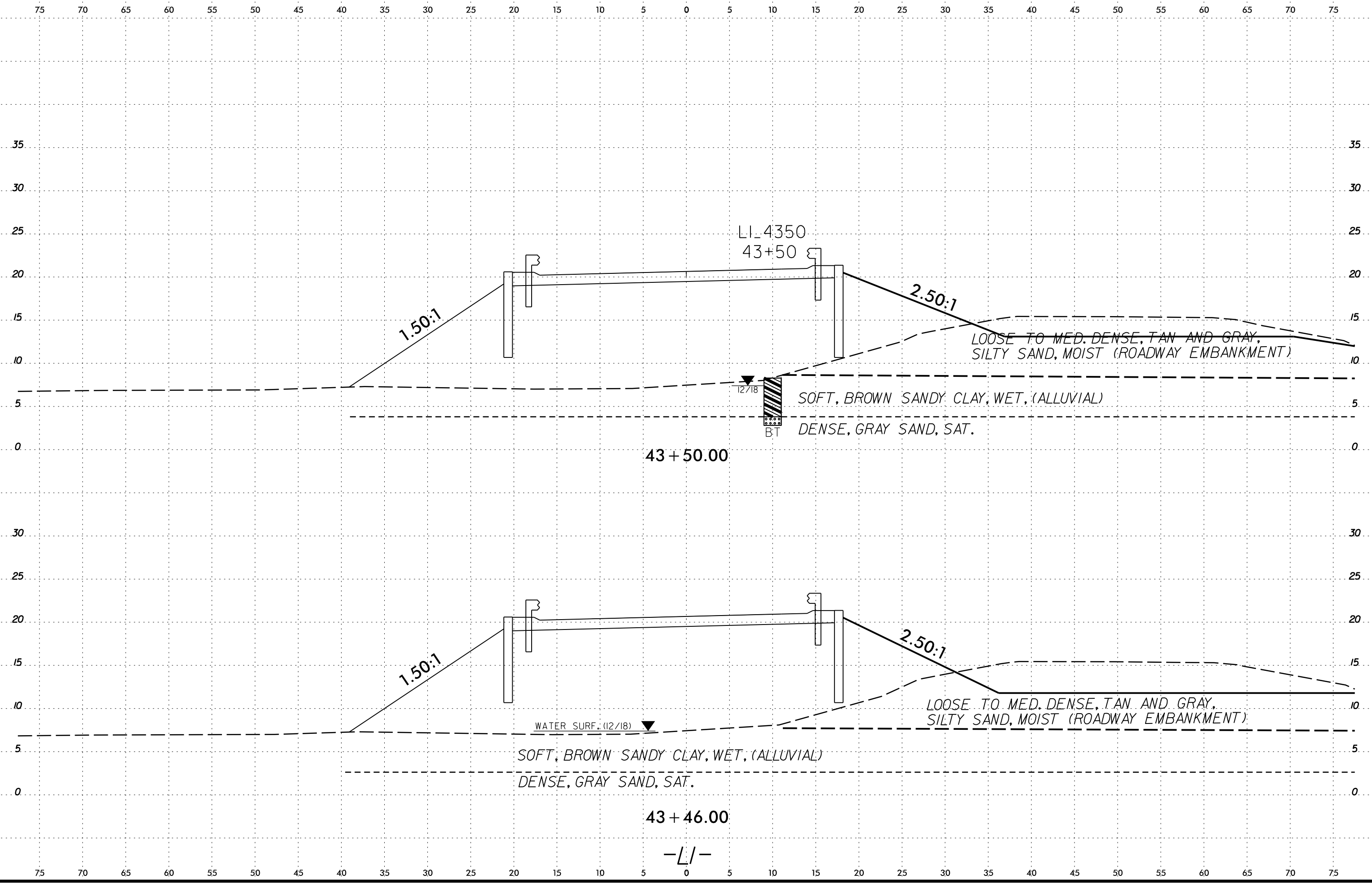
SECTION 39+45.00 TO 39+44.00

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25 20 15 10 5 0 -5

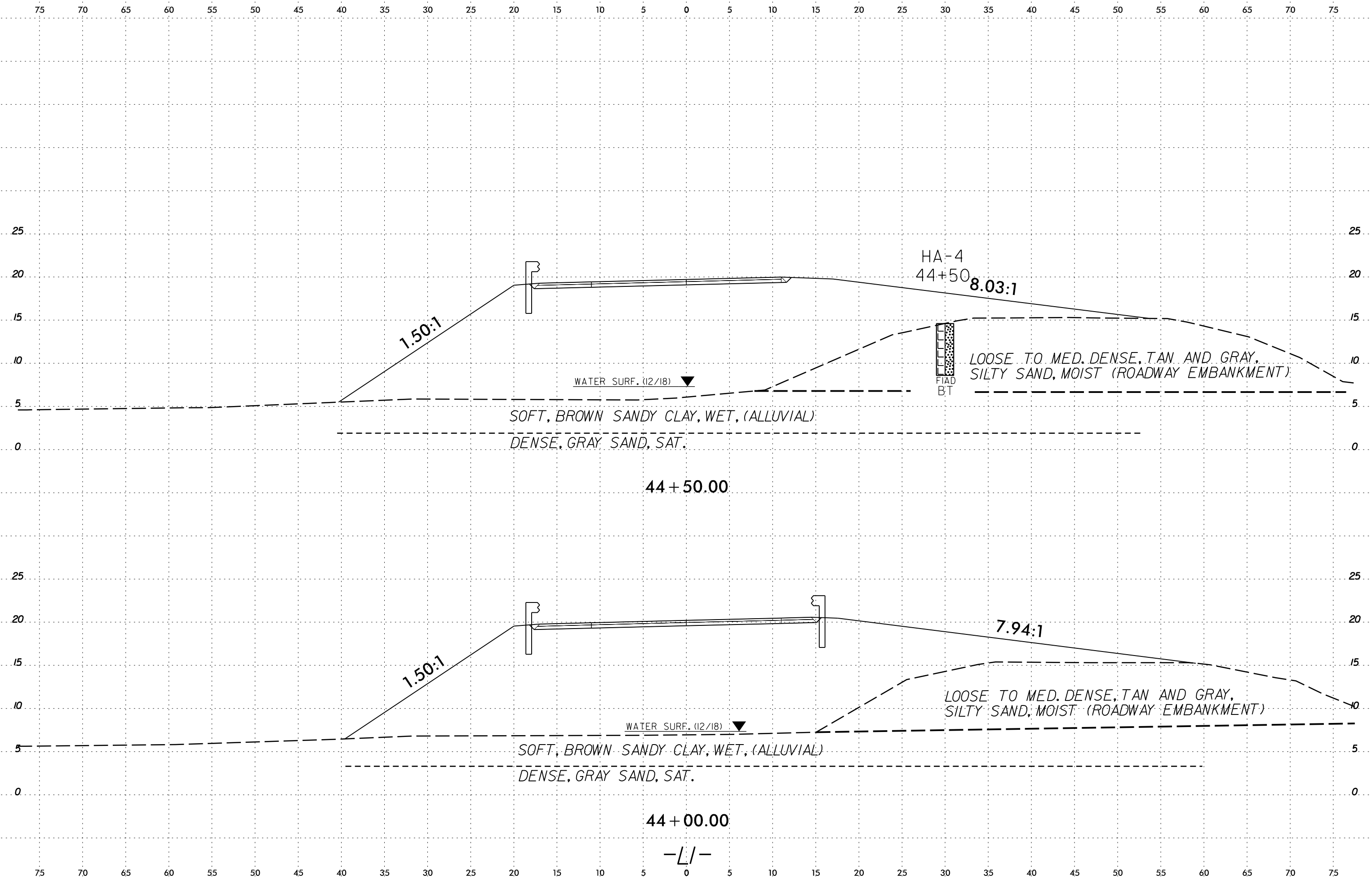
25 20 15 10 5 0 -5

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



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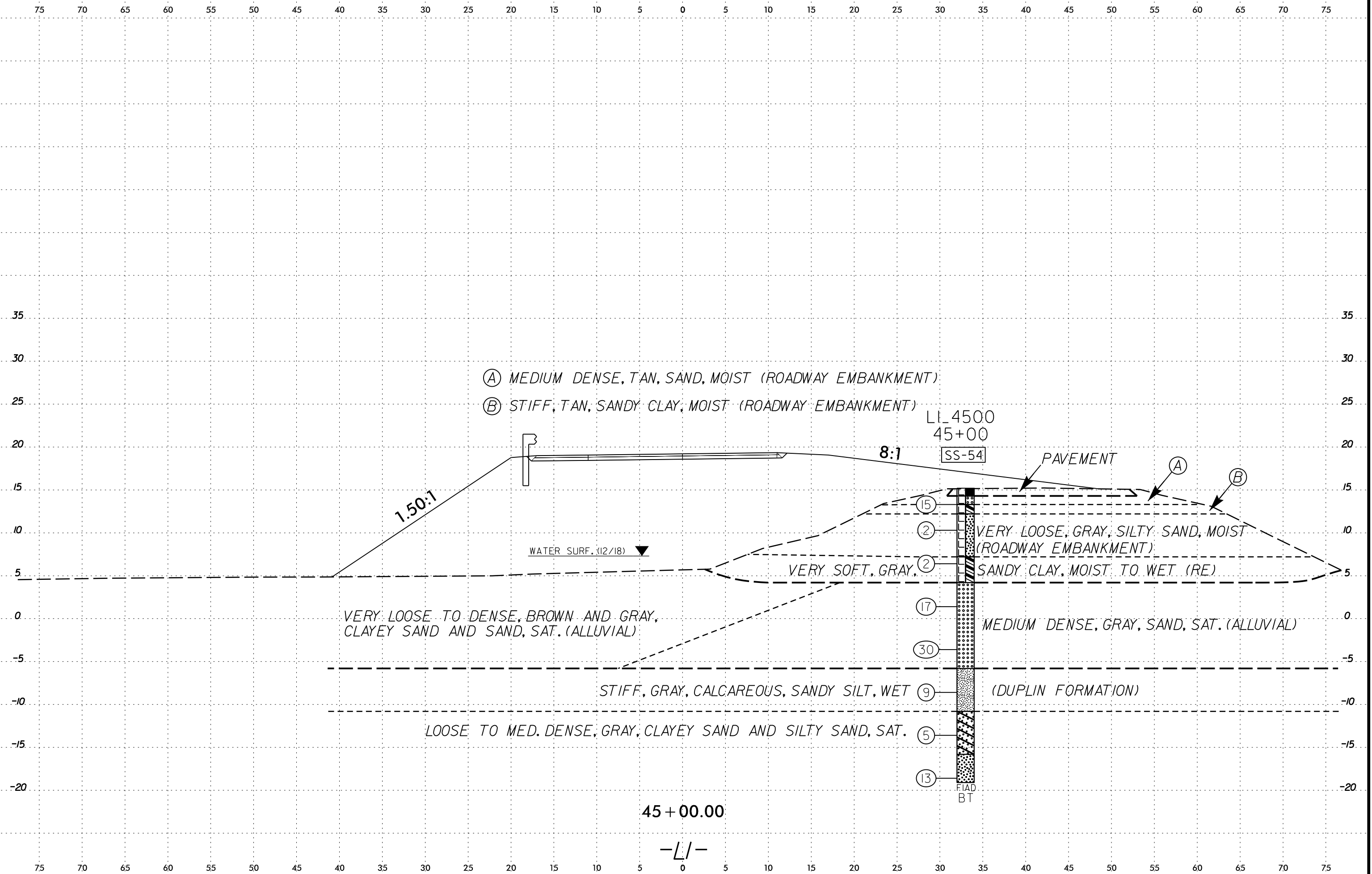
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SCALE: AS SHOWN
SHEET NO.: 36

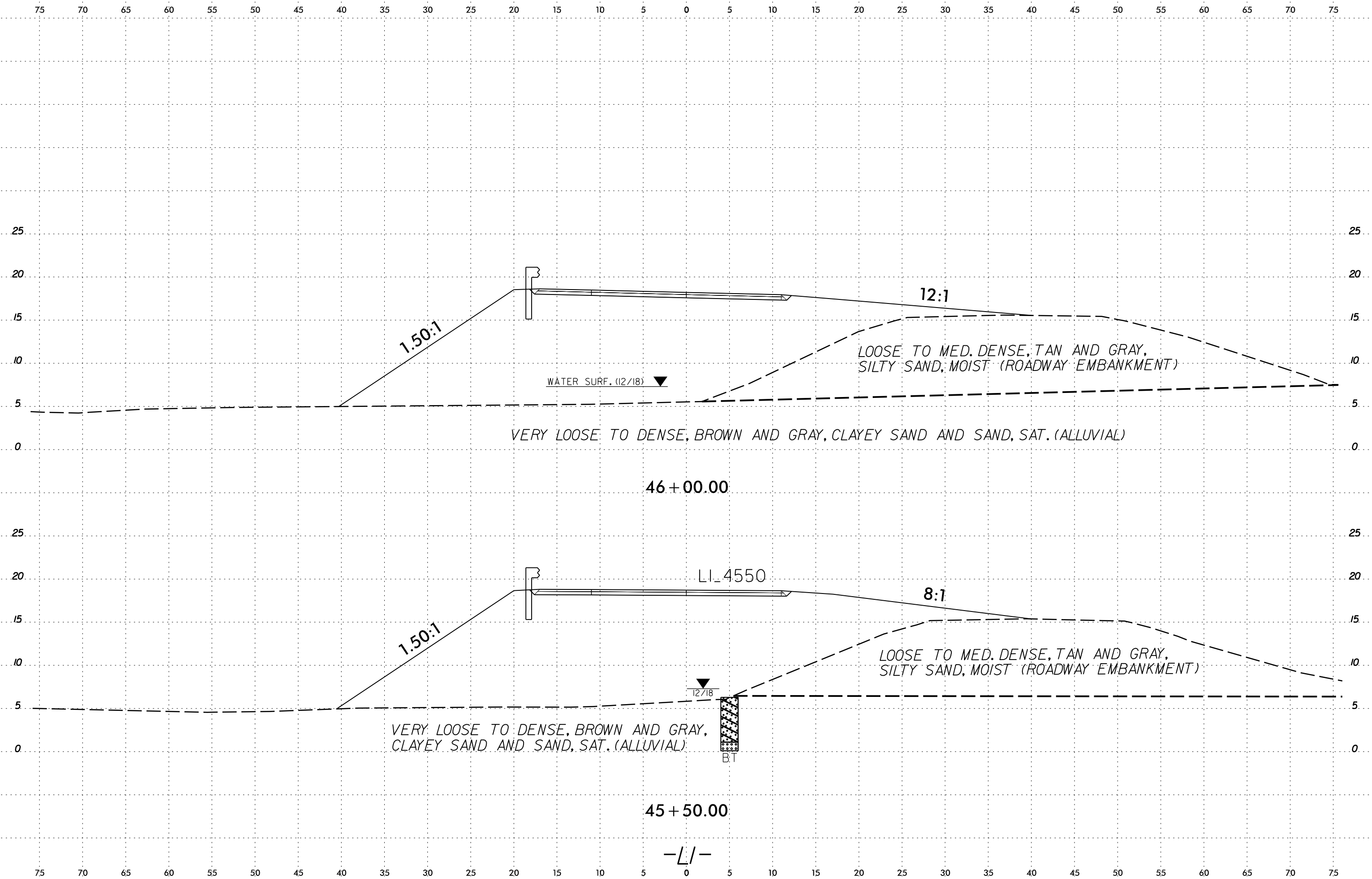


DATE: 6/23/16
DRAWN BY: [unreadable]
CHECKED BY: [unreadable]
SCALE: AS SHOWN

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PIERS

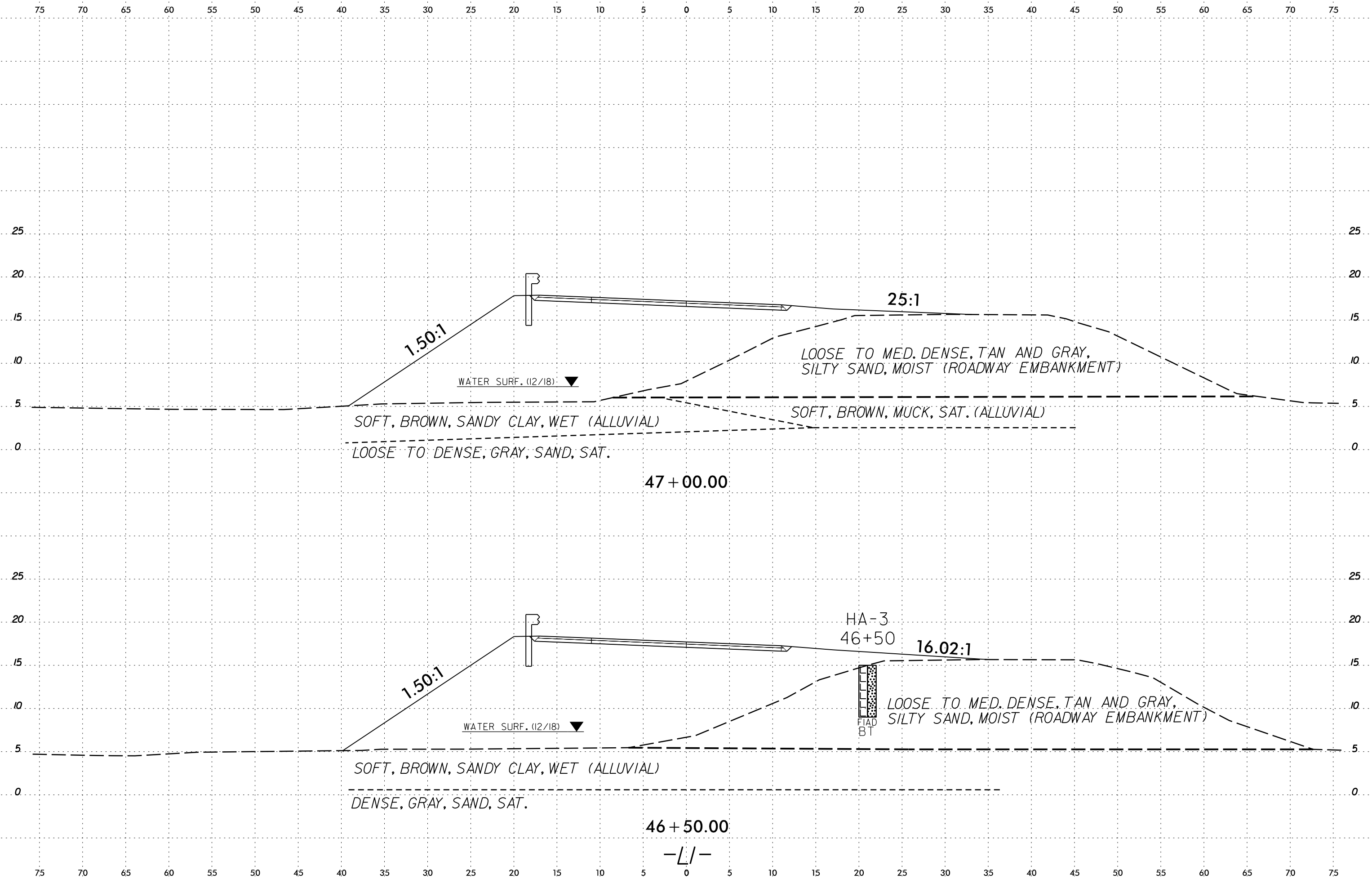




DATE: 6/23/16
DRAWN BY: [illegible]
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SCALE: AS SHOWN

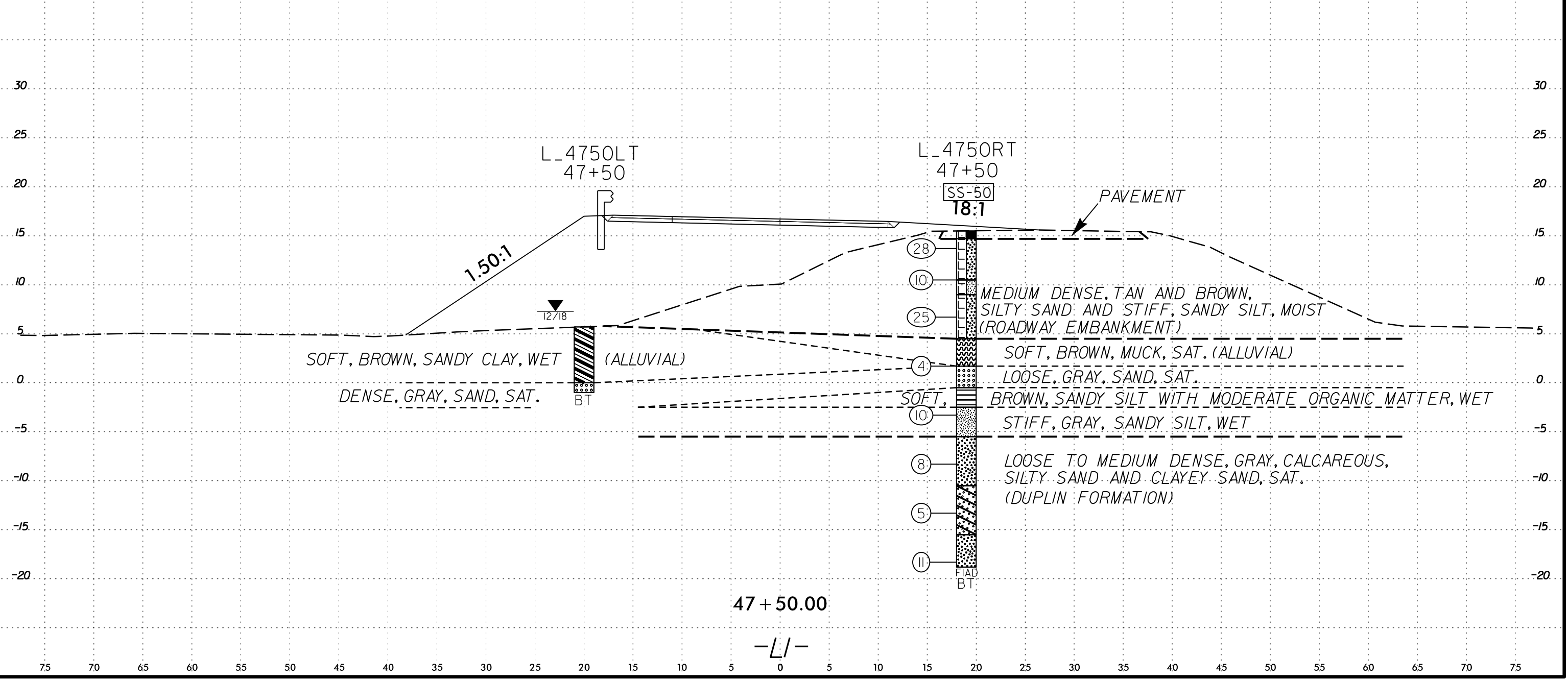
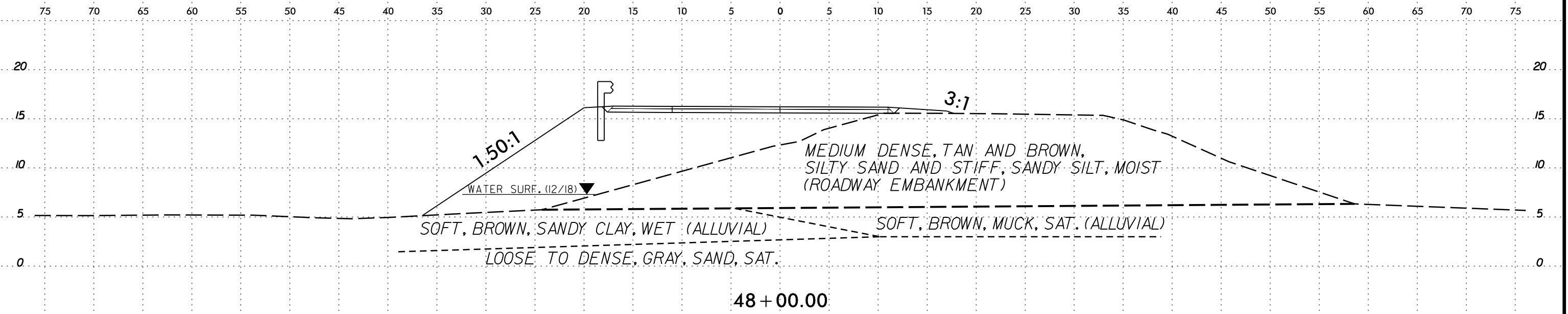
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6/23/16



DATE: 6/23/16
DRAWN BY: [unreadable]
CHECKED BY: [unreadable]
SCALE: AS SHOWN

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SCHEMATIC CROSS SECTION OF ROADWAY EMBANKMENT

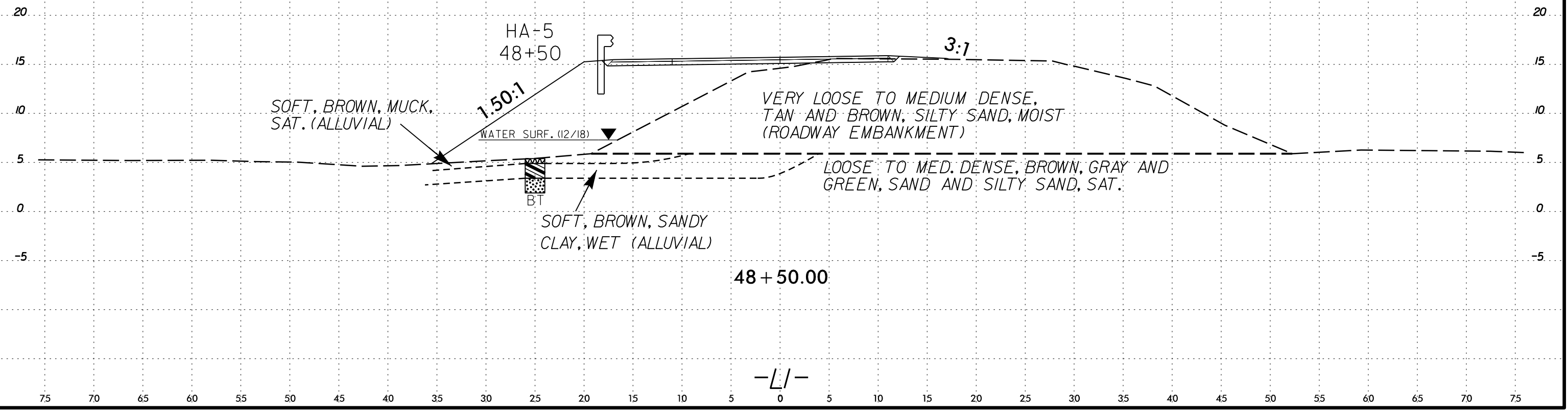
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PROJ. REFERENCE NO. B-4484

SHEET NO. 42

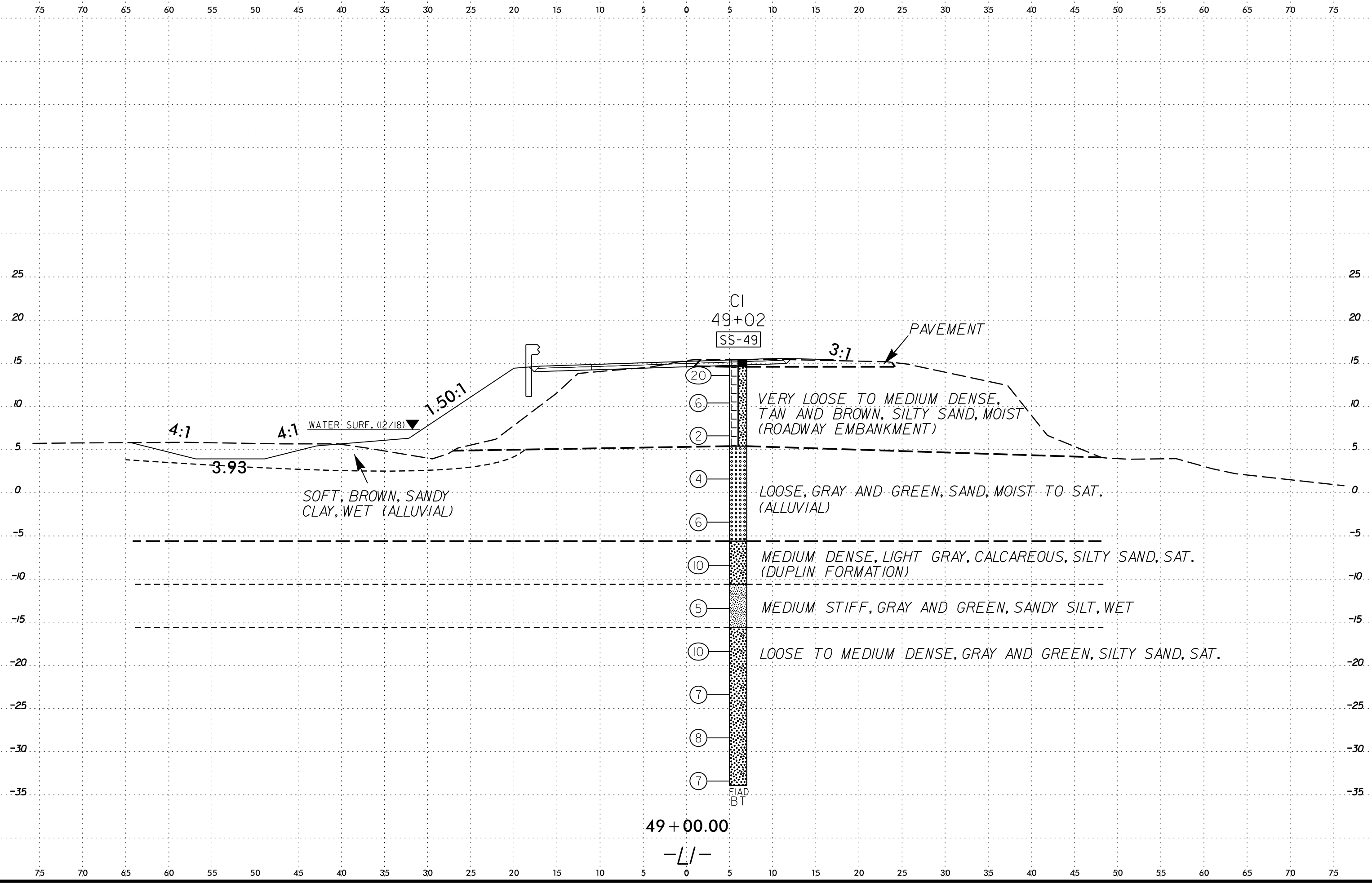
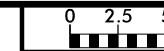
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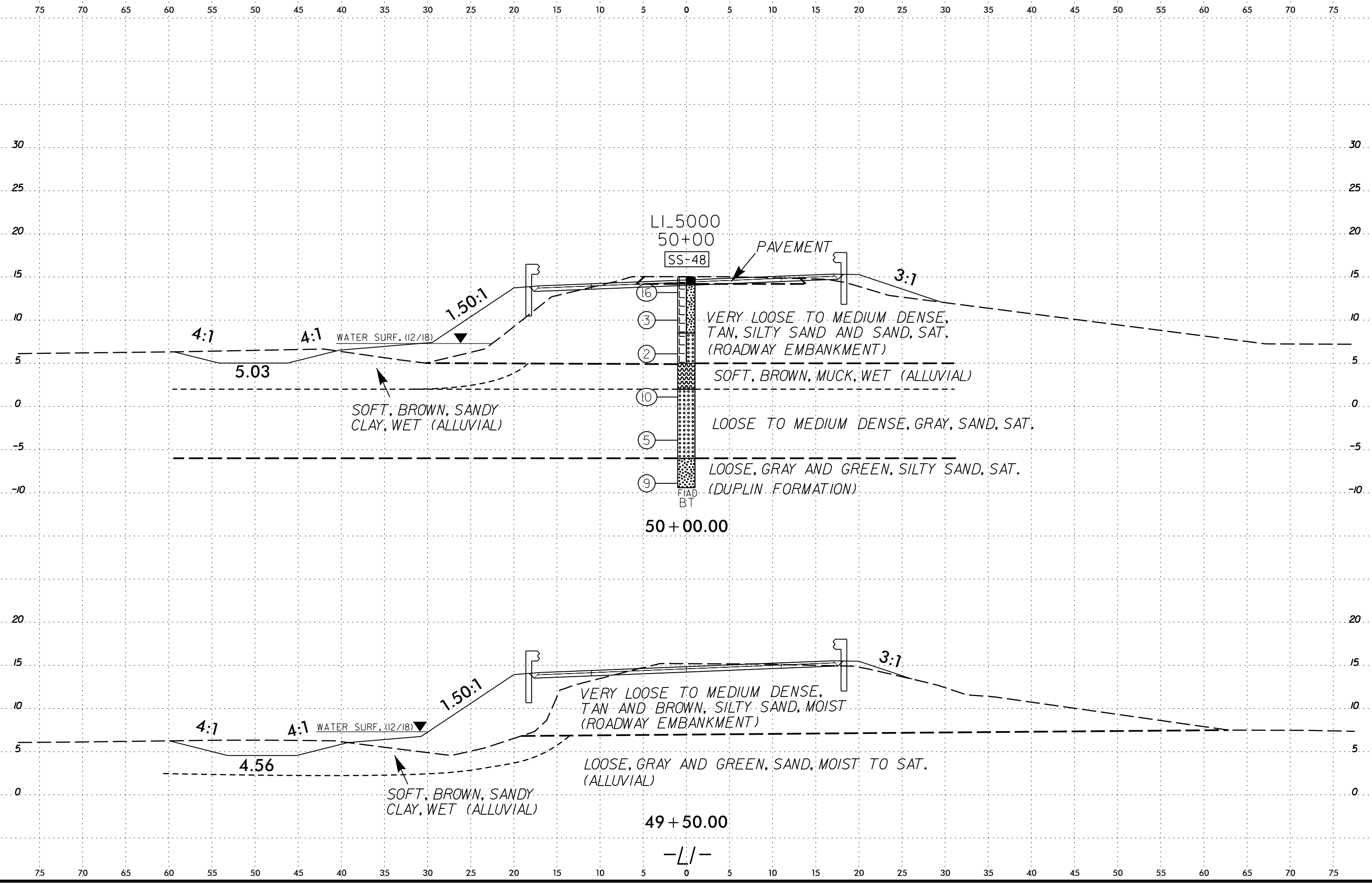


48 + 50.00

-L/-

DATE PLOTTED: 6/23/16
DRAWN BY: [illegible]
CHECKED BY: [illegible]
SCALE: AS SHOWN
SHEET NO. 42





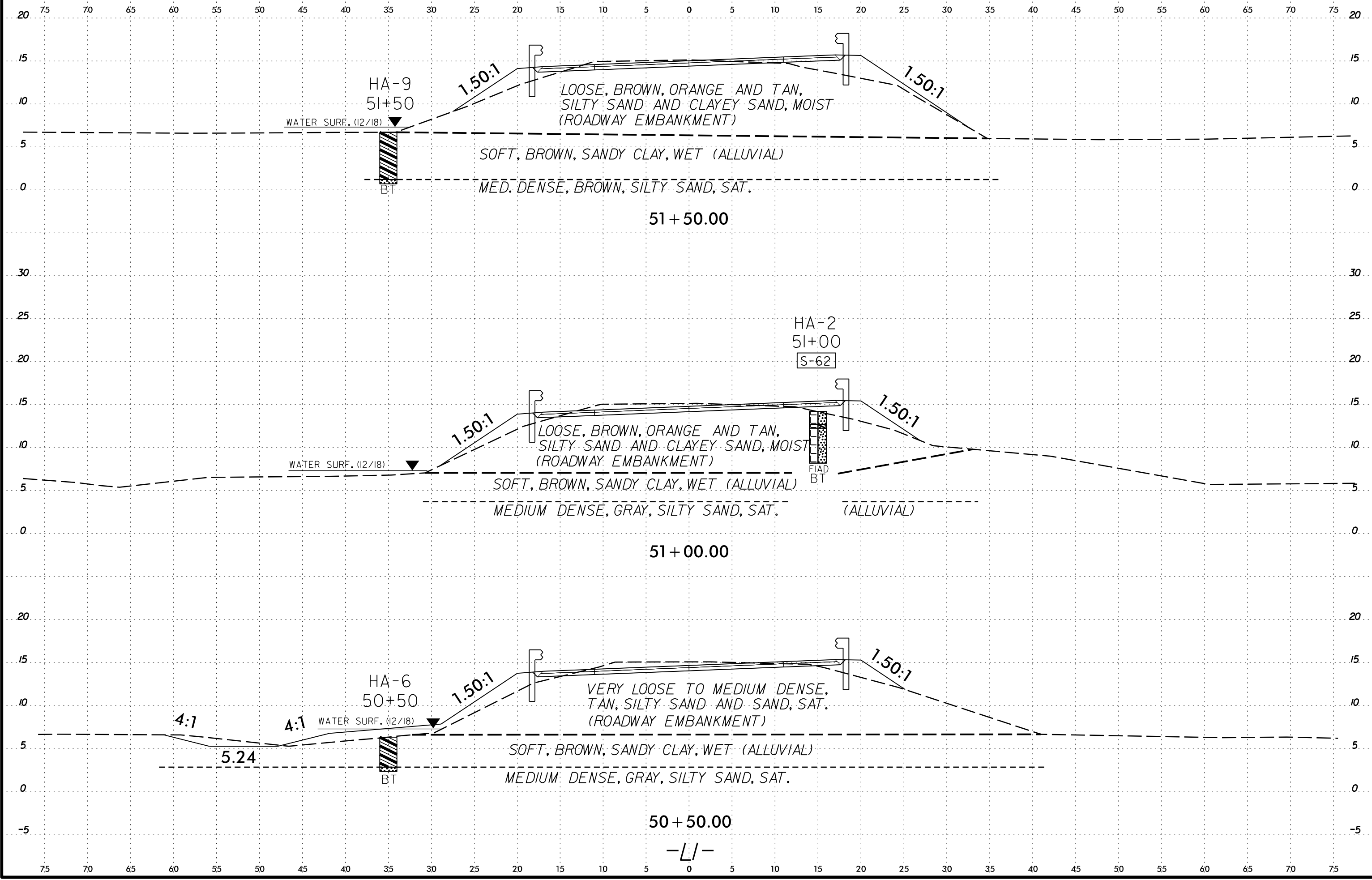
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49 + 50.00

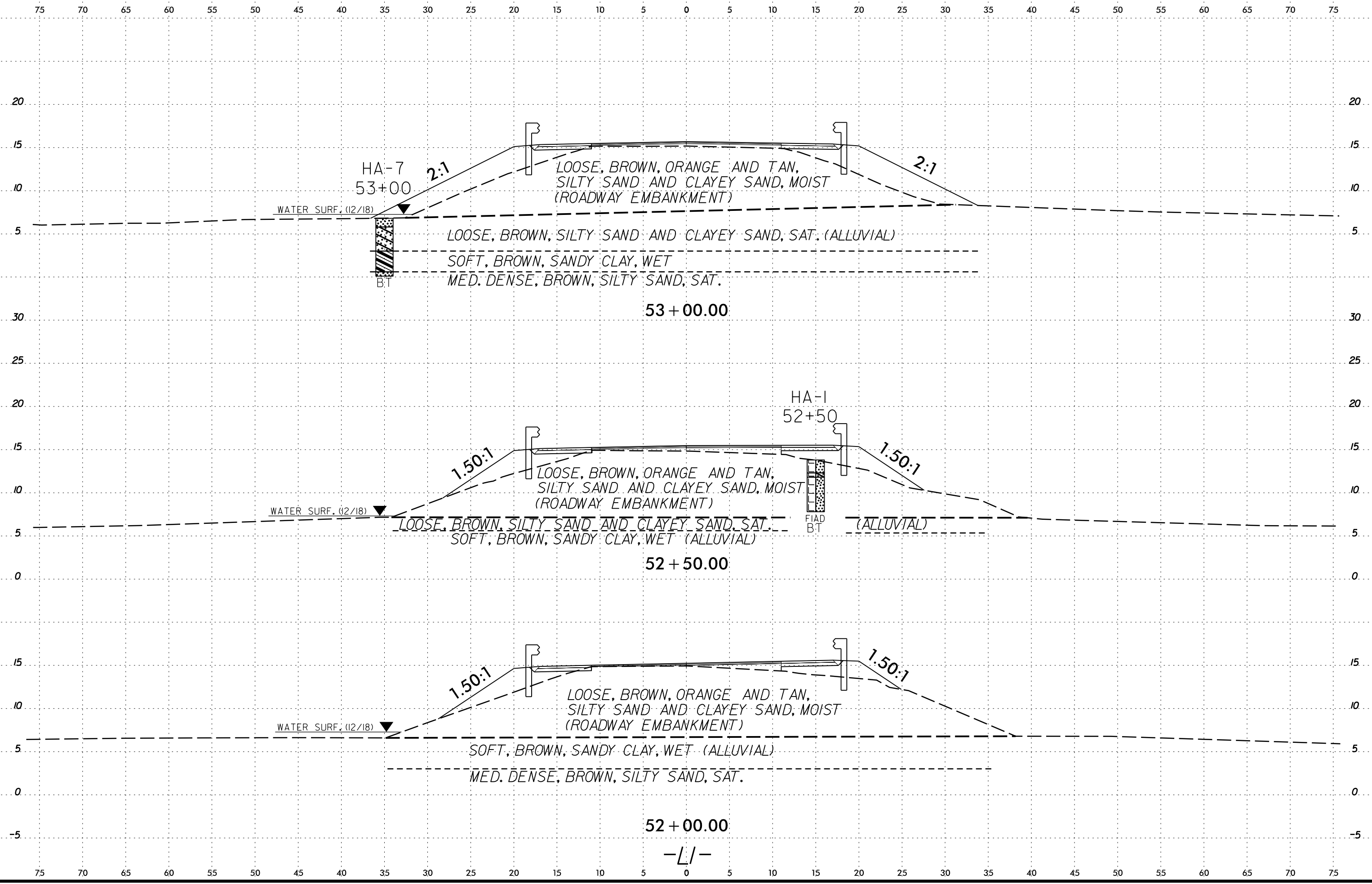
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6/23/16



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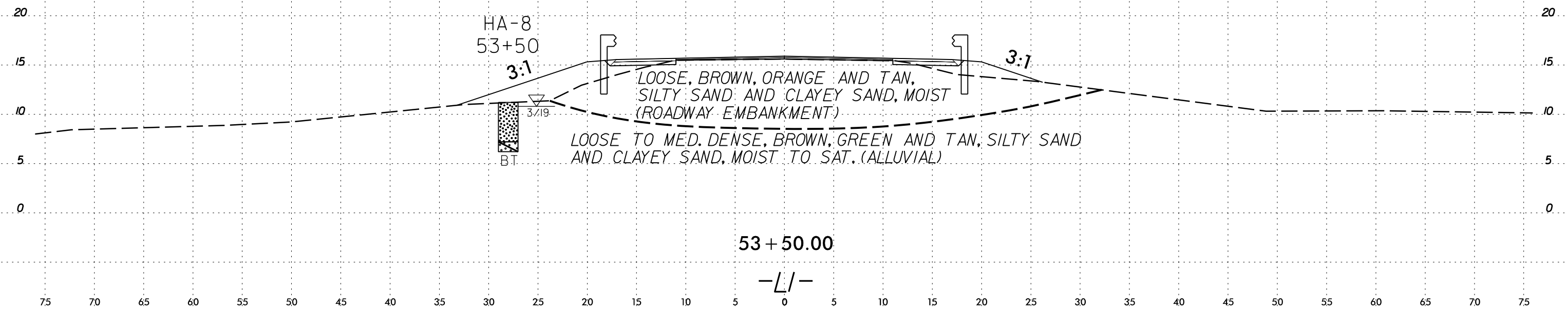


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52 + 00.00

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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75



DATE: 6/23/16
 DRAWN BY: [illegible]
 CHECKED BY: [illegible]
 APPROVED BY: [illegible]



SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616			
S&ME Project #: 6235-18-037	County: Craven		Date Report: 11/26/2018
State Project No.: 33723.1.2	TIP No.: B-4484		Date Tested: 11/16-11/26/18
Federal ID No.: N/A	Project Name: Replace Bridge No. 138 and 139 on SR 1470 (Maple Cypress Rd) over Neuse River and Neuse River Overflow		
Client Name: NCDOT GEU		Client Address: Raleigh, NC	

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
						Sieve #					Coarse Sand	Fine Sand	Silt	Clay				
						10	40	60	200	270								
SS-1	34+00	31 LT	-L1-	13.2-14.7	A-2-4(0)	91	52	41	24	22	50	19	13	9	NP	NP	NP	28.2
SS-2	34+00	31 LT	-L1-	23.2-24.7	A-4(0)	100	97	93	47	40	7	54	19	21	25	22	3	34.0
SS-3	33+00	23 LT	-L1-	8.2-9.7	A-2-4(0)	98	78	61	22	17	37	44	8	9	NP	NP	NP	19.0
SS-4	33+00	23 LT	-L1-	28.2-29.7	A-2-4(0)	91	84	75	35	31	16	15	44	16	NP	NP	NP	28.3
SS-5	32+00	23 LT	-L1-	0.0-1.5	A-2-4(0)	100	95	87	35	30	13	57	14	6	28	26	2	80.1
SS-6	32+00	23 LT	-L1-	7.8-9.3	A-2-6(0)	91	80	66	33	30	27	40	15	18	30	18	12	38.6
SS-8	31+00	31 LT	-L1-	4.2-5.7	A-2-4(0)	100	86	57	17	13	43	44	5	8	NP	NP	NP	19.6
SS-9	31+00	31 LT	-L1-	22.8-24.3	A-4(0)	94	83	70	37	34	26	38	18	18	NP	NP	NP	26.8
SS-10	30+00	31 LT	-L1-	47.8-49.3	A-2-4(0)	86	60	40	17	14	54	29	10	7	NP	NP	NP	19.9
SS-11	30+00	31 LT	-L1-	52.8-54.3	A-2-4(0)	98	76	49	17	15	50	35	7	8	NP	NP	NP	31.9
SS-12	29+00	32 LT	-L1-	13.1-14.6	A-2-4(0)	90	65	52	29	27	43	28	15	14	NP	NP	NP	26.9
SS-13	29+00	32 LT	-L1-	18.1-19.6	A-4(1)	98	84	76	46	42	23	35	20	22	24	16	8	31.0
SS-16	28+10	30 LT	-L1-	33.0-34.5	A-4(0)	95	79	68	41	39	28	31	20	21	27	25	2	25.2
SS-17	28+10	30 LT	-L1-	43.0-44.5	A-1-b(0)	63	33	23	12	11	63	20	8	9	NP	NP	NP	20.0
SS-32	21+50	35 LT	-L1-	17.9-19.4	A-3(1)	100	80	33	4	3	67	30	1	2	NP	NP	NP	23.5
SS-33	21+50	35 LT	-L1-	32.9-34.4	A-4(0)	95	91	86	40	36	10	53	15	22	23	20	3	30.8
SS-34	21+00	38 LT	-L1-	4.1-5.6	A-4(0)	100	100	97	39	30	3	67	10	20	25	18	7	23.2
SS-35	21+00	38 LT	-L1-	32.9-34.4	A-4(0)	99	96	92	45	40	7	52	18	23	24	21	3	30.9
SS-36	20+50	43 LT	-L1-	4.2-5.7	A-6(12)	100	100	99	73	66	1	33	23	43	37	19	18	27.2
SS-37	20+50	43 LT	-L1-	13.1-14.6	A-4(0)	100	100	99	43	34	1	65	13	21	23	21	2	28.5
SS-38	19+90	40 LT	-L1-	4.2-5.7	A-6(6)	100	99	95	62	54	5	41	20	34	31	18	13	27.0
SS-39	19+90	40 LT	-L1-	7.9-9.4	A-7-6(31)	100	99	98	91	87	2	11	28	59	56	26	30	37.3
SS-42	14+00	CL	-DW1-	2.6-4.1	A-3(1)	100	84	39	6	5	61	35	1	3	NP	NP	NP	21.4
SS-43	12+00	CL	-DW1-	12.6-14.1	A-2-4(0)	89	54	44	27	25	50	22	14	14	24	21	3	22.8
SS-44	37+50	CL	-L1-	2.9-4.4	A-2-4(0)	99	83	57	12	9	42	49	4	5	NP	NP	NP	15.2
SS-45	35+85	CL	-L1-	2.6-4.1	A-2-4(0)	100	97	90	24	19	10	71	5	14	NP	NP	NP	19.5
SS-46	39+14	CL	-L1-	27.8-29.3	A-4(1)	99	91	86	56	51	13	35	22	30	26	20	6	30.4
SS-47	39+14	CL	-L1-	87.8-89.3	A-2-4(0)	95	90	81	24	22	15	62	12	11	NP	NP	NP	34.5
SS-48	50+00	CL	-L1-	17.9-19.4	A-3(1)	100	97	62	8	7	38	56	2	4	NP	NP	NP	26.7
SS-49	49+02	6 RT	-L1-	27.8-29.3	A-4(0)	98	86	78	50	46	20	34	19	27	25	20	5	29.4
SS-50	47+50	19 RT	-L1-	22.8-24.3	A-2-4(0)	89	63	53	32	30	40	27	19	14	NP	NP	NP	30.9
SS-51	17+00	9 LT	-L1-	17.8-19.3	A-6(2)	99	98	94	46	39	5	56	13	26	29	18	11	26.5
SS-52	17+00	9 LT	-L1-	22.8-24.3	A-7-5(40)	100	100	99	99	98	1	2	25	72	64	30	34	58.3
SS-53	17+00	9 LT	-L1-	27.8-29.3	A-7-6(14)	100	99	97	72	63	3	35	24	38	41	19	22	35.4



SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #: 6235-18-037	Date Report: 11/26/2018
State Project No.: 33723.1.2	County: Craven
Federal ID No.: N/A	TIP No.: B-4484
Project Name: Replace Bridge No. 138 and 139 on SR 1470 (Maple Cypress Rd) over Neuse River and Neuse River Overflow	
Client Name: NCDOT GEU	
Client Address: Raleigh, NC	

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification	Total % Passing					Total Mortar Fraction (%)				LL	PL	PI	Moist. %
						Sieve #					Coarse Sand	Fine Sand	Silt	Clay				
						10	40	60	200	270								
SS-54	45+00	33 RT	-L1-	22.8-24.3	A-4 (0)	95	75	66	41	37	31	30	21	18	22	20	2	29.6
S-62	51+00	15 RT	-L1-	0.0-1.5	A-2-4 (0)	99	84	66	34	28	33	38	16	13	18	17	1	16.9
ST-2	21+50	35 LT	-L1-	5.9-7.9	A-7-6 (13)	100	96	89	67	61	12	27	22	39	42	20	22	ND
ST-3	20+45	43 LT	-L1-	7.1-9.1	A-6 (4)	100	94	83	49	44	17	39	14	30	32	16	16	ND


References / Comments / Deviations: ND=Not Determined. NP=Non-Plastic.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET
Technician Name:


Signature

104-01-0703
Certification #

Thomas J. Daily, PE
Technical Responsibility:

Project Manager
Position

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Effective Stress Triaxial Compression

Consolidated Undrained

Sample details

Sketch showing specimen location in original Sample



Depth: 5.9 - 7.9 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-7-6) (13)

	Specimen 1	Specimen 2
Type	Undisturbed	Undisturbed
Height H_0 (in)	5.769	5.756
Diameter D_0 (in)	2.859	2.857
Weight W_0 (gr)	1165.6	1160.1
Bulk Density ρ (PCF)	119.90	119.77
Particle Density ρ_s	2.677	2.677
	(measured)	(measured)

Initial Conditions

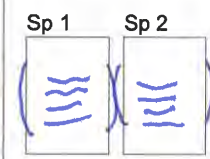
	Specimen 1	Specimen 2
Cell Pressure σ_3 (lb/in ²)	1.5	6.0
Pore Pressure u (lb/in ²)	0.0	0.0
Machine Speed d_r (in/min)	0.011	0.013
No. of Membranes	1	1
Total Thickness (in)	0.012	0.012
Strain Channel	1798	1798
Load Channel	1776	1776
Pore P. Channel	1779	1779
Volume Channel	Volume Chang	Volume Chang
Moisture Content w_0 %	28.4	27.5
Dry Density ρ_{d0} (PCF)	93.37	93.95
Voids Ratio e_0	0.79	0.78
Deg of Saturation S_0 %	96.39	94.55
Final B Value	0.96	0.96

Final Conditions

	Specimen 1	Specimen 2
Moisture Content w_f %	28.2	26.9
Dry Density ρ_d (PCF)	94.41	95.28
Voids Ratio e_f	0.77	0.75
Deg of Saturation S_f %	98.02	95.65
Failure Criteria	Mx Stress Ratio	Mx Stress Ratio
Axial Strain ϵ_f %	6.0	5.0
Corr Dev Stress $(\sigma_1 - \sigma_3)_f$ (lb/in ²)	4.0	6.1
Minor Stress σ_{3f} (lb/in ²)	0.7	2.8
Major Stress σ_{1f} (lb/in ²)	4.7	8.9
Stress Ratio $(\sigma_1/\sigma_3)_f$	6.7	3.2

Notes:

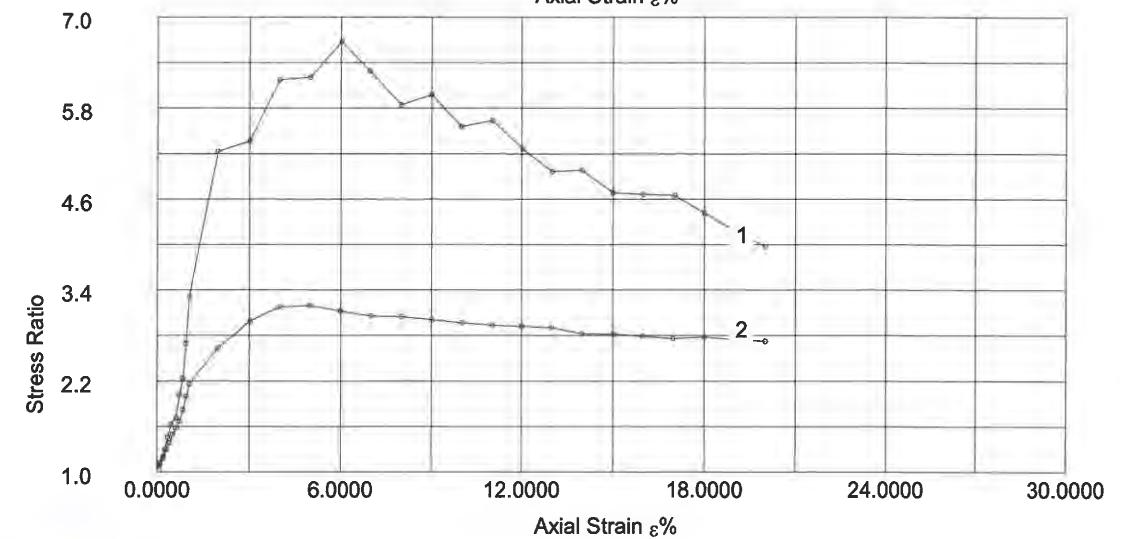
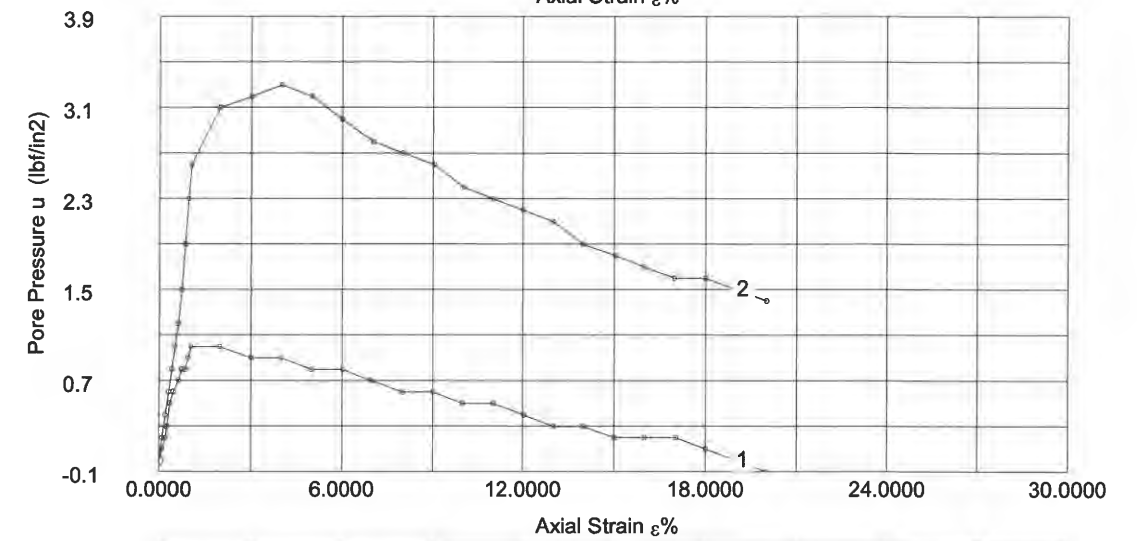
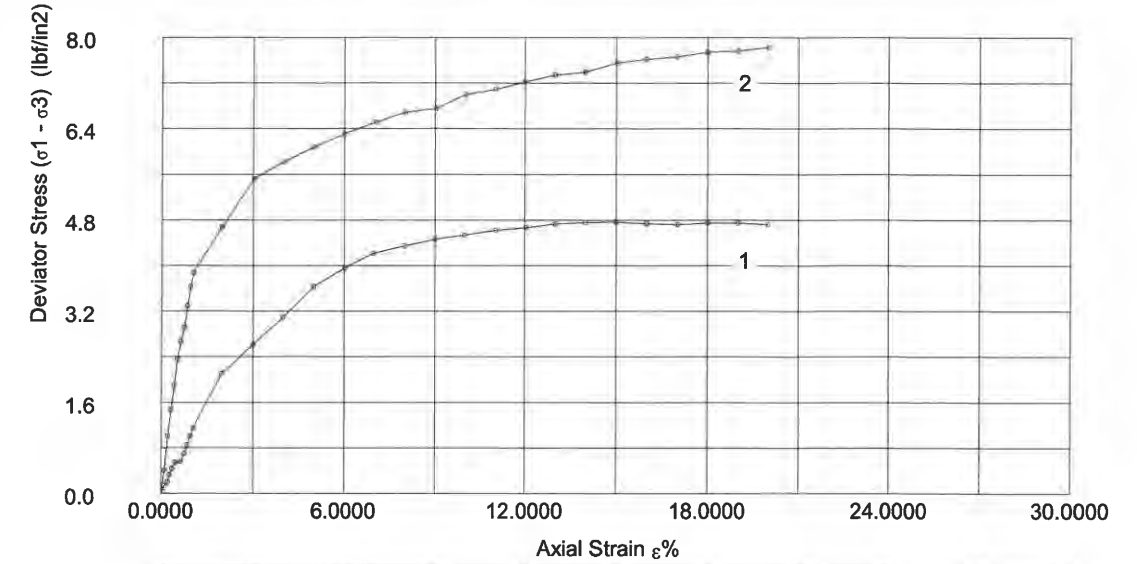
Failure Sketch



Surface Inclination

Effective Stress Triaxial Compression

Consolidated Undrained

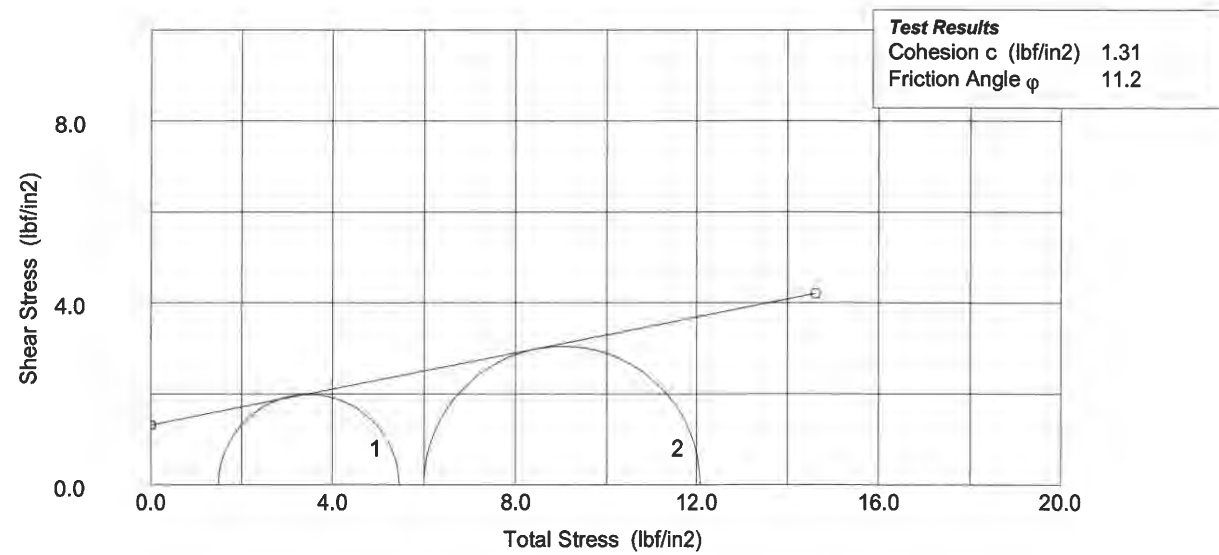
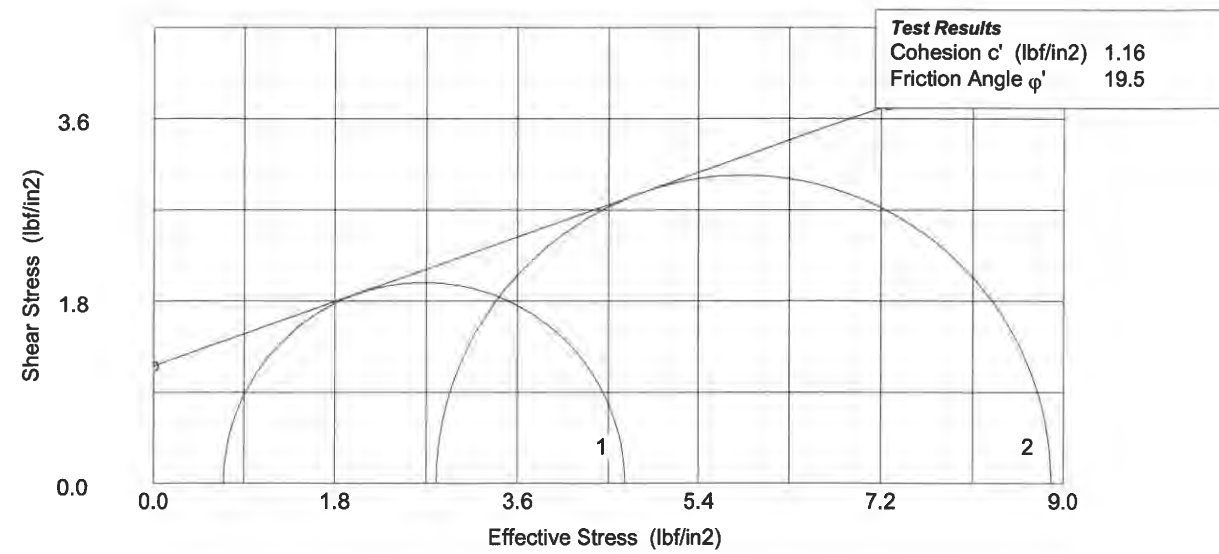


	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
	Operator: <i>ML</i>	Borehole: ST-2
	Checked: <i>ML</i>	Approved:

	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)
	Site Reference: Br. Nos. 138 & 139	Date of Test: 12-26-18
	Jobfile: E:\18-036.JOB	Sample: ST-2
	Operator: <i>ML</i>	Borehole: ST-2
	Checked: <i>ML</i>	Approved:

Effective Stress Triaxial Compression

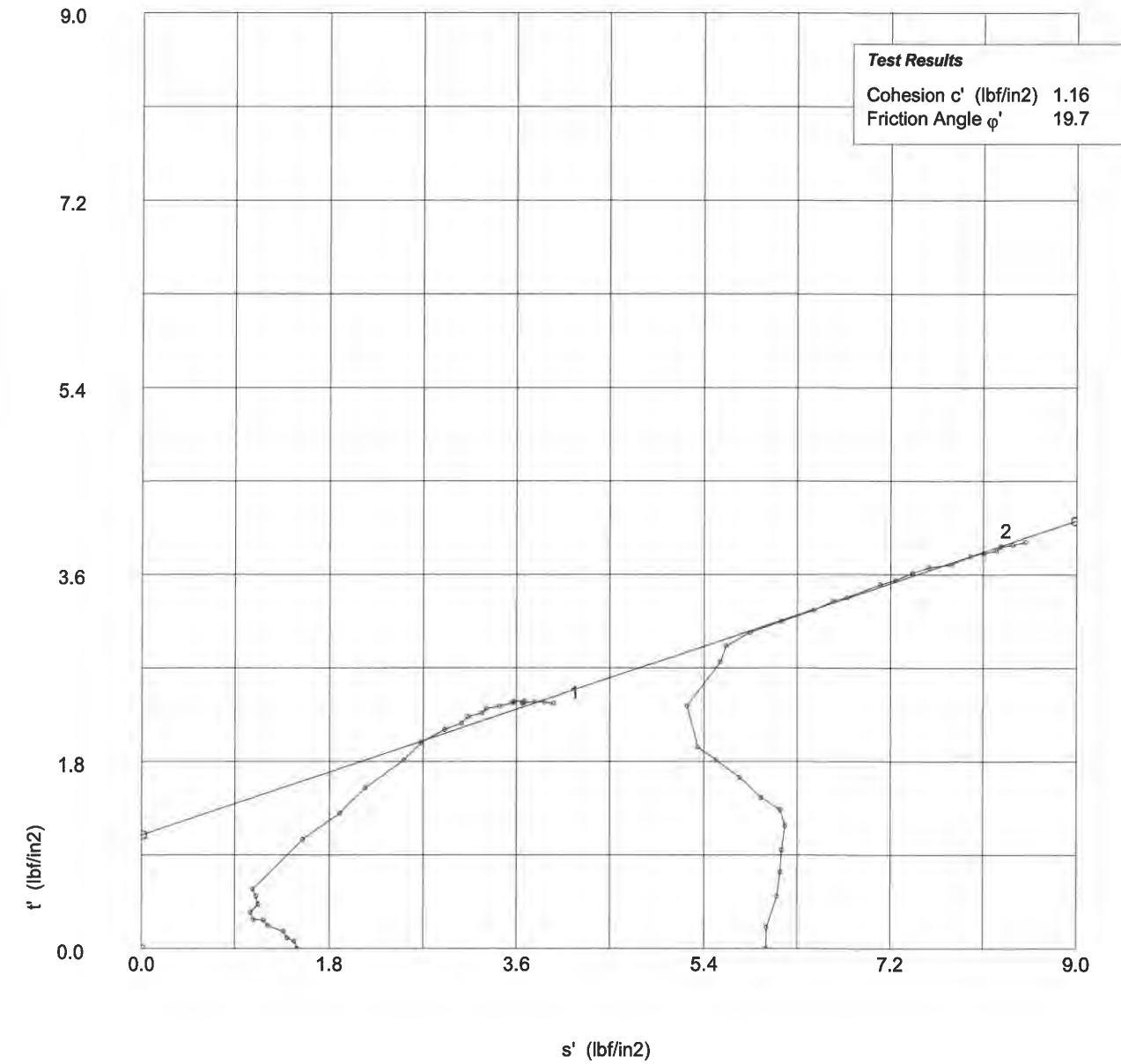
Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-2 Borehole: ST-2
	Operator: <i>ml</i>	Checked: <i>ml</i>

Effective Stress Triaxial Compression

Consolidated Undrained



	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Date of Test: 12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample: ST-2 Borehole: ST-2
	Operator: <i>ml</i>	Checked: <i>ml</i>

Oedometer Settlement Tests

Sample details

Sketch showing specimen location in original Sample



Depth: 7.1 - 9.1 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-6) (4)

Type: Undisturbed
Height H_0 (in): 0.999
Diameter D_0 (in): 2.501
Weight W_0 (gr): 158.56
Bulk Density ρ (PCF): 123.08
Particle Density ρ_s : 2.688 (measured)

Initial Conditions

Settlement Channel: 1001
Moisture Content w_0 %: 27.1
Dry Density ρ_d (PCF): 96.83
Voids Ratio e_0 : 0.7321
Deg of Saturation S_0 %: 99.5
Swelling Pressure S_s (TSF): 0.000

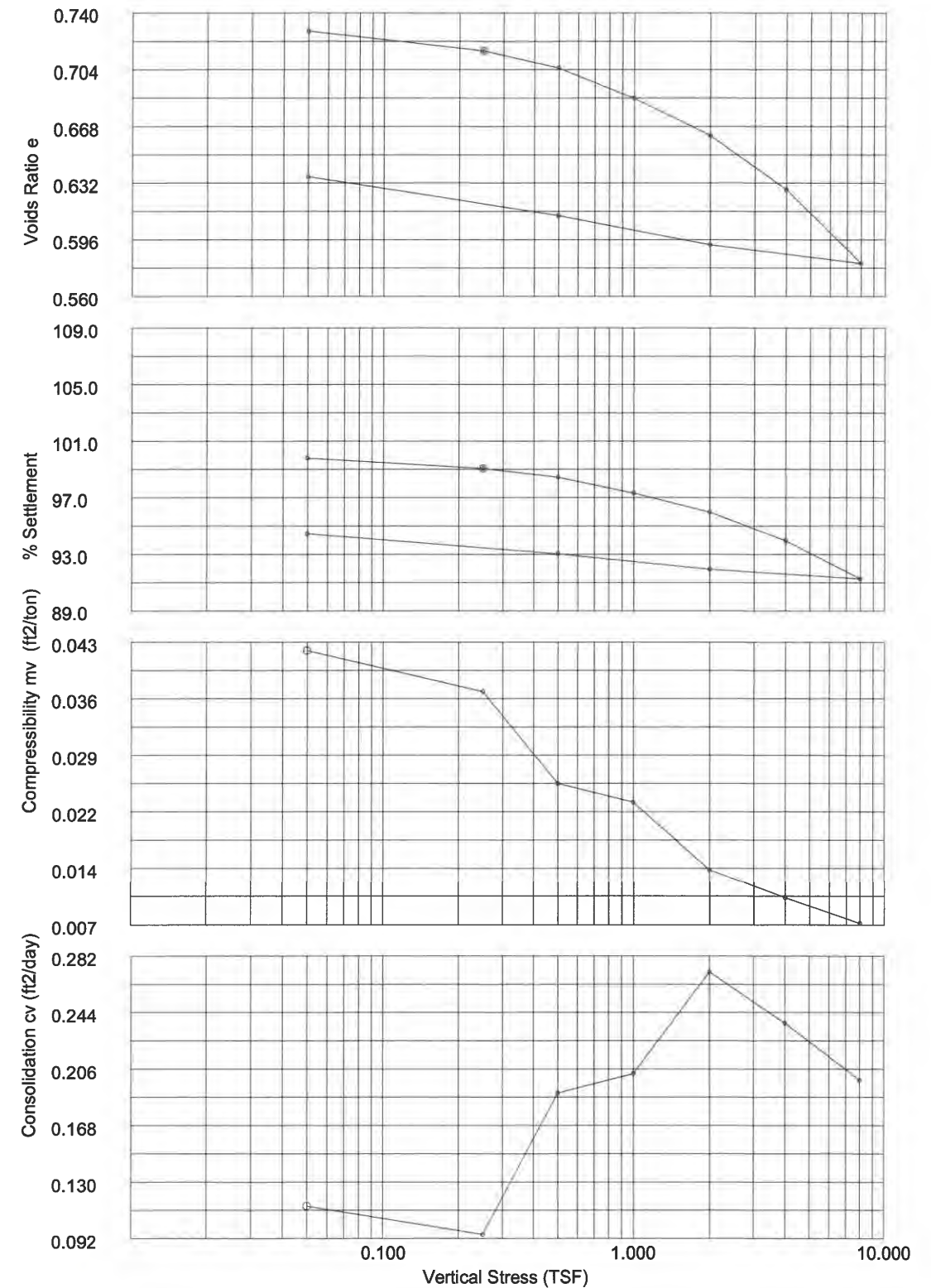
Final Conditions

Moisture Content w_f %: 24.5
Dry Density ρ_d (PCF): 102.52
Voids Ratio e_f : 0.6361
Deg of Saturation S_f %: 100.00
Settlement: (in): 0.055
Compression Index C_c : 0.158

Notes: Test specimen taken from the middle portion of UD tube.

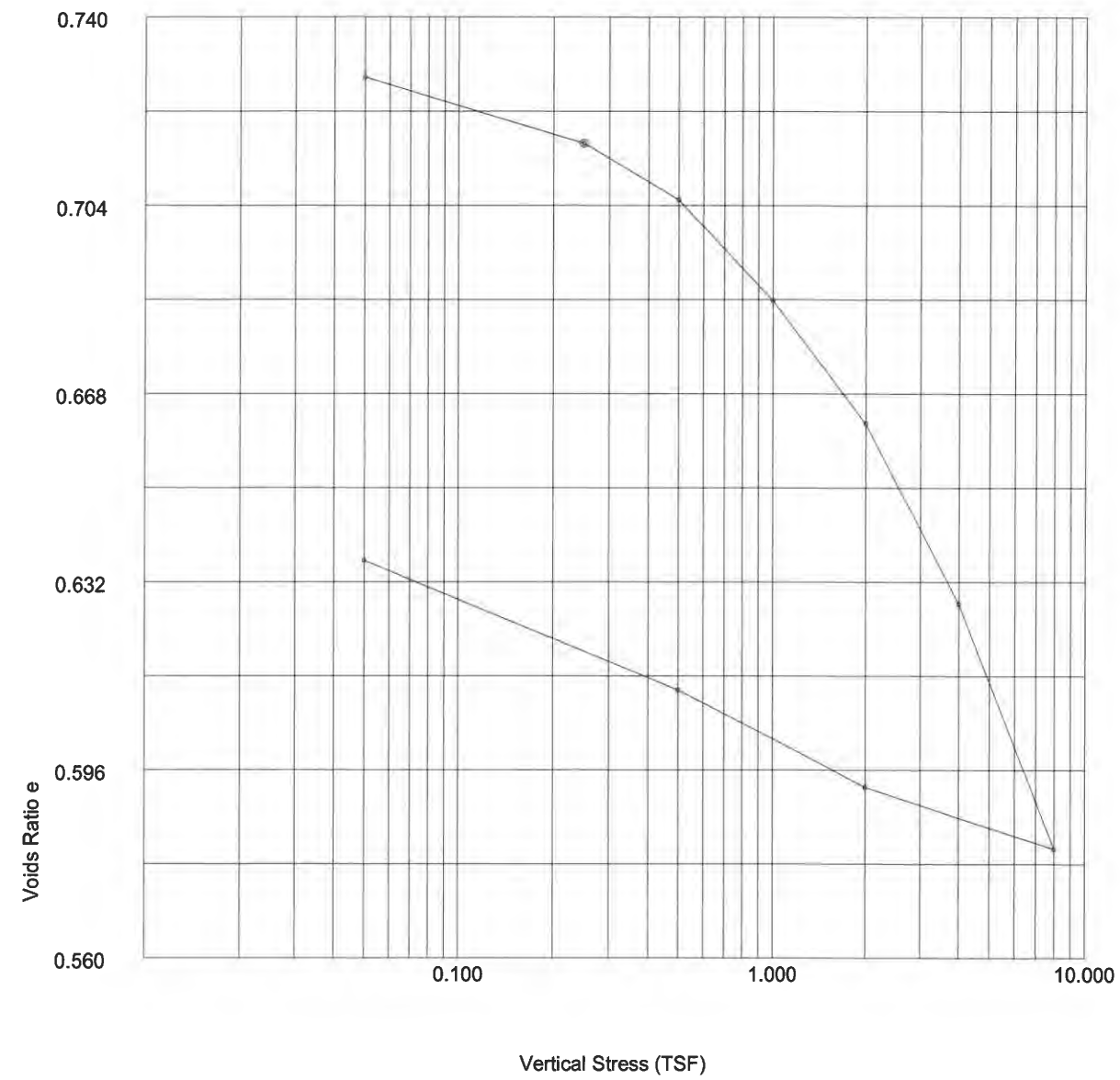
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
	Operator: <i>MK</i>	Checked: <i>MK</i>
		Sample: ST-3 Borehole: ST-3
		Approved:

Oedometer Settlement Tests



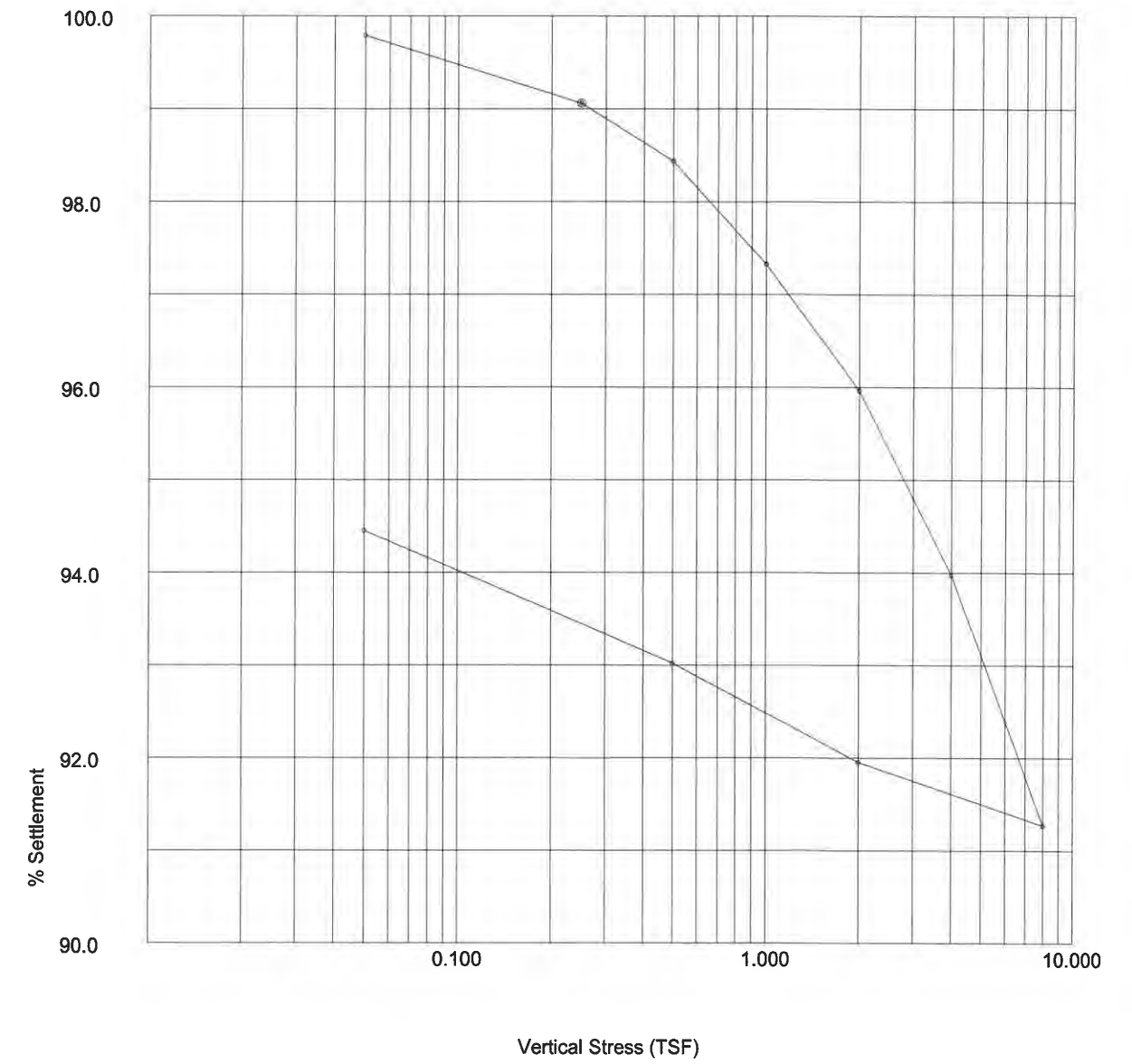
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	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test: 12-26-18
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		Sample: ST-3 Borehole: ST-3
		Approved:

Oedometer Settlement Tests



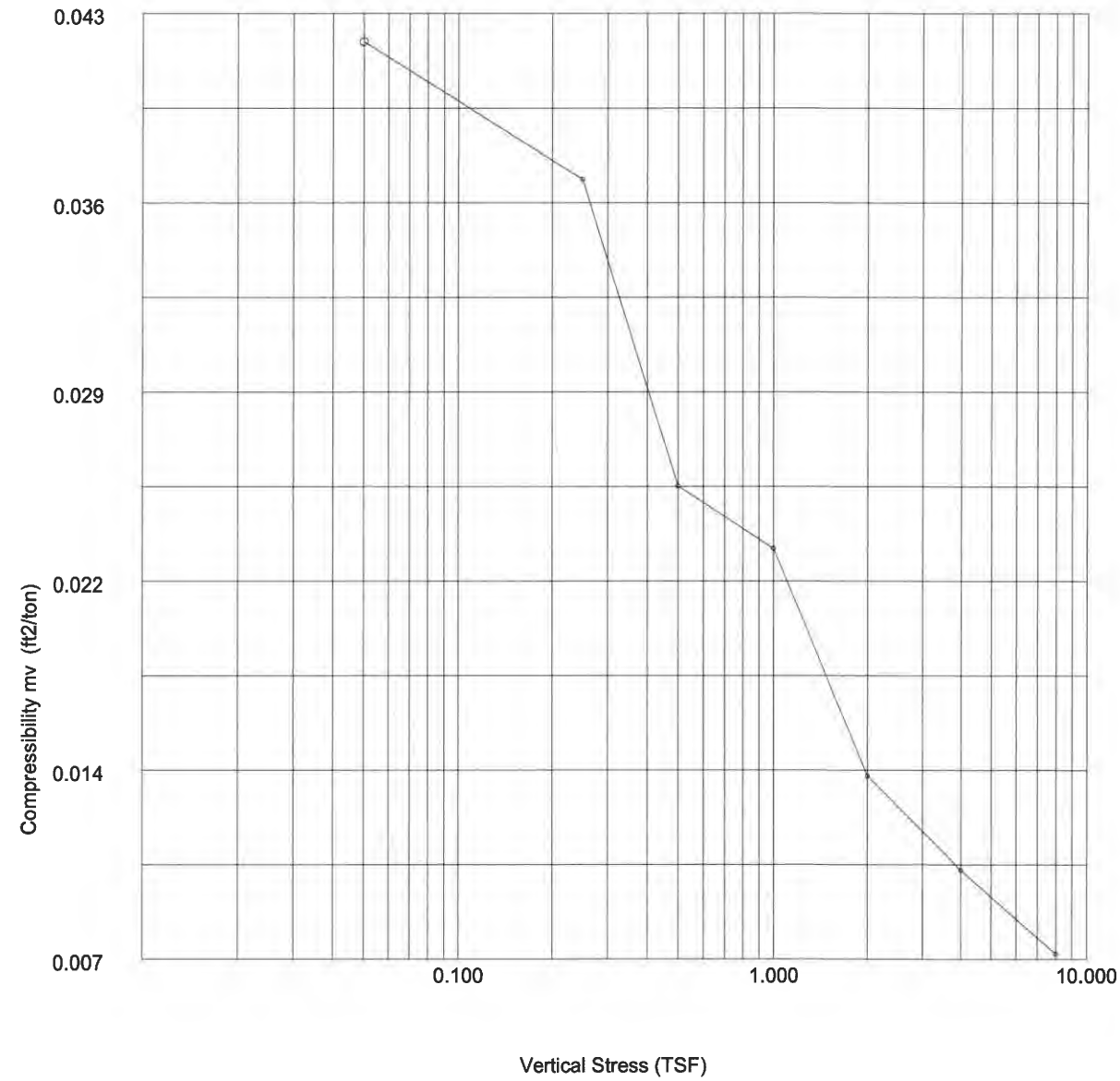
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	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	MK	Checked:	MK
		Approved:	

Oedometer Settlement Tests



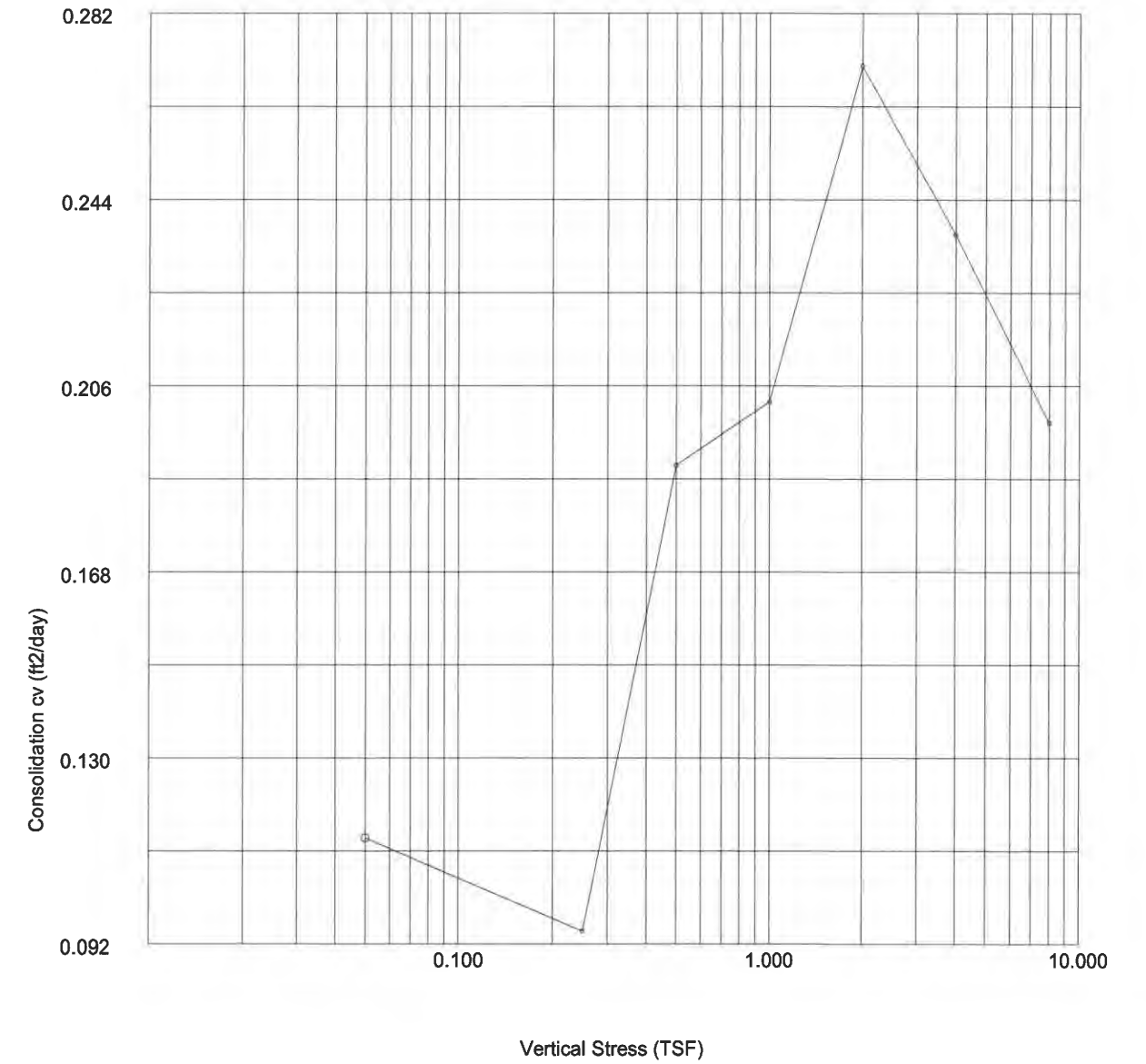
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		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	MK	Checked:	MK
		Approved:	

Oedometer Settlement Tests



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MK</i>	Checked: <i>MK</i>	Approved:	

Oedometer Settlement Tests




	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MK</i>	Checked: <i>MK</i>	Approved:	


Oedometer Settlement Tests

Stress (TSF)	Initial Temp. oC	Settlement Total (in)	Cal Corr. (in)	Final Temp. oC	Voids Ratio e_f	t_{50} (mins)	Secondary Compr C_{sec}	c_v (ft ² /day)	m_v (ft ² /ton)
0.050	20.0	0.0021	0.0	21.7	0.7285	4.315	0.0003	0.115	0.042
0.250	20.0	0.0094	0.0	21.7	0.7158	5.213	0.0005	0.095	0.037
0.500	20.0	0.0156	0.0	21.7	0.7051	2.564	0.001	0.190	0.025
1.000	20.0	0.0267	0.0	21.7	0.6858	2.358	0.0006	0.203	0.023
2.000	20.0	0.0403	0.0	21.7	0.6623	1.718	0.0009	0.271	0.014
4.000	20.0	0.0602	0.0	21.7	0.6278	1.900	0.0012	0.237	0.011
8.000	20.0	0.0872	0.0	21.7	0.5809	2.157	0.0126	0.198	0.007
2.000	20.0	0.0804	0.0	21.7	0.5927				0.001
0.500	20.0	0.0697	0.0	21.7	0.6113				0.008
0.050	20.0	0.0554	0.0	21.7	0.6361				0.034

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	0	0.0000	0.0000
2	0.017	2	0.0002	0.0002
3	0.033	2	0.0002	0.0002
4	0.050	3	0.0003	0.0003
5	0.067	3	0.0003	0.0003
6	0.083	3	0.0003	0.0003
7	0.100	3	0.0003	0.0003
8	0.200	4	0.0004	0.0004
9	0.400	5	0.0005	0.0005
10	0.800	6	0.0006	0.0006
11	1.000	6	0.0006	0.0006
12	2.000	8	0.0008	0.0008
13	4.000	11	0.0011	0.0011
14	8.000	14	0.0014	0.0014
15	10.000	15	0.0015	0.0015
16	20.000	18	0.0018	0.0018
17	40.000	20	0.0020	0.0020
18	80.000	21	0.0021	0.0021
19	86.183	21	0.0021	0.0021

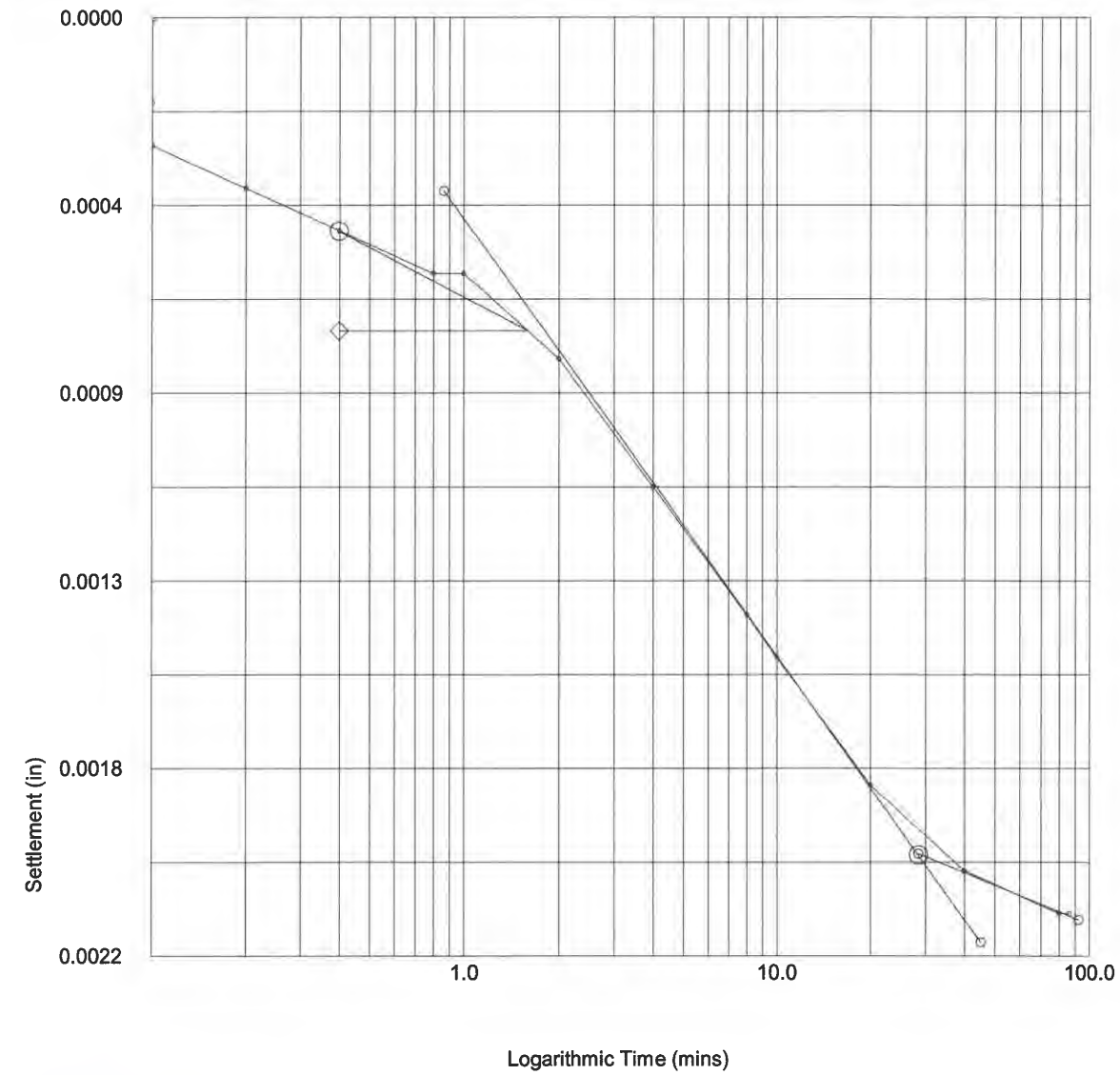
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			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MK	Checked:	MK	Approved:

	ASTM D2435-96		Test name	Consolidation Load: 0.050 (TSF)
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MK	Checked:	MK	Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0021
Voids Ratio e	0.7285
Final Temp oC	0.0
t ₅₀ (mins)	4.32
c _v (ft ² /day)	0.115
m _v (ft ² /ton)	0.042
Sec Compression C _{sec}	0.0003



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	21	0.0021	0.0021
2	0.017	26	0.0026	0.0026
3	0.033	30	0.0030	0.0030
4	0.050	31	0.0031	0.0031
5	0.067	32	0.0032	0.0032
6	0.083	33	0.0033	0.0033
7	0.100	33	0.0033	0.0033
8	0.200	36	0.0036	0.0036
9	0.400	38	0.0038	0.0038
10	0.800	41	0.0041	0.0041
11	1.000	42	0.0042	0.0042
12	2.000	47	0.0047	0.0047
13	4.000	55	0.0055	0.0055
14	8.000	65	0.0065	0.0065
15	10.000	68	0.0068	0.0068
16	20.000	78	0.0078	0.0078
17	40.000	84	0.0084	0.0084
18	80.000	87	0.0087	0.0087
19	100.000	88	0.0088	0.0088
20	200.000	90	0.0090	0.0090
21	400.000	91	0.0091	0.0091
22	800.000	93	0.0093	0.0093
23	1200.000	94	0.0094	0.0094
24	1393.500	94	0.0094	0.0094

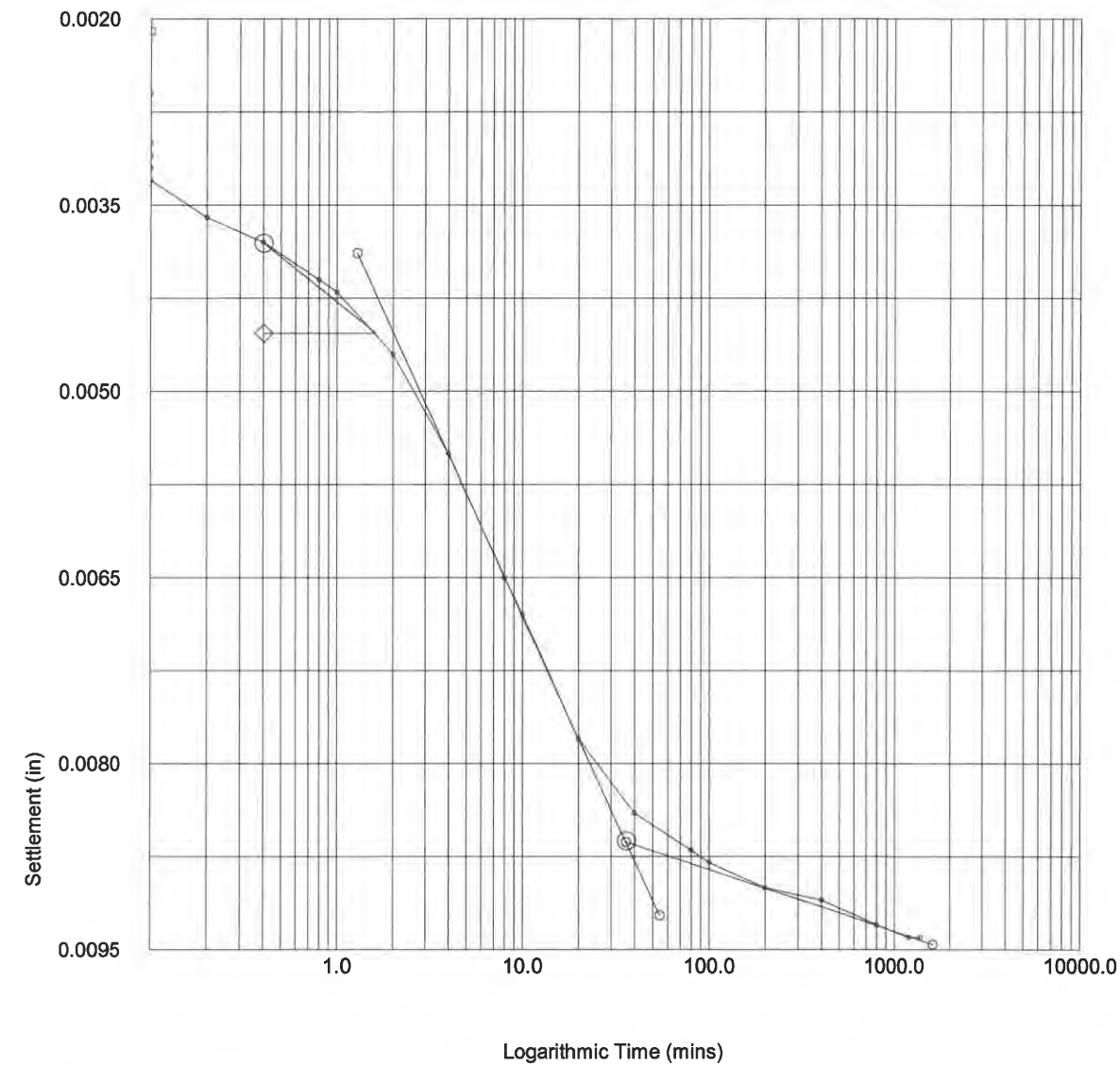
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		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MK</i>	Checked: <i>MK</i>	Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 0.250 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MK</i>	Checked: <i>MK</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0073
Voids Ratio e	0.7158
Final Temp oC	0.0
t ₅₀ (mins)	5.21
c _v (ft ² /day)	0.095
m _v (ft ² /ton)	0.037
Sec Compression C _{sec}	0.0005



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MLC</i>	Checked:	<i>MLC</i>
		Approved:	

Oedometer Settlement Tests

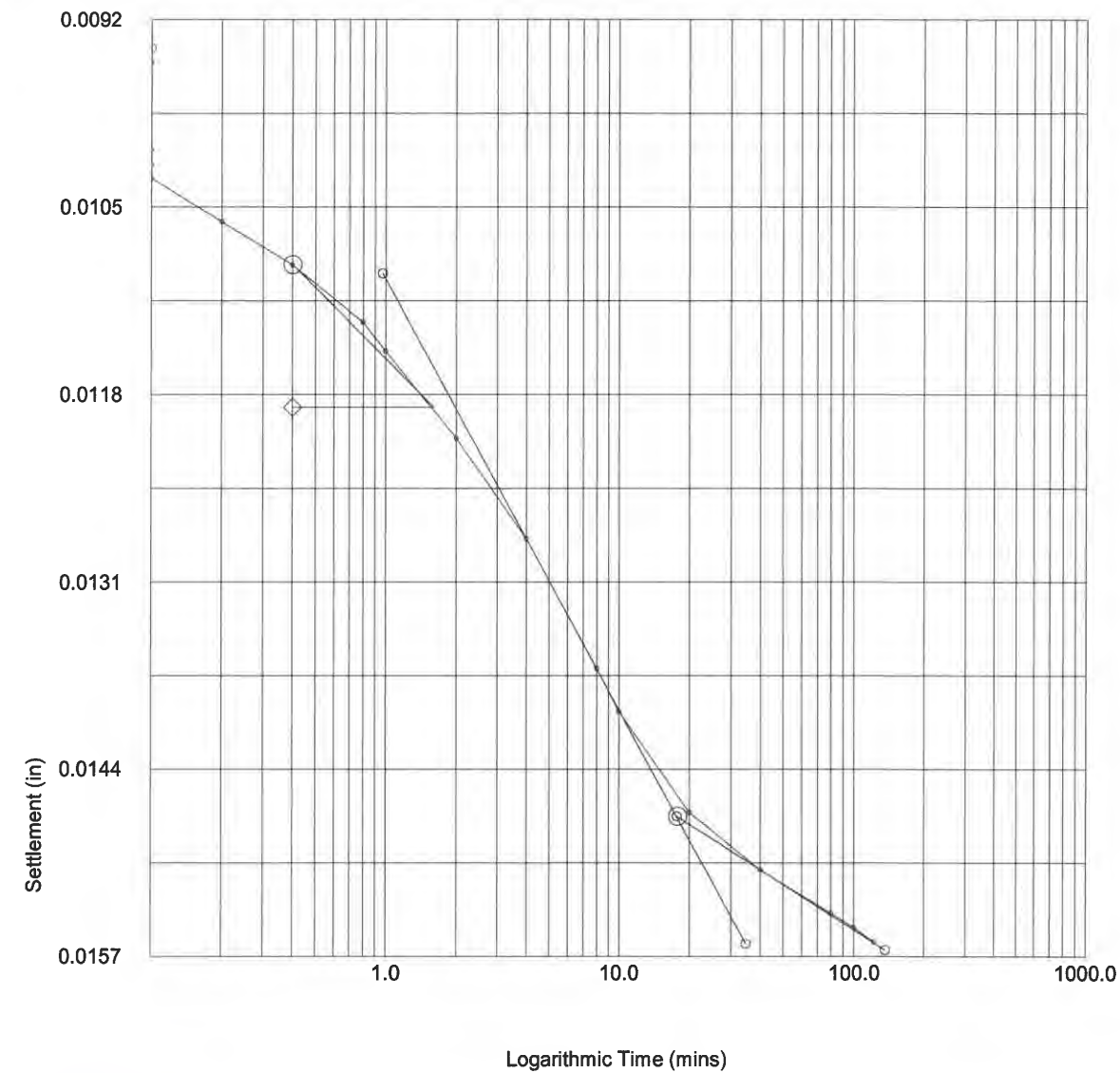
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	94	0.0094	0.0094
2	0.017	95	0.0095	0.0095
3	0.033	101	0.0101	0.0101
4	0.050	102	0.0102	0.0102
5	0.067	102	0.0102	0.0102
6	0.083	103	0.0103	0.0103
7	0.100	103	0.0103	0.0103
8	0.200	106	0.0106	0.0106
9	0.400	109	0.0109	0.0109
10	0.800	113	0.0113	0.0113
11	1.000	115	0.0115	0.0115
12	2.000	121	0.0121	0.0121
13	4.000	128	0.0128	0.0128
14	8.000	137	0.0137	0.0137
15	10.000	140	0.0140	0.0140
16	20.000	147	0.0147	0.0147
17	40.000	151	0.0151	0.0151
18	80.000	154	0.0154	0.0154
19	100.000	155	0.0155	0.0155
20	122.450	156	0.0156	0.0156

	ASTM D2435-96	Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MLC</i>	Checked:	<i>MLC</i>
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0062
Voids Ratio e	0.7051
Final Temp oC	0.0
t ₅₀ (mins)	2.56
c _v (ft ² /day)	0.19
m _v (ft ² /ton)	0.025
Sec Compression C _{sec}	0.001



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	156	0.0156	0.0156
2	0.017	157	0.0157	0.0157
3	0.033	172	0.0172	0.0172
4	0.050	176	0.0176	0.0176
5	0.067	178	0.0178	0.0178
6	0.083	179	0.0179	0.0179
7	0.100	180	0.0180	0.0180
8	0.200	185	0.0185	0.0185
9	0.400	190	0.0190	0.0190
10	0.800	198	0.0198	0.0198
11	1.000	201	0.0201	0.0201
12	2.000	212	0.0212	0.0212
13	4.000	225	0.0225	0.0225
14	8.000	239	0.0239	0.0239
15	10.000	243	0.0243	0.0243
16	20.000	252	0.0252	0.0252
17	40.000	257	0.0257	0.0257
18	80.000	260	0.0260	0.0260
19	100.000	261	0.0261	0.0261
20	200.000	263	0.0263	0.0263
21	400.000	264	0.0264	0.0264
22	800.000	266	0.0266	0.0266
23	970.000	267	0.0267	0.0267

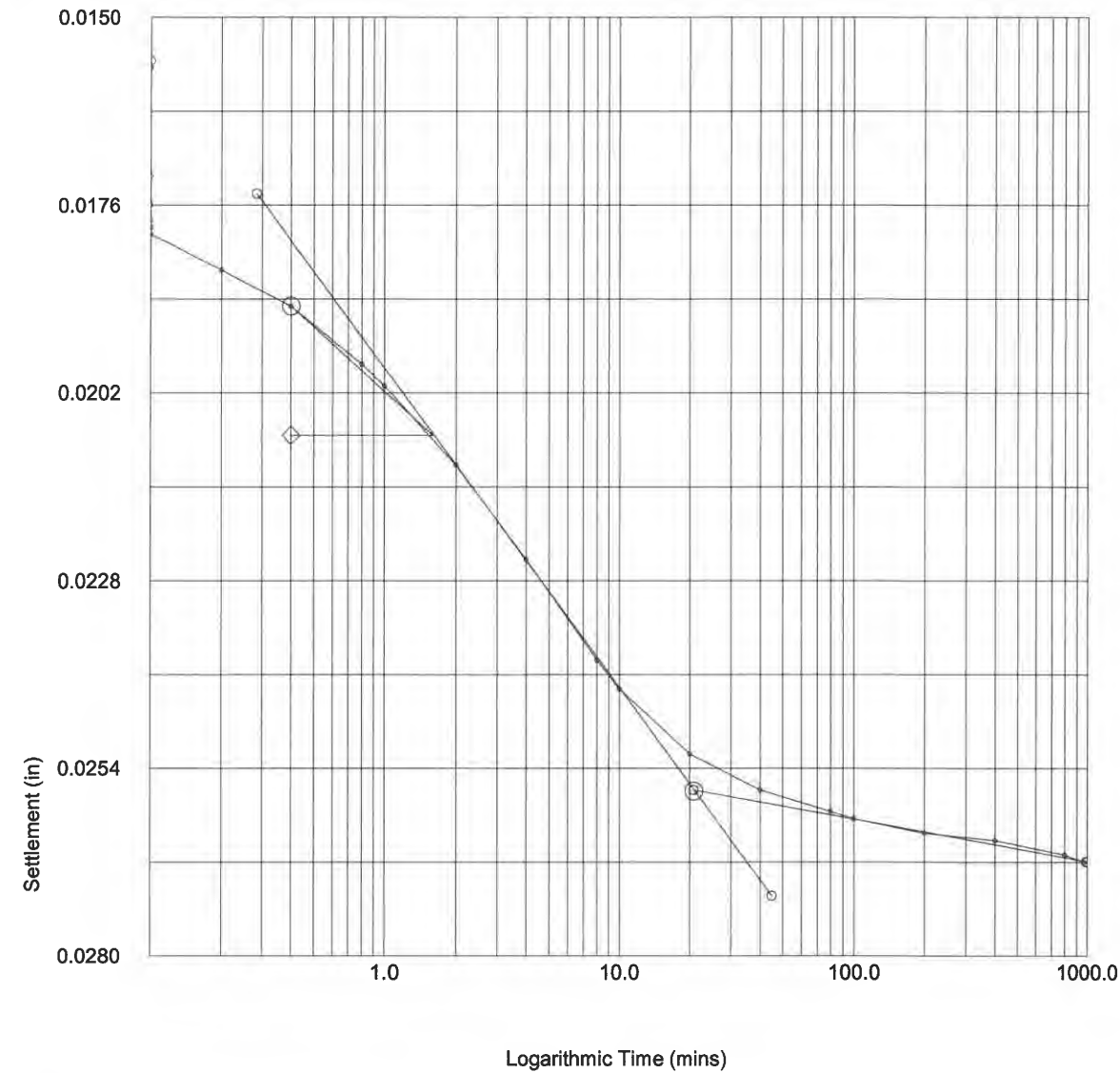
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	Site Reference: Br. Nos. 138 & 139	Date of Test:	12-26-18
	Jobfile: E:\18-036.JOB	Sample:	ST-3
Operator:	Checked:	Approved:	
	<i>MJC</i>	<i>MJC</i>	

	ASTM D2435-96	Test name	Consolidation Load: 1.000 (TSF)
	Site Reference: Br. Nos. 138 & 139	Date of Test:	12-26-18
	Jobfile: E:\18-036.JOB	Sample:	ST-3
Operator:	Checked:	Approved:	
	<i>MJC</i>	<i>MJC</i>	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0111
Voids Ratio e	0.6858
Final Temp oC	0.0
t ₅₀ (mins)	2.36
c _v (ft ² /day)	0.203
m _v (ft ² /ton)	0.023
Sec Compression C _{sec}	0.0006



	ASTM D2435-96	Test name	Consolidation
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
Operator: <i>MK</i>	Checked: <i>MK</i>	Sample:	ST-3
		Borehole:	ST-3
		Approved:	

Oedometer Settlement Tests

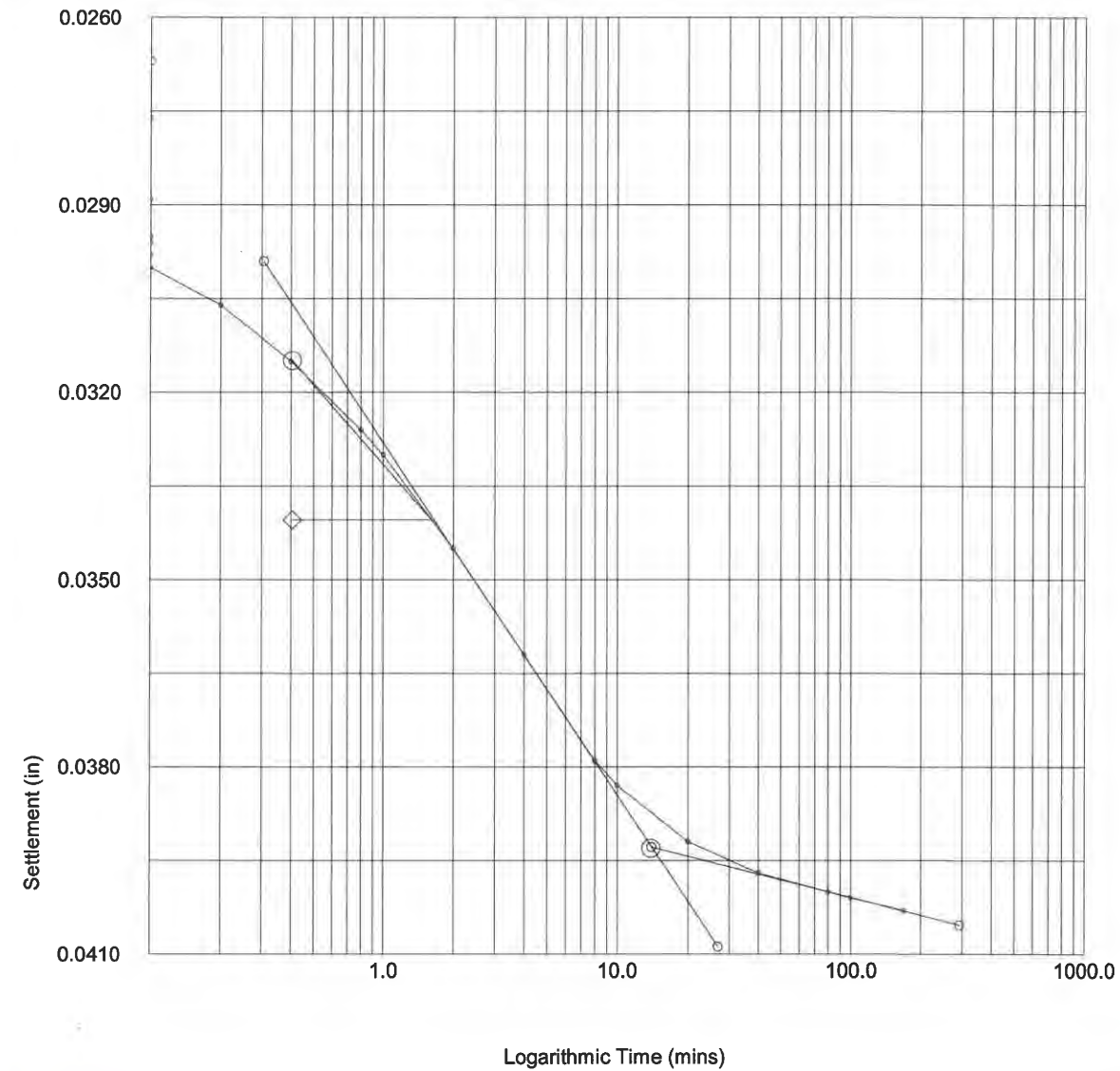
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	267	0.0267	0.0267
2	0.017	276	0.0276	0.0276
3	0.033	289	0.0289	0.0289
4	0.050	295	0.0295	0.0295
5	0.067	296	0.0296	0.0296
6	0.083	298	0.0298	0.0298
7	0.100	300	0.0300	0.0300
8	0.200	306	0.0306	0.0306
9	0.400	315	0.0315	0.0315
10	0.800	326	0.0326	0.0326
11	1.000	330	0.0330	0.0330
12	2.000	345	0.0345	0.0345
13	4.000	362	0.0362	0.0362
14	8.000	379	0.0379	0.0379
15	10.000	383	0.0383	0.0383
16	20.000	392	0.0392	0.0392
17	40.000	397	0.0397	0.0397
18	80.000	400	0.0400	0.0400
19	100.000	401	0.0401	0.0401
20	168.817	403	0.0403	0.0403

	ASTM D2435-96	Test name	Consolidation Load: 2.000 (TSF)
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Date of Test:	12-26-18
Operator: <i>MK</i>	Checked: <i>MK</i>	Sample:	ST-3
		Borehole:	ST-3
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0136
Voids Ratio e	0.6623
Final Temp oC	0.0
t ₅₀ (mins)	1.72
c _v (ft ² /day)	0.271
m _v (ft ² /ton)	0.014
Sec Compression C _{sec}	0.0009



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	403	0.0403	0.0403
2	0.017	404	0.0404	0.0404
3	0.033	404	0.0404	0.0404
4	0.050	433	0.0433	0.0433
5	0.067	438	0.0438	0.0438
6	0.083	444	0.0444	0.0444
7	0.100	446	0.0446	0.0446
8	0.200	457	0.0457	0.0457
9	0.400	470	0.0470	0.0470
10	0.800	486	0.0486	0.0486
11	1.000	492	0.0492	0.0492
12	2.000	513	0.0513	0.0513
13	4.000	540	0.0540	0.0540
14	8.000	565	0.0565	0.0565
15	10.000	572	0.0572	0.0572
16	20.000	586	0.0586	0.0586
17	40.000	593	0.0593	0.0593
18	80.000	597	0.0597	0.0597
19	100.000	598	0.0598	0.0598
20	200.000	601	0.0601	0.0601
21	207.150	602	0.0602	0.0602

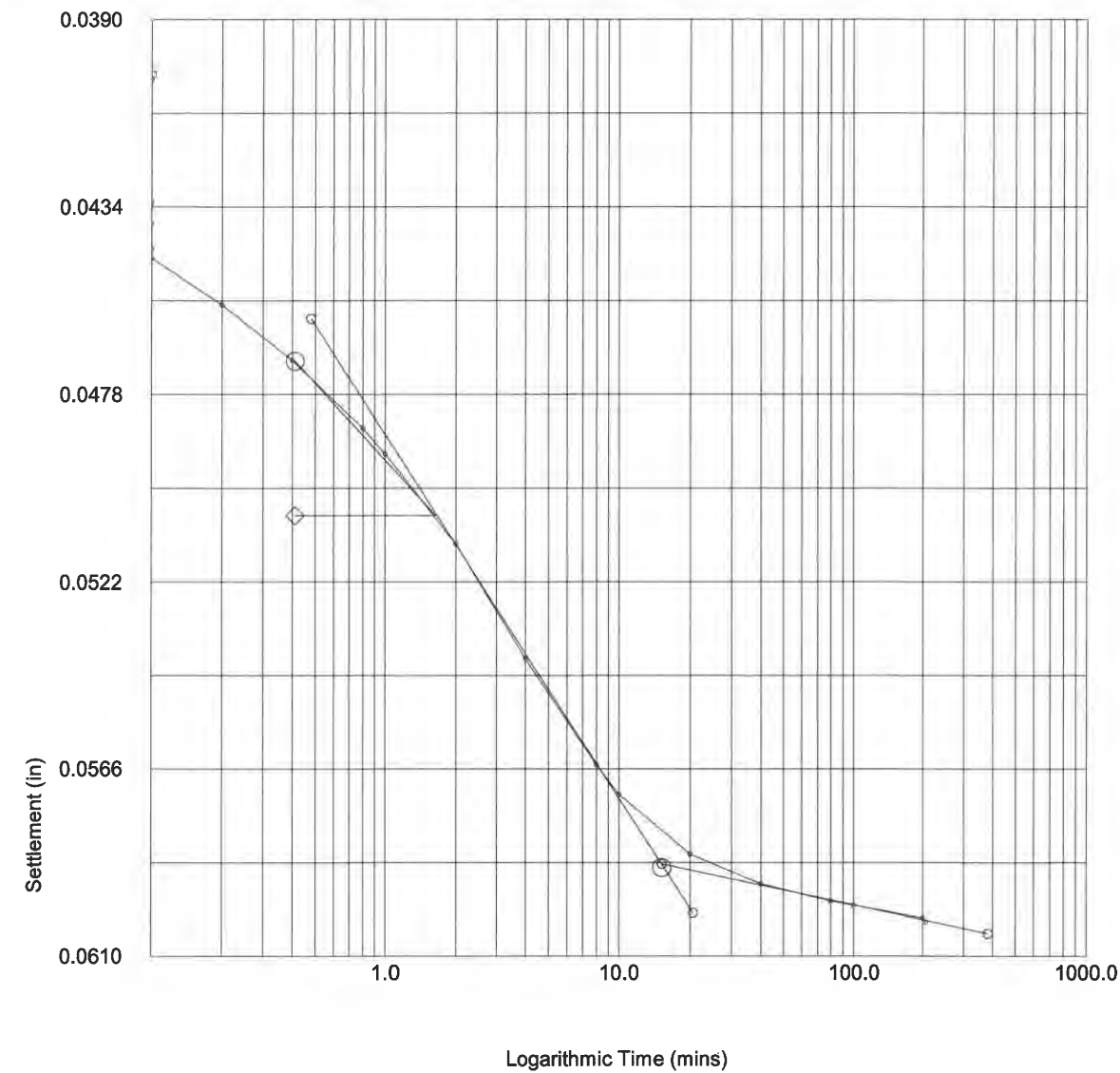
	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MK</i>	Checked:	<i>MK</i>
		Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 4.000 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator:	<i>MK</i>	Checked:	<i>MK</i>
		Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	4.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.0199
Voids Ratio e	0.6278
Final Temp oC	0.0
t ₅₀ (mins)	1.90
c _v (ft ² /day)	0.237
m _v (ft ² /ton)	0.011
Sec Compression C _{sec}	0.0012



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	602	0.0602	0.0602
2	0.017	605	0.0605	0.0605
3	0.033	605	0.0605	0.0605
4	0.050	635	0.0635	0.0635
5	0.067	639	0.0639	0.0639
6	0.083	645	0.0645	0.0645
7	0.100	647	0.0647	0.0647
8	0.200	660	0.0660	0.0660
9	0.400	677	0.0677	0.0677
10	0.800	698	0.0698	0.0698
11	1.000	706	0.0706	0.0706
12	2.000	736	0.0736	0.0736
13	4.000	774	0.0774	0.0774
14	8.000	812	0.0812	0.0812
15	10.000	822	0.0822	0.0822
16	20.000	843	0.0843	0.0843
17	40.000	853	0.0853	0.0853
18	80.000	858	0.0858	0.0858
19	100.000	860	0.0860	0.0860
20	200.000	863	0.0863	0.0863
21	400.000	866	0.0866	0.0866
22	800.000	870	0.0870	0.0870
23	1200.000	871	0.0871	0.0871
24	1348.933	872	0.0872	0.0872

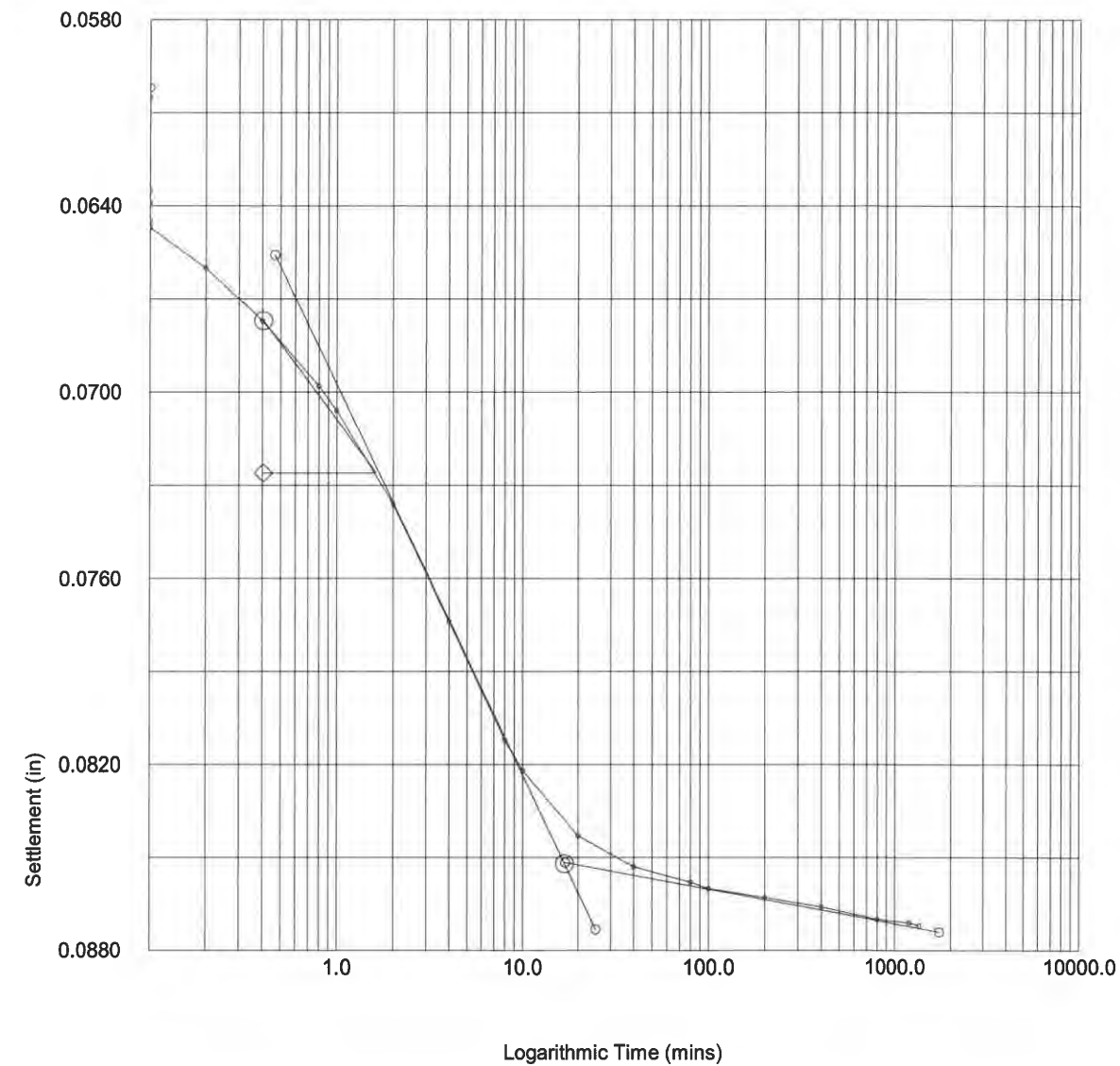
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			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MJC	Checked:	MJC	Approved:

	ASTM D2435-96		Test name	Consolidation Load: 8.000 (TSF)
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MJC	Checked:	MJC	Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	8.000
Initial Temp oC	20.0
Correction (in)	0.0
Settlement (in)	0.027
Voids Ratio e	0.5809
Final Temp oC	0.0
t ₅₀ (mins)	2.16
c _v (ft ² /day)	0.198
m _v (ft ² /ton)	0.007
Sec Compression C _{sec}	0.0126



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	872	0.0872	0.0872
2	0.017	867	0.0867	0.0867
3	0.033	861	0.0861	0.0861
4	0.050	860	0.0860	0.0860
5	0.067	859	0.0859	0.0859
6	0.083	847	0.0847	0.0847
7	0.100	846	0.0846	0.0846
8	0.200	841	0.0841	0.0841
9	0.400	837	0.0837	0.0837
10	0.800	832	0.0832	0.0832
11	1.000	830	0.0830	0.0830
12	2.000	825	0.0825	0.0825
13	4.000	820	0.0820	0.0820
14	8.000	814	0.0814	0.0814
15	10.000	813	0.0813	0.0813
16	20.000	811	0.0811	0.0811
17	40.000	809	0.0809	0.0809
18	80.000	807	0.0807	0.0807
19	100.000	807	0.0807	0.0807
20	200.000	806	0.0806	0.0806
21	400.000	805	0.0805	0.0805
22	800.000	804	0.0804	0.0804
23	1153.783	804	0.0804	0.0804

	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MUC</i>	Checked: <i>MUC</i>	Approved:	

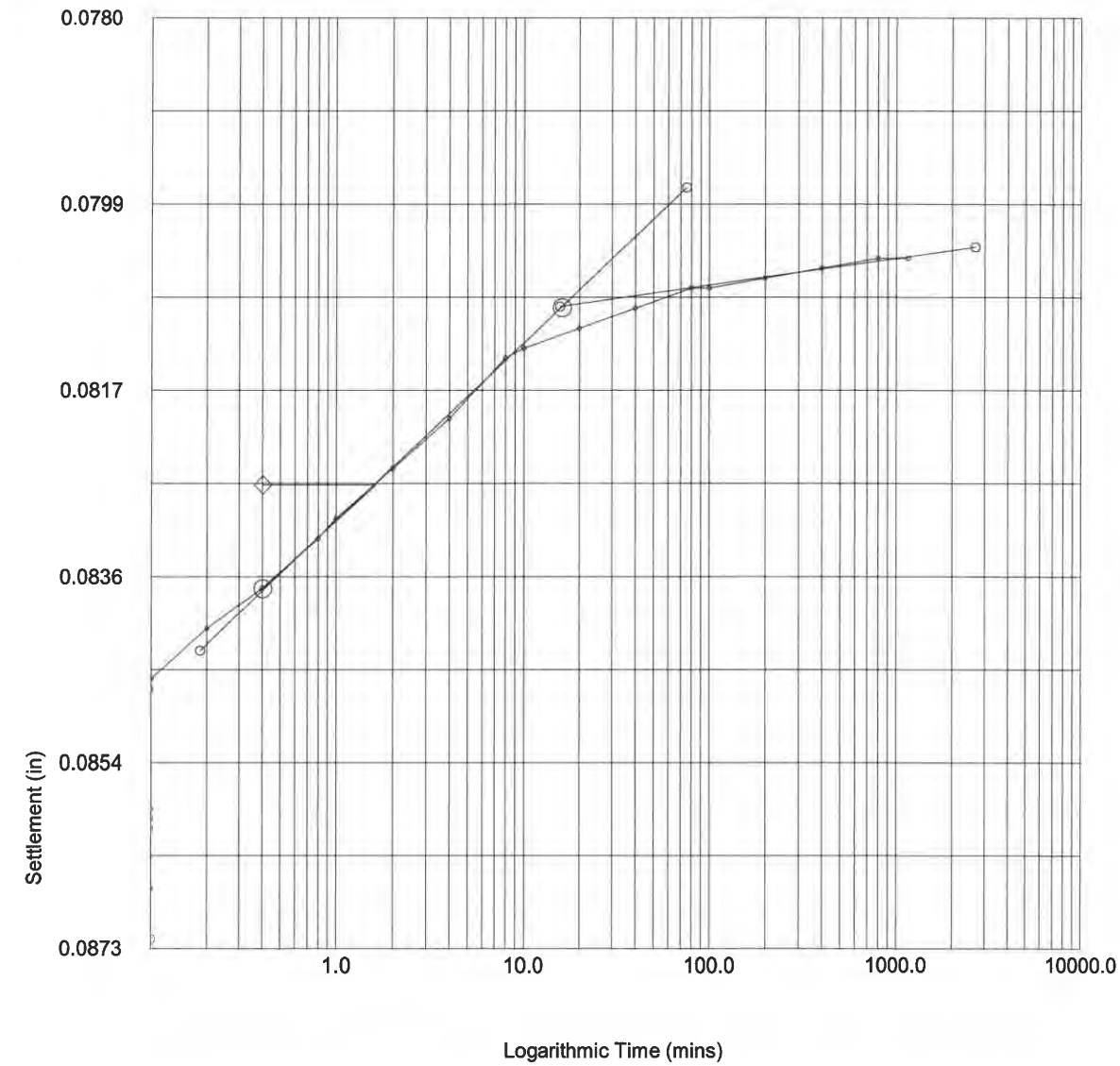
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		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MUC</i>	Checked: <i>MUC</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF) 2.000
 Initial Temp oC 20.0
 Correction (in) 0.0
 Settlement (in) 0.0068
 Voids Ratio e 0.5927

Final Temp oC
 t_{50} (mins)
 c_v (ft²/day)
 m_v (ft²/ton)
 Sec Compression C_{sec}



Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	804	0.0804	0.0804
2	0.017	802	0.0802	0.0802
3	0.033	802	0.0802	0.0802
4	0.050	802	0.0802	0.0802
5	0.067	795	0.0795	0.0795
6	0.083	790	0.0790	0.0790
7	0.100	790	0.0790	0.0790
8	0.200	786	0.0786	0.0786
9	0.400	782	0.0782	0.0782
10	0.800	777	0.0777	0.0777
11	1.000	775	0.0775	0.0775
12	2.000	767	0.0767	0.0767
13	4.000	757	0.0757	0.0757
14	8.000	744	0.0744	0.0744
15	10.000	740	0.0740	0.0740
16	20.000	726	0.0726	0.0726
17	40.000	715	0.0715	0.0715
18	80.000	708	0.0708	0.0708
19	100.000	707	0.0707	0.0707
20	200.000	702	0.0702	0.0702
21	400.000	699	0.0699	0.0699
22	498.117	697	0.0697	0.0697

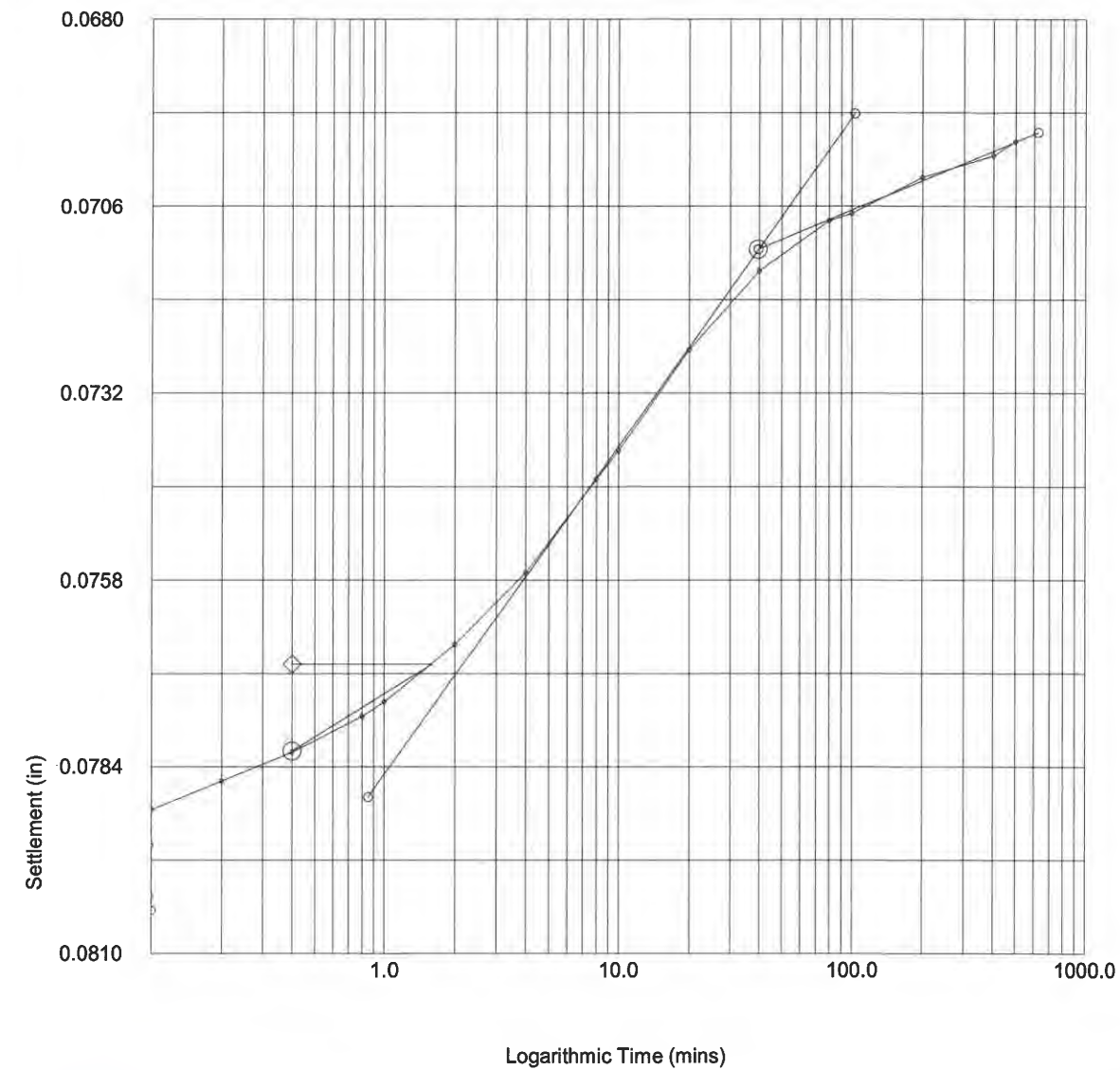
	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	

	ASTM D2435-96	Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139 Jobfile: E:\18-036.JOB	Sample:	ST-3
		Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF) 0.500
 Initial Temp oC 20.0
 Correction (in) 0.0
 Settlement (in) 0.0107
 Voids Ratio e 0.6113
 Final Temp oC
 t₅₀ (mins)
 c_v (ft²/day)
 m_v (ft²/ton)
 Sec Compression C_{sec}



	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MJC	Checked:	MJC	Approved:

Oedometer Settlement Tests

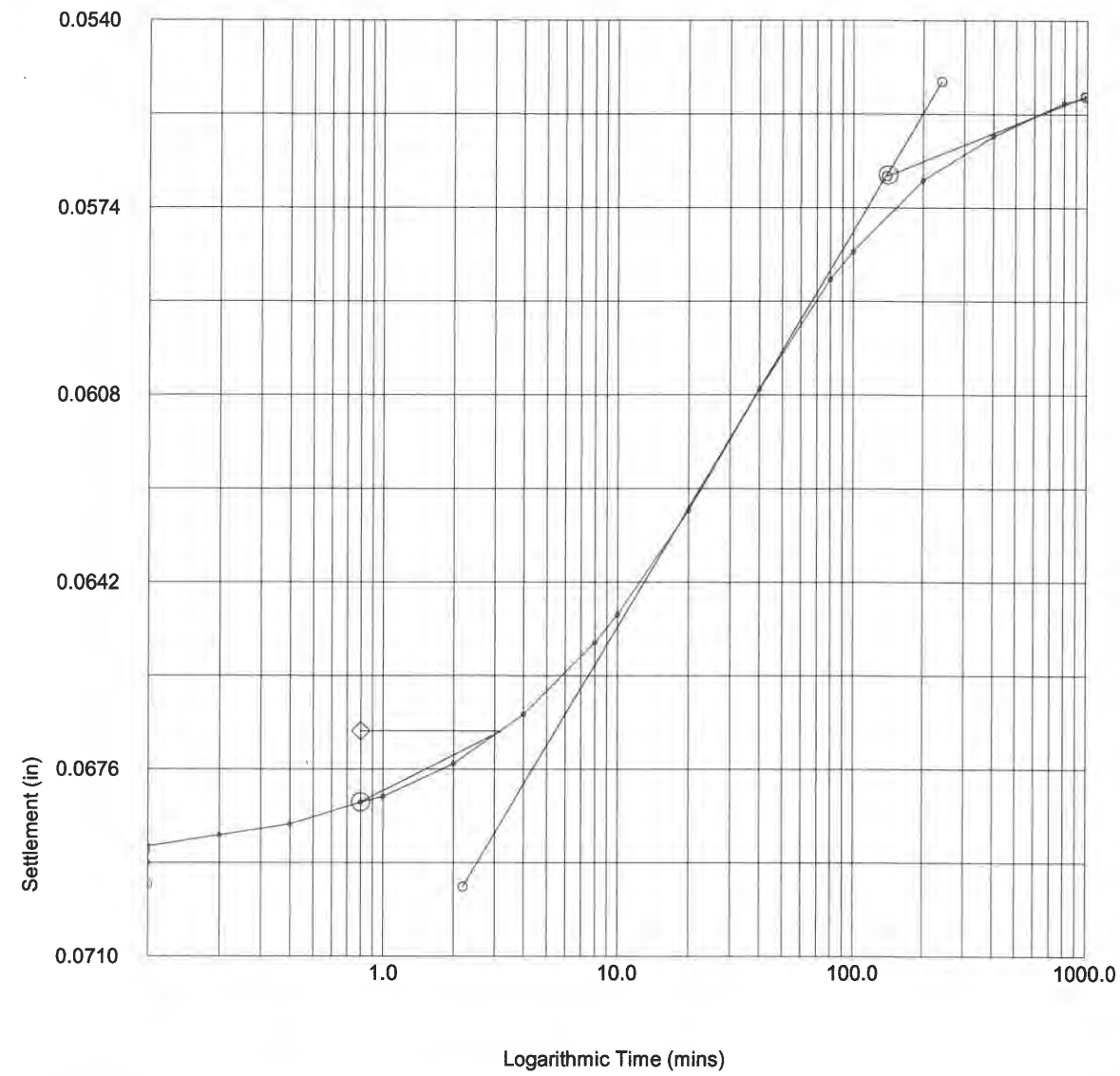
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	697	0.0697	0.0697
2	0.017	693	0.0693	0.0693
3	0.033	693	0.0693	0.0693
4	0.050	691	0.0691	0.0691
5	0.067	691	0.0691	0.0691
6	0.083	690	0.0690	0.0690
7	0.100	690	0.0690	0.0690
8	0.200	688	0.0688	0.0688
9	0.400	686	0.0686	0.0686
10	0.800	682	0.0682	0.0682
11	1.000	681	0.0681	0.0681
12	2.000	675	0.0675	0.0675
13	4.000	666	0.0666	0.0666
14	8.000	653	0.0653	0.0653
15	10.000	648	0.0648	0.0648
16	20.000	629	0.0629	0.0629
17	40.000	607	0.0607	0.0607
18	80.000	587	0.0587	0.0587
19	100.000	582	0.0582	0.0582
20	200.000	569	0.0569	0.0569
21	400.000	561	0.0561	0.0561
22	800.000	555	0.0555	0.0555
23	990.533	554	0.0554	0.0554

	ASTM D2435-96		Test name	Consolidation Load: 0.050 (TSF)
			Date of Test:	12-26-18
	Site Reference:	Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile:	E:\18-036.JOB	Borehole:	ST-3
Operator:	MJC	Checked:	MJC	Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF) 0.050
 Initial Temp oC 20.0
 Correction (in) 0.0
 Settlement (in) 0.0143
 Voids Ratio e 0.6361
 Final Temp oC
 t₅₀ (mins)
 c_v (ft²/day)
 m_v (ft²/ton)
 Sec Compression C_{sec}



	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-26-18
	Site Reference: Br. Nos. 138 & 139	Sample:	ST-3
	Jobfile: E:\18-036.JOB	Borehole:	ST-3
Operator: <i>MJC</i>	Checked: <i>MJC</i>	Approved:	