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REFERENCE: BR-0032

PROJECT: 67032

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY MADISON
PROJECT DESCRIPTION REPLACE BRIDGE NO. 560084
ON NC 209 OVER MEADOW FORK CREEK

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0032	1	39

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

PERSONNEL

B. SMITH, PG

A. GROSS, GIT

L. GONZALEZ

D. SUTTON

INVESTIGATED BY B. SMITH, PG

DRAWN BY B. SMITH, PG

CHECKED BY B. WORLEY, PG

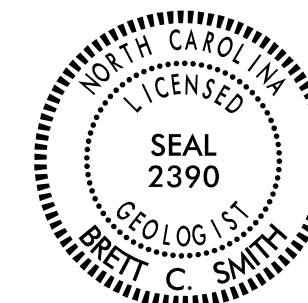
SUBMITTED BY B. SMITH, PG

DATE MARCH, 2019

Prepared in the
Office of:



NC FIRM LICENSE No: P-0339 and C-487
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)



DocuSigned by: [Signature] 3/25/2019
SIGNATURE DATE

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with multiple columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSION, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, INDURATION, PLASTICITY, COLOR.

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

SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

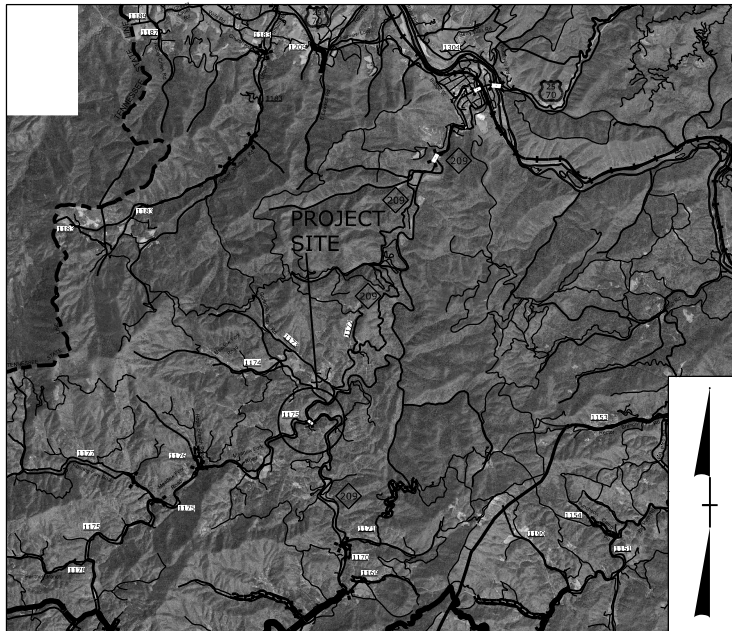
<p>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p> <p>STRUCTURE</p>	<p>SURFACE CONDITIONS</p>	<p>VERY GOOD Very rough, fresh unweathered surfaces</p>	<p>GOOD Rough, slightly weathered, iron stained surfaces</p>	<p>FAIR Smooth, moderately weathered and altered surfaces</p>	<p>POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p>	<p>VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings</p>
<p>COMPOSITION AND STRUCTURE</p>	<p>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</p>	<p>VERY GOOD - Very Rough, fresh unweathered surfaces</p>	<p>GOOD - Rough, slightly weathered surfaces</p>	<p>FAIR - Smooth, moderately weathered and altered surfaces</p>	<p>POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p>	<p>VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p>
<p>INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p>BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p>VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p>BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p>DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p>LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	<p>DECREASING INTERLOCKING OF ROCK PIECES</p>	<p>DECREASING SURFACE QUALITY →</p>				
<p>A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.</p> <p>B. Sandstone with thin inter-layers of siltstone</p> <p>C. Sandstone and siltstone in similar amounts</p> <p>D. Siltstone or silty shale with sandstone layers</p> <p>E. Weak siltstone or clayey shale with sandstone layers</p> <p>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</p> <p>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</p> <p>H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</p> <p>→ Means deformation after tectonic disturbance</p>	<p>DECREASING SURFACE QUALITY</p>	<p>DECREASING SURFACE QUALITY →</p>				
<p>90</p> <p>80</p> <p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p>	<p>DECREASING INTERLOCKING OF ROCK PIECES</p>	<p>DECREASING SURFACE QUALITY →</p>				
<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>DECREASING INTERLOCKING OF ROCK PIECES</p>	<p>DECREASING SURFACE QUALITY →</p>				
<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>DECREASING INTERLOCKING OF ROCK PIECES</p>	<p>DECREASING SURFACE QUALITY →</p>				

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 \$\$\$SERVNAME\$\$\$

TIP PROJECT: BR-0032

CONTRACT:

See Sheet 1A For Index of Sheets
 See Sheet 1B For Conventional Symbols
 See Sheet 1C-1 For Survey Control Sheet



VICINITY MAP

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS

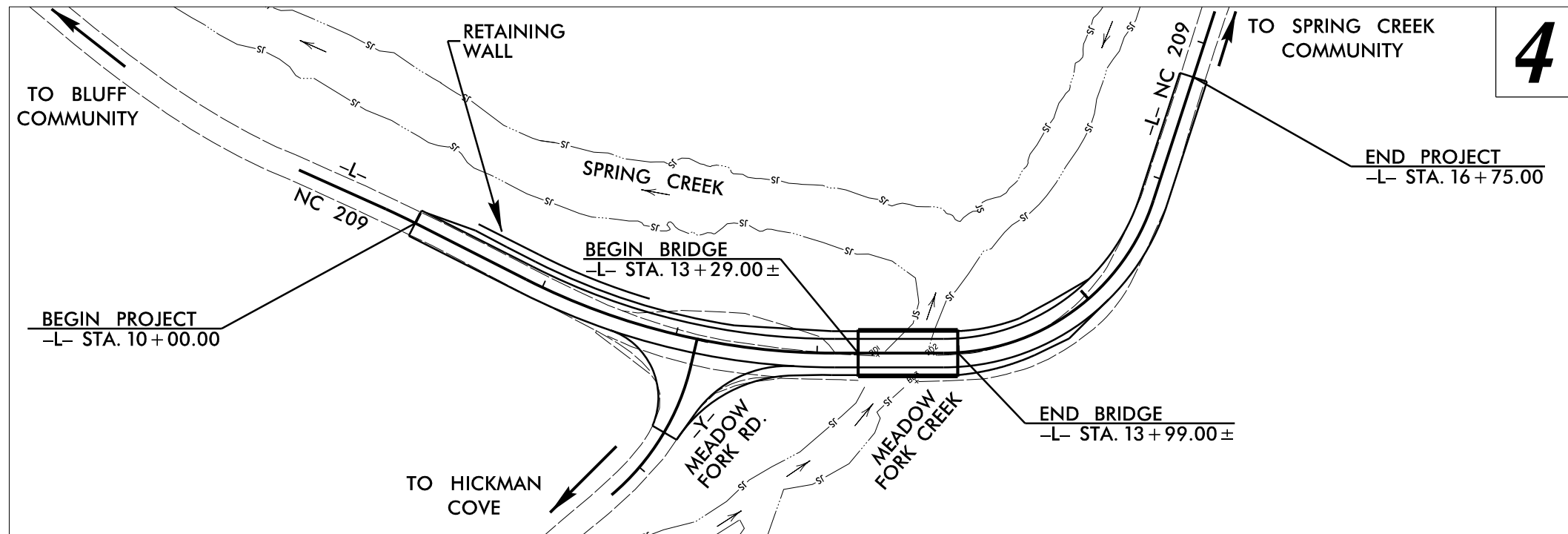
MADISON COUNTY

**LOCATION: BRIDGE NO. 560084 ON NC 209
 OVER MEADOW FORK CREEK**

TYPE OF WORK: GRADING, DRAINAGE, PAVING, RETAINING WALL AND STRUCTURE.

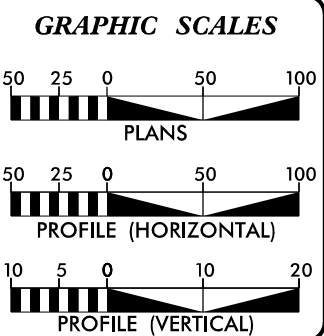
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0032	3	39
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
67032.1.1		PE	

25% PLANS



*DESIGN SPEED EXCEPTION AND **HORIZ. CURVE SSD DESIGN EXCEPTION REQUIRED.
 CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD .

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



DESIGN DATA

ADT 2013 =	430 vpd
ADT 2040 =	600 vpd
D =	60 %
K =	10 %
T =	13 % *
* V =	25 MPH
* TTST =	1% DUAL 12%
FUNC CLASS =	RURAL COLLECTOR
SUB REGIONAL TIER	

PROJECT LENGTH

LENGTH ROADWAY PROJECT =	0.115 MILES
LENGTH STRUCTURES PROJECT =	0.013 MILES
TOTAL LENGTH PROJECT =	0.128 MILES
NCDOT CONTACT:	DAVID STUTTS, PE PROJECT MANAGER

Prepared In the Office of:

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2018 STANDARD SPECIFICATIONS

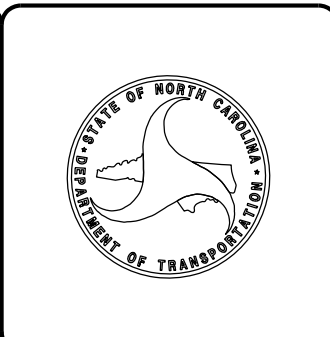
RIGHT OF WAY DATE: MAY 17, 2019	JAMES A. SPEER, PE PROJECT ENGINEER
LETTING DATE: MAY 19, 2020	BRANDON W. JOHNSON, PE PROJECT DESIGN ENGINEER

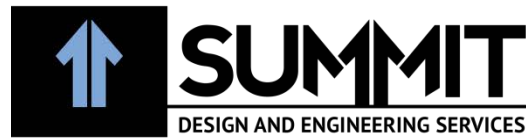
HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





919.732.3883 SUMMIT-ENGINEER.COM
504 Meadowland Drive, Hillsborough, NC 27278

February 22, 2019

WBS Number: 67032.1.1
 TIP Number: BR-0032
 Project ID: 34275
 County: Madison
 Description: Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek

SUBJECT: Geotechnical Report - Roadway Subsurface Inventory

Project Description

The proposed 0.128-mile project is located in remote Madison County. The project will involve the replacement of Bridge No. 560084 on NC 209. In addition to the bridge replacement, 0.115-miles of roadway widening is proposed to accommodate the new bridge size and placement. Lastly, a retaining wall is proposed to allow for the roadway widening in the steep mountainous terrain. The retaining wall and bridge were investigated at the time of the roadway investigation. These structure borings are included in this Roadway Subsurface Inventory in order to assist with the overall interpretation of the subsurface conditions underlying the project corridor. Subsurface Inventory reports for the retaining wall and bridge will be turned in under separate covers and at a later date.

The geotechnical investigation was conducted from January 23, 2019 to February 1, 2019. Borings were advanced using a CME-550X drill machine equipped with an automatic hammer. Drill tooling was mostly advanced using NW casing with an advancer. A few of the shallow roadway borings were advanced using hollow stem augers. Standard Penetration Tests (SPT) were performed at all planned boring locations to provide subsurface information for structure foundation, roadway foundation, and slope design/construction. Rock coring, using NQ2 wireline equipment, was performed when in-situ Crystalline Rock needed to be confirmed or if shallow in-situ Crystalline Rock was encountered. All investigations and reporting were performed in accordance with the NCDOT Geotechnical Engineering Unit’s 2016 “Geotechnical Investigation and Recommendations Manual.”

The following alignments were investigated for this project:

<u>Alignment</u>	<u>Station(±)</u>
-L-	10+00.00 - 16+75.00

Physiography, Geography, and Geology

The project area is located in far western North Carolina within the Blue Ridge Physiographic Province. Topography within this province is best characterized as a deeply dissected mountainous area of numerous steep mountain ridges, intermontane basins and trench valleys that intersect at all angles and give the area it’s rugged mountain character. The Blue Ridge Physiographic Province contains the highest elevations and most rugged terrain in the state of North Carolina with 43 peaks exceeding 6,000 feet in elevation. The project corridor is located within a mountain valley at an elevation of approximately 1,875 feet above sea level. The local topography is rugged with hillsides steeply dropping into the floodplain of Spring Creek.

The project area is located within the French Broad River Basin. Within the project corridor, Meadow Fork Creek feeds into Spring Creek which then flows north and empties into the French Broad River.

Geologically, the project area is located within the Western Blue Ridge Terrane. A geological terrane is fault-bounded fragment of Earth’s crust that shares a common geologic history distinguishing it from surrounding terranes or areas. The Western Blue Ridge is one of the most geologically complicated areas of the state and is likely composed of several geologic terranes. Generally, the Western Blue Ridge includes rocks that have always been associated with ancient North America (known as Laurentia by geologists). This mountainous region is composed of a group of over one billion-year-old gneisses and the younger sedimentary rocks that were deposited on top of them. This complex mixture of igneous, sedimentary, and metamorphic rock has repeatedly been squeezed, fractured, faulted, and folded. During the investigation the project corridor was found to be underlain by a Metamorphosed Granite.

Soil Properties

Residual soils, soils derived from the weathering of rock, were not encountered during the geotechnical investigation. However, they are likely present within the project corridor and could be impacted during construction as a relatively thin soil layer overlying Weathered and/or Crystalline Rock. Based on the underlying rock types encountered, these soils would likely consist of saprolitic silty sands (A-2-4) or sandy silts (A-4). Topsoil was also not encountered and will have to be estimated for clearing and grubbing purposes.

Roadway Embankment soils from the construction of existing NC 209 are present throughout the project corridor. These soils are mostly composed of silty sands (A-2-4) and will be commonly impacted during construction. They vary widely in soil density, ranging from very loose to dense. They also vary widely in soil moisture ranging from dry to saturated with soil moistures increasing with depth. Gravel, cobbles, and boulders were encountered within the silty sands in sometimes significant amounts. The composition of the Roadway Embankment is likely directly related to the material that was excavated from adjacent hillside. As the original roadway cuts for NC 209 were made into the hillside, Residual soils, Weathered Rock, and Crystalline Rock were all combined together and pushed into a level surface for the future roadway. In addition to silty sands, one small area of sandy clay (A-6) was encountered deeper within the Roadway Embankment near the beginning of the project. The above classifications are based on field classifications only. No laboratory testing was performed based on the lack of above or near grade cohesive soils.

Alluvial soils, soils that have been transported and deposited by water, were encountered in the project corridor within the floodplain of Meadow Fork Creek. As expected, based on the high energy nature of the creek, these soils consisted of sand (A-1-b) with gravel, cobbles, and boulders. The sand ranged from very loose to dense and was generally saturated. These alluvial soils are not anticipated to impact roadway construction but will be a factor during the construction of the new bridge.

Rock Properties

Metamorphosed Granite both underlies and is exposed at surface within the project corridor. The surface exposures are both naturally occurring outcrop and more recently revealed road cut exposures from the construction of NC 209. The granite is believed to be Middle Proterozoic in age which is a range of approximately 900 million - 1.6 billion years old. It has undergone both ductile and brittle deformation with as many as 4 potential fracture sets identified. Six of the ten total borings drilled across the project corridor were cored. All core recovered appeared to be from the same unit of Metamorphosed Granite. Analysis of the core would suggest the Meta-Granite is generally slightly to moderately weathered and hard to very hard. Some areas of moderate severe weathering and medium to moderate hardness were encountered. In addition, some seams of Weathered Rock are present within the Crystalline Rock in some areas. The approximate average Strata Core Recovery (SREC) within the Meta-Granite was 92%. The approximate average Strata Rock Quality Designation (SRQD) was 49% and the average Geologic Strength Index (GSI) value given was 65.

Groundwater Properties

The field investigation as conducted during a period of above average rainfall. Groundwater was only encountered in four of the ten total borings. Groundwater measurements varied from 1866.4 feet to 1849.7 feet above sea level. An average water table elevation of 1858.8 feet above sea was calculated within the project corridor. Groundwater was not encountered within six feet of proposed grade is not anticipated to be a factor during construction of the roadway. However, groundwater flow within the project corridor is likely heavily controlled by rock fractures which is typically one of the least predictable phenomena in groundwater science.

A visual reconnaissance for water wells was conducted throughout the project corridor. This was used in conjunction with the final survey file to attempt to identify water wells within or adjacent to the proposed right of way of the project. Properly abandoned wells are not included in the following list. Some water well locations are well hidden, and it is possible that some wells were missed or misidentified by the final survey and/or visual reconnaissance. The following water wells were identified within the project corridor:

<u>Alignment</u>	<u>Station(±)</u>	<u>Offset</u>
-L-	12+58	36'RT

Areas of Special Geotechnical Interest

Crystalline Rock - During the geotechnical investigation, Crystalline Rock was encountered in several areas. Crystalline Rock can present issues with excavation during construction and may require blasting. More detailed information on the rocks underlying the project corridor can be found in the "Rock

Properties" section of this text report. The following approximate locations listed below show areas where Crystalline Rock is believed to be present within six feet of proposed grade:

<u>Alignment</u>	<u>Station(±)</u>	<u>Offset</u>
-L-	10+00 - 11+25	Right
-L-	14+00 - 14+75	Right

References

North Carolina Geological Survey, 1985, Geologic map of North Carolina: North Carolina Geological Survey, General Geologic Map, scale 1:500000.

The Geology of the Carolinas, J. Wright Horton, Jr., and Victor A. Zullo

Groundwater Science, Charles R. Fitts


Respectfully Submitted,

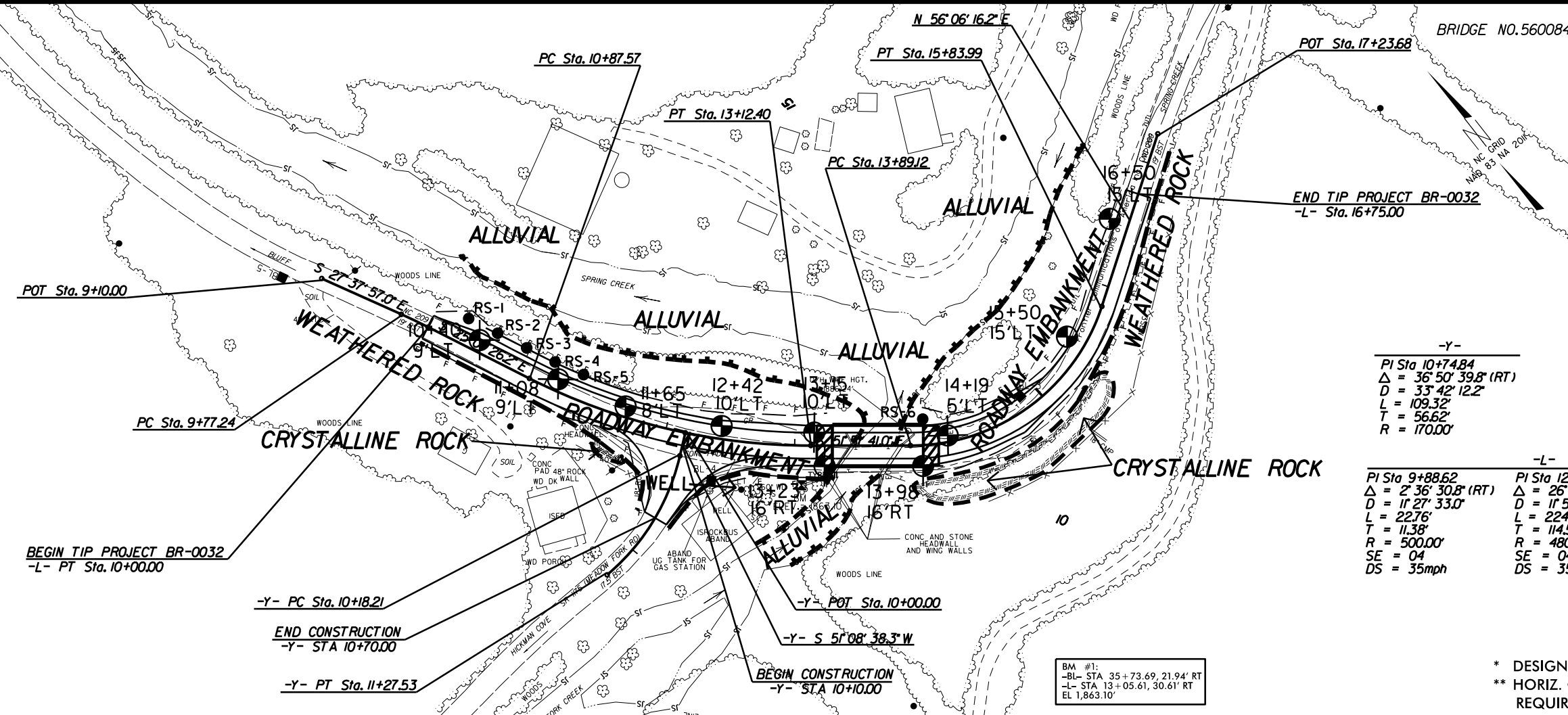


Brett Smith, PG
 Project Geologist
 Summit Design and Engineering Services, PLLC

8/17/99

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PROJECT REFERENCE NO. BR-0032	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
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Prepared in the Office of:	 <small>NC FIRM LICENSE NO. P-0339 504 Meadowslands Drive Hillsborough, NC 27278 (919) 732-3881 (919) 732-6676 (FAX)</small>



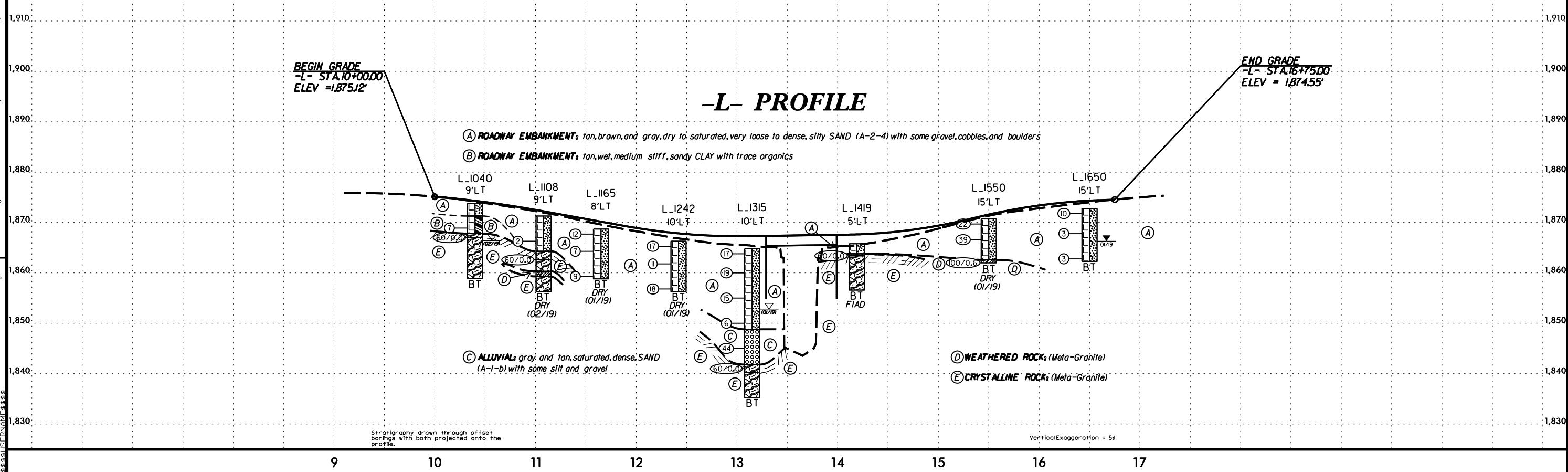
-Y-

PI Sta 10+74.84 $\Delta = 36' 50'' 39.8''$ (RT) $D = 33' 42'' 12.2''$ $L = 109.32'$ $T = 56.62'$ $R = 170.00'$	-L- PI Sta 9+88.62 $\Delta = 2' 36'' 30.8''$ (RT) $D = 11' 27'' 33.0''$ $L = 22.76'$ $T = 11.38'$ $R = 500.00'$ $SE = 04$ $DS = 35\text{mph}$	PI Sta 12+02.09 $\Delta = 26' 50'' 14.8''$ (LT) $D = 11' 56'' 11.8''$ $L = 224.83'$ $T = 114.52'$ $R = 480.00'$ $SE = 04$ $DS = 35\text{mph}$	PI Sta 15+01.80 $\Delta = 72' 02'' 02.8''$ (LT) $D = 36' 57'' 54.1''$ $L = 194.87'$ $T = 112.68'$ $**R = 155.00'$ $SE = 04$ $*DS = 25\text{mph}$
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BM #1:
 -BL- STA 35+73.69, 21.94' RT
 -L- STA 13+05.61, 30.61' RT
 EL. 1,863.10'

* DESIGN SPEED EXCEPTION AND
 ** HORIZ. CURVE SSD DESIGN EXCEPTION
 REQUIRED.

-L- PROFILE

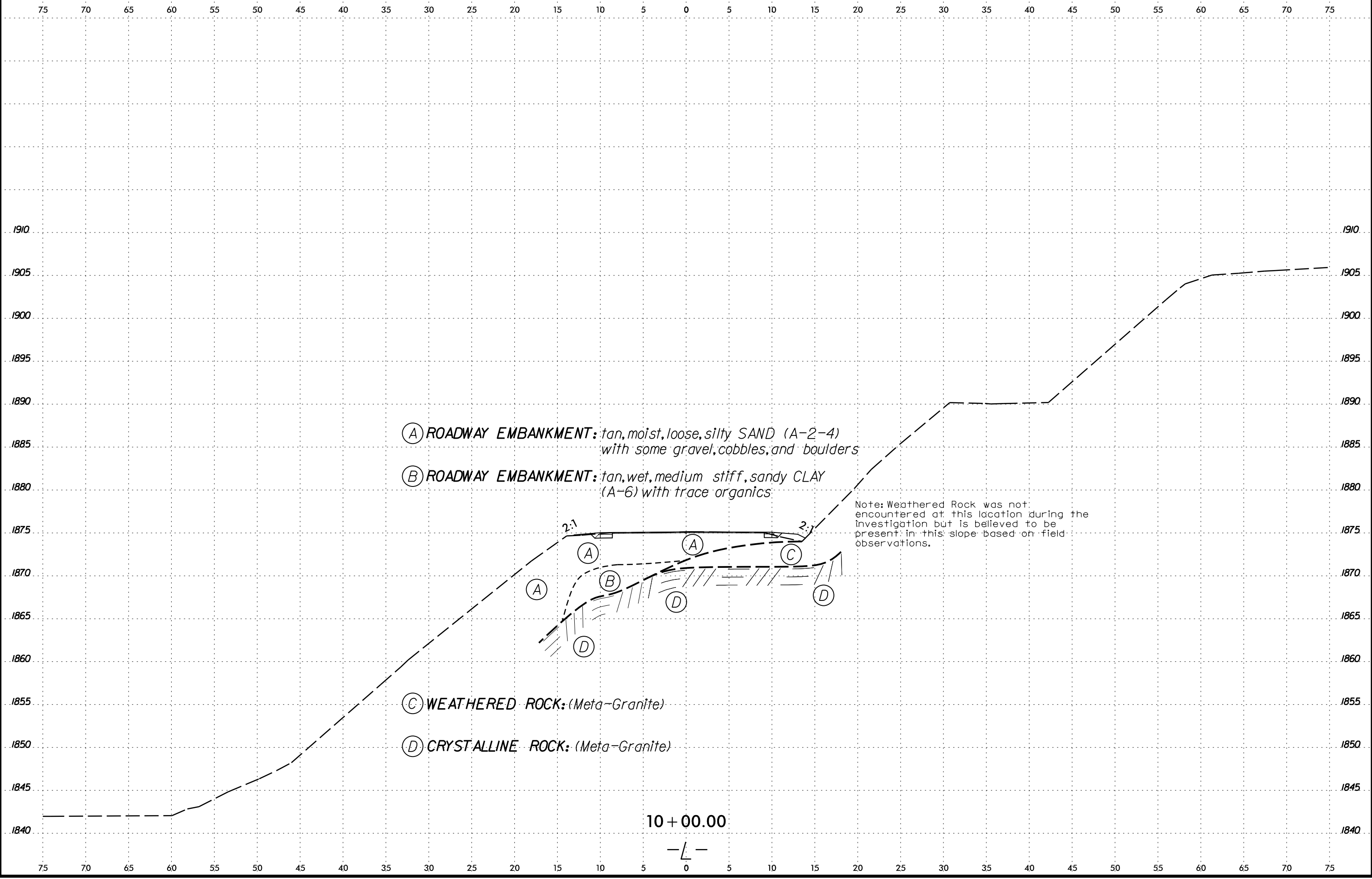


- (A) ROADWAY EMBANKMENT: tan, brown, and gray, dry to saturated, very loose to dense, silty SAND (A-2-4) with some gravel, cobbles, and boulders
- (B) ROADWAY EMBANKMENT: tan, wet, medium stiff, sandy CLAY with trace organics
- (C) ALLUVIAL: gray and tan, saturated, dense, SAND (A-1-b) with some silt and gravel
- (D) WEATHERED ROCKS (Meta-Granite)
- (E) CRYSTALLINE ROCKS (Meta-Granite)

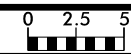
Stratigraphy drawn through offset borings with both projected onto the profile.

Vertical Exaggeration = 5x

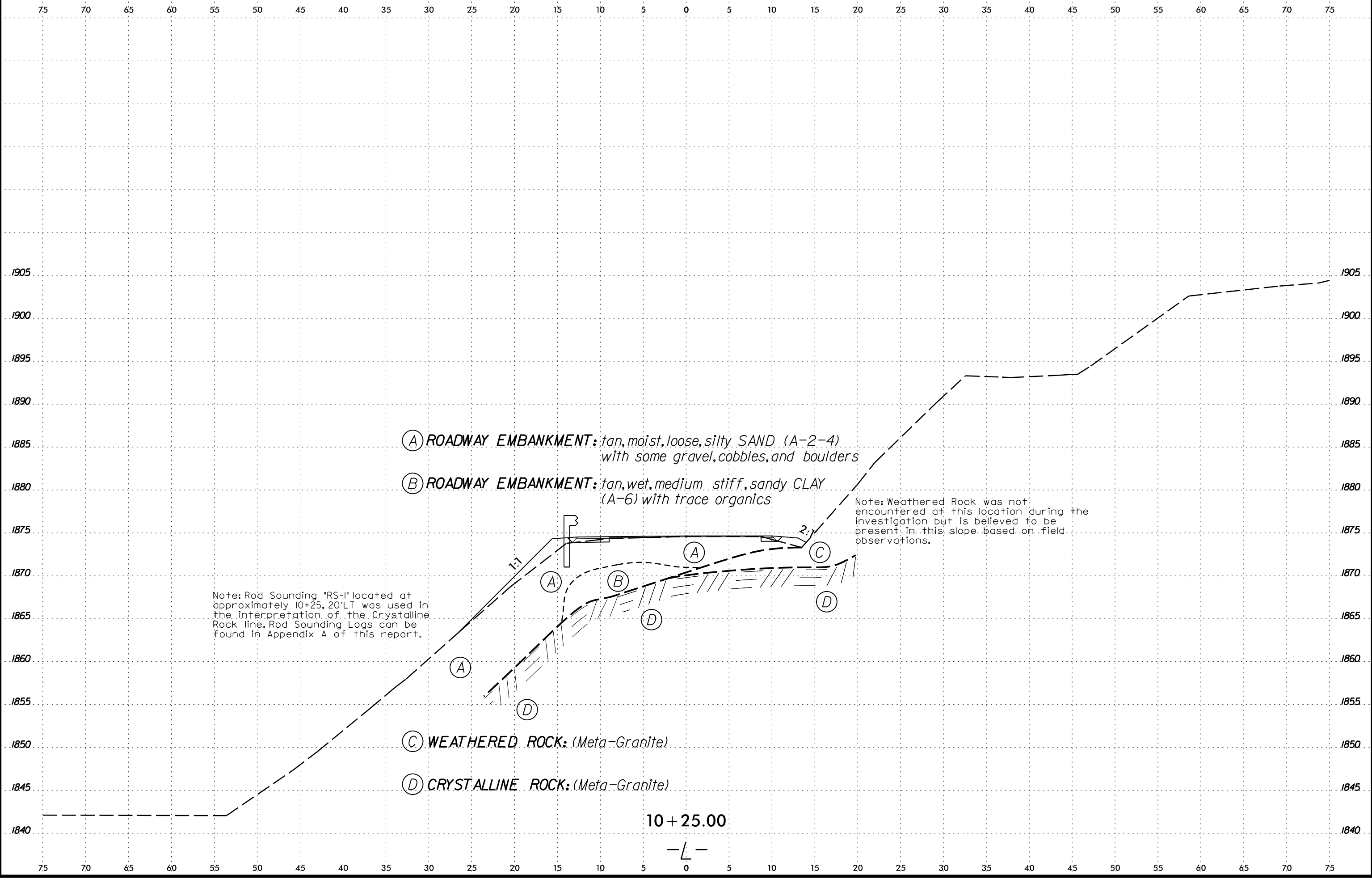
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25-MAR-2019 10:02
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6/23/16
25-MAR-2019 10:02
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PROJ. REFERENCE NO.	SHEET NO.
BR-0032	6



(A) ROADWAY EMBANKMENT: *tan, moist, loose, silty SAND (A-2-4) with some gravel, cobbles, and boulders*

(B) ROADWAY EMBANKMENT: *tan, wet, medium stiff, sandy CLAY (A-6) with trace organics*

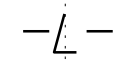
Note: Weathered Rock was not encountered at this location during the investigation but is believed to be present in this slope based on field observations.

Note: Rod Sounding "RS-1" located at approximately 10+25, 20'LT was used in the interpretation of the Crystalline Rock line. Rod Sounding Logs can be found in Appendix A of this report.

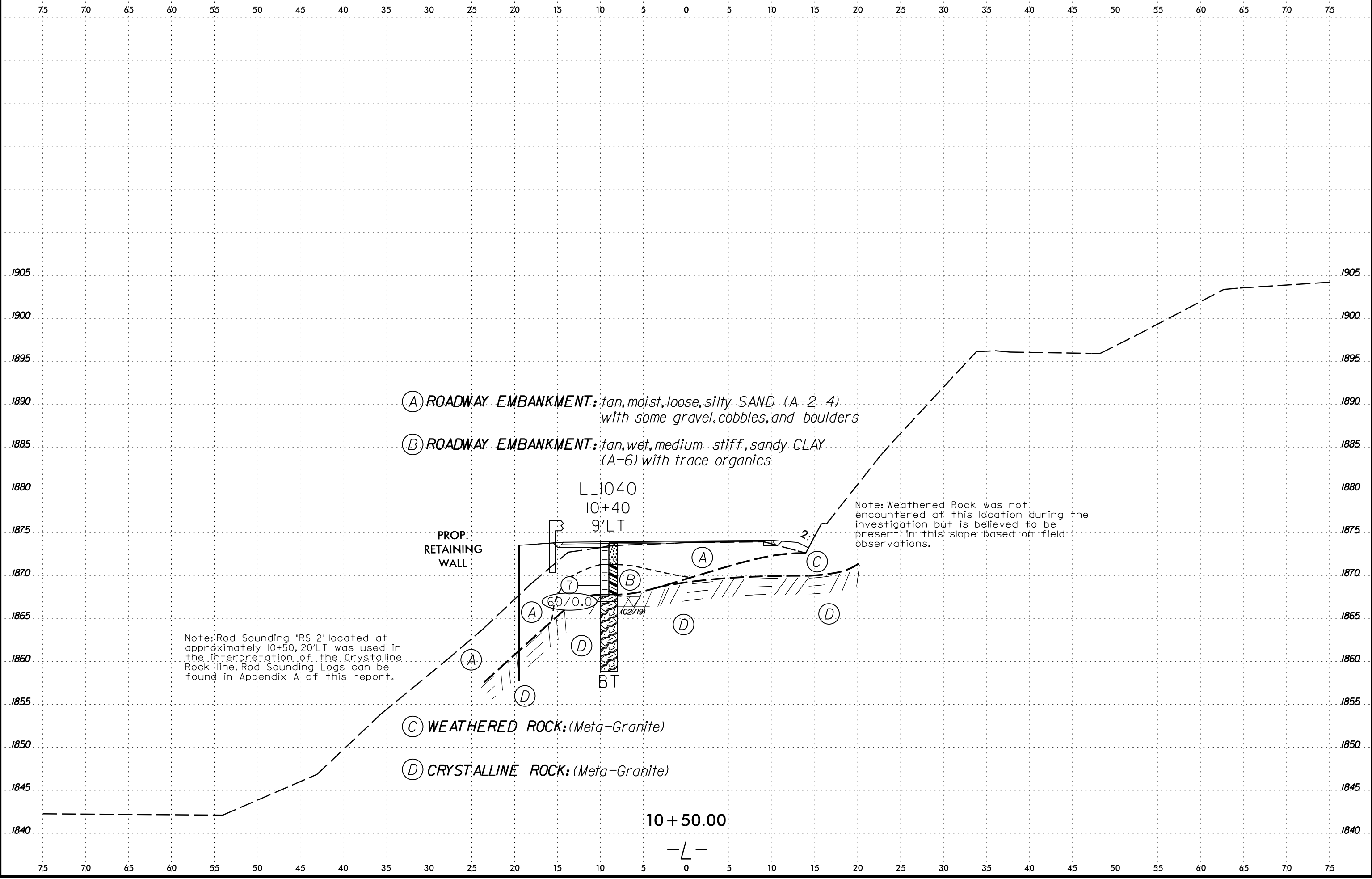
(C) WEATHERED ROCK: (Meta-Granite)

(D) CRYSTALLINE ROCK: (Meta-Granite)

10 + 25.00



6/23/16
25-MAR-2019 10:03
C:\Users\jgibson\Documents\NCDOT Projects\Active Projects\BR-0032 Roadway - Madison County\BR-0032 GEO-PDWY_Inventory\REV1_Summit\CADD_GEO\TECH\BR0032_GEO_xsi.L_Summit15-151.dgn



(A) ROADWAY EMBANKMENT: *tan, moist, loose, silty SAND (A-2-4) with some gravel, cobbles, and boulders*

(B) ROADWAY EMBANKMENT: *tan, wet, medium-stiff, sandy CLAY (A-6) with trace organics*

(C) WEATHERED ROCK: *(Meta-Granite)*

(D) CRYSTALLINE ROCK: *(Meta-Granite)*

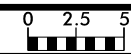
Note: Rod Sounding "RS-2" located at approximately 10+50, 20'LT was used in the interpretation of the Crystalline Rock line. Rod Sounding Logs can be found in Appendix A of this report.

Note: Weathered Rock was not encountered at this location during the investigation but is believed to be present in this slope based on field observations.

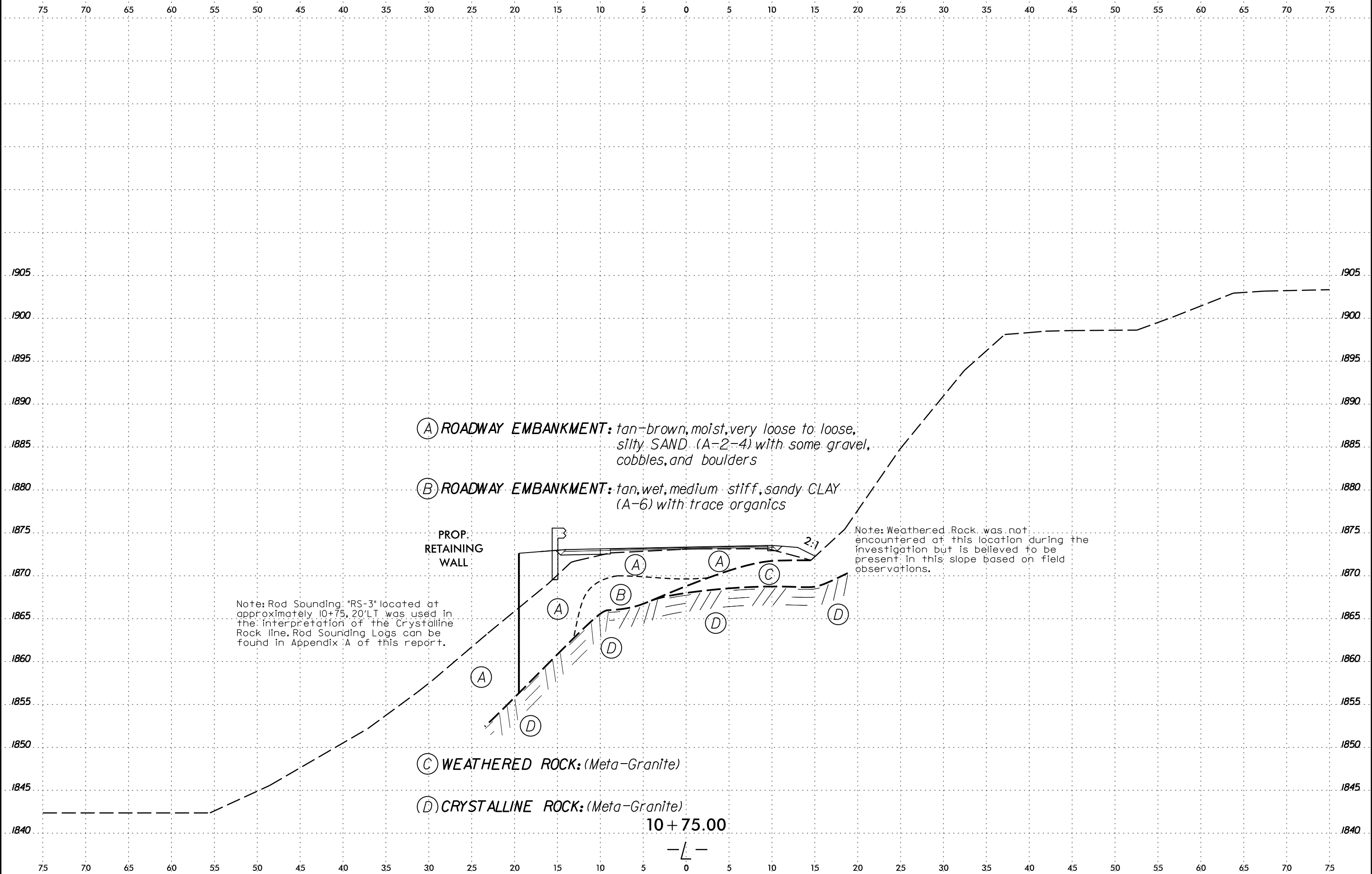
10 + 50.00

-L-

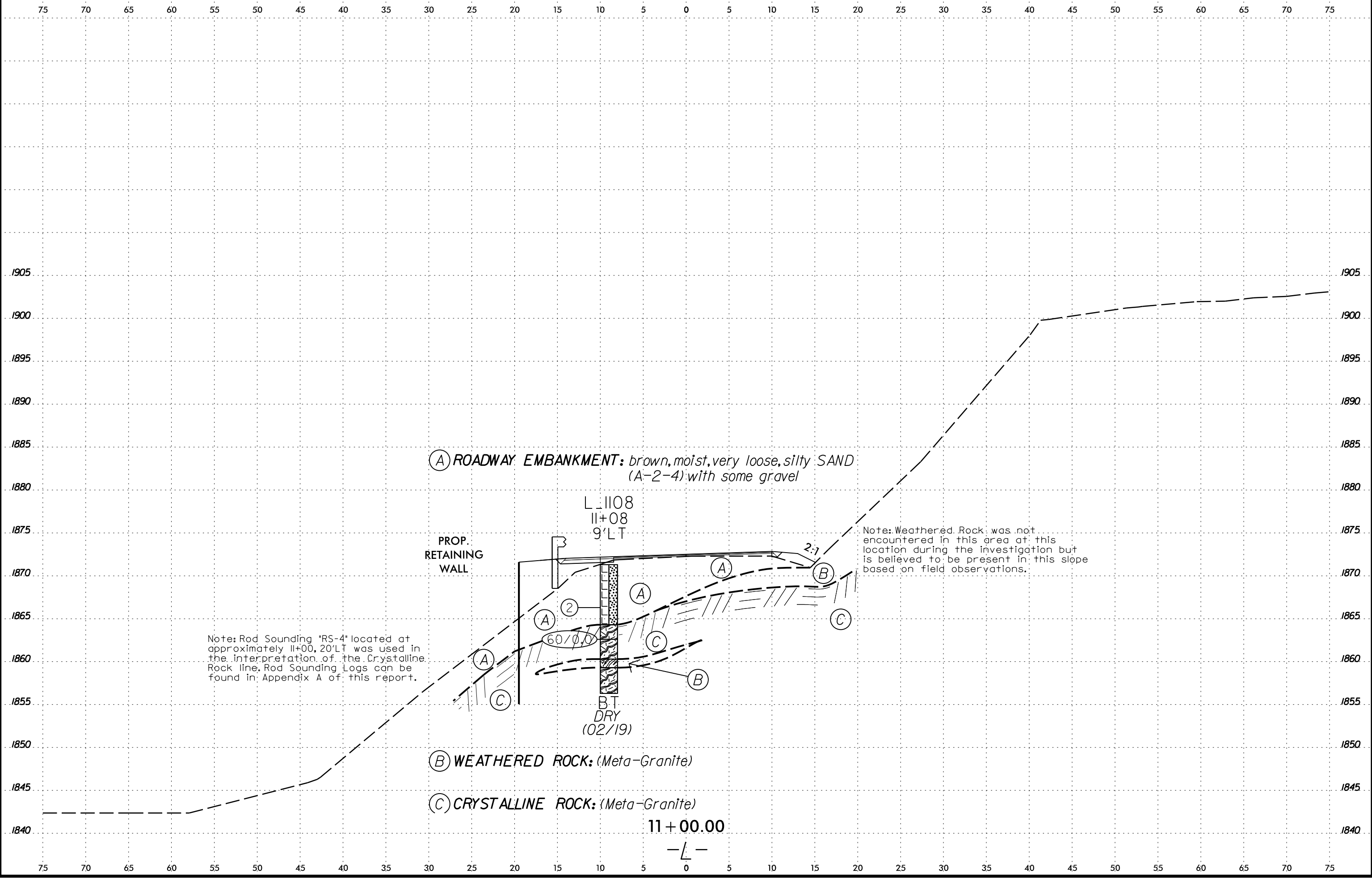
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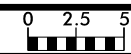
PROJ. REFERENCE NO.	SHEET NO.
BR-0032	8



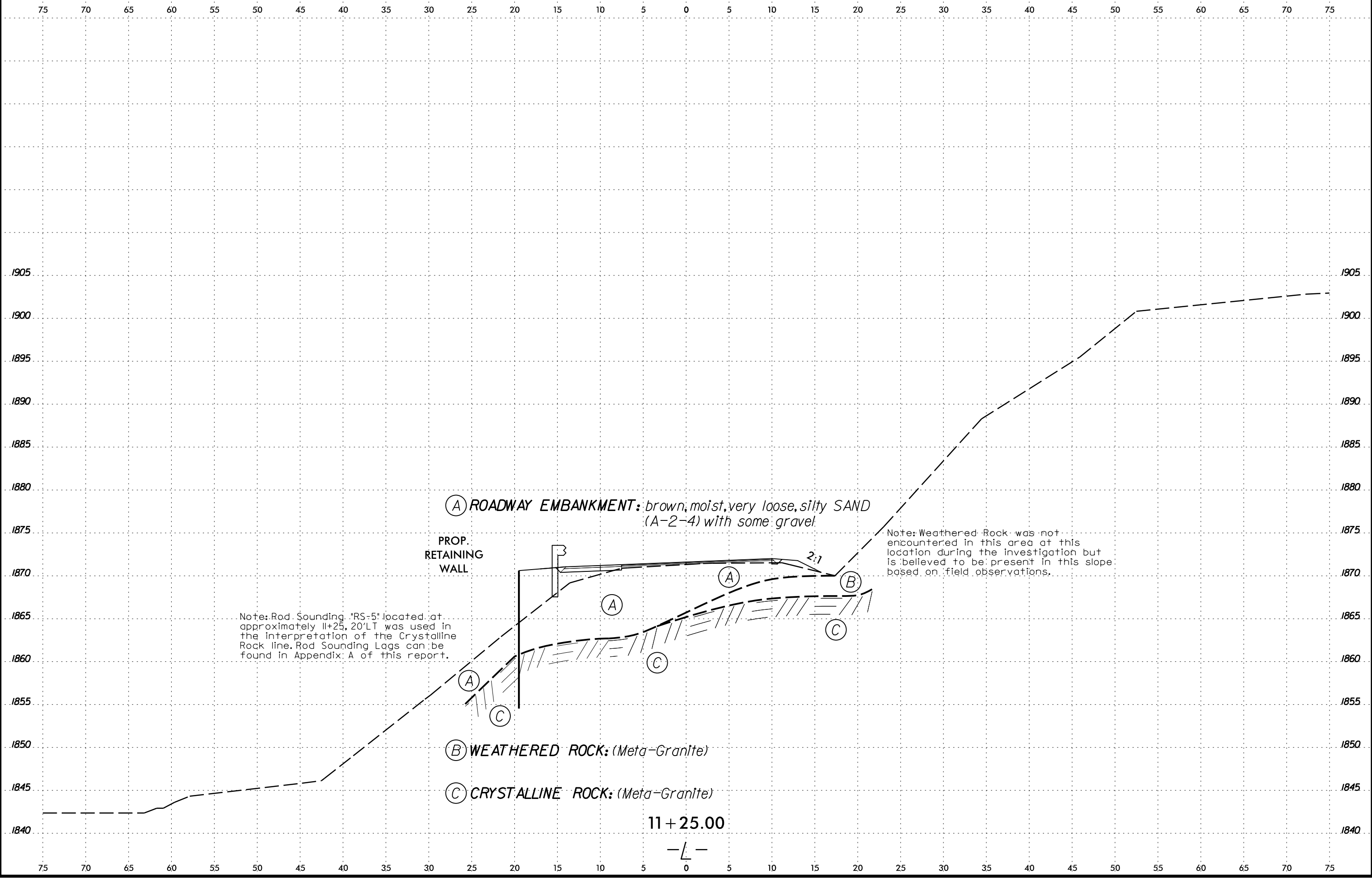
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6/23/16
25-MAR-2019 10:04
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PROJ. REFERENCE NO.	SHEET NO.
BR-0032	10



(A) ROADWAY EMBANKMENT: brown, moist, very loose, silty SAND (A-2-4) with some gravel

PROP. RETAINING WALL

Note: Weathered Rock was not encountered in this area at this location during the investigation but is believed to be present in this slope based on field observations.

Note: Rod Sounding "RS-5" located at approximately 11+25.00. LT was used in the interpretation of the Crystalline Rock line. Rod Sounding Logs can be found in Appendix A of this report.

(B) WEATHERED ROCK: (Meta-Granite)

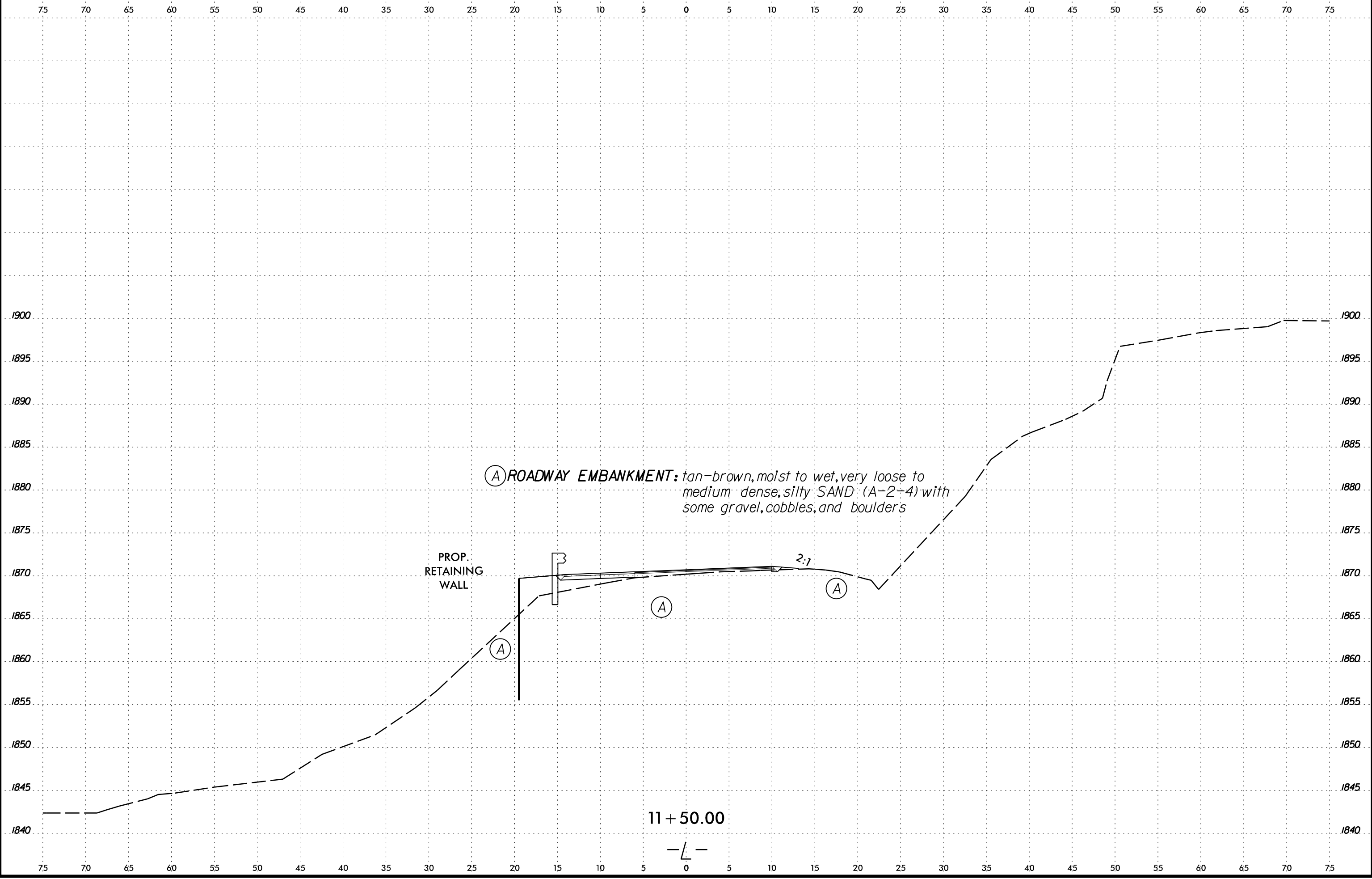
(C) CRYSTALLINE ROCK: (Meta-Granite)

11 + 25.00

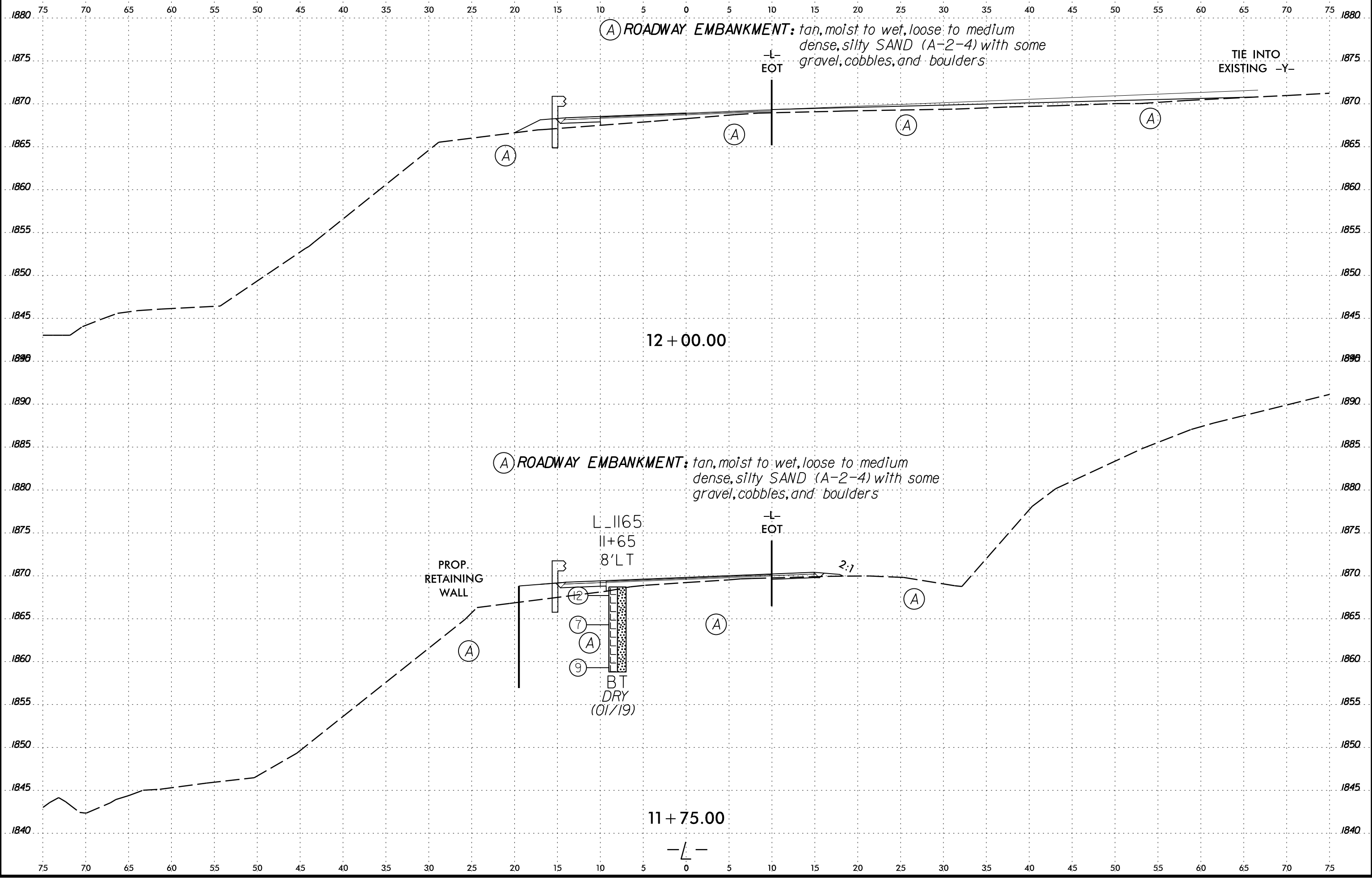
-L-

6/23/16
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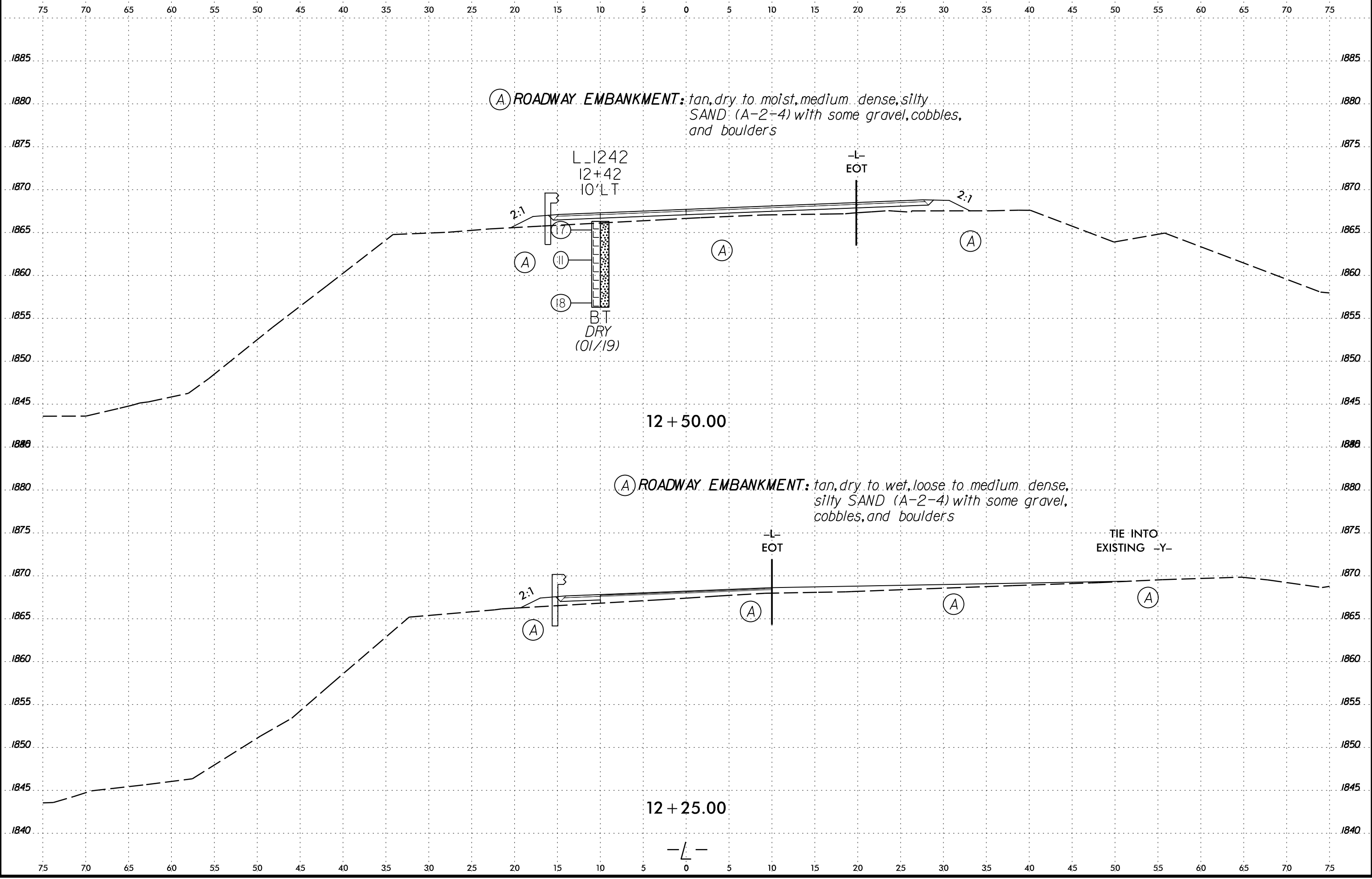
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	BR-0032	11



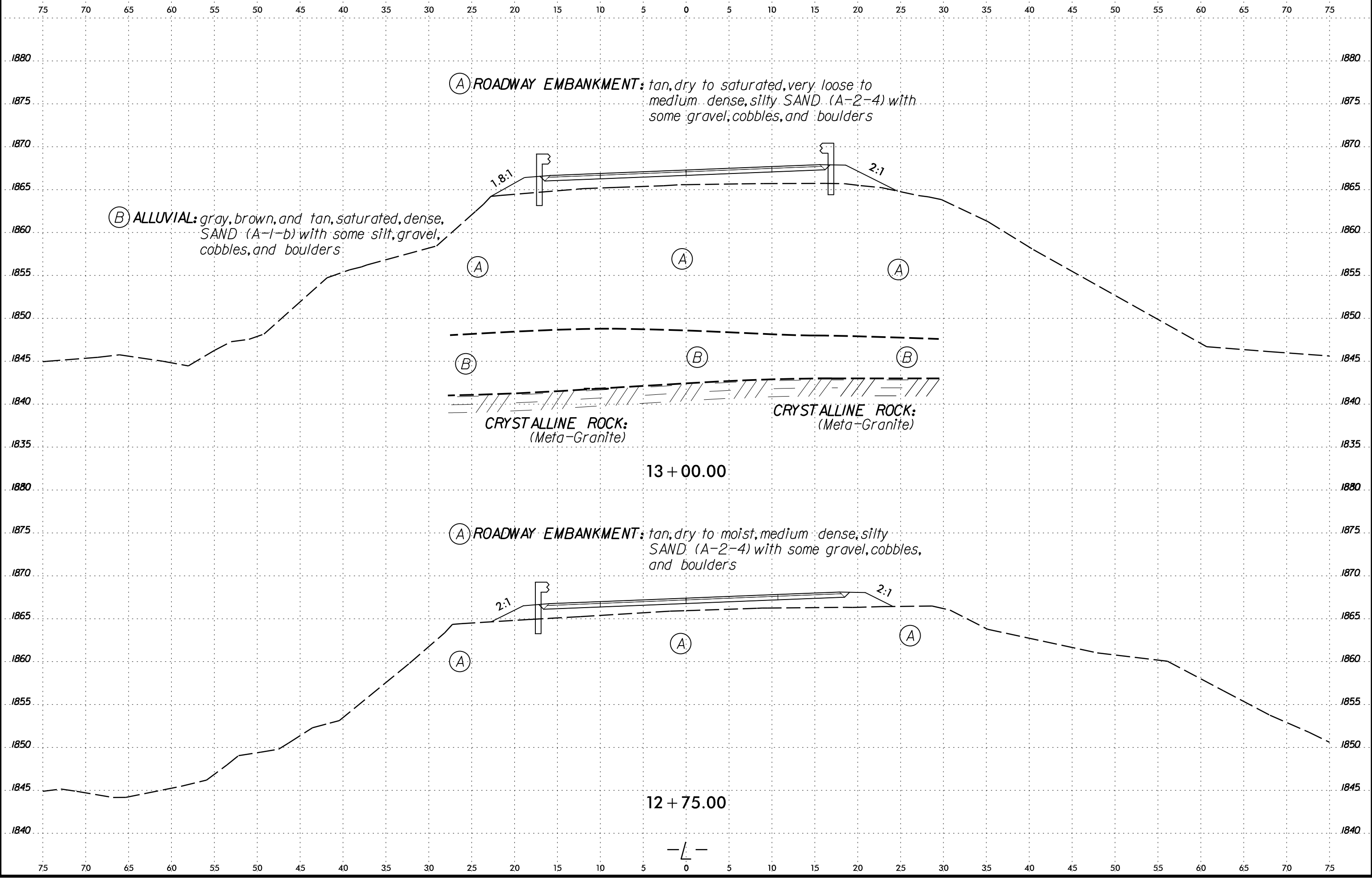
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SUBSERIAL#333



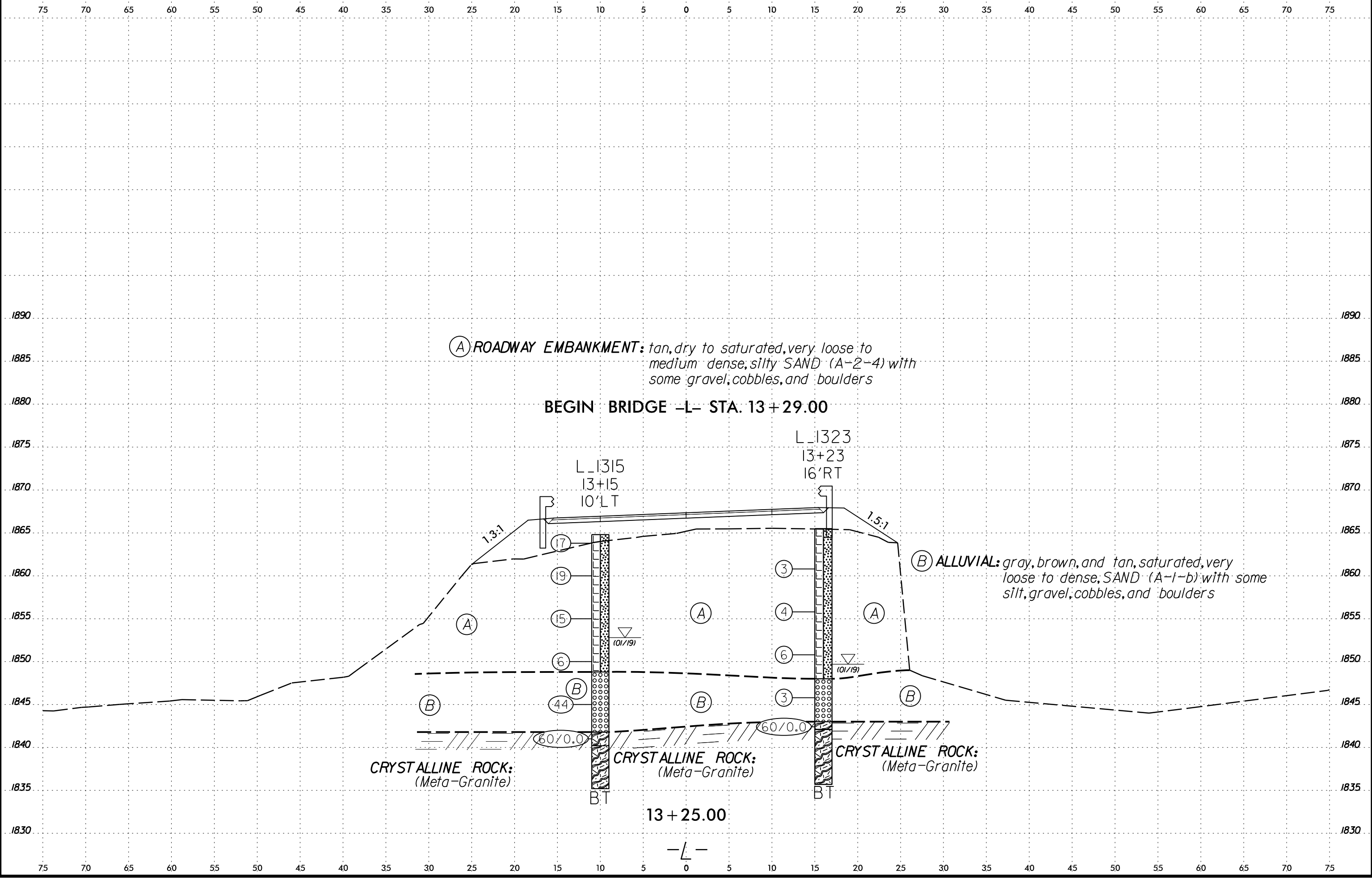
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6/23/16
25-MAR-2019 10:06
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6/23/16
25-MAR-2019 10:06
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(A) ROADWAY EMBANKMENT: tan, dry to saturated, very loose to medium dense, silty SAND (A-2-4) with some gravel, cobbles, and boulders

BEGIN BRIDGE -L- STA. 13+29.00

L_1315
13+15
10' LT

L_1323
13+23
16' RT

(B) ALLUVIAL: gray, brown, and tan, saturated, very loose to dense, SAND (A-1-b) with some silt, gravel, cobbles, and boulders

CRYSTALLINE ROCK:
(Meta-Granite)

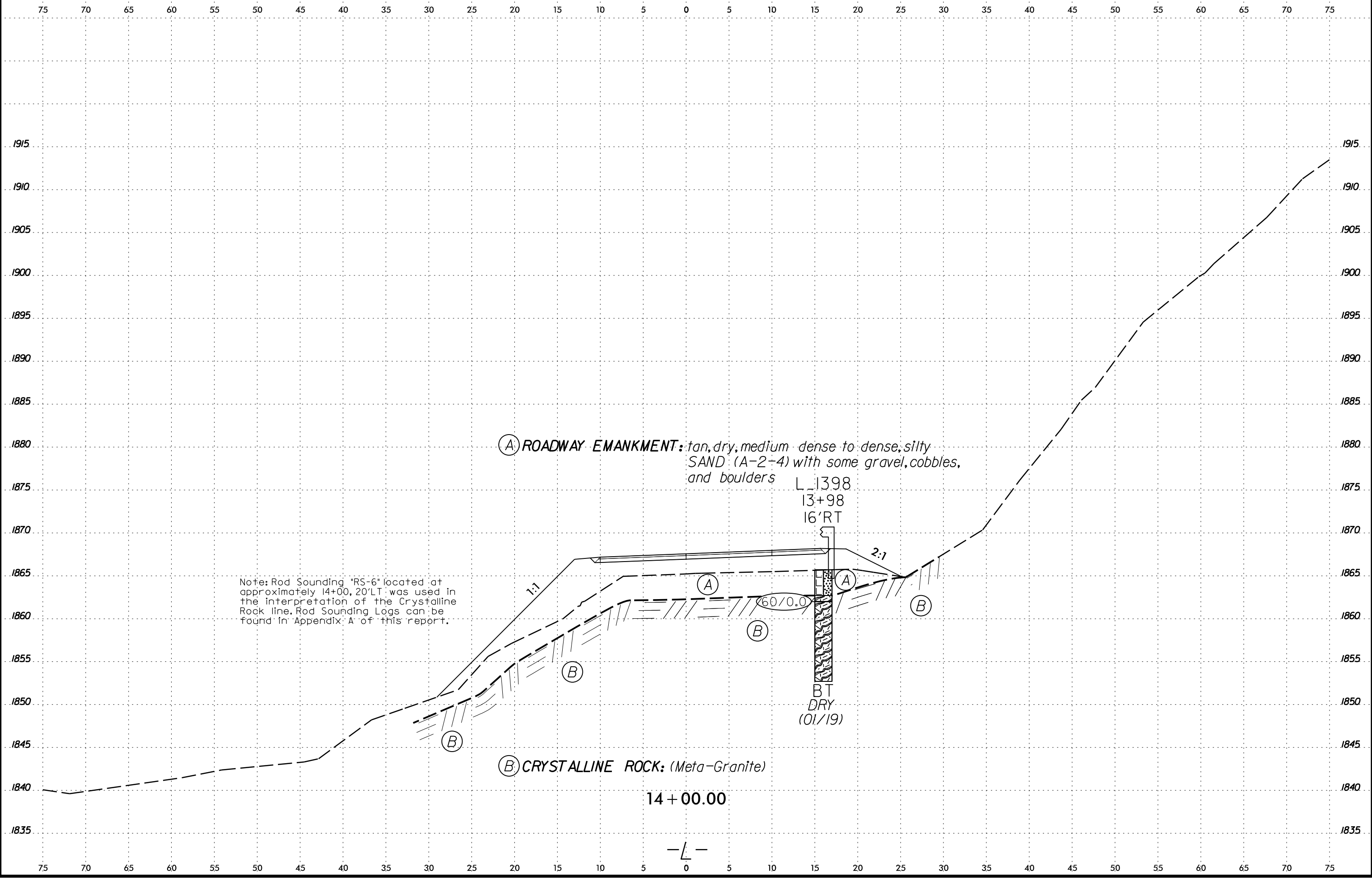
CRYSTALLINE ROCK:
(Meta-Granite)

CRYSTALLINE ROCK:
(Meta-Granite)

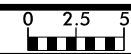
13+25.00

-L-

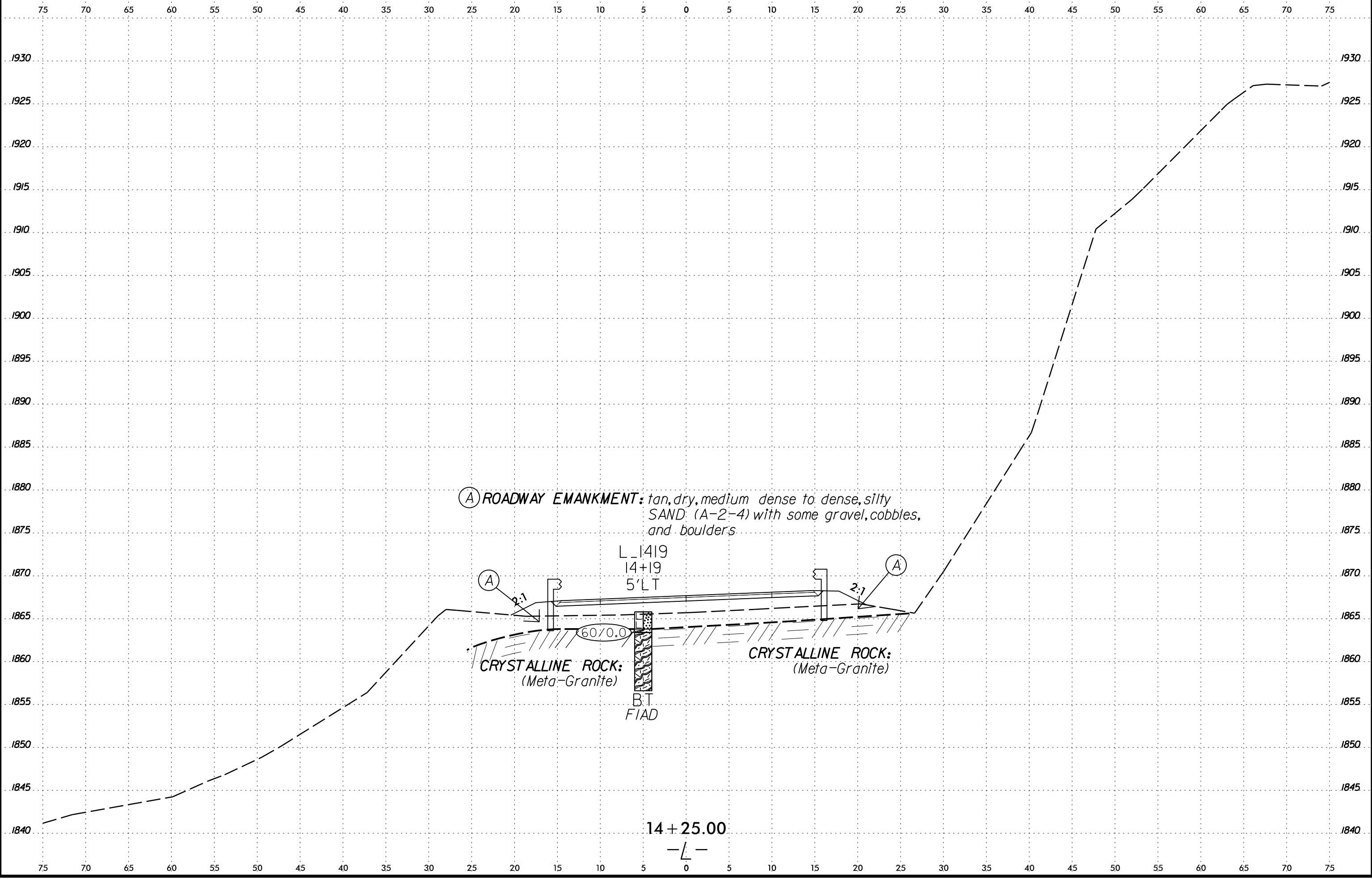
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6/23/16
25-MAR-2019 10:07
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PROJ. REFERENCE NO.	SHEET NO.
BR-0032	17



(A) ROADWAY EMANKMENT: *tan, dry, medium dense to dense, silty SAND: (A-2-4) with some gravel, cobbles, and boulders.*

L_1419
14+19
5' LT

(A)

(A)

CRYSTALLINE ROCK:
(Meta-Granite)

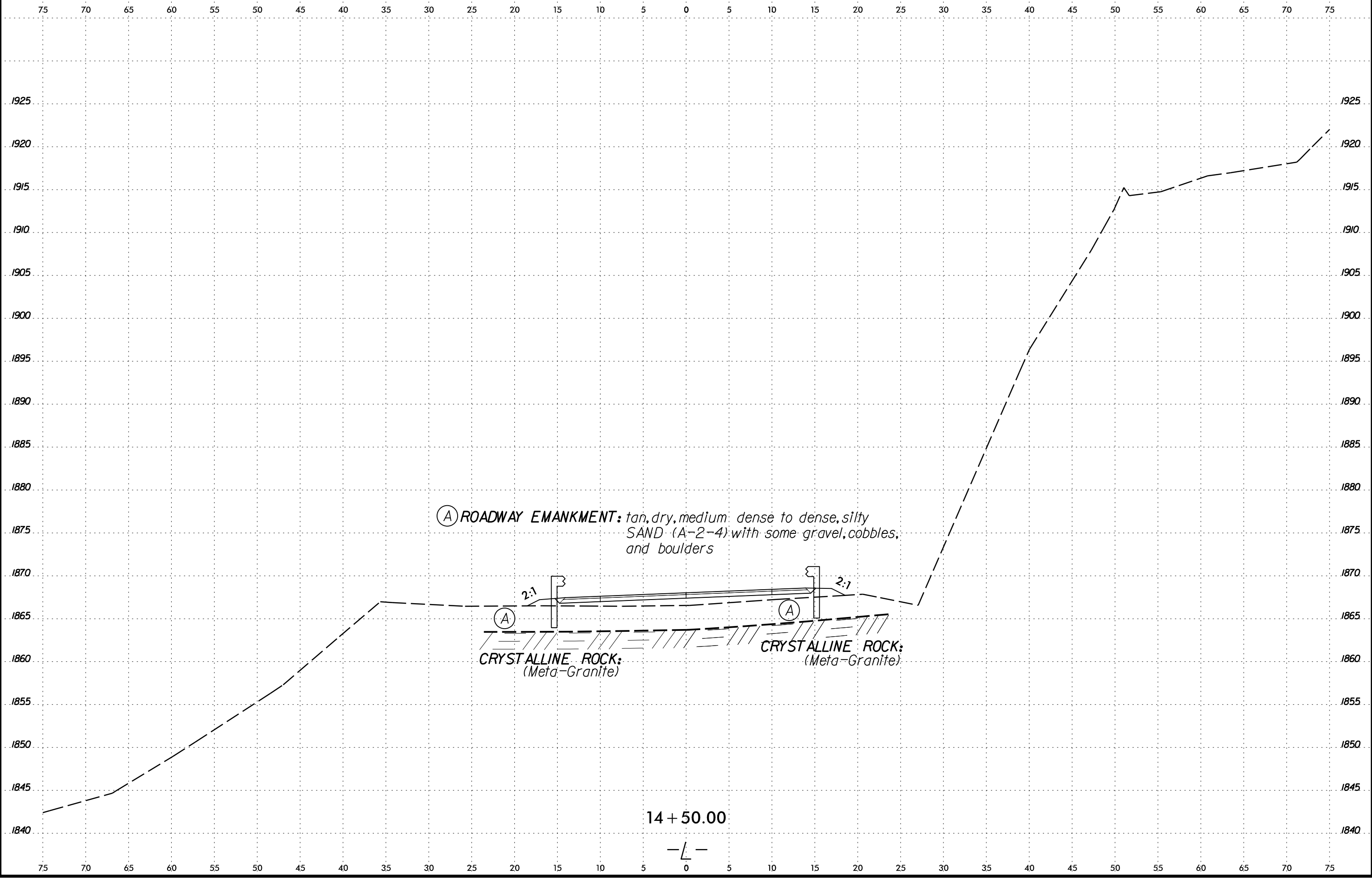
CRYSTALLINE ROCK:
(Meta-Granite)

BT
FIAD

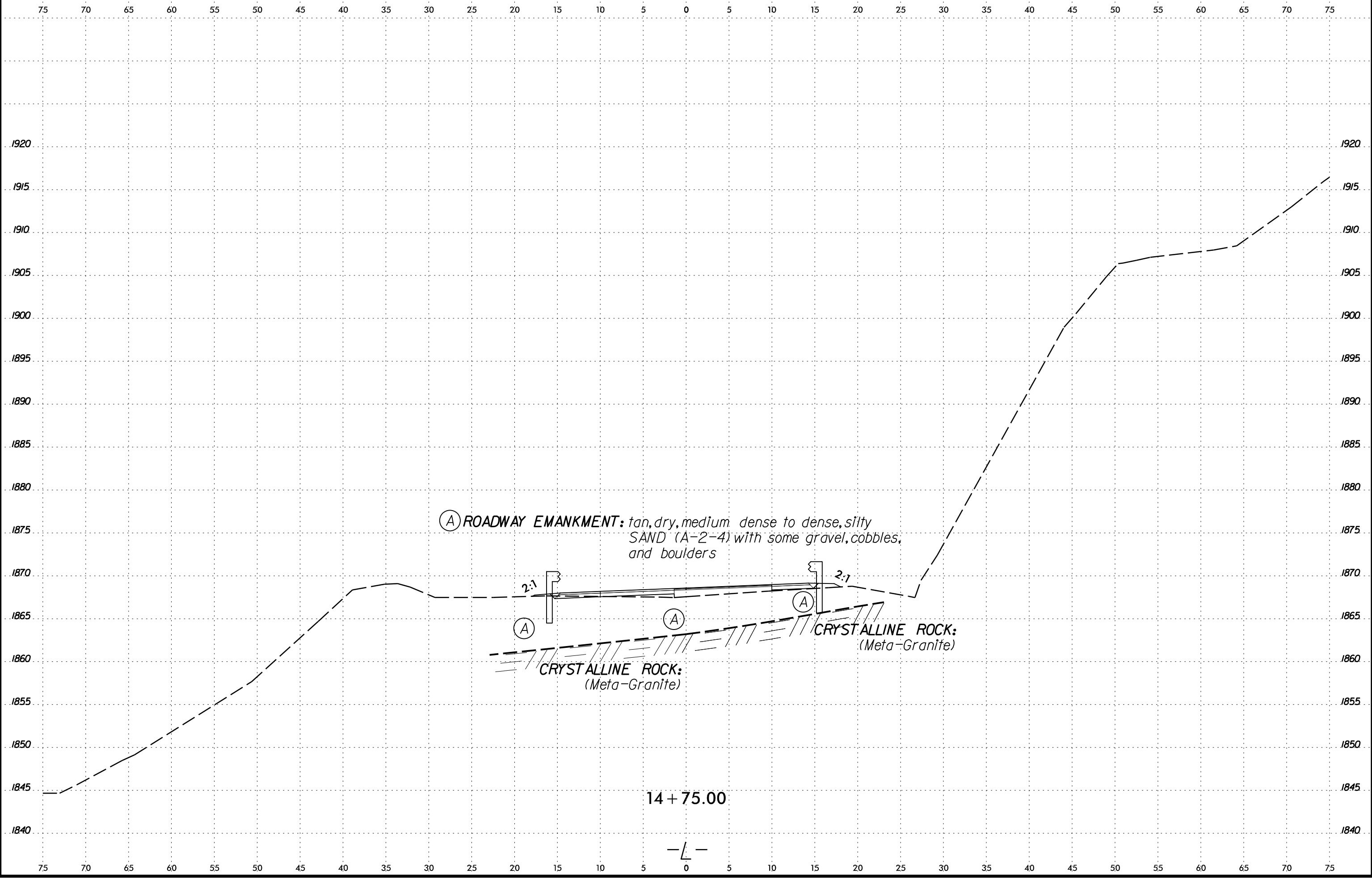
14 + 25.00

-L-

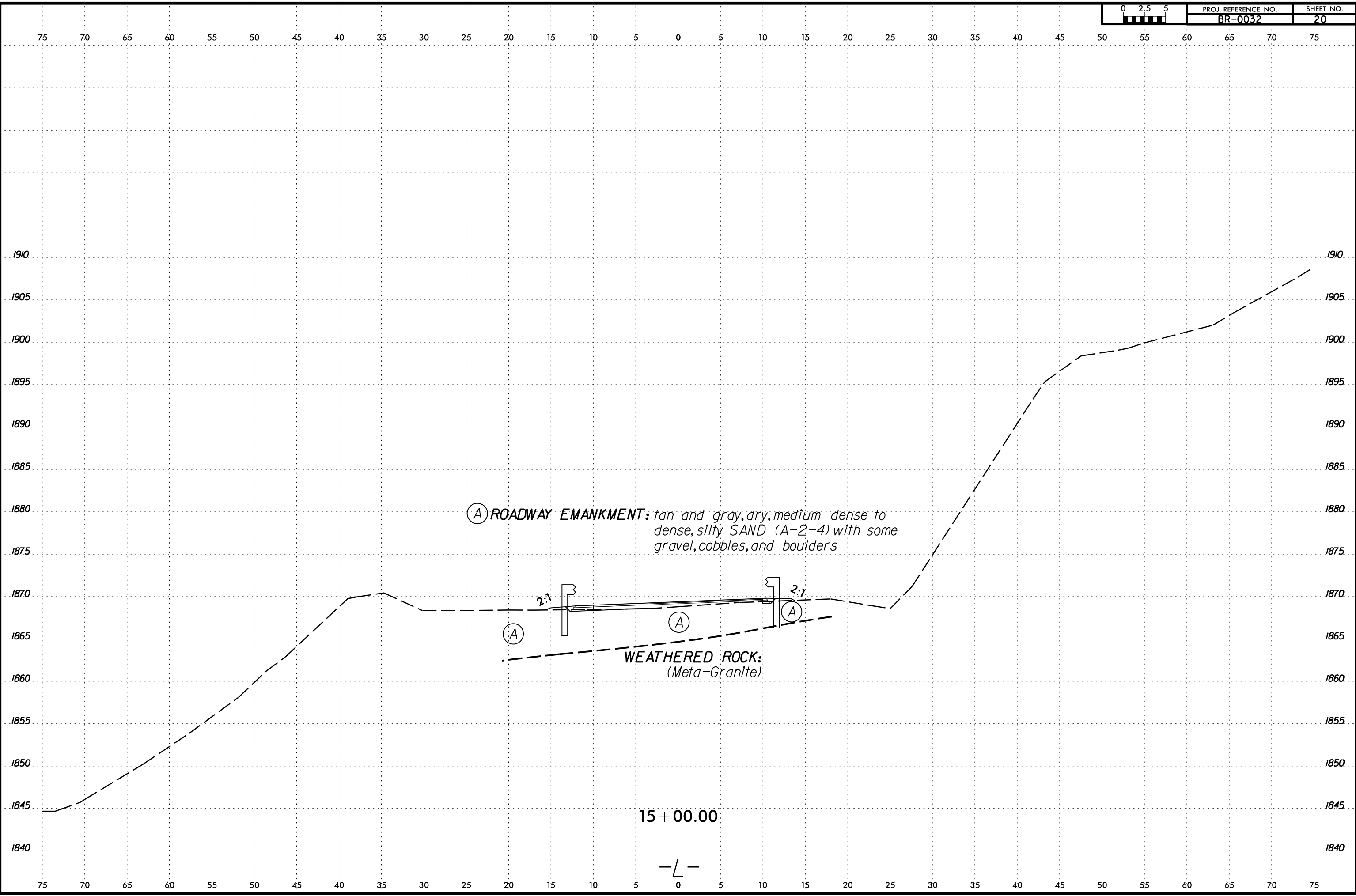
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6/23/16
25-MAR-2019 10:08
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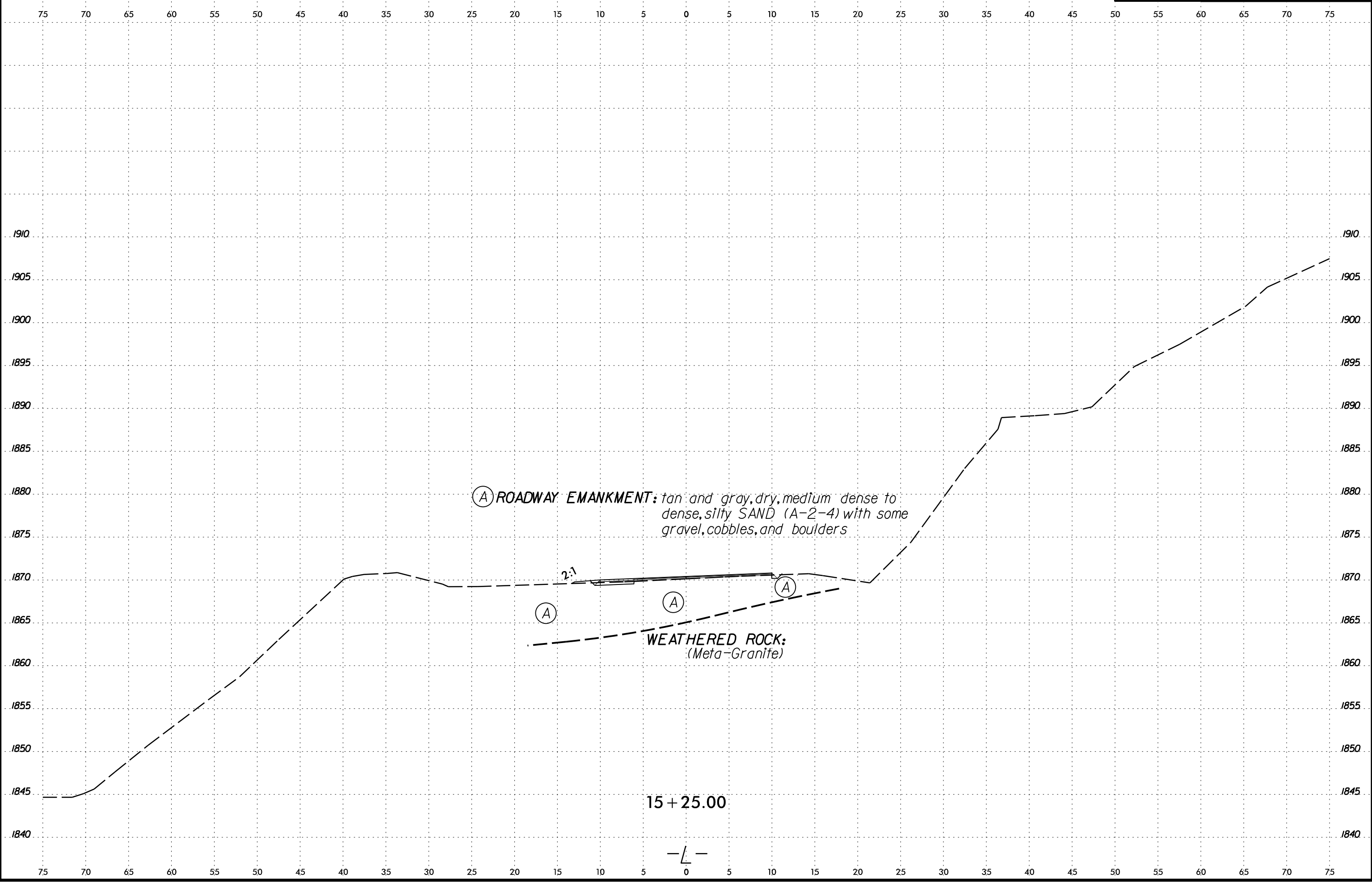
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25-MAR-2019 10:09
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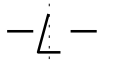
PROJ. REFERENCE NO.	SHEET NO.
BR-0032	21



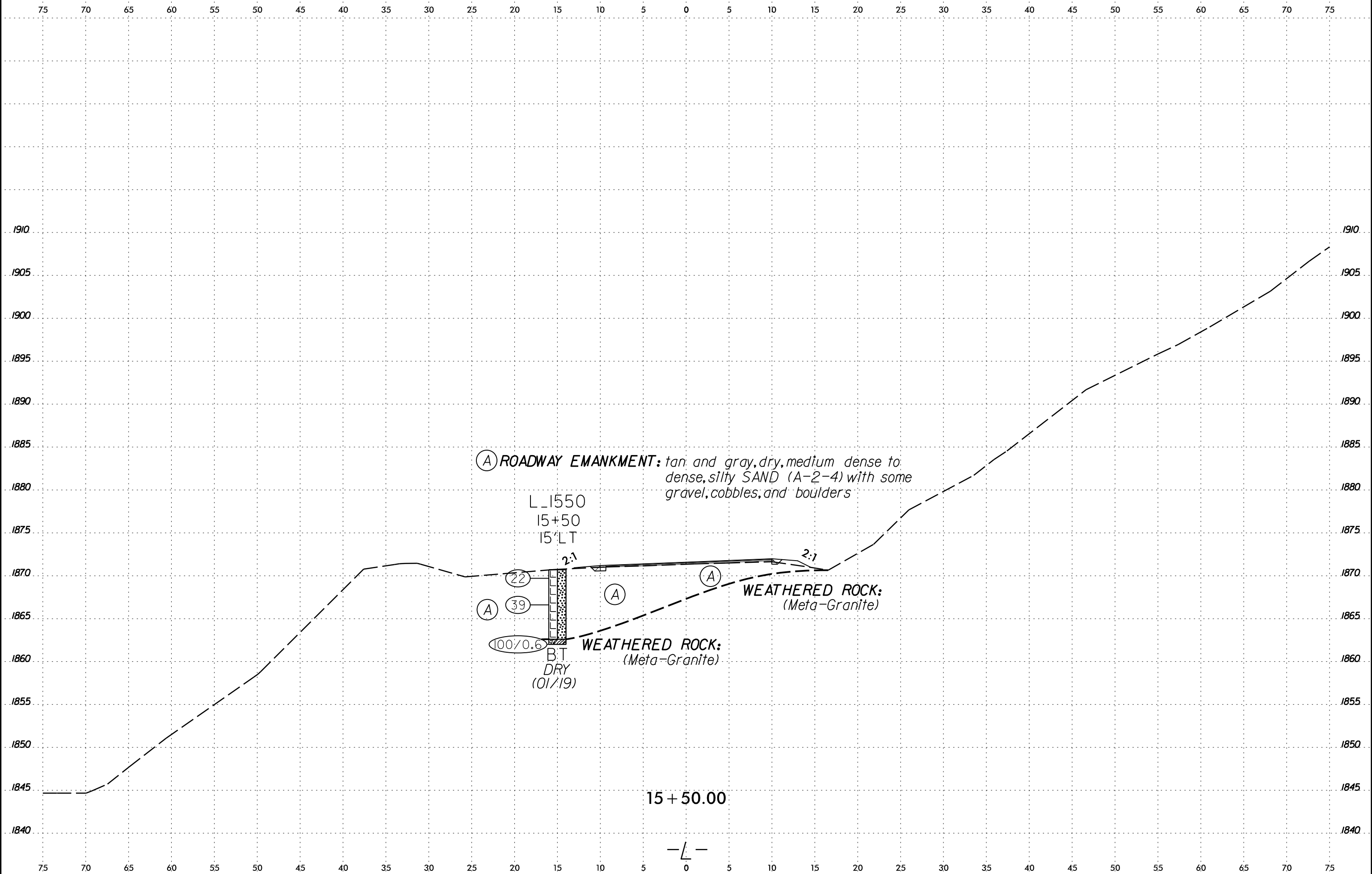
(A) ROADWAY EMBANKMENT: tan and gray, dry, medium dense to dense, silty SAND (A-2-4) with some gravel, cobbles, and boulders

(A) WEATHERED ROCK:
(Meta-Granite)

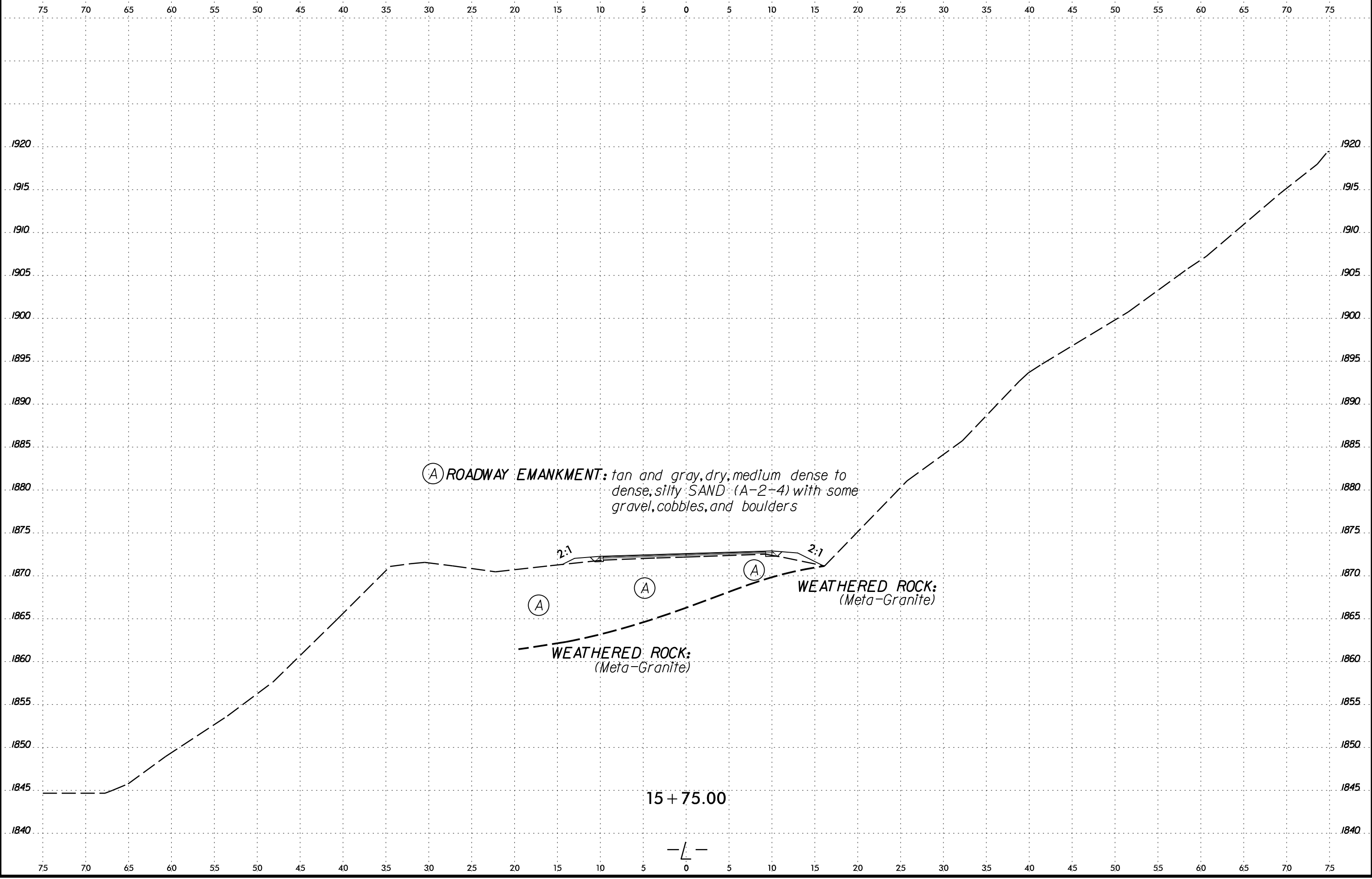
15 + 25.00



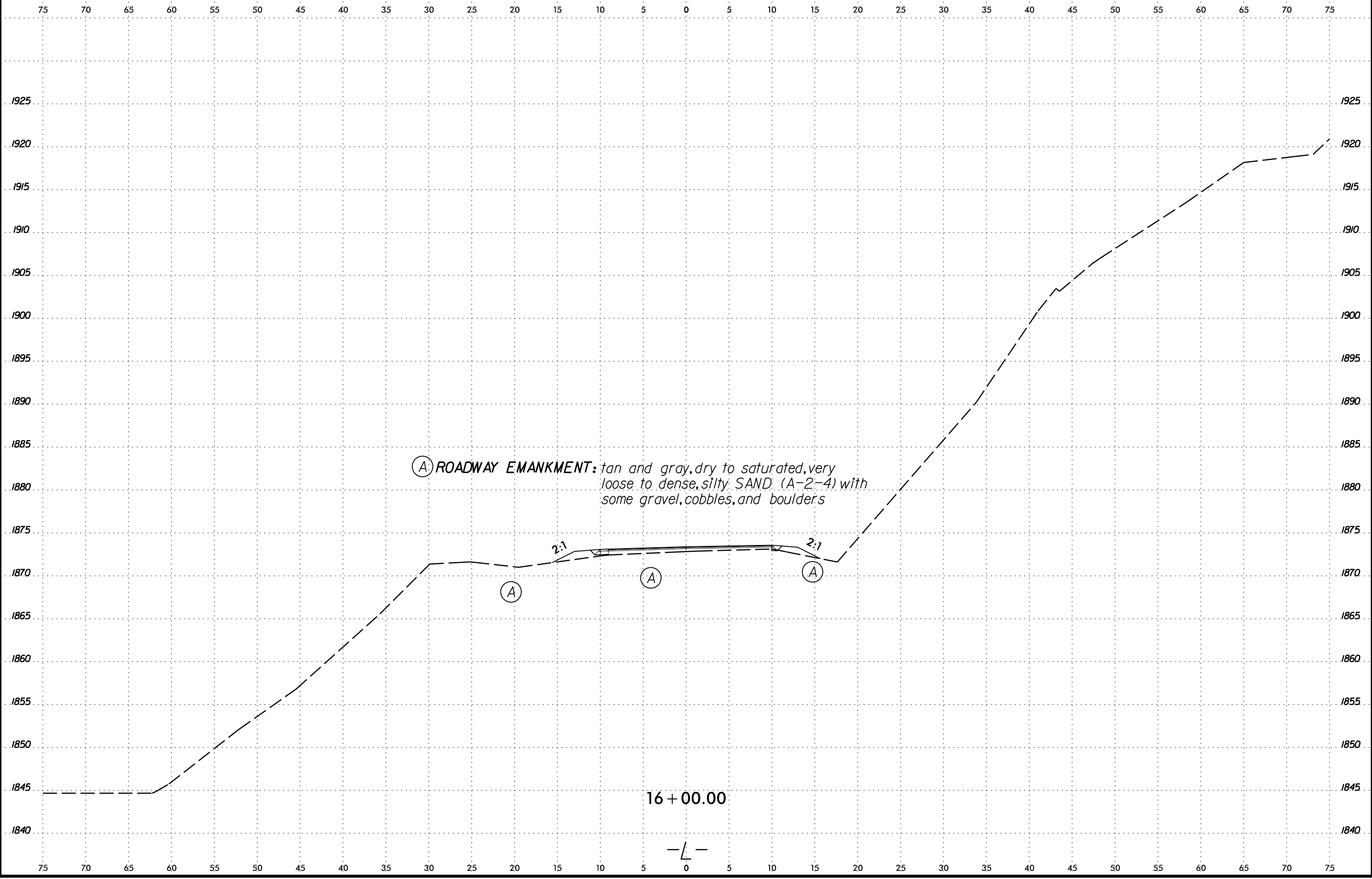
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6/23/16
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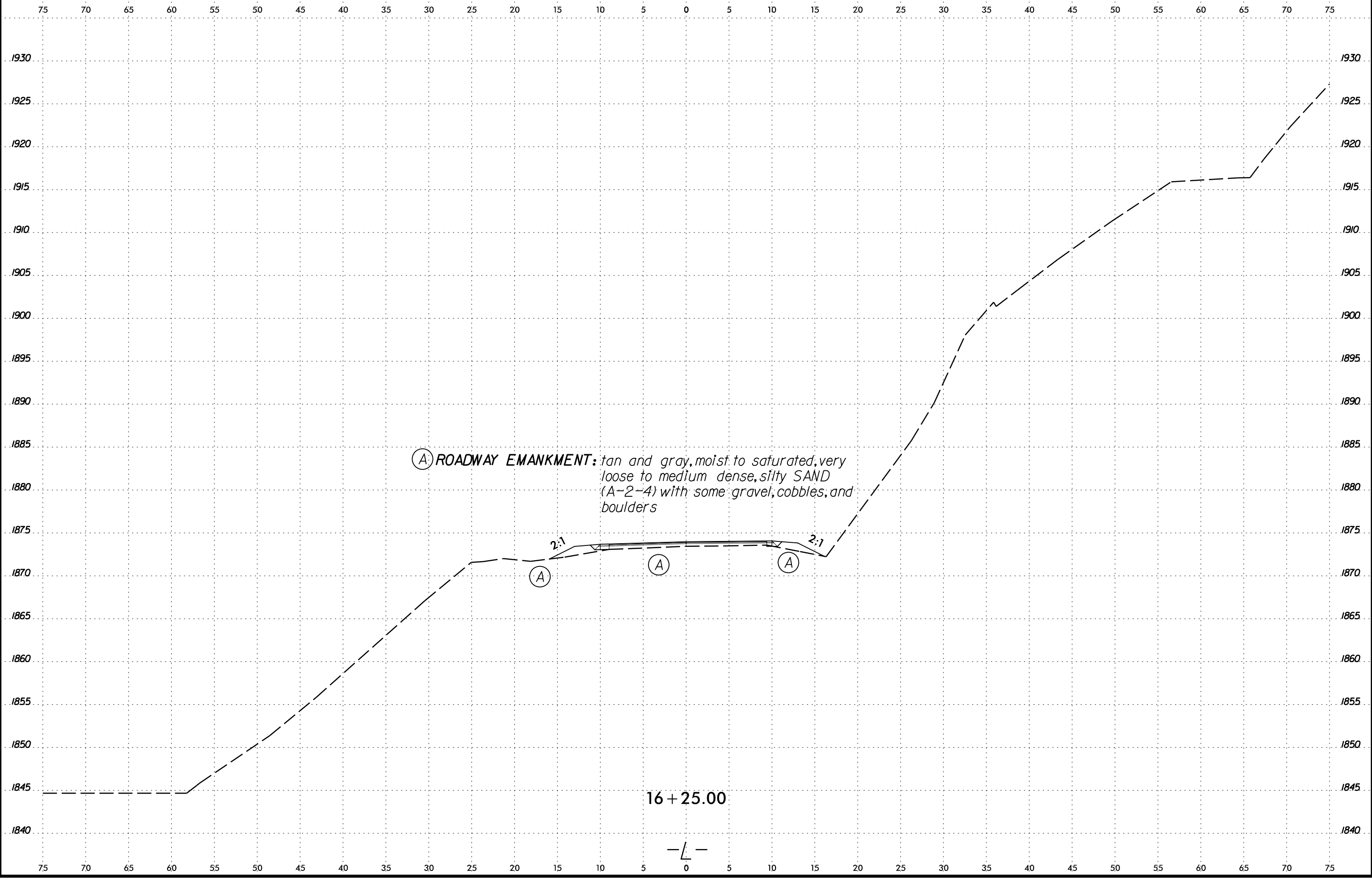


25-MAR-2019 10:40
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6/23/16

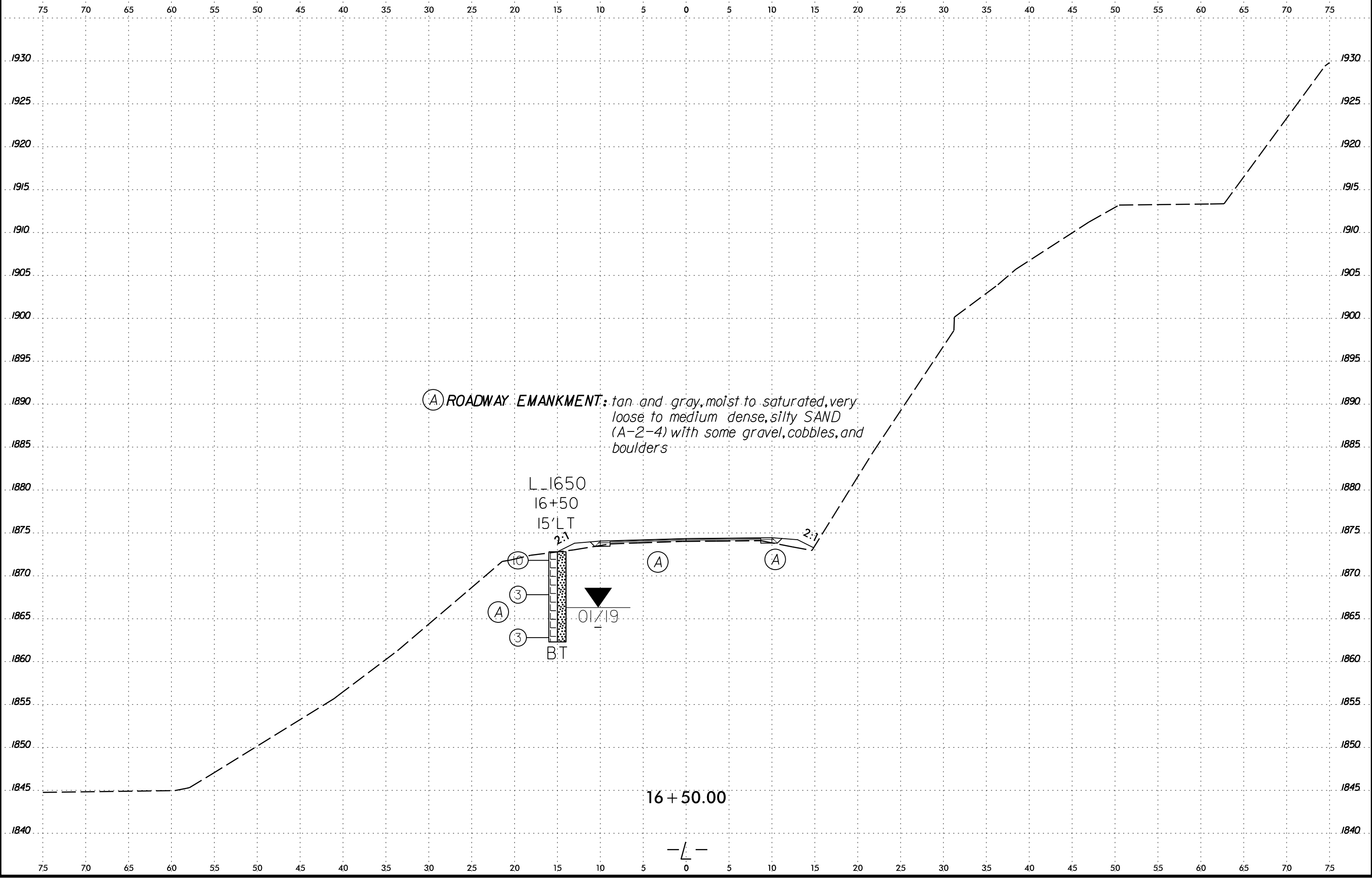


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SUBSTRNAME

0 2.5 5	PROJ. REFERENCE NO. BR-0032	SHEET NO. 25
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6/23/16
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(A) ROADWAY EMBANKMENT: tan and gray, moist to saturated, very loose to medium dense, silty SAND (A-2-4) with some gravel, cobbles, and boulders

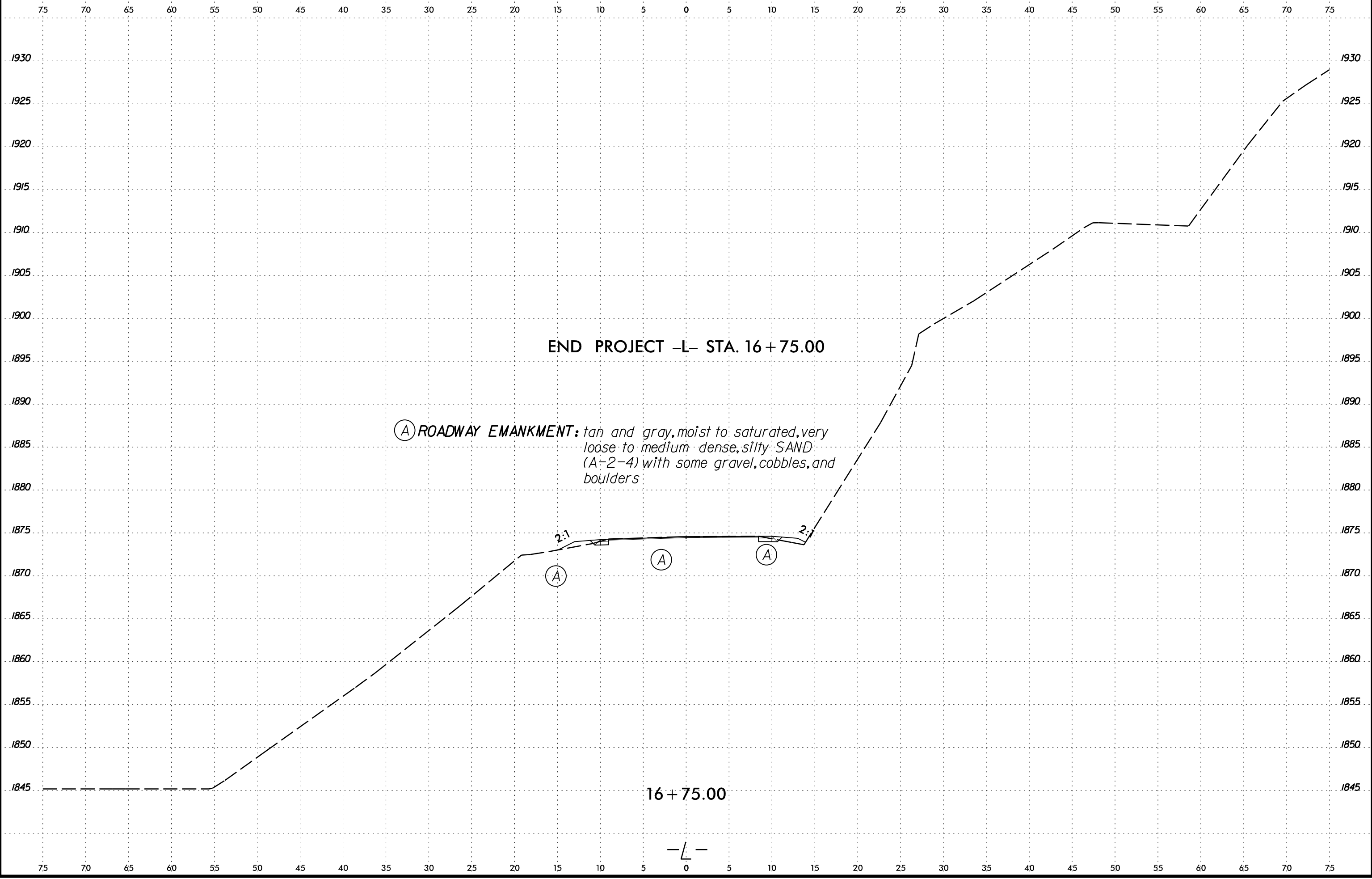
L_1650
16+50
15' LT
2:1
B.T

01719

16 + 50.00

— L —

6/23/16
25-MAR-2019 10:11
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SUBSEQUENT



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
APPENDIX A
CORE LOGS, CORE PHOTOS, AND ROD SOUNDING LOGS

REFERENCE: BR-0032

PROJECT: 67032

Prepared in the
Office of:



NC FIRM LICENSE No: P-0339 and C-487
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1040		STATION 10+40		OFFSET 9 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1,873.8 ft		TOTAL DEPTH 14.9 ft		NORTHING 779,800		EASTING 855,370					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 02/01/19		COMP. DATE 02/01/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 8.1 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1867.05	1,867.0	6.8	3.1	N=60/0.0 3:42/1.0 3:52/1.0 3:09/1.1	(3.0) 97%	(1.4) 45%	(8.0) 99%	(4.3) 53%		Begin Coring @ 6.8 ft	6.8
1865	1,863.9	9.9	5.0	2:45/1.0 2:50/1.0 3:14/1.0 3:20/1.0 4:05/1.0	(5.0) 100%	(2.9) 58%				CRYSTALLINE ROCK gray, pink, and white, moderate to moderately severe weathering, medium hard to hard, close fracture spacing, METAMORPHOSED GRANITE (Meta-Granite). GSI: 55-65	
1860	1,858.9	14.9								Boring Terminated at Elevation 1,858.9 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 6.8 feet.	14.9

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1108		STATION 11+08		OFFSET 9 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1,871.3 ft		TOTAL DEPTH 15.0 ft		NORTHING 779,739		EASTING 855,399					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 02/01/19		COMP. DATE 02/01/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 6.3 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1862.61	1,862.6	8.7	1.3	N=60/0.0 4:21/1.3	(0.8) 62%	(0.4) 31%	(1.8) 78%	(0.8) 35%		Begin Coring @ 8.7 ft	8.7
1860	1,861.3	10.0	5.0	2:29/1.0 1:36/1.0 3:15/1.0 3:46/1.0 4:59/1.0	(4.3) 86%	(2.6) 52%				CRYSTALLINE ROCK brown, pink, and gray, moderate to moderately severe weathering, close fracture spacing, moderately hard, METAMORPHOSED GRANITE (Meta-Granite). GSI: 50-60	11.0
										WEATHERED ROCK (Meta-Granite)	12.0
	1,856.3	15.0								CRYSTALLINE ROCK pink, gray, black, and white, slight weathering, hard, moderately close fracture spacing, METAMORPHOSED GRANITE (Meta-Granite). GSI: 70-80 Boring Terminated at Elevation 1,856.3 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 8.7 feet.	15.0

NCDOT CORE DOUBLE BR0032_GEO_RDWY_GINT_SUMMIT.GPJ NC_DOT_GDT 2/22/19

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1315		STATION 13+15		OFFSET 10 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1,864.8 ft		TOTAL DEPTH 29.6 ft		NORTHING 779,585		EASTING 855,528					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 01/23/19		COMP. DATE 01/24/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 5.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1840.2	1,840.2	24.6	5.0	4:51/1.0 5:11/1.0 3:52/1.0 5:45/1.0 9:35/1.0	(4.6) 92%	(2.6) 52%	(4.6) 92%	(2.6) 52%	[Pattern]	1,840.2 gray, pink and white, moderate severe to slight weathering, medium hard to very hard, close fracture spacing, METAMORPHOSED GRANITE (Meta-Granite). GSI: 60-70	24.6
	1,835.2	29.6							[Pattern]	Boring Terminated at Elevation 1,835.2 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 24.6 feet.	29.6

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1323		STATION 13+23		OFFSET 16 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 1,865.5 ft		TOTAL DEPTH 29.8 ft		NORTHING 779,559		EASTING 855,519					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 01/31/19		COMP. DATE 01/31/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 6.4 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1842.1	1,842.1	23.4	1.4	9:25/1.4	(1.2) 86%	(1.0) 71%	(5.7) 89%	(2.3) 36%	[Pattern]	1,842.1 CRYSTALLINE ROCK	23.4
1840	1,840.7	24.8	5.0	2:32/1.0 3:56/1.0 4:11/1.0 5:26/1.0 6:29/1.0	(4.5) 90%	(1.3) 26%			[Pattern]	1,840.7 gray, pink, white, and black, moderate severe to slight weathering, medium hard to very hard, close to moderately close fracture spacing, METAMORPHOSED GRANITE (Meta-Granite). GSI: 60-70	24.8
	1,835.7	29.8							[Pattern]	Boring Terminated at Elevation 1,835.7 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 23.4 feet.	29.8

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1398		STATION 13+98		OFFSET 16 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 1,865.7 ft		TOTAL DEPTH 13.0 ft		NORTHING 779,512		EASTING 855,578					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 01/31/19		COMP. DATE 01/31/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 9.3 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1862	1,862.0	3.7	1.3	N=60/0.0 3:11/1.3	(1.0) 77%	(0.4) 31%	(8.4) 90%	(2.7) 29%		Continued from previous page	
1860	1,860.7	5.0	5.0	2:02/1.0 2:31/1.0 3:09/1.0 3:40/1.0 3:23/1.0	(4.8) 96%	(1.2) 24%				1,862.0	3.7
1855	1,855.7	10.0	3.0	2:28/1.0 3:35/1.0 4:07/1.0	(2.6) 87%	(1.1) 37%					
	1,852.7	13.0									1,852.7
Boring Terminated at Elevation 1,852.7 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 3.7 feet.											

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)				
BORING NO. L_1419		STATION 14+19		OFFSET 5 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1,865.8 ft		TOTAL DEPTH 9.2 ft		NORTHING 779,519		EASTING 855,608					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 90% 11/19/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 01/25/19		COMP. DATE 01/25/19		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 6.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
1863.4	1,863.4	2.4	1.8	N=60/0.0 5:53/0.8 6:45/1.0	(1.5) 83%	(1.0) 56%	(6.4) 94%	(2.9) 43%		Continued from previous page	
1860	1,861.6	4.2	5.0	9:27/1.0 6:44/1.0 6:02/1.0 3:20/1.0 7:18/1.0	(4.9) 98%	(1.9) 38%				1,863.4	2.4
	1,856.6	9.2									1,856.6
Boring Terminated at Elevation 1,856.6 ft in Crystalline Rock (Meta-Granite) - Casing advancer refusal and begin core at 2.4 feet.											

CORE PHOTOGRAPHS

L_1040
6.8 - 14.9 FEET



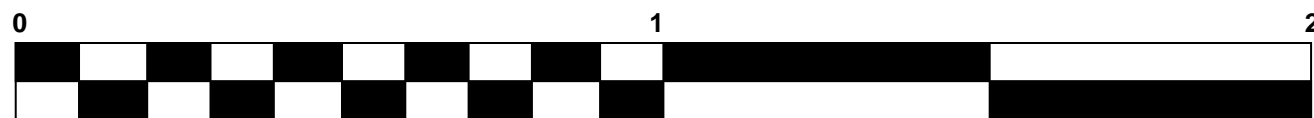
L_1315
24.6 - 29.6 FEET



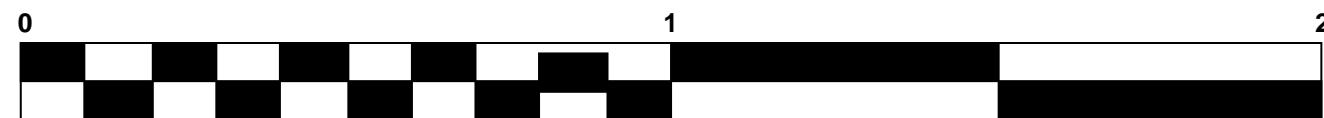
L_1108
8.7 - 15.0 FEET



L_1323
23.4 - 29.8 FEET



FEET



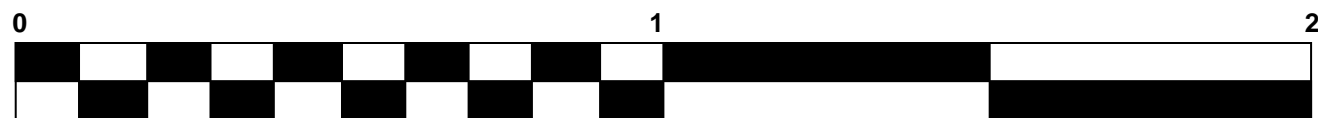
FEET

CORE PHOTOGRAPHS

L_1398
3.7 - 13.0 FEET



L_1419
2.4 - 9.2 FEET



FEET

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.											
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)										
BORING NO. RS-1		STATION 10+25		OFFSET 20 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 1,869.1 ft		TOTAL DEPTH 8.0 ft		NORTHING 779,818		EASTING 855,373											
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A											
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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							
1870														1,869.1	GROUND SURFACE	0.0	
1865			1	1		2									ROADWAY EMBANKMENT tan, moist, loose, silty SAND (A-2-4) with some gravel, cobbles, and boulders		
			5	6													
			8	4													
			3	3													
			2	1													
			3	5													
			10	8													
			3	2													
														1,861.1		Boring Terminated at Elevation 1,861.1 ft in Roadway Embankment (silty SAND)	8.0

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.										
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)									
BORING NO. RS-2		STATION 10+50		OFFSET 20 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,867.3 ft		TOTAL DEPTH 6.5 ft		NORTHING 779,795		EASTING 855,384										
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A										
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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						
1870														1,867.3	GROUND SURFACE	0.0
1865			0	1		1									ROADWAY EMBANKMENT tan, moist, loose, silty SAND (A-2-4) with some gravel, cobbles, and boulders	
			0	1												
			1	1												
			1	2												
			2	2												
			3	3												
			3	50/0.0										50/0.0		
														1,860.8	CRYSTALLINE ROCK (Meta-Granite) Boring Terminated at Elevation 1,860.8 ft on Crystalline Rock (Meta-Granite) - Rod sounding refusal at 6.5 feet was interpreted as a refusal on Crystalline Rock. However, it should be noted that it is possible that the refusal was a result of a boulder within the Roadway Embankment.	6.5

NCDOT BORE DOUBLE BR0032_GEO_RDWY_GINT_SUMMIT.GPJ_NC_DOT_GDT_3/25/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.									
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)								
BORING NO. RS-3		STATION 10+75		OFFSET 20 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,865.9 ft		TOTAL DEPTH 8.0 ft		NORTHING 779,773		EASTING 855,394									
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A									
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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					
1870															
1865			1	1		2								1,865.9	0.0
			1	1											
			5	10											
			10	8											
			3	4											
			3	2											
			3	3											
			1	1										1,857.9	8.0
Boring Terminated at Elevation 1,857.9 ft in Roadway Embankment (silty SAND)															

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.									
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)								
BORING NO. RS-4		STATION 11+00		OFFSET 20 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,864.7 ft		TOTAL DEPTH 3.5 ft		NORTHING 779,751		EASTING 855,405									
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A									
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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					
1865															
			1	1										1,864.7	0.0
			1	1											
			1	3										1,861.2	3.5
			10	50/0.0											
ROADWAY EMBANKMENT brown, moist, very loose, silty SAND (A-2-4) with some gravel CRystalline Rock (Meta-Granite) Boring Terminated at Elevation 1,861.2 ft on Crystalline Rock (Meta-Granite) - Rod sounding refusal at 3.5 feet was interpreted as a refusal on Crystalline Rock. However, it should be noted that it is possible that the refusal was a result of a boulder within the Roadway Embankment.															

NCDOT BORE DOUBLE BR0032_GEO_RDWY_GINT_SUMMIT.GPJ_NC_DOT.GDT 3/25/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.										
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)									
BORING NO. RS-5		STATION 11+25		OFFSET 20 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,864.1 ft		TOTAL DEPTH 3.5 ft		NORTHING 779,729		EASTING 855,416										
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A										
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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						
1865														1,864.1	GROUND SURFACE	0.0
			1	1		2									ROADWAY EMBANKMENT	
			4	10		14									brown, moist, very loose, silty SAND (A-2-4)	
			15	19		34								1,860.6	with some gravel	3.5
			6	50/0.0											CRYSTALLINE ROCK	
															(Meta-Granite)	
															Boring Terminated at Elevation 1,860.6 ft on Crystalline Rock (Meta-Granite)	
															- Rod sounding refusal at 3.5 feet was interpreted as a refusal on Crystalline Rock. However, it should be noted that it is possible that the refusal was a result of a boulder within the Roadway Embankment.	

WBS 67032.1.1		TIP BR-0032		COUNTY MADISON		GEOLOGIST Gross, A.										
SITE DESCRIPTION Replace Bridge No. 560084 on NC 209 over Meadow Fork Creek							GROUND WTR (ft)									
BORING NO. RS-6		STATION 14+00		OFFSET 20 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 1,857.3 ft		TOTAL DEPTH 2.5 ft		NORTHING 779,541		EASTING 855,600										
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD Rod Sounding			HAMMER TYPE N/A										
DRILLER N/A		START DATE 03/12/19		COMP. DATE 03/12/19		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						
1860														1,857.3	GROUND SURFACE	0.0
			1	1		2									ROADWAY EMBANKMENT	
			6	9		15									tan, dry, medium dense, silty SAND (A-2-4)	
			20	50/0.0										1,854.8	with some gravel, cobbles, and boulders	2.5
1855															CRYSTALLINE ROCK	
															(Meta-Granite)	
															Boring Terminated at Elevation 1,854.8 ft on Crystalline Rock (Meta-Granite)	
															- Rod sounding refusal at 2.5 feet was interpreted as a refusal on Crystalline Rock.	

NCDOT BORE DOUBLE BR0032_GEO_RDWY_GINT_SUMMIT.GPJ NC_DOT.GDT 3/25/19