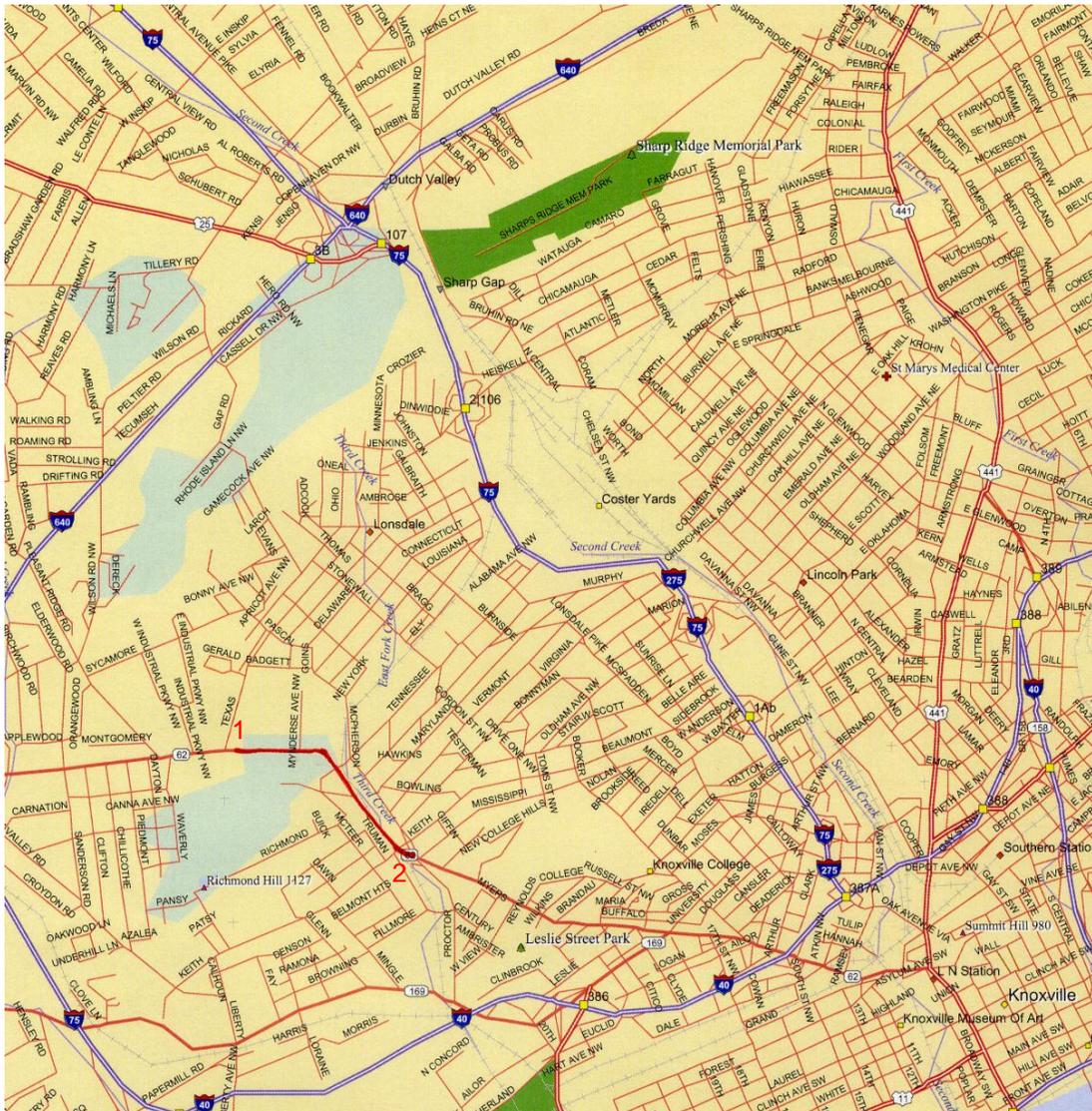


GEOTECHNICAL REPORT
STATE ROUTE 62 (WESTERN AVENUE)
FROM 525 FEET EAST OF TEXAS AVENUE
TO MAJOR AVENUE
STATE PROJECT NO. 47023-1257-14
PIN NO. 101204.00
KNOX COUNTY



1. BEGIN PROJECT STATION 104+33.53
2. END PROJECT STATION 144+93.40

FILE NO4708207

GEOTECHNICAL REPORT
STATE ROUTE 62 (WESTERN AVENUE)
FROM: 525 FEET ± EAST OF TEXAS AVENUE
TO: MAJOR AVENUE
KNOX COUNTY
PROJECT NUMBER 47023-1257-14
PIN 101204.00

EXECUTIVE SUMMARY

This report discusses the surface and subsurface study and the resulting geotechnical design recommendations for the proposed urban realignment of State Route 62 (Western Avenue) from near Texas Avenue to Major Avenue. Geotechnical design recommendations are presented for the following connected roadways as part of the project: Mynderse Avenue at Stations 10+00 to 23+58.44 and Massachusetts Avenue at Stations 200+00 to 213+00.

All cutslopes shall be constructed with ratios that are equal to or flatter than a 2:1. All fill slopes shall be constructed at ratios that are at or flatter than a 2:1. A proposed retaining wall, which is shown on the provided plans from Station 122+56± to Station 124+00 of State Route 62, will require a proper geotechnical study.

GEOTECHNICAL REPORT
STATE ROUTE 62 (WESTERN AVENUE)
FROM: 525 FEET ± EAST OF TEXAS AVENUE
TO: MAJOR AVENUE
KNOX COUNTY
PROJECT NUMBER 47023-1257-14
PIN 101204.00

INTRODUCTION

This project is a realignment of existing State Route 62 (Western Avenue) from just after the intersection with Texas Avenue to Major Avenue within the city limits of Knoxville. The project also consists of the design of several connecting side streets, including the realignment of Mynderse Avenue, Massachusetts Avenue and a minor segment of Tennessee Avenue. The stationing of State Route 62 (Western Avenue) runs from Station 100+00 to Station 144+93.4.

GEOLOGY, SOILS, AND SITE CONDITIONS

The project is located in the Valley and Ridge Province of East Tennessee. The beginning of the State Route 62 project to approximately Station 119+00 is underlain by thin residual shaly clay soil and generally weathered shale strata of the Nolichucky Shale, which is a member of the Conasauga Group. All of Mynderse Avenue is located over these materials. A narrow band of the Maynardville limestone of the Conasauga Group is then traversed to approximately Station 122+00. Mostly residual clay soil material was noted at the ground surface here. Some limestone strata is exposed near the crossing of Third Creek by the alignment. Most of Tennessee Avenue and a portion of the end of Massachusetts Avenue will overlie this formation.

The next segment of the roadway alignment beginning near Station 122+00 and continuing to near Station 133+00 overlies generally thick residual cherty clay soil material and parent dolostone strata of the Copper Ridge Dolomite, which is the lowest stratigraphical member of the Knox Group. The side streets of Massachusetts Avenue, Maryland Avenue, Bowling Avenue and Vermont Avenue along with several alleys overlie the residual soils of this formation. The residual cherty clay soil of the Chepultepec Dolomite formation of the Knox Group is then traversed by the alignment between Station 133+00 and approximately Station 141+00. The sideroads or other roadways of the project along this formation strike-belt include several alleyways, Virginia Avenue, Keith Avenue, Western Avenue intersection with Keith Avenue and

finally Mississippi Avenue. From Station 141+00 to near Station 144+00, the alignment crosses a narrow strike-band of the residual soil material of the Longview Dolomite of the Knox Group. The remainder of the alignment to the end of the project overlies residual soil material of the Newala Formation of the Knox Group. One alley realignment connecting with Mississippi Avenue overlies the residual soil material of this formation.

SURFACE AND SUBSURFACE EXPLORATION

Both a subsurface drilling program and a surface investigation were conducted along the main alignment of State Route 62 (Western Avenue) and the affected sideroads. The subsurface drilling program was limited due to the large extent of utilities within the project limits. However, the limited amount of subsurface drilling that was completed should be adequate for geotechnical design purposes. The subsurface drilling program consisted of the advancement of auger borings along the main alignment of State Route 62 (Western Avenue), Mynderse Avenue and Massachusetts Avenue. One bulk bank sample was collected at Maryland Avenue. Additional soil samples were collected from specified auger borings on the project for representative proctor and CBR results. Please refer to the attached Boring Logs and Soil Description Sheets.

GEOTECHNICAL DESIGN RECOMMENDATIONS

General Geotechnical Design Recommendations:

All cutslopes within the project boundary shall be constructed with ratios that are equal to or flatter than a 2:1. All fill slopes shall be equal to or flatter than a 2:1 ratio. A CBR value of 5 should be used for pavement design purposes.

State Route 62 (Western Avenue) Main Line Section from Station 103+00 to Station 144+93.40:

The main line section of the project contains cut intervals that are all less than 25 feet in height. All of these cutslopes have been designed with 3:1 or flatter ratios, which should provide more than adequate slope stability. Several cross sections are provided so as to represent the typical subsurface conditions anticipated for specific cut intervals along the main line section of State Route 62. These cross sections are listed and should be made part of the construction plans, as follows:

<u>Cross Section Station</u>	<u>Typical Subsurface Conditions Station Interval</u>
105+00	103+50± -- 106+00±

129+00
140+50

127+50± -- 131+00±
139+50± -- 143+50±

Some embankment intervals of substantial height and mass do occur within the extent of this section. These are located at the bridge approaches over CSX Railroad and Third Creek and at the sidehill fill intervals at Stations 126+00 to 127+00 and Stations 130+50 to 135+50. A **Graded Solid Rock Fill** shall be required at the base of the fill at the right of centerline between Station 126+20± and Station 126+80± - please see the *Design Cross Section for Station 126+50*. This **Graded Solid Rock Fill** will be brought up to Elevation 905.0 feet at which point a one (1) foot separation layer of No.4 Stone shall be placed between the top of this “rock fill” and the overlying common fill material.

Another **Graded Solid Rock Fill** shall be placed at the base of the embankment, which is adjacent to Third Creek at the right of centerline, between Station 130+80± and Station 132+30±. This design concept may be seen on the *Design Cross Section for Station 131+50*. The top of the **Graded Solid Rock Fill** is established at Elevation 891.0 feet. A one (1) foot separation layer of No. 4 Stone shall be placed before the overlying common fill material is placed.

Mynderse Avenue from Station 10+00 to Station 24+08.44:

Most of the proposed alignment of Mynderse Avenue traverses through an industrial area of the project. It cuts thorough several existing buildings and crosses several train tracks in the vicinity of Station 19+00. Most of the alignment follows the existing groundline, which was mostly inaccessible to the drilling equipment. Only an existing poorly consolidated filled area of mostly clay material from approximately Station 20+50 to Station 24+00 was accessible for drilling.

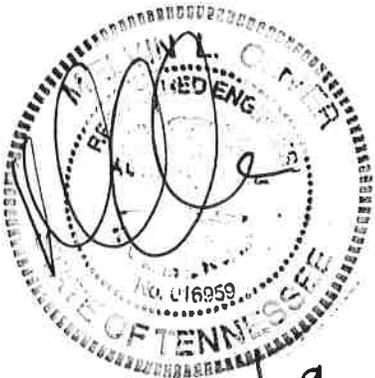
The grade of the Mynderse Avenue template cuts directly through this existing clay fill area along this station interval. It is recommended that both cutslopes at the left and right of centerline be constructed with a maximum slope ratio of 3:1 – see the *Design Cross section for Station 21+50*. The base of this clay fill material overlies weathered shale material of the Nolicucky Shale formation. However, this base is approximately one (1) to three (3) feet below the roadway grade here. It is recommended that this clay fill material be undercut down to the underlying weathered shale strata, then the roadway subgrade material is placed.

Massachusetts Avenue from Station 200+00 to Station 213+20±

The centerline of this roadway skirts the existing Massachusetts Avenue then turns to the left to intercept old Tennessee Avenue to the west. For the most part, it traverses through an older residential neighborhood. The cross section for Station 207+00 shows the typical subsurface conditions anticipated along this alignment. The slope ratios shown on this cross section are adequate for the subsurface soil materials along the extent of the roadway.

All Other Roadway Template Designs:

The slopes shown on all cross sections of the remainder of the project roadways should provide the proper stability for all cut and fill intervals.



A/23/09

George Danker
George Danker
Operations Specialist Supervisor 1

Harry Moore
Harry Moore
Transportation Manager 1

M. Leonard Oliver
M. Leonard Oliver
Civil Engineering Manager 2

GD:kw
Attachment
March 17, 2009

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING

BORING LOG

Project Reference Number 101204.00 Region I
 Project Number 47023-1257-14 County _____
 Location SR 62 (Western Avenue) from 525' ± East of Texas Avenue to Major Avenue
 Data Started April 2, 2008 Date Completed April 8, 2008
 Geologist/Soils Engineer Danker Drill Crew Chief Elmore

Station	Hole No.	Location Reference C/L	Depth	Sample No.	Description
<u>SR 62, Western Ave. Main Alignment</u>					
105+25		75' Lt.	0 2 13	1	Dark red-brn. clay fill w/brick Mod. firm, dry, weath. brn. shale T.B
129+00		50' Lt.	0 1 18	3	Moderately soft, moist black clay Mod. firm, moist, red-brn. clay T.B
130+00		50' Lt.	0 18		Same as Sample No. 3 T.B
140+50		39' Lt.	0 18	6 CBR#1	Mod. firm, moist, red-brn., lt. cherty clay T.B
<u>Mynderse Ave., Begins @ Sta. 110+99.20 SR 62</u>					
<u>Note:</u> Existing fill located along alignment between Stas. 20+50 & 24+00					
21+50		15' Lt.	0 10 13		Same as Sample No. 2 Same as Sample No. 1 T.B
21+50		C/L	0 9 18		Same as Sample No. 2 Same as Sample No. 1 T.B
21+50		15' Rt.	0 10 18		Same as Sample No. 2 Same as Sample No. 1 T.B
23+00		15' Lt.	0 3 13		Same as Sample No. 2 Same as Sample No. 1 T.B

BORING LOG (continued)

Page 2 of

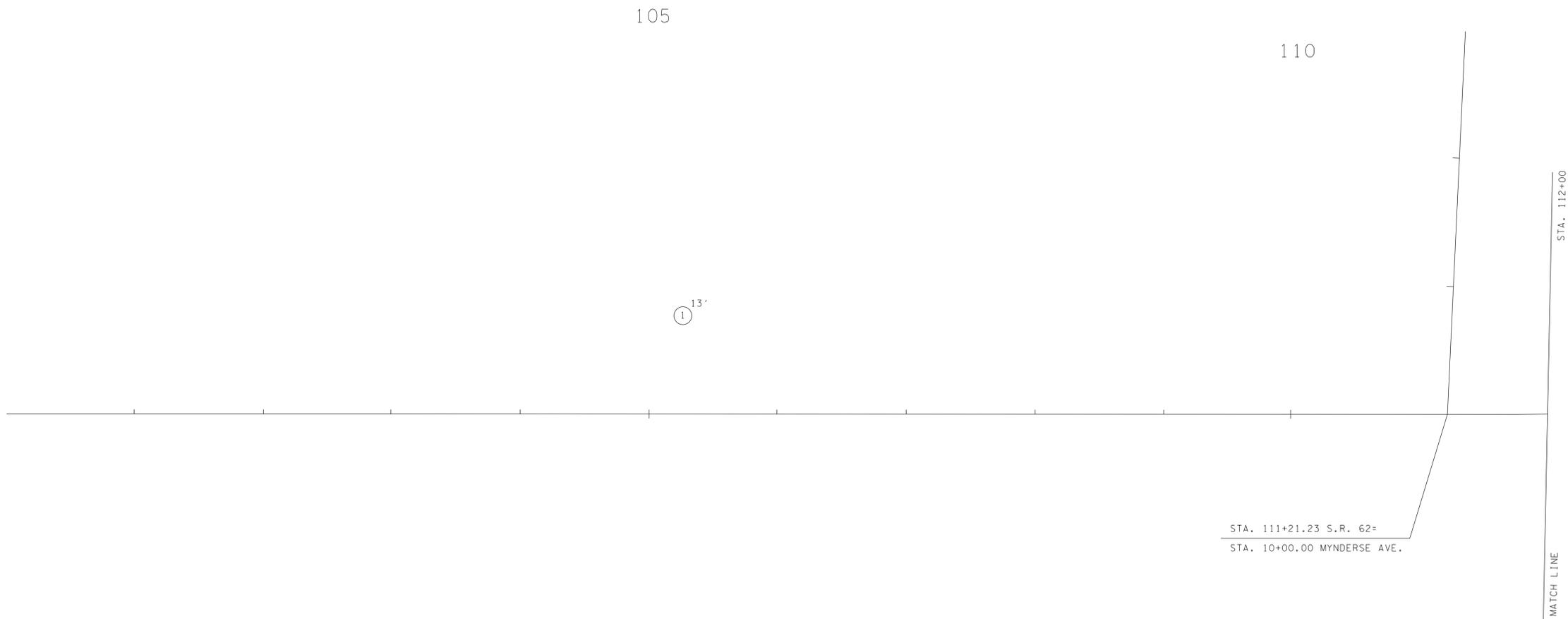
Project Reference Number 101204.00 Region I

Project Number 47023-1257-14 County Knox

Location SR 62 (Western Avenue) from 525' ± East of Texas Avenue to Major Avenue

Station	Hole No.	Location Reference C/L	Depth	Sample No.	Description
23+00		C/L	0 5 13		Same as Sample No. 2 Same as Sample No. 1 T.B
23+00		15' Rt.	0 5 8	2	Mod. firm, moist, red-brn. clay fill Same as Sample No. 1 T.B
<u>Massachusetts Ave., Begins @ Sta. 123+89.80 of SR 62</u>					
206+00		25' Lt.	0 13		Same as Sample No. 4 T.B
206+00		C/L	0 13		Same as Sample No. 4 T.B
206+00		25' Rt.	0 18		Same as Sample No. 4 T.B
207+00		25' Lt.	0 18		Same as Sample No. 4 T.B
207+00		C/L	0 18	4	Mod. firm, moist, red-brn. cherty clay T.B
207+00		25' Rt.	0 18		Same as Sample No. 4 T.B
<u>Maryland Ave., Begins @ Sta. 127+48.54 of SR 62</u>					
31+00		30' Rt.	Bank	5	Mod. firm, moist, red-brn. clay

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44V

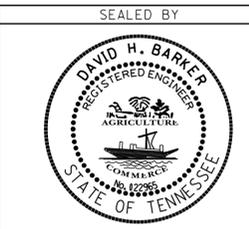


SAMPLE NO.	DESCRIPTION	DENSITY	OPTIMUM MOISTURE	MOISTURE RANGE	LL	PL	AASHTO CLASS	USCS CLASS	* MATERIAL TYPE
1	SHALE- brown, moderately firm, dry, weathered	106.2	16.5	13.0-20.5	35	18	A-6(8)	CL	C

* REFER TO SOILS DEFINITION OF TERMS

HOLE NO	SAMPLE NO	DEPTH
1	-	0-2.0
	† 1	2.0-13.0

† INDICATES LOCATION WHERE SAMPLE WAS TAKEN AND LAB TEST PERFORMED.
ALL OTHER SAMPLE NUMBER LABELS INDICATE AN APPARENT SIMILARITY
BASED ON VISUAL IDENTIFICATION IN THE FIELD.

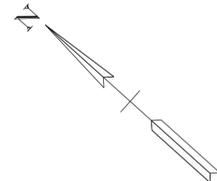


STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOILS
STATE ROUTE 62
STATION 100+00
TO
STATION 112+00
KNOX COUNTY

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TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44W



GRADED SOLID ROCK

BORROW EXCAVATION (GRADED SOLID ROCK) SHALL CONSIST OF THE REMOVAL AND SATISFACTORY PLACEMENT OF SOUND, NON-DEGRADABLE ROCK WITH A MAXIMUM SIZE OF 1 METER (3 FEET). AT LEAST 50 PERCENT OF THE ROCK SHALL BE UNIFORMLY DISTRIBUTED BETWEEN 300 MILLIMETERS (1 FOOT) AND 1 METER (3 FEET) IN DIAMETER AND NO GREATER THAN 10 PERCENT SHALL BE LESS THAN 50 MILLIMETERS (2 INCHES) IN DIAMETER. THE MATERIAL SHALL BE ROUGHLY EQUI-DIMENSIONAL IN SHAPE. THIN, SLABBY MATERIAL WILL NOT BE ACCEPTED. THE CONTRACTOR SHALL BE REQUIRED TO PROCESS THE MATERIAL WITH AN ACCEPTABLE MECHANICAL SCREENING PROCESS THAT PRODUCES THE REQUIRED GRADATION. WHEN THE MATERIAL IS SUBJECTED TO FIVE ALTERATIONS OF THE SODIUM SULFATE SOUNDNESS TEST (AASHTO T 104), THE WEIGHTED PERCENTAGE OF LOSS SHALL BE NOT MORE THAN 12. THE MATERIAL SHALL BE APPROVED BY THE ENGINEER BEFORE USE.

HOLE NO	SAMPLE NO	DEPTH
2	-	0-1.0
3	† 3	1.0-18.0
3	3	0-18.0

† INDICATES LOCATION WHERE SAMPLE WAS TAKEN AND LAB TEST PERFORMED. ALL OTHER SAMPLE NUMBER LABELS INDICATE AN APPARENT SIMILARITY BASED ON VISUAL IDENTIFICATION IN THE FIELD.

• REFER TO SOILS DEFINITION OF TERMS

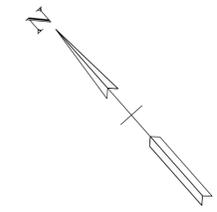
SAMPLE NO.	DESCRIPTION	DENSITY	OPTIMUM MOISTURE	MOISTURE RANGE	LL	PL	AASHTO CLASS	USCS CLASS	* MATERIAL TYPE
2	CLAY- red-brown, moderately firm, moist, fill	96.8	20.0	16.0-25.5	45	27	A-7-6(14)	ML	A
3	CLAY- red-brown, moderately firm, moist	94.0	25.0	21.0-29.5	66	39	A-7-5(24)	MH	A
5	CLAY- red-brown, moderately firm, moist	92.6	22.0	18.5-26.5	41	33	A-7-5(6)	ML	A



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOILS
STATE ROUTE 62
STATION 123+00
TO
STATION 135+00
KNOX COUNTY

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44X



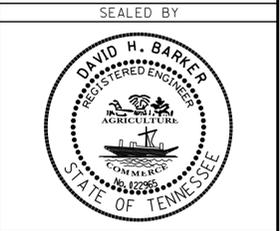
HOLE NO	SAMPLE NO	DEPTH
4	† 6 † CBR1	0-18.0

† INDICATES LOCATION WHERE SAMPLE WAS TAKEN AND LAB TEST PERFORMED. ALL OTHER SAMPLE NUMBER LABELS INDICATE AN APPARENT SIMILARITY BASED ON VISUAL IDENTIFICATION IN THE FIELD.

* REFER TO SOILS DEFINITION OF TERMS

SAMPLE NO.	DESCRIPTION	DENSITY	OPTIMUM MOISTURE	MOISTURE RANGE	LL	PL	AASHTO CLASS	USCS CLASS	* MATERIAL TYPE
6	CLAY- red-brown, moderately firm, moist, cherty	97.0	21.5	18.8-24.2	59	34	A-7-5(19)	MH	A

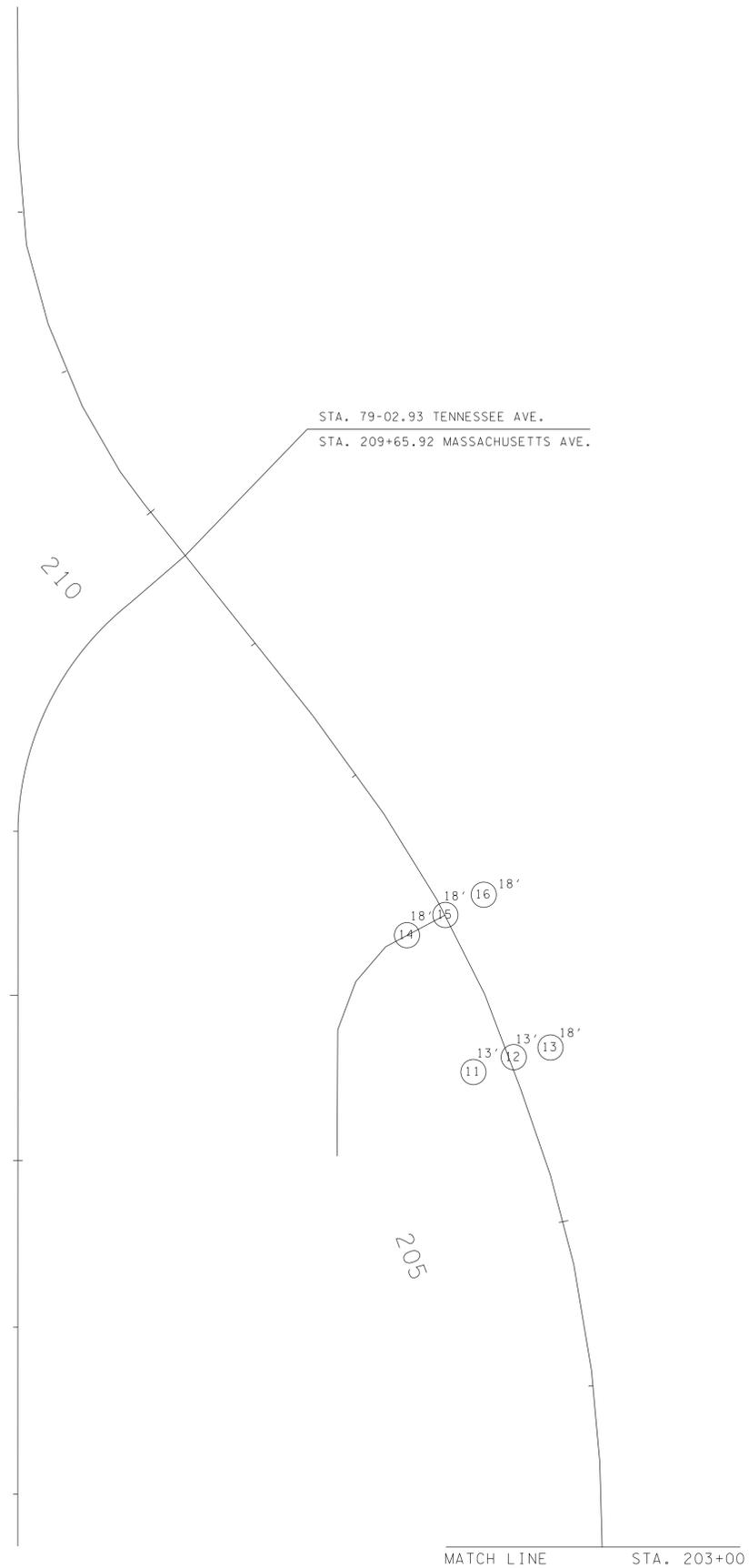
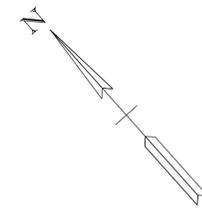
CBR NO.	DESCRIPTION	DENSITY	OPTIMUM MOISTURE	MOISTURE RANGE	LL	PL	AASHTO CLASS	USCS CLASS	CBR	* MATERIAL TYPE
1	CLAY- red-brown, moderately firm, moist, cherty	93.0	23.2	12.2-25.2	54	35	A-7-5(18)	MH	5	A



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

SOILS
STATE ROUTE 62
STATION 135+00
TO
STATION 147+00
KNOX COUNTY

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44Y



HOLE NO	SAMPLE NO	DEPTH
11	4	0-13.0
12	4	0-13.0
13	4	0-18.0
14	4	0-18.0
15	† 4	0-18.0
16	4	0-18.0

† INDICATES LOCATION WHERE SAMPLE WAS TAKEN AND LAB TEST PERFORMED.
 ALL OTHER SAMPLE NUMBER LABELS INDICATE AN APPARENT SIMILARITY
 BASED ON VISUAL IDENTIFICATION IN THE FIELD.



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

SOILS

MASSACHUSETTS AVENUE

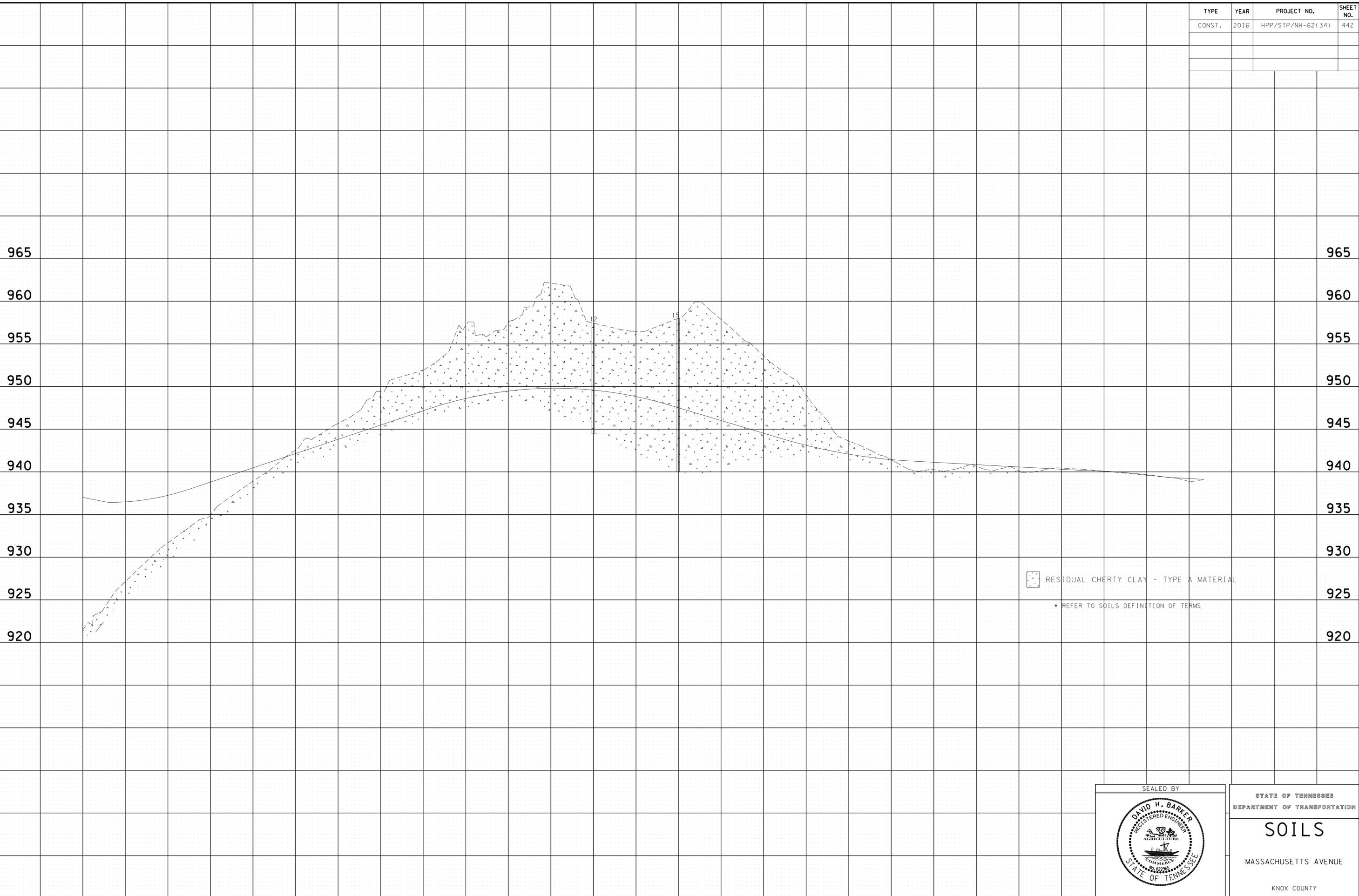
KNOX COUNTY

SAMPLE NO.	DESCRIPTION	DENSITY	OPTIMUM MOISTURE	MOISTURE RANGE	LL	PL	AASHTO CLASS	USCS CLASS	* MATERIAL TYPE
4	CLAY- red-brown, moderately firm, moist, cherty	83.0	30.0	25.5-39.0	75	42	A-7-5(42)	MH	A

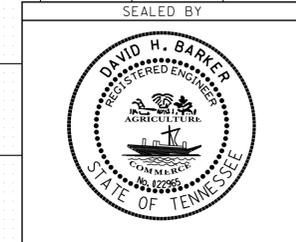
* REFER TO SOILS DEFINITION OF TERMS

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TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	442



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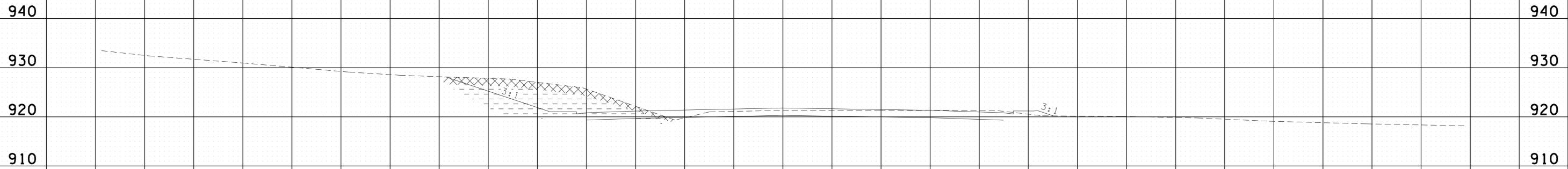
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

SOILS

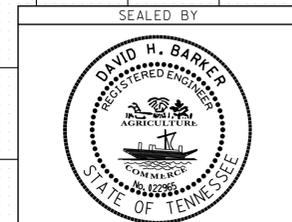
MASSACHUSETTS AVENUE
 KNOX COUNTY

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44AA

TYPICAL SECTION FOR THE INTERVAL
STATION 103+50 TO STATION 106+00



-  RESIDUAL SOIL AND/OR FILL MATERIAL - TYPE A MATERIAL
-  WEATHERED SHALE - TYPE C MATERIAL
- * REFER TO SOILS DEFINITION OF TERMS



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
TYPICAL SECTIONS
STATE ROUTE 62
KNOX COUNTY

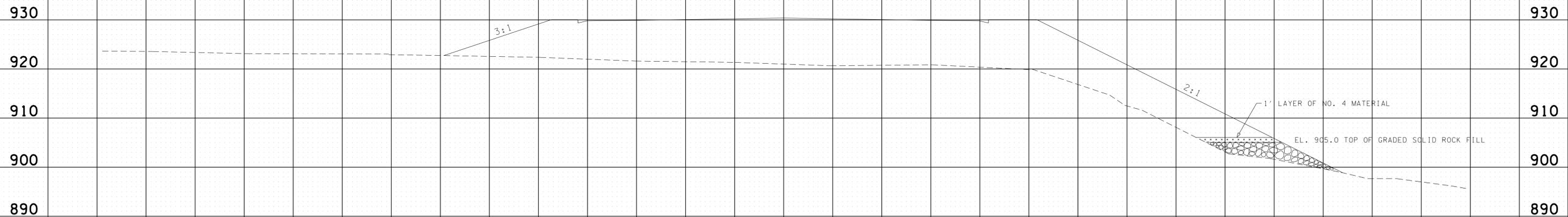
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140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44AB

TYPICAL SECTION FOR GRADED SOLID ROCK FILL STATION 126+20 TO STATION 126+60 RIGHT OF \mathcal{C}

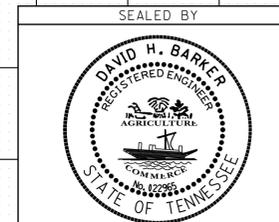
STATION 126+20 TO STATION 126+60 RIGHT OF CENTERLINE
CONSTRUCT A GRADED SOLID ROCK FILL AT THE BASE OF THE
EMBANKMENT UP TO ELEVATION 905.0



GRADED SOLID ROCK

BORROW EXCAVATION (GRADED SOLID ROCK) SHALL CONSIST OF THE REMOVAL AND SATISFACTORY PLACEMENT OF SOUND, NON-DEGRADABLE ROCK WITH A MAXIMUM SIZE OF 1 METER (3 FEET). AT LEAST 50 PERCENT OF THE ROCK SHALL BE UNIFORMLY DISTRIBUTED BETWEEN 300 MILLIMETERS (1 FOOT) AND 1 METER (3 FEET) IN DIAMETER AND NO GREATER THAN 10 PERCENT SHALL BE LESS THAN 50 MILLIMETERS (2 INCHES) IN DIAMETER. THE MATERIAL SHALL BE ROUGHLY EQUI-DIMENSIONAL IN SHAPE. THIN, SLABBY MATERIAL WILL NOT BE ACCEPTED. THE CONTRACTOR SHALL BE REQUIRED TO PROCESS THE MATERIAL WITH AN ACCEPTABLE MECHANICAL SCREENING PROCESS THAT PRODUCES THE REQUIRED GRADATION. WHEN THE MATERIAL IS SUBJECTED TO FIVE ALTERATIONS OF THE SODIUM SULFATE SOUNDNESS TEST (AASHTO T 104), THE WEIGHTED PERCENTAGE OF LOSS SHALL BE NOT MORE THAN 12. THE MATERIAL SHALL BE APPROVED BY THE ENGINEER BEFORE USE.

126+50.00



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

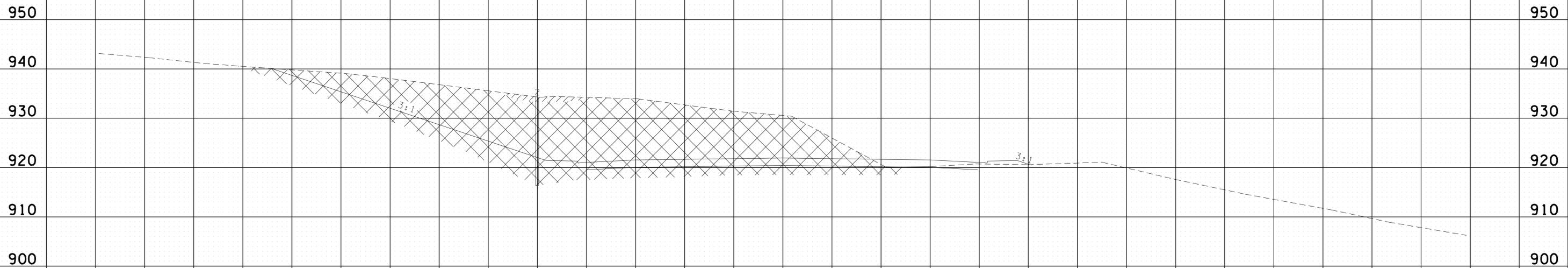
TYPICAL SECTIONS

STATE ROUTE 62

KNOX COUNTY

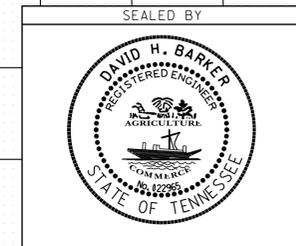
TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44AC

TYPICAL SECTION FOR THE INTERVAL
STATION 127+50 TO STATION 131+00



-  SOFT SOIL MATERIAL - TYPE A MATERIAL
-  RESIDUAL CLAY SOIL (SOME DOLOSTONE PINNACLES MAY BE ENCOUNTERED AT DEPTH) - TYPE A MATERIAL
- * REFER TO SOILS DEFINITION OF TERMS

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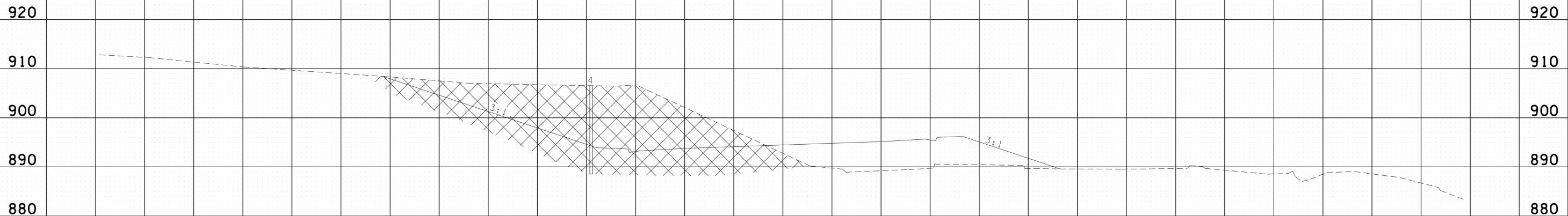
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS

STATE ROUTE 62
KNOX COUNTY

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44AD

TYPICAL SECTION FOR THE INTERVAL
STATION 139+50 TO STATION 143+50



RESIDUAL CLAY SOIL (SOME DOLOSTONE PINNACLES
MAY BE ENCOUNTERED AT DEPTH) - TYPE A MATERIAL

* REFER TO SOILS DEFINITION OF TERMS

140+50.00

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STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

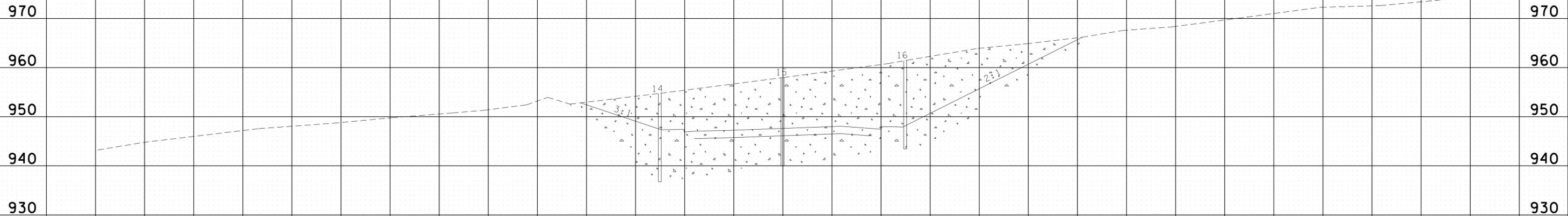
TYPICAL
SECTIONS

STATE ROUTE 62

KNOX COUNTY

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONST.	2016	HPP/STP/NH-62(34)	44AE

TYPICAL SECTION FOR THE INTERVAL
STATION 203+00 TO STATION 212+00

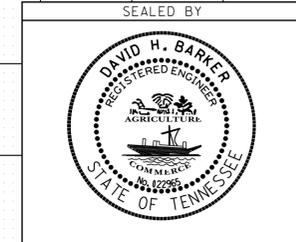



 CHERTY CLAY (SOME DOLOSTONE PINNACLES
MAY BE ENCOUNTERED AT DEPTH) - TYPE A MATERIAL

* REFER TO SOILS DEFINITION OF TERMS

207+00.00

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STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
TYPICAL SECTIONS
 MASSACHUSETTS AVENUE
 KNOX COUNTY

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