



STATE OF TENNESSEE  
**TENNESSEE DEPARTMENT OF TRANSPORTATION**  
GEOTECHNICAL ENGINEERING SECTION  
6601 CENTENNIAL BOULEVARD  
NASHVILLE, TENNESSEE 37243-0360

April 10, 2015

Mr. Wayne Seger, P.E., Civil Engineering Director  
Structures Division  
Suite 1100, James K. Polk Building  
505 Deaderick Street  
Nashville, Tennessee 37243

RE: Project No. 45011-1217-94  
SR 92 Bridge over French Broad River (Douglas Lake) in Dandridge  
Pin No. 100494.00  
Jefferson County

Dear Mr. Seger:

Enclosed are two (2) copies of the foundation report and completed sounding sketch on the above project. An electronic copy of the drawing is also being forwarded to Mike Childress via e-mail.

Sincerely,

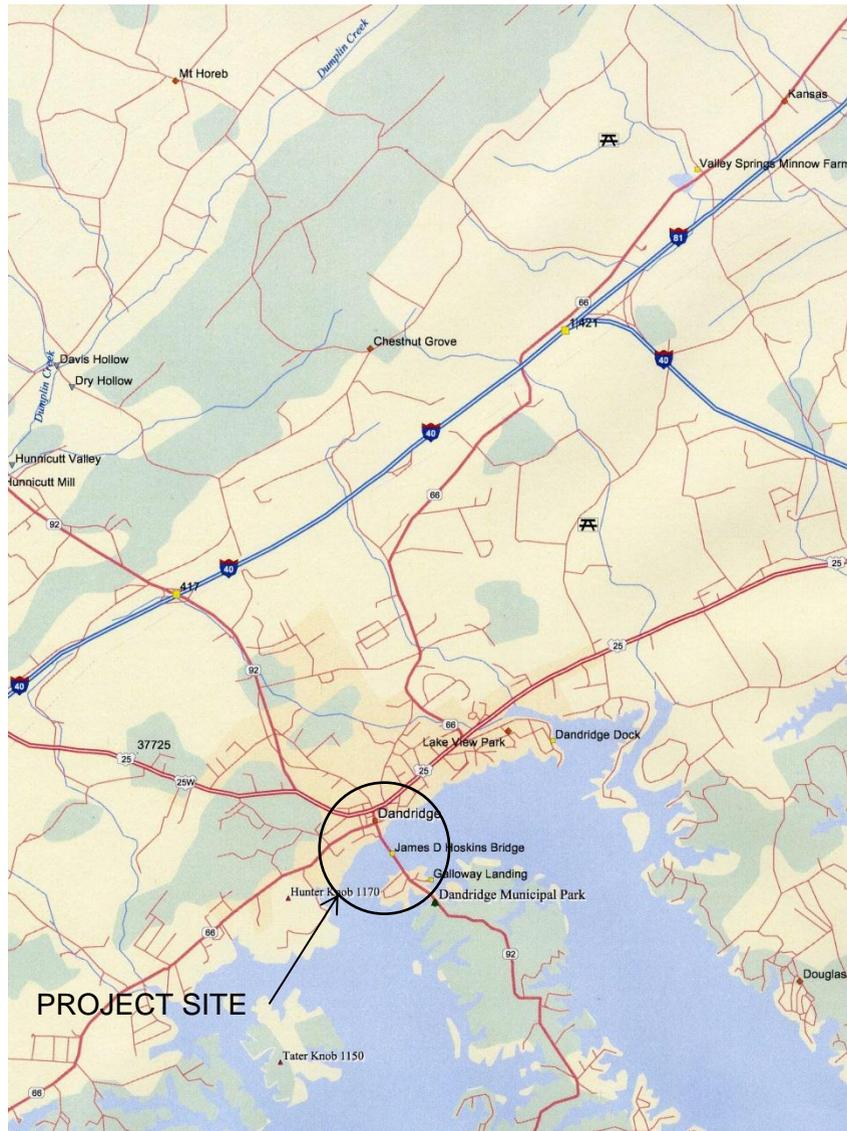
A handwritten signature in cursive script that reads "David Barker".

David Barker, P.E.  
Civil Engineering Manager 1

DHB:kw  
Enclosures

cc: Cabrina Dieters  
Christine Wickhorst

**SOILS AND GEOLOGY REPORT**  
STATE ROUTE 92  
BRIDGE OVER FRENCH BROAD RIVER (DOUGLAS LAKE)  
STATION 120+55.00 L.M. 9.16  
STATE PROJECT NO. 45011-1217-94  
PIN NO. 100494.00  
JEFFERSON COUNTY



BRIDGE FOUNDATION REPORT  
ABUTMENTS ONLY  
Project No. 45011-1217-94  
SR 92 Bridge over French Broad River (Douglas Lake) in Dandridge  
Pin No. 100494.00  
Jefferson County

Executive Summary:

This report addresses the geotechnical site investigation and foundation recommendations for the replacement of the SR 92 Bridge over the French Broad River in Dandridge. The proposed plans call for drilled shaft piers and new abutment foundations to be built. This report only addresses the abutments at this time due to a delay in drilling activities in the river.

It is recommended that the abutments be placed on end bearing piles. The recently completed drilling program and a review of the drilling data for the existing bridge indicate soft to moderately firm silty clay with scattered boulders atop a slightly variable bedrock elevation. All end bearing piles will need to include cast steel points to ensure the piles cut through obstacles and are firmly seated in solid rock.

BRIDGE FOUNDATION REPORT  
ABUTMENTS ONLY  
Project No. 45011-1217-94  
SR 92 Bridge over French Broad River (Douglas Lake) in Dandridge  
Pin No. 100494.00  
Jefferson County

Introduction:

This report addresses the geotechnical site investigation and foundation recommendations for the replacement of the SR 92 Bridge over the French Broad River in Dandridge. This report only addresses the abutments at this time. The investigation consisted of a review of the proposed design plans, site inspections as well as drilling for the abutments. Plans from the existing bridge were also reviewed.

Site Geology:

The project site spans across three geologic formations. Abutment 1 and Pier 1 are located in the Mascot Dolomite formation. This formation is dominated by siliceous and locally cherty dolomite. In the middle of the river, Pier 3 will be located in the Kingsport formation dominated by medium to light-gray and yellowish-gray dolomite with beds of chert nodules and sandstone beds. Pier 2 is very close to the contact between the Mascot and Kingsport formations. Piers 4 and 5 and Abutment 2 will be in the Longview Dolomite formation. This formation is dominated by siliceous, light to very light gray dolomite. It weathers to white to light-pink, easily fractured chert blocks (Hatcher, Robert D., *Geologic Map and Mineral Resources Summary of the Jefferson City Quadrangle, Tennessee*, State of Tennessee Department of Conservation, Division of Geology, 1973).

Discussions and Recommendations:

Four core holes were advanced at the four corners of the bridge abutments. Core Holes B-1 and B-2 were advanced for Abutment 1 of the bridge on the east bank. Core Holes B-8 and B-9 were advanced for Abutment 2 of the bridge on the west bank. Coring will be done in the river for the piers once winter water levels have been reached.

### Abutment No. 1

The proposed design plans and cross-sections were reviewed. Core Holes B-1 and B-2 indicate a relatively uniform top of bedrock elevation. The top of rock for both holes was within 1.5 feet of each other. Hole B-1 indicates rock near elevation 970.7 while Hole B-2 indicates rock near elevation 969.3. Both holes indicate the clay overlying the dolomite bed rock is a mixture of red and brown clays with some rock fragments. Overburden ranges in depth from 35 to 55 feet. SPT tests were performed every 5 feet through the overburden. N-values for the overburden were typically very low and ranged in value from 3 to 20 with a few intervals being over 20. Drilling information from the existing bridge indicated top of rock at elevation 955, which is approximately 15 feet below the top of rock elevations indicated by B-1 and B-2. It is recommended that end bearing piles be used to support this abutment. Due to the irregularity of the rock surface, pile tip refusals should be expected between 955 and 975.

Due to the possibility of boulders and the irregular bedrock surface, it is also recommended that cast steel points like Hard-Bite HP 77600 (or equivalent in shape) be used on the ends of all piles used for this project. The cutting wedges of this point help cut through boulders and other obstacles and assure a firm installation on solid rock.

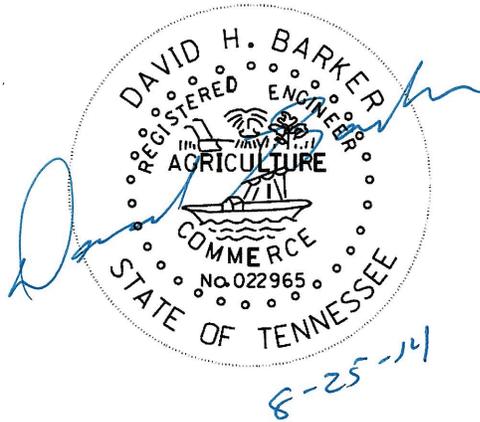
### Abutment No. 2

As with Abutment No. 1, two core holes were advanced. Holes B-8 and B-9 also indicated a relatively uniform surface with the possibility of boulders. Hole B-8 encountered a dolomite boulder at elevation 1011, underlain by more than 30 feet of red clay. The clay overburden on Hole B-9 was measured to be 48 feet. SPT tests were performed every 5 feet through the overburden. N-values for the clay were typically very low and ranged from 1 to 20 with 2 intervals of B-8 returning blow counts of over 50 just before encountering rock. Top of rock varied from elevation 975.5 to 975.8. Drilling information from the existing bridge indicated the top of rock to be at elevation 972. It is recommended that end bearing piles be used to support this abutment. Pile tip refusals should be expected between 970 and 980 with the presence of boulders throughout.

Due to the possibility of boulders, it is also recommended that cast steel points like Hard-Bite HP 77600 (or equivalent in shape) be used on the ends of all piles used

for this project. The cutting wedges of this point help cut through boulders and other obstacles and assure a firm installation on solid rock.

If further information is needed regarding the soil and geologic conditions, please contact the Region I Geotechnical Engineering office.



Ann Beaver  
Project Transportation Specialist

David Barker, P.E.  
Civil Engineering Manager 1

August 25, 2014

AB:kw

Attachments

# BRIDGE FOUNDATION REPORT

Project No. 45011-1217-94

SR 92 Bridge over French Broad River (Douglas Lake) in Dandridge

Pin No. 100494.00

Jefferson County

## **Executive Summary**

This report addresses the geotechnical site investigation and foundation recommendations for the replacement of the SR 92 Bridge over the French Broad River in Dandridge. The proposed plans call for drilled shaft piers and new abutment foundations to be built. This report includes the abutment information which was previously sent, along with the pier information.

It is recommended that the abutments be placed on end bearing piles. The completed drilling program and a review of the drilling data for the existing bridge indicate soft to moderately firm silty clay with scattered boulders atop a slightly variable bedrock surface. All end bearing piles will need to include cast steel points to ensure the piles cut through obstacles and are firmly seated in solid rock.

The piers will be placed on drilled shaft deep foundations as designed. The properties of the geomaterial are the same for all the shafts with only the elevation interval differing. See the report for exact elevations for each pier.

## **Geotechnical Axial Resistance (All Piers)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	Varies	N.A.	N.A.	0.40
Limestone	Top -1.5B	180 TSF	10 TSF	0.50
Limestone	1.5 - 2.0B	870 TSF	10 TSF	0.50
Limestone	Below 2.0B	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (All Piers)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	Varies	N.A.	N.A.	1.0
Limestone	Top – Minus 5'	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Minus 5' – 2.0B	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 2.0B	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

BRIDGE FOUNDATION REPORT  
Project No. 45011-1217-94  
SR 92 Bridge over French Broad River (Douglas Lake) in Dandridge  
Pin No. 100494.00  
Jefferson County

**Introduction**

This report addresses the geotechnical site investigation and foundation recommendations for the replacement of the SR 92 Bridge over the French Broad River in Dandridge. This report includes the abutment information which was previously sent along with the pier information. The investigation consisted of a review of the proposed design plans, site inspections, as well as drilling. Plans from the existing bridge were also reviewed.

**Site Geology**

The project site spans across three geologic formations. Abutment 1 and Pier 1 will be located in the Mascot Dolomite formation. This formation is dominated by siliceous and locally cherty dolomite. In the middle of the river, Pier 3 will be located in the Kingsport formation dominated by medium to light-gray and yellowish-gray dolomite with beds of chert nodules and sandstone beds. Pier 2 is very close to the contact between the Mascot and Kingsport formations. Piers 4 and 5 and Abutment 2 will be in the Longview Dolomite formation. This formation is dominated by siliceous, light to very light gray dolomite. It weathers to white to light-pink, easily fractured chert blocks (Hatcher, Robert D., *Geologic Map and Mineral Resources Summary of the Jefferson City Quadrangle, Tennessee*, State of Tennessee Department of Conservation, Division of Geology, 1973).

**Surface and Subsurface Investigation**

A total of fourteen core holes were drilled to investigate the subsurface. Two holes were drilled for each abutment and each of the five piers. Each pier is designed to have three drilled shafts. Holes at the piers were located near center of the outermost shafts. The center shaft was not drilled. Overburden thickness for the holes

for the piers ranged from 11.1-14.9 feet. This overburden is soft and wet and offers negligible geotechnical resistance. The rock was categorized as good using the Rock Mass Rating in the 2012 AASHTO LRFD Bridge manual (Table 10.4.6.4-1) and samples were sent for strength testing with results ranging from 1120-3045 ksf. For the purpose of calculations, an average compressive strength of 1500 ksf was used for the rock. For more information on each hole see the attached boring record and Appendix A, where photos of all rock core can be found.

### **Construction Comments**

Due to the irregular rock surface, a portion of the shaft may encounter rock prior to reaching the design elevation of the rock. Tooling may have to be adjusted if this occurs in order to reach the expected design elevation. It should also be noted that the rock is very hard and could cause an accelerated wear of cutting tooling as well as slow drilling.

### **Discussions and Recommendations**

#### **Abutment No. 1**

The proposed design plans and cross-sections were reviewed. Core Holes 1 and 2 (formally known as B-1 and B-2) indicate a relatively uniform top of bedrock elevation. The top of rock for both holes was within 1.5 feet of each other. Hole 1 indicates rock near elevation 970.7 while Hole 2 indicates rock near elevation 969.3. Both holes indicate the clay overlying the dolomite bedrock is a mixture of red and brown clays with some rock fragments. Overburden ranges in depth from 35 to 55 feet. SPT tests were performed every 5 feet through the overburden with N-values for the overburden typically very low ranging in value from 3 to 20. Drilling information from the existing bridge indicated top of rock at elevation 955, which is approximately 15 feet below the top of rock elevations indicated by 1 and 2. In addition to drilling information, it was observed while the water was down, that the exposed rock surface is very irregular. It is recommended that end bearing piles be used to support this abutment. Due to the irregularity of the rock surface, pile tip refusals should be expected between 955 and 975. Due to the possibility of boulders and the irregular bedrock surface, it is

also recommended that cast steel tips be used on the ends of all piles used for this project.

**Piers**

LPILE was used to analyze the behavior of the drilled shaft within the rock. Through that analysis, all shafts are recommended to be embedded in rock at least 13.5 feet (1.8B). Information for the elevation for top of rock for each pier can be found below.

**Pier 1**

Holes 3 and 4 were drilled at the locations of the outer shafts to determine the quality of rock for the three proposed 7.5 foot diameter drilled shafts for Pier 1. The rock is overlain by 19-25 feet of very soft brown, silty clay. The rock consists of moderately hard to hard limestone and dolostone. Side resistance for the shafts will be controlled by the strength of the concrete used for the shafts. Numbers listed are based on a f'c of 3 ksi. Engineering properties for each of the three shafts, left (L), center (C) and right (R), are listed below. Elevations for the center shaft are estimated values.

**Geotechnical Axial Resistance (Pier 1L)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	961-935	N.A.	N.A.	0.40
Limestone	935-924 (1.5B)	180 TSF	10 TSF	0.50
Limestone	924-920 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 920	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 1L)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	961-935	N.A.	N.A.	1.0
Limestone	935-930	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	930-920	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 920	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

**Geotechnical Axial Resistance (Pier 1C)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	961-938	N.A.	N.A.	0.40
Limestone	938-927 (1.5B)	180 TSF	10 TSF	0.50
Limestone	927-923 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 923	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 1C)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	961-938	N.A.	N.A.	1.0
Limestone	938-935	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	935-923	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 923	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Geotechnical Axial Resistance (Pier 1R)

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	961-941	N.A.	N.A.	0.40
Limestone	941-930 (1.5B)	180 TSF	10 TSF	0.50
Limestone	930-926 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 926	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 1R)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	961-941	N.A.	N.A.	1.0
Limestone	941-936	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	936-926	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 926	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Pier 2

Holes 5 and 6 were drilled at the locations of the outer shafts to determine the quality of rock for the three proposed 7.5 foot diameter drilled shafts for Pier 2. The rock is overlain by 11-12.5 feet of very soft brown, silty clay. The rock consists of moderately hard to hard limestone and dolostone that is slightly to moderately fractured. Side resistance for the shafts will be controlled by the strength of the concrete used for the shafts. Numbers listed are based on a  $f'_c$  of 3 ksi. Engineering properties for each of the three shafts, left (L), center (C) and right (R), are listed below. Elevations for the center shaft are estimated values.

**Geotechnical Axial Resistance (Pier 2L)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	919-906	N.A.	N.A.	0.40
Limestone	906-895 (1.5B)	180 TSF	10 TSF	0.50
Limestone	895-891 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 891	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 2L)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	919-906	N.A.	N.A.	1.0
Limestone	906-901	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	901-891	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 891	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

**Geotechnical Axial Resistance (Pier 2C)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	919-907	N.A.	N.A.	0.40
Limestone	907-896 (1.5B)	180 TSF	10 TSF	0.50
Limestone	896-892 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 892	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 2C)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	919-907	N.A.	N.A.	1.0
Limestone	907-902	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	902-892	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 892	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Geotechnical Axial Resistance (Pier 2R)

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	919-908	N.A.	N.A.	0.40
Limestone	908-897 (1.5B)	180 TSF	10 TSF	0.50
Limestone	897-893 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 893	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 2R)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	919-908	N.A.	N.A.	1.0
Limestone	908-903	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	903-893	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 893	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Pier 3

Holes 7 and 8 were drilled at the locations of the outer shafts to determine the quality of rock for the three proposed 7.5 foot diameter drilled shafts for Pier 3. The rock is overlain by 12-14 feet of very soft brown, silty clay. The rock consists of moderately hard to hard limestone and dolostone that is slightly to moderately fractured. Side resistance for the shafts will be controlled by the strength of the concrete used for the shafts. Numbers listed are based on a  $f'_c$  of 3 ksi. Engineering properties for each of

the three shafts, left (L), center (C) and right (R), are listed below. Elevations for the center shaft are estimated values.

**Geotechnical Axial Resistance (Pier 3L)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	909-897	N.A.	N.A.	0.40
Limestone	897-886 (1.5B)	180 TSF	10 TSF	0.50
Limestone	886-882 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 882	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 3L)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	909-897	N.A.	N.A.	1.0
Limestone	897-892	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	892-882	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 882	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

**Geotechnical Axial Resistance (Pier 3C)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	910-897	N.A.	N.A.	0.40
Limestone	897-886 (1.5B)	180 TSF	10 TSF	0.50
Limestone	886-882 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 882	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 3C)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	910-897	N.A.	N.A.	1.0
Limestone	897-892	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	892-882	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 882	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Geotechnical Axial Resistance (Pier 3R)

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	911-897	N.A.	N.A.	0.40
Limestone	897-886 (1.5B)	180 TSF	10 TSF	0.50
Limestone	885-882 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 882	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 3R)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	911-897	N.A.	N.A.	1.0
Limestone	897-892	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	892-882	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 882	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Pier 4

Holes 9 and 10 were drilled at the locations of the outer shafts to determine the quality of rock for the three proposed 7.5 foot diameter drilled shafts for Pier 4. The rock is overlain by 14-15 feet of very soft brown, silty clay. The rock consists of moderately hard to hard limestone and dolostone that is slightly to moderately fractured. Side resistance for the shafts will be controlled by the strength of the concrete used for the shafts. Numbers listed are based on a  $f'_c$  of 3 ksi. Engineering properties for each of

the three shafts, left (L), center (C) and right (R), are listed below. Elevations for the center shaft are estimated values.

**Geotechnical Axial Resistance (Pier 4L)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	0.40
Limestone	890-879 (1.5B)	180 TSF	10 TSF	0.50
Limestone	878-875 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 875	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 4L)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	1.0
Limestone	890-885	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	885-875	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 875	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

**Geotechnical Axial Resistance (Pier 4C)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	0.40
Limestone	890-879 (1.5B)	180 TSF	10 TSF	0.50
Limestone	879-875 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 875	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 4C)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	1.0
Limestone	890-885	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	885-875	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 875	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Geotechnical Axial Resistance (Pier 4R)

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	0.40
Limestone	890-879 (1.5B)	180 TSF	10 TSF	0.50
Limestone	879-875 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 875	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 4R)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	904-890	N.A.	N.A.	1.0
Limestone	890-885	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	885-875	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 875	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Pier 5

Holes 11 and 12 were drilled at the locations of the outer shafts to determine the quality of rock for the three proposed 7.5 foot diameter drilled shafts for Pier 5. The rock is overlain by 11.5-14.5 feet of very soft brown, silty clay. The rock consists of moderately hard to hard limestone and dolostone that is moderately to highly fractured. Side resistance for the shafts will be controlled by the strength of the concrete used for the shafts. Numbers listed are based on a  $f'_c$  of 3 ksi. Engineering properties for each of

the three shafts, left (L), center (C) and right (R), are listed below. Elevations for the center shaft are estimated values.

**Geotechnical Axial Resistance (Pier 5L)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	919-907	N.A.	N.A.	0.40
Limestone	907-896 (1.5B)	180 TSF	10 TSF	0.50
Limestone	896-892 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 892	1875 TSF	10 TSF	0.50

**Geotechnical Lateral Resistance (Pier 5L)**

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	919-907	N.A.	N.A.	1.0
Limestone	907-902	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	902-892	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 892	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

**Geotechnical Axial Resistance (Pier 5C)**

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	918-905	N.A.	N.A.	0.40
Limestone	905-894 (1.5B)	180 TSF	10 TSF	0.50
Limestone	893-890 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 890	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 5C)

Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	918-905	N.A.	N.A.	1.0
Limestone	905-900	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	900-890	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 890	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Geotechnical Axial Resistance (Pier 5R)

Geomaterial	Elevation Interval	Base Resistance	Side Resistance	Resistance Factor, $\phi$
Clay	916-902	N.A.	N.A.	0.40
Limestone	902-891 (1.5B)	180 TSF	10 TSF	0.50
Limestone	890-887 (2.0B)	870 TSF	10 TSF	0.50
Limestone	Below 887	1875 TSF	10 TSF	0.50

### Geotechnical Lateral Resistance (Pier 5R)

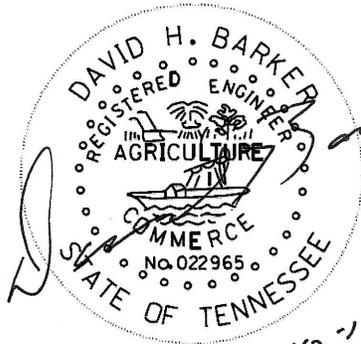
Geomaterial	Elevation Interval	Strength of Rock Mass	Rock Modulus, $E_m$	Resistance Factor, $\phi$
Clay	916-902	N.A.	N.A.	1.0
Limestone	902-897	180 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	897-887	250 TSF	$330 \text{ TSF} \times 10^3$	1.0
Limestone	Below 887	1875 TSF	$330 \text{ TSF} \times 10^3$	1.0

### Abutment No. 2

As with Abutment No. 1, two core holes were advanced. Holes 13 and 14 (formally known as B-8 and B-9) also indicated a relatively uniform surface with the possibilities of boulders. Hole 13 encountered a dolomite boulder at elevation 1011, underlain by more than 30 feet of red clay. The clay overburden on Hole 14 was measured to be 48 feet. SPT tests were performed every 5 feet through the overburden with N-values for the clay typically very low ranging from 1 to 20. Two intervals of Hole

13 returned blow counts of over 50 just before encountering rock. Top of rock varied from elevation 975.5 to 975.8. Drilling information from the existing bridge indicated the top of rock to be at elevation 972. It is recommended that end bearing piles be used to support this abutment. Pile tip refusals should be expected between 970 and 980 with the presence of boulders throughout. Due to the possibility of boulders, it is also recommended that cast steel tips be used on the ends of all piles used for this project.

If further information is needed regarding the soil and geologic conditions, please contact the Region I Geotechnical Engineering office.



Ann Beaver, E.I.  
Project Transportation Specialist

David Barker, P.E.  
Civil Engineering Manager 1

April 10, 2015

AB:kw

Attachments

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 113+04 Location Reference C/L 21.9' LT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 1  
 Hole Number 1 Top Hole Elevation 1007.7 Rock Elevation 970.7 Bottom Elevation 960.7

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<b>All depths in feet</b>							
0							CLAY - red with rock fragments
	5.0	5.5				8	
	5.5	6.0	1	S	1.3	5	
	6.0	6.5				4	
	10.0	10.5				4	
	10.5	11.0	2	S	0.4	3	
	11.0	11.5				3	
20							CLAY - red and brown with rock fragments
	20.0	20.5				1	
	20.5	21.0	3	S	1.2	4	
	21.0	21.5				5	
25							CLAY - red and brown
	25.0	25.5				2	
	25.5	26.0	4	S	1	3	
	26.0	26.5				4	
	30.0	30.5				2	
	30.5	31.0	5	S	1.4	4	
	31.0	31.5				8	
	35.0	35.5				4	
	35.5	36.0	6	S	1.5	17	
	36.0	36.5				18	

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/1/2014

Page 1 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 113+04 Location Reference C/L 21.9' LT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 1  
 Hole Number 1 Top Hole Elevation 1007.7 Rock Elevation 970.7 Bottom Elevation 960.7

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<u>All depths in feet</u>							
37	37.0	40.8	1	NQ	3.8	58	LIMESTONE - medium gray, inter-bedded with dark gray MICRITE laminate, fine grained, thinly bedded at 75° - vertical hard, fresh, slightly - highly fractured
	40.8	45.8	2	NQ	4	80	VOID from 42.3-43.0'
	45.8	47.0	3	NQ	1.2	92	
47							TERMINATED

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/1/2014  
 Page 2 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 113+03 Location Reference C/L 29.4' RT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 1  
 Hole Number 2 Top Hole Elevation 1021.8 Rock Elevation 961.3 Bottom Elevation 954.3

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<u>All depths in feet</u>							
0							ASPHALT - gravel and subgrade
1.5							CLAY - brown
	2.0	2.5				2	
	2.5	3.0	1	S	0.3	2	
	3.0	3.5				2	
	4.7	5.2				2	
	5.2	5.7	2	S	0.6	2	
	5.7	6.2				2	
	9.7	10.2				2	
	10.2	10.7	3	S	1.0	2	
	10.7	11.2				3	
	19.7	20.2				1	
	20.2	20.7	4	S	0.9	2	
	20.7	21.2				3	
	24.7	25.2				0	
	25.2	25.7	5	S	1.0	1	
	25.7	26.2				2	
	29.7	30.2				1	
	30.2	30.7	6	S	1.3	1	
	30.7	31.2				2	

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/2/2014

Page 1 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 113+03 Location Reference C/L 29.4' RT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 1  
 Hole Number 2 Top Hole Elevation 1021.8 Rock Elevation 961.3 Bottom Elevation 954.3

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<u>All depths in feet</u>							
	34.7	35.2				1	
	35.2	35.7	7	S	1.4	2	
	35.7	36.2				3	
	39.7	40.2				0	
	40.2	40.7	8	S	1.5	1	
	40.7	41.2				3	
	44.7	45.2				3	
	45.2	45.7	9	S	1.4	6	
	45.7	46.2				8	
	49.7	50.2				0	
	50.2	50.7	10	S	1.2	1	
	50.7	51.2				2	
52.5	52.5	55.5	1	NQ	2.4	79	LIMESTONE - medium gray, fine grained, thick bedded, hard, fresh, slightly fractured, CLAY seam from 54.3-55.5' and CLAY seam from 56.2-60.5'
	55.5	60.5	2	NQ	0.8	14	
	60.5	65.5	3	NQ	5.0	100	
	65.5	67.5	4	NQ	2.0	100	
67.5							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/2/2014

Page 2 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 114+89 Location Reference C/L 23' LT  
 Bent Number \_\_\_\_\_ Pier Number 1 Abutment Number \_\_\_\_\_  
 Hole Number 3 Top Hole Elevation 961.3 Rock Elevation 936.1 Bottom Elevation 894.9

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD / Blows	Description
	From	To					
All depths in feet							
0							SAND & GRAVEL - brown
4.5	4.5	6.0	1	S	1.4	2/1/2	CLAY - brown with rock fragments
	9.5	11.0	2	S	1.3	0/0/1	
14.5	14.5	16.0	3	S	1.4	0/1/1	CLAY - brown with silt
19.5	19.5	21.0	4	S	1.4	1/0/0	SILT - brown
	24.5	25.4	5	S	0.9	1/50+	
25.2							LIMESTONE; set casing, no sample
25.7	25.7	29.4	1	NQ	3.4	59	LIMESTONE - mottled light to dark gray, fine grained, medium to thinly bedded, moderately hard, moderately fractured
	29.4	34.4	2	NQ	4.8	96	
	34.4	39.4	3	NQ	5.0	100	
	39.4	44.4	4	NQ	5.0	100	
	44.4	49.4	5	NQ	5.0	100	
	49.4	54.4	6	NQ	4.9	98	
	54.4	59.4	7	NQ	4.8	96	
	59.4	64.4	8	NQ	5.0	92	
	64.4	66.4	9	NQ	2.0	100	
66.4							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/9/2014

Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 115+05 Location Reference C/L 18.5' RT  
 Bent Number \_\_\_\_\_ Pier Number 1 Abutment Number \_\_\_\_\_  
 Hole Number 4 Top Hole Elevation 961.4 Rock Elevation 941.7 Bottom Elevation 900.9

Stratum Depth	Sample Depth		Sample/ Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							SAND & GRAVEL - brown
19.7							LIMESTONE; set casing, no sample
20.2	20.2	24.5	1	NQ	3.2	72	LIMESTONE - mottled light to dark gray, fine grained, medium to thinly bedded, moderately hard, moderately fractured, CLAY seam from 22.2-23.4'  DOLOSTONE - light to dark gray, fine grained, slightly fractured, occasional SHALE partings          TERMINATED
	24.5	29.5	2	NQ	5.0	92	
29.5	34.5	3	NQ	4.8	90		
38.0	34.5	39.5	4	NQ	5.0	94	
	39.5	44.5	5	NQ	5.0	94	
	44.5	49.5	6	NQ	4.9	86	
	49.5	54.5	7	NQ	5.0	94	
	54.5	59.5	8	NQ	5.0	100	
60.5	59.5	60.5	9	NQ	1.0	100	

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/19/2014  
 Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 117+80 Location Reference C/L 18.5 LT  
 Bent Number \_\_\_\_\_ Pier Number 2 Abutment Number \_\_\_\_\_  
 Hole Number 5 Top Hole Elevation 919.0 Rock Elevation 906.5 Bottom Elevation 866.2

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
12.5							DOLOSTONE; set casing, no sample
13.1	13.1	17.8	1	NQ	4.0	85	DOLOSTONE interbedded with LIMESTONE - light to dark gray, moderately to slightly fractured, moderately hard to hard, slightly to moderately fractured, occasional SHALE partings.  CLAY seam from 15.1-15.8' SHALE seam from 32.8-33.2'
	17.8	22.8	2	NQ	4.9	86	
	22.8	27.8	3	NQ	5.0	94	
	27.8	32.8	4	NQ	5.0	100	
	32.8	37.8	5	NQ	5.0	90	
	37.8	42.8	6	NQ	5.0	92	
	42.8	47.8	7	NQ	4.9	98	
	47.8	52.8	8	NQ	5.0	96	
52.8							TERMINATED

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/16/2014  
 Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 117+80 Location Reference C/L 18.5 RT  
 Bent Number \_\_\_\_\_ Pier Number 2 Abutment Number \_\_\_\_\_  
 Hole Number 6 Top Hole Elevation 919.6 Rock Elevation 908.5 Bottom Elevation 877.4

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
11.1							LIMESTONE; set casing, no sample
13.1	13.1	17.4	1	NQ	4.0	93	DOLOSTONE interbedded with LIMESTONE - light to dark gray, medium to fine grained, moderately hard to hard, slightly to moderately fractured, occasional SHALE partings.  SHALE - seam from 37.6-37.8'
	17.4	22.2	2	NQ	4.8	96	
	22.2	27.2	3	NQ	4.9	90	
	27.2	32.2	4	NQ	4.9	96	
	32.2	37.2	5	NQ	4.9	98	
	37.2	42.2	6	NQ	5.0	96	
42.2							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/10/2014

Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 120+55 Location Reference C/L 18.5 LT  
 Bent Number \_\_\_\_\_ Pier Number 3 Abutment Number \_\_\_\_\_  
 Hole Number 7 Top Hole Elevation 909.3 Rock Elevation 896.9 Bottom Elevation 853.8

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
12.4							DOLOSTONE; set casing, no sample
14.3	14.3	18.5	1	NQ	4.2	60	DOLOSTONE -medium to light gray, interbedded with LIMESTONE, light gray. Medium to fine grained, medium to thinly bedded, moderately hard, slightly weathered, slightly to moderately fractured. Bedding approx. 50°.
	18.5	23.5	2	NQ	5.0	88	
	23.5	28.5	3	NQ	5.0	96	
28.5	28.5	33.5	4	NQ	5.0	100	DOLOSTONE - medium gray, fine grained, thickly bedded, moderately hard, fresh, slightly to moderately fractured, occasional SHALE partings.
	33.5	38.5	5	NQ	5.0	88	
	38.5	43.5	6	NQ	5.0	98	
	43.5	48.5	7	NQ	5.0	76	
	48.5	53.5	8	NQ	5.0	90	
55.5	53.5	55.5	9	NQ	1.9	95	TERMINATED

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/17/2014  
 Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 120+55 Location Reference C/L 18.5 RT  
 Bent Number \_\_\_\_\_ Pier Number 3 Abutment Number \_\_\_\_\_  
 Hole Number 8 Top Hole Elevation 911.5 Rock Elevation 897.5 Bottom Elevation 855.6

Stratum Depth	Sample Depth		Sample/ Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
14.0							LIMESTONE; set casing, no sample
16.2	16.2	20.6	1	NQ	4.3	80	LIMESTONE - light to dark gray, medium to fine grained, medium to thinly bedded, moderately hard, slightly to moderately fractured. Highly fractured from 20.6-22.8'. Occasional SHALE partings from 47.6 to 55.6'.
	20.6	25.6	2	NQ	5.0	54	
	25.6	30.6	3	NQ	5.0	94	
	30.6	35.6	4	NQ	5.0	100	
	35.6	40.6	5	NQ	4.9	98	
	40.6	45.6	6	NQ	5.0	100	
	45.6	50.6	7	NQ	5.0	90	
	50.6	55.6	8	NQ	4.6	92	
55.6							TERMINATED

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/13/2014  
 Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 123+30 Location Reference C/L 18.5 LT  
 Bent Number \_\_\_\_\_ Pier Number 4 Abutment Number \_\_\_\_\_  
 Hole Number 9 Top Hole Elevation 904.6 Rock Elevation 890.1 Bottom Elevation 843.7

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
14.5							DOLOSTONE; set casing, no sample
15.3	15.3	18.9	1	NQ	3.6	100	DOLOSTONE - light to dark gray, medium to fine grained,
18.9	18.9	23.9	2	NQ	5.0	98	moderately to slightly fractured, moderately hard to hard,
23.9	23.9	28.9	3	NQ	5.0	88	occasional SHALE partings
33.3	28.9	33.9	4	NQ	5.0	74	DOLOSTONE - light to dark gray, medium to fine grained,
	33.9	38.9	5	NQ	5.0	86	moderately to slightly fractured, moderately hard to hard,
	38.9	43.9	6	NQ	5.0	98	cherty
	43.9	48.9	7	NQ	5.0	64	
	48.9	53.9	8	NQ	5.0	100	
	53.9	55.9	9	NQ	2.0	85	
55.9							TERMINATED

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/18/2014  
 Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 123+30 Location Reference C/L 18.5 RT  
 Bent Number \_\_\_\_\_ Pier Number 4 Abutment Number \_\_\_\_\_  
 Hole Number 10 Top Hole Elevation 904.5 Rock Elevation 889.6 Bottom Elevation 846.4

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
14.9							DOLOSTONE; set casing, no sample
15.4	15.4	18.1	1	NQ	2.7	80	DOLOSTONE - light to dark gray, medium to fine grained,
	18.1	23.1	2	NQ	5.0	88	moderately to slightly fractured, moderately hard to hard,
	23.1	28.1	3	NQ	4.8	82	occasional SHALE partings
	28.1	33.1	4	NQ	5.0	96	
35.8	33.1	38.1	5	NQ	5.0	96	DOLOSTONE - light to dark gray, fine to coarse grained,
	38.1	43.1	6	NQ	5.0	76	moderately to slightly fractured, moderately hard to hard,
	43.1	48.1	7	NQ	5.0	100	cherty, SANDSTONE deposit from 40.5-41.7'
	48.1	53.1	8	NQ	5.0	100	
	53.1	58.1	9	NQ	4.9	66	
58.1							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/12/2014

Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 126+05 Location Reference C/L 18.5 LT  
 Bent Number \_\_\_\_\_ Pier Number 5 Abutment Number \_\_\_\_\_  
 Hole Number 11 Top Hole Elevation 918.9 Rock Elevation 907.0 Bottom Elevation 866.4

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
11.9							DOLOSTONE; set casing, no sample
12.6	12.6	17.5	1	NQ	4.9	65	DOLOSTONE - light to dark gray, medium to fine grained,
	17.5	22.5	2	NQ	4.8	81	slightly to highly fractured, medium to thickly
	22.5	27.5	3	NQ	5.0	92	bedded, slightly weathered, bedding dip approx. 45°,
	27.5	32.5	4	NQ	5.0	84	cherty, highly fractured from 27.5' to 28.5'
	32.5	37.5	5	NQ	5.0	82	
	37.5	42.5	6	NQ	5.0	98	
	42.5	47.5	7	NQ	5.0	100	
	47.5	52.5	8	NQ	4.8	98	
52.5							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/14/2014

Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 126+05 Location Reference C/L 18.5 RT  
 Bent Number \_\_\_\_\_ Pier Number 5 Abutment Number \_\_\_\_\_  
 Hole Number 12 Top Hole Elevation 916.4 Rock Elevation 902.1 Bottom Elevation 861.1

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							OVERBURDEN
14.3							DOLOSTONE; set casing, no sample
15.5	15.5	20.3	1	NQ	4.8	100	DOLOSTONE - light to medium gray, medium to fine grained, moderately to slightly fractured, moderately hard to hard, cherty
	20.3	25.3	2	NQ	5.0	86	
	25.3	30.3	3	NQ	5.0	84	
	30.3	35.3	4	NQ	5.0	96	
	35.3	40.3	5	NQ	5.0	100	
	40.3	45.3	6	NQ	5.0	84	
	45.3	50.3	7	NQ	4.9	94	
	50.3	55.3	8	NQ	5.0	100	
55.3							TERMINATED

Sample Type

T- Thin Wall            AX - Core  
 S- Split Spoon        BX - Core  
 B- Bulk                NX - Core  
 W- Wash                NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 12/15/2014

Page 1 of 1

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 128+19.5 Location Reference C/L 26.9' LT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 2  
 Hole Number 13 Top Hole Elevation 1017 Rock Elevation 975.8 Bottom Elevation 946.8

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							Topsoil and gravel
2.0	2.0	2.5				1	CLAY - red with gravel
	2.5	3.0	1	S	0.9	2	
	3.0	3.5				9	
	4.2	4.7				2	
	4.7	5.2	2	S	1.1	25	
	5.2	5.7				24	
6.0	6.0	9.8	1	NQ	1.8	37	DOLOMITE BOULDER - light gray, medium grained, thick bedded, hard, fresh
10	10.0	10.5				1	CLAY - red
	10.5	11.0	3	S	0.6	1	
	11.0	11.5				1	
	15.0	15.5				1	
	15.5	16.0	4	S	1.5	0	
	16.0	16.5				1	
	20.0	20.5				2	
	20.5	21.0	5	S	1.5	4	
	21.5	21.5				3	
	25.0	25.5				4	
25.5	26.0	6	S	1.5	6		
26.0	26.5				9		

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/3/2014

Page 1 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 128+19.5 Location Reference C/L 26.9' LT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 2  
 Hole Number 13 Top Hole Elevation 1017 Rock Elevation 975.8 Bottom Elevation 946.8

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<u>All depths in feet</u>							
	30.0	30.5				2	
	30.5	31.0	7	S	1.2	3	
	31.0	31.5				3	
	35.0	35.5				0	
	35.5	36.0	8	S	1.4	1	
	36.0	36.5				7	
40	40.0	40.5				32	ROCK - weathered
	40.5	41.0	9	S	0.9	45	
	41.0	41.2				50	
41.2	41.2	45.2	2	NQ	1.4	0	DOLOMITE - medium gray, fine grained, moderately hard, moderately weathered, highly fractured
45.2	45.2	50.2	3	NQ	2.9	0	DOLOMITE - white, cherty, fine grained, moderately hard, moderately weathered, highly fractured
	50.2	55.2	4	NQ	0.3	0	
	55.2	60.2	5	NQ	0.4	0	
	60.2	65.2	6	NQ	2.5	48	
65.2	65.2	70.2	7	NQ	5	64	DOLOMITE - light gray, fine grained, thick bedded, hard, moderately fractured
70.2							TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24 \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/3/2014

Page 2 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 128+07 Location Reference C/L 29.4' RT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number 2  
 Hole Number 14 Top Hole Elevation 1023.5 Rock Elevation 975.5 Bottom Elevation 956.2

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
All depths in feet							
0							TOPSOIL
4.8	4.8	5.3				0	CLAY - red with rock
	5.3	5.8	1	S	0.7	2	
	5.8	6.3				3	
19.8	9.8	10.3				1	CLAY - brown to reddish brown
	10.3	10.8	2	S	0.9	2	
	10.8	11.3				4	
	14.8	15.3				2	
	15.3	15.8	3	S	0.6	2	
	15.8	16.3				2	
19.8	19.8	20.3				0	CLAY - brown to reddish brown
	20.3	20.8	4	S	1.5	1	
	20.8	21.3				1	
	24.8	25.3				2	
	25.3	25.8	5	S	1.5	3	
	25.8	26.3				5	
19.8	29.8	30.3				5	CLAY - brown to reddish brown
	30.3	30.8	6	S	1.5	8	
	30.8	31.3				12	

Sample Type  
 T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table \_\_\_\_\_  
 Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/2/2014

Page 1 of 2

STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
 GEOTECHNICAL ENGINEERING  
 BORING RECORD

Project Number 45011-1217-94 Project Reference Number GES 4511113; PIN 100494.00 Region 1  
 Description SR 92 Bridge over French Broad River (Douglas Lake)  
 Geologist/Soils Engineer Beaver Drill Crew Chief Consultant County Jefferson  
 Station Number 128+07 Location Reference C/L 29.4' RT  
 Bent Number \_\_\_\_\_ Pier Number \_\_\_\_\_ Abutment Number \_\_\_\_\_  
 Hole Number 14 Top Hole Elevation 1023.5 Rock Elevation 975.5 Bottom Elevation 956.2

Stratum Depth	Sample Depth		Sample/Run No.	Sample Type	Core Recovered	RQD	Description
	From	To					
<u>All depths in feet</u>							
	34.8	35.3				2	
	35.3	35.8	7	S	1.5	3	
	35.8	36.3				3	
	39.8	40.3				0	
	40.3	40.8	8	S	1.5	1	
	40.8	41.3				1	
	44.8	45.3				0	
	45.3	45.8	9	S	1.5	0	
	45.8	46.3				1	
48	48.0	52.3	1	NQ	4.1	42	DOLOMITE - white to light gray, fine grained, thick bedded, moderately hard, moderately to slightly weathered, highly to moderately fractured
51.8							SANDSTONE - pinkish gray, medium grained, moderately hard, moderately weathered, moderately fractured
52.8	52.3	57.3	2	NQ	2.8	0	CLAY - yellowish red, sandy, medium grained
61.3	57.3	62.3	3	NQ	2.8	0	DOLOMITE - white, fine grained, thick bedded, moderately hard, slightly to moderately weathered, moderately fractured
67.3	62.3	67.3	4	NQ	5	62	TERMINATED

Sample Type

T- Thin Wall      AX - Core  
 S- Split Spoon    BX - Core  
 B- Bulk            NX - Core  
 W- Wash          NQ -Core

Water Table

Water Table + 24' \_\_\_\_\_  
 Casing Size \_\_\_\_\_  
 Spoon Size \_\_\_\_\_  
 Hammer Weight \_\_\_\_\_  
 Fall \_\_\_\_\_

Date 4/2/2014

Page 2 of 2

## Appendix A



Hole 1: Station 113+04, 21.9' Left, Box 1 of 1



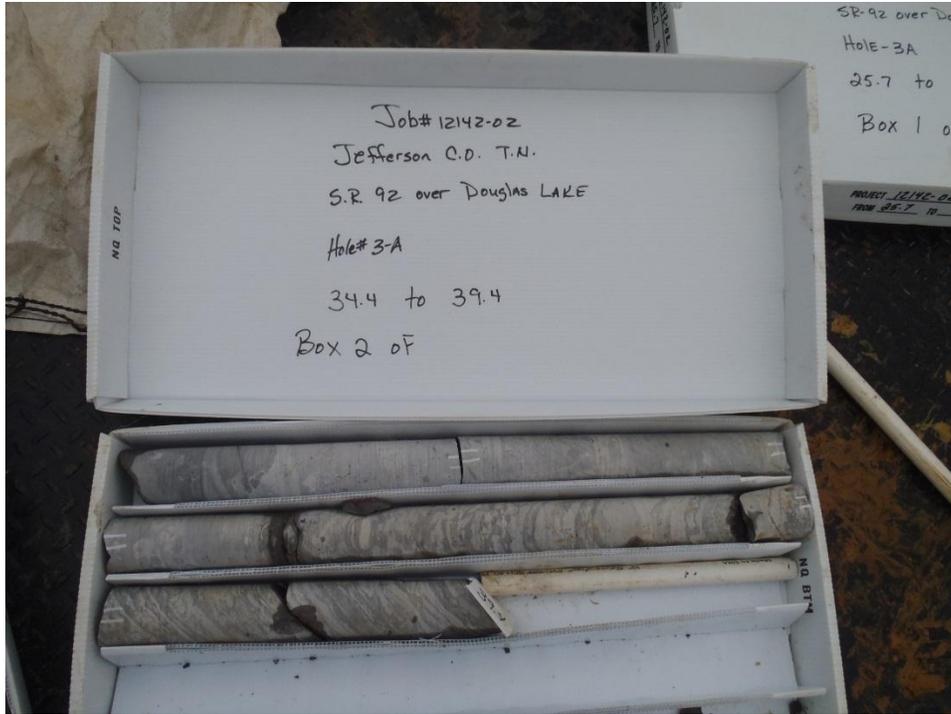
Hole 2: Station 113+03, 29.4' Right, Box 1 of 2



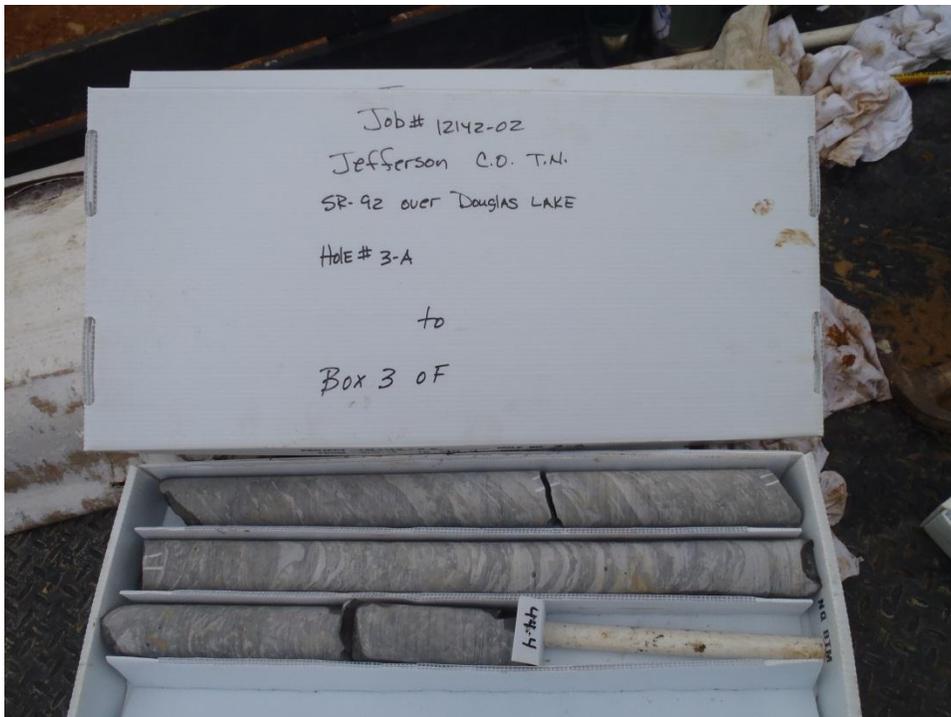
Hole 2: Station 113+03, 29.4' Right, Box 2 of 2



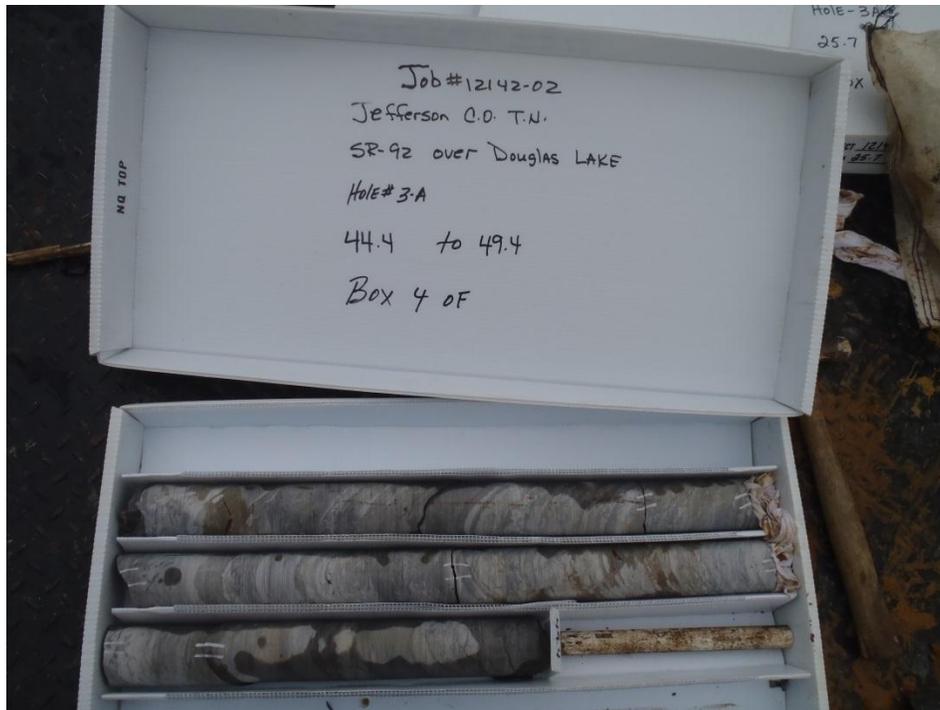
Hole 3: Station 114+89, 23' Left, Box 1 of 6



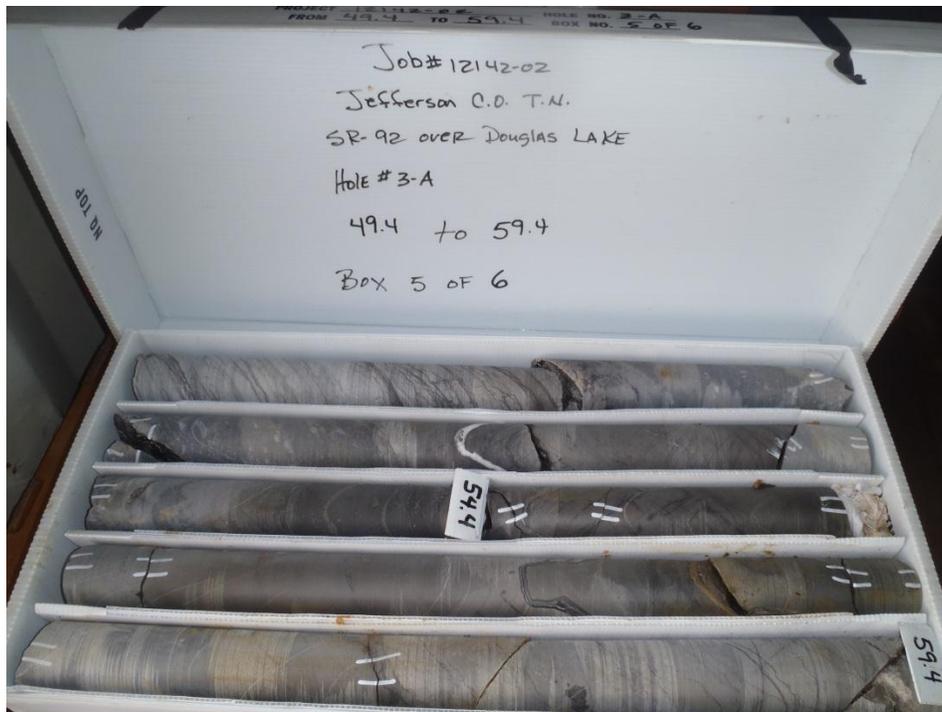
Hole 3: Station 114+89, 23' Left, Box 2 of 6



Hole 3: Station 114+89, 23' Left, Box 3 of 6



Hole 3: Station 114+89, 23' Left, Box 4 of 6



Hole 3: Station 114+89, 23' Left, Box 5 of 6



Hole 3: Station 114+89, 23' Left, Box 6 of 6



Hole 4: Station 115+05, 18.5' Right, Box 1 of 5



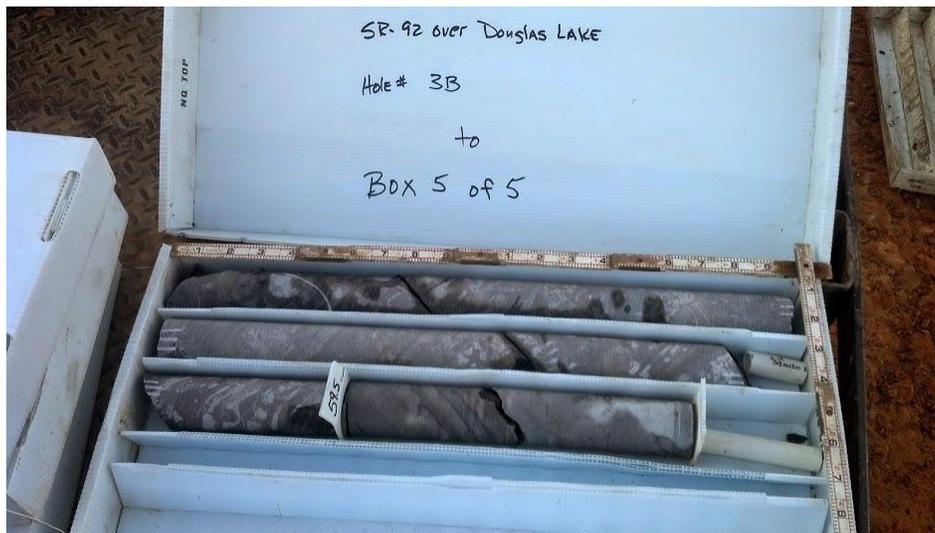
Hole 4: Station 115+05, 18.5' Right, Box 2 of 5



Hole 4: Station 115+05, 18.5' Right, Box 3 of 5



Hole 4: Station 115+05, 18.5' Right, Box 4 of 5



Hole 4: Station 115+05, 18.5' Right, Box 5 of 5



Hole 5: Station 117+80, 18.5' Left, Box 1 of 5



Hole 5: Station 117+80, 18.5' Left, Box 2 of 5



Hole 5: Station 117+80, 18.5' Left, Box 3 of 5



Hole 5: Station 117+80, 18.5' Left, Box 4 of 5



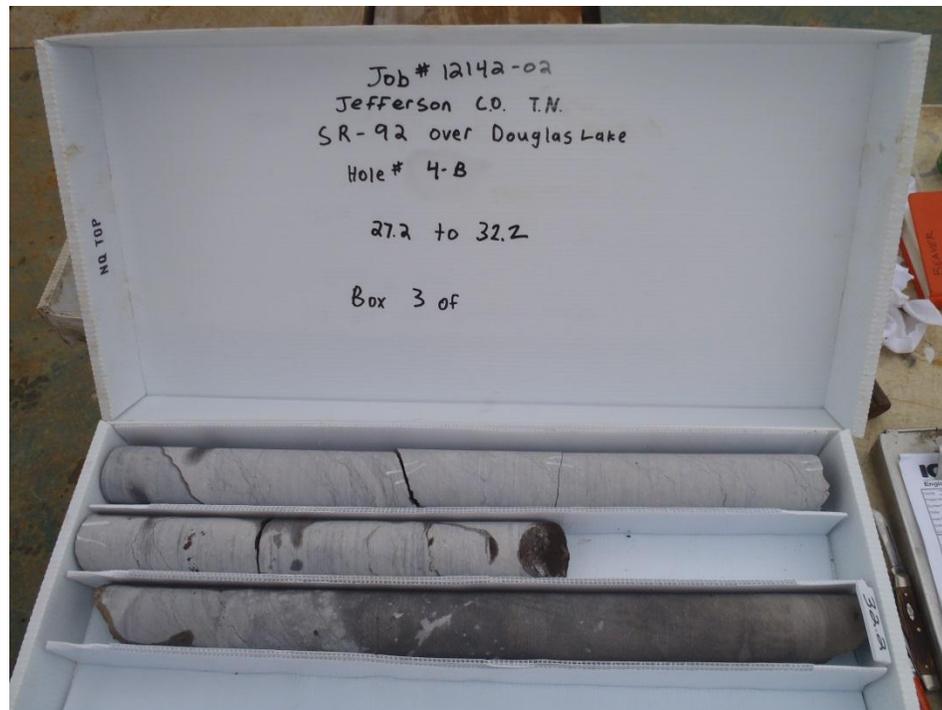
Hole 5: Station 117+80, 18.5' Left, Box 5 of 5



Hole 6: Station 117+80, 18.5' Right, Box 1 of 5



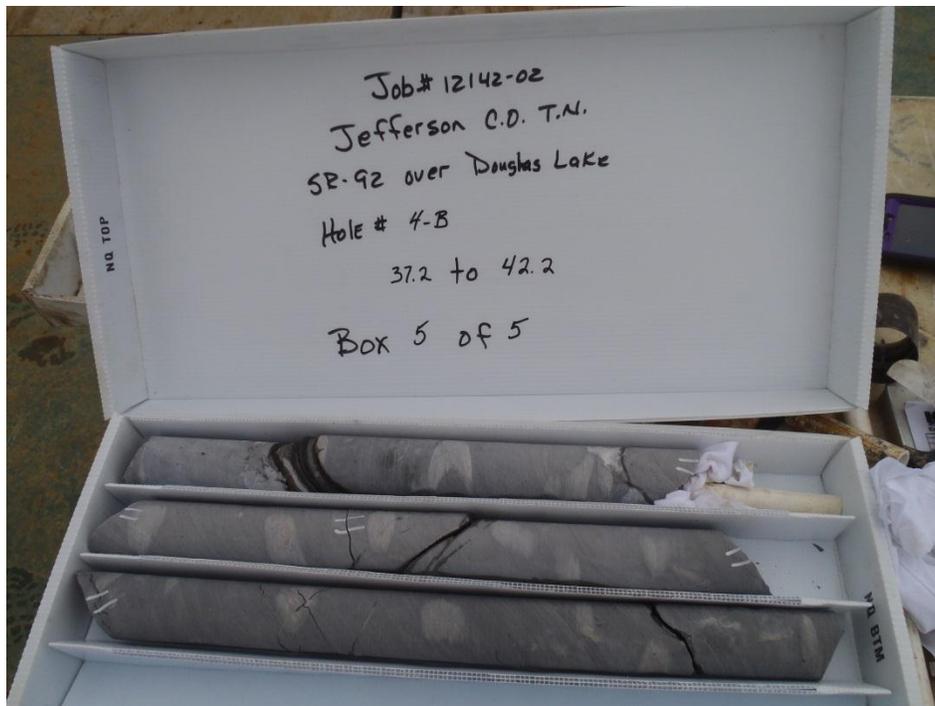
Hole 6: Station 117+80, 18.5' Right, Box 2 of 5



Hole 6: Station 117+80, 18.5' Right, Box 3 of 5



Hole 6: Station 117+80, 18.5' Right, Box 4 of 5



Hole 6: Station 117+80, 18.5' Right, Box 5 of 5



Hole 7: Station 120+55, 18.5' Left, Box 1 of 5



Hole 7: Station 120+55, 18.5' Left, Box 2 of 5



Hole 7: Station 120+55, 18.5' Left, Box 3 of 5



Hole 7: Station 120+55, 18.5' Left, Box 4 of 5



Hole 7: Station 120+55, 18.5' Left, Box 5 of 5



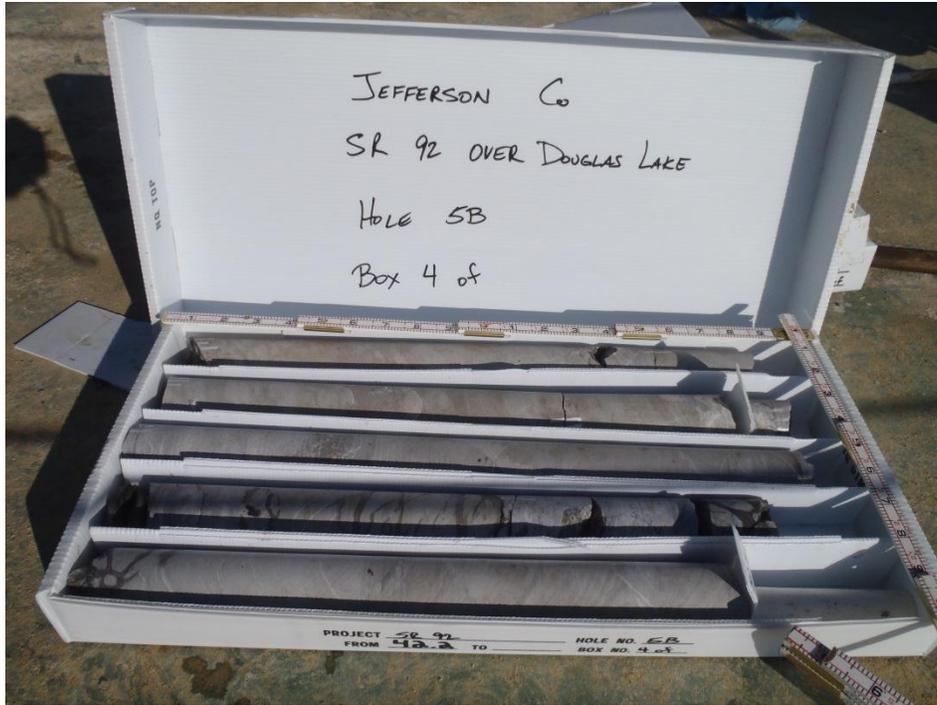
Hole 8: Station 120+55, 18.5' Right, Box 1 of 5



Hole 8: Station 120+55, 18.5' Right, Box 2 of 5



Hole 8: Station 120+55, 18.5' Right, Box 3 of 5



Hole 8: Station 120+55, 18.5' Right, Box 4 of 5



Hole 8: Station 120+55, 18.5' Right, Box 5 of 5



Hole 9: Station 123+30, 18.5' Left, Box 1 of 5



Hole 9: Station 123+30, 18.5' Left, Box 2 of 5



Hole 9: Station 123+30, 18.5' Left, Box 3 of 5



Hole 9: Station 123+30, 18.5' Left, Box 4 of 5



Hole 9: Station 123+30, 18.5' Left, Box 5 of 5



Hole 10: Station 123+30, 18.5' Right, Box 1 of 5



Hole 10: Station 123+30, 18.5' Right, Box 2 of 5



Hole 10: Station 123+30, 18.5' Right, Box 3 of 5



Hole 10: Station 123+30, 18.5' Right, Box 4 of 5



Hole 10: Station 123+30, 18.5' Right, Box 5 of 5



Hole 11: Station 126+05, 18.5' Left, Box 1 of 5



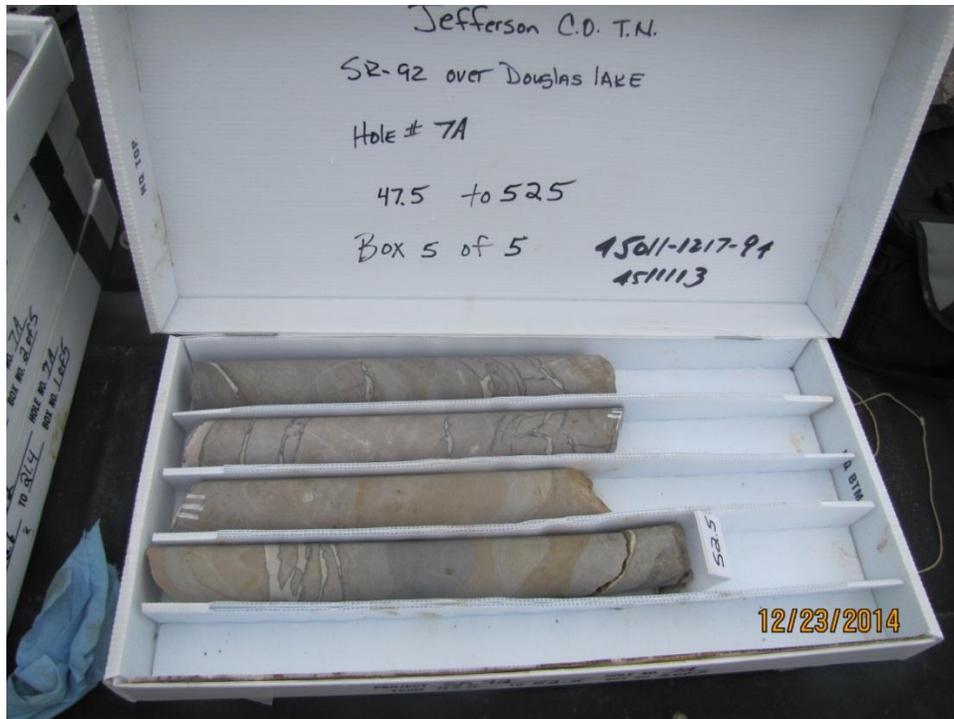
Hole 11: Station 126+05, 18.5' Left, Box 2 of 5



Hole 11: Station 126+05, 18.5' Left, Box 3 of 5



Hole 11: Station 126+05, 18.5' Left, Box 4 of 5



Hole 11: Station 126+05, 18.5' Left, Box 5 of 5



Hole 12: Station 126+05, 18.5' Right, Box 1 of 5



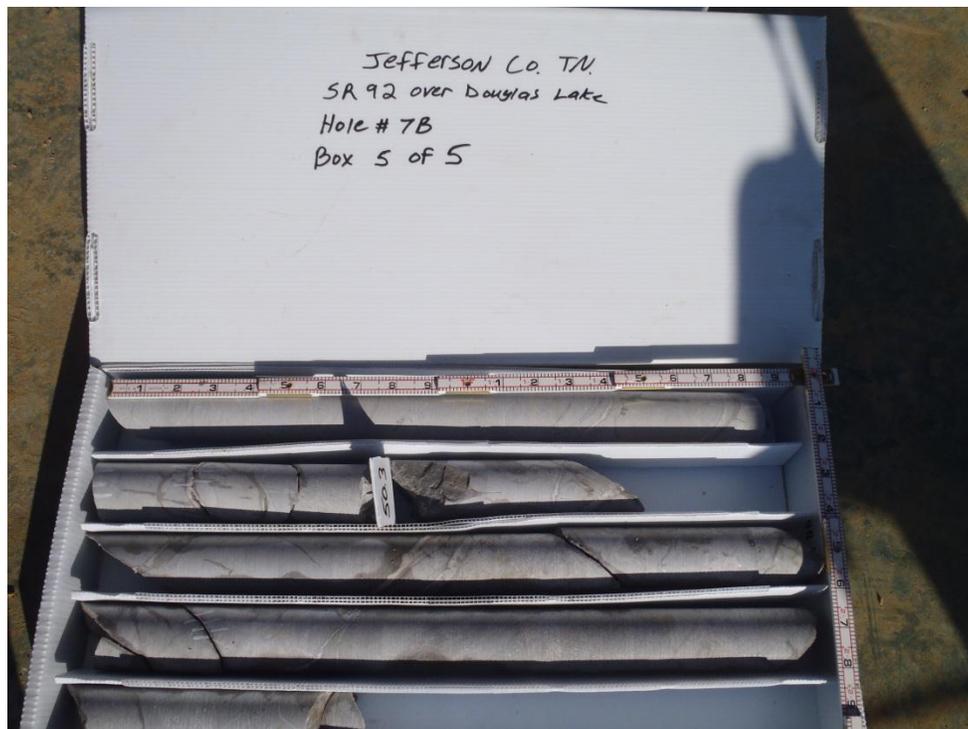
Hole 12: Station 126+05, 18.5' Right, Box 2 of 5



Hole 12: Station 126+05, 18.5' Right, Box 3 of 5



Hole 12: Station 126+05, 18.5' Right, Box 4 of 5



Hole 12: Station 126+05, 18.5' Right, Box 5 of 5



Hole 13: Station 128+19.5 26.9' Left, Box 1 of 2



Hole 13: Station 128+19.5 26.9' Left, Box 2 of 2



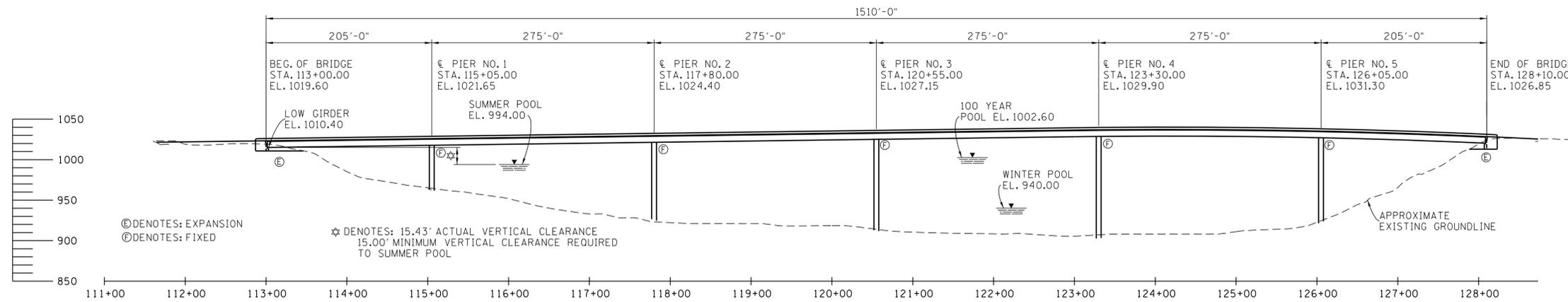
Hole 14: Station 128+07 29.4' Left, Box 1 of 2



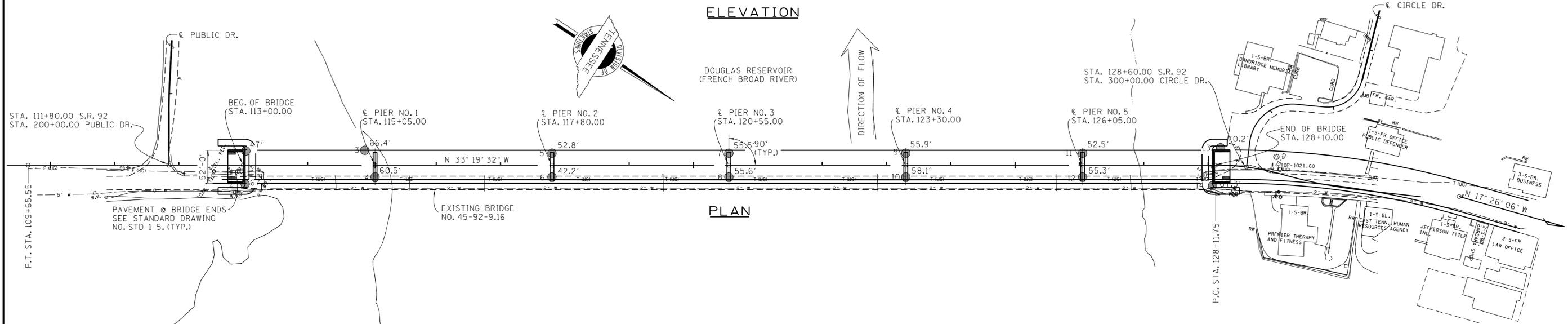
Hole 14: Station 128+07 29.4' Left, Box 2 of 2

PROJECT NO.	YEAR	SHEET NO.
BB-STP-92(11)	2012	

REVISIONS			
NO.	DATE	BY	BRIEF DESCRIPTION



CURVE DATA		CURVE DATA	
PI	128+64.89	PI	129+80.11
N	621,934.3565	N	622,044.8953
E	2,733,336.5681	E	2,733,301.7444
Δ	15° 50' 21" (RT)	Δ	9° 23' 33" (LT)
D	15° 00' 00"	D	7° 30' 00"
R	381.97	R	763.94
L	105.60	L	125.23
T	53.14	T	62.76
SE	.040 FT/FT	SE	.034 FT/FT
DESIGN SPEED	35 MPH	DESIGN SPEED	35 MPH
TRANS. LENGTH	120 FT	TRANS. LENGTH	115 FT
PC	128+11.75	PRC	129+17.35
PRC	129+17.35	PT	130+42.58



CORE NO.	STATION	OFFSET DISTANCE	DEPTH	GROUND ELEVATION	ROCK ELEVATION
1	113+04.00	21.9' LT.	47.0'	1007.7	970.7
2	113+03.00	29.4' RT.	67.5'	1021.8	961.3
3	114+89.00	23.0' LT.	66.4'	961.3	936.1
4	115+05.00	18.5' RT.	60.5'	961.4	941.7
5	117+80.00	18.5' LT.	52.8'	919.0	906.5
6	117+80.00	18.5' RT.	42.2'	919.6	908.5
7	120+55.00	18.5' LT.	55.5'	909.3	896.9
8	120+55.00	18.5' RT.	55.6'	911.5	897.5
9	123+30.00	18.5' LT.	55.9'	904.6	890.1
10	123+30.00	18.5' RT.	58.1'	904.5	889.6
11	126+05.00	18.5' LT.	52.5'	918.9	907.0
12	126+05.00	18.5' RT.	55.3'	916.4	902.1
13	128+19.5	26.9' LT.	70.2'	1017.0	975.8
14	128+07.00	29.4' RT.	67.3'	1023.5	975.5

LEGEND  
CORE NO. 1 ● 47.0' TOTAL DEPTH DRILLED

**CONTROL POINTS:**

- 1) CP - S5  
STA. 129+01.24, 25.23' (LT)  
N 621961.2080  
E. 2733302.0368  
EL. 1023.89
- 2) CD - S4  
STA. 106+51.48, 1.74' (RT)  
N 620119.1112  
E 2734593.3475  
EL. 1013.57 ALLUMIN. DISK
- 3) CP - S3  
STA. 100+43.90, 20.34' (LT)  
N 619869.2157  
E. 2735144.1541  
EL. 1006.69 ALLUM. DISK

**REQUIRED:**

- 1) SUFFICIENT GROUND, ROCK AND CORING INFORMATION FOR BRIDGE FOUNDATION.
- 2) APPROXIMATE EXISTING GROUND AND ROCK LINE.

NOTE: THIS DRAWING IS FOR FOUNDATION DATA ONLY AND IS NOT TO BE USED AS A LAYOUT.

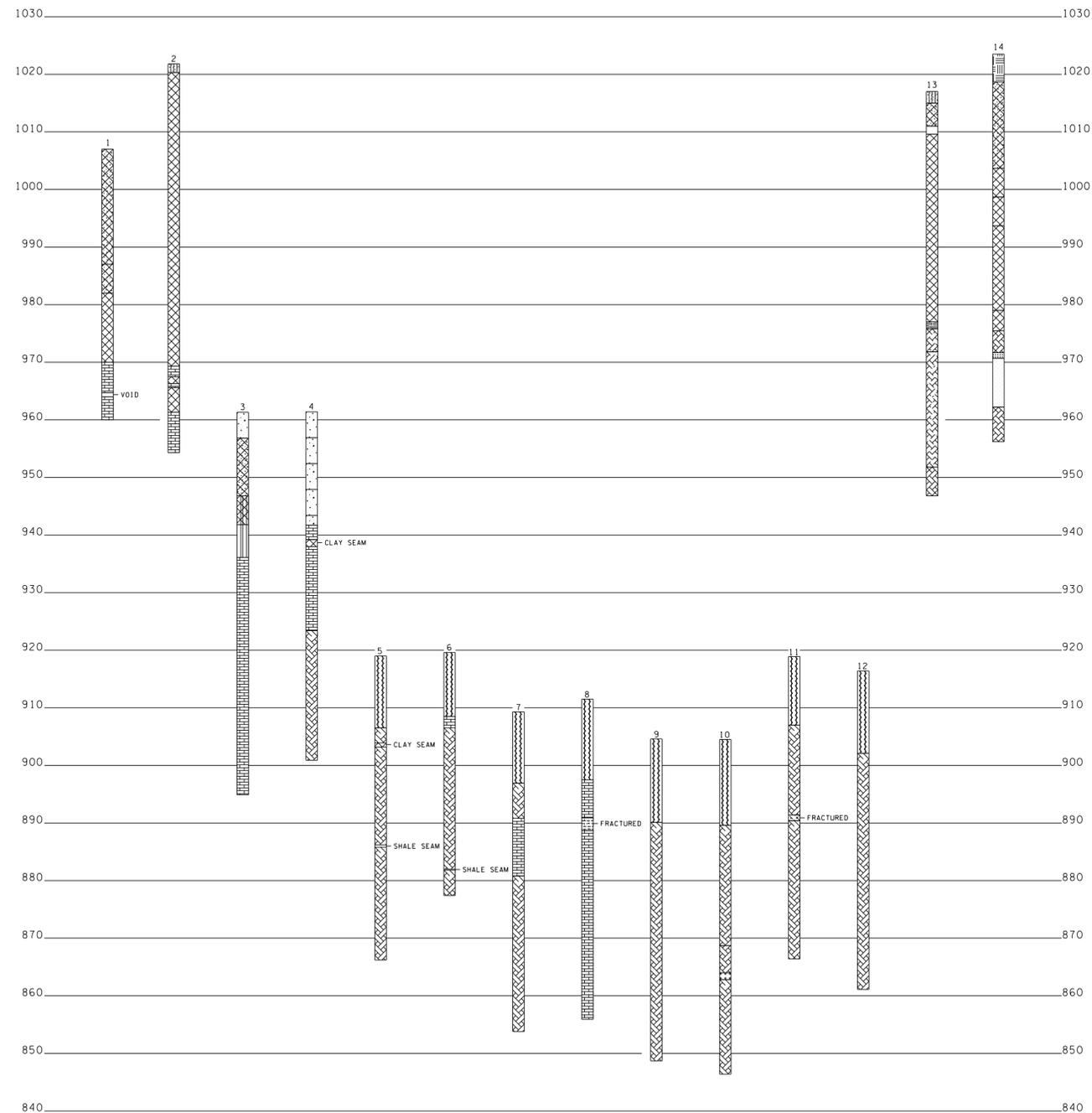
2025 ADT = 44,000 ROADWAY 5'-0" SIDEWALK  
 STD-1-1SS PARAPET & STD-11-1 BRIDGERAIL  
 DESIGN SPEED = 50 MPH  
 STATE OF TENNESSEE  
**DEPARTMENT OF TRANSPORTATION**  
**FOUNDATION DATA**  
**STATE ROUTE 92**  
**OVER**  
**FRENCH BROAD RIVER**  
**STATION 120+55.00 L.M. 9.16**  
**BRIDGE I.D. NO.**  
**JEFFERSON COUNTY**  
**2012**

DESIGNED BY J.S. HASTINGS DATE 7-04  
 DRAWN BY K.L. FRANKENFIELD DATE 7-04  
 SUPERVISED BY R.L. CRAWFORD DATE 7-04  
 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_

CORRECT Edward P. Wasserman  
 ENGINEER OF STRUCTURES

PROJECT NO.	YEAR	SHEET NO.
BB-SIP-92(11)	2012	

REVISIONS			
NO.	DATE	BY	BRIEF DESCRIPTION



-  TOPSOIL
-  ASPHALT AND GRAVEL
-  OVERBURDEN
-  CLAY
-  CLAY WITH ROCK FRAGMENTS
-  CLAY WITH SILT
-  SILT
-  SAND
-  SAND AND GRAVEL
-  SANDSTONE
-  WEATHERED ROCK
-  FRACTURED DOLOMITE
-  DOLOMITE
-  LIMESTONE

STATE OF TENNESSEE  
 DEPARTMENT OF TRANSPORTATION  
 FOUNDATION DATA  
 STATE ROUTE 92  
 OVER  
 FRENCH BROAD RIVER  
 STATION 120+55.00 L.M. 9.16  
 BRIDGE I.D. NO.  
 JEFFERSON COUNTY  
 2012

CORRECT Edward P. Wasserman  
 ENGINEER OF STRUCTURES

DESIGNED BY J.S. HASTINGS DATE 7-04  
 DRAWN BY K.L. EBANKS/ELD DATE 7-04  
 SUPERVISED BY R.L. CRAWFORD DATE 7-04  
 CHECKED BY \_\_\_\_\_ DATE \_\_\_\_\_