



**Preliminary Geotechnical Subsurface Data Report
Emergency Bridge Package 4
S-28-36 Pine Grove Road over Twenty-Five Mile Creek
Kershaw County, South Carolina
F&R Project No. 65T-0215**

Prepared for:



South Carolina Department of Transportation
Design-Build Section
955 Park Street
Columbia, SC 29201

December 3, 2015



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Mr. Trapp Harris, PE
South Carolina Department of Transportation
Design-Build Section
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Reference: Preliminary Geotechnical Subsurface Data Report
Emergency Bridge Package 4
S-28-36 Pine Grove Road over Twentyfive Mile Creek
Kershaw County, South Carolina
F&R Project No. 65T-0215

Dear Mr. Harris:

The purpose of this geotechnical subsurface data report is to present the results of the subsurface investigation program undertaken by Froehling & Robertson, Inc. (F&R) in connection with the Emergency Bridge Package 4 at State Route S-28-36 Pine Grove Road over Twentyfive Mile Creek in Kershaw County, South Carolina. Our services were performed in general accordance with your work order request emailed to F&R on November 18, 2015, and as authorized by your office per our On-Call Contract with SCDOT. The attached report presents our understanding of the project, reviews our investigation procedures, describes existing site and general subsurface conditions, and presents the results of our soil laboratory tests.

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F&R greatly appreciates the opportunity to work with you on this project. If there are any questions concerning this report or if any additional information is required, please do not hesitate to contact us.

Sincerely,
FROEHLING & ROBERTSON, INC.

Gary R. Taylor, PE
Senior Geotechnical Engineer
Registered SC No. 27330



Benedictus K. Azumah, PE
Geotechnical Engineer
Registered VA No. 052166





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1.0 PURPOSE & SCOPE OF SERVICES

The purpose of this Geotechnical Investigation was to explore the subsurface conditions at the site and perform soil laboratory tests on selected soil samples obtained from the investigation. F&R's scope of services included the following:

- Completion of two soil test borings to a depth of approximately 33.5 and 35 feet below the existing ground surface and as close as possible to each previous bridge abutment location.
- Completion of rock coring below each of the soil test borings.
- Preparation of typed SCDOT Soil Boring Logs;
- Performing soil laboratory tests including natural moisture contents, Atterberg Limits, Wash No. 200 Gradation tests, unconfined compressive strength of rock;
- Preparation of this preliminary geotechnical subsurface data report by professional engineers.

This report was prepared in general accordance with the 2010 SCDOT Geotechnical Design Manual (GDM), Version 1.1.

Our scope of services did not include identification and evaluation of appropriate foundation systems for the proposed bridge, design capacities and other environmental aspects of the project site.

2.0 PROJECT INFORMATION

2.1 Site Description

The project site is on Pine Grove Road (State Route S-28-36) located between State Road S-28-651 and Ridgeway Road in Kershaw County, South Carolina. The area around the creek and the road is partly wooded with several residential dwellings. Project surroundings are shown on the attached Figure No. 1 - Site Vicinity Map included in Appendix I.



2.2 Project Description

Recent flooding in the region has caused extensive erosion around the bridge and resulted in extensive damage to the bridge. Emergency replacement of the bridge is planned. For this purpose, the geotechnical subsurface investigation and laboratory testing is required by SCDOT and will form part of a preliminary investigation of the site.

3.0 SUBSURFACE INVESTIGATION

3.1 Subsurface Investigation Program

The subsurface investigation program consisted of two soil test borings (STB) with rock coring. The borings, designated as B-01 and B-02 were advanced to a termination depth of approximately 39.5 and 68 ft below the existing ground surface on the approaches adjacent to the location of the bridge. Upon auger refusal, the borings were then advanced into rock using NQ rock coring techniques. Approximate boring locations are identified on Figure No. 2 - Boring Location Plan included in Appendix I. Photographs of Borings B-01 and B-02 being drilled are also included as Figure Nos. 3A and 3B in Appendix I.

3.2 Location Control

The STB locations were staked in the field by personnel from our office following instructions from your office. The borings were drilled in the centerline of the existing alignment a few feet from the edge of the bridge end bents. The ground surface elevation at the borings locations were not provided to us at the time of this writing. GPS coordinates of Borings B-01 (Latitude 34.247297/ Longitude -80.71354) and B-02 (Latitude 34.247778/ Longitude -80.714198) were obtained with a portable hand-held GPS and are recorded on the soil boring logs included in Appendix II of this report.



3.3 Subsurface Investigation Procedure

Subsurface investigation was performed on November 23, 2015 and November 24, 2015 using an ATV-mounted CME/550X drill rig. The drill rigs used for this project were equipped with an automatic hammer and the drilling method used was the wash rotary boring. The energy ratio of this ATV-mounted hammer is 86%. SPT tests at boring locations were performed continuously from the existing ground surface to a depth of 10 feet. Thereafter, boreholes were advanced and SPT performed at approximate 5-foot intervals to the auger refusal depths. The Standard Penetration Test (SPT) was performed at the boring locations in general accordance with ASTM D1586.

Soil samples were obtained with a long split-spoon sampler with each SPT being driven with a 140-lb automatic hammer falling 30 inches. The number of blows required to drive the sampler each 6-inch increment of penetration was recorded and are shown on the boring logs. The first six-inch increment is used to seat the sampler with the sum of the second and third penetration increments being termed the SPT value, "N". A representative portion of each disturbed split-spoon sample was collected with each SPT, placed in a glass jar, and returned to our laboratory for review and testing.

The recovered split-spoon samples were visually classified by F&R engineers in general accordance with the ASTM D2488. The boring logs provided in Appendix II show the subsurface conditions encountered on the dates and at the approximate locations indicated.

Upon auger refusal, the borings were then advanced into rock to depths of 39.5 to 68 feet using NQ rock-coring techniques generally following procedures outlined in ASTM D 2113 using a 2-inch nominal inside diameter diamond-impregnated drill attached to the end of a double-tube core barrel. Rock core specimens were measured for recovery immediately upon retrieval, placed in core boxes for protection, labeled and transported to the laboratory for further evaluation by our professional staff. In the laboratory, the rock core specimens were measured for Percent Recovery and Rock Quality Designation (RQD) by a member of our professional



staff. Percent Recovery is the ratio of the recovered core length to the length of rock drilled, expressed by a percentage. RQD is the ratio of the cumulative length of all pieces of rock greater than or equal to four (4) inches to the total amount drilled, expressed as a percent of the total amount drilled. The RQD value is related to the soundness and quality of the rock mass and has been correlated with engineering properties of rock.

By the nature of the work performed, the drilling activities result in disturbances to the site. The completed boreholes performed were backfilled upon completion. The borehole backfill may subside at some time following our work. F&R assumes no responsibility for borehole subsidence after completion of the field investigation and departing the site.

3.4 Groundwater

Groundwater was encountered in Borings B-01 and B-02 at a depth of approximately 13.5 feet. The test borings were backfilled after completion of drilling for safety. The depth at which groundwater was encountered in each individual boring is indicated on the attached soil boring logs in Appendix II.

The groundwater levels at the boring locations were determined based on our observation of free water in the split-spoon soil samples following removal of the sampler. Upon completion of drilling, the boreholes were backfilled for safety, hence the absence of 24-hour water level readings on the boring logs.

The groundwater levels on the soil boring logs indicate our estimate of the hydrostatic water table at the time of our investigation. The final design should anticipate the fluctuation of the hydrostatic water table depending on variations in precipitation, surface runoff, evaporation, creek levels and similar factors.



4.0 LABORATORY TESTING

Laboratory testing consisted of Atterberg Limits Tests, No. 200 Sieve Cut grain size analyses (Wash #200), Natural Moisture Content and unconfined compressive strength of rock tests performed on specific soil or rock samples. The specific tests performed on the selected samples are listed in Tables No. 1 and 2 below.

Table No. 1: Soil Laboratory Tests Performed on Selected Soil Samples

| Boring | Sample Number | Depth (ft) | Atterberg Limits | Percent Fines Wash # 200 | Natural Moisture Content |
|--------|---------------|------------|------------------|--------------------------|--------------------------|
| B-01 | SS-2 | 2.0-4.0 | | X | X |
| B-01 | SS-4 | 6.0-8.0 | | X | X |
| B-01 | SS-5 | 8.0-10.0 | | X | X |
| B-01 | SS-6 | 13.5-15.0 | X | X | X |
| B-01 | SS-7 | 18.5-20.0 | X | X | X |
| B-01 | SS-8 | 23.5-25.0 | X | X | X |
| B-02 | SS-3 | 4.0-6.0 | | X | X |
| B-02 | SS-5 | 8.0-10.0 | | X | X |
| B-02 | SS-6 | 13.5-15.0 | X | X | X |
| B-02 | SS-7 | 18.5-20.0 | X | X | X |
| B-02 | SS-8 | 23.5-25.0 | X | X | X |
| B-02 | SS-9 | 28.5-30.0 | | X | X |

Table No. 2: Rock Laboratory Tests Performed on Selected Rock Core Samples

| Boring | Sample Number | Approximate 4" Sample Depth (ft) |
|--------|---------------|----------------------------------|
| B-01 | 1 | 35.5-36.5 |
| B-01 | 2 | 35.5-36.5 |
| B-01 | 3 | 42.0-42.5 |
| B-01 | 4 | 59.0-60.0 |
| B-01 | 5 | 63.0-64.0 |
| B-01 | 6 | 66.5-67.5 |
| B-02 | 7 | 36.5-37.5 |
| B-02 | 8 | 37.5-38.5 |



The laboratory testing results are presented in Appendix III and the laboratory test data sheets are presented in Appendix IV.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of South Carolina Department of Transportation or their agent, for specific application to the referenced site in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our investigation is based on site location information furnished to us; and generally accepted geotechnical engineering practice. The subsurface investigation logs included herein, do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to perform additional subsurface exploration based upon on-site observations of the conditions.



APPENDIX I



Site Location



FROEHLING & ROBERTSON, INC.
 GEOTECHNICAL • ENGINEERS • MATERIALS

DATE: 11/30/2015

CLIENT: SCDOT

PROJECT NO.: 65T-0215

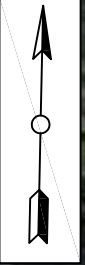
Site Vicinity Map
Emergency Bridge Package 4 Additional Bridge - Pine Grove Road
Kershaw County, South Carolina

Figure No. 1

Drawing Legend:



SPT Boring



S-28-651

B-2

PINE GROVE ROAD

B-1



FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENGINEERS • MATERIALS

DATE: 11/30/2015

CLIENT: SCDOT

PROJECT NO.: 65T-0215

Boring Location Map
Emergency Bridge Package 4 Additional Bridge - Pine Grove Road
Kershaw County, South Carolina

Figure No. 2

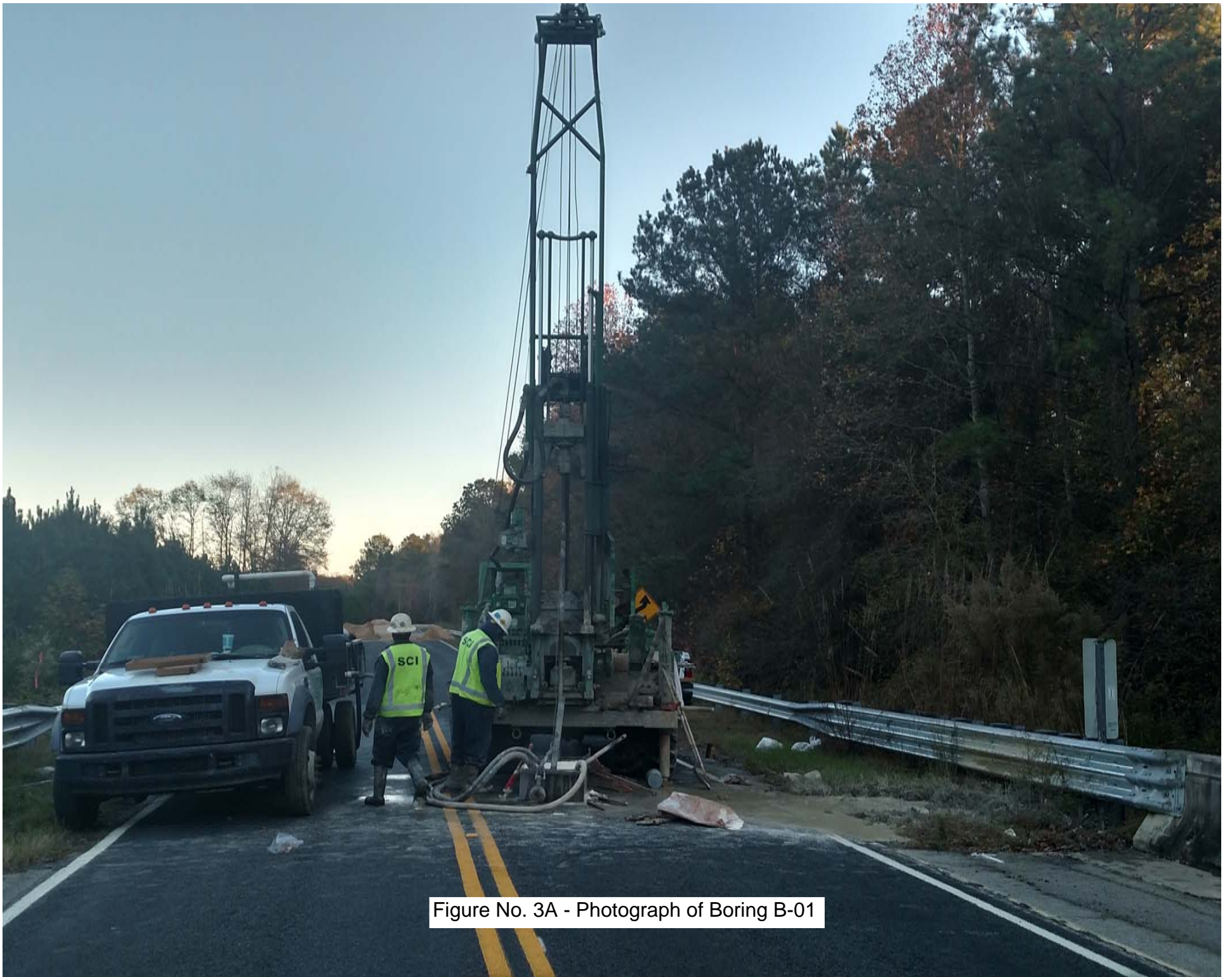


Figure No. 3A - Photograph of Boring B-01



Figure No. 3B - Photograph of Boring B-02



APPENDIX II



KEY TO SOIL CLASSIFICATION
Correlation of Penetration Resistance with
Relative Density and Consistency

| <u>Sands and Gravels</u> | | <u>Silts and Clays</u> | |
|--------------------------|-------------------------|------------------------|--------------------|
| <u>No. of Blows, N</u> | <u>Relative Density</u> | <u>No. of Blows, N</u> | <u>Consistency</u> |
| 0 - 4 | Very loose | 0 - 2 | Very soft |
| 5 - 10 | Loose | 3 - 4 | Soft |
| 11 - 30 | Medium dense | 5 - 8 | Firm |
| 31 - 50 | Dense | 9 - 15 | Stiff |
| Over 50 | Very dense | 16 - 30 | Very stiff |
| | | 31 - 50 | Hard |
| | | Over 50 | Very hard |

Particle Size Identification

(Unified Classification System)

| | |
|----------------|---|
| Boulders: | Diameter exceeds 12-in. (300-mm) |
| Cobbles: | 3-in. (75-mm) to 12-in. (300-mm) diameter |
| Gravel: | Coarse - ¾-in. (19-mm) to 3 in. (75-mm) diameter Fine - No. 4 (4.75-mm) sieve to ¾-in. (19-mm) diameter |
| Sand: | Coarse – No. 10 (2.0-mm) to No. 4 (4.76 mm) sieve Medium – No. 40 (0.425-mm) to No. 10 (2.0-mm) sieve Fine - No. 200 (0.075-mm) to No. 40 (0.425-mm) sieve |
| Silt and Clay: | Less than No. 200 (0.075-mm) sieve |



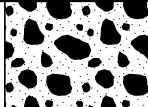



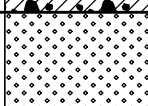
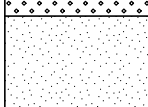
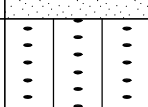
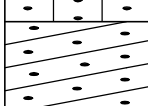
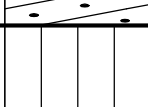
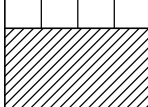

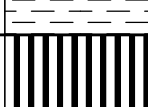
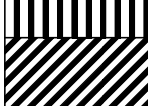
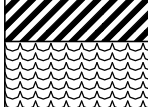
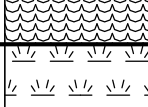
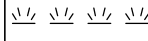
Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

| Approximate Content | Modifiers |
|----------------------------|------------------|
| ≤ 5%: | Trace |
| 5 to 10%: | Few |
| 15 to 25%: | Little |
| 30 to 45%: | Some |
| 50 to 100% | Mostly |

| Field Moisture Description | |
|-----------------------------------|---|
| Dry | Absence of moisture, dusty, dry to touch |
| Moist | Damp but no visible water |
| Wet | Visible free water, usually soil is below water table |

SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS | | TYPICAL DESCRIPTIONS | |
|---|---|--|---|---|--|---|
| | | | GRAPH | LETTER | | |
| <p>COARSE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</p> | <p>GRAVEL AND GRAVELLY SOILS</p> <p>(LITTLE OR NO FINES)</p> | CLEAN GRAVELS |  | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | |
| | | GRAVELS WITH FINES |  | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | |
| | | (APPRECIABLE AMOUNT OF FINES) |  | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES | |
| | <p>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</p> | <p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p> | CLEAN SANDS |  | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| | | | (LITTLE OR NO FINES) |  | SP | POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES |
| | | | SANDS WITH FINES |  | SM | SILTY SANDS, SAND - SILT MIXTURES |
| | <p>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</p> | <p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p> | (LITTLE OR NO FINES) |  | SC | CLAYEY SANDS, SAND - CLAY MIXTURES |
| | | | (APPRECIABLE AMOUNT OF FINES) |  | CL | CLAYEY SANDS, SAND - CLAY MIXTURES |
| | | | (APPRECIABLE AMOUNT OF FINES) |  | SC | CLAYEY SANDS, SAND - CLAY MIXTURES |
| <p>FINE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</p> | <p>SILTS AND CLAYS</p> <p>LIQUID LIMIT LESS THAN 50</p> | (LITTLE OR NO FINES) |  | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY | |
| | | (LITTLE OR NO FINES) |  | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS | |
| | | (LITTLE OR NO FINES) |  | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | |
| | <p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p> | <p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p> | (LITTLE OR NO FINES) |  | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS |
| | | | (LITTLE OR NO FINES) |  | CH | INORGANIC CLAYS OF HIGH PLASTICITY |
| | | | (LITTLE OR NO FINES) |  | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS |
| <p>HIGHLY ORGANIC SOILS</p> | | |  | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS | |

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SCDOT Soil Test Boring Log Descriptors

a - **Relative Density / Consistency Terms**

| <u>Relative Density¹</u> | | | <u>Consistency²</u> | | |
|-------------------------------------|------------------|----------------|--------------------------------|---|----------------|
| Descriptive Term | Relative Density | SPT Blow Count | Descriptive Term | Unconfined Compression Strength (q_u) (tsf) | SPT Blow Count |
| Very Loose | 0 to 15% | < 4 | Very Soft | <0.25 | <2 |
| Loose | 16 to 35% | 5 to 10 | Soft | 0.26 to 0.50 | 3 to 4 |
| Medium Dense | 36 to 65% | 11 to 30 | Firm | 0.51 to 1.00 | 5 to 8 |
| Dense | 66 to 85% | 31 to 50 | Stiff | 1.01 to 2.00 | 9 to 15 |
| Very Dense | 86 to 100% | >51 | Very Stiff | 2.01 to 4.00 | 16 to 30 |
| | | | Hard | >4.01 | > 31 |

b **Moisture Condition**

| <u>Descriptive Term</u> | <u>Criteria</u> |
|-------------------------|---|
| Dry | Absence of moisture, dusty, dry to the touch |
| Moist | Damp but no visible water |
| Wet | Visible free water, usually in coarse-grained soils below the water table |

c **Color**

Describe the sample color while sample is still moist, using Munsell color chart.

d **Angularity¹**

| <u>Descriptive Term</u> | <u>Criteria</u> |
|-------------------------|--|
| Angular | Particles have sharp edges and relatively plane sides with unpolished surfaces |
| Subangular | Particles are similar to angular description but have rounded edges |
| Subrounded | Particles have nearly plane sides but have well-rounded corners and edges |
| Rounded | Particles have smoothly curved sides and no edges |

e **HCl Reaction³**

| <u>Descriptive Term</u> | <u>Criteria</u> |
|-------------------------|--|
| None Reactive | No visible reaction |
| Weakly Reactive | Some reaction, with bubbles forming slowly |
| Strongly Reactive | Violent reaction, with bubbles forming immediately |

f **Cementation³**

| <u>Descriptive Term</u> | <u>Criteria</u> |
|-------------------------|--|
| Weakly Cemented | Crumbles or breaks with handling or little finger pressure |
| Moderately Cemented | Crumbles or breaks with considerable finger pressure |
| Strongly Cemented | Will not crumble or break with finger pressure |

g **Particle-Size Range¹**

| <u>Gravel</u> | | | <u>Sand</u> | | |
|---------------|--------------|------------------|-------------|---------------|-------------|
| | mm | Sieve size | | mm | Sieve size |
| Fine | 4.76 to 19.1 | #4 to ¾ inch | Fine | 0.074 to 0.42 | #200 to #40 |
| Coarse | 19.1 to 76.2 | ¾ inch to 3 inch | Medium | 0.42 to 2.00 | #40 to #10 |
| | | | Coarse | 4.00 to 4.76 | #10 to #4 |

h **Primary Soil Type^{1,2}**

The primary soil type will be shown in all capital letters

i **USCS Soil Designation**

Indicate USCS soil designation as defined in ASTM D-2487 and D-2488

j **AASHTO Soil Designation**

Indicate AASHTO soil designation as defined in AASHTO M-145 and ASTM D-3282

¹Applies to coarse-grained soils (major portion retained on No. 200 sieve)

²Applies to fine-grained soils (major portion passing No. 200 sieve)

³Use as required

Figure 6-11, SCDOT Soil Test Boring Log Descriptors - Soil

SCDOT Soil Test Boring Log Descriptors

ROCK WEATHERING / ALTERATION

| Description | Recognition |
|--------------------------------|--|
| Residual Soil | Original minerals of rock have been entirely decomposed to secondary minerals, and original rock fabric is not apparent; material can be easily broken by hand |
| Completely Weathered / Altered | Original minerals of rock have been almost entirely decomposed to secondary minerals, although the original fabric may be intact; material can be granulated by hand |
| Highly Weathered / Altered | More than half of the rock is decomposed; rock is weakened so that a minimum 1-7/8 inch diameter sample can be easily broken readily by hand across rock fabric |
| Moderately Weathered / Altered | Rock is discolored and noticeably weakened, but less than half is decomposed; a minimum 1-7/8 inch diameter sample cannot be broken readily by hand across rock fabric |
| Slightly Weathered / Altered | Rock is slightly discolored, but not noticeably lower in strength than fresh rock |
| Fresh | Rock shows no discoloration, loss of strength, or other effect of weathering / alteration |

ROCK STRENGTH

| Description | Recognition | Approximately Uniaxial Compressive Strength (psi) |
|-----------------------|--|---|
| Extremely Weak Rock | Can be indented by thumbnail | 35 – 150 |
| Very Weak Rock | Can be pected by pocket knife | 150 – 700 |
| Weak Rock | Can be peeled with difficulty by pocket knife | 700 – 3,500 |
| Medium Strong Rock | Can be indented 3/16 inch with sharp end of pick | 3,500 – 7,200 |
| Strong Rock | Requires one hammer blow to fracture | 7,200 – 14,500 |
| Very Strong Rock | Requires many hammer blows to fracture | 14,500 – 35,000 |
| Extremely Strong Rock | Can only be chipped with hammer blows | > 35,000 |

DISCONTINUITY DESCRIPTORS

k - Dip of fracture surface measured relative to horizontal with bearing and direction

| l Discontinuity Type | m Discontinuity Width (millimeters) | n Amount of Infilling |
|-----------------------------|--|------------------------------|
| F - Fault | W - Wide (12.5 – 50) | Su - Surface Stain |
| J - Joint | MW - Moderately Wide (2.5 – 12.5) | Sp - Spotty |
| Sh - Shear | N - Narrow (1.25 – 2.5) | Pa - Partially Filled |
| Fo - Foliation | VN - Very Narrow (< 1.25) | Fi - Filled |
| V - Vein | T - Tight (0) | No - None |
| B - Bedding | | |

| o Type of Infilling | p Surface Shape of Joint | q Discontinuity Spacing (feet) |
|----------------------------|---------------------------------|---------------------------------------|
| Cl - Clay | Wa - Wavy | EW - Extremely Wide (> 65) |
| Ca - Calcite | Pl - Planar | W - Wide (22 – 65) |
| Ch - Chloride | St - Stepped | M - Moderate (7.5 – 22) |
| Fe - Iron Oxide | Ir - Irregular | C - Close (2 – 7.5) |
| Gy - Gypsum/Talc | | VC - Very Close (< 2) |
| H - Healed | | |
| No - None | | |

| r Roughness of Surface |
|---|
| Slk - Slicksided (surface has smooth, glassy finish with visual evidence of striations) |
| S - Smooth (surface appears smooth and feels so to the touch) |
| SR - Slightly Rough (asperities on the discontinuity surfaces are distinguishable and can be felt) |
| R - Rough (some ridges and side-angle steps are evident; asperities are clearly visible, and discontinuity surface feels very abrasive) |
| VR - Very Rough (near-vertical steps and ridges occur on the discontinuity surface) |

Figure 6-12, SCDOT Soil Test Boring Log Descriptors - Rock

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-01 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.713549 | Longitude: | 34.247297 | Date Started: | 11/23/2015 |
| Total Depth: | 65 ft | Soil Depth: | 35 ft | Core Depth: | 30 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |

| Elevation (ft) | Depth (ft) | MATERIAL DESCRIPTION | Graphic Log | Sample Depth (ft) | Sample No./Type | 1st 6" | 2nd 6" | 3rd 6" | N Value | SPT N VALUE | | | | | | | | | | | |
|----------------|------------|--|-------------|-------------------|-----------------|--------|--------|--------|---------|-------------|----|----|-------------------|--|--|--|--|--|--|--|--|
| | | | | | | | | | | PL | MC | LL | FINES CONTENT (%) | | | | | | | | |
| | 0.0 | 7" Asphalt Pavement and 3" Aggregate Base | | 0.0 | | | | | | | | | | | | | | | | | |
| | 0.8 | FILL, loose, reddish brown, fine to coarse, moist, SILTY SAND (SM/A-2) , contains coarse gravel Munsel=5YR 4/3 SS-2: NMC=27.2%, %200=32.6 | | 1.0 | 1/SS | 4 | 4 | 4 | 8 | ● | | | | | | | | | | | |
| | 2.0 | | | 2.0 | 2/SS | 3 | 2 | 2 | 4 | ● | ○ | ▲ | | | | | | | | | |
| | 4.0 | Loose, moist, light brown, fine to medium, SILTY SAND (SM/A-4) , contains mica Munsel=7.5YR 6/3 SS-4: NMC=25.8%, %200=37.0 SS-5: NMC=31.5, %200=45.2 | | 4.0 | 3/SS | 1 | 1 | 3 | 4 | ● | | | | | | | | | | | |
| | 6.0 | Very loose | | 6.0 | 4/SS | 1 | 1 | 1 | 2 | ● | ○ | ▲ | | | | | | | | | |
| | 8.0 | | | 8.0 | 5/SS | 1 | 1 | 1 | 2 | ● | ○ | ▲ | | | | | | | | | |
| | 13.5 | ALLUVIAL , firm, moist, brown, SANDY SILT (ML/A-4) , contains root fragments Munsel=7.5YR 5/3 SS-6: NMC=29.8%, %200=51.2, LL=28, | | 13.5 | 6/SS | 1 | 2 | 2 | 4 | ● | ⊗ | ○ | ▲ | | | | | | | | |

LEGEND

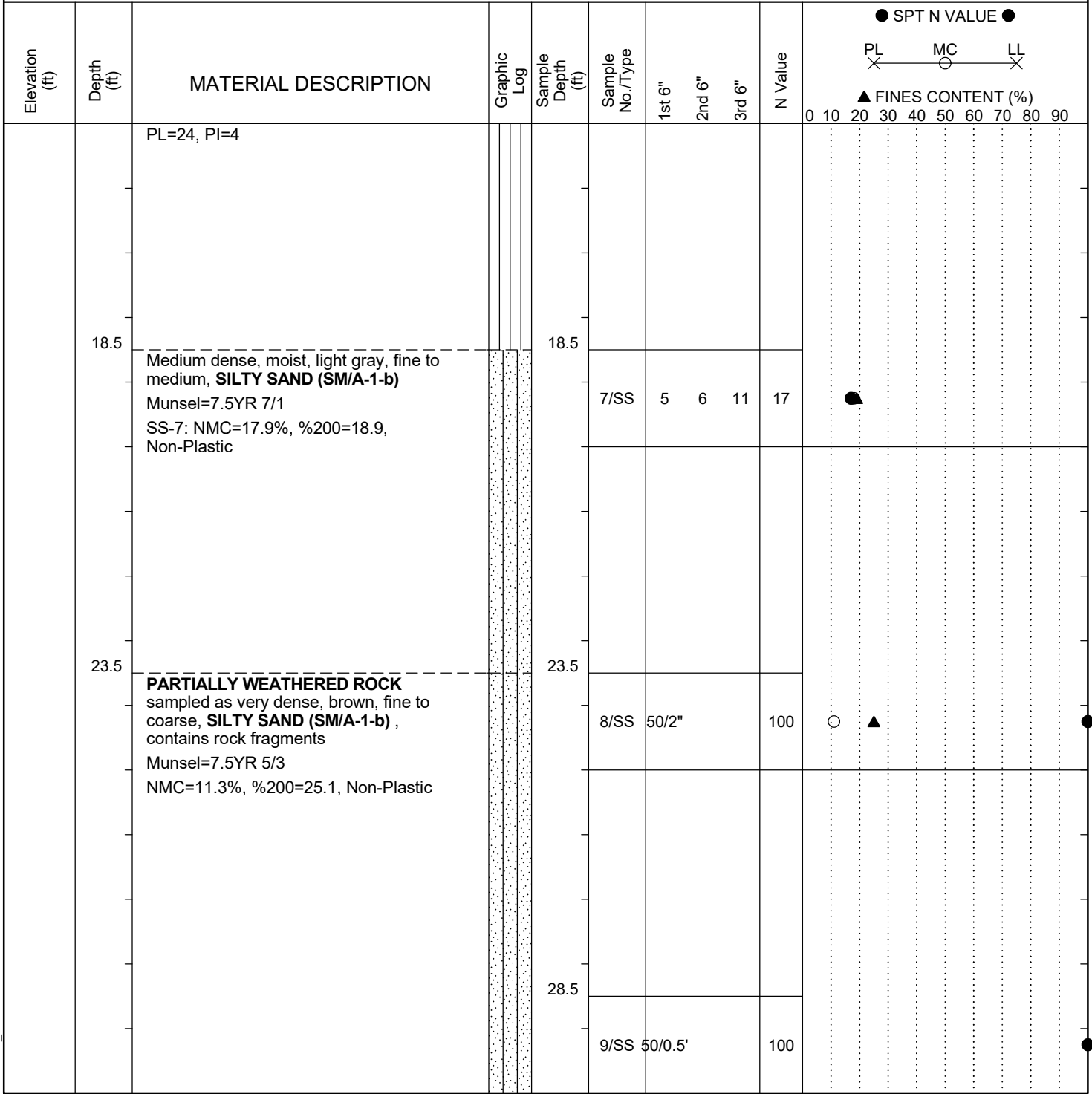
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SC_DOT_65T0215.GPJ SC_DOT.GDT 12/3/15

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-01 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.713549 | Longitude: | 34.247297 | Date Started: | 11/23/2015 |
| Total Depth: | 65 ft | Soil Depth: | 35 ft | Core Depth: | 30 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |



LEGEND

Continued Next Page

SC_DOT 65T0215.GPJ SC_DOT.GDT 12/3/15

| | | | |
|-------------------------|------------------------|--------------------------------|------------------|
| SAMPLER TYPE | | DRILLING METHOD | |
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-01 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.713549 | Longitude: | 34.247297 | Date Started: | 11/23/2015 |
| Total Depth: | 65 ft | Soil Depth: | 35 ft | Core Depth: | 30 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |

| Elevation (ft) | Depth (ft) | MATERIAL DESCRIPTION | Graphic Log | Sample Depth (ft) | Sample No./Type | 1st 6" | 2nd 6" | 3rd 6" | N Value | SPT N VALUE | | | | | | | | | | | |
|----------------|------------|--|-------------|-------------------|-----------------|--------|--------|--------|---------|-------------|----|----|-------------------|----|----|----|----|----|----|--|--|
| | | | | | | | | | | PL | MC | LL | FINES CONTENT (%) | | | | | | | | |
| | | | | | | | | | | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | | |
| | | | | 33.5 | | | | | | | | | | | | | | | | | |
| | | | | | 10/SS | 50/1" | | | 100 | | | | | | | | | | | | |
| | 35.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=97.2%, RQD=69.4%, RMR=62, moderately hard to hard, Fo, J, VC, T, PL, S to SR, Su UC Strength=1,120 psi UC Strength=4,283 psi | | 35.0 | NQ-1 | | | | | | | | | | | | | | | | |
| | 38.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=95.0%, RQD=30%, RMR=59, moderately hard to hard, Fo, J, VC to K, T, PL, S to SR, Su UC Strength=3,850 psi | | 38.0 | NQ-2 | | | | | | | | | | | | | | | | |
| | 43.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=35%, RQD=8.3%, RMR=52, moderately hard to hard, Fo, J, VC, T, PL, S to SR, Su | | 43.0 | NQ-3 | | | | | | | | | | | | | | | | |

LEGEND

Continued Next Page

SC_DOT_65T0215.GPJ SC_DOT.GDT 12/3/15

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-01 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.713549 | Longitude: | 34.247297 | Date Started: | 11/23/2015 |
| Total Depth: | 65 ft | Soil Depth: | 35 ft | Core Depth: | 30 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |

| Elevation (ft) | Depth (ft) | MATERIAL DESCRIPTION | Graphic Log | Sample Depth (ft) | Sample No./Type | 1st 6" | 2nd 6" | 3rd 6" | N Value | SPT N VALUE | | | | | | | | | | | |
|----------------|------------|--|-------------|-------------------|-----------------|--------|--------|--------|---------|-------------|----|----|-------------------|--|--|--|--|--|--|--|--|
| | | | | | | | | | | PL | MC | LL | FINES CONTENT (%) | | | | | | | | |
| 48.0 | 48.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=6.0%, RQD=0%, RMR=52, moderately hard to hard, Fo, J, VC, T, PL, S to SR, Su | | 48.0 | NQ-4 | | | | | | | | | | | | | | | | |
| 53.0 | 53.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=11.6%, RQD=0%, RMR=52, moderately hard to hard, Fo, J, VC, T, PL, S to SR, Su | | 53.0 | NQ-5 | | | | | | | | | | | | | | | | |
| 58.0 | 58.0 | Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=68.3%, RQD=40.8%, RMR=57, moderately hard to hard, Fo, J, C to K, T, PL, SR to R, Su | | 58.0 | NQ-6 | | | | | | | | | | | | | | | | |

LEGEND Continued Next Page

| | | | | | | | |
|--|--|--|--|--|--|--|--|
| SAMPLER TYPE SS - Split Spoon ST - Shelby Tube AWG - Rock Core, 1-1/8" | | SAMPLER TYPE NQ - Rock Core, 1-7/8" CU - Cuttings CT - Continuous Tube | | DRILLING METHOD HSA - Hollow Stem Auger CFA - Continuous Flight Augers DC - Driving Casing | | DRILLING METHOD RW - Rotary Wash RC - Rock Core | |
|--|--|--|--|--|--|--|--|

SC_DOT 65T0215.GPJ SC_DOT.GDT 12/3/15

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-01 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.713549 | Longitude: | 34.247297 | Date Started: | 11/23/2015 |
| Total Depth: | 65 ft | Soil Depth: | 35 ft | Core Depth: | 30 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |

| Elevation (ft) | Depth (ft) | MATERIAL DESCRIPTION | Graphic Log | Sample Depth (ft) | Sample No./Type | 1st 6" | 2nd 6" | 3rd 6" | N Value | SPT N VALUE | | | | | | | | | | |
|----------------|------------|---|-------------|-------------------|-----------------|--------|--------|--------|---------|-------------|----|----|-------------------|----|----|----|----|----|----|--|
| | | | | | | | | | | PL | MC | LL | FINES CONTENT (%) | | | | | | | |
| | | | | | | | | | | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | |
| | 63.0 | UC Strength=2,842 psi Meta-sedimentary, gray to dark gray (5YR 4/1), very fine to fine grained, laminated to very thinly bedded (approx. 45 degrees), slightly weathered to fresh, strong to very strong, REC=94.1%, RQD=70%, RMR=64, moderately hard to hard, Fo, J, VC, T, PL, S to SR, Su UC Strength=2,842 psi UC Strength=3,641 psi | | 63.0 | NQ-7 | | | | | | | | | | | | | | | |
| | 68.0 | | | | | | | | | | | | | | | | | | | |

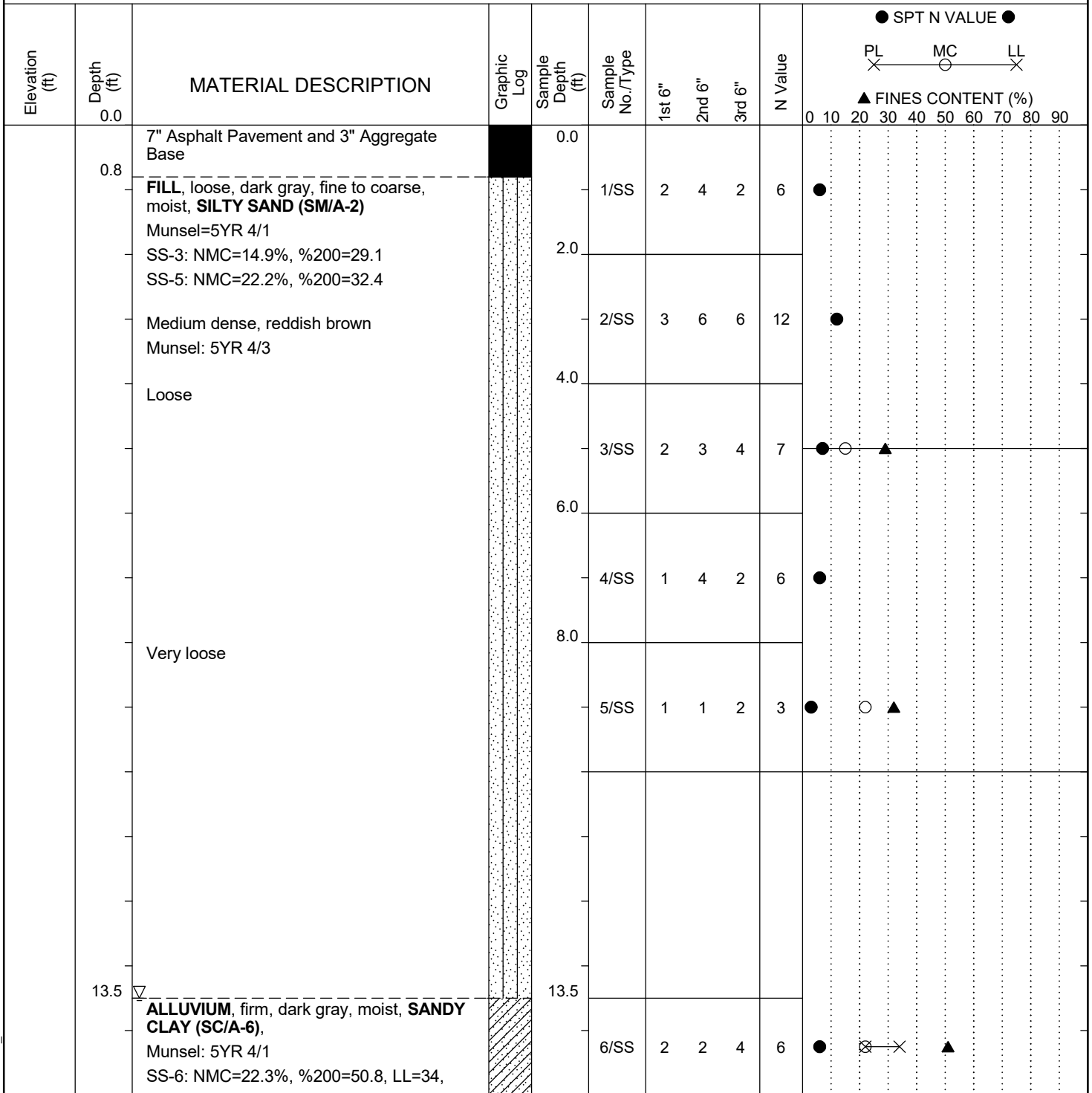
LEGEND

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

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SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-02 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.714198 | Longitude: | 34.247778 | Date Started: | 11/24/2015 |
| Total Depth: | 65 ft | Soil Depth: | 34 ft | Core Depth: | 7 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |



LEGEND

Continued Next Page

SC_DOT 65T0215.GPJ SC_DOT.GDT 12/3/15

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

SCDOT Soil Test Boring Log

| | | | |
|---|-----------------------------------|---------------------------------|-----------------------------------|
| File No.: 65T-0215 | Project No. (PIN): P029412 | County: Kershaw | Eng./Geo.: F&R |
| Site Description: Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | Route: S-28-36 | |
| Boring No.: B-02 | Boring Location: | Offset: | Alignment: Existing |
| Elev.: ft | Latitude: -80.714198 | Longitude: 34.247778 | Date Started: 11/24/2015 |
| Total Depth: 65 ft | Soil Depth: 34 ft | Core Depth: 7 ft | Date Completed: 11/24/2015 |
| Bore Hole Diameter (in): | Sampler Configuration | Liner Required: Y (N) | Liner Used: Y (N) |
| Drill Machine: CME-55X | Drill Method: RW/RC | Hammer Type: Automatic | Energy Ratio: 86% |
| Core Size: NQ | Driller: F&R | Groundwater: TOB 13.5 ft | 24HR: N/A |

| Elevation (ft) | Depth (ft) | MATERIAL DESCRIPTION | Graphic Log | Sample Depth (ft) | Sample No./Type | 1st 6" | 2nd 6" | 3rd 6" | N Value | SPT N VALUE | | | | | | | | | | |
|----------------|------------|--|-------------|-------------------|-----------------|--------|--------|--------|---------|-------------|----|----|-------------------|----|----|----|----|---|---|---|
| | | | | | | | | | | PL | MC | LL | FINES CONTENT (%) | | | | | | | |
| | 18.5 | PL=22, PI=12 Very dense, reddish brown, fine to coarse, moist, SILTY SAND (SM/A-2-4) , contains gravel Munsel=5YR 4/3 SS-7: NMC=12.5%, %200=20.1, Non-Plastic | | 18.5 | 7/SS | 8 | 10 | 40 | 50 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | ● | ○ | ▲ |
| | 22.5 | PARTIALLY WEATHERED ROCK sampled as very dense, dark gray, fine to coarse, SILTY SAND (SM/A-2-4) , contains rock fragments Munsel: 5YR 4/1 SS-8: NMC=16%, %200=35.1, LL=32, PL=28, PI=4 SS-9: NMC=14.3%, %200=32.1 | | 23.5 | 8/SS | 50/2 | | | 100 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | ● | ○ | ▲ |
| | | | | 28.5 | 9/SS | 50/6 | | | 100 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | ● | ○ | ▲ |

LEGEND

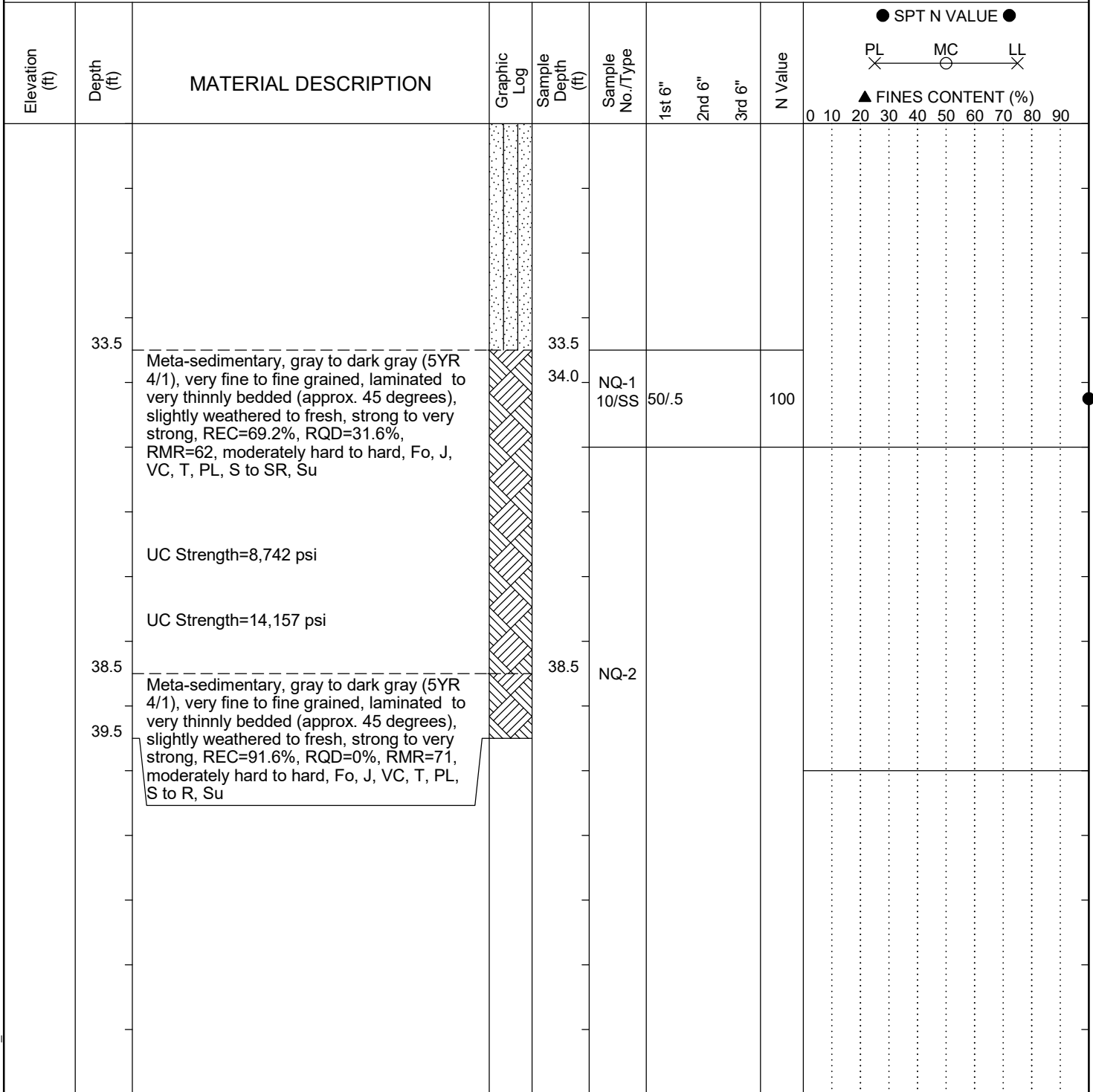
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SC_DOT 65T0215.GPJ SC_DOT.GDT 12/3/15

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

SCDOT Soil Test Boring Log

| | | | | | | | |
|---------------------------------|----------|--|------------|------------------------|-------------|------------------------|------------|
| File No.: | 65T-0215 | Project No. (PIN): | P029412 | County: | Kershaw | Eng./Geo.: | F&R |
| Site Description: | | Emergency Bridge Package 4 Additional Bridge - Pine Grove Road | | | | Route: | S-28-36 |
| Boring No.: | B-02 | Boring Location: | | Offset: | | Alignment: | Existing |
| Elev.: | ft | Latitude: | -80.714198 | Longitude: | 34.247778 | Date Started: | 11/24/2015 |
| Total Depth: | 65 ft | Soil Depth: | 34 ft | Core Depth: | 7 ft | Date Completed: | 11/24/2015 |
| Bore Hole Diameter (in): | | Sampler Configuration | | Liner Required: | Y (N) | Liner Used: | Y (N) |
| Drill Machine: | CME-55X | Drill Method: | RW/RC | Hammer Type: | Automatic | Energy Ratio: | 86% |
| Core Size: | NQ | Driller: | F&R | Groundwater: | TOB 13.5 ft | 24HR | N/A |



LEGEND

| SAMPLER TYPE | | DRILLING METHOD | |
|-------------------------|------------------------|--------------------------------|------------------|
| SS - Split Spoon | NQ - Rock Core, 1-7/8" | HSA - Hollow Stem Auger | RW - Rotary Wash |
| ST - Shelby Tube | CU - Cuttings | CFA - Continuous Flight Augers | RC - Rock Core |
| AWG - Rock Core, 1-1/8" | CT - Continuous Tube | DC - Driving Casing | |

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APPENDIX III



FROEHLING & ROBERTSON, INC.

LABORATORY TEST SUMMARY SHEET

F&R Project No: 65T-0215
Client: South Carolina Department of Transportation
Project: S-28-36 Pine Grove Road over Twentyfive Creek
SCDOT Proj ID
City/State: Kershaw County, SC

| Boring/Sample No. | Depth (ft) | LL | PL | PI | USCS/AASHTO Classification | Water Content (%) | Percent Passing No. 200 Sieve |
|-------------------|------------|----|----|----|----------------------------|-------------------|-------------------------------|
| B-01/SS-2 | 2.0-4.0 | | | | SM/A-2 | 27.2 | 32.6 |
| B-01/SS-4 | 6.0-8.0 | | | | SM/A-4 | 25.8 | 37.0 |
| B-01/SS-5 | 8.0-10.0 | | | | SM/A-4 | 31.5 | 45.2 |
| B-01/SS-6 | 13.5-15.0 | 28 | 24 | 4 | ML/A-4 | 29.8 | 51.2 |
| B-01/SS-7 | 18.5-20.0 | NP | NP | NP | SM/A-1-b | 17.9 | 18.9 |
| B-01/SS-8 | 23.5-25.0 | NP | NP | NP | SM/A-1-b | 11.3 | 25.1 |
| B-02/SS-3 | 4.0-6.0 | | | | SM/A-2 | 14.9 | 29.1 |
| B-02/SS-5 | 8.0-10.0 | | | | SM/A-2 | 22.2 | 32.4 |
| B-02/SS-6 | 13.5-15.0 | 34 | 22 | 12 | SC/A-6 | 22.3 | 50.8 |
| B-02/SS-7 | 18.5-20.0 | NP | NP | NP | SM/A-2-4 | 12.5 | 20.1 |
| B-02/SS-8 | 23.5-25.0 | 32 | 28 | 4 | SM/A-2-4 | 16.0 | 35.1 |
| B-02/SS-9 | 28.5-30.0 | | | | SM/A-2-4 | 14.3 | 32.1 |

NP: non-plastic

Date: 12/2/15



FROEHLING & ROBERTSON, INC.

ROCK CORE COMPRESSIVE STRENGTH TESTS

| | | |
|---|--|-----------------------------|
| Project: Emergency Bridge Package 4 Additional Bridge - Kershaw County | Report Date: | December 2, 2015 |
| Client: SCDOT | Drill Date: 11/23/15 - 11/24/15 | Record No.: 65T-0215 |

COMPRESSIVE STRENGTH DATA

| Core No. | Boring No. | Length (in) | Weight (lbs) | Unit Weight (pcf) | Core Dia. (in) | L/D Ratio | X-sec Area (sq-in) | Test Date | Applied Load (lbs) | Unit Stress (psi) | Corr. Factor | Corrected Compressive Strength (psi) |
|--|------------|-------------|--------------|-------------------|----------------|-----------|--------------------|-----------|--------------------|-------------------|---------------|--------------------------------------|
| 1 | B-01 | 4.1 | 1.24 | 169.5 | 1.97 | 2.10 | 3.05 | 12/1/15 | 3,420 | 1120 | 1.0000 | 1120 |
| 2 | B-01 | 4.1 | 1.21 | 167.4 | 1.97 | 2.07 | 3.05 | 12/1/15 | 13,080 | 4283 | 1.0000 | 4283 |
| 3 | B-01 | 4.0 | 1.19 | 169.2 | 1.97 | 2.02 | 3.05 | 12/1/15 | 11,760 | 3850 | 1.0000 | 3850 |
| 4 | B-01 | 4.1 | 1.21 | 169.0 | 1.97 | 2.05 | 3.05 | 12/1/15 | 8,680 | 2842 | 1.0000 | 2842 |
| 5 | B-01 | 4.2 | 1.26 | 169.7 | 1.97 | 2.13 | 3.05 | 12/1/15 | 9,780 | 3202 | 1.0000 | 3202 |
| 6 | B-01 | 4.1 | 1.25 | 172.1 | 1.97 | 2.08 | 3.05 | 12/1/15 | 11,120 | 3641 | 1.0000 | 3641 |
| 7 | B-02 | 4.1 | 1.21 | 166.2 | 1.97 | 2.09 | 3.05 | 12/1/15 | 26,700 | 8742 | 1.0000 | 8742 |
| 8 | B-02 | 4.1 | 1.21 | 167.8 | 1.97 | 2.07 | 3.05 | 12/1/15 | 43,240 | 14157 | 1.0000 | 14157 |
| AVERAGE COMPRESSIVE STRENGTH B-01 | | | | | | | | | | | 3,156 | |
| AVERAGE COMPRESSIVE STRENGTH B-02 | | | | | | | | | | | 11,450 | |



APPENDIX IV

KERSHAW COUNTY

MOISTURE CONTENT (%)

*

| | #1 | #2 | #3 | #4 | #5 | #6 | #7 |
|---------------------|------------|----|----------|----|----------|----|------------|
| Sample I.D. | B-1 2-4 | | B-1 6-8 | | B-1 8-10 | | B-1 13s-15 |
| Wet Soil + Tare | 301.39 | | 468.73 | | 492.12 | | 421.72 |
| Dry Soils + Tare | 248.40 | | 403.29 | | 408.99 | | 358.92 |
| Tare # & Weight | S-7 147.11 | | G 149.32 | | K 145.33 | | S10 148.24 |
| Weight of Water | 32.99 | | 65.44 | | 83.13 | | 62.80 |
| Weight of Dry Soils | 121.29 | | 253.97 | | 263.76 | | 210.68 |
| Moisture Content | 0.272 | | 0.258 | | 0.315 | | 0.298 |

*

*

| | #8 | #9 | #10 | #11 | #12 | #13 | #14 |
|---------------------|------------|----|-------------|-----|-----|-----|-----|
| Sample I.D. | B-1 18s-20 | | B-1 23s-25 | | | | |
| Wet Soil + Tare | 370.78 | | 228.58 | | | | |
| Dry Soils + Tare | 336.65 | | 220.53 | | | | |
| Tare # & Weight | B 146.03 | | S-51 149.33 | | | | |
| Weight of Water | 34.13 | | 8.05 | | | | |
| Weight of Dry Soils | 190.62 | | 71.20 | | | | |
| Moisture Content | 0.179 | | 0.113 | | | | |

*

*

| | #15 | #16 | #17 | #18 | #19 | #20 | #21 |
|---------------------|-----------|-----|----------|-----|------------|-----|------------|
| Sample I.D. | B-2 4-6 | | B-2 8-10 | | B-2 13s-15 | | B-2 18s-20 |
| Wet Soil + Tare | 558.94 | | 556.99 | | 456.94 | | 501.39 |
| Dry Soils + Tare | 512.88 | | 492.96 | | 410.96 | | 462.21 |
| Tare # & Weight | AE 204.29 | | L 204.23 | | AD 204.32 | | S3 149.18 |
| Weight of Water | 46.06 | | 64.03 | | 45.98 | | 39.18 |
| Weight of Dry Soils | 308.59 | | 288.73 | | 206.64 | | 313.03 |
| Moisture Content | 0.149 | | 0.222 | | 0.223 | | 0.125 |

*

| | #22 | #23 | #24 | #25 | #26 | #27 | #28 |
|---------------------|------------|-----|------------|-----|-----|-----|-----|
| Sample I.D. | B-2 23s-25 | | B-2 28s-30 | | | | |
| Wet Soil + Tare | 286.97 | | 504.93 | | | | |
| Dry Soils + Tare | 268.03 | | 460.23 | | | | |
| Tare # & Weight | J 149.33 | | S21 147.69 | | | | |
| Weight of Water | 18.94 | | 44.70 | | | | |
| Weight of Dry Soils | 118.7 | | 312.54 | | | | |
| Moisture Content | 0.160 | | 0.143 | | | | |



WASH 200 (C 117)

CLIENT _____

PROJECT KERSHAW CO

RECORD NO. _____

B-1
2-A

TECHNICIAN _____

TEST DATE _____

SOIL CLASSIFICATION _____

TARE # AB-A

TARE WEIGHT 172.81

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>294.19</u> |
| B Dry Soil | (A-Tare) | <u>121.38</u> |
| C Tare and Dry Soil After Wash | | <u>254.67</u> |
| D Dry Soil After Wash | (C-Tare) | <u>81.86</u> |
| E Material Lost | (B-D) | <u>39.52</u> |

Percent Passing #200

(B-D)/B x 100=

32.6%



WASH 200 (C 117)

CLIENT _____

B-1

TECHNICIAN _____

PROJECT KERSHAW CO.

TEST DATE _____

RECORD NO. _____

6-8

SOIL CLASSIFICATION _____

TARE # AA

TARE WEIGHT 247.74

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>501.95</u> |
| B Dry Soil | (A-Tare) | <u>254.21</u> |
| C Tare and Dry Soil After Wash | | <u>407.90</u> |
| D Dry Soil After Wash | (C-Tare) | <u>160.16</u> |
| E Material Lost | (B-D) | <u>94.05</u> |

Percent Passing #200

(B-D)/B x 100=

37.0%



WASH 200 (C 117)

CLIENT _____

B-1

TECHNICIAN _____

PROJECT KERSHAW CO.

8-10

TEST DATE _____

RECORD NO. _____

SOIL CLASSIFICATION _____

TARE # E

TARE WEIGHT 248.03

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>512.17</u> |
| B Dry Soil | (A-Tare) | <u>264.14</u> |
| C Tare and Dry Soil After Wash | | <u>392.80</u> |
| D Dry Soil After Wash | (C-Tare) | <u>144.77</u> |
| E Material Lost | (B-D) | <u>119.37</u> |

Percent Passing #200

(B-D)/B x 100=

45.2%



WASH 200 (C 117)

CLIENT _____
PROJECT KERSHAW CO.
RECORD NO. _____

B-1
13.5-15

TECHNICIAN _____
TEST DATE _____

SOIL CLASSIFICATION _____

TARE # A3

TARE WEIGHT 249.96

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>460.98</u> |
| B Dry Soil | (A-Tare) | <u>211.02</u> |
| C Tare and Dry Soil After Wash | | <u>352.93</u> |
| D Dry Soil After Wash | (C-Tare) | <u>102.97</u> |
| E Material Lost | (B-D) | <u>108.05</u> |

Percent Passing #200

(B-D)/B x 100=

51.2%



WASH 200 (C 117)

CLIENT _____

B-1

TECHNICIAN _____

PROJECT KERSHAW CO.

185-20

TEST DATE _____

RECORD NO. _____

SOIL CLASSIFICATION _____

TARE # ACC

TARE WEIGHT 255.10

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>446.06</u> |
| B Dry Soil | (A-Tare) | <u>190.96</u> |
| C Tare and Dry Soil After Wash | | <u>410.06</u> |
| D Dry Soil After Wash | (C-Tare) | <u>154.96</u> |
| E Material Lost | (B-D) | <u>36.0</u> |

Percent Passing #200

(B-D)/B x 100=

18.9%



WASH 200 (C 117)

CLIENT _____

B-1

TECHNICIAN _____

PROJECT KERSHAW CO.

TEST DATE _____

RECORD NO. _____

23.5-25

SOIL CLASSIFICATION _____

TARE # 176

TARE WEIGHT 178.22

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>249.65</u> |
| B Dry Soil | (A-Tare) | <u>71.43</u> |
| C Tare and Dry Soil After Wash | | <u>231.71</u> |
| D Dry Soil After Wash | (C-Tare) | <u>53.49</u> |
| E Material Lost | (B-D) | <u>17.94</u> |

Percent Passing #200

(B-D)/B x 100=

25.1%



WASH 200 (C 117)

CLIENT _____

PROJECT KERSHAW CO.

RECORD NO. _____

B-2

A-6

TECHNICIAN _____

TEST DATE _____

SOIL CLASSIFICATION _____

TARE # N2

TARE WEIGHT 319.87

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>614.00</u> |
| B Dry Soil | (A-Tare) | <u>294.13</u> |
| C Tare and Dry Soil After Wash | | <u>528.55</u> |
| D Dry Soil After Wash | (C-Tare) | <u>208.68</u> |
| E Material Lost | (B-D) | <u>85.45</u> |

Percent Passing #200

(B-D)/B x 100=

29.1%



WASH 200 (C 117)

CLIENT _____

B-2

TECHNICIAN _____

PROJECT KERSHAW CO.

8-10

TEST DATE _____

RECORD NO. _____

SOIL CLASSIFICATION _____

TARE # XD

TARE WEIGHT 306.15

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>595.54</u> |
| B Dry Soil | (A-Tare) | <u>289.39</u> |
| C Tare and Dry Soil After Wash | | <u>501.80</u> |
| D Dry Soil After Wash | (C-Tare) | <u>195.65</u> |
| E Material Lost | (B-D) | <u>93.74</u> |

Percent Passing #200

(B-D)/B x 100=

32.4%



WASH 200 (C 117)

CLIENT _____

TECHNICIAN _____

PROJECT KERSHAW CO,

B-2

TEST DATE _____

RECORD NO. _____

135-15

SOIL CLASSIFICATION _____

TARE # D3

TARE WEIGHT 250.06

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>457.37</u> |
| B Dry Soil | (A-Tare) | <u>207.31</u> |
| C Tare and Dry Soil After Wash | | <u>351.99</u> |
| D Dry Soil After Wash | (C-Tare) | <u>101.93</u> |
| E Material Lost | (B-D) | <u>105.38</u> |

Percent Passing #200

(B-D)/B x 100=

50.8%



WASH 200 (C 117)

CLIENT _____

TECHNICIAN _____

PROJECT KERSHAW CO.

B-2

TEST DATE _____

RECORD NO. _____

18.5-20

SOIL CLASSIFICATION _____

TARE # N4

TARE WEIGHT 330.48

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>644.39</u> |
| B Dry Soil | (A-Tare) | <u>313.91</u> |
| C Tare and Dry Soil After Wash | | <u>581.42</u> |
| D Dry Soil After Wash | (C-Tare) | <u>250.94</u> |
| E Material Lost | (B-D) | <u>62.97</u> |

Percent Passing #200

(B-D)/B x 100=

20.1%



WASH 200 (C 117)

CLIENT _____
PROJECT KEESHAW CO. B-2 TECHNICIAN _____
RECORD NO. _____ 23.5-25 TEST DATE _____
SOIL CLASSIFICATION _____

TARE # NI TARE WEIGHT 327.17

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>446.66</u> |
| B Dry Soil | (A-Tare) | <u>119.49</u> |
| C Tare and Dry Soil After Wash | | <u>404.66</u> |
| D Dry Soil After Wash | (C-Tare) | <u>77.49</u> |
| E Material Lost | (B-D) | <u>42.0</u> |

Percent Passing #200 (B-D)/B x 100= 35.1%



WASH 200 (C 117)

CLIENT _____
PROJECT KERSHAW CO. B-2 28.5-30 TECHNICIAN _____
RECORD NO. _____ TEST DATE _____
SOIL CLASSIFICATION _____

TARE # 8A TARE WEIGHT 337.70

| | | |
|--------------------------------|----------|---------------|
| A Tare and Dry Soil | | <u>651.12</u> |
| B Dry Soil | (A-Tare) | <u>313.42</u> |
| C Tare and Dry Soil After Wash | | <u>550.37</u> |
| D Dry Soil After Wash | (C-Tare) | <u>212.67</u> |
| E Material Lost | (B-D) | <u>100.75</u> |

Percent Passing #200 (B-D)/B x 100= 32.1%

Froehling & Robertson, Inc.
Laboratory Sample Analyses

SPA

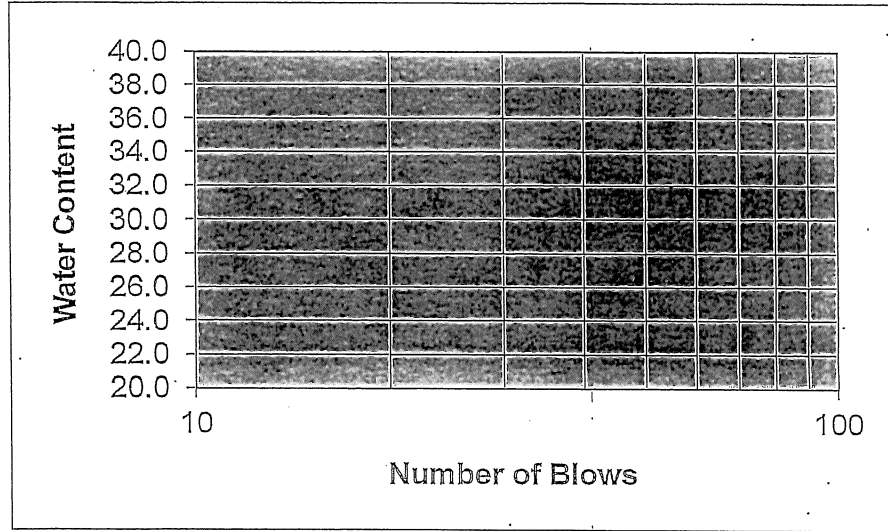
A

Client: _____
Project: KERSHAW CB
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No: _____
Location: B-1 13.5-15
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | |
|----------------|--------------|--------------|--------------|
| Tare No. | <u>60</u> | <u>1</u> | <u>M3</u> |
| Cup & Wet Soil | <u>34.30</u> | <u>34.89</u> | <u>35.33</u> |
| Cup & Dry Soil | <u>31.88</u> | <u>32.26</u> | <u>32.55</u> |
| Moisture Loss | <u>2.42</u> | <u>2.63</u> | <u>2.78</u> |
| Cup Weight | <u>23.11</u> | <u>23.03</u> | <u>23.12</u> |
| Dry Soil | <u>8.77</u> | <u>9.23</u> | <u>9.43</u> |
| Blows | <u>31</u> | <u>24</u> | <u>16</u> |
| Moisture % | <u>0.276</u> | <u>0.285</u> | <u>0.295</u> |
| Plastic Limit | | | |
| Tare No. | <u>12</u> | <u>7A</u> | |
| Cup & Wet Soil | <u>30.52</u> | <u>29.85</u> | |
| Cup & Dry Soil | <u>29.07</u> | <u>28.59</u> | |
| Moisture Loss | <u>1.45</u> | <u>1.26</u> | |
| Cup Weight | <u>23.05</u> | <u>23.23</u> | |
| Dry Soil | <u>6.02</u> | <u>5.36</u> | |
| Moisture % | <u>0.241</u> | <u>0.235</u> | |



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

$$LL = 28.5 \left(\frac{24}{25} \right)^{0.121} = 28$$

$$PL = 24$$

$$PI = 4$$

Froehling & Robertson, Inc.
Laboratory Sample Analyses

SP3

D

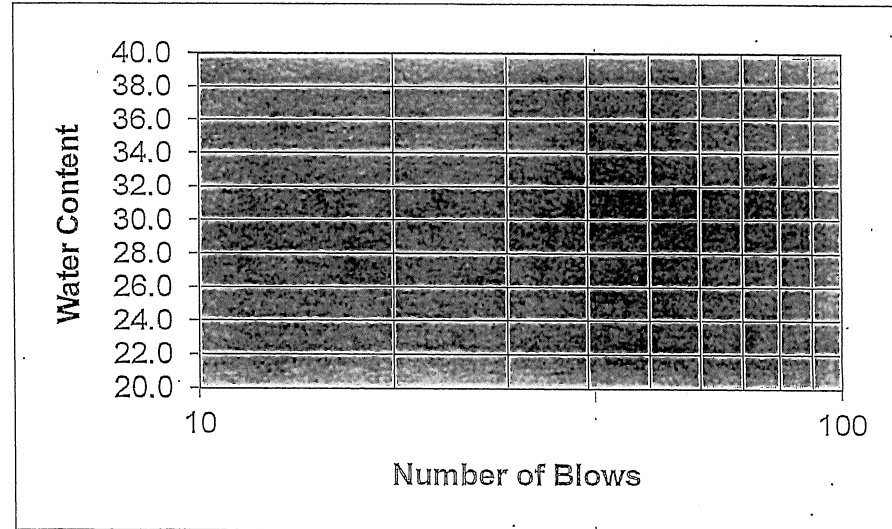
Client: _____
Project: KERSHAW CO 1
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No: 7
Location: B-1 18.5-20
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | | |
|----------------|--|--|--|--|
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Blows | | | | |
| Moisture % | | | | |
| Plastic Limit | | | | |
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Moisture % | | | | |

NON-PLASTIC



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

Froehling & Robertson, Inc.
Laboratory Sample Analyses

SPI

G

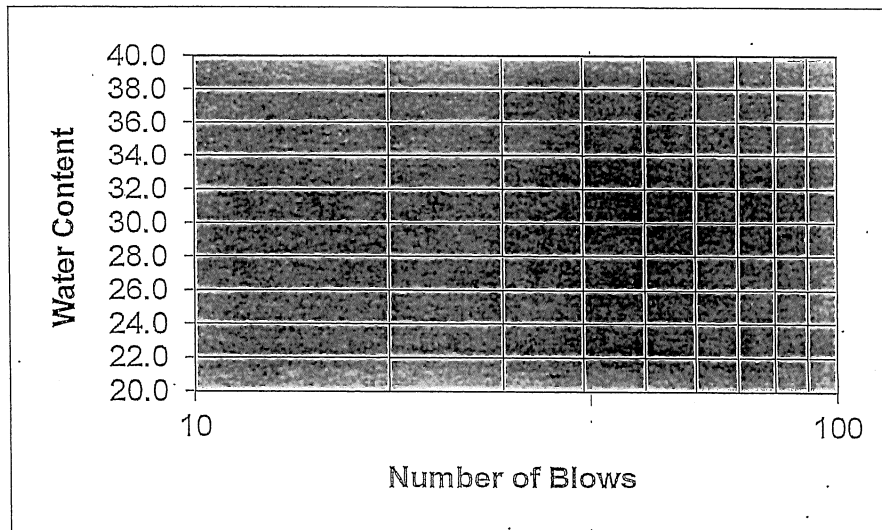
Client: _____
Project: KERSHAW CO
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No: 8
Location: B-1 23.5-25
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | | |
|----------------|--|--|--|--|
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Blows | | | | |
| Moisture % | | | | |
| Plastic Limit | | | | |
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Moisture % | | | | |

NON-PLASTIC



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

Froehling & Robertson, Inc.
Laboratory Sample Analyses

C

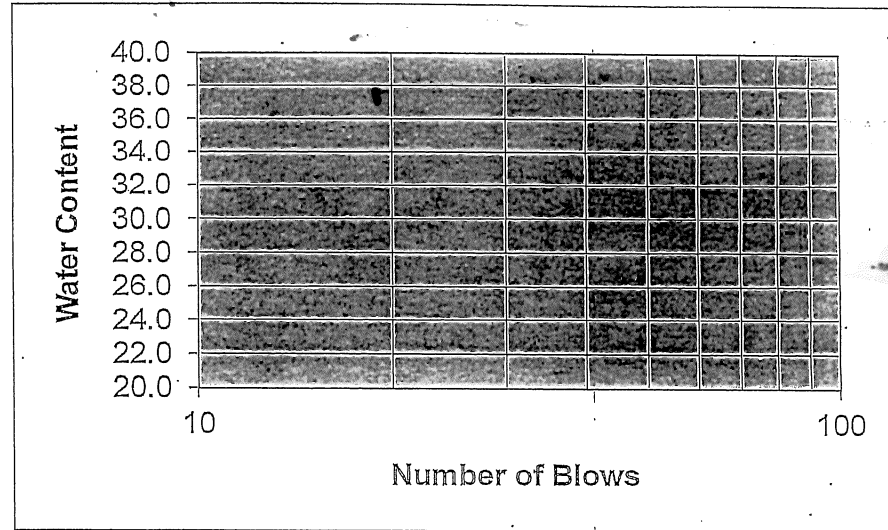
SP2

Client: _____
Project: KERSHAW CO
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No.: 6
Location: B-2 13.5-15
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | |
|----------------|-------|-------|-------|
| Tare No. | 8 | PII | 108 |
| Cup & Wet Soil | 37.18 | 37.41 | 37.57 |
| Cup & Dry Soil | 33.68 | 33.68 | 33.73 |
| Moisture Loss | 3.50 | 3.73 | 3.84 |
| Cup Weight | 23.09 | 22.93 | 23.15 |
| Dry Soil | 10.59 | 10.75 | 10.58 |
| Blows | 31 | 23 | 17 |
| Moisture % | 0.331 | 0.347 | 0.363 |
| Plastic Limit | | | |
| Tare No. | M1 | S1 | |
| Cup & Wet Soil | 29.83 | 31.56 | |
| Cup & Dry Soil | 28.66 | 29.99 | |
| Moisture Loss | 1.17 | 1.57 | |
| Cup Weight | 23.03 | 23.03 | |
| Dry Soil | 5.63 | 6.94 | |
| Moisture % | 0.208 | 0.226 | |



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

$$LL = 34.7 \left(\frac{23}{25} \right)^{0.121} = 34$$

$$PL = 22$$

$$PI = 12$$

Froehling & Robertson, Inc.
Laboratory Sample Analyses

SP5

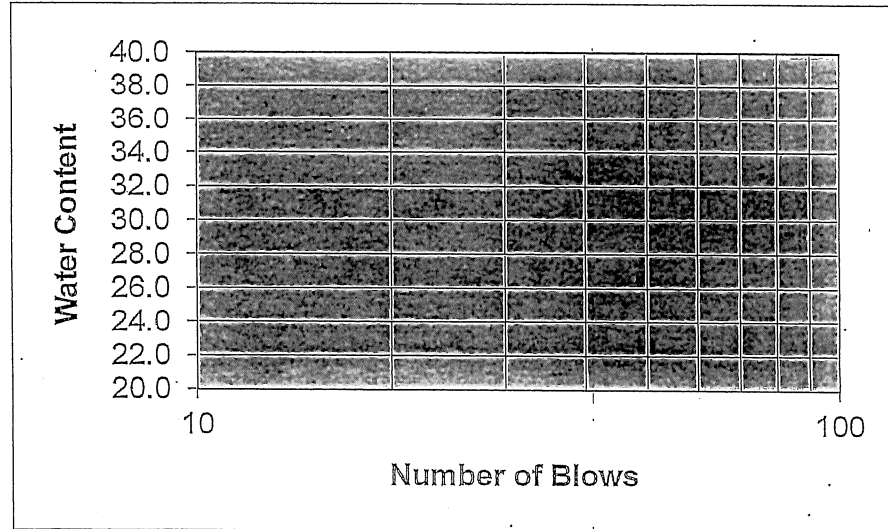
E

Client: _____
Project: KERSHAW CO
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No: _____
Location: B-2 7 185-20
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | | |
|----------------|--------------------|--|--|--|
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | NON-PLASTIC | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Blows | | | | |
| Moisture % | | | | |
| Plastic Limit | | | | |
| Tare No. | | | | |
| Cup & Wet Soil | | | | |
| Cup & Dry Soil | | | | |
| Moisture Loss | | | | |
| Cup Weight | | | | |
| Dry Soil | | | | |
| Moisture % | | | | |



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

Froehling & Robertson, Inc.
Laboratory Sample Analyses

P1

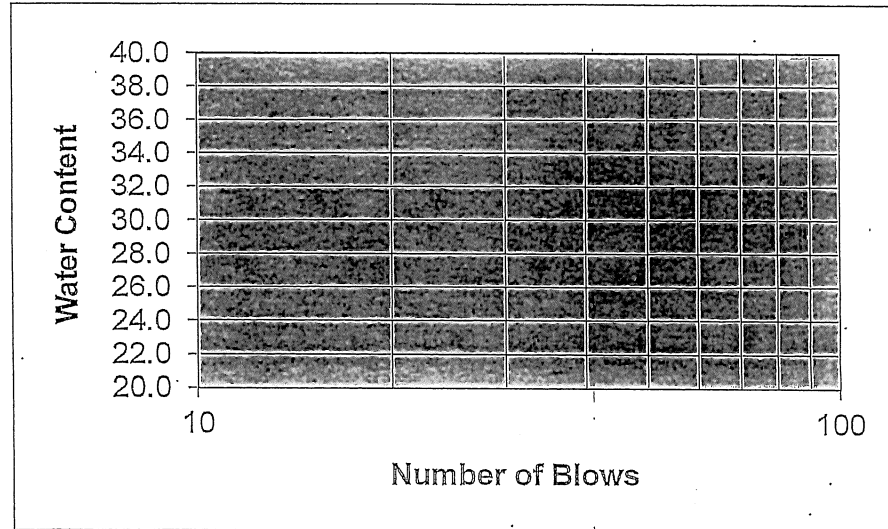
F

Client: _____
Project: HERSHAW CO
F&R Project No.: _____
Item Code/Use: _____

Material: _____
Sample No: 9
Location: B-2 23.5-25
Source: _____

Date Received: 11/25/15
Date Processed: _____

| Liquid Limit | | | |
|----------------|--------------|--------------|--------------|
| Tare No. | <u>M2</u> | <u>85</u> | <u>DG</u> |
| Cup & Wet Soil | <u>36.06</u> | <u>34.17</u> | <u>36.41</u> |
| Cup & Dry Soil | <u>32.99</u> | <u>31.47</u> | <u>32.88</u> |
| Moisture Loss | <u>3.07</u> | <u>2.70</u> | <u>3.53</u> |
| Cup Weight | <u>23.26</u> | <u>23.12</u> | <u>23.00</u> |
| Dry Soil | <u>9.73</u> | <u>8.35</u> | <u>9.88</u> |
| Blows | <u>30</u> | <u>25</u> | <u>15</u> |
| Moisture % | <u>0.316</u> | <u>0.323</u> | <u>0.357</u> |
| Plastic Limit | | | |
| Tare No. | <u>42</u> | <u>82</u> | |
| Cup & Wet Soil | <u>29.16</u> | <u>29.56</u> | |
| Cup & Dry Soil | <u>27.78</u> | <u>28.15</u> | |
| Moisture Loss | <u>1.38</u> | <u>1.41</u> | |
| Cup Weight | <u>22.91</u> | <u>23.25</u> | |
| Dry Soil | <u>4.87</u> | <u>4.90</u> | |
| Moisture % | <u>0.283</u> | <u>0.288</u> | |



Laboratory Technician: _____
Reviewed By: _____
Program Administrator

LL = _____
PL = _____
PI = _____
USCS = _____

[Handwritten signature]

LL = 32
PL = 28
PI = 4



APPENDIX V



Core No. 1
UC Strength = 1,120 psi

Core No. 2
UC Strength = 4,283 psi

Core No. 3
UC Strength = 3,850 psi

Fig. 4A - Compressive Strength Test Sample Photos - B-01



Core No. 4
UC Strength = 2,842 psi



Core No. 5
UC Strength = 3,202 psi



Core No. 6
UC Strength = 3,641 psi

Fig. 4B - Compressive Strength Test Sample Photos - B-01



Core No. 7
UC Strength = 8,742 psi



Core No. 8
UC Strength = 14,157 psi

Fig. 4C - Compressive Strength Test Sample Photos - B-02



Figure No. 5A Rock Core Photographic Log
 S-28-36 Pine Grove Road, Kershaw County, South Carolina

Boring B-01

| Rock Sample Depth | Run No. | Run Length | Recovery | RQD |
|-------------------|---------|------------|-------------|------|
| 35 ft - 38 ft | #1 | 3 ft | 35 inches | 69 % |
| 38 ft - 43 ft | #2 | 5 ft | 47.5 inches | 30 % |
| 43 ft - 48 ft | #3 | 5 ft | 21 inches | 8 % |



Figure No. 5B Rock Core Photographic Log
 S-28-36 Pine Grove Road, Kershaw County, South Carolina

Boring B-01

| Rock Sample Depth | Run No. | Run Length | Recovery | RQD |
|-------------------|---------|------------|-------------|------|
| 43 ft - 48 ft | #3 | 5 ft | 21 inches | 8 % |
| 48 ft - 53 ft | #4 | 5 ft | 4 inches | 0 % |
| 53 ft - 58 ft | #5 | 5 ft | 7 inches | 0 % |
| 58 ft - 63 ft | #6 | 5 ft | 41 inches | 41 % |
| 63 ft - 68 ft | #7 | 5 ft | 56.5 inches | 70 % |



Figure No. 5C Rock Core Photographic Log
 S-28-36 Pine Grove Road, Kershaw County, South Carolina

Boring B-02

| Rock Sample Depth | Run No. | Run Length | Recovery | RQD |
|-------------------|---------|------------|-------------|------|
| 33.5 ft - 38.5 ft | #1 | 5 ft | 41.5 inches | 32 % |
| 38.5 ft - 39.5 ft | #2 | 1 ft | 11 inches | 0 % |