

REFERENCE: B-5344

PROJECT: 46058

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

**STRUCTURE
SUBSURFACE INVESTIGATION**

COUNTY GUILFORD
PROJECT DESCRIPTION BRIDGE NO.161 ON SR 2821
(HARVEST ROAD) OVER SOUTH BUFFALO CREEK

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| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-------|-----------------------------|-----------|--------------|
| N.C. | B-5344 | 1 | 10 |

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PERSONNEL

D. RACEY

S. DAVIS

M. RENZA

C. WANG

T. WALKER

INVESTIGATED BY F&R, Inc.

DRAWN BY D. RACEY

CHECKED BY P. ALTON

SUBMITTED BY P. ALTON

DATE JULY 2015



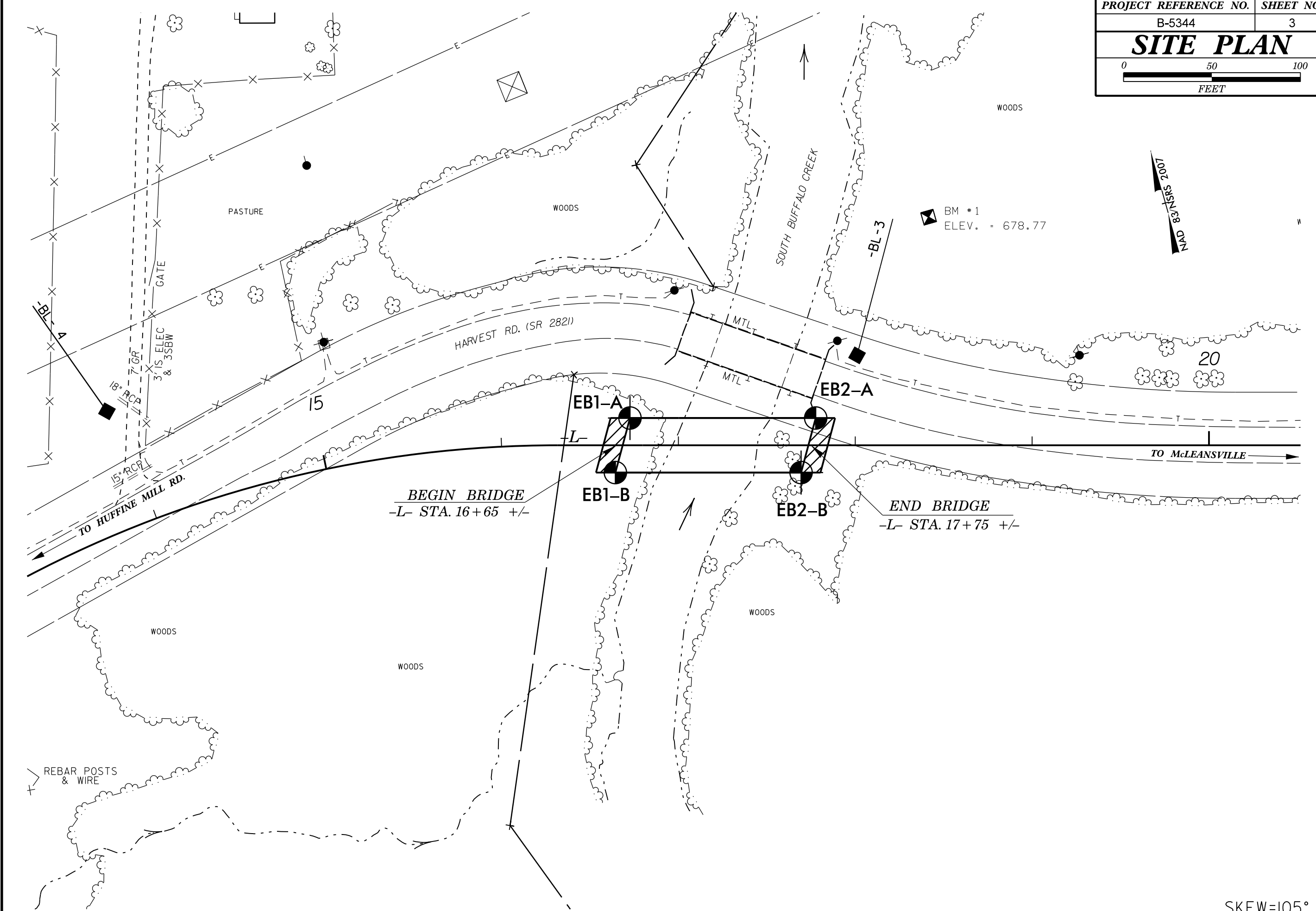
DocuSigned by: 10/20/2015

Patrick Alton

SIGNATURE

DATE

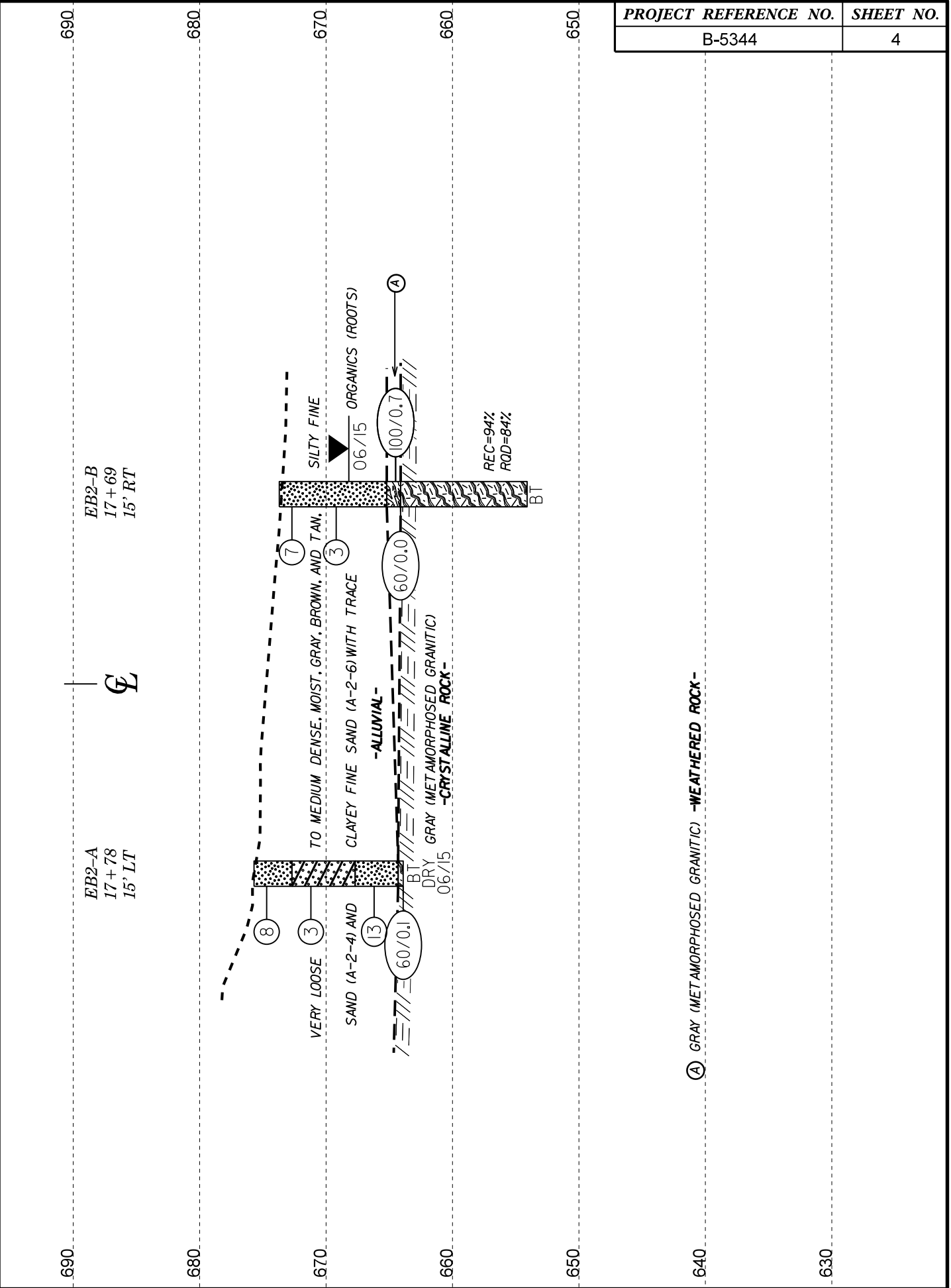
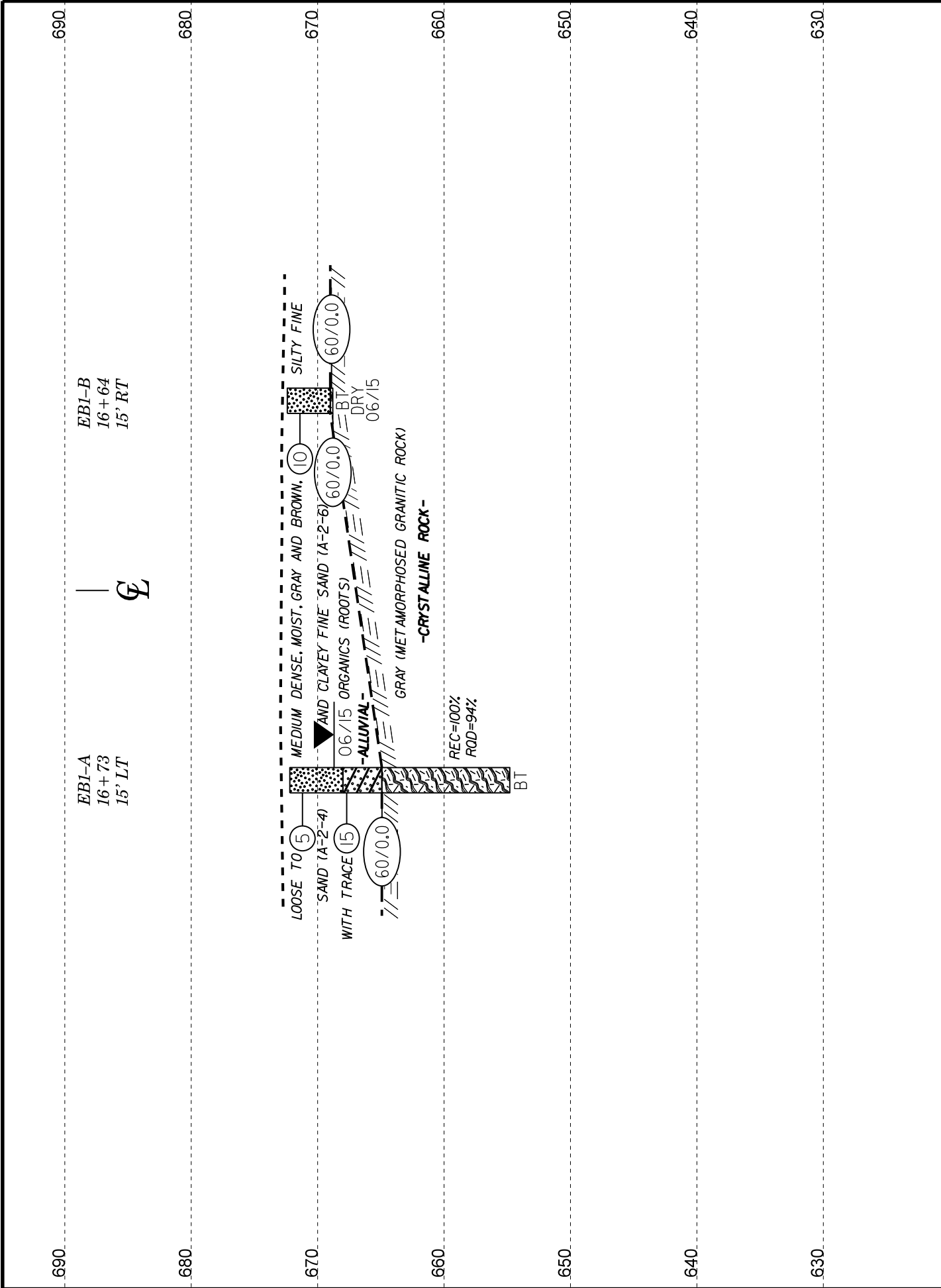
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BM #1
ELEV. = 678.77

↑
MAD 83°N/SRS 2007

SKEW=105°



(A) GRAY (METAMORPHOSED GRANITIC) -WEATHERED ROCK-



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| WBS 46058.1.1 | | TIP B-5344 | | COUNTY GUILFORD | | GEOLOGIST C. Wang | | | | | | | | | |
|---|-----------------|---------------------|------------|------------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|---|-----|
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | |
| BORING NO. EB1-A | | STATION 16+73 | | OFFSET 15 ft LT | | ALIGNMENT -L- | | | | | | | | | |
| COLLAR ELEV. 672.2 ft | | TOTAL DEPTH 17.4 ft | | NORTHING 860,617 | | EASTING 1,801,542 | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | | | DRILL METHOD SPT Core Boring | | HAMMER TYPE Automatic | | | | | | | | | |
| DRILLER S. Davis | | START DATE 06/09/15 | | COMP. DATE 06/09/15 | | SURFACE WATER DEPTH N/A | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 675 | | | | | | | | | | | | | | | |
| | 672.2 | 0.0 | 1 | 2 | 3 | 5 | | | | | | M | 672.2 | GROUND SURFACE | 0.0 |
| 670 | 668.7 | 3.5 | 4 | 7 | 8 | 15 | | | | | | M | 668.0 | GRAY, SILTY FINE SAND (A-2-4) WITH TRACE ROOTS AND GRAVEL | 4.2 |
| | | | | | | | | | | | | | | GRAY, CLAYEY FINE SAND (A-2-6) | 4.2 |
| 665 | 664.9 | 7.3 | 60/0.0 | | | | | | | | | | 664.9 | CRYSTALLINE ROCK GRAY (METAMORPHOSED GRANITIC ROCK) | 7.3 |
| 660 | | | | | | | | | | | | | | | |
| 655 | | | | | | | | | | | | | | | |
| Boring Terminated at Elevation 654.8 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITIC ROCK) | | | | | | | | | | | | | | | |
| NOTES: AUGER REFUSAL AT 7.3' | | | | | | | | | | | | | | | |

NCDOT BORE DOUBLE B5344_GEO_BH_BRDG0161.GPJ NC_DOT.GDT 7/20/15



NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

| WBS 46058.1.1 | | TIP B-5344 | | COUNTY GUILFORD | | GEOLOGIST C. Wang | | | | | | |
|---|---------------|---------------------|----------|--|---------------|-------------------------|-----------------|----------------|--------------|-----|---|------------|
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. EB1-A | | STATION 16+73 | | OFFSET 15 ft LT | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. 672.2 ft | | TOTAL DEPTH 17.4 ft | | NORTHING 860,617 | | EASTING 1,801,542 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | | | DRILL METHOD SPT Core Boring | | HAMMER TYPE Automatic | | | | | | |
| DRILLER S. Davis | | START DATE 06/09/15 | | COMP. DATE 06/09/15 | | SURFACE WATER DEPTH N/A | | | | | | |
| CORE SIZE NQ3 | | TOTAL RUN 10.1 ft | | | | | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | SAMP. NO. | STRATA | | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (ft) % | RQD (ft) % | | REC. (ft) % | RQD (ft) % | | | |
| 664.93 | 664.9 | 7.3 | 5.1 | 1:05/0.8 1:27/1.0 1:30/1.0 2:15/1.0 1:59/1.0 0:35/0.3 | (5.1) 100% | (4.5) 88% | | (10.1) 100% | (9.5) 94% | | Begin Coring @ 7.3 ft | |
| 660 | 659.8 | 12.4 | 5.0 | 1:51/1.0 1:30/1.0 1:34/1.0 1:26/1.0 1:45/1.0 | (5.0) 100% | (5.0) 100% | | | | | CRYSTALLINE ROCK GRAY, VERY SLIGHTLY WEATHERED TO FRESH MODERATELY HARD TO HARD, METAMORPHOSED GRANITIC ROCK, CLOSE TO WIDE FRACTURE SPACING | |
| 655 | 654.8 | 17.4 | | | | | | | | | Boring Terminated at Elevation 654.8 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITIC ROCK) | 17.4 |
| NOTES: AUGER REFUSAL AT 7.3' | | | | | | | | | | | | |

NCDOT CORE DOUBLE B5344_GEO_BH_BRDG0161.GPJ NC_DOT.GDT 7/20/15



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

| | | | |
|---|---------------------|--------------------------|-------------------------|
| WBS 46058.1.1 | TIP B-5344 | COUNTY GUILFORD | GEOLOGIST C. Wang |
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | GROUND WTR (ft) |
| BORING NO. EB1-B | STATION 16+64 | OFFSET 15 ft RT | ALIGNMENT -L- |
| COLLAR ELEV. 672.4 ft | TOTAL DEPTH 3.6 ft | NORTHING 860,589 | EASTING 1,801,526 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER S. Davis | START DATE 06/09/15 | COMP. DATE 06/09/15 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|-----|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 675 | | | | | | | | | | | | | | | |
| | 672.4 | 0.0 | 2 | 6 | 4 | | | | | | | | | 672.4 | 0.0 |
| 670 | 668.9 | 3.5 | | | | | | | | | | | | 669.0 | 3.4 |
| | 668.8 | 3.6 | 60/0.0 | | | | | | | | | | | 668.8 | 3.6 |
| | | | 60/0.0 | | | | | | | | | | | | |
| | | | 60/0.0 | | | | | | | | | | | | |

| | | | |
|---|---------------------|--------------------------|-------------------------|
| WBS 46058.1.1 | TIP B-5344 | COUNTY GUILFORD | GEOLOGIST C. Wang |
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | GROUND WTR (ft) |
| BORING NO. EB2-A | STATION 17+78 | OFFSET 15 ft LT | ALIGNMENT -L- |
| COLLAR ELEV. 675.7 ft | TOTAL DEPTH 11.8 ft | NORTHING 860,588 | EASTING 1,801,643 |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | DRILL METHOD H.S. Augers | HAMMER TYPE Automatic |
| DRILLER S. Davis | START DATE 06/09/15 | COMP. DATE 06/09/15 | SURFACE WATER DEPTH N/A |

| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | |
|-----------|-----------------|------------|------------|-------|-------|----------------|----|----|----|-----|-----------|-----|---------------------------|------------|------|
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | |
| 680 | | | | | | | | | | | | | | | |
| | 675.7 | 0.0 | | | | | | | | | | | | 675.7 | 0.0 |
| 675 | 675.7 | 0.0 | 1 | 3 | 5 | | | | | | | | | | |
| | 672.2 | 3.5 | 3 | 1 | 2 | | | | | | | | | 672.2 | 3.0 |
| 670 | | | | | | | | | | | | | | | |
| | 667.2 | 8.5 | 3 | 4 | 9 | | | | | | | | | 667.2 | 8.0 |
| 665 | | | | | | | | | | | | | | | |
| | 664.0 | 11.7 | 60/0.1 | | | | | | | | | | | 664.0 | 11.4 |
| | | | | | | | | | | | | | | 663.9 | 11.8 |

NOTES:
AUGER REFUSAL AT 11.7'



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

| WBS 46058.1.1 | | TIP B-5344 | | COUNTY GUILFORD | | GEOLOGIST C. Wang | | | | | | | | | | |
|---|-----------------|---------------------|------------|------------------------------|-------|-------------------------|-----------------|----|----|-----|-----------|-----|---------------------------|------------|--|------|
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | | | | | GROUND WTR (ft) | | | | | | | | | |
| BORING NO. EB2-B | | STATION 17+69 | | OFFSET 15 ft RT | | ALIGNMENT -L- | | | | | | | | | | |
| COLLAR ELEV. 673.7 ft | | TOTAL DEPTH 19.6 ft | | NORTHING 860,561 | | EASTING 1,801,627 | | | | | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | | | DRILL METHOD SPT Core Boring | | HAMMER TYPE Automatic | | | | | | | | | | |
| DRILLER S. Davis | | START DATE 06/09/15 | | COMP. DATE 06/09/15 | | SURFACE WATER DEPTH N/A | | | | | | | | | | |
| ELEV (ft) | DRIVE ELEV (ft) | DEPTH (ft) | BLOW COUNT | | | BLOWS PER FOOT | | | | | SAMP. NO. | LOG | SOIL AND ROCK DESCRIPTION | DEPTH (ft) | | |
| | | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | 75 | 100 | | | | | | |
| 675 | 673.7 | 0.0 | 2 | 4 | 3 | | | | | | | | | 673.7 | GROUND SURFACE | 0.0 |
| 670 | 670.2 | 3.5 | 2 | 1 | 2 | | | | | | | | | | ALLUVIAL GRAY, BROWN, AND TAN, SILTY FINE SAND (A-2-4) WITH TRACE ORGANICS (ROOTS) | |
| 665 | 665.2 | 8.5 | 44 | 56 | 0.2 | | | | | | | | | 665.2 | WEATHERED ROCK | 8.5 |
| | 664.1 | 9.6 | 60 | 0.0 | | | | | | | | | | 664.1 | GRAY (METAMORPHOSED GRANITIC ROCK) | 9.6 |
| 660 | | | | | | | | | | | | | | | CRYSTALLINE ROCK | |
| | | | | | | | | | | | | | | | GRAY (METAMORPHOSED GRANITIC ROCK) | |
| 655 | | | | | | | | | | | | | | 654.1 | Boring Terminated at Elevation 654.1 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITIC ROCK) | 19.6 |

NCDOT BORE DOUBLE_B5344_GEO_BH_BRDG0161.GPJ_NC_DOT.GDT 7/17/15



NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

| WBS 46058.1.1 | | TIP B-5344 | | COUNTY GUILFORD | | GEOLOGIST C. Wang | | | | | | |
|---|---------------|---------------------|----------|------------------------------|-----------|-------------------------|-----------------|---------|-----------|-----|--|------------|
| SITE DESCRIPTION BRIDGE NO. 161 ON SR 2821 OVER SOUTH BUFFALO CREEK | | | | | | | GROUND WTR (ft) | | | | | |
| BORING NO. EB2-B | | STATION 17+69 | | OFFSET 15 ft RT | | ALIGNMENT -L- | | | | | | |
| COLLAR ELEV. 673.7 ft | | TOTAL DEPTH 19.6 ft | | NORTHING 860,561 | | EASTING 1,801,627 | | | | | | |
| DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015 | | | | DRILL METHOD SPT Core Boring | | HAMMER TYPE Automatic | | | | | | |
| DRILLER S. Davis | | START DATE 06/09/15 | | COMP. DATE 06/09/15 | | SURFACE WATER DEPTH N/A | | | | | | |
| ELEV (ft) | RUN ELEV (ft) | DEPTH (ft) | RUN (ft) | DRILL RATE (Min/ft) | RUN | | STRATA | | SAMP. NO. | LOG | DESCRIPTION AND REMARKS | DEPTH (ft) |
| | | | | | REC. (ft) | ROD (ft) | REC. (%) | ROD (%) | | | | |
| 664.11 | 664.1 | 9.6 | 1.0 | 3:48/1.0 | (0.9) | (0.6) | | | | | Begin Coring @ 9.6 ft | |
| | 663.1 | 10.6 | 5.0 | 2:04/1.0 | 90% | 60% | | | | | CRYSTALLINE ROCK | 9.6 |
| 660 | | | | 2:48/1.0 | (4.5) | (3.8) | | | | | GRAY, SLIGHTLY WEATHERED TO FRESH, MODERATELY HARD TO HARD, METAMORPHOSED GRANITIC ROCK, CLOSE TO MODERATELY CLOSE FRACTURED SPACING | |
| | 658.1 | 15.6 | 4.0 | 3:23/1.0 | 90% | 76% | | | | | | |
| | | | | 5:58/1.0 | | | | | | | | |
| 655 | | | | 4:51/1.0 | (4.0) | (4.0) | | | | | | |
| | 654.1 | 19.6 | | 6:40/1.0 | 100% | 100% | | | | | | |
| | | | | 10:00/1.0 | | | | | | | | |
| | | | | 10:00/1.0 | | | | | | | | |
| | | | | | | | | | | | Boring Terminated at Elevation 654.1 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITIC ROCK) | 19.6 |

NCDOT CORE DOUBLE_B5344_GEO_BH_BRDG0161.GPJ_NC_DOT.GDT 7/17/15



CORE PHOTOGRAPHS: Bridge No. 161 on SR 2821 over South Buffalo Creek, EB1-A 16+73, 15' LT

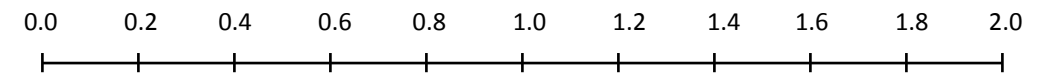
**Begin Run 1
7.3 feet**



**End Run 1
12.4 feet**

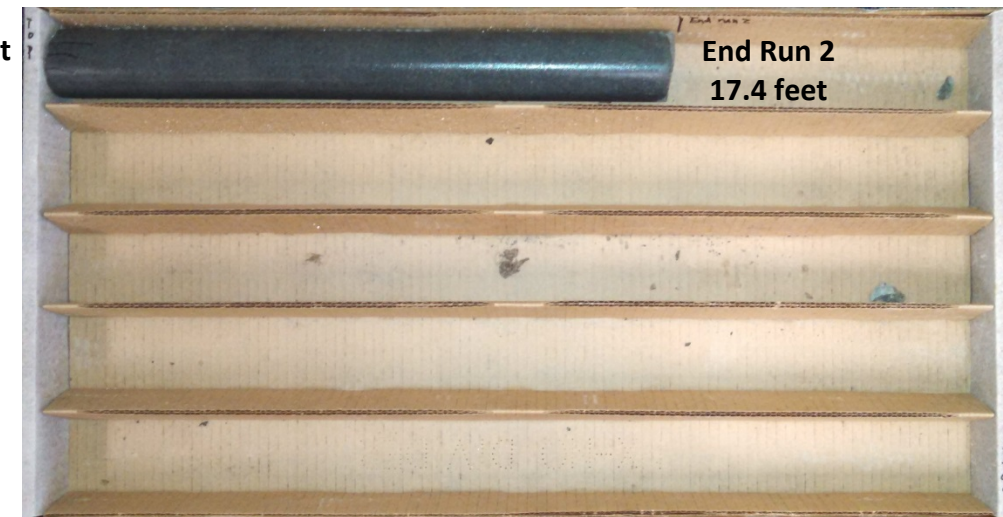
**Begin Run 2
12.4 feet**

16.2 feet

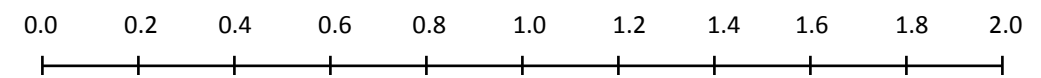


SCALE IN FEET

16.2 feet



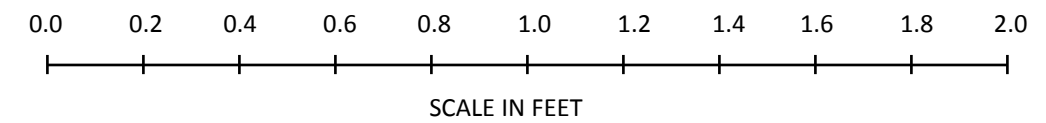
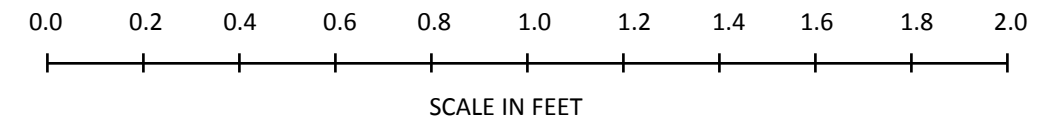
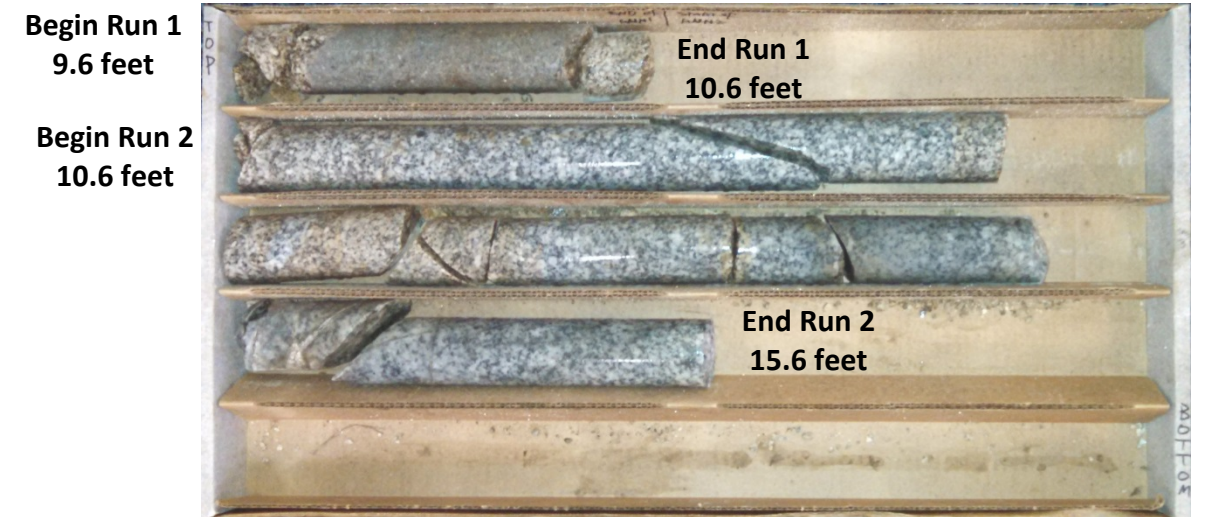
**End Run 2
17.4 feet**



SCALE IN FEET



CORE PHOTOGRAPHS: Bridge No. 161 on SR 2821 over South Buffalo Creek, EB2-B 17+69, 15' RT





Bridge No. 161 on SR 2821 over South Buffalo Creek SITE PHOTOGRAPHS



Photograph No. 1: View of existing bridge looking west



Photograph No. 3: View of South Buffalo Creek looking upstream



Photograph No. 2: View of existing bridge looking east



Photograph No. 4: View of South Buffalo Creek looking downstream