STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	C-4901B	1	30

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
49010.1.STR05T1B	N/A	P.E.
		R/W & UTIL.

CONTRACT: C203141 ID: C-4901B

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. *49010.1.STR05T1B* F.A. PROJ. *N/A*

COUNTY *DAVIDSON*

PROJECT DESCRIPTION *UPPER LAKE ROAD (SR 2024) GRADE SEPARATION OVER HAMBY CREEK TRIBUTARY AND NS/NCRR RAILROAD*

INVENTORY

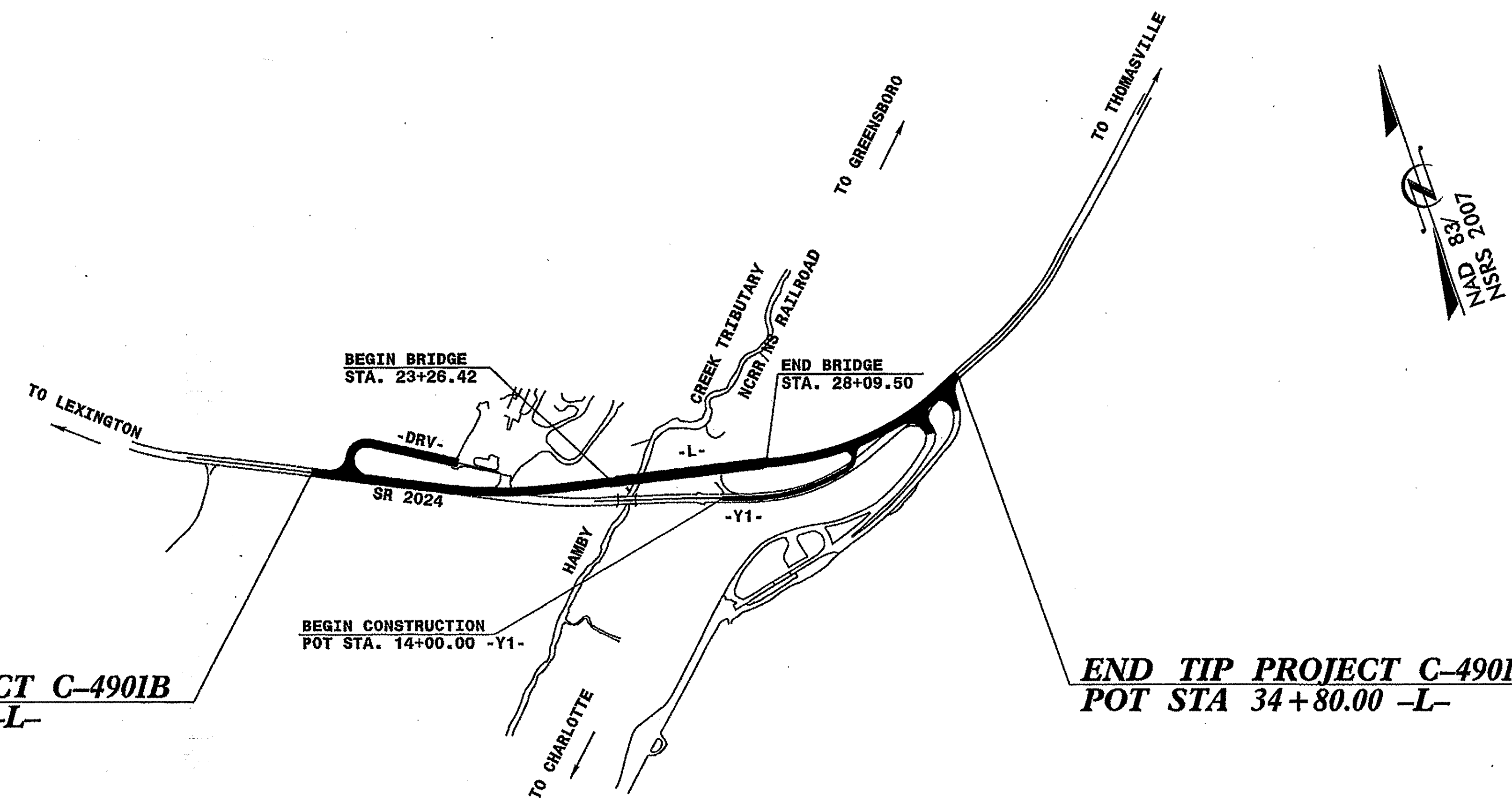
CONTENTS

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. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THIS 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.



BEGIN TIP PROJECT C-4901B
POT STA. 13+90.00 -L-

END TIP PROJECT C-4901B
POT STA 34+80.00 -L-

PERSONNEL

R. E. KRAL

C. A. BOYCE

A. J. FOWLER

M. R. GRABSKI

INVESTIGATED BY *F&R, INC.*

CHECKED BY *M. J. WALKO*

SUBMITTED BY *F&R, INC.*

DATE *DECEMBER 2012*

NORTH CAROLINA PROFESSIONAL SEAL 026917 ENGINEER MICHAEL J. WALKO 12/3/12

DRAWN BY: *R. E. KRAL*

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT REFERENCE NO.	SHEET NO.
C-4901B	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

)IL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS HAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 10 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL LASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: ONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH S MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

ENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
ROUP	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
LASS.	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6			
SYMBOL														
PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
IID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
STIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
OUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
UAL TYPES MAJOR TERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
N. RATING AS A UBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	<4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	>50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	<2	<0.25
	SOFT	2 TO 4	0.25 TO 0.50
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	>30	>4

TEXTURE OR GRAIN SIZE

S. STD. SIEVE SIZE	4	10	40	60	200	270
ENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

RAIN SIZE							
	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
ASTIC ANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
ONPLASTIC	0-5	VERY LOW
OW PLASTICITY	6-15	SLIGHT
ED. PLASTICITY	16-25	MEDIUM
IGH PLASTICITY	26 OR MORE	HIGH

COLOR

ESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	>10%	>20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING W/ CORE
- SPT N-VALUE
- REF — SPT REFUSAL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B- __
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550X
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B-
- [X] -N 02
- [ ] -H-

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FEET
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	> 4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:
FA0064
ELEVATION: 673.53 FT.

NOTES:
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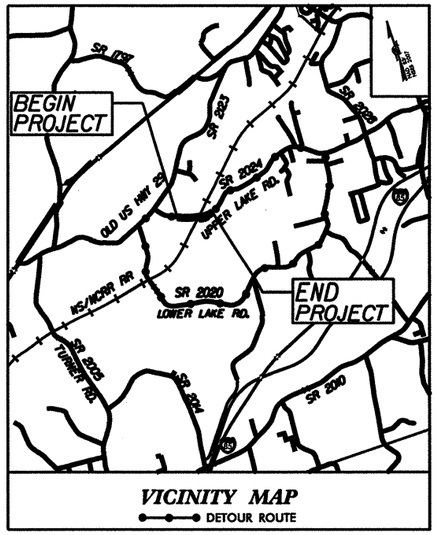
REVISED 09/23/09

DGN 0259DEL_P1A-2

TIP PROJECT: C-4901B

CONTRACT: C203141

See Sheet 1-A For Index of Sheets



VICINITY MAP
DETOUR ROUTE

STATE OF NORTH CAROLINA
RAIL DIVISIONS

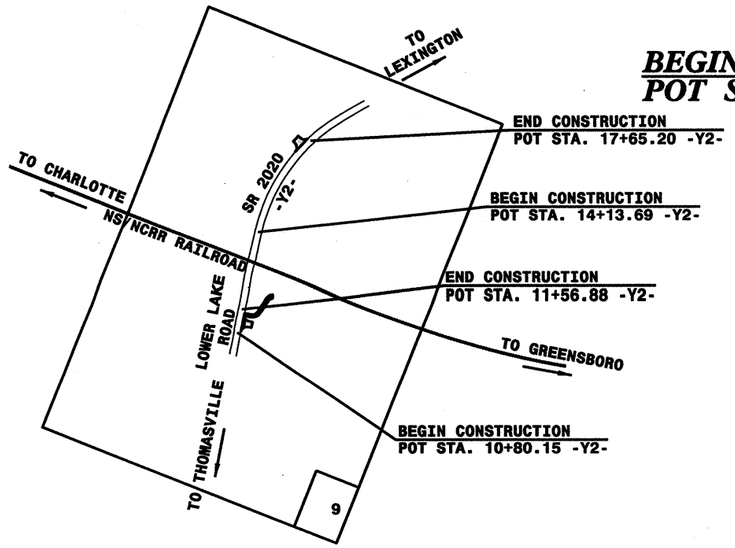
DAVIDSON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	C-4901B	2A	

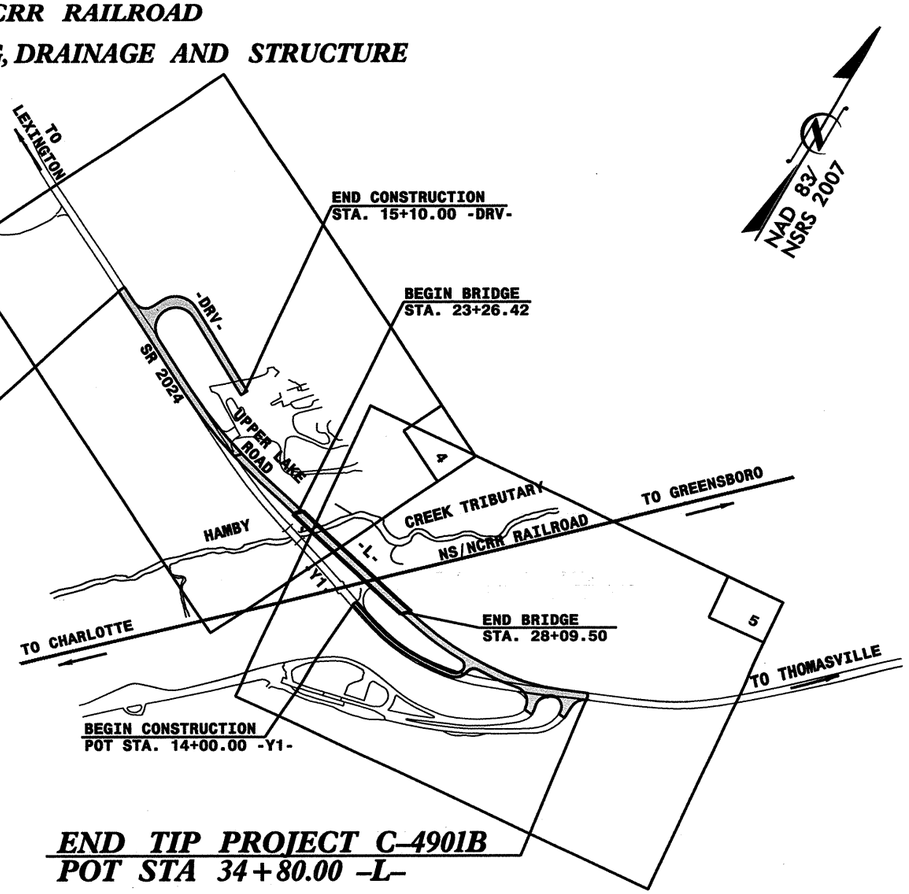
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
49010.1.STR05T1B		PE, UTIL PE
49010.1.STR06T3		PE, UTIL PE
43219.2.STR02C4901		R/W
49010.3.STR02T4D		UTIL CONST., CONST.

LOCATION: UPPER LAKE RD. (SR 2024) GRADE SEPARATION OVER HAMBY CREEK TRIBUTARY AND NS/NCRR RAILROAD

TYPE OF WORK: PAVING, GRADING, DRAINAGE AND STRUCTURE



BEGIN TIP PROJECT C-4901B
POT STA. 13+90.00 -L-



NAD 83/
NSRS 2007

END TIP PROJECT C-4901B
POT STA 34+80.00 -L-

GRAPHIC SCALES

PLANS: 50 25 0 50 100
PROFILE (HORIZONTAL): 50 25 0 50 100
PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2013 = 1080
ADT 2035 = 2400
DHV = 11 %
D = 55 %
T = 36 % *
V = 50 MPH
* TTST = 3% DUAL 33%
FUNC CLASS = LOCAL
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT C-4901B = 0.305 MILES

LENGTH STRUCTURE TIP PROJECT C-4901B = 0.091 MILES

TOTAL LENGTH TIP PROJECT C-4901B = 0.396 MILES

Prepared for the North Carolina Department of Transportation in the office of:

PARSONS
RALEIGH, NORTH CAROLINA
5540 Centerview Drive
Suite 217
Raleigh NC 27606
License No: F-0246
Main: 919-854-1345
Fax: 919-854-2103

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: APRIL 30, 2012

LETTING DATE: MARCH 19, 2013

EDWARD S. ROBBINS P.E.
PROJECT ENGINEER

DAVID GARRETT
PROJECT DESIGN ENGINEER

SANDRA A. STEPNEY P.E.
ENGINEERING & SAFETY BRANCH: SENIOR PROJECT ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

P.E.

SIGNATURE:

NC DEPARTMENT OF TRANSPORTATION
RAIL DIVISION
PLANNING AND DEVELOPMENT

28-DEC-2012 15:48
J:\C-4901B\Roadway\Proj\C4901B_Rdy_TSH.dgn
$$$$USERNAME$$$$

SINCE 1881

FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

2505 Hutchison McDonald Road
Charlotte, North Carolina 28269 I USA
T 704.596.2889 I F 704.596.3784
NC Engineering License # F-0266

December 28, 2012

Project No.:	49010.1.STR05T1B
TIP No.:	C-4901B
F.A. Number:	N/A
County:	Davidson
Description:	SR 2024 – Proposed Upper Lake Road Grade Separation
SUBJECT:	**Geotechnical Report – Inventory**

Project Description

The project will consist of realigning Upper Lake Road (SR 2024) to a new location north of the existing roadway and construction of a new two-lane, 5-span bridge, with a length of approximately 483 feet over the existing and proposed NCRR/NC Mainline tracks at Milepost 311.09 and over Jimmys Creek. The new grade separation project will include the closure and removal of the existing public at-grade crossing along Upper Lake Road.

Based on the Preliminary Plans dated April 18, 2012, the project will begin at Station 13+90.00 (-L-) and end at Station 34+80.00 (-L-) for a total length of 2,090 feet. The bridge will consist of a 5-span structure beginning at approximate Station 23+26.42 (-L-) continuing to approximate Station 28+09.50 (-L-) for a length of approximately 483 feet. The NCRR/NS Mainline tracks cross the site at approximate Station 26+52.19 (-L-).

A subsurface exploration was conducted by F&R between January and February 2012 during which a total of eighteen (18) standard penetration test (SPT) borings were advanced with an ATV-mounted CME 550X drill rig with an automatic hammer. Six roadway borings (R-1 through R-6) and twelve bridge borings (EB1-A, EB1-B, B1-A, B1-B, B2-A, B2-B, B3-A, B3-B, B4-A, B4-B, EB2-A and EB2-B) were performed. Representative soil and rock samples were collected for visual classification in the field and for laboratory analysis by F&R's testing laboratory.

The following alignment was investigated:

Line	Station(±)
-L-	13+90.00 to 34+80.00

Areas of Special Geotechnical Interest

1) Soft, Loose and Wet Soils: The following areas contain relatively soft or loose and/or wet soils that have the potential for subgrade problems, embankment stability or long-term settlement problems during construction:

Line	Station (±)
-L-	20+25 to 23+60
-L-	27+10 to 30+50

2) Cohesive Soils: The following areas contain cohesive soils that have the potential to cause subgrade problems during construction, embankment stability or long-term settlement problems:

Line	Station (±)
-L-	21+00 to 23+60
-L-	27+10 to 30+50

3) Shallow Groundwater: The following areas encountered shallow groundwater that has the potential to impact undercutting operations:

Line	Station (±)
-L-	20+25 to 23+60
-L-	27+10 to 28+40

4) Artificial Fill: The following areas encountered artificial fill. It is possible that unsuitable soils within the artificial fill may be encountered that could require additional undercutting or remedial repairs:

Line	Station (±)
-L-	22+00 to 23+60
-L-	28+50
-L-	31+50

Physiography and Geology

The project site is located within the Charlotte Belt of the Piedmont Geologic Province of North Carolina. More specifically, it is located in an area mapped as metavolcanic rock (CZv) with interbedded felsic to mafic tuffs and flowrock. Based on visual observation of the rock core samples obtained from this site, it appears that the rock is predominantly granitic. The virgin soils are the residual product of in-place chemical weathering of rock that was similar to the rock presently underlying the site.

From the beginning of the project to End Bent 1, the ground surface elevation generally slopes downward from Elevation 701 +/- feet to Elevation 667 +/- feet, which is the approximate elevation of the floodplain of the existing creek. Between End Bent 1 and the existing railroad tracks, the ground surface elevation slopes upward to Elevation 683 +/- feet at the tracks. Just east of the tracks, the ground surface slopes steeply downward to Elevation 670 +/- feet and remains relatively level to End Bent 2. East of End Bent 2 to the end of the project, the ground surface elevation slopes upward to match the existing roadway elevation of approximately 740 +/- feet.

Based on the proposed grades and the existing ground surface at End Bent 1, up to approximately 31 feet of fill will be required to reach a grade point elevation of approximately 698 feet. At End Bent 2, up to approximately 50 feet of fill will be required to reach a grade point elevation of approximately 721 feet. The preliminary plans indicate that 2H:1V side slopes are to be constructed for the roadway embankments. At End Bent 1, a 1.5H:1V end slope with Class II Rip Rap protection will be constructed. At End Bent 2, a 2H:1V end slope with 4 inches of concrete slope protection will be constructed. The proposed road ties into the existing Upper Lake Road at each end of the project.

Soils Properties

The subsurface conditions discussed below and those shown on the attached drawings, represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the Borelogs. Sometimes the relatively small sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Soils within the area of this project have been divided into four categories: surficial materials (topsoil & asphalt), artificial fill, alluvial soils and residual soils.

Surficial Materials: Two asphalt cores were obtained from Upper Lake Road in the vicinity of Station 17+00 and 34+00. The asphalt was measured to be approximately 6-inches in thickness underlain by approximately 4 inches of aggregate base course (ABC) stone at each location.

With the exception of borings B3-A and B3-B, a layer of surficial organic-laden soils (topsoil/rootmat), ranging in thickness from approximately 3 to 12 inches, was encountered.

Artificial Fill: Artificial fill was encountered below the surficial soils at Borings EB1-A, EB1-B, B2-A, B2-B, B3-A, B3-B, R-3, R-4 and R-6 and extended to depths ranging from approximately 3 to 8½ feet below existing grades. In general, the artificial fill soils consisted of sandy and silty CLAYS (A-6, A-7-5), sandy SILTS (A-4) and clayey SANDS (A-2-6). Standard Penetration Resistances (N-values) in the artificial fill soils ranged from 2 to 10 blows per foot (bpf). N-values of 2 to 5 bpf are generally indicative of poorly compacted soils while N-values of greater than 10 bpf are generally indicative of moderately to well-compacted soils.

Alluvial Soils: Alluvial (water deposited) soils were encountered below the surficial soils at Boring R-1 and extended to a depth of approximately 3 feet below existing grades. The alluvial soil encountered at R-1 consisted of SAND (A-2-4) with an N-value of 1 bpf.

Residual Soils: Residual soils were encountered below the artificial fill at Borings EB1-A, EB1-B, B2-A, B2-B, B3-A, B3-B, R-3, R-4 and R-6; beneath the alluvial soils at Boring R-1; and below the surficial materials at Borings B1-A, B1-B, B4-A, B4-B, EB2-A, EB2-B, R-2 and R-5.
The residual soils generally consisted of sandy and silty CLAYS (A-6, A-7-5), sandy and clayey SILTS (A-4, A-5), and silty SANDS (A-2-4) with N-values ranging from 1 to 71 bpf that generally increase with depth. Please note that a majority of the lower N-values (N < 5 bpf) were typically encountered in the upper 3 to 8 feet of the boring.

Rock Properties

Weathered rock (WR) and/or crystalline rock (CR) was encountered below the residual soils at all of the boring locations. The top of weathered rock / crystalline rock was encountered at depths ranging from approximately 8½ to 23½ feet below existing grades (elevations ranging from ≈706.6 to 656.2 feet) and was typically sampled as granite. In accordance with the NCDOT legend, weathered rock is defined as residual material exhibiting an SPT N-value of at least 100 blows per foot and crystalline rock is defined by SPT refusal (i.e., 60/0.1' or 60/0.0').

Rock coring was performed at interior bent bridge borings B1-B, B2-A, B3-A and B4-B to continue the exploration after auger/SPT refusal was obtained. In general, the crystalline rock (CR) encountered was primarily granitic and generally consisted of slightly to moderately weathered, hard rhyolitic metatuff; slightly to moderately weathered, moderately hard to hard felsic/mafic metavolcanic; very slightly to slightly weathered, hard granodiorite; and slightly weathered, hard meta-gabbro. Isolated zones of lost core recovery was noted in Borings B1-B, B2-A, B3-A and B4-B, which may be indicative of relatively thin soil seams or weathered rock.

The Recovery of each core run (Recovery = length of the recovered core divided by the length of the core run) and the Rock quality Designation (RQD) of each core run (RQD = total length of recovered pieces longer than 4 inches divided by the length of the core run) were measured by F&R staff. The RQD gives a relative indication of the degree of fracturing, soundness and continuity of the rock. Both the core Recovery and RQD are indicated on the Boring Logs. The recoveries ranged from 60% to 100% and the RQD's ranged from 0% to 84%.

Groundwater Properties

Groundwater levels were measured in the borings both immediately after drilling and, where applicable, after a stabilization period of approximately 24 hours. At the time of drilling, water was encountered in the borings at elevation ranging from approximately 647 feet to 669 feet (approximate depths of 1 to 28 feet bgs). After a stabilization period of 24 hours, water was measured at elevations ranging from approximately 665 feet to 670 feet (approximate depths of ½ to 9 feet bgs). The soil moisture in the recovered soil samples was generally described as moist or wet below the measured groundwater levels. Above the measured groundwater level, the soil moisture was generally described as moist.

Please do not hesitate to contact us if you have any questions regarding this report or if you need additional services.

Sincerely,
FROEHLING & ROBERTSON, INC.

Robert E. Kral, E.I.
Project Manager

Michael J. Walko, P.E.
Senior Engineer

30

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT **TIP # C-4901B** COUNTY Davidson DATE 1/2/2013 SHEET 1 OF 1 SHEET

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT EXCAV.	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	UNDERCUT EMB.	EARTH EMB.	EMBANK. 20%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
-L-	13+90.00	23+26.42 (Begin Bridge)	227	-	4,485	-	227	25540	-	-	25540	30,648	30,421	-	4,485	4,485
-DRV-	10+50.00	15+10.00	17,102	-	-	-	17,102	107	-	-	107	128	-	16,974	-	16,974
SUBTOTAL			17,329	-	4,485	-	17,329	25647	-	-	25647	30,776	30,421	16,974	4,485	21,459
-L-	28+09.50 (End Bridge)	34+80.00	225	-	5,421	-	225	46354	-	-	46354	55,625	55,400	-	5,421	5,421
-Y1-	14+00.00	18+50.00	416	-	-	-	416	4,001	-	-	4,001	4,801	4,385	-	-	-
SUBTOTAL			641	-	5,421	-	641	50355	-	-	50355	60,426	59,785	-	5,421	5,421
-Y2-	10+74.31	11+45.32	162	-	-	-	162	3	-	-	3	4	-	158	-	158
-DRV1-	10+00.00	11+35.00	274	-	-	-	274	-	-	-	-	-	-	274	-	274
-Y2-	16+98.86	17+65.20	106	-	-	-	106	2	-	-	2	2	-	104	-	104
SUBTOTAL			542	-	-	-	542	5	-	-	5	6	-	536	-	536
PROJECT SUBTOTAL			18,512	-	9,906	-	18,512	76007	-	-	76007	91,208	90,206	17,510	9,906	27,416
ADDITIONAL UNDERCUT*					500			-	-	-	-	-	-		500	500
SHOULDER MATERIAL								1,570			1,570	1,884	1,884			
WASTE IN LIEU OF BORROW													(16,974)	(16,974)	-	(16,974)
PROJECT TOTAL			18,512	-	10,406	-	18,512	77577	-	-	77577	93,092	75,116	536	10,406	10,942
EST 5% TO REPLACE TOP SOIL ON BORROW PIT													3756			
GRAND TOTAL			18512		10406								78872			
SAY			**18600**		**10500**								**78900**			

*** 500 CY OF UNDERCUT CONT. PER GEOTECH REPORT DATED 8/17/2012**

DRAINAGE DITCH EXCAVATION = 1,660 CY

SELECT GRANULAR MATERIAL CLASS III 10,500 CY

02560EL_P10c2

R-1

R-2

R-3

R-4

R-5

R-6

EB1-A

EB1-B

EB2-A

EB2-B

B1-A

B1-B

B2-A

B2-B

B3-A

B3-B

B4-A

B4-B

-L- S 77° 53' 15.3" E

N71°53'36.8"W

S 73° 05' 36.6"

77° 53' 15.3"

S 71° 24' 33.6" E

N 1° 48' 29.1" W

S 71° 05' 49

N69°54'15.3"W

S 40° 32' 42.3" W

-Y1-

-BY1-

-EY1-

-L-

HAMBY CREEK TRIBUTARY

WE 667.1'

WE 666.3'

WE 670.1'

WE 670.2'

WE 669.9'

WE 670.0'

NCRR/NS RAILROAD

EXISTING R/W

INV=668.25'
1 CONC. HW
TOP=672.51'

96"CONC HW
TOP=673.38'
INV=668.89'

36" x 36"
CONCRETE
CULVERT

WOOD
WW

SEAT=674.40'

SEAT=674.38'

SEAT=674.45'

SEAT=674.51'

BRIDGE #2
WOOD

RIP
RAP

OBLITERATE

REMOVE
BRIDGE
OBLITERATE

BM#5
STA. 132+33.82
220.31' RT.
ELEV.=674.35'

F/G POSTS

MTL W/MTL POSTS

CROSSING
CASE

CROSS
ARM

SIGNAL
BOX

MTL GR W
MTL POSTS

CABLE
GATE

AATUR

GRAU 350

6" PVC (DATUR)

INSTALL R-6
GATE

72" WD S/R

48" WOOD

72" CHL

BEGIN CONSTRUCTION
POT STA. 14+00.00 -Y1-

END PAVING

POT Sta. 10+00.00

PC Sta. 12+12.52

PT Sta. 12+71.31

POT Sta. 26+69.02
POT Sta. 7642+44.98

POT Sta. 26+52.19
POT Sta. 7642+59.64

PC Sta. 16+07.93

PT Sta. 18+70.84

POC Sta. 30+
POT Sta. 18+

PC Sta. 16+91.16

02.82

MARTIN MARIETTA MA

1B

2-5'X7'
BARRELS

BURIED ON
BRIDGE DECK

CONC HW

AATUR

WD POST
W/ RAIL

CONC

1SBLKBUS

FLAG
POLE

SCALE

THIS DRAWING IS PART OF A REPORT
AND SHOULD ONLY BE USED IN CONJUNCTION WITH THE WRITTEN REPORT
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BORING LOCATION PLAN

SR 2024 - Upper Lake Road Grade Separation

49010.1STR05T1B (C-4901B)

Thomasville, North Carolina

Scale: 1" = 70'	DR. REK	CHK. MJW	REV.

Prepared For:

Parsons

Froehling & Robertson, Inc.
2505 Hutchison-McDonald Road
Charlotte, North Carolina

Proj.: 63M-0278	Date: December 2012	Sheet: 4

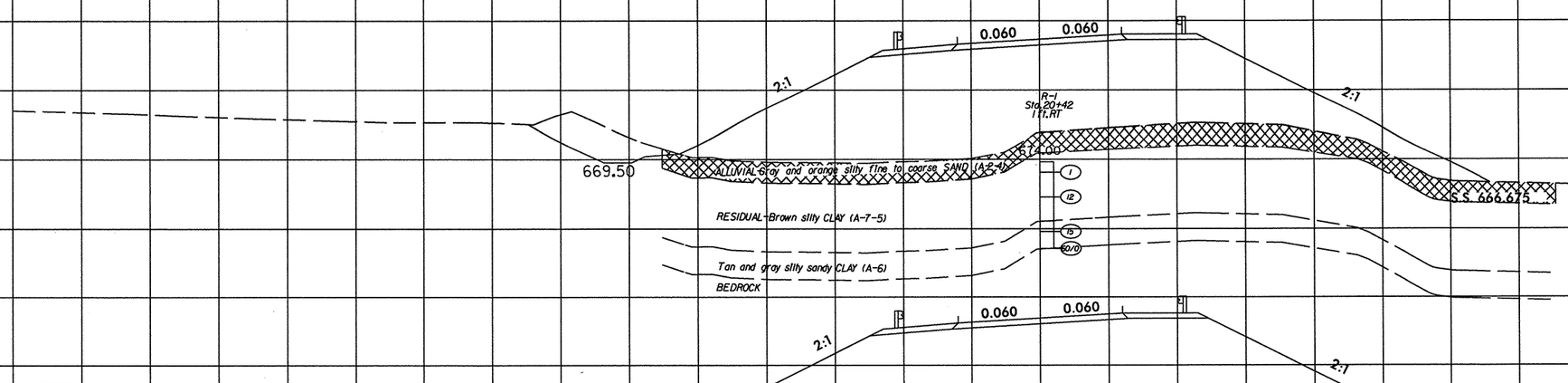
F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	5

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

20+50.00



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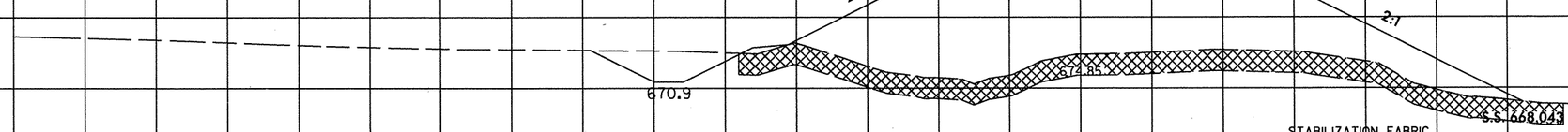

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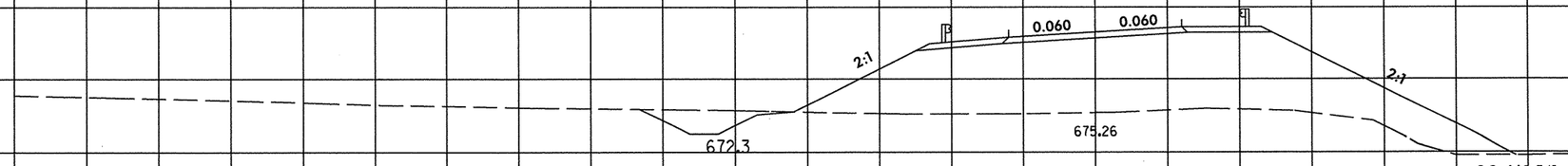
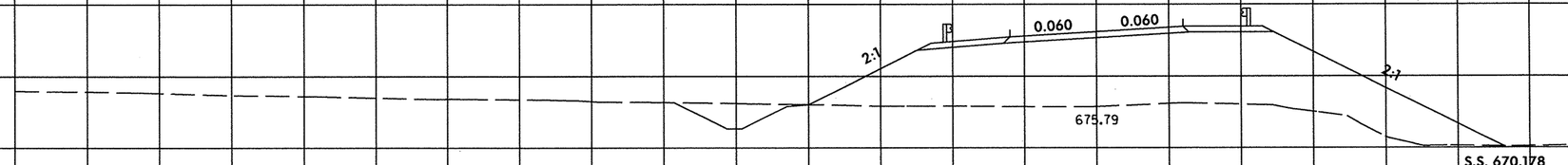


19+75.00



F&R	0 5 10	F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
		63M-0278	C-4901B	6

LEGEND

RECOMMENDED AREA FOR UNDERCUT

21+50.00

0.041 0.041

2:1 2:1

R-2 Sta.21+40 17 ft.RT

S.S. 668.697

S.S. 674.278

RESIDUAL-Brown, orange and gray silty SAND (A-2-4)

668.53

Tan and gray silty fine to coarse SAND (A-2-4)

50/0

50/0

WEATHERED ROCK-Gray and tan GRANITE

BEDROCK

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

21+25.00

0.051 0.051

2:1 2:1

667.8

S.S. 673.817

668.38

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

21+00.00

0.060 0.060

2:1 2:1

667.9

S.S. 672.440

668.8

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

20+75.00

0.060 0.060

2:1 2:1

668.7

668.39

S.S. 667.396

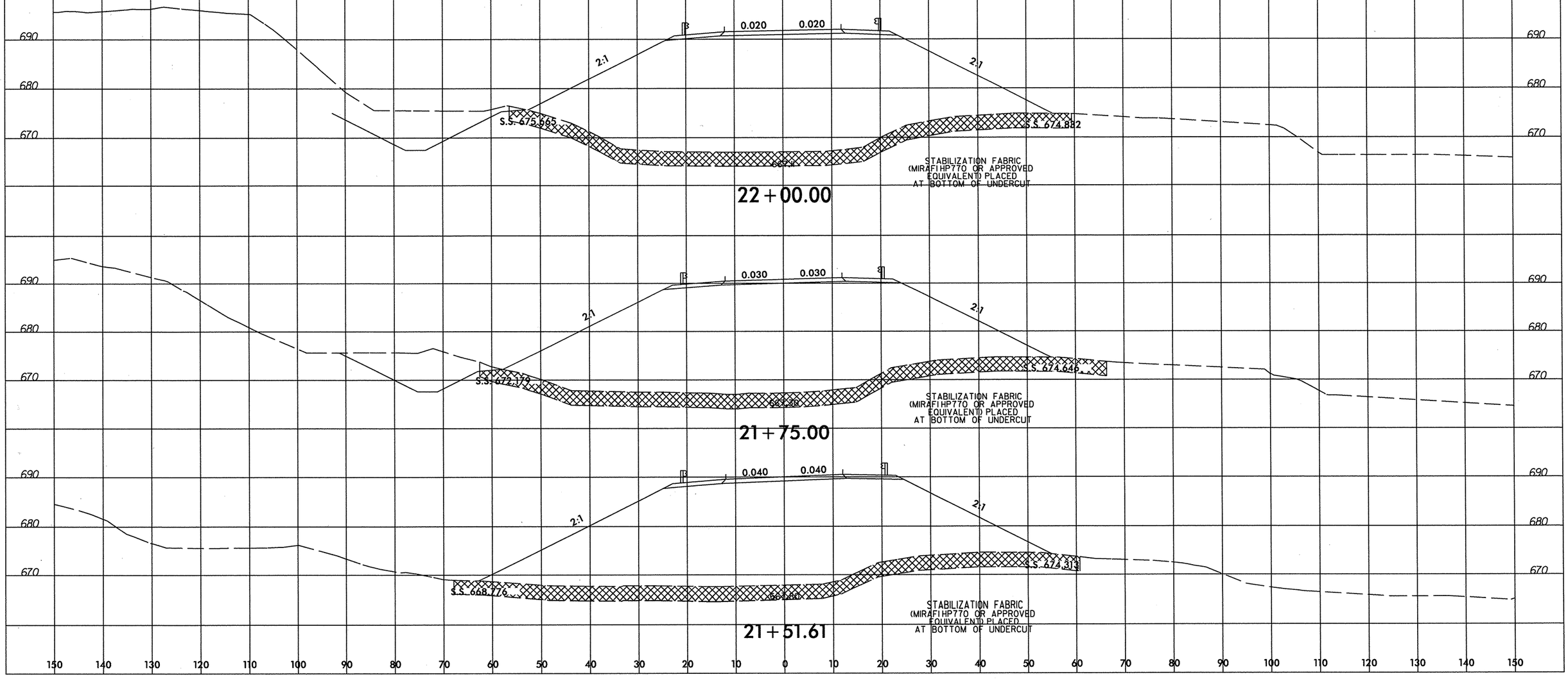
STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	7

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

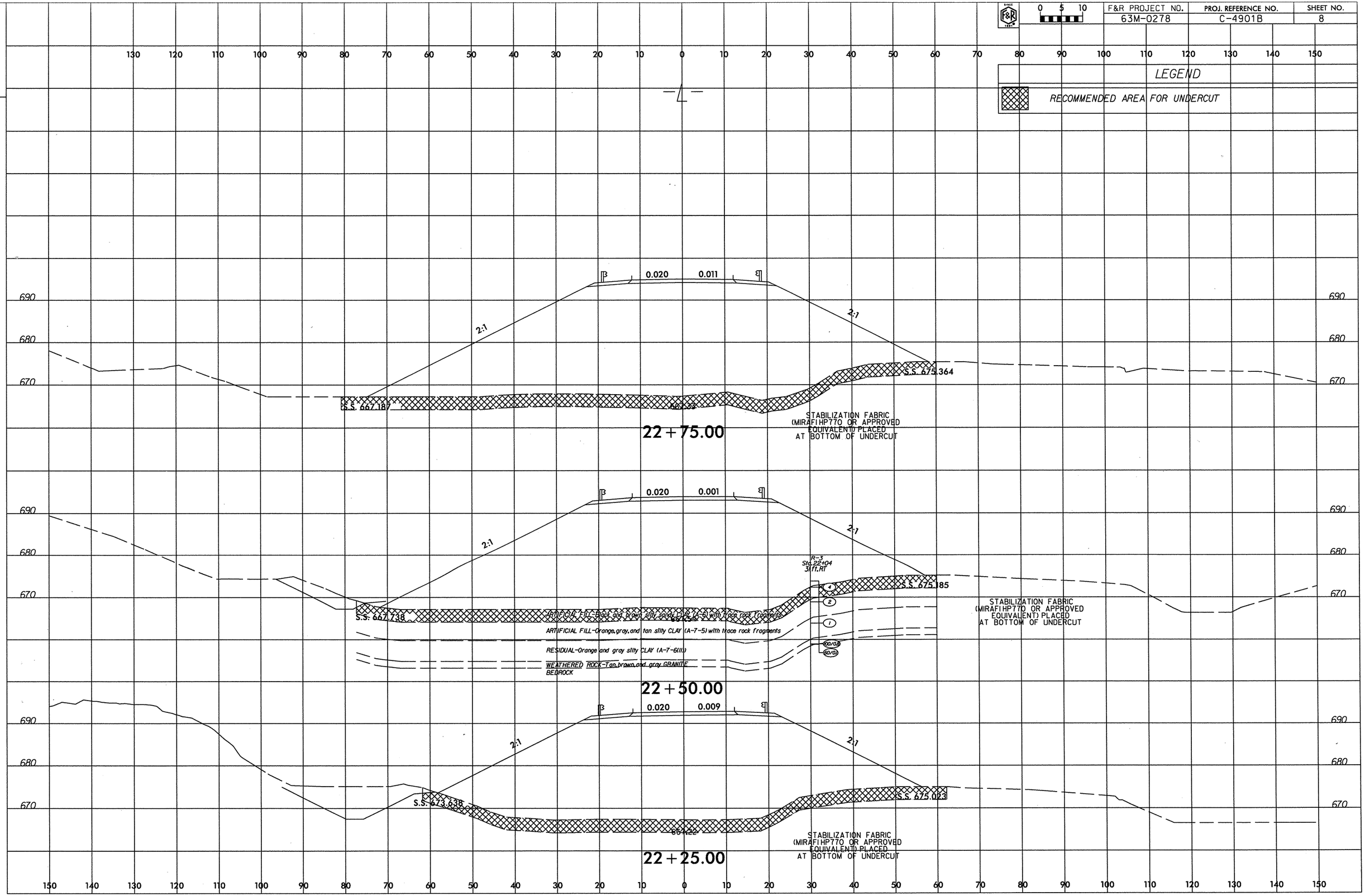


F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	8

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

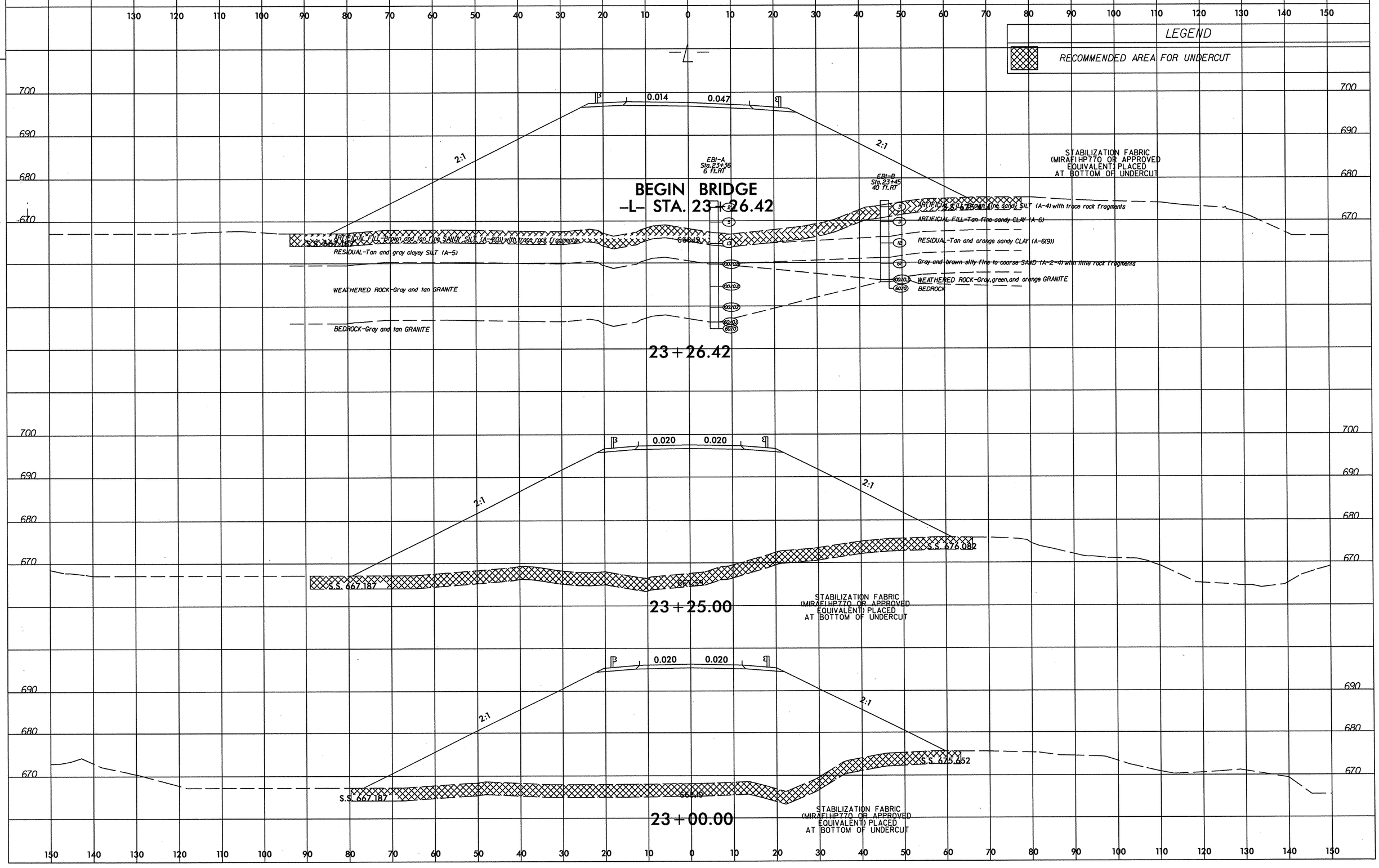


0 5 10

DGN 025DES_PIN2

LEGEND

RECOMMENDED AREA FOR UNDERCUT



F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	10

0 5 10

130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND

RECOMMENDED AREA FOR UNDERCUT

720 710 700 690 680 670

0.020 0.020

2:1

2:1

3:1

3:1

0.017 0.017

691.55

S.S. 691.524

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) MAY NOT BE REQUIRED ON -Y1- LINE PENDING A SUCCESSFUL PROOFROLL

671.98

S.S. 670.161

28+25.00

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

END BRIDGE
-L- STA. 28+09.50

EB2-A
Sta. 28+16
10 FT. LT

EB2-B
Sta. 27+98
19 FT. RT

671.48

S.S. 669.379

S.S. 673.254

S.S. 691.278

RESIDUAL-Brown and gray silty CLAY (A-7-5)

Brown, orange, and gray fine sandy SILT (A-4(0))

WEATHERED ROCK-Brown and gray GRANITE

BEDROCK

RESIDUAL-Brown and orange fine sandy CLAY (A-6)

Gray, tan, and orange fine sandy SILT (A-4(3))

WEATHERED ROCK-Green, tan, and gray GRANITE

BEDROCK

100/10

50/01

100/05

50/01

28+09.50

F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	11

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

720 710 700 690 680 670

0.020 0.003

2:1

2:1

696.60

3:1

0.005 0.006

3:1

S.S. 694.465

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

S.S. 670.210

675.12
675.12

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) MAY NOT BE REQUIRED ON -Y1- LINE PENDING A SUCCESSFUL PROOFROLL

28+73.61

0.020 0.008

2:1

2:1

694.02

3:1

0.011 0.011

3:1

S.S. 692.950

28+50.00

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) PLACED AT BOTTOM OF UNDERCUT

S.S. 670.250

R-4
Sta. 28+46
3' Rt. RT

3
3
1
60/10
60/0

675.69

ARTIFICIAL FILL-Tan and brown fine sandy CLAY (A-6) with trace root fragments

RESIDUAL-Brown, orange, and gray sandy SILT (A-4(4))

Tan and gray silty CLAY (A-7-5)

WEATHERED ROCK-Gray, orange, and tan GRANITE

BEDROCK

STABILIZATION FABRIC (MIRAFI HP770 OR APPROVED EQUIVALENT) MAY NOT BE REQUIRED ON -Y1- LINE PENDING A SUCCESSFUL PROOFROLL

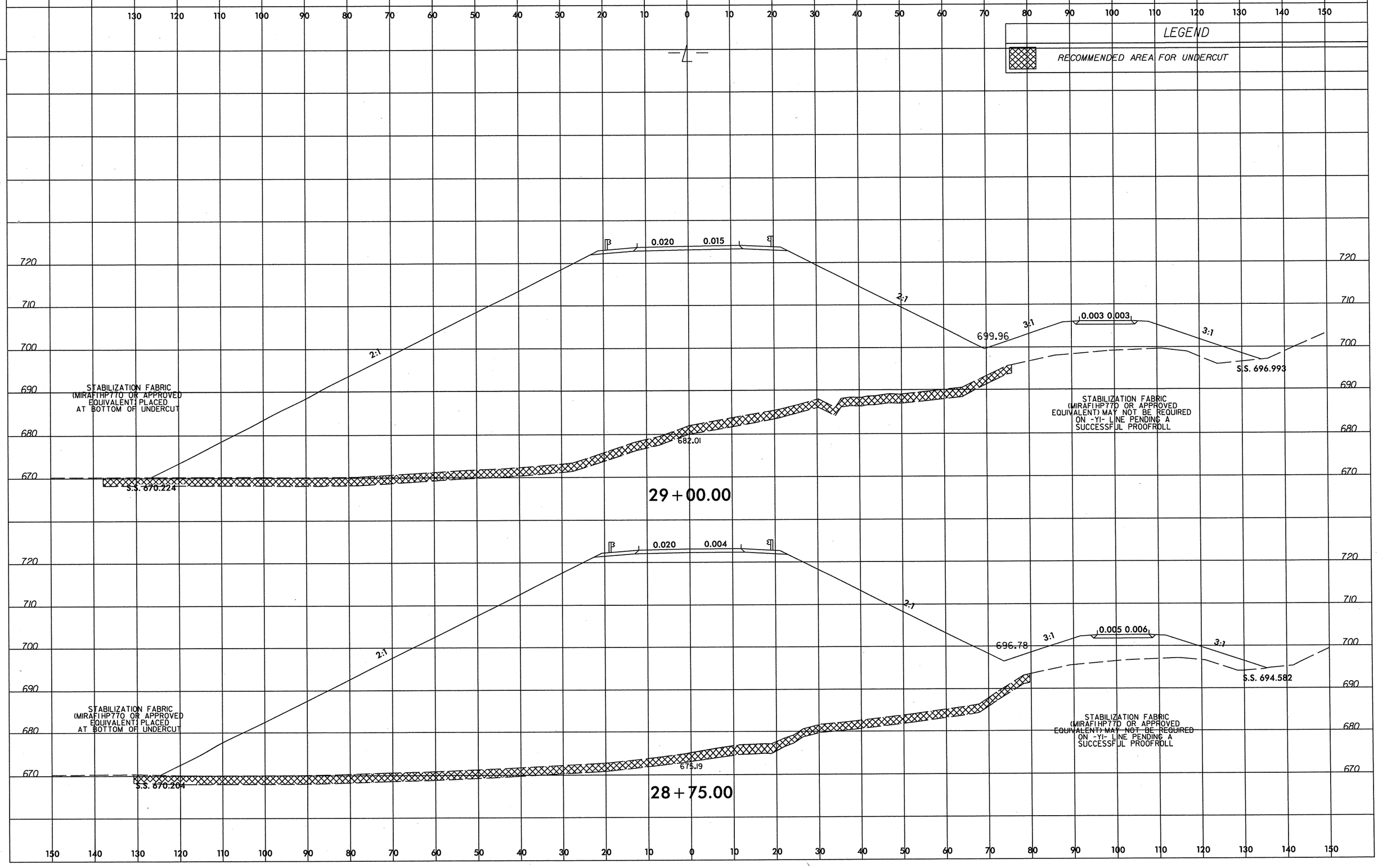
150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	12

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

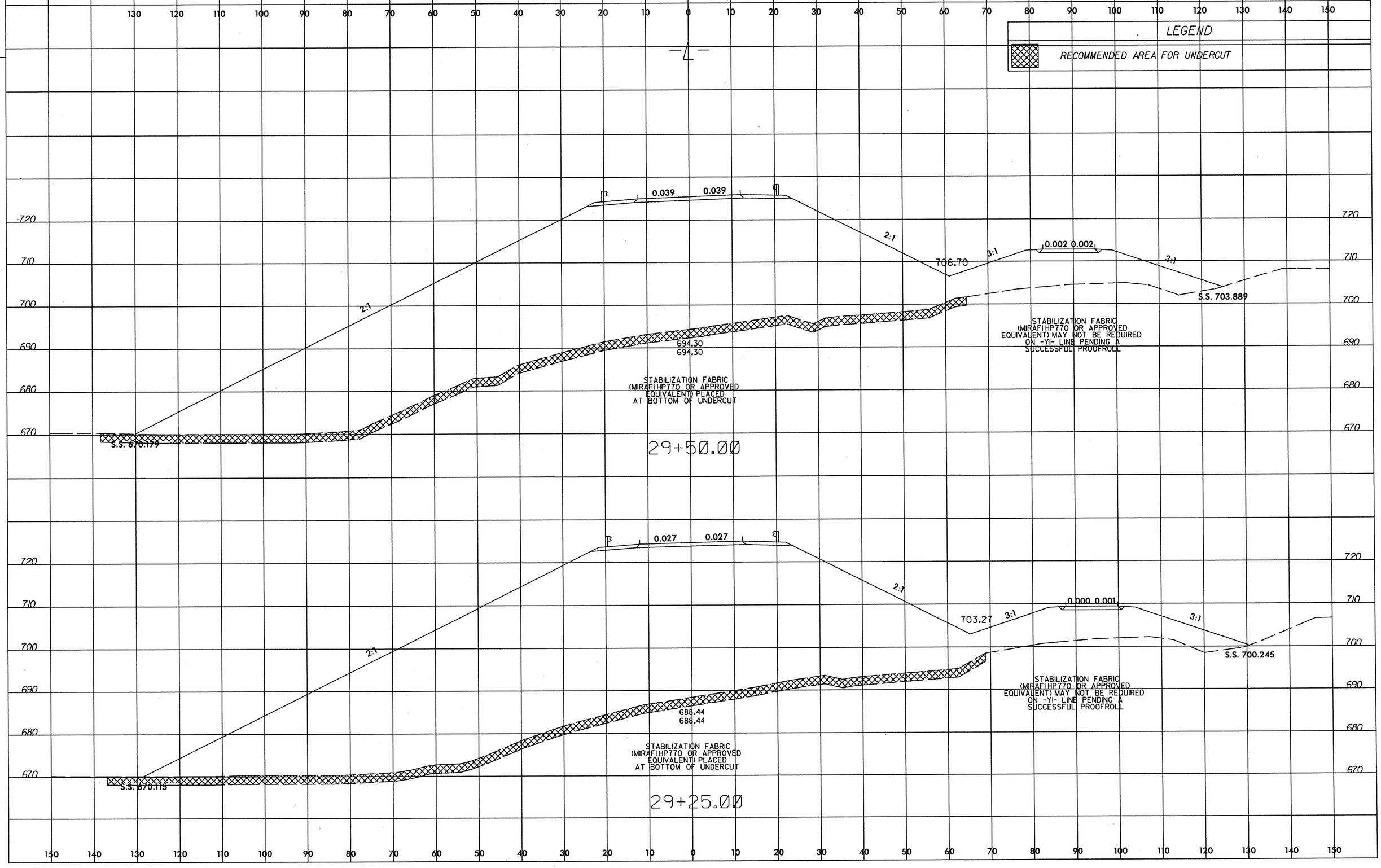


F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	13

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT

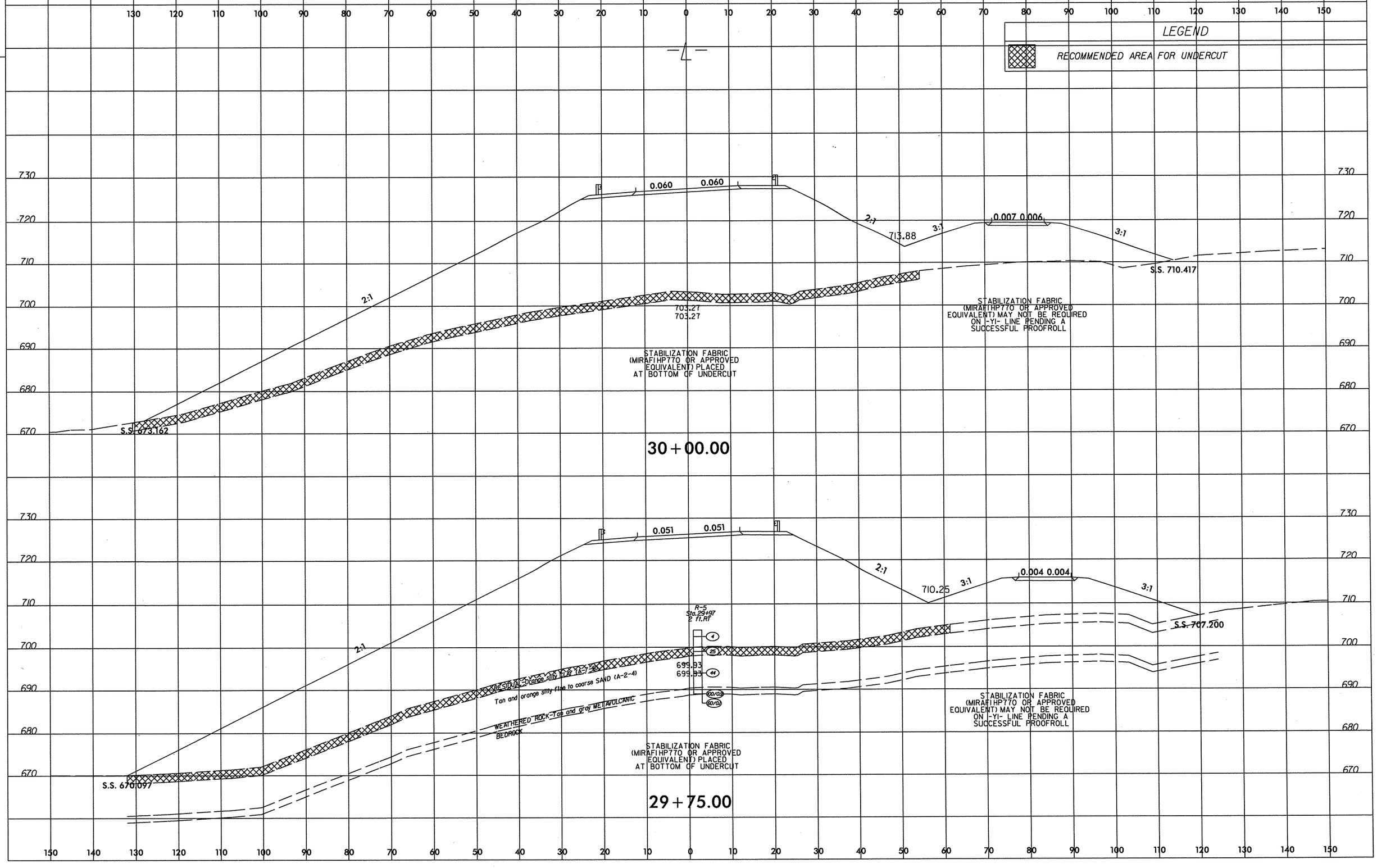


F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	14

0 5 10

LEGEND

RECOMMENDED AREA FOR UNDERCUT



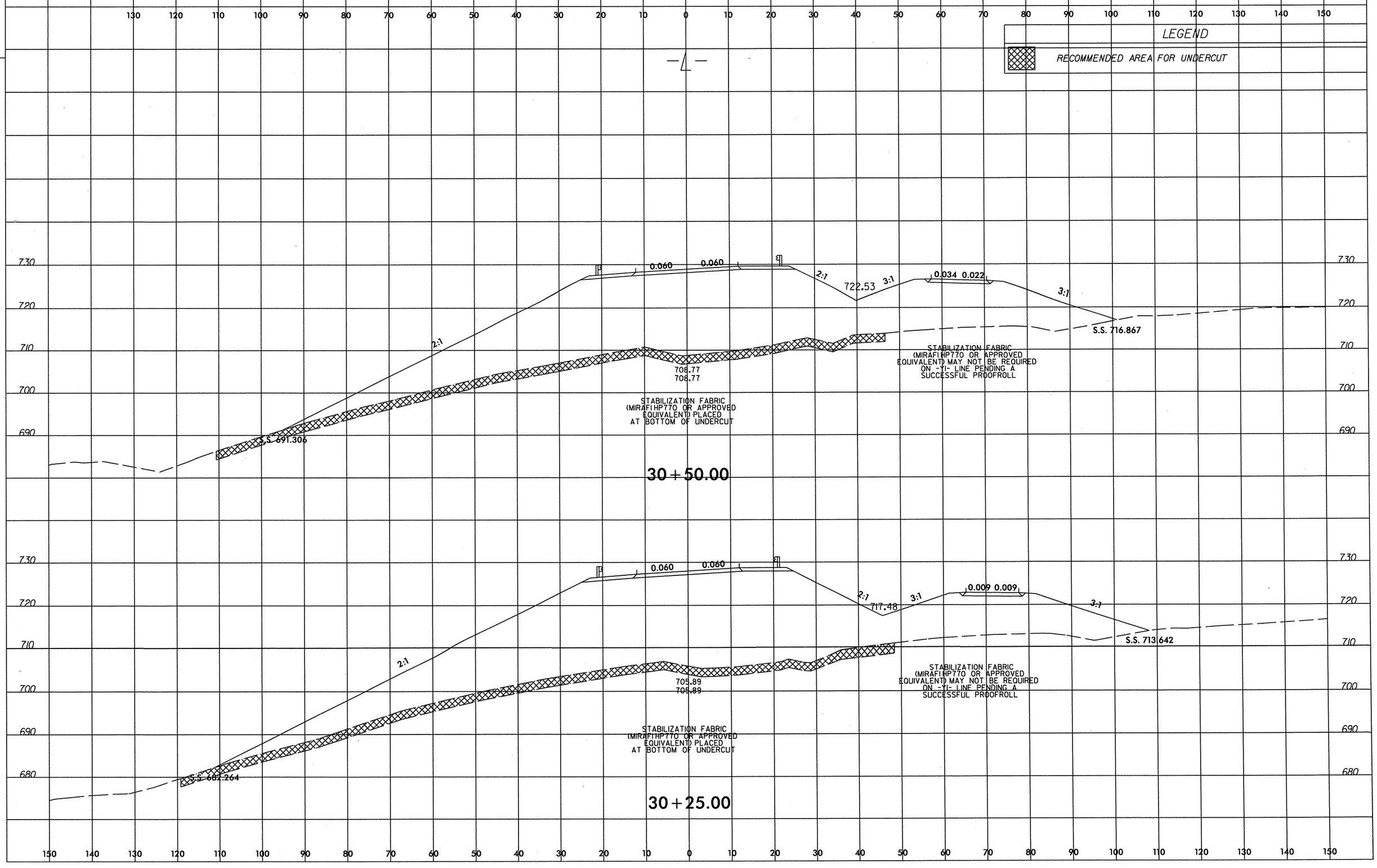
F&R PROJECT NO.	PROJ. REFERENCE NO.	SHEET NO.
63M-0278	C-4901B	15

0 5 10

DGN 0259DEL_P1R2

LEGEND

RECOMMENDED AREA FOR UNDERCUT



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 23+36	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 28.0
COLLAR ELEV. 674.7 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 767,407	**EASTING** 1,655,144	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 02/06/12	**COMP. DATE** 02/06/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
675												
	674.7	0.0	0	1	1	2		M		GROUND SURFACE ARTIFICIAL FILL Tan and brown clayey fine to coarse SAND (A-2-6)	674.7	0.0
	671.2	3.5									671.2	3.5
670			3	3	2	5	SS-2	18%		ARTIFICIAL FILL Brown and tan fine sandy SILT (A-4(0)) with trace rock fragments		
	666.2	8.5									666.2	8.5
665			3	5	8	13		M		RESIDUAL Tan and gray clayey SILT (A-5)		
	661.2	13.5									661.2	13.5
660			45	55/0.3		100/0.8				WEATHERED ROCK Gray and tan GRANITE		
	656.2	18.5	100/0.2			100/0.2						
655												
	651.2	23.5	65	35/0.2		100/0.7						
650												
	646.2	28.5	60/0.1			60/0.1					646.2	28.5
645	644.7	30.0	60/0.0			60/0.0				CRYSTALLINE ROCK Gray and tan GRANITE	644.7	30.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 644.7 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Driller indicated approximately 8 inches of Surficial Organic Laden soil.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 23+45	**OFFSET** 40 ft RT	**ALIGNMENT** -L-	**0 HR.** 17.0
COLLAR ELEV. 674.7 ft	**TOTAL DEPTH** 19.0 ft	**NORTHING** 767,367	**EASTING** 1,655,114	**24 HR.** 9.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 02/06/12	**COMP. DATE** 02/06/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
675												
	674.7	0.0	2	1	2	3		M		GROUND SURFACE ARTIFICIAL FILL Brown fine sandy SILT (A-4) with trace rock fragments	674.7	0.0
	671.2	3.5									671.2	3.5
670			2	1	2	3		M		Tan fine sandy CLAY (A-6)		
	666.2	8.5									666.2	8.5
665			3	6	6	12	SS-1	23%		RESIDUAL Tan and orange fine sandy CLAY (A-6(9))		
	661.2	13.5									661.2	13.5
660			11	29	38	67		M		Gray and brown silty fine to coarse SAND (A-2-4) with little rock fragments		
	656.2	18.5	100/0.3			100/0.3					656.2	18.5
	655.7	19.0	60/0.0			60/0.0				WEATHERED ROCK Gray, green and orange GRANITE	655.7	19.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 655.7 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Driller indicated approximately 8 inches of Surficial Organic Laden soil.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

SHEET

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 24+47	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 671.3 ft	**TOTAL DEPTH** 16.0 ft	**NORTHING** 767,393	**EASTING** 1,655,254	**24 HR.** 5.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/18/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	671.3	0.0								671.3 GROUND SURFACE	0.0
670			1	2	2	4		M		**RESIDUAL** Tan silty CLAY (A-7-5)	
	667.8	3.5									
665			3	4	4	8		W			
	662.8	8.5								662.3	9.0
660			20	71	29/0.1	100/0.6				**WEATHERED ROCK** Tan and white to gray and green GRANITE	
	657.8	13.5	100/0.4			100/0.4					
	655.3	16.0	60/0.0			60/0.0				655.3	16.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 655.3 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Driller indicated approximately 10 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 24+26	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 671.7 ft	**TOTAL DEPTH** 37.5 ft	**NORTHING** 767,371	**EASTING** 1,655,228	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/18/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	671.7	0.0	1	1	2	3		W		671.7 GROUND SURFACE	0.0
670										**RESIDUAL** Tan and brown fine sandy CLAY (A-6)	
	668.2	3.5	3	3	4	7		M		668.2 Tan silty CLAY (A-7-5)	3.5
665											
	663.2	8.5	17	23	24	47		M		663.7 Tan and white silty fine to coarse SAND (A-2-4)	8.0
660											
	658.2	13.5	100/0.5			100/0.5				658.2 **WEATHERED ROCK** Tan and white GRANITE	13.5
655											
	654.2	17.5	60/0.0			60/0.0	RS-1			654.2 **CRYSTALLINE ROCK** Light gray to medium gray fine to medium grained rhyolitic METATUFF	17.5
650											
645										644.2 **CRYSTALLINE ROCK**	27.5
640										643.2 Dark greenish gray fine grained mafic METAVOLCANIC	28.5
										CRYSTALLINE ROCK Light gray to medium gray fine to medium grained rhyolitic METATUFF	
635							RS-2				
	634.2	37.5								634.2 Boring Terminated at Elevation 634.2 ft in CRYSTALLINE ROCK (Granitic Rock)	37.5

1) Auger Refusal at a depth of 17.5 feet, began coring at a depth of 17.5 feet.

2) Driller indicated approximately 12 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 24+26	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 671.7 ft	**TOTAL DEPTH** 37.5 ft	**NORTHING** 767,371	**EASTING** 1,655,228	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/18/12	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ2	**TOTAL RUN** 20.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
654.2												
	654.2	17.5	5.0	N=60/0.0 2:48/1.0 6:52/1.0 6:28/1.0 8:06/1.0 8:45/1.0	(4.8) 96%	(0.3) 6%		(9.5) 95%	(0.3) 3%		654.2 **Begin Coring @ 17.5 ft** **CRYSTALLINE ROCK**	17.5
650	649.2	22.5	5.0	9:05/1.0 10:40/1.0 26:29/1.0 17:07/1.0 3:43/1.0	(4.7) 94%	(0.0) 0%	RS-1				Light gray to medium gray, slightly to moderately weathered, hard, very close to closely spaced fractures, rhyolitic METATUFF RS-1 20.0 - 20.4 qu = 9,540 psi RMR = 7+3+10+12+7 = 39	
645	644.2	27.5	5.0	1:08/1.0 2:56/1.0 2:18/1.0 2:57/1.0 4:08/1.0	(4.7) 94%	(1.9) 38%		(1.0) 100%	(0.0) 0%		644.2 643.2 **CRYSTALLINE ROCK**	27.5 28.5
640	639.2	32.5	5.0	7:09/1.0 7:58/1.0 10:08/1.0 11:04/1.0 9:03/1.0	(4.3) 86%	(0.7) 14%	RS-2	(8.0) 89%	(2.6) 29%		Dark greenish gray, moderately weathered, moderately hard, very close fractures, mafic METAVOLCANIC RMR = 4+3+5+12+7 = 31 **CRYSTALLINE ROCK** Light gray to medium gray, slightly weathered, hard, very close to closely spaced fractures, rhyolitic METATUFF 634.2 RS-2 34.0 - 34.4 qu = 10,180 psi RMR = 7+8+10+20+10 = 55	37.5
635	634.2	37.5									Boring Terminated at Elevation 634.2 ft in CRYSTALLINE ROCK (Granitic Rock)	

1) Auger Refusal at a depth of 17.5 feet, began coring at a depth of 17.5 feet.

2) Driller indicated approximately 12 inches of Surficial Organic Laden soil.

NCDOT CORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 25+35	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 674.4 ft	**TOTAL DEPTH** 38.0 ft	**NORTHING** 767,374	**EASTING** 1,655,340	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	674.4	0.0	2	2	2	4		M		674.4 GROUND SURFACE	0.0
										ARTIFICIAL FILL Red-orange silty CLAY (A-7-5)	
	670.9	3.5	3	4	4	8		M		671.4	3.0
670										**RESIDUAL** Tan and brown clayey SILT (A-5) with little fine sand	
	665.9	8.5	9	6	17	23		M		666.4 White, gray and brown fine sandy SILT (A-4)	8.0
665											
	660.9	13.5	100/0.5			100/0.5				660.9 **WEATHERED ROCK** Gray and white GRANITE	13.5
660											
	656.4	18.0	60/0.0			60/0.0				656.4 **CRYSTALLINE ROCK** Light gray fine to medium grained rhyolitic METATUFF	18.0
655											
650										648.9 **CRYSTALLINE ROCK** Medium gray to pink fine to medium grained meta GRANODIORITE	25.5
645							RS-3				
640										636.4	38.0

Boring Terminated at Elevation 636.4 ft in CRYSTALLINE ROCK (Granitic Rock)

1) Auger Refusal at a depth of 18.0 feet, began coring at a depth of 18.0 feet.

2) Driller indicated approximately 9 inches of Surficial Organic Laden soil.

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 25+35	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 674.4 ft	**TOTAL DEPTH** 38.0 ft	**NORTHING** 767,374	**EASTING** 1,655,340	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A
CORE SIZE NQ2	**TOTAL RUN** 20.0 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
656.4											Begin Coring @ 18.0 ft	
655	656.4	18.0	5.0	*N=60/0.0* 4:05/1.0 3:25/1.0 5:20/1.0 4:19/1.0 2:50/1.0	(3.0) 60%	(0.4) 8%		(5.3) 71%	(1.3) 17%		656.4 **CRYSTALLINE ROCK** Light gray, slightly weathered, hard, very close to closely spaced fractures, rhyolitic METATUFF RMR = 7+3+5+12+7 = 34	18.0
	651.4	23.0	5.0	3:47/1.0 2:34/1.0 3:24/1.0 4:46/1.0 9:12/1.0	(4.8) 96%	(1.2) 24%					648.9 **CRYSTALLINE ROCK** Medium gray to pink very slightly to slightly weathered, hard, closely spaced fractures, GRANODIORITE RS-3 30.0 - 30.5 qu = 4,360 psi RMR = 4+13+10+20+10 = 57	25.5
650								(12.5) 100%	(6.9) 55%			
	646.4	28.0	5.0	6:34/1.0 8:10/1.0 14:32/1.0 12:39/1.0 34:56/1.0	(5.0) 100%	(2.4) 48%	RS-3					
645	641.4	33.0	5.0	5:09/1.0 12:54/1.0 10:53/1.0 6:02/1.0 7:51/1.0	(5.0) 100%	(4.2) 84%						
640	636.4	38.0									636.4	38.0

Boring Terminated at Elevation 636.4 ft in CRYSTALLINE ROCK (Granitic Rock)

1) Auger Refusal at a depth of 18.0 feet, began coring at a depth of 18.0 feet.

2) Driller indicated approximately 9 inches of Surficial Organic Laden soil.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 25+15	**OFFSET** 19 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.0
COLLAR ELEV. 675.6 ft	**TOTAL DEPTH** 29.0 ft	**NORTHING** 767,351	**EASTING** 1,655,315	**24 HR.** 9.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/18/12	**COMP. DATE** 01/18/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
680											
675	675.6	0.0								675.6 GROUND SURFACE	0.0
			1	1	2	3		M		**ARTIFICIAL FILL** Red-orange silty CLAY (A-7-5)	
	672.1	3.5								672.6	3.0
670			2	2	3	5		M		**RESIDUAL** Tan, orange and brown clayey SILT (A-5)	
	667.1	8.5								667.6	8.0
665			18	27	32	59		D		Gray, brown and green silty fine to coarse SAND (A-2-4) with some rock fragments	
	662.1	13.5									
660			26	31	40	71		D			
	657.1	18.5								657.1	18.5
655			10	8	11	19		W		Gray, black and brown clayey SILT (A-5)	
	652.1	23.5								652.1	23.5
650			44	56/0.2		100/0.7				**WEATHERED ROCK** Gray and brown METAVOLCANIC	
	647.1	28.5								647.1	28.5
	646.6	29.0	60/0.0			60/0.0				646.6 **CRYSTALLINE ROCK** Gray and tan GRANITE	29.0
			60/0.0							Boring Terminated with Standard Penetration Test Refusal at Elevation 646.6 ft on CRYSTALLINE ROCK (Granitic Rock)	

1) Driller indicated approximately 8 inches of Surficial Organic Laden soil.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 26+22	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 678.6 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 767,356	**EASTING** 1,655,425	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/17/12	**COMP. DATE** 01/17/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
680										
	678.6	0.0								678.6 GROUND SURFACE 0.0
			2	2	2	4		M		**ARTIFICIAL FILL** Red-orange and black silty CLAY (A-7-5) with trace rock fragments
675	675.1	3.5								
			5	4	6	10		M		
670	670.1	8.5								670.6 8.0
			7	5	8	13		M		**RESIDUAL** Red-orange and tan clayey SILT (A-5)
665	665.1	13.5								665.1 13.5
	663.6	15.0	60/0.1			60/0.1				663.6 **CRYSTALLINE ROCK** Tan GRANITE 15.0
			60/0.0			60/0.0				**CRYSTALLINE ROCK** Light gray to medium gray fine grained felsic METAVOLCANIC
660							RS-4			658.6 20.0
655							RS-5			**CRYSTALLINE ROCK** Medium gray fine to coarse grained meta GABBRO
650										
645										643.6 35.0

Boring Terminated at Elevation 643.6 ft in CRYSTALLINE ROCK (Granitic Rock)

1) Auger Refusal at a depth of 15.0 feet, began coring at a depth of 15.0 feet.

2) Driller indicated no Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 26+22	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 678.6 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 767,356	**EASTING** 1,655,425	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/17/12	**COMP. DATE** 01/17/12	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 20.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
663.6											**Begin Coring @ 15.0 ft**
	663.6	15.0	5.0	*N=60/0.0* 23:20/1.0 12:28/1.0 15:05/1.0 26:40/1.0 56:20/1.0	(5.0) 100%	(0.8) 16%		(5.0) 100%	(0.8) 16%		663.6 **CRYSTALLINE ROCK** Light to medium gray, slightly to moderately weathered, moderately hard to hard, very close to closely spaced fractures, METAVOLCANIC 15.0
660							RS-4				
	658.6	20.0									658.6 RS-4 18.3 - 18.8 qu = 12,580 psi RMR = 7+3+10+20+7 = 47 20.0
			5.0	9:50/1.0 9:58/1.0 12:17/1.0 19:03/1.0 28:29/1.0	(4.8) 96%	(2.2) 44%		(14.2) 95%	(7.2) 48%		**CRYSTALLINE ROCK** Medium gray, slightly weathered, hard, very close to closely spaced fractures, meta GABBRO
655							RS-5				
	653.6	25.0									RS-5 23.3 - 23.8 qu = 18,760 psi RMR = 12+8+10+20+10 = 60
			5.0	3:35/1.0 3:01/1.0 3:13/1.0 3:54/1.0 5:18/1.0	(4.6) 92%	(3.1) 62%					
650	648.6	30.0									
			5.0	8:21/1.0 8:50/1.0 43:54/1.0 14:44/1.0 7:58/1.0	(4.8) 96%	(1.9) 38%					
645	643.6	35.0									643.6 35.0

Boring Terminated at Elevation 643.6 ft in CRYSTALLINE ROCK (Granitic Rock)

1) Auger Refusal at a depth of 15.0 feet, began coring at a depth of 15.0 feet.

2) Driller indicated no Surficial Organic Laden soil.

NCDOT CORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 26+03	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 679.4 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 767,334	**EASTING** 1,655,401	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/17/12	**COMP. DATE** 01/17/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
680	679.4	0.0	2	1	2	3		M		679.4 GROUND SURFACE	0.0
										ARTIFICIAL FILL Orange and brown silty CLAY (A-7-5) with trace rock fragments	
675	675.9	3.5	2	2	3	5		M			
										671.4 **RESIDUAL** Orange and tan silty fine to coarse SAND (A-2-4)	8.0
670	670.9	8.5	6	6	14	20		M			
										665.9	13.5
665	665.9	13.5	6	24	76/0.2	100/0.7				664.3 **WEATHERED ROCK** Tan and brown GRANITE	15.1
	664.4	15.0	60/0.1			60/0.1				Boring Terminated with Standard Penetration Test Refusal at Elevation 664.3 ft on CRYSTALLINE ROCK (Granitic Rock)	
										1) Driller indicated no Surficial Organic Laden soil.	

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B4-A	**STATION** 27+40	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.0
COLLAR ELEV. 670.7 ft	**TOTAL DEPTH** 13.0 ft	**NORTHING** 767,332	**EASTING** 1,655,541	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/19/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
670	670.7	0.0	0	0	2	2		W		670.7 GROUND SURFACE	0.0
	667.2	3.5	2	1	3	4		Sat.		**RESIDUAL** Orange, tan and brown fine sandy CLAY (A-6)	
665										667.7 Tan and orange silty fine to coarse SAND (A-2-4)	3.0
	662.2	8.5	100/0.5			100/0.5				662.2 **WEATHERED ROCK** Tan, white and gray GRANITE	8.5
660	657.7	13.0	60/0.0			60/0.0				657.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 657.7 ft on CRYSTALLINE ROCK (Granitic Rock)	13.0
										1) Driller indicated approximately 12 inches of Surficial Organic Laden soil.	

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. B4-B	**STATION** 27+22	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.0
COLLAR ELEV. 670.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 767,309	**EASTING** 1,655,518	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/19/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
670										
	670.0	0.0	0	0	3	3		W		670.0 GROUND SURFACE 0.0 **RESIDUAL** Brown and orange silty CLAY (A-7-5)
	666.5	3.5								667.0 3.0 Brown and tan silty fine to coarse SAND (A-2-4)
665			2	2	3	5		Sat.		
	661.5	8.5								661.5 8.5
660	660.0	10.0	46 60/0.0	54/0.3		100/0.8 60/0.0				660.0 10.0 **WEATHERED ROCK** Brown and tan GRANITE
										CRYSTALLINE ROCK Dark greenish gray fine grained mafic METAVOLCANIC
655										655.0 15.0
										CRYSTALLINE ROCK Light to medium gray fine to medium grained felsic METAVOLCANIC
650										
645							RS-6			
640										640.0 30.0 Boring Terminated at Elevation 640.0 ft in CRYSTALLINE ROCK (Granitic Rock) 1) Auger Refusal at a depth of 10.0 feet, began coring at a depth of 10.0 feet. 2) Driller indicated approximately 12 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral / J. Harris
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. B4-B	**STATION** 27+22	**OFFSET** 18 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.0
COLLAR ELEV. 670.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 767,309	**EASTING** 1,655,518	**24 HR.** 1.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/19/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 20.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
660											Begin Coring @ 10.0 ft
	680.0	10.0	5.0	*N=60/0.0* 5:27/1.0 8:16/1.0 5:12/1.0 4:28/1.0 3:42/1.0	(4.5) 90%	(0.0) 0%		(4.5) 90%	(0.0) 0%		660.0 **CRYSTALLINE ROCK** Dark greenish gray, slightly weathered, hard, very close to closely spaced fractures, mafic METAVOLCANIC 10.0
655	655.0	15.0									655.0 RMR = 7+3+10+12+10 = 42 15.0
			5.0	12:17/1.0 7:19/1.0 3:07/1.0 8:05/1.0 6:19/1.0	(5.0) 100%	(2.6) 52%		(14.0) 93%	(5.8) 39%		**CRYSTALLINE ROCK** Light to medium gray, slightly weathered, moderately hard to hard, very close to closely spaced fractures, felsic METAVOLCANIC
650	650.0	20.0									RS-6 25.0 - 25.5 qu = 13,330 psi RMR = 7+8+5+20+10 = 50
			5.0	7:08/1.0 8:22/1.0 6:09/1.0 3:52/1.0 5:07/1.0	(4.0) 80%	(1.2) 24%					
645	645.0	25.0									
			5.0	4:38/1.0 4:41/1.0 6:15/1.0 5:22/1.0 7:49/1.0	(5.0) 100%	(2.0) 40%	RS-6				
640	640.0	30.0									640.0 30.0 Boring Terminated at Elevation 640.0 ft in CRYSTALLINE ROCK (Granitic Rock) 1) Auger Refusal at a depth of 10.0 feet, began coring at a depth of 10.0 feet. 2) Driller indicated approximately 12 inches of Surficial Organic Laden soil.

NCDOT CORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	TIP C-4901B	COUNTY Davidson	GEOLOGIST R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				GROUND WTR (ft)
BORING NO. EB2-A	STATION 28+16	OFFSET 10 ft LT	ALIGNMENT -L-	0 HR. 3.0
COLLAR ELEV. 671.3 ft	TOTAL DEPTH 12.1 ft	NORTHING 767,317	EASTING 1,655,615	24 HR. 2.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER C. Boyce	START DATE 01/19/12	COMP. DATE 01/19/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	671.3	0.0								671.3 GROUND SURFACE	0.0
670			0	0	1	1		M		RESIDUAL Brown and gray silty CLAY (A-7-5)	
	667.8	3.5	1	1	1	2	SS-4	28%		667.8 Brown, orange and gray fine sandy SILT (A-4(0))	3.5
665											
	662.8	8.5	14	40	60	100/1.0				662.8 WEATHERED ROCK Brown and gray GRANITE	8.5
660	659.3	12.0	60/0.1			60/0.1				659.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 659.2 ft on CRYSTALLINE ROCK (Granitic Rock)	12.1

1) Driller indicated approximately 5 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	TIP C-4901B	COUNTY Davidson	GEOLOGIST R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				GROUND WTR (ft)
BORING NO. EB2-B	STATION 27+98	OFFSET 19 ft RT	ALIGNMENT -L-	0 HR. 3.0
COLLAR ELEV. 671.8 ft	TOTAL DEPTH 15.0 ft	NORTHING 767,292	EASTING 1,655,592	24 HR. 2.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER C. Boyce	START DATE 01/19/12	COMP. DATE 01/19/12	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	671.8	0.0								671.8 GROUND SURFACE	0.0
670			0	0	1	1		W		RESIDUAL Brown and orange fine sandy CLAY (A-6)	
	668.3	3.5	0	1	0	1	SS-3	28%		668.8 Gray, tan and orange fine sandy SILT (A-4(3))	3.0
665											
	663.3	8.5	23	40	60	100/1.0				663.3 WEATHERED ROCK Green, tan and gray GRANITE	8.5
660	658.3	13.5	46	54/0.1		100/0.6				656.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 656.8 ft on CRYSTALLINE ROCK (Granitic Rock)	15.0
	656.8	15.0	60/0.0			60/0.0					

1) Driller indicated approximately 3 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. R-1	**STATION** 20+42	**OFFSET** 1 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.0
COLLAR ELEV. 669.6 ft	**TOTAL DEPTH** 12.5 ft	**NORTHING** 767,472	**EASTING** 1,654,858	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 02/07/12	**COMP. DATE** 02/07/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
670											
	669.6	0.0	0	0	1	1		W		669.6 GROUND SURFACE	0.0
										ALLUVIAL	
										Gray and orange silty fine to coarse SAND (A-2-4)	
	666.1	3.5								666.6	3.0
665			4	5	7	12		W		RESIDUAL	
										Brown silty CLAY (A-7-5)	
	661.1	8.5								661.1	8.5
660			4	8	7	15		W		Tan and gray silty sandy CLAY (A-6)	
	657.1	12.5	60/0.0			60/0.0				657.1	12.5

Boring Terminated with Standard Penetration Test Refusal at Elevation 657.1 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Driller indicated approximately 4 inches of Surficial Organic Laden Soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. R-2	**STATION** 21+40	**OFFSET** 17 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.0
COLLAR ELEV. 667.9 ft	**TOTAL DEPTH** 10.5 ft	**NORTHING** 767,432	**EASTING** 1,654,949	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 02/07/12	**COMP. DATE** 02/07/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
670											
	667.9	0.0						W		667.9 GROUND SURFACE	0.0
			0	1	2	3				RESIDUAL	
										Brown, orange and gray silty CLAY (A-7-5)	
	664.4	3.5								664.9	3.0
665			1	2	1	3		W		Tan and gray silty fine to coarse SAND (A-2-4)	
	659.4	8.5								659.4	8.5
			46	50/0.2		100/0.7				WEATHERED ROCK	
660	657.4	10.5	60/0.0			60/0.0				657.4 Gray and tan GRANITE	10.5

Boring Terminated with Standard Penetration Test Refusal at Elevation 657.4 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Boring was offset approximately 13 ft RT from planned location due to accessibility issues resulting from standing water.

2) Driller indicated approximately 4 inches of Surficial Organic Laden soil.

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. R-3	**STATION** 22+04	**OFFSET** 31 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 673.9 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 767,405	**EASTING** 1,655,008	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 02/07/12	**COMP. DATE** 02/07/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
675											
	673.9	0.0	2	2	2	4		M		673.9 GROUND SURFACE	0.0
670	670.4	3.5	3	1	1	2		W		**ARTIFICIAL FILL** Brown and black silty sandy CLAY (A-6) with trace rock fragments 670.9	3.0
	665.4	8.5	0	0	1	1		26%		Orange, gray and tan silty CLAY (A-7-5) with little rock fragments 665.4 **RESIDUAL** Orange and gray silty CLAY (A-7-6(11))	8.5
665											
660	660.4	13.5	13	46	54/0.3	100/0.8				660.4	13.5
	658.8	15.1	60/0.1			60/0.1				**WEATHERED ROCK** Tan, brown and gray GRANITE 658.8	15.1

Boring Terminated with Standard Penetration Test Refusal at Elevation 658.8 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Boring was offset approximately 31 ft RT from planned location due to accessibility issues resulting from standing water.

2) Driller indicated approximately 3 inches of Surficial Organic Laden soil.

3) Shelby Tube (ST-1) obtained from approxiamtely 9 to 11 feet.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral	
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation				**GROUND WTR (ft)**
BORING NO. R-4	**STATION** 28+46	**OFFSET** 3 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 675.1 ft	**TOTAL DEPTH** 18.0 ft	**NORTHING** 767,298	**EASTING** 1,655,642	**24 HR.** 5.5
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER C. Boyce	**START DATE** 01/19/12	**COMP. DATE** 01/19/12	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
680											
675	675.1	0.0	2	1	2	3		M		675.1 GROUND SURFACE	0.0
	671.6	3.5	0	2	1	3		W		**ARTIFICIAL FILL** Tan and brown fine sandy CLAY (A-6) with trace rock fragments 671.6	3.5
670	666.6	8.5	0	0	1	1		W		**RESIDUAL** Brown, orange and gray sandy SILT (A-4(4)) 666.6 Tan and gray silty CLAY (A-7-5)	8.5
665	661.6	13.5	25	32	68	100/1.0				661.6 **WEATHERED ROCK** Gray, orange and tan GRANITE	13.5
660	657.1	18.0	60/0.0			60/0.0				657.1	18.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 657.1 ft on CRYSTALLINE ROCK (Granitic Rock)

1) Driller indicated approximately 9 inches of Surficial Organic Laden soil.

2) Shelby Tube (ST-2) obtained from approximately 6 to 8 feet.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. R-5	**STATION** 29+97	**OFFSET** 2 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 704.0 ft	**TOTAL DEPTH** 15.1 ft	**NORTHING** 767,276	**EASTING** 1,655,792	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/26/12	**COMP. DATE** 01/26/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
705											
	704.0	0.0	1	1	3	4		M		704.0 GROUND SURFACE	0.0
700	700.5	3.5	13	14	11	25		M		RESIDUAL Orange silty CLAY (A-7-5) 700.5	3.5
695	695.5	8.5	13	21	23	44		M		Tan and orange silty fine to coarse SAND (A-2-4)	
690	690.5	13.5	20	28	72/.4	100/0.9				690.5	13.5
	689.0	15.0	60/0.1			60/0.1				688.9 WEATHERED ROCK Tan and gray METAVOLCANIC	15.1
										Boring Terminated with Standard Penetration Test Refusal at Elevation 688.9 ft on CRYSTALLINE ROCK (Methvolcanic Rock)	
										1) Driller indicated approximately 8 inches of Surficial Organic Laden soil.	

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 49010.1.STR05T1B	**TIP** C-4901B	**COUNTY** Davidson	**GEOLOGIST** R. Kral
SITE DESCRIPTION SR 2024 - Upper Lake Road Grade Separation			**GROUND WTR (ft)**
BORING NO. R-6	**STATION** 31+47	**OFFSET** 1 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 720.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 767,280	**EASTING** 1,655,942	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R968 CME-550X 81% 12/28/2011		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER C. Boyce	**START DATE** 01/26/12	**COMP. DATE** 01/26/12	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
725											
720	720.1	0.0	2	2	3	5		M		720.1 GROUND SURFACE	0.0
	716.6	3.5	7	14	20	34		M		ARTIFICIAL FILL Tan and brown fine sandy CLAY (A-6) 716.6	3.5
715	711.6	8.5	10	23	26	49		D		RESIDUAL Tan and yellow fine sandy SILT (A-4) 711.6	8.5
710	706.6	13.5	33	67/0.2		100/0.7				Tan, yellow and white silty fine to coarse SAND (A-2-4) 706.6	13.5
705	701.6	18.5	60/0.1			60/0.1				WEATHERED ROCK Tan, white and gray GRANITE 700.1	20.0
	700.1	20.0	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 700.1 ft on CRYSTALLINE ROCK (Granitic Rock)	
										1) Driller indicated approximately 3 inches of Surficial Organic Laden soil.	

NCDOT BORE SINGLE 63M-0278 (UPPER LAKE ROAD).GPJ NC_DOT.GDT 8/17/12

SR 2024 – Upper Lake Road Grade Separation

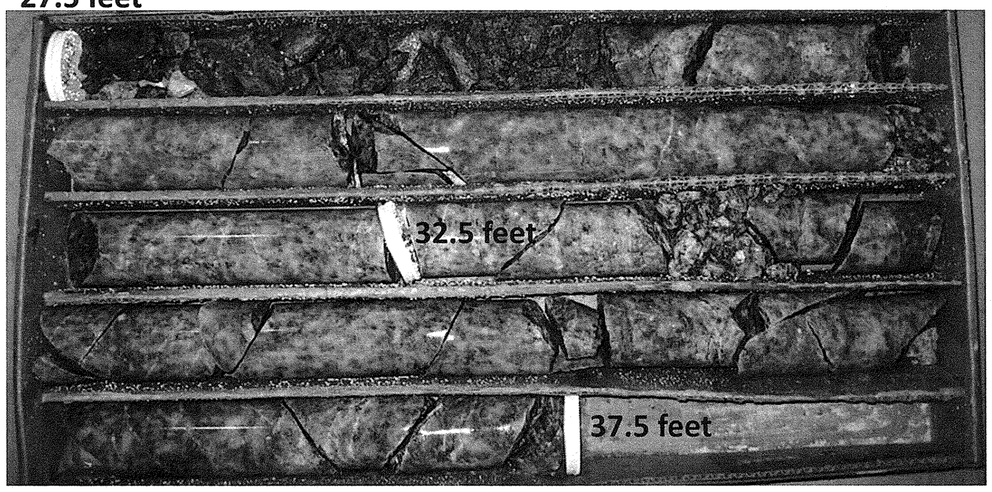
CORE PHOTOGRAPHS: B1-B: Station 24+26

17.5 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

27.5 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

SR 2024 – Upper Lake Road Grade Separation

CORE PHOTOGRAPHS: B2-A: Station 25+35

18.0 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

29.6 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

SR 2024 – Upper Lake Road Grade Separation

CORE PHOTOGRAPHS: B3-A: Station 26+22

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

25.0 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

SR 2024 – Upper Lake Road Grade Separation

CORE PHOTOGRAPHS: B4-B: Station 27+22

10.0 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

20.0 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

SOIL TEST RESULTS

Boring No.	Sample No.	Station	Offset	Depth Interval	AASHTO Class.	L.L.	P.I.	% By Weight				% Passing (Sieves)			% Moisture	% Organic
								C. Sand	F. Sand	Silt	Clay	10	40	200		
EB1-B	SS-1	23+24	15' RT	8.5-10.0	A-6(9)	20	17	20.4	19.7	32.9	27.0	100.0	88.3	63.2	23	NT
EB1-A	SS-2	23+34	15' LT	3.5-5.0	A-4(0)	17	1	8.8	34.3	43.6	13.3	100.0	96.4	64.4	18	NT
EB2-B	SS-3	28+02	15' RT	3.5-5.0	A-4(3)	28	7	5.5	32.8	46.9	14.8	100.0	99.5	68.8	28	NT
EB2-A	SS-4	28+22	15' LT	3.5-5.0	A-4(0)	23	2	7.4	41.1	38.5	13.0	100.0	99.7	59.3	28	NT
R-3	ST-1	22+44	31' RT	9.0-11.0	A-7-6(11)	41	14	23.0	3.4	35.3	38.3	100.0	80.8	74.6	30	NT
R-4	ST-2	28+47	CL	6.0-8.0	A-4(4)	34	9	18.4	25.1	33.5	23.0	100.0	88.1	60.9	28	NT

NT = Not Tested

ROCK TEST RESULTS

Boring No.	Sample No.	Station	Offset	Depth Interval	Area (square inches)	Unit Weight (pcf)	Length (inches)	Diameter (inches)	Unconfined Compressive Strength (psi)
B1-B	RS-1	24+26	18' RT	20.0-20.4	2.99	172.4	3.27	1.95	9540*
B1-B	RS-2	24+26	18' RT	34.0-34.4	3.11	166.6	3.80	1.99	10180*
B2-A	RS-3	25+35	8' LT	30.0-30.5	3.14	166.8	4.97	2.00	4,360
B3-A	RS-4	26+22	9' LT	18.3-18.8	3.11	139.2	4.89	1.99	12,580
B3-A	RS-5	26+22	9' LT	23.3-23.8	3.11	167.5	4.89	1.99	18,760
B4-B	RS-6	27+22	18' RT	25.0-25.5	3.05	186.2	4.34	1.97	13,330

* A reduction factor applied where L/D ratio is less than 2