STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1(U-3326A)	1	18

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1(U-3326A) F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)

INVENTORY

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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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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PERSONNEL
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INVESTIGATED BY J.I. MILKOVITS, JR.
CHECKED BY T.P. MOOREFIELD
SUBMITTED BY N.T. ROBERSON
DATE APRIL 2009

NORTH CAROLINA LICENSED GEOLOGIST SEAL 3301 THOMAS P. MOOREFIELD 4-30-09

PROJECT: 34924.1.1

ID: U-3326A

DRAWN BY: T.T. WALKER

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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.
34924.1.1(U-3326A)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		NP	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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 PLASTIC RANGE (PI) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [x] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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: BL 4 -Y10- 23+73/18' LT

ELEVATION: 849.55 FT.

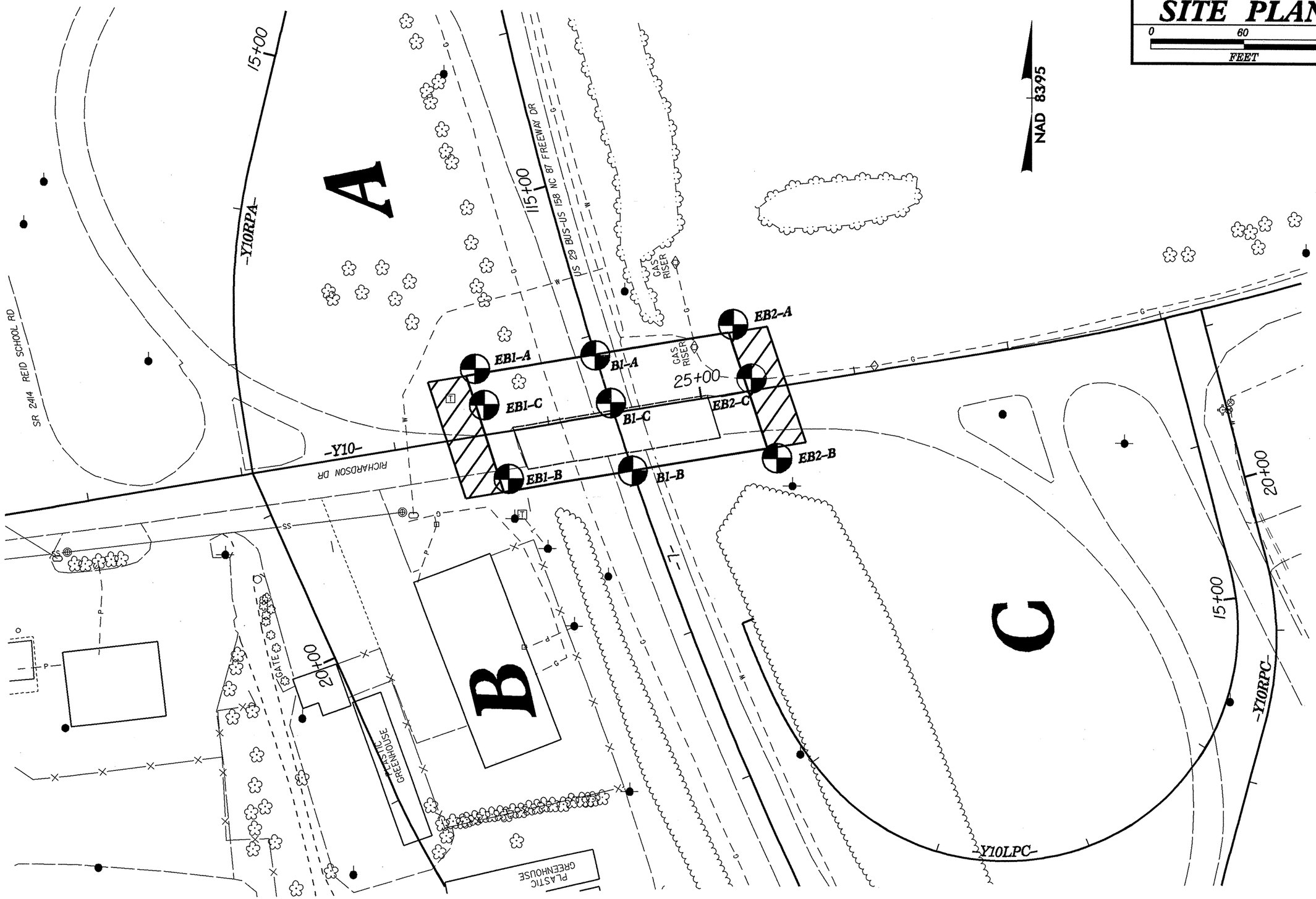
NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
34924.1.1(U-3326A)	3

SITE PLAN

0 60 120
FEET



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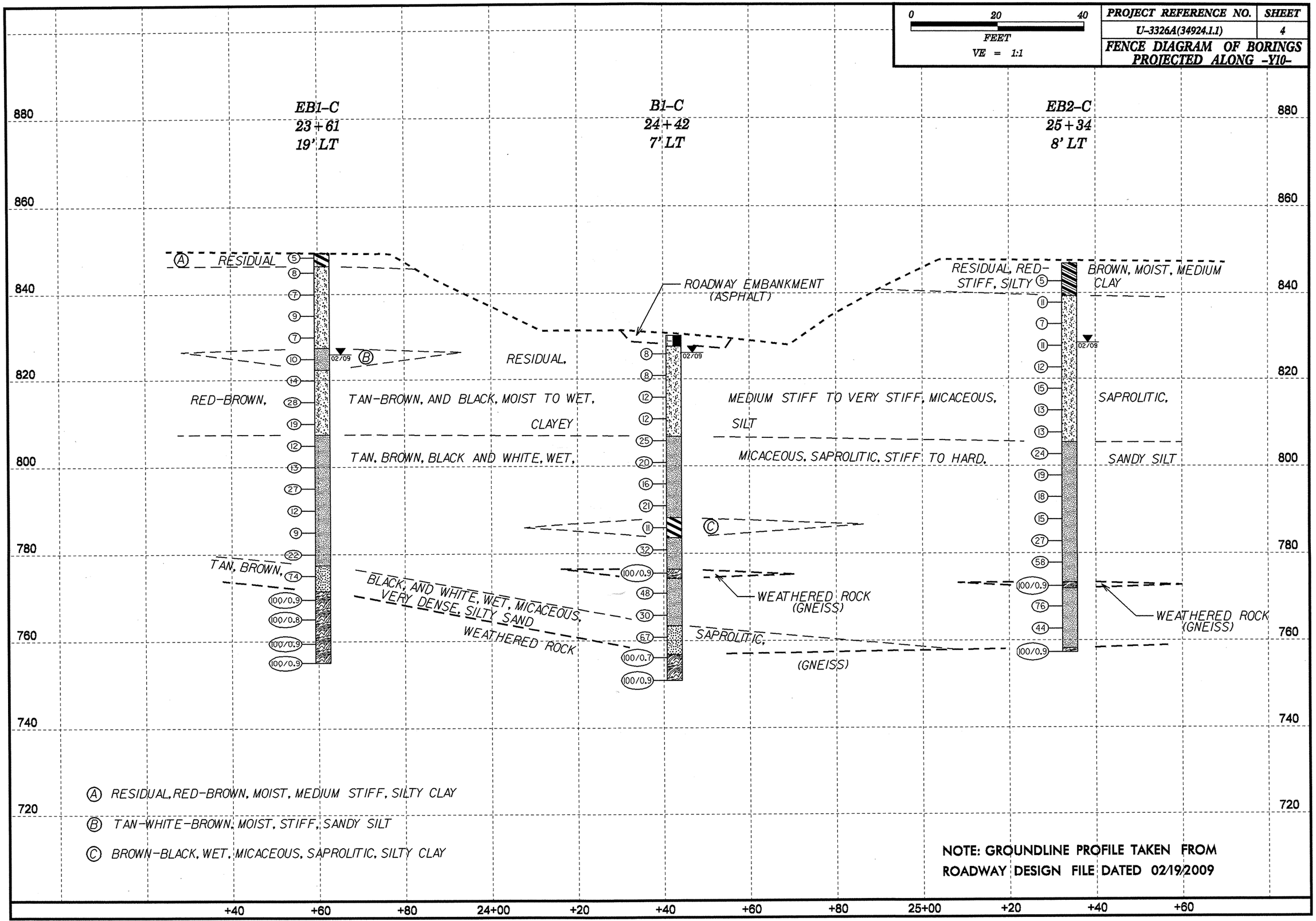
U-3326A(34924.1.1)	4

FENCE DIAGRAM OF BORINGS PROJECTED ALONG -Y10-



Ⓐ RESIDUAL, RED-BROWN, MOIST, MEDIUM STIFF, SILTY CLAY

Ⓑ TAN-WHITE-BROWN, MOIST, STIFF, SANDY SILT

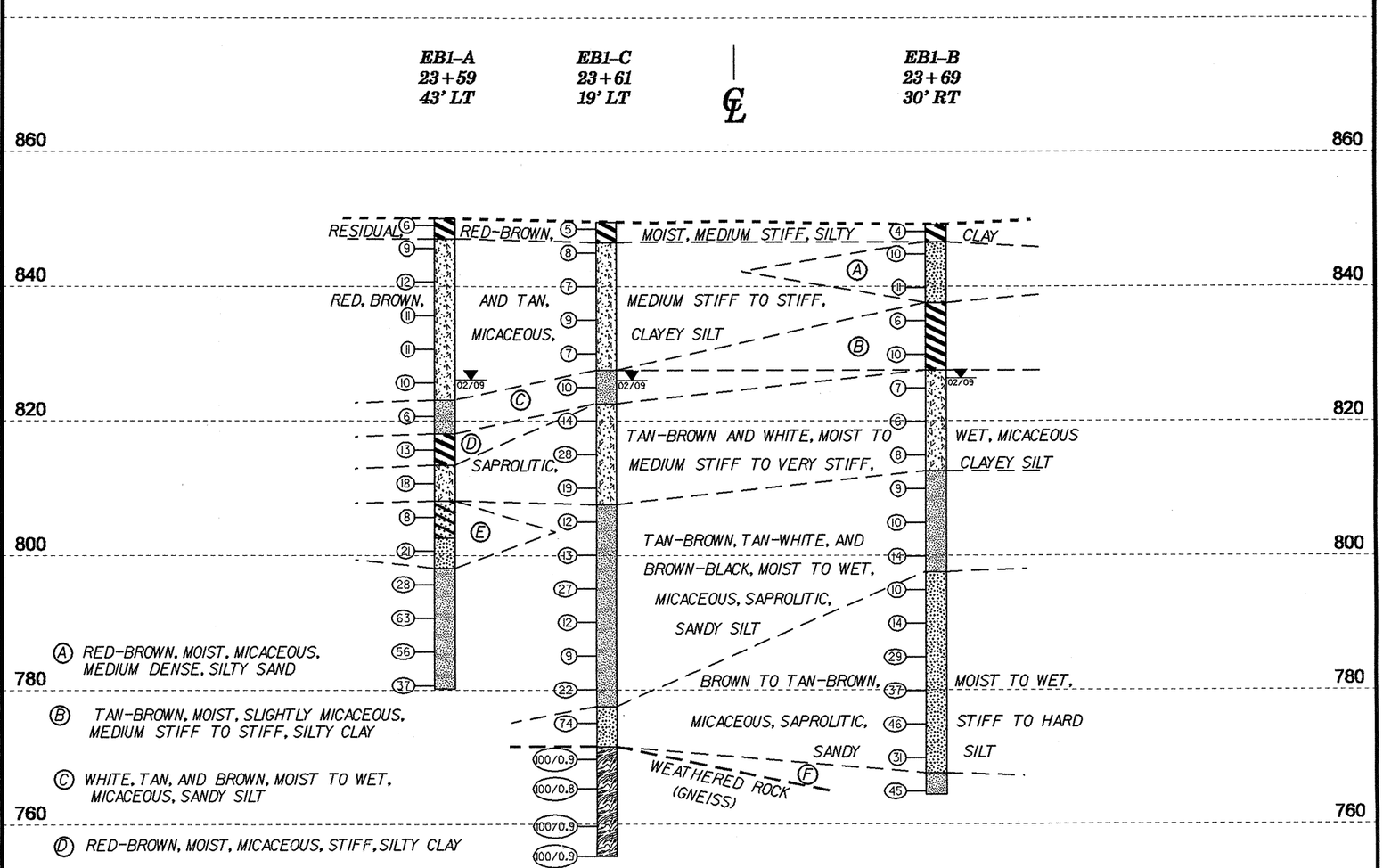
Ⓒ BROWN-BLACK, WET, MICACEOUS, SAPROLITIC, SILTY CLAY

NOTE: GROUNDLINE PROFILE TAKEN FROM ROADWAY DESIGN FILE DATED 02/19/2009

HORIZ. SCALE (FEET) 0 20 40

VE = 1:1

CROSS SECTION THROUGH END BENT 1



(A) RED-BROWN, MOIST, MICACEOUS, MEDIUM DENSE, SILTY SAND

(B) TAN-BROWN, MOIST, SLIGHTLY MICACEOUS, MEDIUM STIFF TO STIFF, SILTY CLAY

(C) WHITE, TAN, AND BROWN, MOIST TO WET, MICACEOUS, SANDY SILT

(D) RED-BROWN, MOIST, MICACEOUS, STIFF, SILTY CLAY

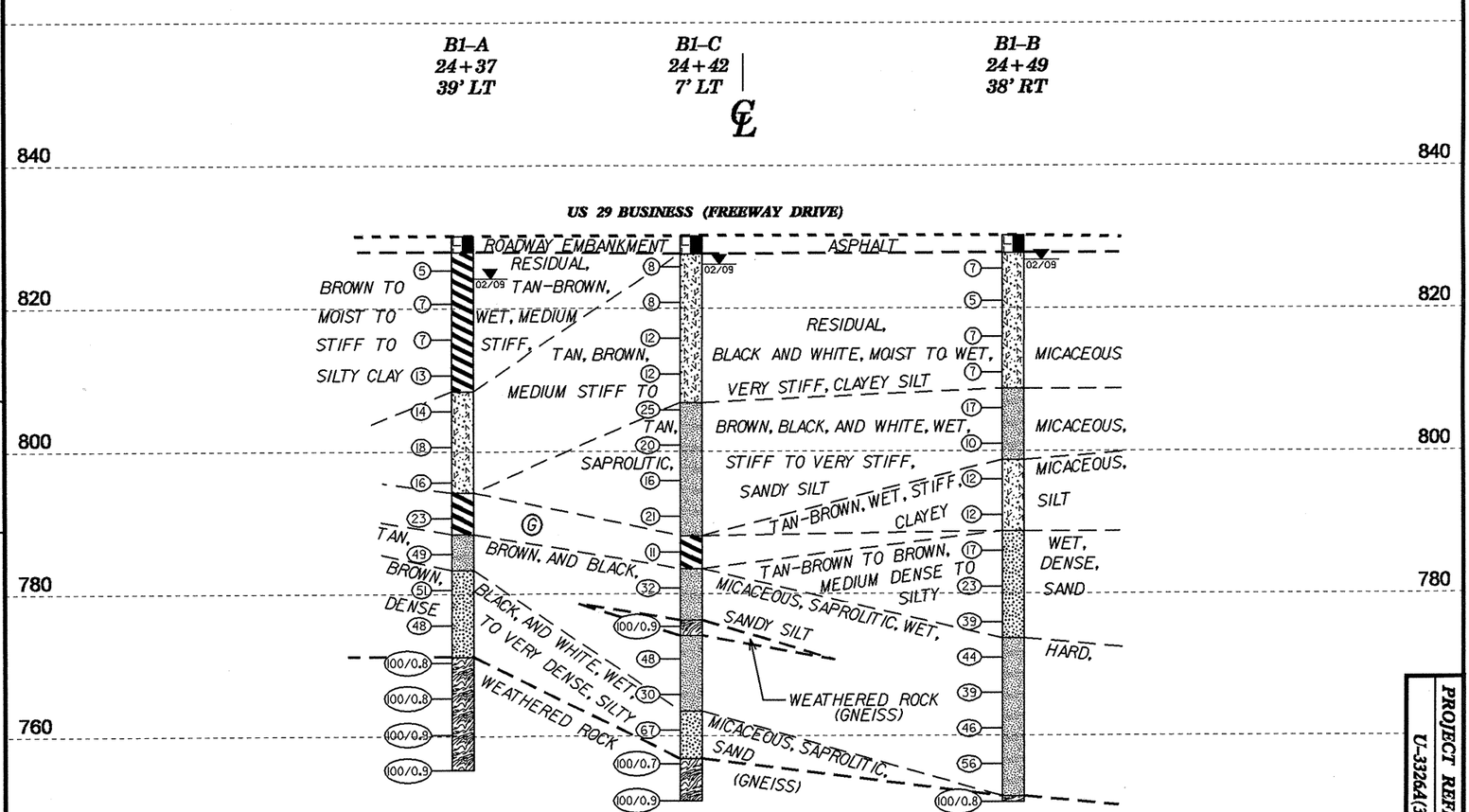
(E) TAN AND GRAY, MOIST, SAPROLITIC, LOOSE TO MEDIUM DENSE, SILTY SAND AND CLAYEY SAND

(F) TAN-BROWN, MOIST, HARD, SANDY SILT

HORIZ. SCALE (FEET) 0 20 40

VE = 1:1

CROSS SECTION THROUGH BENT 1



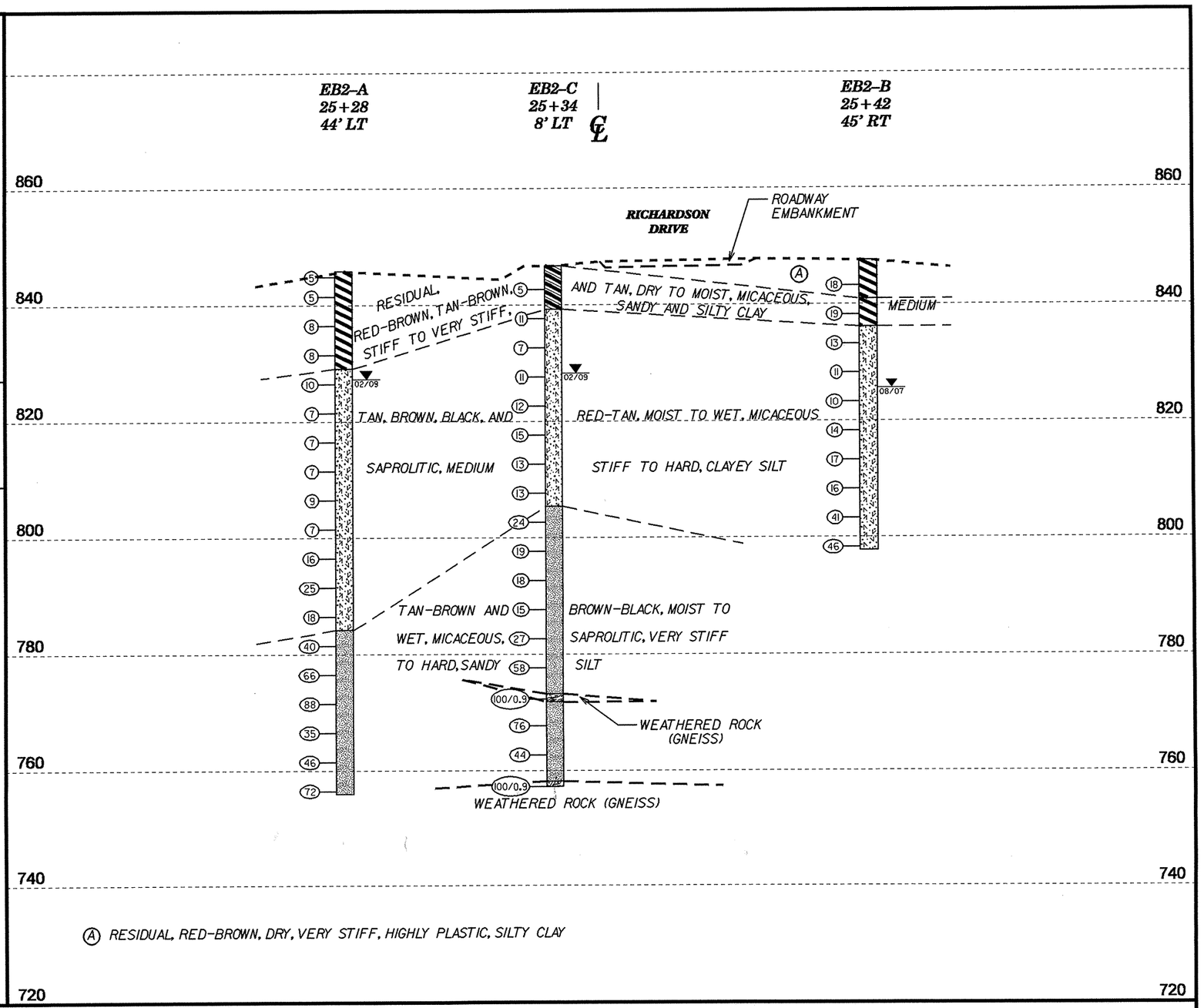
(G) TAN, BROWN, AND WHITE, WET, MICACEOUS, SAPROLITIC, SILTY CLAY

PROJECT REFERENCE NO.	SHEET
U-3326A(34924.1.1)	5

HORIZ. SCALE (FEET) 0 20 40

VE = 1:1

CROSS SECTION THROUGH END BENT 2



PROJECT REFERENCE NO.	SHEET
U-3326A(34924.1.1)	6

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 23+59	**OFFSET** 43ft LT	**ALIGNMENT** -Y10- — **0 HR.** 30.0
COLLAR ELEV. 850.0 ft	**TOTAL DEPTH** 69.9 ft	**NORTHING** 941,286	**EASTING** 1,795,859 — **24 HR.** 24.0
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/09/09	**COMP. DATE** 02/10/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
850										850.0 GROUND SURFACE 0.0
	850.0	0.0	1	3	3	6	SS-1	M		**RESIDUAL** RED-BROWN, SILTY CLAY — 847.0 3.0
	846.6	3.4								
845			3	4	5	9	SS-2	M		RED-TAN TO TAN-BROWN, MICACEOUS, CLAYEY SILT
	841.6	8.4								
840			2	5	7	12	SS-3	M		
	836.6	13.4								
835			3	5	6	11	SS-4	M		
	831.6	18.4								
830			3	5	6	11	SS-5	M		
	826.6	23.4								
825			3	3	7	10		M		823.0 27.0
	821.6	28.4								WHITE-TAN, SANDY SILT WITH SOME ROCK FRAGMENTS
820			4	3	3	6	SS-6	W		818.0 32.0
	816.6	33.4								RED-BROWN TO TAN-BROWN, MICACEOUS, SILTY CLAY
815			4	6	7	13	SS-7	M		813.3 36.7
	811.6	38.4								TAN-BROWN, MICACEOUS, SAPROLITIC, CLAYEY SILT
810			6	7	11	18	SS-8	M		808.0 42.0
	806.6	43.4								TAN-GRAY, SAPROLITIC, CLAYEY SAND
805			2	4	4	8	SS-9	M		802.5 47.5
	801.6	48.4								TAN, SILTY SAND
800			3	8	13	21	SS-10	M		798.0 52.0
	796.6	53.4								TAN-BROWN, SAPROLITIC, SANDY SILT
795			7	12	16	28	SS-11	M		
	791.6	58.4								
790			15	28	35	63	SS-12	M		
	786.6	63.4								
785			15	24	32	56		M		
	781.6	68.4								
780			13	15	22	37		M		780.1 69.9
										Boring Terminated at Elevation 780.1 ft in SANDY SILT
775										
770										

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PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 23+61	**OFFSET** 19ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 849.4 ft	**TOTAL DEPTH** 94.4 ft	**NORTHING** 941,262	**EASTING** 1,795,865
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/10/09	**COMP. DATE** 02/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. 28.0; 24 HR. 23.5

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))
850	849.4	0.0								849.4 — GROUND SURFACE — 0.0
			1	2	3	5		M		**RESIDUAL** RED-BROWN, SILTY CLAY — 846.4 — 3.0
845	845.9	3.5	3	3	5	8	SS-13	M		RED-BROWN TO TAN-BROWN, MICACEOUS, CLAYEY SILT
840	840.9	8.5	2	3	4	7		M		
835	835.9	13.5	2	4	5	9	SS-14	M		
830	830.9	18.5	2	3	4	7	SS-15	M		827.4 — 22.0
825	825.9	23.5	2	4	6	10	SS-16	M		TAN-WHITE-BROWN, MICACEOUS, SANDY SILT — 822.4 — 27.0
820	820.9	28.5	3	5	9	14	SS-17	M		RED-BROWN, MICACEOUS, SAPROLITIC, CLAYEY SILT
815	815.9	33.5	6	11	17	28		M		
810	810.9	38.5	5	7	12	19		M		807.4 — 42.0
805	805.9	43.5	4	5	7	12	SS-18	W		TAN-BROWN TO BROWN-BLACK, MICACEOUS, SAPROLITIC, SANDY SILT
800	800.9	48.5	3	5	8	13		W		
795	795.9	53.5	6	9	18	27		W		
790	790.9	58.5	3	4	8	12	SS-19	W		
785	785.9	63.5	1	4	5	9		W		
780	780.9	68.5	9	11	11	22		W		777.4 — 72.0
775	775.9	73.5	15	28	46	74	SS-20	W		TAN-BROWN, MICACEOUS, SAPROLITIC, SILTY SAND — 771.4 — 78.0
770	770.9	78.5	27	44	56/0.4					

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 23+61	**OFFSET** 19ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 849.4 ft	**TOTAL DEPTH** 94.4 ft	**NORTHING** 941,262	**EASTING** 1,795,865
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/10/09	**COMP. DATE** 02/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. 28.0; 24 HR. 23.5

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
770						Match Line				
765	765.9	83.5	57	43/0.3		100/0.9				**WEATHERED ROCK** (GNEISS) *(continued)*
760	760.9	88.5	27	47	53/0.4	100/0.8				
755	755.9	93.5	39	61/0.4		100/0.9				755.0 — 94.4
						100/0.9				Boring Terminated at Elevation 755.0 ft in WEATHERED ROCK (GNEISS)
750										
745										
740										
735										
730										
725										
720										
715										
710										
705										
700										
695										
690										

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PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 23+69	**OFFSET** 30ft RT	**ALIGNMENT** -Y10-
COLLAR ELEV. 848.8 ft	**TOTAL DEPTH** 84.8 ft	**NORTHING** 941,215	**EASTING** 1,795,881
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/12/09	**COMP. DATE** 02/12/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft)	
0 HR.	25.5
24 HR.	23.0

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)
850											
	848.8	0.0								848.8 GROUND SURFACE	0.0
			1	2	2	4		M		**RESIDUAL** RED-BROWN, SILTY CLAY	
845	845.5	3.3								846.3 RED-BROWN, MICACEOUS, SILTY SAND	2.5
			3	5	5	10	SS-21	M			
840	840.5	8.3									
			4	5	6	11		M			
835	835.5	13.3								837.2 TAN-BROWN, SLIGHTLY MICACEOUS, SILTY CLAY	11.6
			3	3	3	6	SS-22	M			
830	830.5	18.3									
			3	4	6	10		M			
825	825.5	23.3								827.2 TAN-WHITE-BROWN, MICACEOUS, CLAYEY SILT	21.6
			1	3	4	7	SS-23	M			
820	820.5	28.3									
			3	2	4	6		M			
815	815.5	33.3									
			2	3	5	8		W			
810	810.5	38.3								812.2 TAN-WHITE TO TAN-BROWN, SLIGHTLY MICACEOUS TO MICACEOUS, SANDY SILT	36.6
			3	4	5	9	SS-24	W			
805	805.5	43.3									
			8	4	6	10	SS-25	W			
800	800.5	48.3									
			4	6	8	14	SS-26	M			
795	795.5	53.3								797.2 BROWN TO TAN-BROWN, HIGHLY MICACEOUS, SAPROLITIC, SILTY SAND	51.6
			2	5	5	10	SS-27	M			
790	790.5	58.3									
			4	6	8	14		M			
785	785.5	63.3									
			4	8	21	29		M			
780	780.5	68.3									
			8	14	23	37	SS-28	M			
775	775.5	73.3									
			11	18	28	46		M			
770	770.5	78.3									

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 23+69	**OFFSET** 30ft RT	**ALIGNMENT** -Y10-
COLLAR ELEV. 848.8 ft	**TOTAL DEPTH** 84.8 ft	**NORTHING** 941,215	**EASTING** 1,795,881
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/12/09	**COMP. DATE** 02/12/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft)	
0 HR.	25.5
24 HR.	23.0

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
770						Match Line				
			6	12	19	31		M		BROWN TO TAN-BROWN, HIGHLY MICACEOUS, SAPROLITIC, SILTY SAND *(continued)* 767.2 – 81.6
765	765.5	83.3								
			10	17	28	45	SS-29	M		TAN-BROWN, MICACEOUS, SAPROLITIC, SANDY SILT 764.0 – 84.8
										Boring Terminated at Elevation 764.0 ft in SANDY SILT
760										
755										
750										
745										
740										
735										
730										
725										
720										
715										
710										
705										
700										
695										
690										

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PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 24+37	**OFFSET** 39ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 830.2 ft	**TOTAL DEPTH** 74.9 ft	**NORTHING** 941,294	**EASTING** 1,795,937
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/19/09	**COMP. DATE** 02/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft)	
0 HR.	N/A
24 HR.	6.0

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)
840											
835											
830										830.2 GROUND SURFACE	0.0
										827.9 **ASPHALT**	2.3
825	826.4	3.8	4	2	3	5	SS-42	M		**RESIDUAL** BROWN TO TAN-BROWN, SILTY CLAY	
820	821.7	8.5	2	2	5	7	SS-43	W			
815	816.7	13.5	2	2	5	7		W			
810	811.7	18.5	4	6	7	13		W			
										808.4 TAN-BROWN-BLACK, SAPROLITIC, CLAYEY SILT	21.8
805	806.7	23.5	4	6	8	14	SS-44	W			
800	801.7	28.5	4	7	11	18		W			
795	796.7	33.5	4	6	10	16		W			
										794.2 TAN-BROWN-WHITE, SAPROLITIC, SILTY CLAY	36.0
790	791.7	38.5	8	10	13	23	SS-45	W			
										788.4 TAN-BROWN-BLACK, SAPROLITIC, SANDY SILT	41.8
785	786.7	43.5	13	22	27	49	SS-46	W			
										783.4 BROWN-BLACK, MICACEOUS, SAPROLITIC, SILTY SAND	46.8
780	781.7	48.5	16	23	28	51	SS-47	W			
775	776.7	53.5	13	19	29	48		W			
										771.2 **WEATHERED ROCK** (GNEISS)	59.0
770	771.7	58.5	32	55	45/0.3	100/0.8					
765	766.7	63.5	21	48	52/0.3	100/0.8					
760	761.7	68.5	20	34	66/0.4	100/0.9					

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 24+37	**OFFSET** 39ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 830.2 ft	**TOTAL DEPTH** 74.9 ft	**NORTHING** 941,294	**EASTING** 1,795,937
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/19/09	**COMP. DATE** 02/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft)	
0 HR.	N/A
24 HR.	6.0

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
760						Match Line				
	756.7	73.5								**WEATHERED ROCK** (GNEISS) *(continued)*
755			30	41	59/0.4	100/0.9				755.3 Boring Terminated at Elevation 755.3 ft in WEATHERED ROCK (GNEISS) 74.9
750										
745										
740										
735										
730										
725										
720										
715										
710										
705										
700										
695										
690										
685										
680										

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PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 24+42	**OFFSET** 7ft LT	**ALIGNMENT** -Y10- — **0 HR.** N/A
COLLAR ELEV. 830.1 ft	**TOTAL DEPTH** 79.2 ft	**NORTHING** 941,264	**EASTING** 1,795,947 — **24 HR.** 4.0
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/24/09	**COMP. DATE** 02/24/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
830										830.1 GROUND SURFACE	0.0
										ASPHALT 827.6	2.5
	826.8	3.3	6	4	4	8	SS-54	M		**RESIDUAL** RED-BROWN, MICACEOUS, CLAYEY SILT	
	821.8	8.3	3	3	5	8		W			
	816.8	13.3	3	5	7	12		W			
	811.8	18.3	4	5	7	12		W			
	806.8	23.3	5	11	14	25	SS-55	W		BROWN-WHITE-BLACK, MICACEOUS, SAPROLITIC, SANDY SILT	
	801.8	28.3	5	9	11	20		W			
	796.8	33.3	4	6	10	16		W			
	791.8	38.3	4	8	13	21		W			
	786.8	43.3	3	5	6	11	SS-56	W		BROWN-BLACK, SLIGHTLY MICACEOUS, SAPROLITIC, SILTY CLAY	
	781.8	48.3	3	7	25	32	SS-57	W		TAN-BLACK, SLIGHTLY MICACEOUS, SAPROLITIC, SANDY SILT	
	776.8	53.3	27	45	55/0.4	100/0.9					
										WEATHERED ROCK (GNEISS) 774.1	56.0
	771.8	58.3	8	20	28	48	SS-58	W		**RESIDUAL** RED-BROWN, SAPROLITIC, SANDY SILT	
	766.8	63.3	8	13	17	30		W			
	761.8	68.3	17	22	45	67	SS-59	W		BROWN-WHITE, BLACK, SAPROLITIC, MICACEOUS, SILTY SAND	
	756.8	73.3	67	33/0.2		100/0.7					

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 24+42	**OFFSET** 7ft LT	**ALIGNMENT** -Y10- — **0 HR.** N/A
COLLAR ELEV. 830.1 ft	**TOTAL DEPTH** 79.2 ft	**NORTHING** 941,264	**EASTING** 1,795,947 — **24 HR.** 4.0
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/24/09	**COMP. DATE** 02/24/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
755						Match Line				
	751.8	78.3	50	50/0.4		100/0.9				**WEATHERED ROCK** (GNEISS) *(continued)* 750.9 79.2
										Boring Terminated at Elevation 750.9 ft in WEATHERED ROCK (GNEISS)

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BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 24+49	**OFFSET** 38ft RT	**ALIGNMENT** -Y10-
COLLAR ELEV. 830.2 ft	**TOTAL DEPTH** 79.5 ft	**NORTHING** 941,220	**EASTING** 1,795,961
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/17/09	**COMP. DATE** 02/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. N/A; 24 HR. 3.5

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)
830.2										GROUND SURFACE	0.0
										ASPHALT	
827.7											2.5
	826.5	3.7	3	3	4	7	SS-34	M		**RESIDUAL** TAN-BROWN TO BROWN, MICACEOUS, CLAYEY SILT	
	822.0	8.2	1	2	3	5	SS-35	W			
	817.0	13.2	2	3	4	7		W			
	812.0	18.2	2	2	5	7		W			
808.7										TAN-BROWN, MICACEOUS, SANDY SILT	21.5
	807.0	23.2	4	8	9	17	SS-36	W			
	802.0	28.2	3	4	6	10		W			
	797.0	33.2	3	5	7	12	SS-37	W			
	792.0	38.2	3	5	7	12		W			
788.7										TAN-BROWN TO BROWN, SILTY SAND	41.5
	787.0	43.2	5	7	10	17	SS-38	W			
	782.0	48.2	6	9	14	23	SS-39	W			
	777.0	53.2	10	18	21	39		W			
773.7										TAN-BROWN, MICACEOUS, SAPROLITIC, SANDY SILT	56.5
	772.0	58.2	9	11	33	44	SS-40	W			
	767.0	63.2	10	16	23	39		W			
	762.0	68.2	10	20	26	46	SS-41	W			
	757.0	73.2	15	26	30	56		W			

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 24+49	**OFFSET** 38ft RT	**ALIGNMENT** -Y10-
COLLAR ELEV. 830.2 ft	**TOTAL DEPTH** 79.5 ft	**NORTHING** 941,220	**EASTING** 1,795,961
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/17/09	**COMP. DATE** 02/19/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. N/A; 24 HR. 3.5

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
755						Match Line				
	752.0	78.2	38	54	46/0.3	100/0.8				TAN-BROWN, MICACEOUS, SAPROLITIC, SANDY SILT *(continued)*
751.5										78.7
750.7										**WEATHERED ROCK** (GNEISS) 79.5

Boring Terminated at Elevation 750.7 ft in WEATHERED ROCK (GNEISS)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 25+28	**OFFSET** 44ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 845.9 ft	**TOTAL DEPTH** 89.9 ft	**NORTHING** 941,314	**EASTING** 1,796,026
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/13/09	**COMP. DATE** 02/23/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. 7.5; 24 HR. 18.5

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)
845.9		0.0								GROUND SURFACE	0.0
	842.5	3.4	2	2	3	5 5	SS-30	M		**RESIDUAL** RED-BROWN TO TAN-BROWN, MICACEOUS, SILTY CLAY	
	837.5	8.4	2	2	3	5 8	SS-31	M			
	832.5	13.4	3	4	4	8 8		M			
	827.5	18.4	3	3	5	10 7	SS-32	M		829.2 TAN, BROWN, AND BLACK, MICACEOUS, SAPROLITIC, CLAYEY SILT	16.7
	822.5	23.4	3	4	6	7 7		M			
	817.5	28.4	2	3	4	7 7	SS-33	W			
	812.5	33.4	1	3	4	9 7		W			
	807.5	38.4	1	3	4	7 16	SS-48	M			
	802.5	43.4	3	4	5	25 18		M			
	797.5	48.4	1	3	4	40 66	SS-49	M			
	792.5	53.4	3	6	10	88	SS-50	M			
	787.5	58.4	4	10	15			M			
	782.5	63.4	5	7	11		SS-51	M		784.2 BROW-BLACK, SLIGHTLY MICACEOUS, SAPROLITIC, SANDY SILT	61.7
	777.5	68.4	12	17	23			M			
	772.5	73.4	13	24	42			M			
			15	29	59			M			

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 25+28	**OFFSET** 44ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 845.9 ft	**TOTAL DEPTH** 89.9 ft	**NORTHING** 941,314	**EASTING** 1,796,026
DRILL MACHINE CME-550X	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/13/09	**COMP. DATE** 02/23/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. 7.5; 24 HR. 18.5

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
						Match Line				
	767.5	78.4	20	17	18	35	SS-52	W		BROW-BLACK, SLIGHTLY MICACEOUS, SAPROLITIC, SANDY SILT *(continued)*
	762.5	83.4	15	21	25	46		W		
	757.5	88.4	18	34	38	72	SS-53	M		756.0 Boring Terminated at Elevation 756.0 ft in RESIDUAL, SANDY SILT 89.9

NCDOT BORE DOUBLE U3326A_GEO_BH_BRDG65.GPJ NC_DOT.GDT 4/1/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 25+34	**OFFSET** 8ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 846.8 ft	**TOTAL DEPTH** 89.5 ft	**NORTHING** 941,280	**EASTING** 1,796,037
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/25/09	**COMP. DATE** 02/26/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. N/A; 24 HR. 18.4

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)
850										846.8 GROUND SURFACE	0.0
845	843.7	3.1	1	2	3	5	SS-60	M		**RESIDUAL** RED-BROWN, SANDY CLAY	
840	838.7	8.1	2	5	6	11	SS-61	M		839.3 TAN, BROWN, AND BLACK, MICACEOUS, SAPROLITIC, CLAYEY SILT	7.5
835	833.7	13.1	2	3	4	7	SS-62	M			
830	828.7	18.1	2	5	6	11		M			
825	823.7	23.1	3	5	7	12	SS-63	W			
820	818.7	28.1	4	6	9	15		W			
815	813.7	33.1	5	6	7	13		W			
810	808.7	38.1	3	5	8	13	SS-64	W			
805	803.7	43.1	9	9	15	24	SS-65	W		805.4 TAN-WHITE AND BROWN-BLACK, MICACEOUS, SAPROLITIC, SANDY SILT	41.4
800	798.7	48.1	5	7	12	19		W			
795	793.7	53.1	4	7	11	18		W			
790	788.7	58.1	3	4	11	15		W			
785	783.7	63.1	7	11	16	27	SS-66	W			
780	778.7	68.1	10	18	40	58		W			
775	773.7	73.1	26	46	54/0.4	100/0.9				773.2 / 771.8 **WEATHERED ROCK** (GNEISS)	73.6 / 75.0
770											

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 25+34	**OFFSET** 8ft LT	**ALIGNMENT** -Y10-
COLLAR ELEV. 846.8 ft	**TOTAL DEPTH** 89.5 ft	**NORTHING** 941,280	**EASTING** 1,796,037
DRILL MACHINE CME-550X	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 02/25/09	**COMP. DATE** 02/26/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** N/A

GROUND WTR (ft): 0 HR. N/A; 24 HR. 18.4

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
770						Match Line				
765	768.7	78.1	22	39	37	76	SS-67	W		**RESIDUAL** TAN-WHITE AND BROWN-BLACK, MICACEOUS, SAPROLITIC, SANDY SILT *(continued)*
760	763.7	83.1	15	16	28	44	SS-68	W		
755	758.7	88.1	27	46	54/0.4	100/0.9				758.2 / 757.3 **WEATHERED ROCK** (GNEISS) — 88.6 / 89.5
750										Boring Terminated at Elevation 757.3 ft in WEATHERED ROCK (GNEISS)
745										
740										
735										
730										
725										
720										
715										
710										
705										
700										
695										
690										

NCDOT BORE DOUBLE U3326A_GEO_BH_BRDG65.GPJ NC_DOT.GDT 4/1/09

PROJECT NO. 34924.1.1	**ID.** U-3326A	**COUNTY** ROCKINGHAM	**GEOLOGIST** Kuntakova, K.
SITE DESCRIPTION BRIDGE NO. 65 ON -Y10- (US 158) OVER US 29 BUSINESS (FREEWAY DRIVE)			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 25+42	**OFFSET** 45ft RT	**ALIGNMENT** -Y10-	**0 HR.** N/A
COLLAR ELEV. 847.7 ft	**TOTAL DEPTH** 49.9 ft	**NORTHING** 941,229	**EASTING** 1,796,054	**24 HR.** 22.0
DRILL MACHINE CME-45	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 08/14/07	**COMP. DATE** 08/14/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
850										847.7 GROUND SURFACE 0.0
845	844.3	3.4								**RESIDUAL** RED-BROWN, HIGHLY PLASTIC, SILTY CLAY
			8	8	10	18	SS-93	D		
840	839.3	8.4								841.0 6.7 TAN TO TAN-GRAY, CLAYEY SILT
			8	9	10	19	SS-94	M		
835	834.3	13.4								836.2 11.5 RED-TAN, SILTY CLAY
			5	6	7	13	SS-95	M		
830	829.3	18.4								
			5	5	6	11		M		
825	824.3	23.4								
			4	5	5	10	SS-96	M		
820	819.3	28.4								
			4	7	7	14		M		
815	814.3	33.4								
			6	8	9	17		W		
810	809.3	38.4								
			6	7	9	16	SS-97	W		
805	804.3	43.4								
			12	20	21	41		M		
800	799.3	48.4								
			13	16	30	46		M		797.8 49.9 Boring Terminated at Elevation 797.8 ft in RESIDUAL CLAYEY SILT
795										
790										
785										
780										
775										
770										

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	43' LT	23+59	0.0-1.5	A-7-5(15)	53	23	13.1	24.8	15.6	46.4	98	92	66	-	-
SS-2	43' LT	23+59	3.4-4.9	A-5(3)	44	10	24.2	34.7	14.8	26.2	100	85	50	-	-
SS-3	43' LT	23+59	8.4-9.9	A-5(3)	47	8	11.5	48.2	24.1	16.1	100	96	51	-	-
SS-4	43' LT	23+59	13.4-14.9	A-5(1)	48	9	27.0	42.2	18.7	12.1	99	85	41	-	-
SS-5	43' LT	23+59	18.4-19.9	A-5(0)	46	8	29.1	41.8	17.1	12.1	98	82	37	-	-
SS-6	43' LT	23+59	28.4-29.9	A-4(0)	37	7	35.9	30.3	15.6	18.2	93	69	39	-	-
SS-7	43' LT	23+59	33.4-34.9	A-7-5(3)	47	12	19.0	43.2	23.7	14.1	94	84	44	-	-
SS-8	43' LT	23+59	38.4-39.9	A-5(2)	44	8	16.3	46.4	21.1	16.1	99	91	47	-	-
SS-9	43' LT	23+59	43.4-44.9	A-2-6(1)	38	15	7.5	64.2	12.2	16.1	98	96	35	-	-
SS-10	43' LT	23+59	48.4-49.9	A-2-5(0)	43	8	27.6	46.0	14.2	12.1	97	82	34	-	-
SS-11	43' LT	23+59	53.4-54.9	A-4(1)	39	6	20.8	43.4	25.7	10.1	100	92	46	-	-
SS-12	43' LT	23+59	58.4-59.9	A-4(0)	35	6	26.6	43.0	18.3	12.1	100	89	39	-	-

EB1-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-13	19' LT	23+61	3.5-5.0	A-5(0)	43	6	30.1	37.9	17.9	14.1	100	83	40	-	-
SS-14	19' LT	23+61	13.5-15.0	A-5(1)	51	7	27.2	39.0	21.7	12.1	100	85	42	-	-
SS-15	19' LT	23+61	18.5-20.0	A-5(2)	44	8	23.2	35.3	25.3	16.1	98	84	49	-	-
SS-16	19' LT	23+61	23.5-25.0	A-4(0)	40	5	35.9	33.3	16.6	14.1	95	71	36	-	-
SS-17	19' LT	23+61	28.5-30.0	A-5(0)	44	5	27.4	39.2	23.3	10.1	99	85	42	-	-
SS-18	19' LT	23+61	43.5-45.0	A-4(0)	40	6	29.1	37.7	21.1	12.1	99	83	42	-	-
SS-19	19' LT	23+61	58.5-60.0	A-4(2)	39	9	16.8	46.4	26.7	10.1	100	93	45	-	-
SS-20	19' LT	23+61	73.5-75.0	A-2-4(0)	34	4	33.5	45.2	15.2	6.1	99	79	29	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-21	30' RT	23+69	3.3-4.8	A-2-5(0)	43	5	30.3	49.0	12.6	8.1	100	87	26	-	-
SS-22	30' RT	23+69	13.3-14.8	A-7-5(12)	58	17	6.9	40.6	30.4	22.2	100	97	64	-	-
SS-23	30' RT	23+69	23.3-24.8	A-5(3)	48	6	10.9	44.2	28.8	16.1	100	96	56	-	-
SS-24	30' RT	23+69	38.3-39.8	A-4(2)	39	9	29.7	27.6	24.5	18.2	91	70	45	-	-
SS-25	30' RT	23+69	43.3-44.8	A-4(5)	39	5	10.5	19.4	41.9	28.3	100	93	77	-	-
SS-26	30' RT	23+69	48.3-49.8	A-4(0)	39	4	26.4	40.4	23.1	10.1	98	82	42	-	-
SS-27	30' RT	23+69	53.3-54.8	A-2-5(0)	42	NP	29.9	44.2	17.9	8.1	97	79	35	-	-
SS-28	30' RT	23+69	68.3-69.8	A-2-4(0)	37	5	34.1	38.3	17.5	10.1	96	77	35	-	-
SS-29	30' RT	23+69	83.3-84.8	A-4(0)	37	8	24.2	44.0	21.7	10.1	98	86	40	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-42	39' LT	24+37	3.8-5.3	A-7-5(5)	49	13	13.9	42.8	31.1	12.1	97	92	51	-	-
SS-43	39' LT	24+37	8.5-10.0	A-7-5(10)	52	13	9.7	29.9	28.1	32.3	97	93	66	-	-
SS-44	39' LT	24+37	23.5-25.0	A-5(3)	42	10	21.8	42.0	28.1	8.1	97	86	47	-	-
SS-45	39' LT	24+37	38.5-40.0	A-7-5(5)	44	13	22.8	28.7	28.3	20.2	98	88	53	-	-
SS-46	39' LT	24+37	43.5-45.0	A-4(0)	34	4	28.9	39.0	24.0	8.1	94	82	39	-	-
SS-47	39' LT	24+37	48.5-50.0	A-2-4(0)	38	3	26.9	46.7	20.4	6.1	97	83	35	-	-

B1-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-54	7' LT	24+42	3.3-4.8	A-5(0)	41	5	28.0	40.7	25.2	6.0	98	83	41	-	-
SS-55	7' LT	24+42	23.3-24.8	A-4(1)	39	5	12.5	50.4	29.0	8.1	100	96	51	-	-
SS-56	7' LT	24+42	43.3-44.8	A-7-5(17)	57	20	9.1	23.2	47.6	20.2	100	96	75	-	-
SS-57	7' LT	24+42	48.3-49.8	A-4(2)	39	9	15.3	44.6	32.1	8.1	100	93	48	-	-
SS-58	7' LT	24+42	58.3-59.8	A-4(0)	37	4	20.8	46.4	26.8	6.0	100	91	44	-	-
SS-59	7' LT	24+42	68.3-69.8	A-2-4(0)	32	3	30.6	38.9	24.4	6.0	92	78	35	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-34	38' RT	24+49	3.7-5.2	A-5(1)	46	7	18.8	47.7	21.4	12.1	94	86	43	-	-
SS-35	38' RT	24+49	8.2-9.7	A-5(0)	48	7	15.4	58.0	20.6	6.1	99	92	39	-	-
SS-36	38' RT	24+49	23.2-24.7	A-4(0)	38	3	14.7	46.3	30.9	8.1	97	92	49	-	-
SS-37	38' RT	24+49	33.2-34.7	A-5(1)	45	7	16.6	54.7	20.6	8.1	100	93	43	-	-
SS-38	38' RT	24+49	43.2-44.7	A-2-5(0)	42	4	17.6	61.8	16.6	4.0	100	94	32	-	-
SS-39	38' RT	24+49	48.2-49.7	A-2-4(0)	33	4	32.3	44.8	16.8	6.1	95	79	32	-	-
SS-40	38' RT	24+49	58.2-59.7	A-4(1)	34	7	23.6	32.5	23.6	20.2	91	79	47	-	-
SS-41	38' RT	24+49	68.2-69.7	A-4(0)	33	4	23.6	45.5	24.8	6.1	97	87	39	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-30	44' LT	25+28	0.0-1.5	A-7-6(12)	52	23	15.9	21.2	14.4	48.4	90	82	60	-	-
SS-31	44' LT	25+28	8.4-9.9	A-7-5(5)	48	11	17.4	37.9	26.5	18.2	98	89	53	-	-
SS-32	44' LT	25+28	18.4-19.9	A-5(5)	46	7	14.7	30.9	32.2	22.2	100	92	64	-	-
SS-33	44' LT	25+28	23.4-24.9	A-5(3)	43	8	16.1	41.2	30.6	12.1	100	93	50	-	-
SS-48	44 LT	25+28	38.4-39.9	A-5(1)	47	6	13.1	52.5	26.3	8.1	100	95	45	-	-
SS-49	44' LT	25+28	48.4-49.9	A-5(2)	45	9	19.8	46.3	25.9	8.1	98	89	46	-	-
SS-50	44' LT	25+28	53.4-54.9	A-5(0)	41	4	14.5	53.9	23.4	8.1	100	95	43	-	-
SS-51	44' LT	25+28	63.4-64.9	A-4(1)	37	6	19.6	39.4	28.9	12.1	99	90	50	-	-
SS-52	44' LT	25+28	78.4-79.9	A-4(1)	35	8	24.4	34.1	31.5	10.1	94	81	47	-	-
SS-53	44' LT	25+28	88.4-89.9	A-4(1)	34	7	28.0	26.2	33.7	12.1	88	71	46	-	-

EB2-C

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-60	8' LT	25+34	3.1-4.6	A-6(8)	37	21	19.8	29.2	16.7	34.3	99	90	54	-	-
SS-61	8' LT	25+34	8.1-9.6	A-5(5)	47	9	16.3	32.5	29.0	22.2	97	90	58	-	-
SS-62	8' LT	25+34	13.1-14.6	A-5(4)	46	7	14.7	40.3	34.9	10.1	100	93	59	-	-
SS-63	8' LT	25+34	23.1-24.6	A-5(3)	43	7	15.9	40.9	35.1	8.1	100	94	57	-	-
SS-64	8' LT	25+34	38.1-39.6	A-5(6)	43	10	13.9	33.5	42.5	10.1	100	94	63	-	-
SS-65	8' LT	25+34	43.1-44.6	A-4(2)	40	7	18.8	41.1	32.1	8.1	100	93	50	-	-
SS-66	8' LT	25+34	63.1-64.6	A-4(0)	38	5	17.9	54.6	23.4	4.0	100	93	38	-	-
SS-67	8' LT	25+34	78.1-79.6	A-4(0)	34	6	30.4	38.5	23.0	8.1	92	75	37	-	-
SS-68	8' LT	25+34	83.1-84.6	A-4(1)	38	8	27.2	36.3	28.4	8.1	99	84	44	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-93	40' RT	25+42	3.4-4.9	A-7-5(32)	79	36	8.3	19.6	19.4	52.6	100	96	76	-	-
SS-94	40' RT	25+42	8.4-9.9	A-7-5(13)	56	14	7.7	29.8	38.3	24.3	100	97	73	-	-
SS-95	40' RT	25+42	13.4-14.9	A-5(1)	45	4	22.7	36.8	34.4	6.1	98	85	50	-	-
SS-96	40' RT	25+42	23.4-24.9	A-5(2)	44	6	21.7	38.1	32.2	8.1	100	88	49	-	-
SS-97	40' RT	25+42	38.4-39.9	A-5(0)	43	NP	17.6	47.0	31.4	4.0	99	90	46	-	-

SITE PHOTOGRAPH

Bridge No. 65 on -Y10- (US 158-Richardson Drive) Over -L- (US 29 Bus.-Freeway Drive)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1 (U-3326B)	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1 F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM SR 2670 (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION BRIDGE NO. 146 ON -Y17- (SR 1998, WENTWORTH ST.) OVER -L- (US 29 BUS./US 158) AT STATION 16+20.75

PROJECT: 34924.1.1

ID: U-3326B

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CAUTION NOTICE

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PERSONNEL

H.R. CONLEY

C.D. CZAJKA

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J.I. MILKOVITS

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INVESTIGATED BY C.D. CZAJKA

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE APRIL 2009

NORTH CAROLINA LICENSED SEAL 2151 GEOLOGIST CHARLES DOUG CZAJKA

04/17/09

DRAWN BY: C.D. CZAJKA

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PROJECT REFERENCE NO.	SHEET NO.
34924.1.1 (U-3326B)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT / PLASTIC INDEX	6 MX		NP	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	40 MX / 10 MX	41 MN / 10 MX	40 MX / 11 MN	41 MN / 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [X] 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.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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: CAP ON EBI-A WINGWALL OF EXISTING BRIDGE

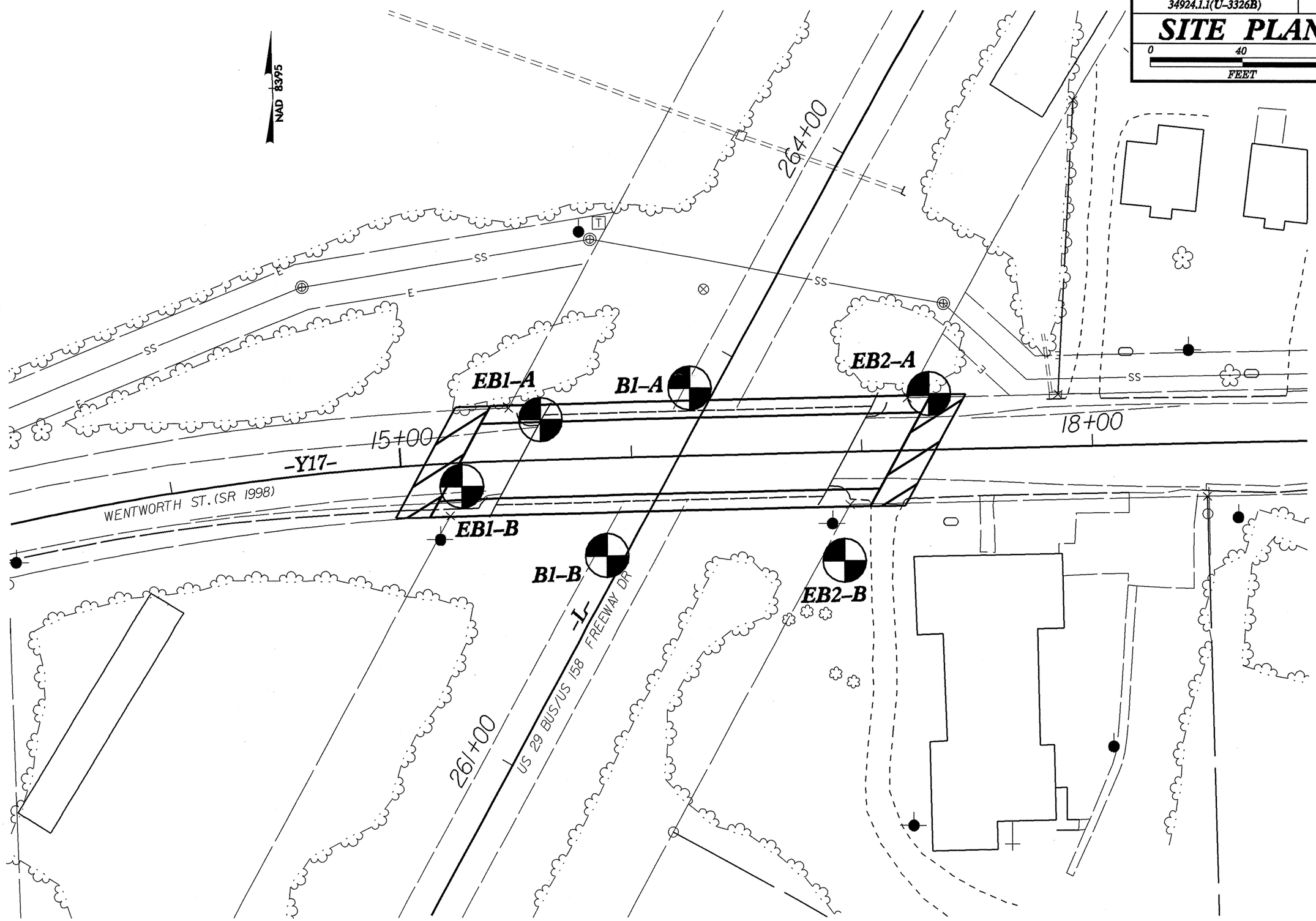
ELEVATION: 752.00 FT.

NOTES:

PROJECT REFERENCE NO.	SHEET
34924.1.1(U-3326B)	3

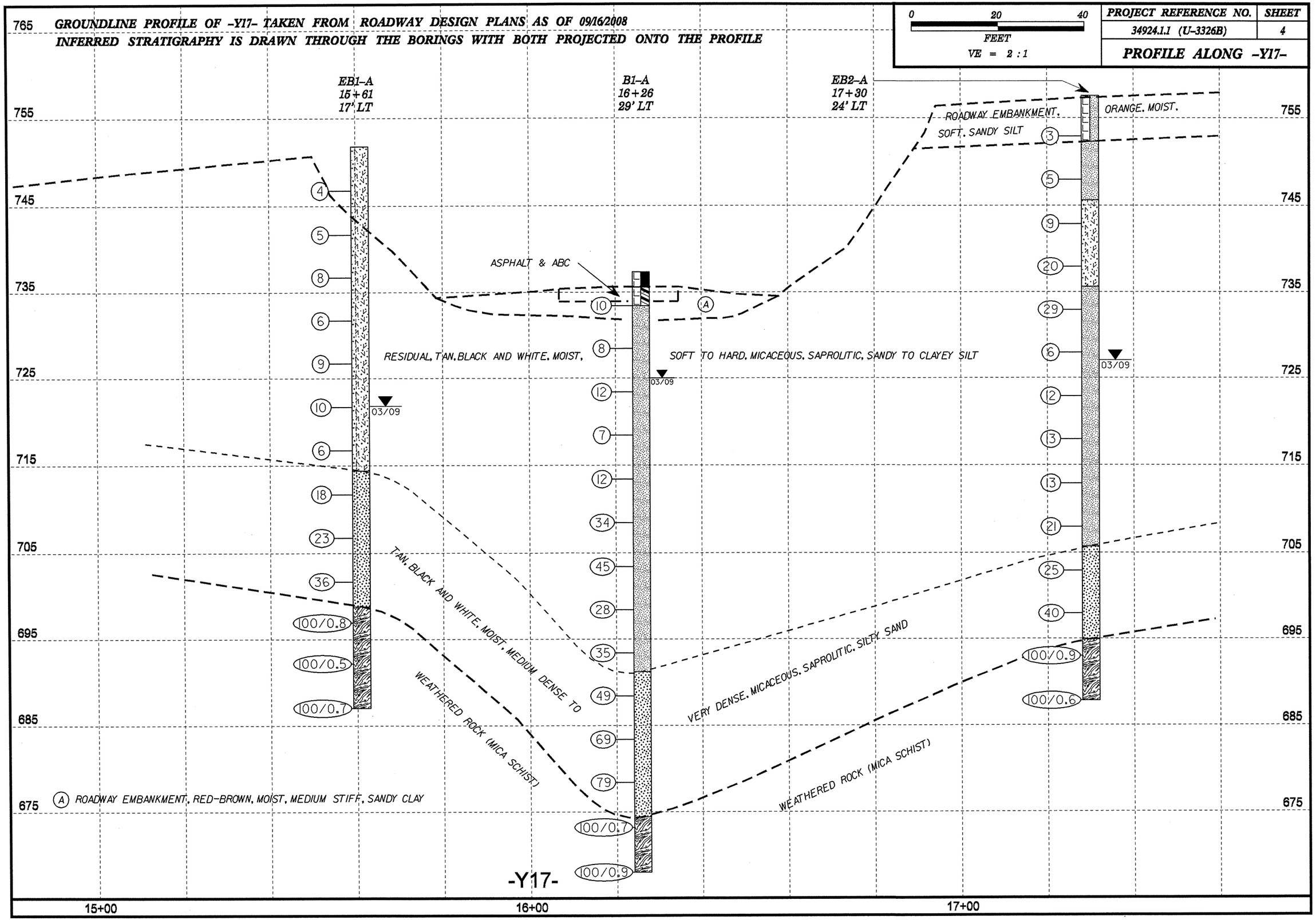
SITE PLAN

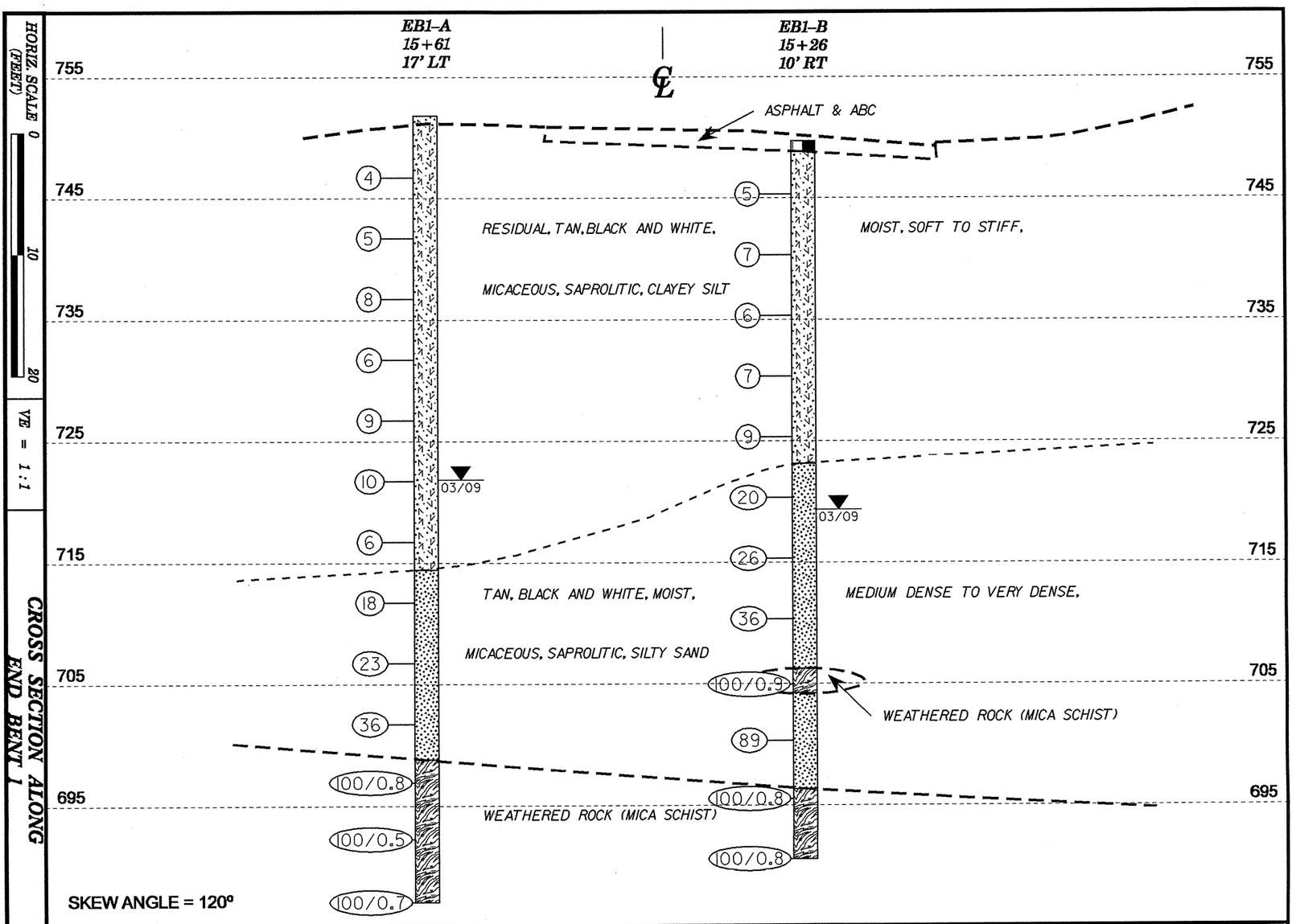
0 40 80
FEET

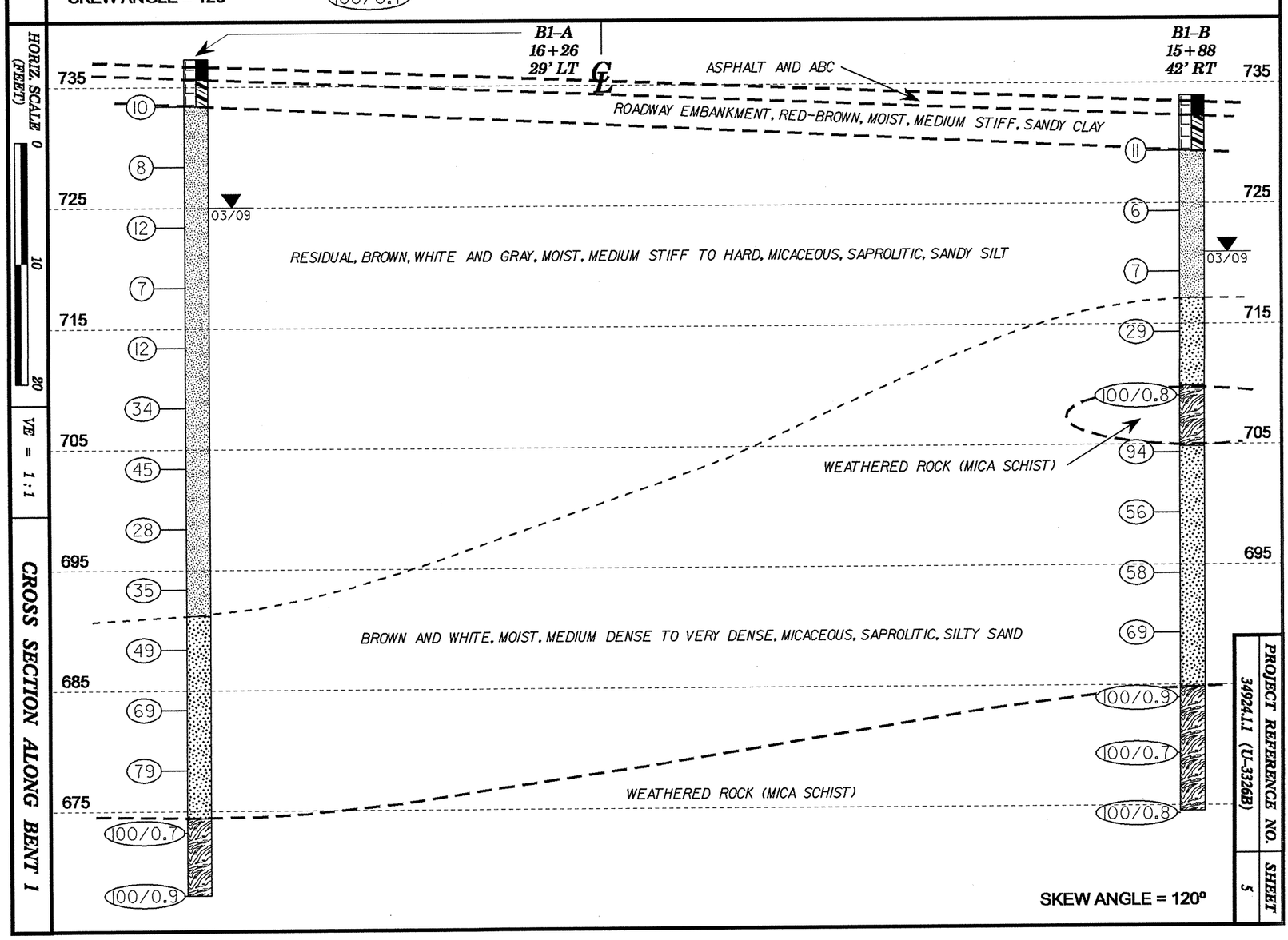


PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	4

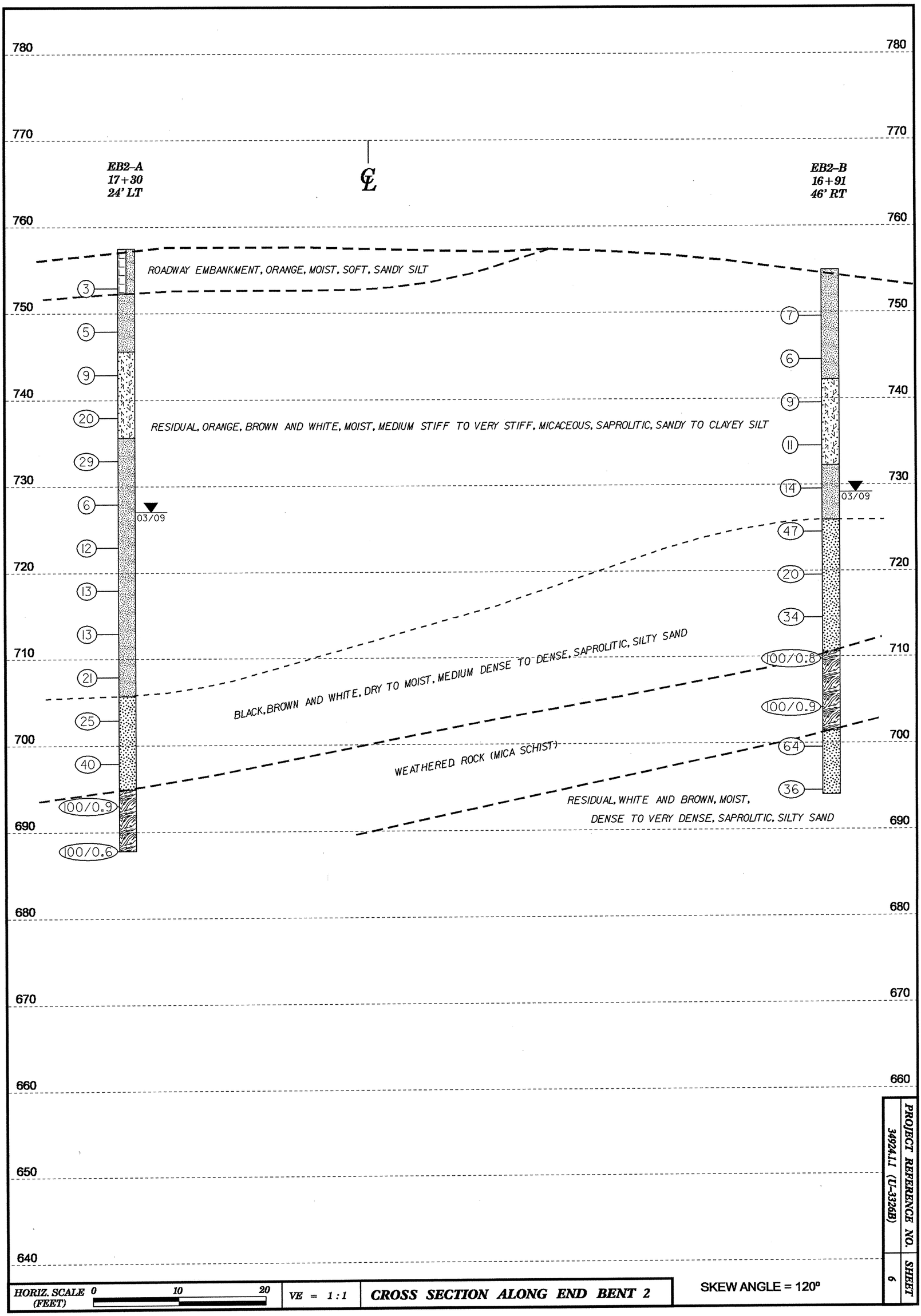
PROFILE ALONG -Y17-







PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	5



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION ALONG END BENT 2

SKEW ANGLE = 120°

PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	ID. U-3326B	COUNTY Rockingham	GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				GROUND WTR (ft)
BORING NO. EB1-A	STATION 15+61	OFFSET 17ft LT	ALIGNMENT -Y17-	0 HR. 18.5
COLLAR ELEV. 751.8 ft	TOTAL DEPTH 64.8 ft	NORTHING 954,670	EASTING 1,800,435	24 HR. 30.0
DRILL MACHINE CME-550	DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
START DATE 03/09/09	COMP. DATE 03/10/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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)
755											
										751.8 GROUND SURFACE	0.0
750										RESIDUAL Tan, Black and White, Micaceous, Saprolitic, Clayey Silt	
	747.7	4.1									
			3	2	2	4	SS-10	M			
745											
	742.7	9.1									
			1	3	2	5	SS-11	M			
740											
	737.7	14.1									
			2	4	4	8		M			
735											
	732.7	19.1									
			2	3	3	6		M			
730											
	727.7	24.1									
			4	4	5	9		M			
725											
	722.7	29.1									
			3	5	5	10		M			
720											
	717.7	34.1									
			2	2	4	6		M			
715											
	712.7	39.1									
			7	9	9	18	SS-12	M			
710											
	707.7	44.1									
			14	12	11	23	SS-13	M			
705											
	702.7	49.1									
			9	10	26	36		M			
700											
										714.4 Tan, Black and White, Micaceous, Saprolitic, Silty Sand	37.4
	697.7	54.1									
			55	45/0.3		100/0.8					
695											
										698.8 WEATHERED ROCK (Mica Schist)	53.0
	692.7	59.1									
			100/0.5			100/0.5					
690											
	687.7	64.1									
			24	76/0.2		100/0.7					
685											
										687.0 Boring Terminated at Elevation 687.0 ft In Weathered Rock (Mica Schist)	64.8
680											
675											

PROJECT NO. 34924.1.1	ID. U-3326B	COUNTY Rockingham	GEOLOGIST Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				GROUND WTR (ft)
BORING NO. EB1-B	STATION 15+26	OFFSET 10ft RT	ALIGNMENT -Y17-	0 HR. N/A
COLLAR ELEV. 749.7 ft	TOTAL DEPTH 59.2 ft	NORTHING 954,641	EASTING 1,800,401	24 HR. 30.4
DRILL MACHINE CME-550	DRILL METHOD Mud Rotary		HAMMER TYPE Automatic	
START DATE 03/10/09	COMP. DATE 03/11/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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	
750											
										749.7 GROUND SURFACE	0.0
										748.8 Asphalt & ABC	0.9
										RESIDUAL Tan, Black and White, Micaceous, Saprolitic, Clayey Silt	
	746.3	3.4									
745			2	2	3	5		M			
	741.3	8.4									
740			2	2	5	7		M			
	736.3	13.4									
735			2	3	3	6		M			
	731.3	18.4									
730			3	3	4	7		M			
	726.3	23.4									
725			4	4	5	9		M			
	721.3	28.4									
720			5	10	10	20	SS-14	M			
	716.3	33.4									
715			17	13	13	26		M			
	711.3	38.4									
710			14	17	19	36		M			
										723.1 Tan, Black and White, Micaceous, Saprolitic, Silty Sand	26.6
	706.3	43.4									
705			38	55	45/0.4	100/0.9					
										706.2 WEATHERED ROCK (Mica Schist)	43.5
										704.2 RESIDUAL Tan and Black, Micaceous, Saprolitic, Silty Sand	45.5
	701.3	48.4									
700			16	31	58	89	SS-15	M			
										696.3 WEATHERED ROCK (Mica Schist)	53.4
	696.3	53.4									
695			30	70/0.3		100/0.8					
	691.3	58.4									
690			35	65/0.3		100/0.8					
										690.5 Boring Terminated at Elevation 690.5 ft In Weathered Rock (Mica Schist)	59.2
685											
680											
675											
670											

NCDOT BORE DOUBLE U3326B_GEO_BRDG146.GPJ NC_DOT.GDT 04/17/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+26	**OFFSET** 29ft LT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 737.3 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 954,683	**EASTING** 1,800,500	**24 HR.** 12.3
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/12/09	**COMP. DATE** 03/12/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										737.3 GROUND SURFACE	0.0
										735.6 Asphalt & ABC	1.7
										ROADWAY EMBANKMENT 733.4 Red-Brown, Sandy Clay	3.9
	734.4	2.9	3	4	6	10	SS-16	M		**RESIDUAL** Brown and White, Micaceous, Saprolitic, Sandy Silt	
	729.4	7.9	3	3	5	8	SS-17	M			
	724.4	12.9	3	3	9	12		M			
	719.4	17.9	3	3	4	7		M			
	714.4	22.9	4	5	7	12		M			
	709.4	27.9	7	16	18	34	SS-18	M			
	704.4	32.9	11	20	25	45		M			
	699.4	37.9	7	11	17	28		M			
	694.4	42.9	7	12	23	35	SS-19	M			
	689.4	47.9	11	19	30	49	SS-20	M		691.2 Brown and White, Micaceous, Saprolitic, Silty Sand	46.1
	684.4	52.9	20	28	41	69		M			
	679.4	57.9	15	50	29	79		M			
	674.4	62.9	25	59	41/0.2	100/0.7				674.4 **WEATHERED ROCK** (Mica Schist)	62.9
	669.4	67.9	24	59	41/0.4	100/0.9				668.0 Boring Terminated at Elevation 668.0 ft In Weathered Rock (Mica Schist)	69.3

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 15+88	**OFFSET** 42ft RT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 733.9 ft	**TOTAL DEPTH** 59.4 ft	**NORTHING** 954,612	**EASTING** 1,800,464	**24 HR.** 13.0
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/17/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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
										733.9 GROUND SURFACE 0.0
										732.2 Asphalt & ABC 1.7
										ROADWAY EMBANKMENT 729.3 Red-Brown, Sandy Clay 4.6
	730.3	3.6	4	4	7	11		M		**RESIDUAL** Brown-Gray, Micaceous, Saprolitic, Sandy Silt
	725.3	8.6	2	2	4	6	SS-21	M		
	720.3	13.6	3	3	4	7		M		717.1 16.8
	715.3	18.6	11	14	15	29	SS-22	M		Brown and White, Micaceous, Saprolitic, Silty Sand
	710.3	23.6	24	46	54/0.3	100/0.8				709.8 24.1 **WEATHERED ROCK** (Mica Shist)
	705.3	28.6	11	43	51	94		M		704.8 29.1 **RESIDUAL** Brown and White, Micaceous, Saprolitic, Silty Sand
	700.3	33.6	18	26	30	56		M		
	695.3	38.6	16	26	32	58	SS-23	M		
	690.3	43.6	10	44	25	69		M		
	685.3	48.6	19	40	60/0.4	100/0.9				684.8 49.1 **WEATHERED ROCK** (Mica Schist)
	680.3	53.6	55	45/0.2		100/0.7				
	675.3	58.6	43	57/0.3		100/0.8				674.5 59.4 Boring Terminated at Elevation 674.5 ft in Weathered Rock (Mica Schist)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+30	**OFFSET** 24ft LT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 757.5 ft	**TOTAL DEPTH** 69.7 ft	**NORTHING** 954,681	**EASTING** 1,800,604	**24 HR.** 35.0
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/05/09	**COMP. DATE** 03/05/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										757.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Orange, Sandy Silt	
	753.9	3.6	1	1	2	3	SS-6	M		752.3	5.2
										RESIDUAL Orange, Micaceous, Sandy Silt	
	748.9	8.6	1	2	3	5	SS-7	M		745.6	11.9
										Brown and White, Saprolitic, Clayey Silt	
	743.9	13.6	2	4	5	9		M			
	738.9	18.6	7	8	12	20		M		735.6	21.9
										Brown and White, Saprolitic, Sandy Silt	
	733.9	23.6	11	12	17	29		M			
	728.9	28.6	3	3	3	6	SS-8	M			
	723.9	33.6	3	5	7	12		M			
	718.9	38.6	3	4	9	13		M			
	713.9	43.6	2	6	7	13		M			
	708.9	48.6	5	8	13	21		M			
	703.9	53.6	12	11	14	25	SS-9	M		705.7	51.8
										Black and White, Saprolitic, Silty Sand	
	698.9	58.6	11	18	22	40		M			
	693.9	63.6	28	72/0.4		100/0.9				694.9	62.6
										WEATHERED ROCK (Mica Schist)	
	688.9	68.6	7	68	32/0.1	100/0.6				687.8	69.7
										Boring Terminated at Elevation 687.8 ft In Weathered Rock (Mica Schist)	

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 16+91	**OFFSET** 46ft RT	**ALIGNMENT** -Y17-	**0 HR.** 26.8
COLLAR ELEV. 754.9 ft	**TOTAL DEPTH** 60.9 ft	**NORTHING** 954,609	**EASTING** 1,800,567	**24 HR.** 25.8
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/04/09	**COMP. DATE** 03/04/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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	
										754.9 GROUND SURFACE	0.0
										RESIDUAL Brown, Micaceous, Saprolitic, Sandy Silt	
	750.5	4.4	3	3	4	7	SS-1	M			
	745.5	9.4	3	2	4	6		M		742.2	12.7
										Brown, Micaceous, Saprolitic, Clayey Silt	
	740.5	14.4	3	4	5	9	SS-2	M			
	735.5	19.4	3	5	6	11		M		732.2	22.7
										Gray, Micaceous, Saprolitic, Sandy Silt	
	730.5	24.4	4	5	9	14	SS-3	M		725.9	29.0
	725.5	29.4	12	25	22	47	SS-4	D		Brown and White, Saprolitic, Silty Sand	
	720.5	34.4	8	10	10	20		D			
	715.5	39.4	5	17	17	34		M		710.5	44.4
										WEATHERED ROCK (Mica Schist)	
	710.5	44.4	28	72/0.3		100/0.8					
	705.5	49.4	33	35	65/0.4	100/0.9				701.4	53.5
										RESIDUAL White and Brown, Saprolitic, Silty Sand	
	700.5	54.4	18	17	47	64	SS-5	M			
	695.5	59.4	23	16	20	36		M		694.0	60.9
										Boring Terminated at Elevation 694.0 ft In Silty Sand	

NCDOT BORE DOUBLE U3326B_GEO_BRDG146.GPJ NC_DOT.GDT 04/17/09

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	17' LT	15+61	4.1-5.6	A-5(2)	42	6	20.8	40.0	27.0	12.2	98	87	49	-	-
SS-11	17' LT	15+61	9.1-10.6	A-5(0)	44	6	24.9	44.9	22.1	8.2	98	86	38	-	-
SS-12	17' LT	15+61	39.1-40.6	A-2-4(0)	40	5	30.8	43.8	19.3	6.1	96	80	31	-	-
SS-13	17' LT	15+61	44.1-45.6	A-2-4(0)	32	1	41.2	35.1	17.6	6.1	89	66	27	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-14	10' RT	15+26	28.4-29.9	A-2-4(0)	33	4	25.5	47.5	18.9	8.2	91	81	32	-	-
SS-15	10' RT	15+26	48.4-49.9	A-2-4(0)	33	NP	31.0	53.2	9.7	6.1	100	90	23	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	29' LT	16+26	2.9-3.9	A-6(7)	40	16	17.7	30.2	17.4	34.7	98	90	56	-	-
SS-17	29' LT	16+26	7.9-9.4	A-4(0)	40	3	27.7	34.5	29.7	8.2	98	80	46	-	-
SS-18	29' LT	16+26	27.9-29.4	A-4(0)	36	5	32.2	36.5	23.1	8.2	98	80	38	-	-
SS-19	29' LT	16+26	42.9-44.4	A-4(1)	37	4	15.3	43.4	31.1	10.2	100	93	54	-	-
SS-20	29' LT	16+26	47.9-49.4	A-2-4(0)	35	4	37.9	32.0	19.9	10.2	92	69	34	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-21	42' RT	15+88	8.6-10.1	A-4(0)	37	4	21.6	48.1	22.1	8.2	100	91	40	-	-
SS-22	42' RT	15+88	18.6-20.1	A-2-4(0)	32	2	30.6	44.9	18.5	6.1	93	79	30	-	-
SS-23	42' RT	15+88	38.6-40.1	A-2-4(0)	31	4	30.0	44.0	17.8	8.2	100	86	35	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	24' LT	17+30	3.6-5.1	A-4(3)	32	10	20.8	33.4	17.2	28.5	96	85	51	-	-
SS-7	24' LT	17+30	8.6-10.1	A-4(0)	38	5	26.9	38.3	22.5	12.2	98	82	45	-	-
SS-8	24' LT	17+30	28.6-30.1	A-4(0)	38	5	33.2	37.5	21.1	8.2	96	76	36	-	-
SS-9	24' LT	17+30	53.6-55.1	A-2-4(0)	34	4	31.8	46.5	15.6	6.1	100	88	30	-	-

EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	46' RT	16+91	4.4-5.9	A-4(0)	40	4	27.3	39.3	21.1	12.2	100	85	42	-	-
SS-2	46' RT	16+91	14.4-15.9	A-5(0)	41	3	20.4	49.1	24.4	6.1	100	90	44	-	-
SS-3	46' RT	16+91	24.4-25.9	A-4(0)	38	4	25.9	44.6	23.3	6.1	98	83	41	-	-
SS-4	46' RT	16+91	34.4-35.9	A-2-4(0)	29	NP	48.5	33.0	14.4	4.1	94	64	23	-	-
SS-5	46' RT	19+91	54.4-55.9	A-2-4(0)	30	NP	24.5	53.4	18.0	4.1	92	81	31	-	-

SITE PHOTOGRAPH

Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) Over -L- (US 29 Bus./US 158)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1 (U-3326B)	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1 F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM SR 2670 (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION BRIDGE NO. 146 ON -Y17- (SR 1998, WENTWORTH ST.) OVER -L- (US 29 BUS./US 158) AT STATION 16+20.75

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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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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PERSONNEL

H.R. CONLEY
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INVESTIGATED BY C.D. CZAJKA
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE APRIL 2009

NORTH CAROLINA LICENSED SEAL 2151 GEOLOGIST CHARLES DOUG CZAJKA 04/17/09

PROJECT: 34924.1.1

ID: U-3326B

DRAWN BY: C.D. CZAJKA

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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.
34924.1.1 (U-3326B)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID 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
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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 PLASTIC RANGE (PI) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

ADVANCING TOOLS:
- [X] 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.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -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: CAP ON EBI-A WINGWALL OF EXISTING BRIDGE

ELEVATION: 752.00 FT.

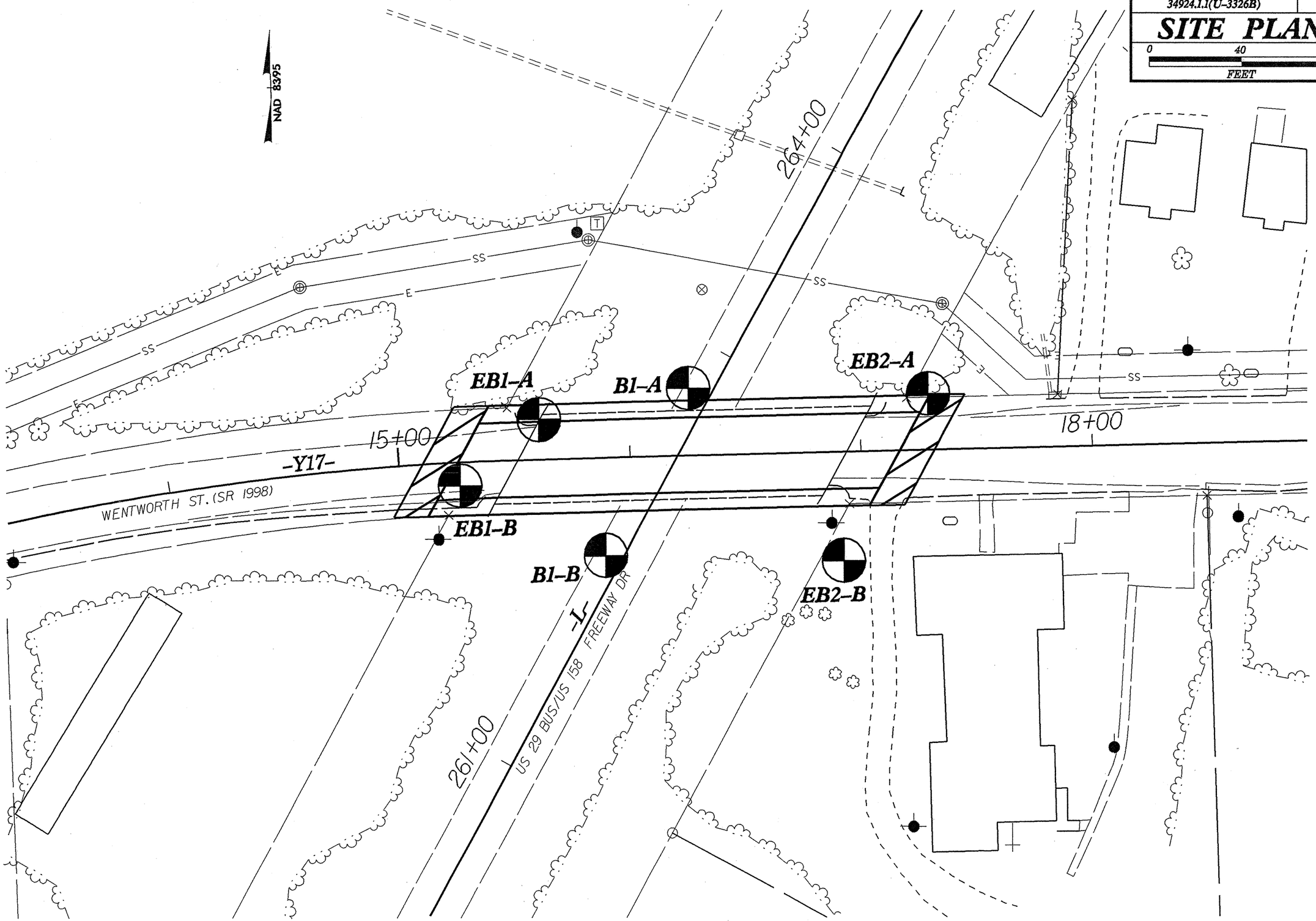
NOTES:

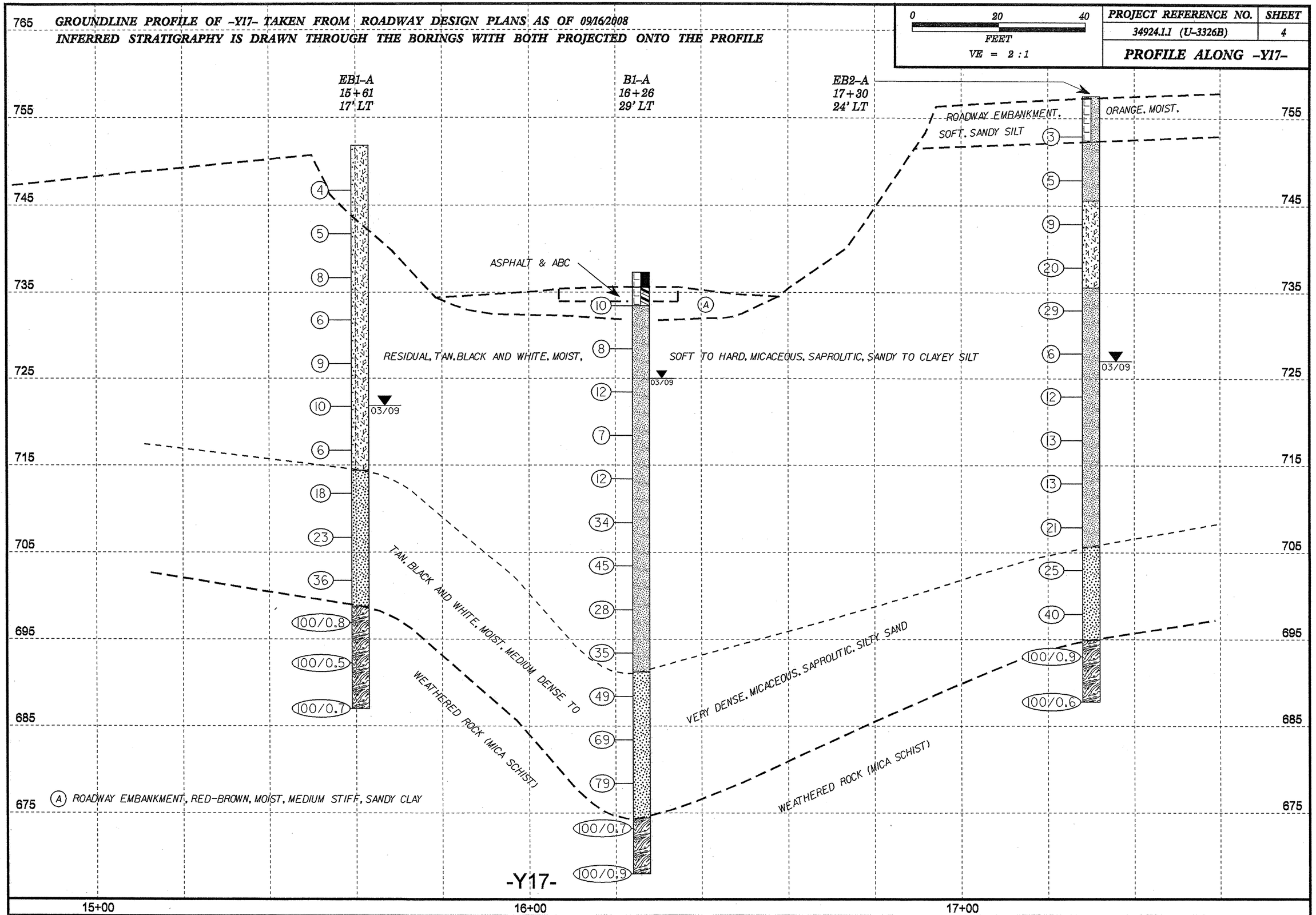
REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
34924.1.1(U-3326B)	3

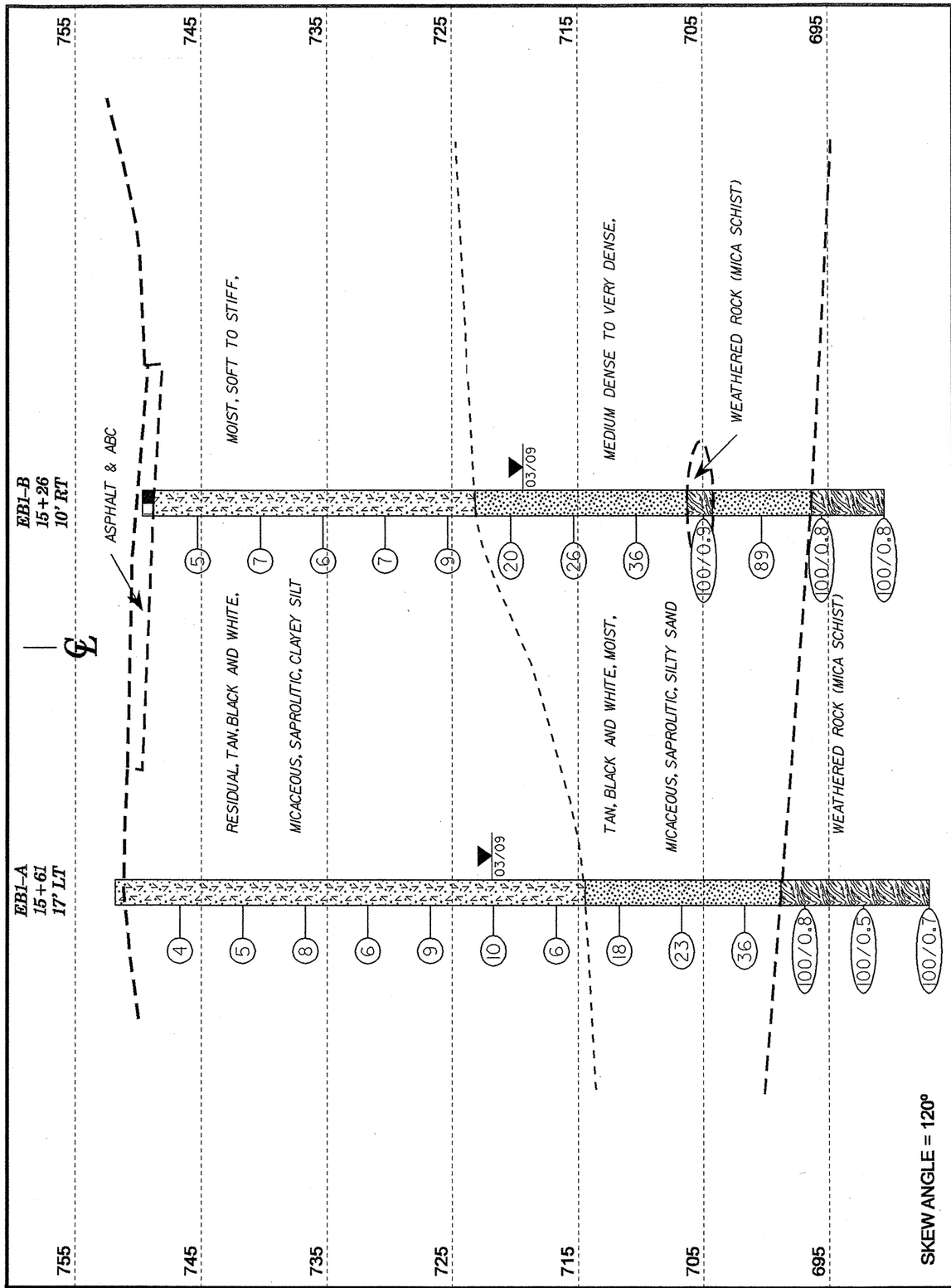
SITE PLAN

0 40 80
FEET

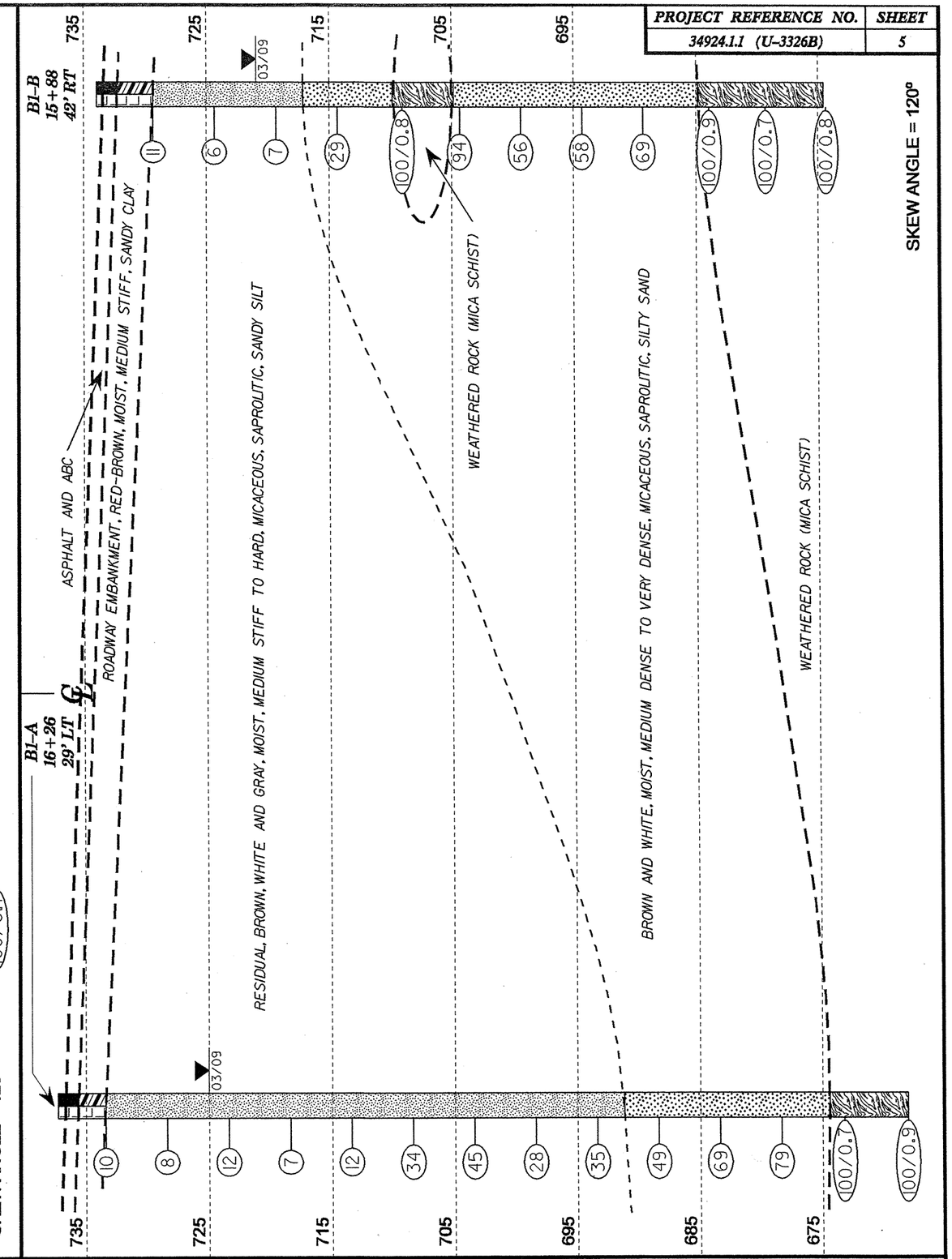



GROUNDLINE PROFILE OF -Y17- TAKEN FROM ROADWAY DESIGN PLANS AS OF 09/16/2008
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE
0 20 40
FEET
VE = 2 : 1
PROJECT REFERENCE NO.
SHEET
34924.1.1 (U-3326B)
4
PROFILE ALONG -Y17-
EB1-A
15+61
17' LT
B1-A
16+26
29' LT
EB2-A
17+30
24' LT
ROADWAY EMBANKMENT, SOFT, SANDY SILT
ORANGE, MOIST,
ASPHALT & ABC
RESIDUAL, TAN, BLACK AND WHITE, MOIST,
SOFT TO HARD, MICACEOUS, SAPROLITIC, SANDY TO CLAYEY SILT
03/09
TAN, BLACK AND WHITE, MOIST, MEDIUM DENSE TO
WEATHERED ROCK (MICA SCHIST)
VERY DENSE, MICACEOUS, SAPROLITIC, SILTY SAND
WEATHERED ROCK (MICA SCHIST)
A ROADWAY EMBANKMENT, RED-BROWN, MOIST, MEDIUM STIFF, SANDY CLAY
-Y17-
765
755
745
735
725
715
705
695
685
675
15+00
16+00
17+00

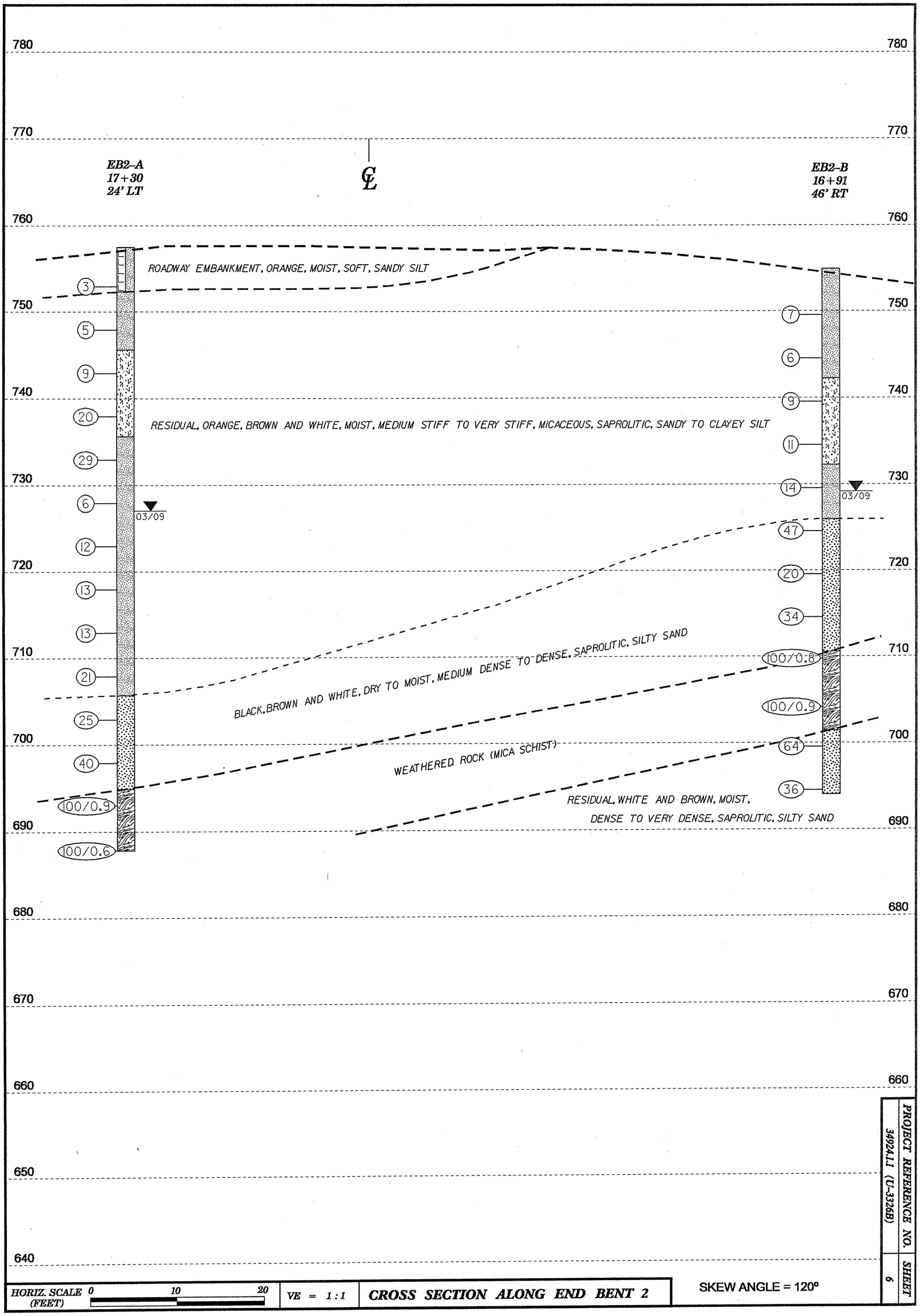
PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	5



CROSS SECTION ALONG END BENT 1



CROSS SECTION ALONG BENT 1



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION ALONG END BENT 2

SKEW ANGLE = 120°

PROJECT REFERENCE NO. 34924.1.1 (U-3326B)

SHEET 6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 15+61	**OFFSET** 17ft LT	**ALIGNMENT** -Y17- — **0 HR.** 18.5
COLLAR ELEV. 751.8 ft	**TOTAL DEPTH** 64.8 ft	**NORTHING** 954,670	**EASTING** 1,800,435 — **24 HR.** 30.0
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 03/09/09	**COMP. DATE** 03/10/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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))
755										
										751.8 GROUND SURFACE 0.0
750										**RESIDUAL** Tan, Black and White, Micaceous, Saprolitic, Clayey Silt
	747.7	4.1								
			3	2	2	4	SS-10	M		
745										
	742.7	9.1								
			1	3	2	5	SS-11	M		
740										
	737.7	14.1								
			2	4	4	8		M		
735										
	732.7	19.1								
			2	3	3	6		M		
730										
	727.7	24.1								
			4	4	5	9		M		
725										
	722.7	29.1								
			3	5	5	10		M		
720										
	717.7	34.1								
			2	2	4	6		M		
715										
	712.7	39.1								
			7	9	9	18	SS-12	M		
710										
	707.7	44.1								
			14	12	11	23	SS-13	M		
705										
	702.7	49.1								
			9	10	26	36		M		
700										
	697.7	54.1								
			55	45/0.3		100/0.8				
695										
	692.7	59.1								
			100/0.5			100/0.5				
690										
	687.7	64.1								
			24	76/0.2		100/0.7				
685										
680										
675										

714.4 — 37.4: Tan, Black and White, Micaceous, Saprolitic, Silty Sand

698.8 — 53.0: **WEATHERED ROCK** (Mica Schist)

687.0 — 64.8: Boring Terminated at Elevation 687.0 ft In Weathered Rock (Mica Schist)

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 15+26	**OFFSET** 10ft RT	**ALIGNMENT** -Y17- — **0 HR.** N/A
COLLAR ELEV. 749.7 ft	**TOTAL DEPTH** 59.2 ft	**NORTHING** 954,641	**EASTING** 1,800,401 — **24 HR.** 30.4
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic
START DATE 03/10/09	**COMP. DATE** 03/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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))
750										
										749.7 GROUND SURFACE 0.0
										748.8 Asphalt & ABC 0.9
										RESIDUAL Tan, Black and White, Micaceous, Saprolitic, Clayey Silt
	746.3	3.4								
745			2	2	3	5		M		
	741.3	8.4								
740			2	2	5	7		M		
	736.3	13.4								
735			2	3	3	6		M		
	731.3	18.4								
730			3	3	4	7		M		
	726.3	23.4								
725			4	4	5	9		M		
										723.1 26.6
										Tan, Black and White, Micaceous, Saprolitic, Silty Sand
	721.3	28.4								
720			5	10	10	20	SS-14	M		
	716.3	33.4								
715			17	13	13	26		M		
	711.3	38.4								
710			14	17	19	36		M		
										706.2 43.5
										WEATHERED ROCK (Mica Schist)
										704.2 45.5
										RESIDUAL Tan and Black, Micaceous, Saprolitic, Silty Sand
	706.3	43.4								
705			38	55	45/0.4	100/0.9				
	701.3	48.4								
700			16	31	58	89	SS-15	M		
	696.3	53.4								696.3 53.4
695			30	70/0.3		100/0.8				**WEATHERED ROCK** (Mica Schist)
	691.3	58.4								
690			35	65/0.3		100/0.8				690.5 59.2
										Boring Terminated at Elevation 690.5 ft In Weathered Rock (Mica Schist)
685										
680										
675										
670										

NCDOT BORE DOUBLE U3326B_GEO_BRDG146.GPJ NC_DOT.GDT 04/17/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 16+26	**OFFSET** 29ft LT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 737.3 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 954,683	**EASTING** 1,800,500	**24 HR.** 12.3
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/12/09	**COMP. DATE** 03/12/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										737.3 GROUND SURFACE	0.0
										735.6 Asphalt & ABC	1.7
										ROADWAY EMBANKMENT Red-Brown, Sandy Clay	
	734.4	2.9	3	4	6	10	SS-16	M		733.4 **RESIDUAL** Brown and White, Micaceous, Saprolitic, Sandy Silt	3.9
	729.4	7.9	3	3	5	8	SS-17	M			
	724.4	12.9	3	3	9	12		M			
	719.4	17.9	3	3	4	7		M			
	714.4	22.9	4	5	7	12		M			
	709.4	27.9	7	16	18	34	SS-18	M			
	704.4	32.9	11	20	25	45		M			
	699.4	37.9	7	11	17	28		M			
	694.4	42.9	7	12	23	35	SS-19	M		691.2 Brown and White, Micaceous, Saprolitic, Silty Sand	46.1
	689.4	47.9	11	19	30	49	SS-20	M			
	684.4	52.9	20	28	41	69		M			
	679.4	57.9	15	50	29	79		M			
	674.4	62.9	25	59	41/0.2	100/0.7				674.4 **WEATHERED ROCK** (Mica Schist)	62.9
	669.4	67.9	24	59	41/0.4	100/0.9				668.0 Boring Terminated at Elevation 668.0 ft In Weathered Rock (Mica Schist)	69.3

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 15+88	**OFFSET** 42ft RT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 733.9 ft	**TOTAL DEPTH** 59.4 ft	**NORTHING** 954,612	**EASTING** 1,800,464	**24 HR.** 13.0
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/17/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										733.9 GROUND SURFACE	0.0
										732.2 Asphalt & ABC	1.7
										ROADWAY EMBANKMENT Red-Brown, Sandy Clay	
	730.3	3.6	4	4	7	11		M		729.3 **RESIDUAL** Brown-Gray, Micaceous, Saprolitic, Sandy Silt	4.6
	725.3	8.6	2	2	4	6	SS-21	M			
	720.3	13.6	3	3	4	7		M		717.1 Brown and White, Micaceous, Saprolitic, Silty Sand	16.8
	715.3	18.6	11	14	15	29	SS-22	M			
	710.3	23.6	24	46	54/0.3	100/0.8				709.8 **WEATHERED ROCK** (Mica Shist)	24.1
	705.3	28.6	11	43	51	94		M		704.8 **RESIDUAL** Brown and White, Micaceous, Saprolitic, Silty Sand	29.1
	700.3	33.6	18	26	30	56		M			
	695.3	38.6	16	26	32	58	SS-23	M			
	690.3	43.6	10	44	25	69		M			
	685.3	48.6	19	40	60/0.4	100/0.9				684.8 **WEATHERED ROCK** (Mica Schist)	49.1
	680.3	53.6	55	45/0.2		100/0.7					
	675.3	58.6	43	57/0.3		100/0.8				674.5 Boring Terminated at Elevation 674.5 ft in Weathered Rock (Mica Schist)	59.4

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham		**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 17+30	**OFFSET** 24ft LT	**ALIGNMENT** -Y17-	**0 HR.** N/A
COLLAR ELEV. 757.5 ft	**TOTAL DEPTH** 69.7 ft	**NORTHING** 954,681	**EASTING** 1,800,604	**24 HR.** 35.0
DRILL MACHINE CME-550	**DRILL METHOD** Mud Rotary		**HAMMER TYPE** Automatic	
START DATE 03/05/09	**COMP. DATE** 03/05/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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)
										757.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Orange, Sandy Silt	
	753.9	3.6	1	1	2	3	SS-6	M		752.3	5.2
										RESIDUAL Orange, Micaceous, Sandy Silt	
	748.9	8.6	1	2	3	5	SS-7	M		745.6	11.9
	743.9	13.6	2	4	5	9		M		Brown and White, Saprolitic, Clayey Silt	
	738.9	18.6	7	8	12	20		M		735.6	21.9
	733.9	23.6	11	12	17	29		M		Brown and White, Saprolitic, Sandy Silt	
	728.9	28.6	3	3	3	6	SS-8	M			
	723.9	33.6	3	5	7	12		M			
	718.9	38.6	3	4	9	13		M			
	713.9	43.6	2	6	7	13		M			
	708.9	48.6	5	8	13	21		M		705.7	51.8
	703.9	53.6	12	11	14	25	SS-9	M		Black and White, Saprolitic, Silty Sand	
	698.9	58.6	11	18	22	40		M		694.9	62.6
	693.9	63.6	28	72/0.4		100/0.9				**WEATHERED ROCK** (Mica Schist)	
	688.9	68.6	7	68	32/0.1	100/0.6				687.8	69.7
										Boring Terminated at Elevation 687.8 ft In Weathered Rock (Mica Schist)	

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham		**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 16+91	**OFFSET** 46ft RT	**ALIGNMENT** -Y17-	**0 HR.** 26.8
COLLAR ELEV. 754.9 ft	**TOTAL DEPTH** 60.9 ft	**NORTHING** 954,609	**EASTING** 1,800,567	**24 HR.** 25.8
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 03/04/09	**COMP. DATE** 03/04/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 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	
										754.9 GROUND SURFACE	0.0
										RESIDUAL Brown, Micaceous, Saprolitic, Sandy Silt	
	750.5	4.4	3	3	4	7	SS-1	M			
	745.5	9.4	3	2	4	6		M		742.2	12.7
										Brown, Micaceous, Saprolitic, Clayey Silt	
	740.5	14.4	3	4	5	9	SS-2	M			
	735.5	19.4	3	5	6	11		M		732.2	22.7
										Gray, Micaceous, Saprolitic, Sandy Silt	
	730.5	24.4	4	5	9	14	SS-3	M		725.9	29.0
	725.5	29.4	12	25	22	47	SS-4	D		Brown and White, Saprolitic, Silty Sand	
	720.5	34.4	8	10	10	20		D			
	715.5	39.4	5	17	17	34		M		710.5	44.4
										WEATHERED ROCK (Mica Schist)	
	710.5	44.4	28	72/0.3		100/0.8					
	705.5	49.4	33	35	65/0.4	100/0.9				701.4	53.5
										RESIDUAL White and Brown, Saprolitic, Silty Sand	
	700.5	54.4	18	17	47	64	SS-5	M			
	695.5	59.4	23	16	20	36		M		694.0	60.9
										Boring Terminated at Elevation 694.0 ft In Silty Sand	

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	17' LT	15+61	4.1-5.6	A-5(2)	42	6	20.8	40.0	27.0	12.2	98	87	49	-	-
SS-11	17' LT	15+61	9.1-10.6	A-5(0)	44	6	24.9	44.9	22.1	8.2	98	86	38	-	-
SS-12	17' LT	15+61	39.1-40.6	A-2-4(0)	40	5	30.8	43.8	19.3	6.1	96	80	31	-	-
SS-13	17' LT	15+61	44.1-45.6	A-2-4(0)	32	1	41.2	35.1	17.6	6.1	89	66	27	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-14	10' RT	15+26	28.4-29.9	A-2-4(0)	33	4	25.5	47.5	18.9	8.2	91	81	32	-	-
SS-15	10' RT	15+26	48.4-49.9	A-2-4(0)	33	NP	31.0	53.2	9.7	6.1	100	90	23	-	-

B1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	29' LT	16+26	2.9-3.9	A-6(7)	40	16	17.7	30.2	17.4	34.7	98	90	56	-	-
SS-17	29' LT	16+26	7.9-9.4	A-4(0)	40	3	27.7	34.5	29.7	8.2	98	80	46	-	-
SS-18	29' LT	16+26	27.9-29.4	A-4(0)	36	5	32.2	36.5	23.1	8.2	98	80	38	-	-
SS-19	29' LT	16+26	42.9-44.4	A-4(1)	37	4	15.3	43.4	31.1	10.2	100	93	54	-	-
SS-20	29' LT	16+26	47.9-49.4	A-2-4(0)	35	4	37.9	32.0	19.9	10.2	92	69	34	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-21	42' RT	15+88	8.6-10.1	A-4(0)	37	4	21.6	48.1	22.1	8.2	100	91	40	-	-
SS-22	42' RT	15+88	18.6-20.1	A-2-4(0)	32	2	30.6	44.9	18.5	6.1	93	79	30	-	-
SS-23	42' RT	15+88	38.6-40.1	A-2-4(0)	31	4	30.0	44.0	17.8	8.2	100	86	35	-	-

EB2-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	24' LT	17+30	3.6-5.1	A-4(3)	32	10	20.8	33.4	17.2	28.5	96	85	51	-	-
SS-7	24' LT	17+30	8.6-10.1	A-4(0)	38	5	26.9	38.3	22.5	12.2	98	82	45	-	-
SS-8	24' LT	17+30	28.6-30.1	A-4(0)	38	5	33.2	37.5	21.1	8.2	96	76	36	-	-
SS-9	24' LT	17+30	53.6-55.1	A-2-4(0)	34	4	31.8	46.5	15.6	6.1	100	88	30	-	-

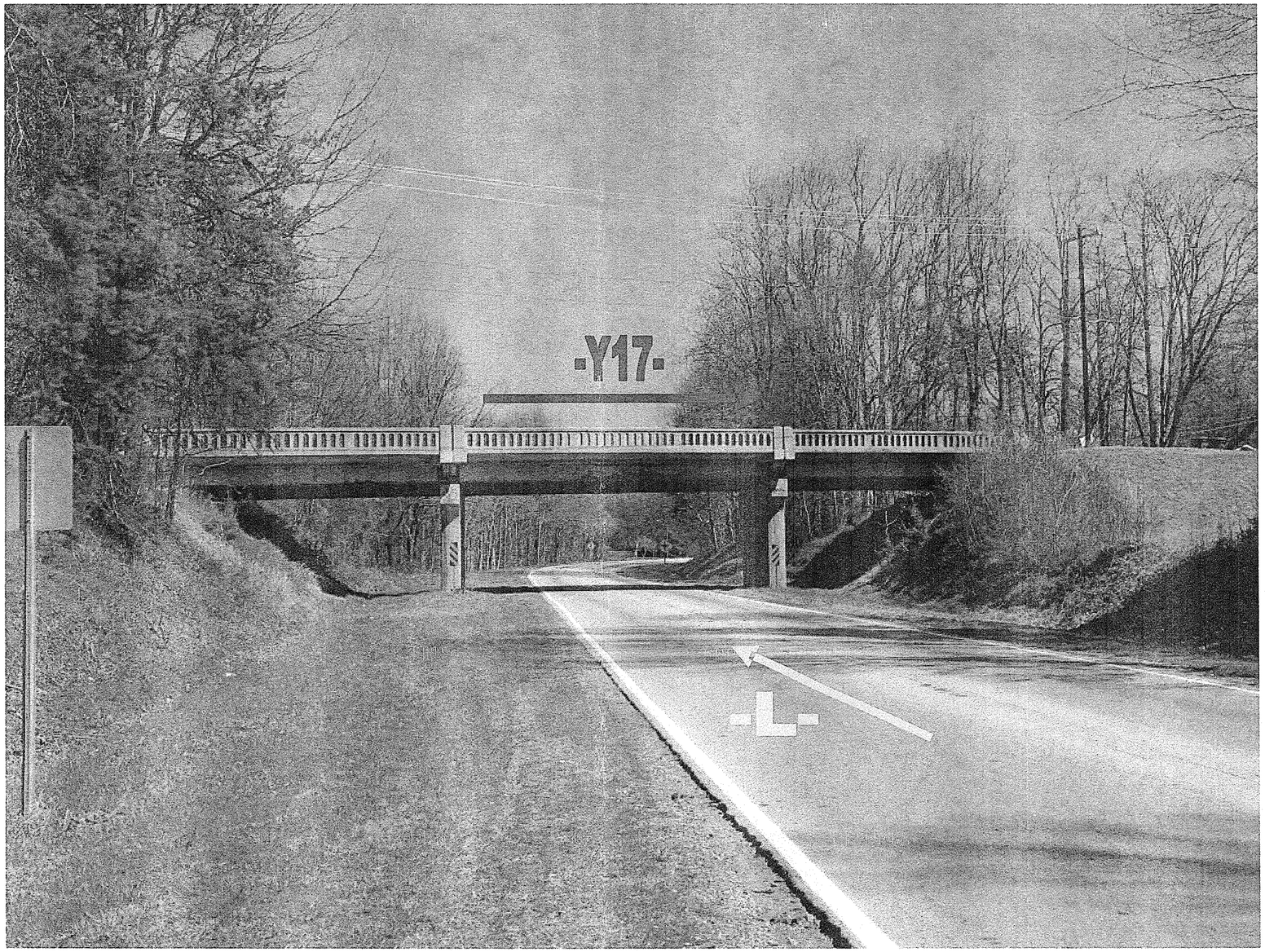
EB2-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	46' RT	16+91	4.4-5.9	A-4(0)	40	4	27.3	39.3	21.1	12.2	100	85	42	-	-
SS-2	46' RT	16+91	14.4-15.9	A-5(0)	41	3	20.4	49.1	24.4	6.1	100	90	44	-	-
SS-3	46' RT	16+91	24.4-25.9	A-4(0)	38	4	25.9	44.6	23.3	6.1	98	83	41	-	-
SS-4	46' RT	16+91	34.4-35.9	A-2-4(0)	29	NP	48.5	33.0	14.4	4.1	94	64	23	-	-
SS-5	46' RT	19+91	54.4-55.9	A-2-4(0)	30	NP	24.5	53.4	18.0	4.1	92	81	31	-	-

SITE PHOTOGRAPH

Bridge No. 146 on -Y17- (SR 1998, Wentworth St.) Over -L- (US 29 Bus./US 158)



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1(U-3326A / B)	1	3

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1(U-3326A&B) F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM SR 2670 (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION RETAINING WALL 1 RT. OF -Y13RPC- AT STA. 16+00 RETAINING WALL 2 LT. OF -L- STA. 304+50

WALL INVENTORY

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN AND PROFILE RW1 AND RW2

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) 250-4088. 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.

NCDOT PERSONNEL
N.D. MOHS
Y. KUNTUKOVA

TRIGON PERSONNEL
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INVESTIGATED BY T.P. MOORFIELD
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE MARCH 2011

NORTH CAROLINA LICENSED SEAL 1912 GEOLOGIST NEIL T. ROBERSON 3-3-2011

PROJECT: 34924.1.1 ID: U-3326A&B

DRAWN BY: T.T. WALKER, T.P. MOOREFIELD, W.D. FIELDS

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.
34924.1.1(U-3326A/B)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID 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
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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 PLASTIC RANGE (PI) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
- 25/026 DIP & DIP DIRECTION OF ROCK STRUCTURES
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- ☐ MOBILE B-___
- ☐ BK-51
- ☐ CME-45C
- ☐ CME-550
- ☐ PORTABLE HOIST
- ■ CME-55
- ■ CME-45

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

HAMMER TYPE:
- ☐ AUTOMATIC
- ■ MANUAL

CORE SIZE:
- ☐ -B_____
- ☐ -N_____
- ☐ -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.

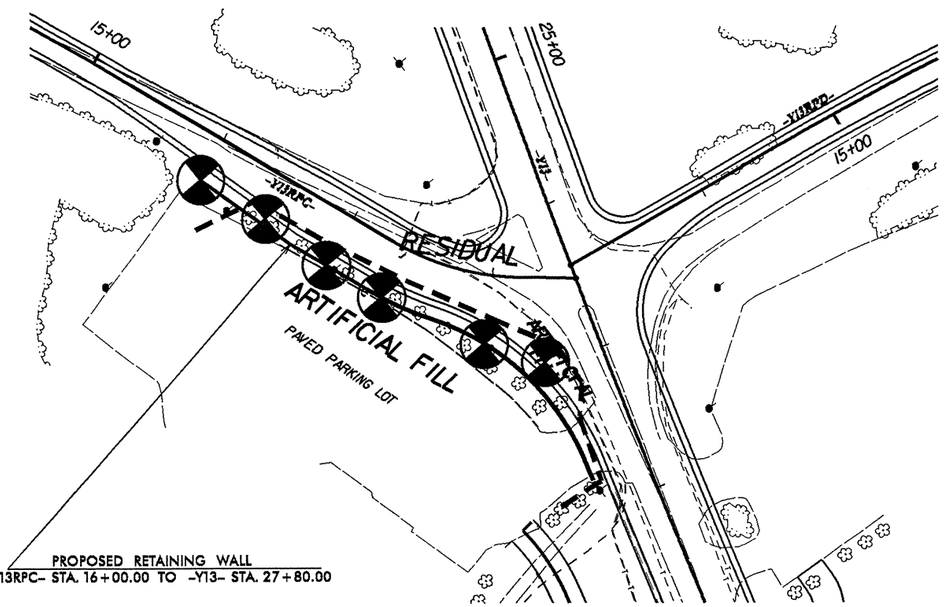
BENCH MARK:

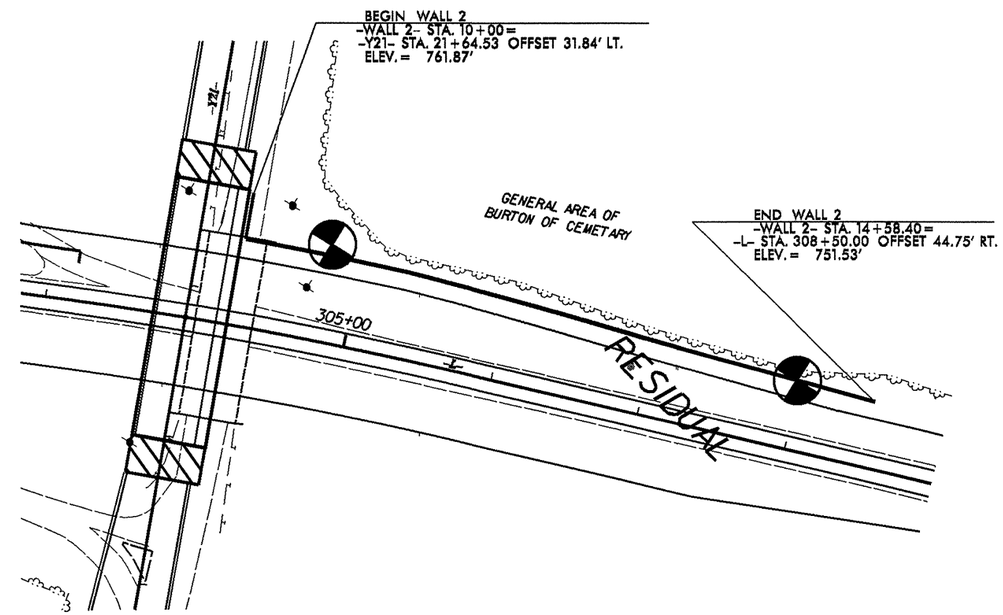
ELEVATION: FT.

NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET NO.
U-3326A/B	3

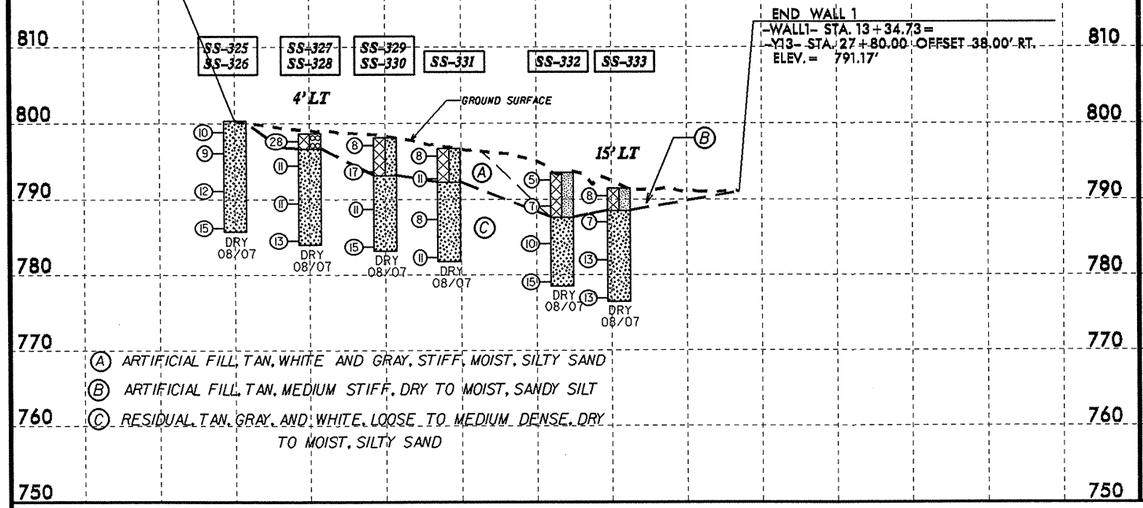




BEGIN WALL 1
-WALL1- STA. 10+00.00=
-Y13RPC- STA. 16+00.00 OFFSET 30.19' RT.
ELEV.= 800.44'

SOIL TEST RESULTS

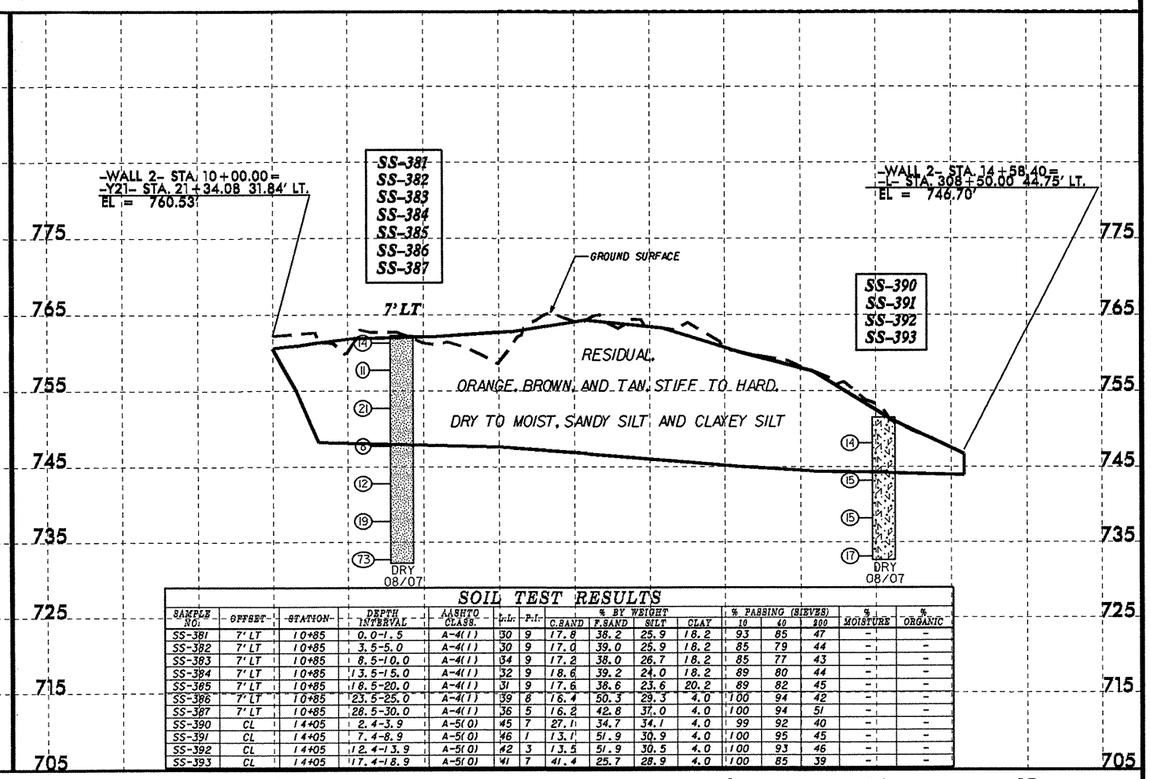
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-325	CL	10+00	0.5-2.0	A-2-4(0)	36	6	38.2	31.1	22.6	8.1	90	67	32	-	-
SS-326	CL	10+00	8.2-9.7	A-2-4(0)	37	NP	44.1	33.3	18.6	4.1	100	72	27	-	-
SS-327	4' LT	10+50	0.0-1.5	A-1-b(0)	40	6	49.9	27.8	16.1	8.1	47	31	12	-	-
SS-328	4' LT	10+50	8.2-9.7	A-2-5(0)	47	NP	35.7	41.2	17.0	6.1	100	83	29	-	-
SS-329	CL	11+00	0.0-1.5	A-2-4(0)	40	4	37.4	35.7	18.8	8.1	98	75	31	-	-
SS-330	CL	11+00	8.5-10.0	A-2-5(0)	44	4	32.5	39.4	22.0	6.1	99	79	33	-	-
SS-331	CL	11+42	4.5-5.0	A-2-4(0)	35	5	48.7	26.4	18.8	6.1	91	57	27	-	-
SS-332	CL	12+17	0.0-1.5	A-4(0)	40	6	31.7	36.3	21.8	10.2	100	82	38	-	-
SS-333	15' LT	12+55	3.5-5.0	A-2-5(0)	49	2	33.5	40.0	20.4	6.1	100	81	32	-	-



(A) ARTIFICIAL FILL, TAN, WHITE AND GRAY, STIFF, MOIST, SILTY SAND

(B) ARTIFICIAL FILL, TAN, MEDIUM STIFF, DRY TO MOIST, SANDY SILT

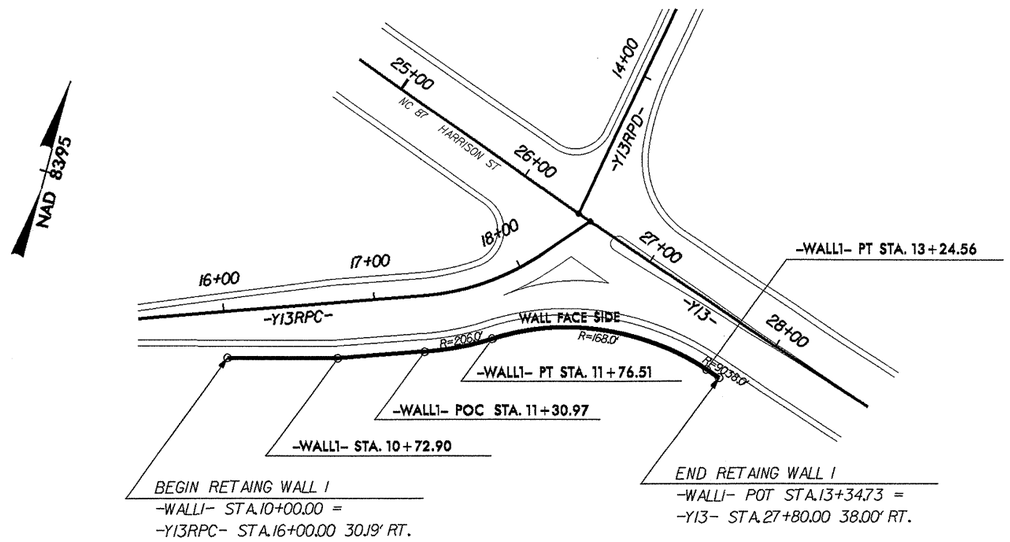
(C) RESIDUAL, TAN, GRAY, AND WHITE, LOOSE TO MEDIUM DENSE, DRY TO MOIST, SILTY SAND



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-381	7' LT	10+85	0.0-1.5	A-4(1)	30	9	17.8	38.2	25.9	18.2	93	85	47	-	-
SS-382	7' LT	10+85	3.5-5.0	A-4(1)	30	9	17.0	39.0	25.9	18.2	85	79	44	-	-
SS-383	7' LT	10+85	8.5-10.0	A-4(1)	34	9	17.2	38.0	26.7	18.2	85	77	43	-	-
SS-384	7' LT	10+85	13.5-15.0	A-4(1)	32	9	18.6	39.2	24.0	18.2	89	80	44	-	-
SS-385	7' LT	10+85	18.5-20.0	A-4(1)	31	9	17.6	38.6	23.6	20.2	89	82	45	-	-
SS-386	7' LT	10+85	23.5-25.0	A-4(1)	39	8	16.4	50.3	29.3	4.0	100	94	42	-	-
SS-387	7' LT	10+85	28.5-30.0	A-4(1)	36	5	16.2	42.8	37.0	4.0	100	94	51	-	-
SS-390	CL	14+05	2.4-3.9	A-5(0)	45	7	27.1	34.7	34.1	4.0	99	92	40	-	-
SS-391	CL	14+05	7.4-8.9	A-5(0)	46	1	13.1	51.9	30.9	4.0	100	95	45	-	-
SS-392	CL	14+05	12.4-13.9	A-5(0)	42	3	13.5	51.9	30.5	4.0	100	93	46	-	-
SS-393	CL	14+05	17.4-18.9	A-5(0)	41	7	41.4	25.7	28.9	4.0	100	85	39	-	-

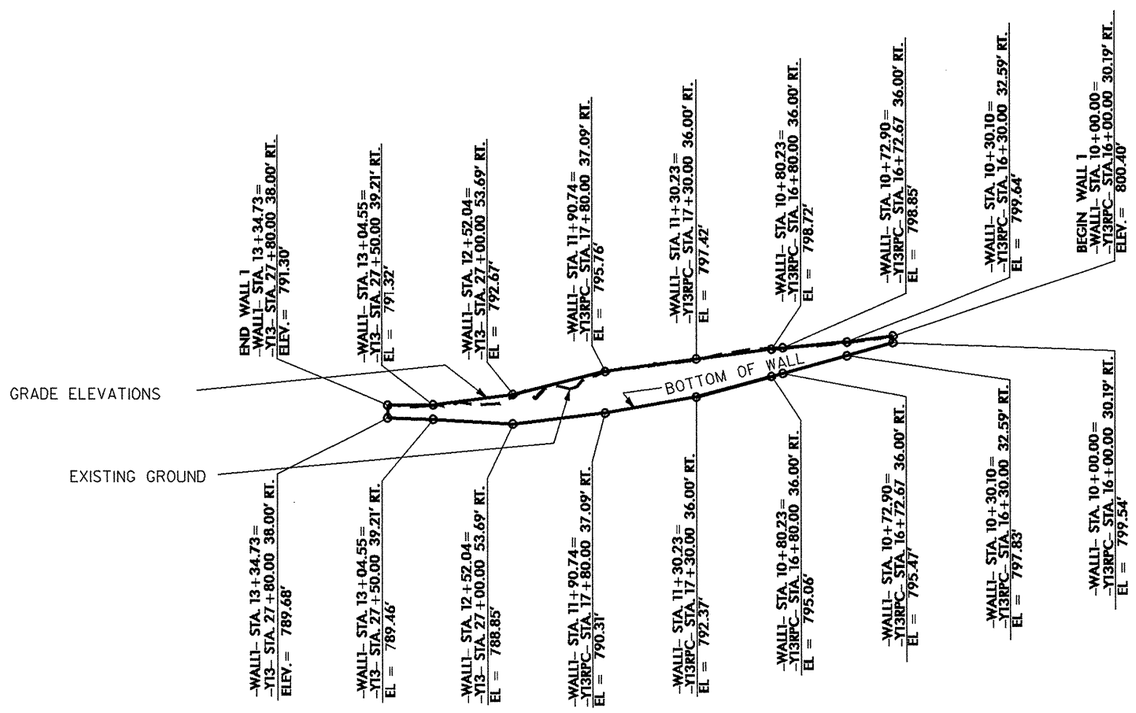
GEOTECHNICAL ENGINEER	ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 32171 ENGINEER JINYOUNG PARK	
SIGNATURE DATE	SIGNATURE DATE



WALL NO. 1 PLAN VIEW, NTS

RETAINING WALL TYPICAL SECTION			
STATION AND OFFSET	BOTTOM OF WALL ELEV.	GRADE ELEV.	DESIGN HEIGHT
-WALL1- 10+00.00 -Y13RPC- 16+00.00 30.19' RT.	789.54'	800.40'	0.86'
-WALL1- 10+30.10 -Y13RPC- 16+30.00 32.59' RT.	797.83'	799.64'	1.81'
-WALL1- 10+80.23 -Y13RPC- 16+80.00 36.00' RT.	795.06'	798.72'	3.66'
-WALL1- 11+30.23 -Y13RPC- 17+30.00 36.00' RT.	792.37'	797.42'	5.05'
-WALL1- 11+90.74 -Y13RPC- 17+80.00 37.09' RT.	790.31'	795.76'	5.45'
-WALL1- 12+52.04 -Y13- 27+00.00 53.69' RT.	788.85'	792.67'	3.82'
-WALL1- 13+04.55 -Y13- 27+00.00 39.21' RT.	789.46'	791.32'	1.86'
-WALL1- 13+34.73 -Y13- 27+80.00 38.00' RT.	789.68'	791.30'	1.62'

TOTAL BILL OF MATERIAL	
SOLDIER PILE RETAINING WALLS (-WALL 1- STA. 10+00.00 TO -WALL 1- STA. 13+34.73)	1,410 SQUARE FEET



WALL NO. 1 ENVELOPE, NTS

- EXPOSED WALL FACE -

PREPARED BY: JINYOUNG PARK	DATE: 03/2011
REVIEWED BY: JAMES R. BATTS	DATE: 03/2011

PROJECT NO.: 34924.1.1 (U-3326A/B)

ROCKINGHAM ***COUNTY***

STATION: -Y13RPC- STA. 16+00.00

SHEET 1 OF 5

GEOTECHNICAL ENGINEERING UNIT

☒ *EASTERN REGIONAL OFFICE*

☐ *WESTERN REGIONAL OFFICE*

☐ *CONTRACT OFFICE*

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

RETAINING WALL NO. 1
PLAN AND ELEVATIONS

REVISIONS							SHEET NO.
NO.	BY	DATE	NO.	BY	DATE		
1			3				TOTAL SHEETS
2			4				

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1 (U-3326B)	1	14

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1 F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM SR 2670 (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION BRIDGE NO. 56 ON -Y21- (SR 2670, NORTH SCALES STREET) OVER -L- (US 29 BUS./US 158) AT STATION 22+21.46

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
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12	SOIL TEST RESULTS
13	CORE PHOTOGRAPHS
14	SITE PHOTOGRAPH

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) 250-4088. 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.

PERSONNEL

H.R. CONLEY

C.D. CZAJKA

D.W. DIXON

J.R. MATULA

J.R. TURNAGE

INVESTIGATED BY C.D. CZAJKA

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE APRIL 2009

NORTH CAROLINA LICENSED SEAL 2151 GEOLOGIST CHARLES DOUG CZAJKA 04/20/09

DRAWN BY: C.D. CZAJKA

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: 34924.1.1

ID: U-3326B

PROJECT REFERENCE NO.	SHEET NO.
34924.1.1 (U-3326B)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID 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
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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 ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
DM — 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
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N X
- [ ] -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.

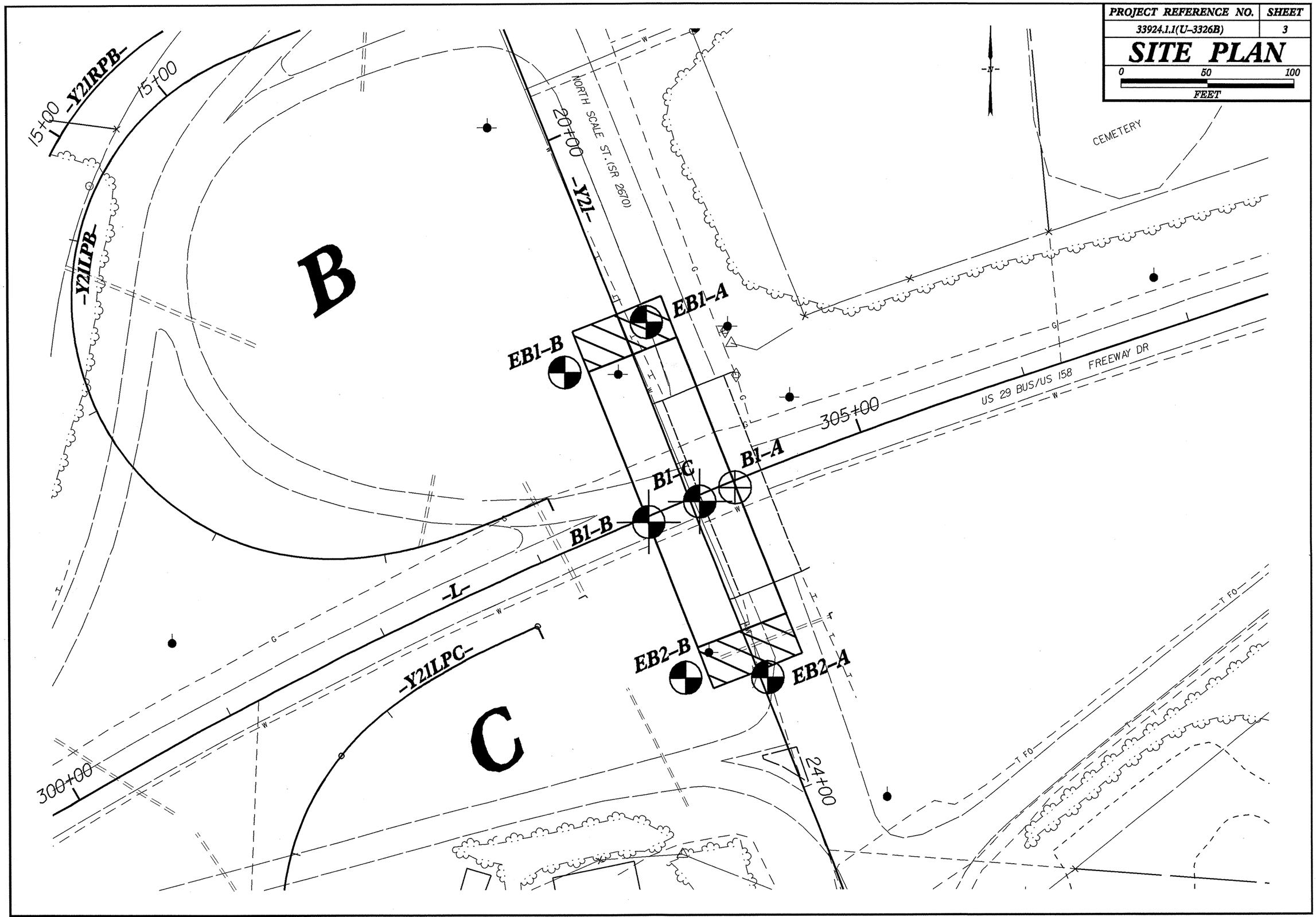
BENCH MARK: BL-42
NORTHING: 957420.2260
EASTING: 1803564.0600 ELEVATION: 766.40 FT.

NOTES:

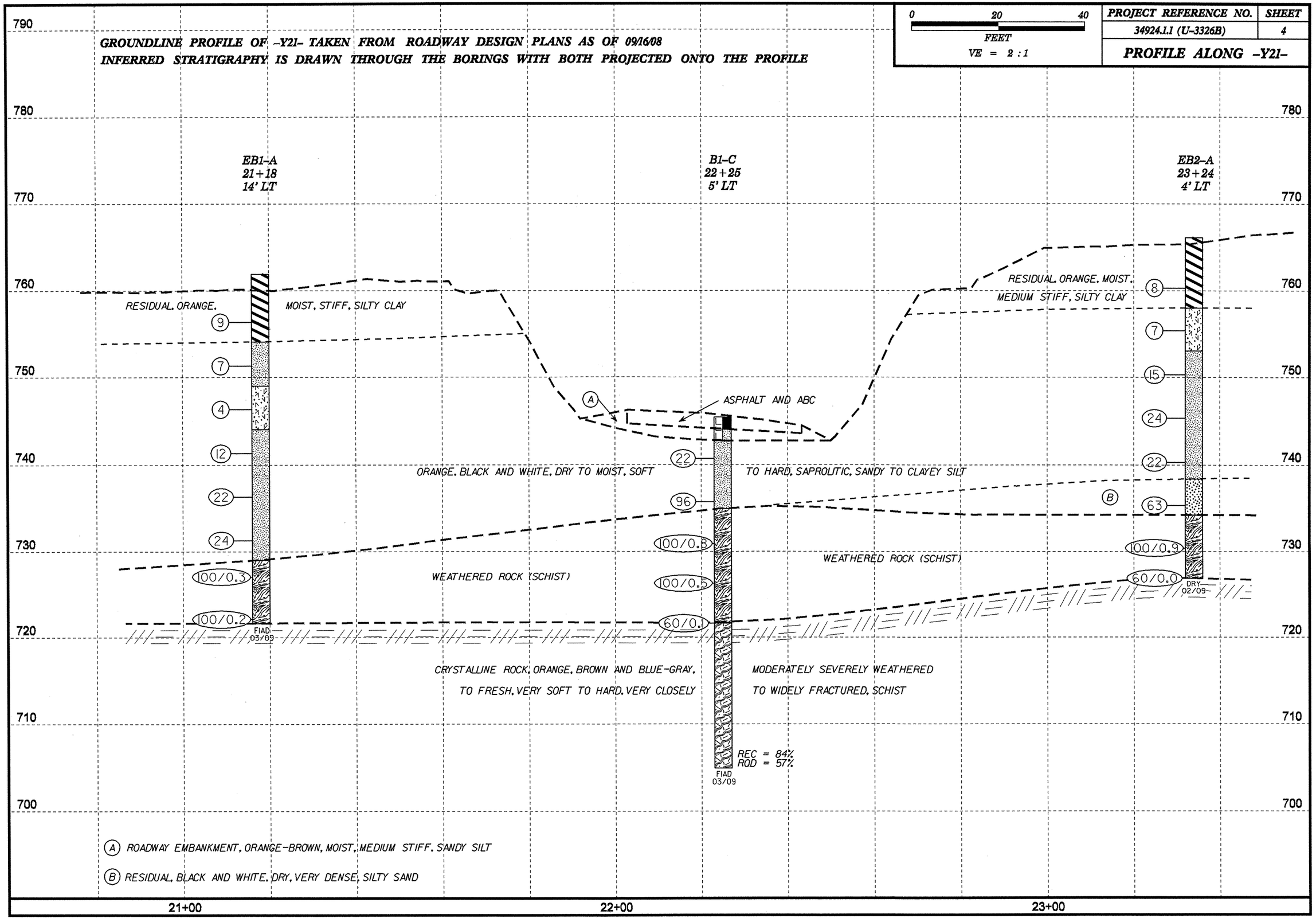
PROJECT REFERENCE NO.	SHEET
33924.1.1(U-3326B)	3

SITE PLAN

0 50 100
FEET



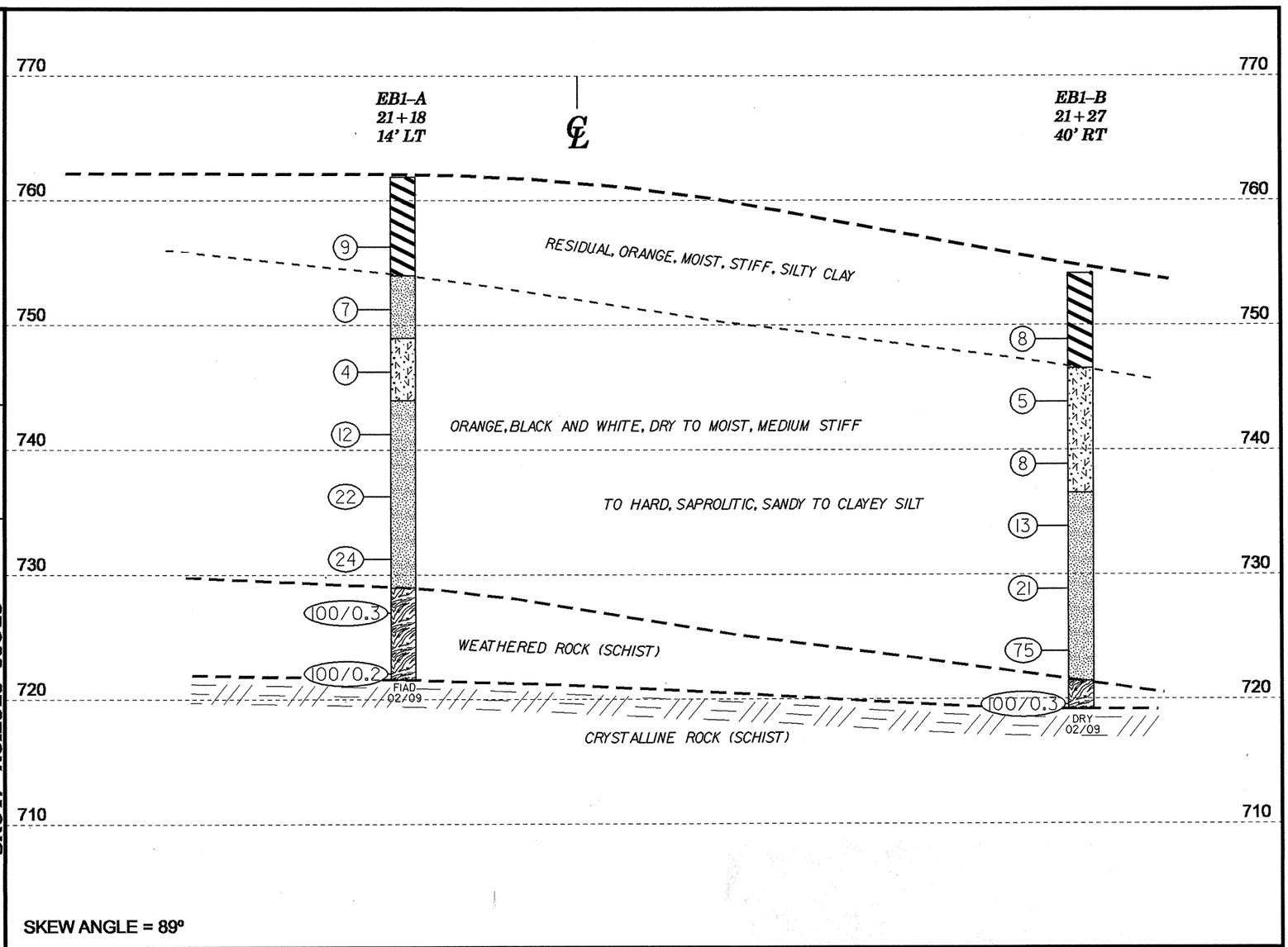
PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	4
PROFILE ALONG -Y21-	



HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

CROSS SECTION ALONG END BENT 1

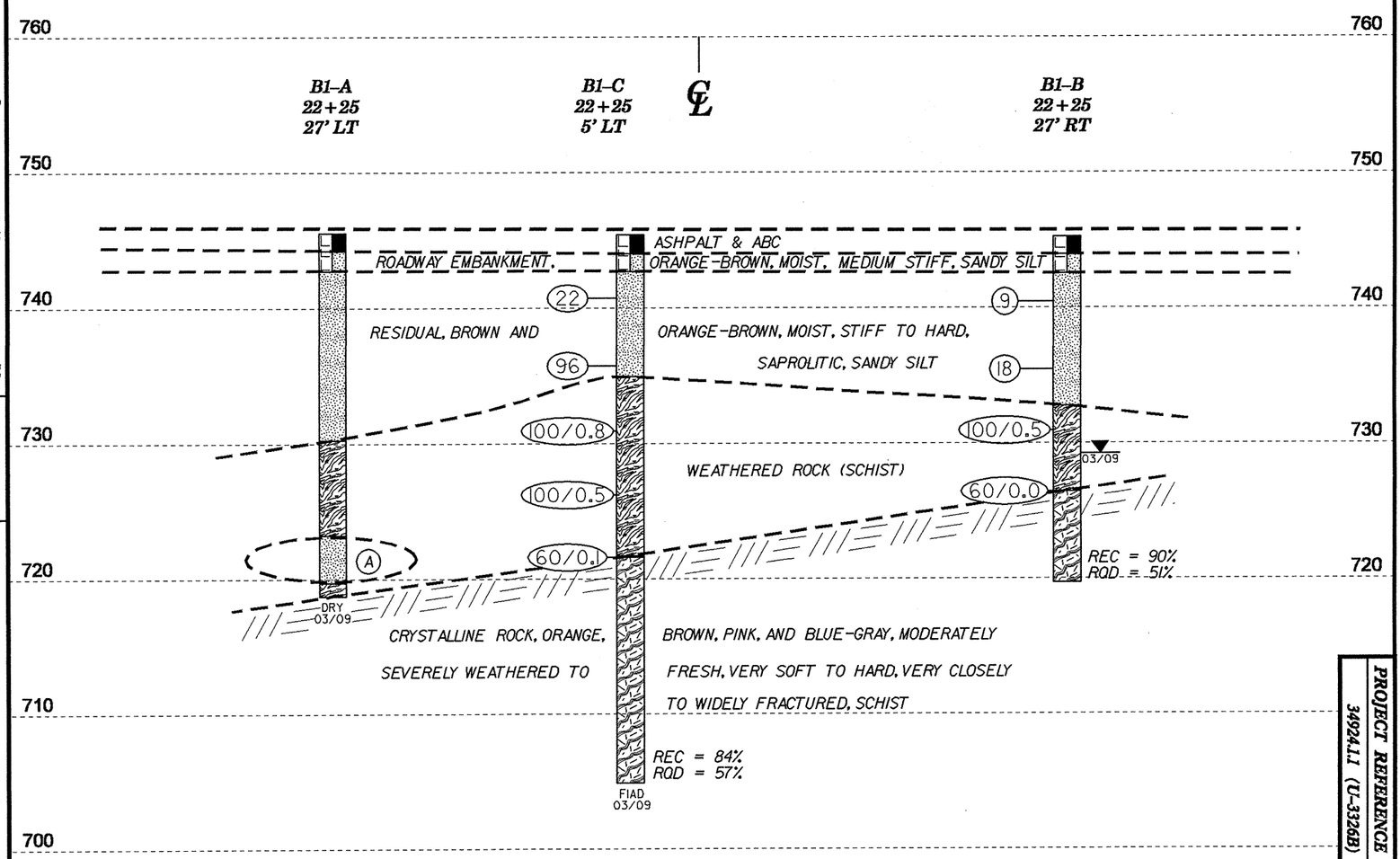


SKEW ANGLE = 89°

HORIZ. SCALE (FEET) 0 10 20

VE = 1:1

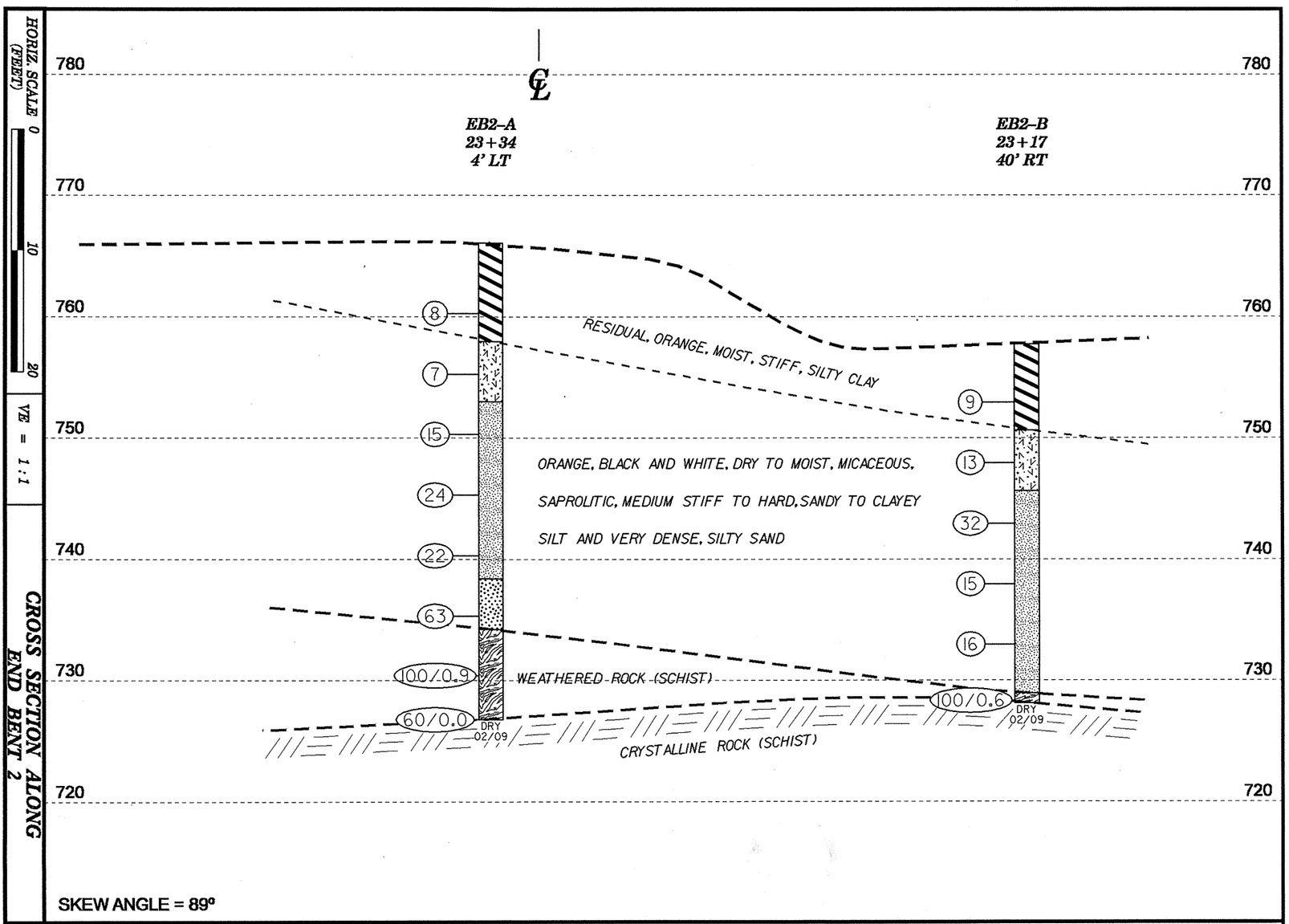
CROSS SECTION ALONG BENT 1



(A) RESIDUAL, BROWN, MOIST, STIFF TO HARD, SANDY SILT

SKEW ANGLE = 89°

PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	5



CROSS SECTION ALONG END BENT 2

PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	6

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 21+18	**OFFSET** 14ft LT	**ALIGNMENT** -Y21-	**0 HR.** Dry
COLLAR ELEV. 761.9 ft	**TOTAL DEPTH** 40.3 ft	**NORTHING** 957,556	**EASTING** 1,803,460	**24 HR.** FIAD
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/27/09	**COMP. DATE** 02/27/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 40.3 ft	

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)
										761.9 GROUND SURFACE	0.0
										RESIDUAL Orange, Silty Clay	
	757.3	4.6	4	4	5	9		M			
	752.3	9.6	4	4	3	7		M		754.0 Orange and Black, Sandy Silt	7.9
	747.3	14.6	2	2	2	4	SS-6	M		749.0 Orange and Black, Saprolitic, Clayey Silt	12.9
	742.3	19.6	4	5	7	12		M		744.0 Orange, Black and White, Saprolitic, Sandy Silt	17.9
	737.3	24.6	7	11	11	22		M			
	732.3	29.6	5	10	14	24		M		729.0 **WEATHERED ROCK** (Schist)	32.9
	727.3	34.6	100/0.3			100/0.3					
	722.3	39.6	100/0.2			100/0.2				721.6 Boring Terminated by Auger Refusal at Elevation 721.6 ft On Crystalline Rock (Schist)	40.3

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 21+27	**OFFSET** 40ft RT	**ALIGNMENT** -Y21-	**0 HR.** Dry
COLLAR ELEV. 754.1 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 957,527	**EASTING** 1,803,413	**24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/25/09	**COMP. DATE** 02/25/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 35.0 ft	

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
										754.1 GROUND SURFACE 0.0
										RESIDUAL Orange, Silty Clay
	749.8	4.3	3	4	4	8	SS-1	M		746.5 7.6
	744.8	9.3	2	2	3	5	SS-2	M		Orange and Black, Saprolitic, Clayey Silt
	739.8	14.3	2	3	5	8		M		736.5 17.6
	734.8	19.3	4	6	7	13	SS-3	M		Orange, Tan, Black and White, Saprolitic, Sandy Silt
	729.8	24.3	4	8	13	21		D		
	724.8	29.3	20	24	51	75		M		721.4 32.7
	719.8	34.3	100/0.3			100/0.3				719.1 35.0 **WEATHERED ROCK** (Schist)
										Boring Terminated by Auger Refusal at Elevation 719.1 ft On Crystalline Rock (Schist)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+25	**OFFSET** 27ft LT	**ALIGNMENT** -Y21-	**0 HR.** N/A
COLLAR ELEV. 745.5 ft	**TOTAL DEPTH** 26.8 ft	**NORTHING** 957,461	**EASTING** 1,803,512	**24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** Wash Boring		**HAMMER TYPE** Automatic	
START DATE 03/18/09	**COMP. DATE** 03/18/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 26.8 ft	

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)
750												
745										745.5	GROUND SURFACE	0.0
										744.2	Pavement & ABC	1.3
										742.7	**ROADWAY EMBANKMENT** Orange-Brown, Sandy Silt	2.8
740											**RESIDUAL** Brown, Saprolitic, Sandy Silt	
735												
730										730.2		15.3
											WEATHERED ROCK (Schist)	
725										723.2		22.3
720											**RESIDUAL** Brown, Saprolitic, Sandy Silt	
										719.7		25.8
										718.7	**WEATHERED ROCK** (Schist)	26.8
715											Boring Terminated by Tricone Refusal at Elevation 718.7 ft On Crystalline Rock (Schist)	
710												
705												
700												
695												
690												
685												
680												
675												
670												

NCDOT BORE DOUBLE U3326B_GEO_BRDG056.GPJ NC_DOT.GDT 04/20/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+25	**OFFSET** 27ft RT	**ALIGNMENT** -Y21- — **0 HR.** N/A
COLLAR ELEV. 745.2 ft	**TOTAL DEPTH** 25.5 ft	**NORTHING** 957,441	**EASTING** 1,803,462 — **24 HR.** 16.0
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/18/09	**COMP. DATE** 03/18/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.8 ft

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)
745.2										GROUND SURFACE	0.0
743.9										Pavement & ABC	1.3
742.5										**ROADWAY EMBANKMENT** Brown, Sandy Silt	2.7
741.4		3.8	4	5	4	9	SS-7	M		**RESIDUAL** Orange-Brown, Saprolitic, Sandy Silt	
736.4		8.8	4	9	9	18		M			
732.7										**WEATHERED ROCK** (Schist)	12.5
731.4		13.8	100/0.5			100/0.5					
726.4		18.8	60/0.0			60/0.0	RS-1			**CRYSTALLINE ROCK** Orange to Pink, Moderately Severely Weathered to Slightly Weathered, Very Soft to Medium Hard, Very Closely to Closely Fractured, Schist	18.8
719.7										Boring Terminated Due to Core Barrel Reamer Breaking at Elevation 719.7 ft In Crystalline Rock (Schist)	25.5

NCDOT BORE DOUBLE U3326B_GEO_BRDG056.GPJ NC_DOT.GDT 04/27/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+25	**OFFSET** 27ft RT	**ALIGNMENT** -Y21- — **0 HR.** N/A
COLLAR ELEV. 745.2 ft	**TOTAL DEPTH** 25.5 ft	**NORTHING** 957,441	**EASTING** 1,803,462 — **24 HR.** 16.0
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/18/09	**COMP. DATE** 03/18/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.8 ft
CORE SIZE NX	**TOTAL RUN** 6.7 ft	**DRILLER** Conley, H. R.	

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)
726.4											Begin Coring @ 18.8 ft	
726.4		18.8	1.7	0:57/0.7	(1.5)	(0.9)		(6.0)	(3.4)		**CRYSTALLINE ROCK** Orange to Pink, Moderately Severely Weathered to Slightly Weathered, Very Soft to Medium Hard, Very Closely to Closely Fractured, Schist	18.8
724.7		20.5	5.0	N=60/0.0 1:26/1.0 1:04/1.0 0:43/1.0 0:47/1.0 0:39/1.0 0:29/1.0	88% (4.5) 90%	53% (2.5) 50%	RS-1	90%	51%			
719.7		25.5									Boring Terminated Due to Core Barrel Reamer Breaking at Elevation 719.7 ft In Crystalline Rock (Schist)	25.5

NCDOT CORE SINGLE U3326B_GEO_BRDG056.GPJ NC_DOT.GDT 04/27/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 22+25	**OFFSET** 5ft LT	**ALIGNMENT** -Y21-	**0 HR.** N/A
COLLAR ELEV. 745.4 ft	**TOTAL DEPTH** 40.5 ft	**NORTHING** 957,454	**EASTING** 1,803,493	**24 HR.** FIAD
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic	
START DATE 03/19/09	**COMP. DATE** 03/22/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.7 ft	

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)
745.4										GROUND SURFACE	0.0
744.0										Asphalt & ABC	1.4
742.7										**ROADWAY EMBANKMENT** Orange-Brown, Sandy Silt	2.7
	741.7	3.7	8	10	12	22		M		**RESIDUAL** Orange-Brown, Saprolitic, Sandy Silt	
	736.7	8.7	29	46	50	96		M			
734.9										**WEATHERED ROCK** (Schist)	10.5
	731.7	13.7	54	46/0.3		100/0.8					
	726.7	18.7	100/0.5			100/0.5					
721.7	721.7	23.7	60/0.1			60/0.1				**CRYSTALLINE ROCK** Orange and Brown to Blue-Gray, Moderately Severely Weathered to Fresh, Very Soft to Hard, Very Closely to Widely Fractured, Schist	23.7
704.9										Boring Terminated at Elevation 704.9 ft In Crystalline Rock (Schist)	40.5

NCDOT BORE DOUBLE U3326B_GEO_BRDG056.GPJ NC_DOT.GDT 04/27/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)			**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 22+25	**OFFSET** 5ft LT	**ALIGNMENT** -Y21-	**0 HR.** N/A
COLLAR ELEV. 745.4 ft	**TOTAL DEPTH** 40.5 ft	**NORTHING** 957,454	**EASTING** 1,803,493	**24 HR.** FIAD
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic	
START DATE 03/19/09	**COMP. DATE** 03/22/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.7 ft	
CORE SIZE NX	**TOTAL RUN** 16.8 ft	**DRILLER** Conley, H. R.		

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)
721.7											Begin Coring @ 23.7 ft	
720	721.7 / 719.9	23.7 / 25.5	1.8	*N=60/0.1* 1:00/0.8 0:40/1.0	(0.1) 6%	(0.0) 0%		(14.0) 83%	(9.6) 57%		721.7 **CRYSTALLINE ROCK** Orange and Brown to Blue-Gray, Moderately Severely Weathered to Fresh, Very Soft to Hard, Very Closely to Widely Fractured, Schist	23.7
715	714.9	30.5	5.0	0:57/1.0 0:40/1.0 0:40/1.0 0:38/1.0 0:46/1.0	(4.0) 80%	(0.3) 6%						
710	709.9	35.5	5.0	1:06/1.0 1:05/1.0 0:57/1.0 0:56/1.0 0:50/1.0	(4.9) 98%	(4.3) 86%						
705	704.9	40.5	5.0	0:46/1.0 0:52/1.0 1:04/1.0 1:03/1.0 1:11/1.0	(5.0) 100%	(5.0) 100%					704.9 Boring Terminated at Elevation 704.9 ft In Crystalline Rock (Schist)	40.5

NCDOT CORE SINGLE U3326B_GEO_BRDG056.GPJ NC_DOT.GDT 04/27/09

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham		**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 23+34	**OFFSET** 4ft LT	**ALIGNMENT** -Y21-	**0 HR.** Dry
COLLAR ELEV. 766.1 ft	**TOTAL DEPTH** 39.3 ft	**NORTHING** 957,351	**EASTING** 1,803,530	**24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 02/26/09	**COMP. DATE** 02/26/09	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 39.3 ft

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)
766.1										GROUND SURFACE	0.0
										RESIDUAL Orange, Silty Clay	
	761.3	4.8	3	3	5	8	SS-4	M			
	756.3	9.8	2	3	4	7		M		758.0 Orange and Black, Micaceous, Saprolitic, Clayey Silt	8.1
	751.3	14.8	4	6	9	15		M		753.0 Orange, Black and White, Saprolitic, Sandy Silt	13.1
	746.3	19.8	8	12	12	24		M			
	741.3	24.8	7	9	13	22		M		738.4 Black and White, Saprolitic, Silty Sand	27.7
	736.3	29.8	16	30	33	63	SS-5	D		734.2 **WEATHERED ROCK** (Schist)	31.9
	731.3	34.8	41	59/0.4		100/0.9					
	726.8	39.3	60/0.0			60/0.0				726.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 726.8 ft On Crystalline Rock (Schist)	39.3

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham		**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 56 on -Y21- (SR 2670, N. Scales St.) over -L- (US 29 Bus.)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+17	**OFFSET** 40ft RT	**ALIGNMENT** -Y21-	**0 HR.** Dry
COLLAR ELEV. 757.7 ft	**TOTAL DEPTH** 29.6 ft	**NORTHING** 957,351	**EASTING** 1,803,483	**24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers			**HAMMER TYPE** Automatic
START DATE 02/26/09	**COMP. DATE** 02/26/09	**SURFACE WATER DEPTH** N/A		**DEPTH TO ROCK** 29.6 ft

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	
757.7										GROUND SURFACE	0.0
										RESIDUAL Orange, Silty Clay	
	753.9	3.8	2	4	5	9		M			
	748.9	8.8	4	6	7	13		M		750.6 Orange and Black, Micaceous, Saprolitic, Clayey Silt	7.1
	743.9	13.8	8	15	17	32		M		745.6 Orange and Black, Saprolitic, Sandy Silt	12.1
	738.9	18.8	5	7	8	15		M			
	733.9	23.8	5	8	8	16		M			
	728.9	28.8	21	79/0.1		100/0.6				728.9 **WEATHERED ROCK** (Schist)	28.8
										728.1 Boring Terminated by Auger Refusal at Elevation 728.1 ft on Crystalline Rock (Schist)	29.6

EB1-A

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	28' LT	21+22	14.6-16.1	A-5(1)	58	NP	7.9	54.1	33.9	4.1	100	99	50	-	-

EB1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	32' RT	21+19	4.3-5.8	A-7-5(10)	44	14	2.4	39.6	33.7	24.3	100	100	71	-	-
SS-2	32' RT	21+19	9.3-10.8	A-5(2)	48	5	8.3	53.1	34.5	4.1	100	98	53	-	-
SS-3	32' RT	21+19	19.3-20.8	A-4(0)	40	NP	9.3	59.0	29.7	2.0	100	97	44	-	-

B1-B

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	27' RT	22+27	3.8-5.3	A-4(0)	32	NP	20.0	54.3	21.7	4.0	100	94	36	-	-

EB2-A

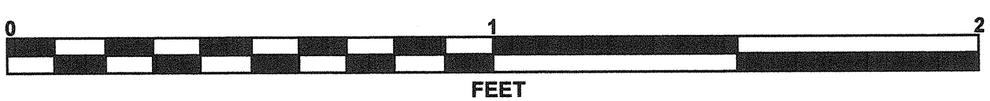
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4	21' RT	23+24	4.8-6.3	A-7-5(5)	47	12	8.7	47.6	23.4	20.3	95	91	53	-	-
SS-5	21' RT	23+24	29.8-31.3	A-2-4(0)	27	NP	20.9	58.0	19.1	2.0	97	91	32	-	-

CORE PHOTOGRAPHS

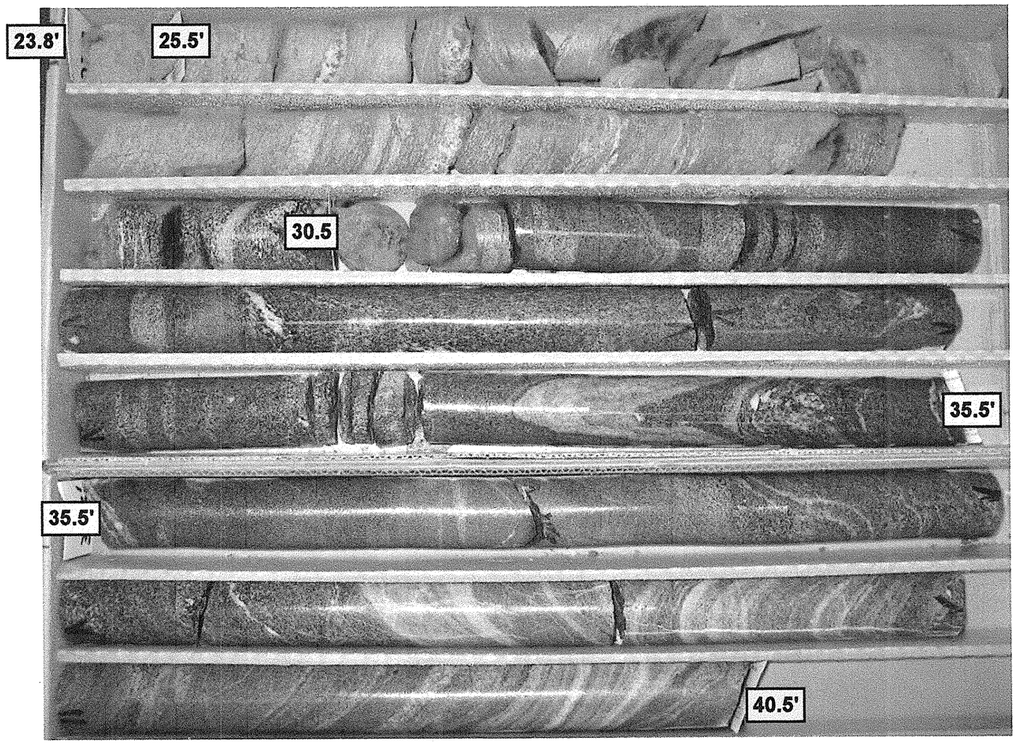
B1-B

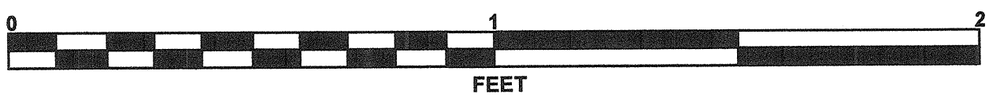
BOXE 1: 18.8 - 25.5 FEET



B1-C

BOXES 1 & 2: 23.8 - 40.5 FEET





SITE PHOTOGRAPH

Bridge No. 056 on -Y21- (SR 2670) Over -L- (US 29 Bus./US 158)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34924.1.1 (U-3326B)	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34924.1.1 F.A. PROJ. STP-29B(1)

COUNTY ROCKINGHAM

PROJECT DESCRIPTION US 29 BUSINESS (FREEWAY DRIVE) FROM SR 2670 (SOUTH SCALES STREET) TO NC 14 IN REIDSVILLE

SITE DESCRIPTION BRIDGE NOS. 311 & 126 ON -L- (US 29 BUS./US 158) OVER -Y13- (NC 87) AT STATION 203+04.30

CONTENTS

SHEET	DESCRIPTION
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17	SOIL TEST RESULTS
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20	SITE PHOTOGRAPH

CAUTION NOTICE

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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.

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PERSONNEL

H.R. CONLEY

C.D. CZAJKA

J.R. MATULA

J.I. MILKOVITS

N.D. MOHS

INVESTIGATED BY C.D. CZAJKA

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE APRIL 2009

NORTH CAROLINA LICENSED SEAL 2151 GEOLOGIST CHARLES DOUG CZAJKA 04/23/09

DRAWN BY: C.D. CZAJKA

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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: 34924.1.1

ID: U-3326B

PROJECT REFERENCE NO.	SHEET NO.
34924.1.1 (U-3326B)	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS 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

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	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	
	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID 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
PLASTIC INDEX				10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	No MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS A SUBGRADE	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/FT^2)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	<4 4 TO 10 10 TO 30 30 TO 50 >50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	<2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30	<0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (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.)

GRAIN SIZE MM: 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005
GRAIN SIZE 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 PLASTIC RANGE (PI) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS 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
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%
MODERATELY ORGANIC	5 - 10%	12 - 20%
HIGHLY ORGANIC	>10%	>20%

OTHER MATERIAL	
TRACE	1 - 10%
LITTLE	10 - 20%
SOME	20 - 35%
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
- SOUNDING ROD
- SPT DPT VST CPT DMT PMT TEST BORING
- AUGER BORING
- CORE BORING
- MW MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF SPT REFUSAL

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

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [X] -N X
- [ ] -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: BL-31
NORTHING: 949835.843
EASTING: 1796953.355 ELEVATION: 806.89 FT.

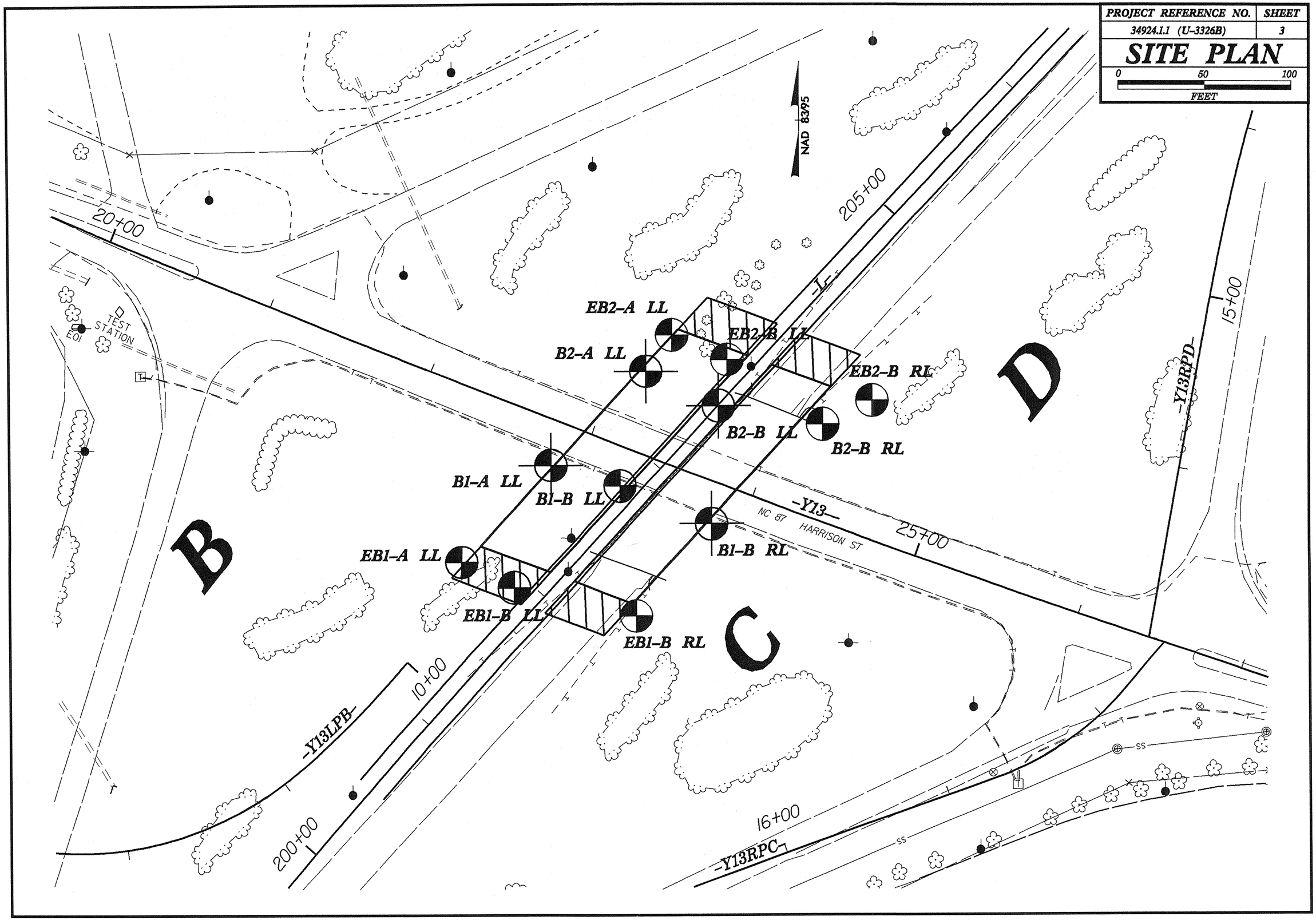
NOTES:

REVISED 02/23/06

PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	3

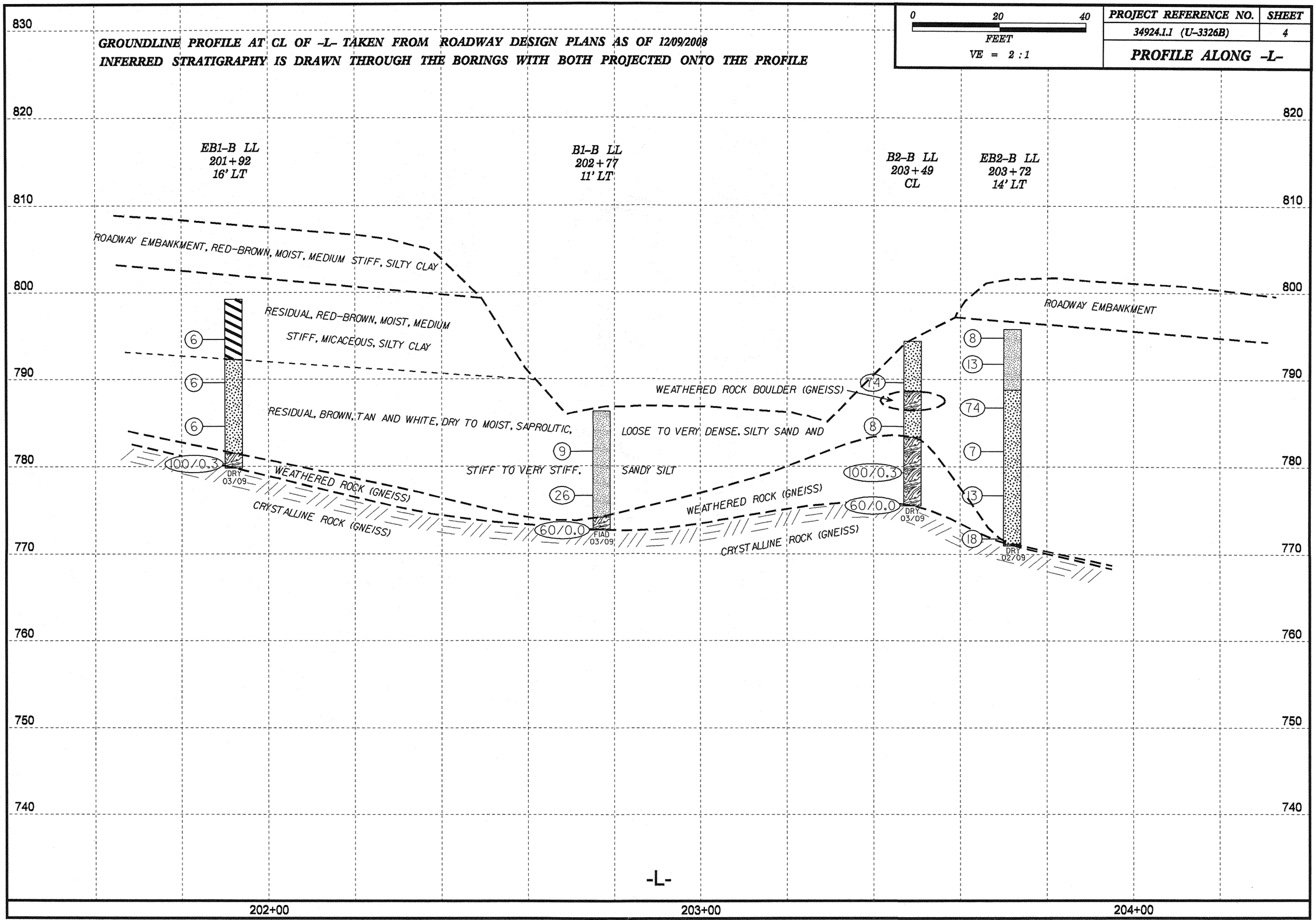
SITE PLAN

0 50 100
FEET

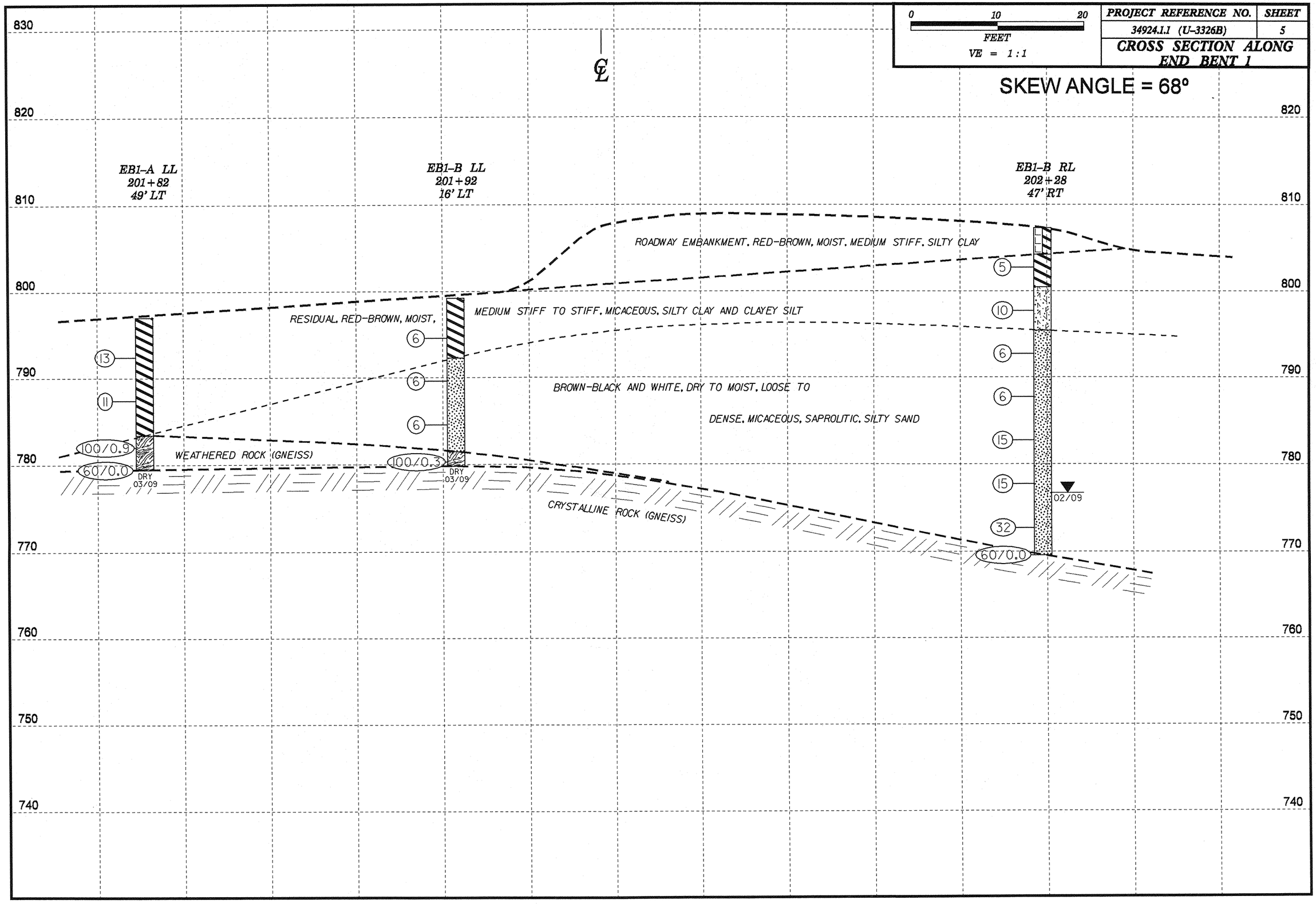


PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	4

PROFILE ALONG -L-



PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	5
CROSS SECTION ALONG END BENT 1	



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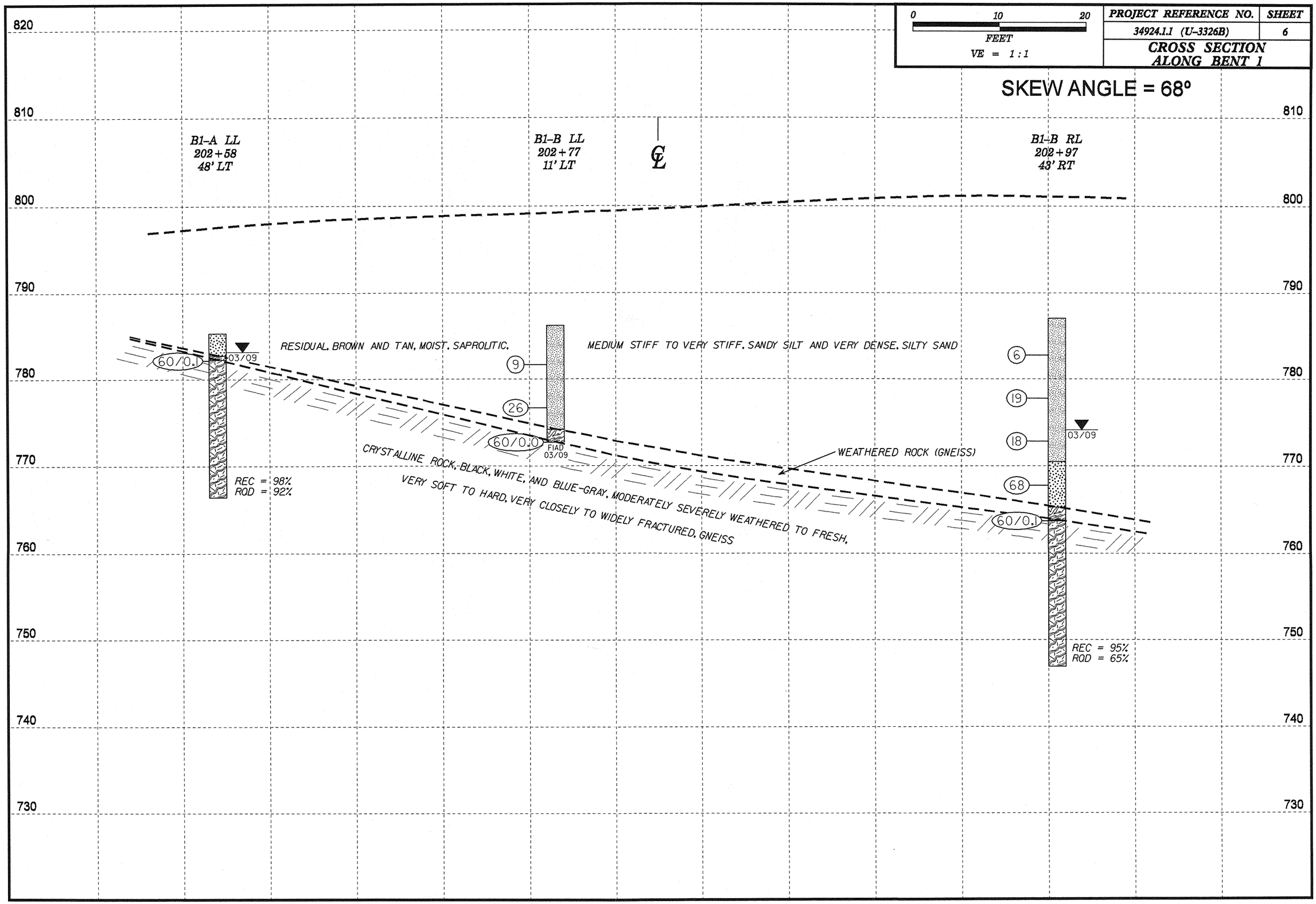
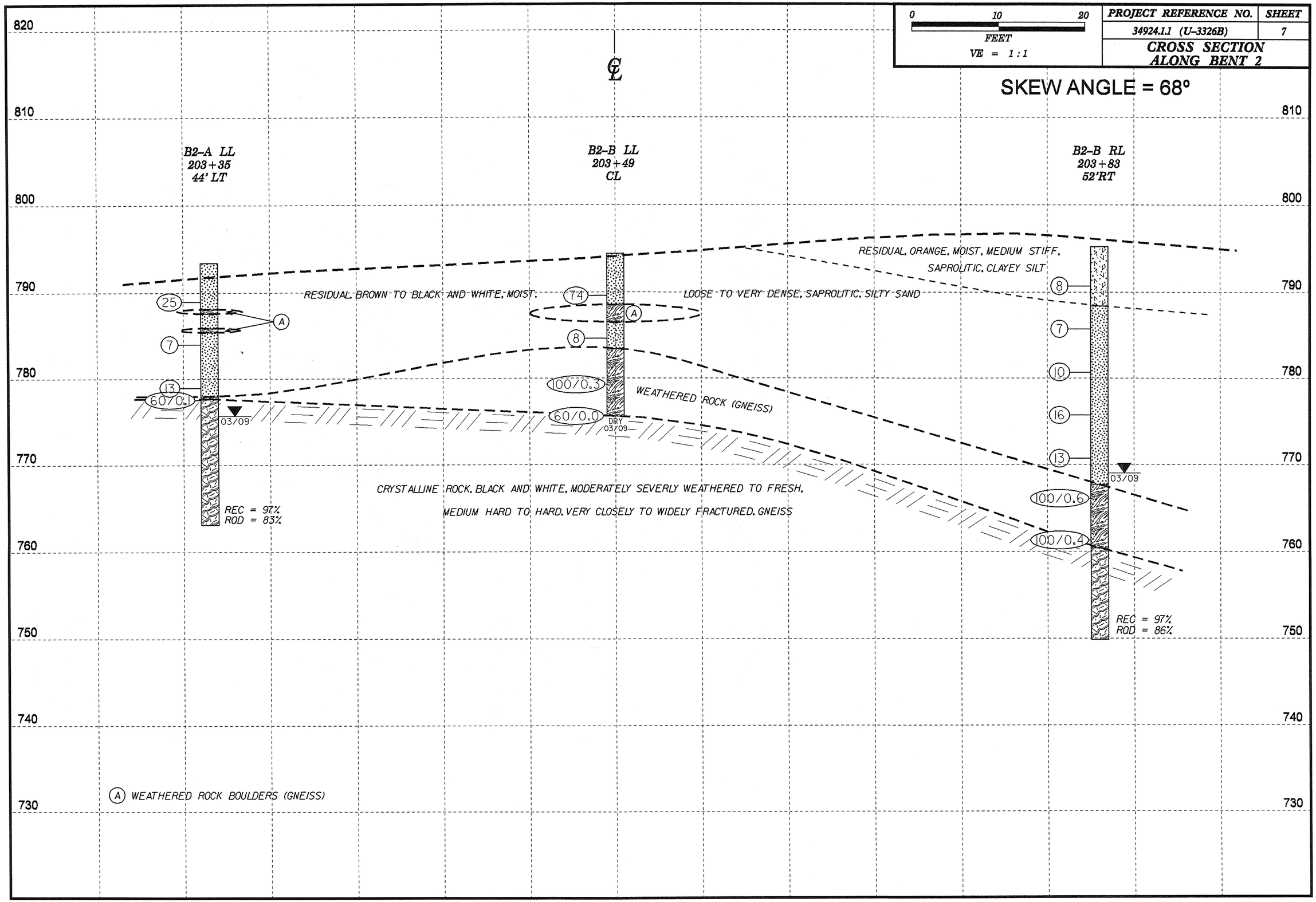


PROJECT REFERENCE NO.	SHEET
34924.1.1 (U-3326B)	7

CROSS SECTION ALONG BENT 2

0 10 20
FEET
VE = 1:1

SKEW ANGLE = 68°



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34924.1.1 (U-3326B)	8
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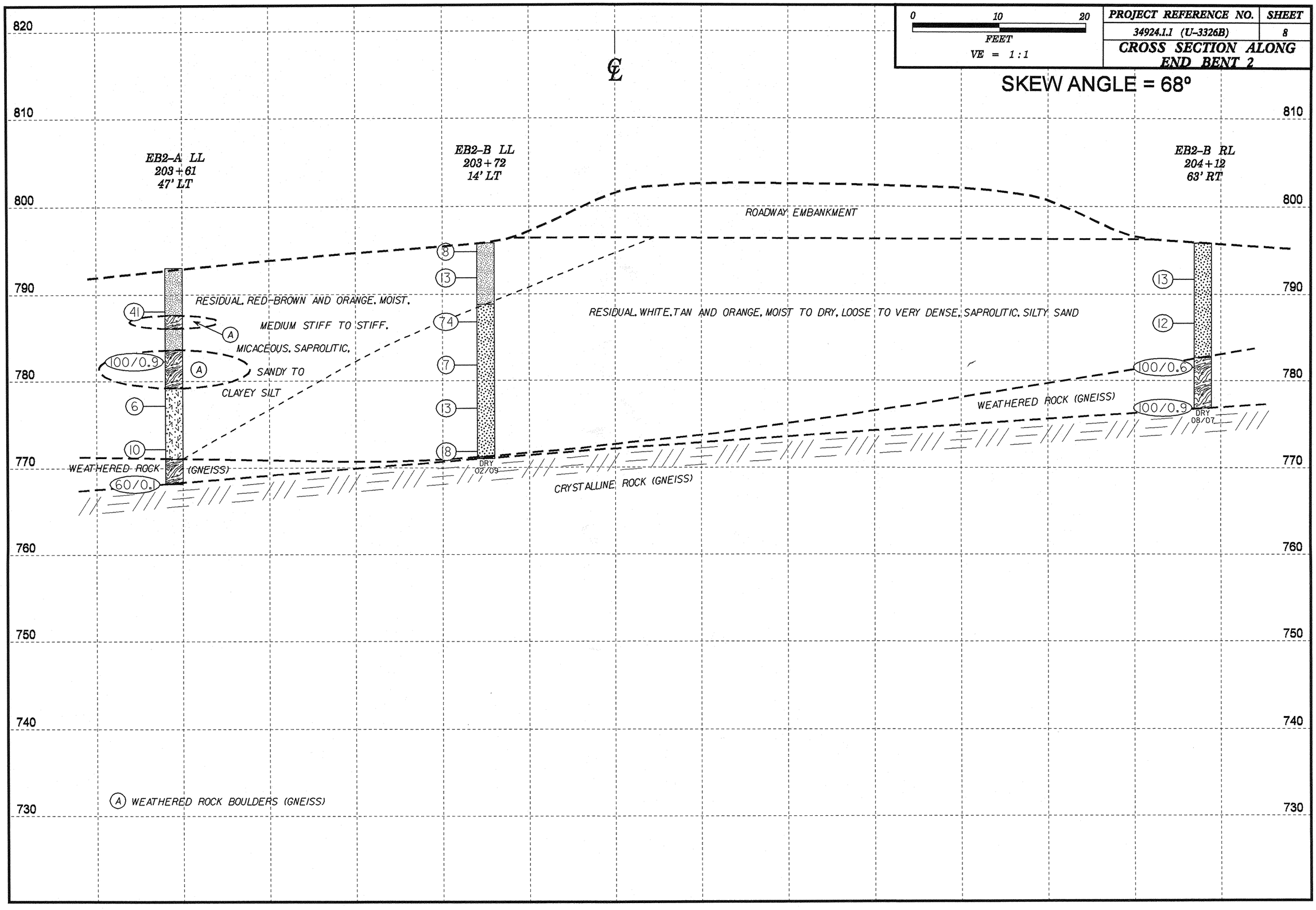


NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. EB1-A LL	**STATION** 201+82	**OFFSET** 49ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 797.0 ft	**TOTAL DEPTH** 17.6 ft	**NORTHING** 949,860	**EASTING** 1,796,849
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/06/09	**COMP. DATE** 03/06/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 17.6 ft

GROUND WTR (ft): 0 HR. Dry; 24 HR. Dry

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)
797.0										GROUND SURFACE	0.0
										RESIDUAL Red-Brown, Micaceous, Silty Clay	
	793.4	3.6	12	6	7	13		M			
	788.4	8.6	5	5	6	11		M			
	783.4	13.6	5	12	88/0.4	100/0.9				783.4	13.6
										WEATHERED ROCK (Gneiss)	
	779.4	17.6	60/0.0			60/0.0				779.4	17.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 779.4 ft On Crystalline Rock (Gneiss)	

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. EB1-B LL	**STATION** 201+92	**OFFSET** 16ft LT	**ALIGNMENT** -L-
COLLAR ELEV. 799.2 ft	**TOTAL DEPTH** 19.4 ft	**NORTHING** 949,845	**EASTING** 1,796,879
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 03/06/09	**COMP. DATE** 03/06/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 19.4 ft

GROUND WTR (ft): 0 HR. Dry; 24 HR. Dry

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
799.2										GROUND SURFACE 0.0
										RESIDUAL Red-Brown, Micaceous, Silty Clay
	795.6	3.6	2	3	3	6		M		
	790.6	8.6	3	2	4	6		M		
	785.6	13.6	3	2	4	6		D		
	780.6	18.6	100/0.3			100/0.3				
792.3										6.9
										Brown and White, Micaceous, Saprolitic, Silty Sand
781.5										17.7
779.8										**WEATHERED ROCK** (Gneiss) 19.4
										Boring Terminated by Auger Refusal at Elevation 779.8 ft On Crystalline Rock (Gneiss)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Milkovits, J. I.	
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)				**GROUND WTR (ft)**
BORING NO. EB1-B RL	**STATION** 202+28	**OFFSET** 47ft RT	**ALIGNMENT** -L-	**0 HR.** 32.5
COLLAR ELEV. 807.4 ft	**TOTAL DEPTH** 37.8 ft	**NORTHING** 949,828	**EASTING** 1,796,950	**24 HR.** 30.6
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic	
START DATE 02/27/09	**COMP. DATE** 02/27/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 37.8 ft	

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)
										807.4 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Red-Brown, Silty Clay	
	803.8	3.6	3	2	3	5	SS-3	M		804.3 **RESIDUAL** Red-Brown, Micaceous, Silty Clay	3.1
	798.8	8.6	3	4	6	10	SS-4	M		800.5 Tan-Brown, Micaceous, Clayey Silt	6.9
	793.8	13.6	2	3	3	6	SS-5	M		795.5 Brown-Black and White, Micaceous, Saprolitic, Silty Sand	11.9
	788.8	18.6	3	3	3	6		M			
	783.8	23.6	6	7	8	15		M			
	778.8	28.6	5	8	7	15		M			
	773.8	33.6	7	10	22	32		M			
	769.6	37.8	60/0.0			60/0.0				769.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 769.6 ft On Crystalline Rock (Gneiss)	37.8

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)				**GROUND WTR (ft)**
BORING NO. B1-B LL	**STATION** 202+77	**OFFSET** 11ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 786.3 ft	**TOTAL DEPTH** 13.6 ft	**NORTHING** 949,903	**EASTING** 1,796,941	**24 HR.** FIAD
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic	
START DATE 03/12/09	**COMP. DATE** 03/12/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 13.6 ft	

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
										786.3 GROUND SURFACE 0.0
										RESIDUAL Tan, Saprolitic, Sandy Silt
	782.7	3.6	5	5	4	9		M		
	777.7	8.6	7	9	17	26		M		
										774.2 12.1
	772.7	13.6	60/0.0			60/0.0				772.7 **WEATHERED ROCK** (Gneiss) 13.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 772.7 ft On Crystalline Rock (Gneiss)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B1-A LL	**STATION** 202+58	**OFFSET** 48ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 785.3 ft	**TOTAL DEPTH** 18.9 ft	**NORTHING** 949,915	**EASTING** 1,796,901 — **24 HR.** 2.2
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/10/09	**COMP. DATE** 03/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 3.1 ft

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)
790											
785										785.3 GROUND SURFACE	0.0
										RESIDUAL Brown, Silty Sand	
	782.2	3.1	60/0.1			60/0.1				782.7	2.6
780										782.2 **WEATHERED ROCK** (Gneiss)	3.1
										CRYSTALLINE ROCK Black, White and Blue-Gray, Moderately Severely Weathered to Fresh, Soft to Hard, Very Close to Widely Fractured, Gneiss	
775							RS-1				
770											
										766.4	18.9
765										Boring Terminated at Elevation 766.4 ft In Crystalline Rock (Gneiss)	
760											
755											
750											
745											
740											
735											
730											
725											
720											
715											
710											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B1-A LL	**STATION** 202+58	**OFFSET** 48ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 785.3 ft	**TOTAL DEPTH** 18.9 ft	**NORTHING** 949,915	**EASTING** 1,796,901 — **24 HR.** 2.2
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/10/09	**COMP. DATE** 03/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 3.1 ft
CORE SIZE NX	**TOTAL RUN** 15.8 ft	**DRILLER** Conley, H. R.	

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)
782.2											Begin Coring @ 3.1 ft	
	782.2	3.1	1.8	1:20/1.0	(1.7)	(1.7)		(15.5)	(14.5)		782.2 **CRYSTALLINE ROCK**	3.1
780	780.4	4.9		*N=60/0.1*	94%	94%		98%	92%		Black, White and Blue-Gray, Moderately Severely Weathered to Fresh, Soft to Hard, Very Close to Widely Fractured, Gneiss	
			5.0	1:11/0.8								
				1:01/1.0	(4.8)	(3.8)						
				1:03/1.0	96%	76%						
				1:13/1.0								
				1:25/1.0								
775	775.4	9.9		1:47/1.0								
			5.0	1:58/1.0	(5.0)	(5.0)	RS-1					
				2:25/1.0	100%	100%						
				2:59/1.0								
				3:28/1.0								
770	770.4	14.9		4:06/1.0								
			4.0	4:38/1.0	(4.0)	(4.0)						
				5:49/1.0	100%	100%						
				6:53/1.0								
	766.4	18.9		7:26/1.0							766.4	18.9
765											Boring Terminated at Elevation 766.4 ft In Crystalline Rock (Gneiss)	
760												
755												
750												
745												
740												
735												
730												
725												
720												
715												
710												
705												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B1-B RL	**STATION** 202+97	**OFFSET** 43ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 787.1 ft	**TOTAL DEPTH** 40.1 ft	**NORTHING** 949,882	**EASTING** 1,796,994 — **24 HR.** 13.0
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/11/09	**COMP. DATE** 03/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.3 ft

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)
790											
										787.1 GROUND SURFACE	0.0
785										**RESIDUAL** Tan, Micaceous, Saprolitic, Sandy Silt	
	783.8	3.3	2	3	3	6	SS-6	M			
780											
	778.8	8.3	3	9	10	19		M			
775											
	773.8	13.3	5	8	10	18		M			
770										770.5	16.6
	768.8	18.3	8	21	47	68		M		Brown, Micaceous, Saprolitic, Silty Sand	
765										765.3	21.8
	763.8	23.3	60/0.1			60/0.1	RS-2			763.8 **WEATHERED ROCK** (Gneiss)	23.3
760										**CRYSTALLINE ROCK** Black, White, Blue-Gray, and Pink, Moderately Severly Weathered to Fresh, Very Soft to Hard, Very Close to Moderately Closely Fractured, Gneiss	
755											
750										747.0	40.1
745										Boring Terminated at Elevation 747.0 ft In Crystalline Rock (Gneiss)	
740											
735											
730											
725											
720											
715											
710											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B1-B RL	**STATION** 202+97	**OFFSET** 43ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 787.1 ft	**TOTAL DEPTH** 40.1 ft	**NORTHING** 949,882	**EASTING** 1,796,994 — **24 HR.** 13.0
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/11/09	**COMP. DATE** 03/11/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 23.3 ft
CORE SIZE NX	**TOTAL RUN** 16.8 ft	**DRILLER** Conley, H. R.	

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)
763.8											Begin Coring @ 23.3 ft	
	763.8	23.3	1.8	*N=60/0.1* 0:42/0.8 0:44/1.0	(0.9) 50%	(0.0) 0%		(15.8) 94%	(10.9) 65%		763.8 **CRYSTALLINE ROCK** Black, White, Blue-Gray, and Pink, Moderately Severly Weathered to Fresh, Very Soft to Hard, Very Close to Moderately Closely Fractured, Gneiss	23.3
	762.0	25.1										
760			5.0	0:48/1.0 0:49/1.0 0:48/1.0 0:54/1.0 0:48/1.0	(5.0) 100%	(2.5) 50%	RS-2					
	757.0	30.1										
755			5.0	1:03/1.0 1:04/1.0 1:03/1.0 1:03/1.0 0:48/1.0	(5.0) 100%	(3.5) 70%						
	752.0	35.1										
750			5.0	0:53/1.0 0:46/1.0 0:51/1.0 0:48/1.0 1:04/1.0	(4.9) 98%	(4.9) 98%						
	747.0	40.1									747.0	40.1
745											Boring Terminated at Elevation 747.0 ft In Crystalline Rock (Gneiss)	
740												
735												
730												
725												
720												
715												
710												
705												
700												
695												
690												
685												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B2-A LL	**STATION** 203+35	**OFFSET** 44ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 793.4 ft	**TOTAL DEPTH** 30.3 ft	**NORTHING** 949,969	**EASTING** 1,796,956 / **24 HR.** 17.7
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/17/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 15.7 ft

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))
795										793.4 GROUND SURFACE 0.0
										RESIDUAL Brown and White, Saprolitic, Silty Sand
790	790.0	3.4	3	10	15	25		M		788.1 5.3
										787.6 5.8 **WEATHERED ROCK** (Gneiss) 785.9 7.5
785	785.0	8.4	3	2	5	7		M		785.4 8.0 **RESIDUAL** Brown and White, Saprolitic, Silty Sand **WEATHERED ROCK** (Gneiss)
780	780.0	13.4	6	6	7	13		M		**RESIDUAL** Red-Brown to White and Black, Micaceous, Saprolitic, Silty Sand 778.0 15.4
775	777.7	15.7	60/0.1			60/0.1				777.7 15.7 **WEATHERED ROCK** (Gneiss)
770							RS-3			**CRYSTALLINE ROCK** Black and White, Moderately Severely Weathered to Fresh, Medium Hard to Hard, Very Close to Widely Fractured, Gneiss
765										763.1 30.3
760										Boring Terminated at Elevation 763.1 ft In Crystalline Rock (Gneiss)
755										
750										
745										
740										
735										
730										
725										
720										
715										

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B2-A LL	**STATION** 203+35	**OFFSET** 44ft LT	**ALIGNMENT** -L- / **0 HR.** N/A
COLLAR ELEV. 793.4 ft	**TOTAL DEPTH** 30.3 ft	**NORTHING** 949,969	**EASTING** 1,796,956 / **24 HR.** 17.7
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
START DATE 03/17/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 15.7 ft
CORE SIZE NX	**TOTAL RUN** 14.6 ft	**DRILLER** Conley, H. R.	

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))
777.7											Begin Coring @ 15.7 ft
	777.7	15.7	4.6	*N=60/0.1* 1:20/0.5 0:37/1.0 0:59/1.0 1:01/1.0 0:57/1.0	(4.1) 89%	(2.6) 57%		(14.0) 96%	(12.1) 83%		777.7 15.7 **CRYSTALLINE ROCK** Black and White, Moderately Severely Weathered to Fresh, Medium Hard to Hard, Very Close to Widely Fractured, Gneiss
775	773.1	20.3	5.0	1:08/1.0 1:08/1.0 1:10/1.0 1:00/1.0 0:59/1.0	(4.9) 98%	(4.5) 90%	RS-3				
770	768.1	25.3	5.0	1:18/1.0 0:59/1.0 1:06/1.0 1:11/1.0 1:22/1.0	(5.0) 100%	(5.0) 100%					
765	763.1	30.3									763.1 30.3 Boring Terminated at Elevation 763.1 ft In Crystalline Rock (Gneiss)
760											
755											
750											
745											
740											
735											
730											
725											
720											
715											
710											
705											
700											

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B2-B RL	**STATION** 203+83	**OFFSET** 52ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 795.2 ft	**TOTAL DEPTH** 45.3 ft	**NORTHING** 949,939	**EASTING** 1,797,059	**24 HR.** 26.2
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic	
START DATE 03/12/09	**COMP. DATE** 03/13/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 34.8 ft	

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)
800											
795										795.2 GROUND SURFACE	0.0
	791.7	3.5								**RESIDUAL** Orange, Saprolitic, Clayey Silt	
790			3	4	4	8	SS-7	M			
	786.7	8.5								788.4	6.8
785			4	4	3	7		M		Tan to Brown and White, Saprolitic, Silty Sand	
	781.7	13.5									
780			4	5	5	10		M			
	776.7	18.5									
775			2	8	8	16		M			
	771.7	23.5									
770			7	7	6	13	SS-8	M			
	766.7	28.5								767.7	27.5
765			94	6/0.1		100/0.6				**WEATHERED ROCK** (Gneiss)	
	761.7	33.5									
760			100/0.4			100/0.4	RS-4			760.4	34.8
755										**CRYSTALLINE ROCK** Black and White, Moderately Severely Weathered to Fresh, Medium Hard to Hard, Closely to Widely Fractured, Gneiss	
750										749.9	45.3
										Boring Terminated at Elevation 749.9 ft In Crstalline Rock (Gneiss)	
745											
740											
735											
730											
725											

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.	
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)				**GROUND WTR (ft)**
BORING NO. B2-B RL	**STATION** 203+83	**OFFSET** 52ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 795.2 ft	**TOTAL DEPTH** 45.3 ft	**NORTHING** 949,939	**EASTING** 1,797,059	**24 HR.** 26.2
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic	
START DATE 03/12/09	**COMP. DATE** 03/13/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 34.8 ft	
CORE SIZE NX	**TOTAL RUN** 10.5 ft	**DRILLER** Conley, H. R.		

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)
760.4											Begin Coring @ 34.8 ft	
	760.4	34.8	0.5	1:18/0.5	(0.5)	(0.0)		(10.2)	(9.0)		760.4 **CRYSTALLINE ROCK**	34.8
	759.9	35.3	5.0	1:28/1.0	100%	0%	RS-4	97%	86%		Black and White, Moderately Severely Weathered to Fresh, Medium Hard to Hard, Closely to Widely Fractured, Gneiss	
				1:00/1.0								
				0:54/1.0	(4.8)	(4.5)						
				0:48/1.0	96%	90%						
755	754.9	40.3		0:52/1.0								
			5.0	0:54/1.0	(4.9)	(4.5)						
				0:49/1.0	98%	90%						
				0:50/1.0								
				0:45/1.0								
750	749.9	45.3		0:43/1.0							749.9	45.3
											Boring Terminated at Elevation 749.9 ft In Crstalline Rock (Gneiss)	
745												
740												
735												
730												
725												
720												
715												
710												
705												
700												
695												
690												
685												

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. B2-B LL	**STATION** 203+49	**OFFSET** CL	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 794.4 ft	**TOTAL DEPTH** 18.8 ft	**NORTHING** 949,949	**EASTING** 1,796,998 — **24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
START DATE 03/17/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 18.8 ft

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)
795										794.4 GROUND SURFACE	0.0
790	790.6	3.8	6	40	34	74		M		**RESIDUAL** White and Brown, Saprolitic, Silty Sand — 788.6	5.8
785	785.6	8.8	3	3	5	8		M		**WEATHERED ROCK** (Gneiss) — 786.5	7.9
										RESIDUAL White and Brown, Saprolitic Silty Sand — 783.4	11.0
780	780.6	13.8	7	19	81/0.3	100/0.3				**WEATHERED ROCK** (Gneiss)	
775	775.6	18.8	60/0.0			60/0.0				775.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 775.6 ft On Crystalline Rock (Gneiss)	18.8
770											
765											
760											
755											
750											
745											
740											
735											
730											
725											
720											
715											

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. EB2-A LL	**STATION** 203+61	**OFFSET** 47ft LT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 793.0 ft	**TOTAL DEPTH** 24.8 ft	**NORTHING** 949,990	**EASTING** 1,796,971 — **24 HR.** N/A
DRILL MACHINE CME-550	**DRILL METHOD** NW Casing w/ SPT		**HAMMER TYPE** Automatic
START DATE 02/06/09	**COMP. DATE** 03/17/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 24.7 ft

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
795										793.0 GROUND SURFACE 0.0
790	789.1	3.9	3	3	38	41	SS-1	M		**RESIDUAL** Red-Brown, Sandy Silt — 787.7 (5.3)
785	783.2	9.8	57	43/0.4		100/0.9				786.1 **WEATHERED ROCK** (Gneiss) (6.9); **RESIDUAL** 783.6 Red-Brown, Sandy Silt (9.4); **WEATHERED ROCK** (Gneiss)
780	778.2	14.8	2	3	3	6	SS-9	M		779.2 (13.8); **RESIDUAL** Orange and Brown, Micaceous, Saprolitic, Clayey Silt
775	773.2	19.8	4	4	6	10		M		771.1 (21.9); **WEATHERED ROCK** (Gneiss)
770	768.3	24.7	60/0.1			60/0.1				768.3 (24.7); 768.2 **CRYSTALLINE ROCK** (Gneiss) (24.8) Boring Terminated with Standard Penetration Test Refusal at Elevation 768.2 ft In Crystalline Rock (Gneiss)
765										
760										
755										
750										
745										
740										
735										
730										
725										
720										
715										

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Czajka, C. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. EB2-B LL	**STATION** 203+72	**OFFSET** 14ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 795.8 ft	**TOTAL DEPTH** 24.8 ft	**NORTHING** 949,976	**EASTING** 1,797,003	**24 HR.** Dry
DRILL MACHINE CME-550	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 02/06/09	**COMP. DATE** 02/06/09	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 24.8 ft

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)
795.8		0.0								GROUND SURFACE	0.0
	792.8	3.0	1	3	5	8, 13		M		**RESIDUAL** Red-Brown, Sandy Silt	
	787.8	8.0	4	6	7			M			
	782.8	13.0	45	48	26	74	SS-2	D		788.8 White and Tan, Saprolitic, Silty Sand	7.0
	777.8	18.0	3	4	3	7		D			
	772.8	23.0	5	6	7	13		D			
			10	7	11	18		D		771.2 **WEATHERED ROCK** (Gneiss)	24.6
										771.0 Boring Terminated by Auger Refusal at Elevation 771.0 ft On Crystalline Rock (Gneiss)	24.8

PROJECT NO. 34924.1.1	**ID.** U-3326B	**COUNTY** Rockingham	**GEOLOGIST** Mohs, N. D.
SITE DESCRIPTION Bridge No. 311 on -L- (US 29 Bus.) over -Y13- (NC 65/87)			**GROUND WTR (ft)**
BORING NO. EB2-B RL	**STATION** 204+12	**OFFSET** 63ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 795.6 ft	**TOTAL DEPTH** 19.0 ft	**NORTHING** 949,959	**EASTING** 1,797,062	**24 HR.** Dry
DRILL MACHINE CME-45C	**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
START DATE 08/22/07	**COMP. DATE** 08/22/07	**SURFACE WATER DEPTH** N/A	**DEPTH TO ROCK** 19.0 ft

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
795.6										GROUND SURFACE 0.0
	792.4	3.2	5	6	7	13	SS-335	M		**RESIDUAL** Orange, Silty Sand
	787.4	8.2	5	6	6	12		M		
	782.4	13.2	7	90	10/0.1	100/0.6				782.4 **WEATHERED ROCK** (Gneiss) 13.2
	778.0	17.6	13	67	33/0.4	100/0.9				777.0 Boring Terminated BY AUGER REFUSAL at Elevation 776.6 ft On Crystalline Rock (Gneiss) 18.6

EB1-B RL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	47' RT	202+28	3.6-5.1	A-7-5(4)	49	11	24.5	32.8	20.4	22.3	100	87	49	-	-
SS-4	47' RT	202+28	8.6-10.1	A-5(3)	51	9	20.6	35.4	23.7	20.2	100	91	50	-	-
SS-5	47' RT	202+28	13.6-15.1	A-2-5(0)	44	NP	29.8	46.0	20.2	4.0	100	87	30	-	-

B1-B RL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-6	43' RT	202+97	3.3-4.8	A-4(0)	35	3	30.2	38.5	23.2	8.1	99	83	38	-	-

B2-B RL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-7	52' RT	203+83	3.5-5.0	A-5(4)	46	9	21.5	32.0	24.3	22.3	100	90	52	-	-
SS-8	52' RT	203+83	23.5-25.0	A-2-4(0)	37	NP	38.9	37.0	20.0	4.0	96	71	30	-	-

EB2-A LL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	47' LT	203+61	3.9-5.3	A-4(0)	33	5	30.6	38.9	18.4	12.1	100	86	36	-	-
SS-9	47' LT	203+61	14.8-16.3	A-5(2)	55	5	20.2	40.9	32.8	6.1	99	89	47	-	-

EB2-B LL

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-2	14' LT	203+72	8.0-9.5	A-2-4(0)	26	NP	42.7	36.8	16.4	4.0	95	71	25	-	-

EB2-B RL

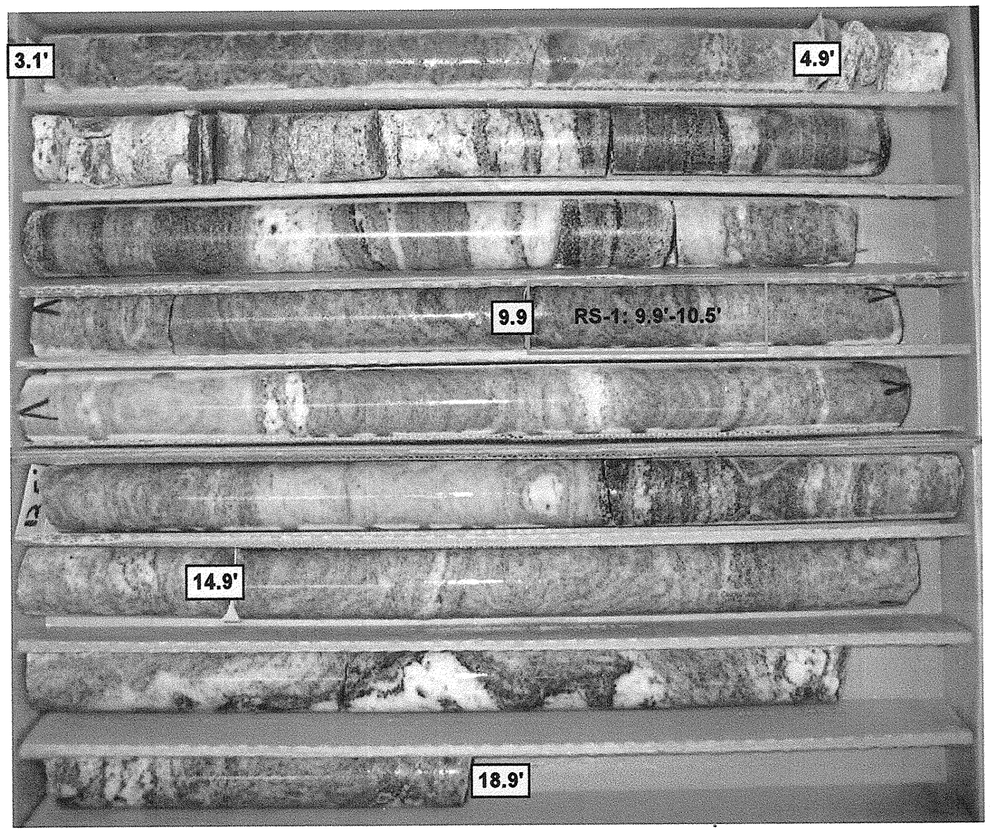
SOIL TEST RESULTS

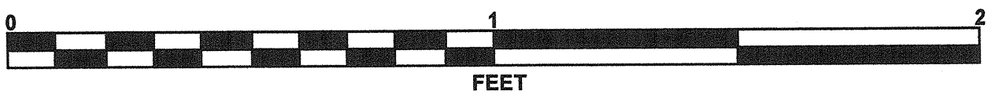
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-335	63' RT	204+12	3.2-4.7	A-2-4(0)	40	5	47.7	20.9	19.2	12.2	98	68	32	-	-

CORE PHOTOGRAPHS

B1-A LL

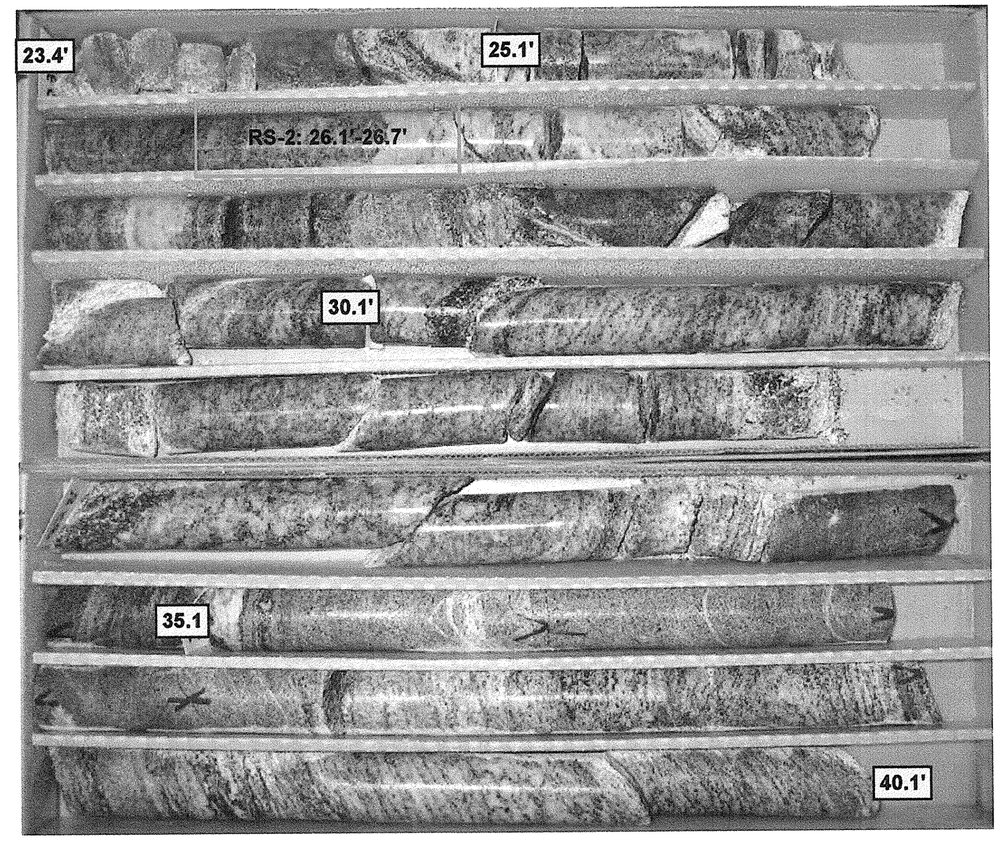
BOXES 1 & 2: 3.1 - 18.9 FEET

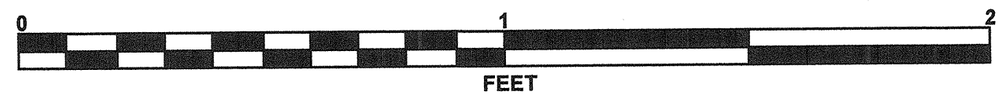




B1-B RL

BOXES 1 & 2: 23.4 - 40.1 FEET

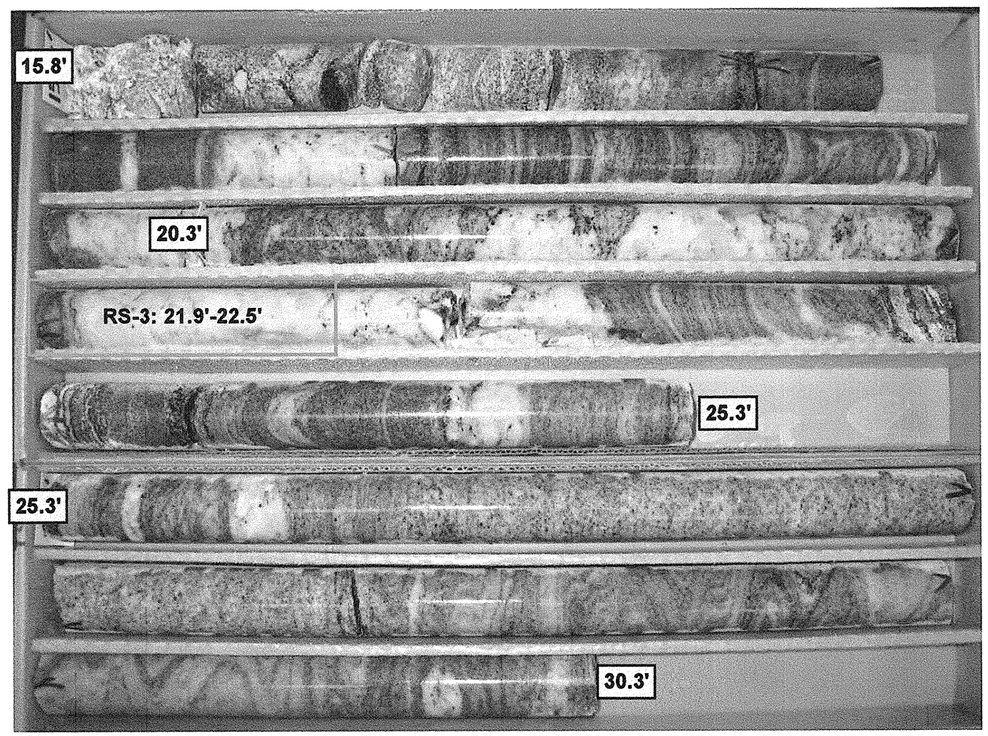


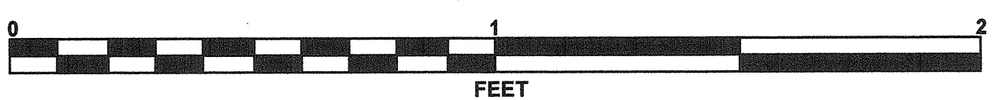


CORE PHOTOGRAPHS

B2-A LL

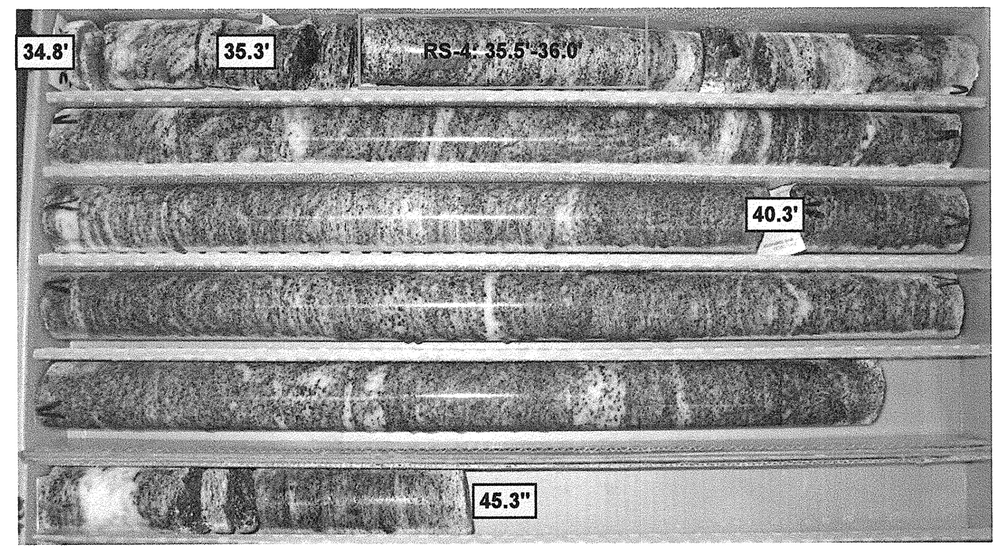
BOXES 1 & 2: 15.8 - 30.3 FEET

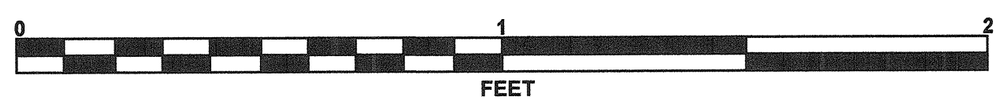




B2-B RL

BOXES 1 & 2: 34.8 - 45.3 FEET





SITE PHOTOGRAPH

Bridge Nos. 126 & 311 on -L- (US 29 Bus./US 158) Over -Y13- (NC 65/ NC 87)