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SHEET NO.

5-6

7-12

# 40191

#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

#### **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY NEW HANOVER

PROJECT DESCRIPTION SR 1409 (MILITARY CUTOFF ROAD) TO US 17 IN WILMINGTON

SITE DESCRIPTION BRIDGE NO. 202 ON -L- (PROPOSED SR 1409) OVER -Y2- (OGDEN PARK DRIVE) AT -L-STA. 62 + 99.10

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4751	1	14

#### **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 1999 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

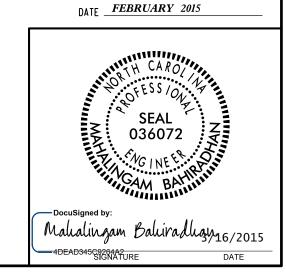
INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS TO BE ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

J. WHITT J. DANIEL S. BUCHANAN S. KITTS A. PAISLEY MID-ATLANTIC DR. INVESTIGATED BY M. BAHIRADHAN DRAWN BY \_S. BUCHANAN CHECKED BY M. BAHIRADHAN SUBMITTED BY SCHNABEL ENG.

**PERSONNEL** M. BAHIRADHAN



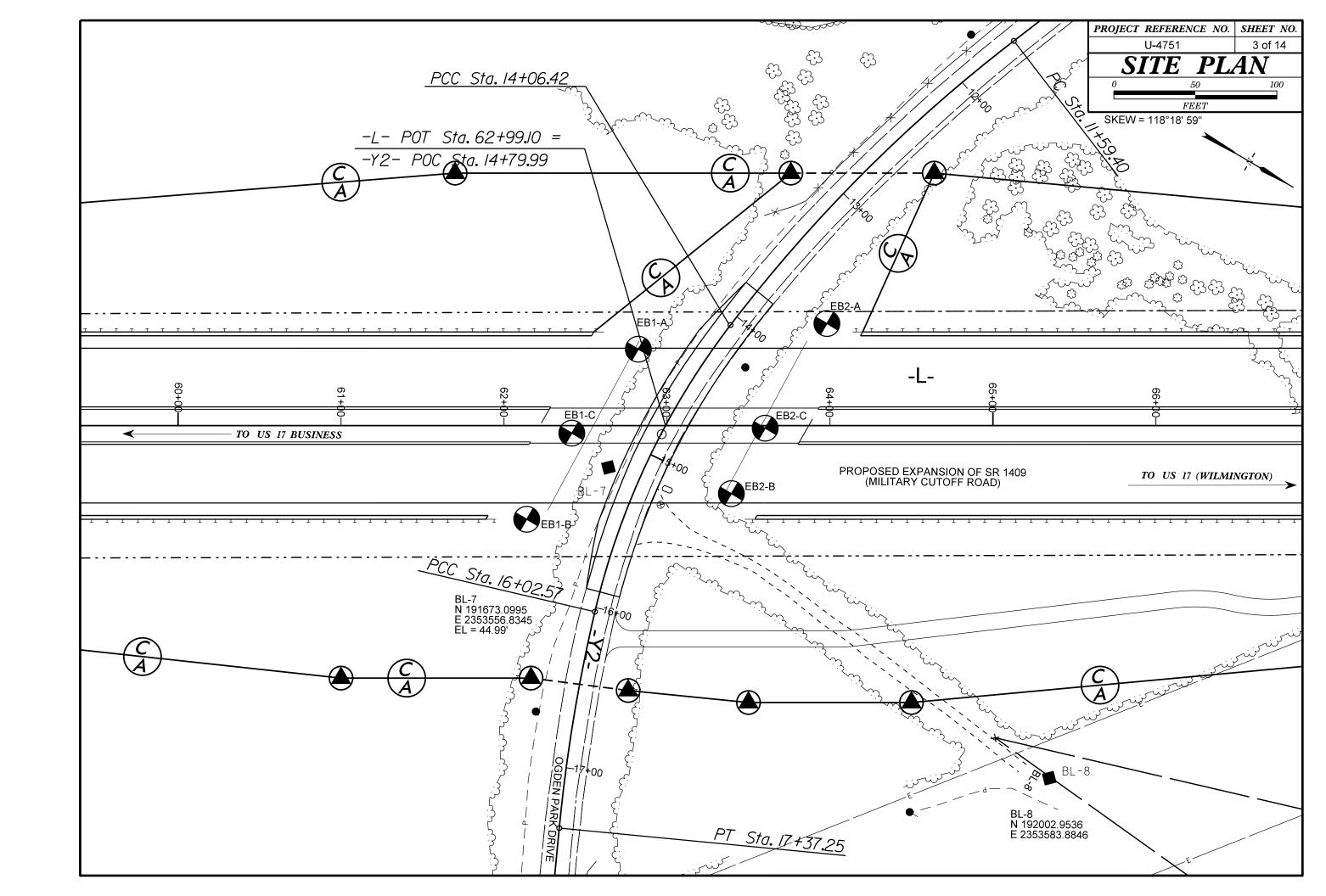
(OJECT REPERENCE NO.		SHEET NO	
U-4751	2	OF	14

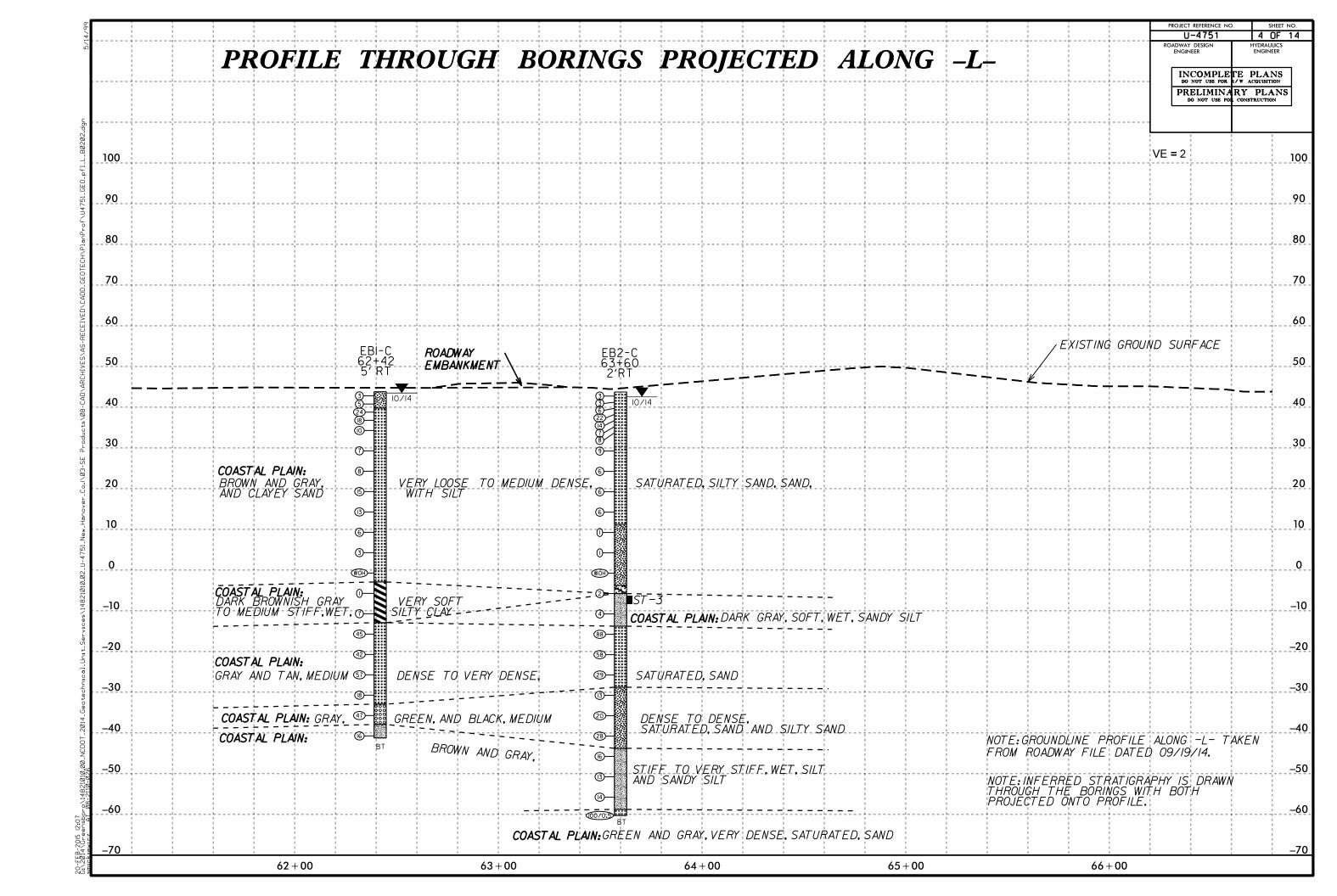
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

### SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED 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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,  VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	WEATHERED VILVA NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. ( \$\( \) 30% PASSING "2000) ( > 30% PASSING "2000)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL COCOGOCOG	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
5555465564554	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
7. PASSING 10 50 MX GRANULAR SILT-GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN   PEAT   200   15 MX 25 MX 0 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN   25 MX 0 MX	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 40 MX 41 MN LITTLE OR LITTLE OR LITTLE OR LITTLE OR	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROLIP INDEX A A A MY 8 MY 12 MY 16 MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS, FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
CEN DATING	→ — — — — — — — — — — — — — — — — — — —	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	PARENT MATERIAL.
AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	SPRING OR SEEP	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK,	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING ON SEEP	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,	FIELD.   JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	☐ ☐ WITH SOIL DESCRIPTION ► OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  ST DOPT DAT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	NT - STATE	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50  VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT  AUGER BORING  CONE PENETROMETER TEST	VERY  ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE  SEVERE  BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM,
GENERALLY   SOFT   2 TO 4   0.25 TO 0.5     SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A DIEZOMETED	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - 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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTT ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNCLASSIFIED EXCAVATION - UNDERCUT UNDERCUT EMBANKMENT OR BACKFILL  ACCEPTABLE DEGRADABLE ROCK	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	TENGTH 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.
PLASTIC LIQUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
■ RANGE / SEMISULID; REQUIRES DRIING TO	FRAGS FRAGMENTS $\omega$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-7, N 191673,0995, E 2353556,8345
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 44.99 FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6° CONTINUOUS ELICHT ALICER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	NM = NOT MEASURED
PLASTICITY	CME-55   B*HOLLOW AUGERS   CORE SIZE:   -BH	INDURATION	
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH	<b>-</b>	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS:	GENILE BLUW BY HAMMER DISINIEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST X TRICONE 2.94 STEEL TEETH HAND AUGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB.	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CME 45B CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED  SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
HODITIENS SOCIETAS ETGIT, DAINE, STILLARED, ETC. HILE OSED TO DESCRIBE ALL ENGANCE.			





<b>WBS</b> 40191		ITY NEW HANOVER	GEOLOGIST J. Whitt	WBS 40191 TIP U-4751	COUNTY NEW HANOVER	GEOLOGIST J. Whitt
SITE DESCRIPTION Bridge No. 2	<del></del>		GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 202 on -L- (Military Cu		GROUND WTR (fr
BORING NO. EB1-A	STATION 62+82	OFFSET 47 ft LT	ALIGNMENT -L- 0.1	BORING NO. EB1-A STATION 62+82	OFFSET 47 ft LT	ALIGNMENT -L- 0 HR. 0.1
COLLAR ELEV. 44.4 ft	TOTAL DEPTH 85.0 ft	<b>NORTHING</b> 191,652	<b>EASTING</b> 2,353,485 <b>24 HR.</b> 1.0	COLLAR ELEV. 44.4 ft TOTAL DEPTH 85	5.0 ft <b>NORTHING</b> 191,652	<b>EASTING</b> 2,353,485 <b>24 HR.</b> 1.0
DRILL RIG/HAMMER EFF./DATE MID1	904 CME-45B 80% 10/22/2014	DRILL METHOD M	fud Rotary HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 80% 10/22/		Mud Rotary HAMMER TYPE Automatic
DRILLER M. Coogan	<b>START DATE</b> 10/14/14	COMP. DATE 10/16/14	SURFACE WATER DEPTH N/A	DRILLER M. Coogan START DATE 10/		SURFACE WATER DEPTH N/A
ELEV CHI DEPTH BLOW COUL (ft) DEPTH BLOW COUL (ft) 0.5ft 0.5ft	NT BLOWS PER FOO 0.5ft 0 25 50	0	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	(ft) ELEV (ft) 0.54 0.54 0.54	NWS PER FOOT SAMP. CONTROL SAM	SOIL AND ROCK DESCRIPTION
45				-35	Match Line	
44.4 0.0 1 3	4 7		-44.4 GROUND SURFACE 0.0 COASTAL PLAIN		Sat.	)   -37 1
42.4 † 2.0   2   3	3	Sat Sat	42.1 DARK BROWN, SILTY FINE GRAINED 2.3 SAND	-39.1 + 83.5		GRAY, SILT WITH TRACE FINE TO MEDIUM GRAINED SAND, AND SOME
40 40.4 7 4.0 7 11	9	Sat.	GRAY AND DARK BROWN, FINE GRAINED SAND	40 9 38 20		⊢-40.6 SHELL FRAGMENTS 85.
	11 20	Sat.				Boring Terminated at Elevation -40.6 ft in Hard Silt
35 36.4 7 8.0 3 4	6	Sat.				E
			- - - -			Ł
30.9 + 13.5			š <u>.</u> -			ţ
30 4 4	5					-
			- 8-			_
25 25.9 18.5 2 3	4	<del>·····</del> I I Sat. l∷∷∷	<u> </u>			
			- -			_
20.9 23.5 6 9		0000	- - -			-
20 6 9	10	Sat.   0000				-
			- - -			-
15 15.9 28.5 4 4	2 6	Sat.	-			-
		0000	- -			-
10 10.9 33.5 1 2			- - -			-
+     2	†   <del>                                   </del>	Sat.	- - -			F
1 20.5			GRAY, SILTY FINE GRAINED SAND 36.7	1		-
5 5.9 4 38.5 WOH WOH V	VOH 0	Sat.				F
			2.7 41.7 GRAY, SILTY CLAY 41.7			F
0 0.9 T 43.5 WOH 1	1		- GRAT, SILTT CLAT			F
	\ \frac{\pi}{\pi} \cdot \cdo		1			E
4.1 + 48.5			1			E
-5 WOH 1	2 03	W	-5.6 50.0 GRAY. FINE TO MEDIUM GRAINED SAND			-
			GIVAT, THE TO MEDIUM GRAINED SAND			ţ
-9.1 - 53.5 1 2	2 1	Sat.	- -			L
			- -			‡
-14.1 + 58.5			<u>-</u>			‡
22 26	44	Sat.   Sat.				-
			-			‡
-19.1 + 63.5   13   12	21 33	Sat.	ā- -			
			-			‡
-15 -14.1 - 58.5 -22 -26 -19.1 - 63.5 -20 -24.1 - 68.5 -25 -24.1 - 68.5 -9 -21 -73.5 -30 -29.1 - 73.5 -3 -29.1 - 73.5 -3	24		-			‡
9 21	24	Sat.				<b>F</b>
			GRAY, GREEN AND BLACK, FINE TO	1		-
-29.1 <u>73.5</u> 3 19	12 31	Sat.   000	COARSE GRAINED SAND WITH TRACE SILT, AND SOME SHELL FRAGMENTS	‡		Ė.
			-			F
$\begin{vmatrix} \frac{1}{2} \\ \frac{1}{2} \end{vmatrix} = 35 \begin{vmatrix} -34.1 + 78.5 \\ \frac{1}{2} \end{vmatrix} = 35 \begin{vmatrix}$		-	-			F

<b>WBS</b> 40191	TIP U-4751 COUN	TY NEW HANOVER	GEOLOGIST J. Whitt		<b>WBS</b> 40191	TIP U-4751 COUN	TY NEW HANOVER	GEOLOGIST J. Whitt
SITE DESCRIPTION Bridge No.	202 on -L- (Military Cutoff Road) ov	ver -Y2- (Ogden Park Drive)		GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 2	202 on -L- (Military Cutoff Road) o	ver -Y2- (Ogden Park Drive)	GROUND WTR (ft)
BORING NO. EB1-B	STATION 62+14	OFFSET 58 ft RT	ALIGNMENT -L-	<b>0 HR.</b> 0.5	BORING NO. EB1-B	STATION 62+14	OFFSET 58 ft RT	ALIGNMENT -L- 0.5
COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft	<b>NORTHING</b> 191,646	<b>EASTING</b> 2,353,610	<b>24 HR.</b> NM	COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft	<b>NORTHING</b> 191,646	<b>EASTING</b> 2,353,610 <b>24 HR.</b> NM
DRILL RIG/HAMMER EFF./DATE MID	1904 CME-45B 80% 10/22/2014	DRILL METHOD Mu	id Rotary HAMM	ER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MID1	1904 CME-45B 80% 10/22/2014	DRILL METHOD M	ud Rotary HAMMER TYPE Automatic
DRILLER M. Coogan	<b>START DATE</b> 10/13/14	<b>COMP. DATE</b> 10/14/14	SURFACE WATER DEPTH N/	A	DRILLER M. Coogan	<b>START DATE</b> 10/13/14	<b>COMP. DATE</b> 10/14/14	SURFACE WATER DEPTH N/A
ELEV Cft) DEPTH BLOW COU		75 100 NO. MOI G	SOIL AND ROCK DES	CRIPTION DEPTH (ft)	ELEV DRIVE DEPTH BLOW COU	UNT BLOWS PER FOO 0.5ft 0 25 50	OT SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
43.9 0.0 WOH 1 41.9 2.0 2 4	1 2	- Sat.	43.9 GROUND SURF COASTAL PL DARK BROWN, SILTY FI	AIN	-35	Match Line		GREEN AND GRAY, SAND(continued)
40 39.9 4.0 9 12	11		SAND 39.9 LIGHT BROWN, FINE GR	4.0	-40 -39.6 + 83.5 6 7	9 016	·   · · · · ·         w     w	-41.1 85.0
37.9 6.0 6 6 35.9 8.0 8 11 30 30.4 13.5 4 7	6 13 24 24	Sat. Sat. Sat.		AINED SAINED		¥10	20003	Boring Terminated at Elevation -41.1 ft in Very Stiff Silt
25 25.4 18.5 6 10	15	Sat.	- - - -					_ - - - -
20 20.4 23.5 4 6	7	Sat.	- - - -					- - - - -
15.4 28.5 4 3	3	0000	- -  					_ -  -
10 10.4 33.5 2 2	3	W 0000	- - - - -					- - - - -
5 5.4 38.5 1 WOH	2	Sat.	-	AINED SAND 41.7				
0 0.4 43.5 WOR WOR	WOR 0	Sat.	- GRAY SILTY C	46.7				- - - - -
-5 -4.6 + 48.5 WOH WOH	2							- - - -
-10 -9.6 + 53.5 9 8	14 22	W	10.1 LIGHT GRAY, FINE GRA	54.0 AINED SAND				-  - -
-15 -14.6 - 58.5 21 31	69/0.4	- 100/0.9 •	15.1 GREEN AND GRAY	7, SAND				-  - -
-20 -19.6 -63.5 11 16	24	Sat.	18.6 LIGHT GRAY, FINE TO GRAINED SAN - GRAINED SAN 	D MEDIUM — 62.5 ND				-  - - -
-25 -24.6 - 68.5   14   11   11   11   11   11   11   1	14 25	Sat.	- - - - -					- - - - -
-30 -29.6 73.5 2 3	26	Sat.						- - - - -
-35 -34.6 + 78.5	<u> </u>		<del>-</del> -34.6	78.5				<u> </u>

WBS 40191 TIP U-4751 COUNT	TY NEW HANOVER GE	EOLOGIST J. Whitt		<b>BS</b> 40191			TIF	P U-4751 COUN	TY NEW HA	ANOVER	GEOLOGIST J. Whitt	
SITE DESCRIPTION Bridge No. 202 on -L- (Military Cutoff Road) ov		GROUND WTR			TION Brid	dae No		n -L- (Military Cutoff Road) o			020200101 01111111	GROUND WTR (
BORING NO. EB1-C STATION 62+42	<del></del>		· 1 —	ORING NO.		age		<b>FATION</b> 62+42	OFFSET		ALIGNMENT -L-	0 HR. 0.
COLLAR ELEV. 43.8 ft TOTAL DEPTH 85.0 ft				OLLAR ELE				OTAL DEPTH 85.0 ft		<b>G</b> 191,643	<b>EASTING</b> 2,353,550	<b>24 HR.</b> 0.
DRILL RIG/HAMMER EFF./DATE MID1904 CME-45B 80% 10/22/2014	DRILL METHOD Mud Rotar		— ⊢			ATF MID		ME-45B 80% 10/22/2014	1.10.1.1.	DRILL METHOD MI	<u> </u>	HAMMER TYPE Automatic
DRILLER M. Coogan START DATE 10/13/14	1	IRFACE WATER DEPTH N/A	— ⊢	RILLER M. (				TART DATE 10/13/14	COMP. D	ATE 10/13/14	SURFACE WATER DEP	
ELEV DRIVE DEPTH BLOW COUNT BLOWS PER FOO	T SAMP. V L			EV DRIVE D	-	OW CO		BLOWS PER FOC		SAMP. / L	Γ'	
(ft) ELEV (ft) 0.5ft 0.5ft 0.5ft 0	75 100 NO. MOI G ELEV.	SOIL AND ROCK DESCRIPTION  /. (ft) DEPTI		t) ELEV C	(ft) 0.5f	ft 0.5ft	0.5ft	0 25 50	75 100	NO. MOI G	SOIL AND ROC	CK DESCRIPTION
45			3	35		. L	J L	Match Line				
43.8 + 0.0   1   1   2   1   2   1   1   2   1   1	43.8 -	GROUND SURFACE  COASTAL PLAIN	0.0	1		19	28	47		Sat. 000	COARSE GRAINED	ND BLACK, FINE TO SAND, WITH LITTLE
41.8 + 2.0		DARK BROWN, SILTY FINE GRAINED SAND						. /			L (con	SHELL FRAGMENTS , 81 tinued)
40 39.8 4.0 7 11 13		GRAY AND LIGHT TO DARK BROWN,	4.0	-39.7	7	6	10	#16		w	<b>L</b> -41.2	OWN, SILT
37.8 + 6.0   9   9   9	Sat.	FINE GRAINED SAND, WITH LITTLE SILT		1							Boring Terminated	at Elevation -41.2 ft in Stiff Silt
35 35.3 + 8.5 4 4 6											_	
	Sat										-	
30 30.3 13.5				‡							<del>-</del> -	
7 2 3 4 57	Sat.			‡							<del>-</del> -	
				‡							<del>-</del> -	
25 25.3 18.5 2 3 5	Sat. Sat.			‡							- -	
	-			‡							- -	
20 20.3 23.5	0000 0000   0000 0000			‡							<del>-</del> -	
T 3 6 9 15	Sat.										<del>-</del> -	
				1 ‡							<del>-</del>	
15 15.3 28.5 6 6 7 13.	Sat.			1 ‡							<del>-</del>	
											<u>-</u>	
10 10.3 7 33.5				†							<del>-</del> -	
3 2 4 6	Sat.			l Ŧ							-	
+				1 - 1							[	
5 5.3 38.5 WOH 1 2 63	Sat.			1 ±							_	
				1 ‡							- -	
0 0.3 + 43.5 WOH WOH WOH											-	
	Sat.		40.7								- -	
-5 -4.7 48.5		DARK BROWNISH GRAY, SILTY CLAY	40./	‡							-  -	
-5 -4.7 T 48.5 WOH WOH 1 1	SS-51 W			‡							<del>-</del> -	
$arphi$ $\left  \begin{array}{c c} I & I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I & I \\ I & I & I \end{array} \right  \left  \begin{array}{c c} I & I \\ I \end{array} \right  \left  \begin{array}{c c} I & I \end{array} \right  \left  \begin{array}{c c} I & I \\ I \end{array} \right  \left  \begin{array}{c c} I & I \\ I \end{array} \right  \left  \begin{array}{c c} I & I \end{array} \right  \left  \begin{array}{c c} I & I \\ I \end{array} \right  \left  \begin{array}{c c} I & I \end{array} \right  \left  \begin{array}{c c} I & I \\ I \end{array} \right  \left  \begin{array}{c c} I & I \end{array} \right  \left  $				‡							<del>-</del> -	
\$\begin{array}{c c c c c c c c c c c c c c c c c c c				‡							<u> </u>	
		,	56.7	‡							-	
6 -15 -14.7 58.5 · · · · · · · · · · · · · · · · · · ·		LIGHT GRAY, FINE TO MEDIUM GRAINED SAND		‡							<u> </u>	
29 45	Sat.	CIONINED OTHER		‡							-	
				‡							-	
H -20 -19.7 + 63.5   18   19   23	Sat.			‡							<u>-</u>	
	·   · · · ·			‡							E	
\( \frac{1}{6} \right _{-25} \right _{-24.7} + \frac{1}{68.5} \right _{-25} \right _{-24.7} + \frac{1}{68.5} \right _{-25} \right _{-25} \right _{-26.7} + \frac{1}{68.5} \right _{-25} \right _{-25} \right _{-26.7} + \frac{1}{68.5} \right _{-25} + \frac{1}{68.5} \right _{-25} + \frac{1}{68.5} \right _{-25} + \frac{1}{68.5} \right _{-25} + \frac{1}{68.5} + \	0000			<del>]</del>								
10 17 40	Sat.			<u> </u>							_	
											_	
-30 -29.7 † 73.5   13	Sat.			<del> </del>							_	
	-32.9	<u></u>	<u>76.7</u>	<u> </u>							<u>-</u>	
9 -35 -34.7 78.5				f							-	

<b>WBS</b> 40191	<b>TIP</b> U-4751	COUNTY NEW HANOVER	GEOLOGIST J. Daniel		WBS	<b>S</b> 40191		<b>TIP</b> U-47	51 COUI	NTY NEW HAI	NOVER	G	EOLOGIST J. Daniel		
SITE DESCRIPTION Bridge N	No. 202 on -L- (Military Cutoff Ro	oad) over -Y2- (Ogden Park Drive)		GROUND WTR (ft)	SITE	DESCRIPTION	N Bridge No	o. 202 on -L- (N	lilitary Cutoff Road)	over -Y2- (Ogd	en Park Drive	e)		GROUND W	TR (ft
BORING NO. EB2-A	STATION 63+98	OFFSET 63 ft LT	ALIGNMENT -L-	<b>0 HR.</b> 3.5	BOR	RING NO. EB2	-A	STATION	63+98	OFFSET 6	63 ft LT	А	LIGNMENT -L-	0 HR.	3.5
COLLAR ELEV. 43.9 ft	TOTAL DEPTH 85.0 ft	<b>NORTHING</b> 191,744	<b>EASTING</b> 2,353,413	<b>24 HR.</b> 1.2	COL	LAR ELEV. 4	3.9 ft	TOTAL D	<b>EPTH</b> 85.0 ft	NORTHING	<b>3</b> 191,744	E	<b>ASTING</b> 2,353,413	24 HR.	1.2
DRILL RIG/HAMMER EFF./DATE N	MID1904 CME-45B 80% 10/22/2014	DRILL METHOD	Mud Rotary HAMN	MER TYPE Automatic	DRIL	L RIG/HAMMER	EFF./DATE MI	D1904 CME-45B 8	0% 10/22/2014	•	DRILL METHO	OD Mud Ro	tary H.	AMMER TYPE Autom	natic
DRILLER M. Coogan	<b>START DATE</b> 10/16/14	<b>COMP. DATE</b> 10/17/14	SURFACE WATER DEPTH N	/A		LLER M. Coo		START D	ATE 10/16/14	COMP. DA	<b>TE</b> 10/17/14	ı s	URFACE WATER DEPT	I N/A	
ELEV CHI		'/	L O SOIL AND ROCK DES	SCRIPTION DEPTH (ft)	ELEV (ft)	DRIVE DEPT (ft)	0.5ft 0.5f		BLOWS PER FC	75 100	SAMP. NO. MO	L O OI G	SOIL AND ROCK	DESCRIPTION	
45				-105	-35				Match Line		Sat.				
43.9 + 0.0 42.4 + 1.5 2 3	$\begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \begin{bmatrix} $		43.9 GROUND SURF COASTAL PL GRAY AND DARK BR	AIN OWN, FINE			11 10	11	<b>9</b> 21		Jai.	0000	GRAY AND GREEN, GRAINED SAND WITH SOME WEAKLY	H SOME SILT, AND CARBONATE	
40 40.9 + 3.0 2 2 2 4 4.5 1 2 3 4 4.5 4 9	D	Sat.	GRAINED SAND WITH	TRACE SILT	-40	-39.6 + 83.5	14 11	10	•21		Sat.	0000 0000 0000 - 0000 - 41.		(continued)	85.0
37.9 + 6.0 4 9 36.4 7.5 8 9	9 9 • 18	Sat. Sat.	000 000 000 000 000			+			•				Boring Terminated at Medium Der		
35 34.9 ± 9.0 3 7 2 3	7 8 15 15 15 15 15 15 15 15 15 15 15 15 15	Sat.   Sat.	000L 000L 000L 000L			1 +						-	Other Samples: ST-2 (40.0 - 42.0)		
			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			‡						-	0. 2 (10.0 12.0)		
30 30.4 13.5 2 2	2 2 • • • • • • • • • • • • • • • • • •	Sat.	000 — 000 — 000 —			1 ‡						F			
			0 0 0 0 0 0 0 0 0			†									
25 25.4 † 18.5   2   1	1 2 3	Sat.	0 0 0 0 0 0 0 0 0 0 0 0			ļ <u></u>									
			0 0 0 L 0 0 0 0 0 0 0 L 0 0 0 0 L			†						<u> </u>			
20 20.4 + 23.5   1   2		Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			+						-			
			000L 000 000 000 000 000			1 ‡						E			
15 15.4 28.5 4 5	5 6	Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			‡						-			
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			GRAY, SILTY FINE GR	32.5		1 ‡						E			
10 10.4	OH 1 1	Sat.	GRAT, SILTT FINE GR	AINED SAND		‡						-			
			6.4 GRAY, FINE GRAIN	37.5		1 ‡						E			
5 5.4 38.5 WOH WO	OH WOH	Sat.	GIAT, FINE GIAIN	LD SAND		†						-			
1 2 425			0.00 0.00 0.00 0.00 0.00			1 1						E			
0 0.4 T 43.5 1 WC	OH WOH	Sat.	000 000 000 000 000			†						-			
1			-3.6 GRAY AND GREEN, S	SILTY FINE — — 47.5								E			
-5 -4.6 + 48.5 1 1	3	Sat.	GRAINED SA			‡						-			
			-8.6 GRAY, FINE GRAINED	52.5		1 1						E			
-10 -9.6 + 53.5 2 1	1 3	w	- GRAT, TINE GRAINED	SANDI SILI		‡						-			
1   440 = 505			-13.6 GRAY, FINE GRAIN	57.5		1 ‡						E			
-15 -14.6 + 58.5   19 2 <sup>-7</sup>	1 32	953	GRAY, FINE GRAIN	ED SAND		‡						-			
1 2 40 0 7 50 5		· · · ·   · · · · ·	000L 000 000L 000L			1 ‡						E			
-20 -19.6 T 63.5 11 17	7 39	<b>▶</b> 56	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			‡						-			
246 7 69 5			000_ 000 000_ 000_ 000_			1						E			
-25 -24.6 + 68.5 9 12	2 20 •32	Sat.	000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			‡						-			
20 6 7 70 5		· · · ·   · · · · ·	-28.6 GREEN AND GRA	72.5		‡						E			
-30 <u>-29.6 † 73.5</u> 100/0.3		100/0.3	GREEN AND GRA	I, SAINU		‡						-			
			-33.6 -00	77.5		1 ‡						E			
-35 -34.6 78.5			ôô <u>.</u>			1									

WBS	40191				TIP	U-4751	COUNT	Y NEW HA	NOVER	₹	GEOL	OGIST J. Daniel			WBS	40191			Т	<b>IP</b> U-4751	COUNT	TY NEW HA	NOVER			SEOLOGIST J. Daniel		
SITE	DESCF	RIPTION	<b>I</b> Bridg	e No. 20	)2 on	-L- (Military Cutoff	Road) ov	er -Y2- (Ogo	den Park	c Drive	)		GROUND WTR (	ft) S	SITE	DESCRIPTIO	N B	ridge No	o. 202 c	on -L- (Military Cutoff	f Road) ov	er -Y2- (Ogd	len Park	Drive)	)		GROUND WT	R (ft
BOR	ING NO	. EB2-l	3		STA	ATION 63+40		OFFSET	42 ft RT	-	ALIG	NMENT -L-	<b>0 HR.</b> 3.	0 <b>E</b>	BOR	ING NO. EB2	2-B		s	<b>TATION</b> 63+40		OFFSET 4	42 ft RT		A	LIGNMENT -L-	0 HR.	3.0
COL	LAR EL	<b>EV</b> . 44	.2 ft		то	TAL DEPTH 85.0 f	t	NORTHIN	<b>G</b> 191,7	746	EAST	'ING 2,353,532	<b>24 HR.</b> NI	и Г	COL	LAR ELEV. 4	14.2 f	t	Т	OTAL DEPTH 85.0	ft	NORTHING	<b>G</b> 191,7	46	Е	<b>EASTING</b> 2,353,532	24 HR.	NM
DRILL	. RIG/HAI	MER EI	FF./DAT	E MID19	04 CM	E-45B 80% 10/22/2014		1	DRILL	METHO	D Mud Rotary	НАМГ	MER TYPE Automatic		DRILL	RIG/HAMMER	EFF./[	DATE MI	ID1904 C	CME-45B 80% 10/22/2014	4	1	DRILL M	/ETHO	D Mud Ro	otary H	HAMMER TYPE Automa	atic
DRIL	LER M	. Wiggi	ns		STA	ART DATE 10/20/1	14	COMP. DA	ATE 10	/20/14	SURF	ACE WATER DEPTH N	I/A		DRIL	LER M. Wigg	gins		S	TART DATE 10/20/	14	COMP. DA	TE 10/2	20/14	S	SURFACE WATER DEPT	'H N/A	
ELEV	DRIVE	DEPTH	BLO	N COUN	Т	BLOWS	PER FOO	T T	SAMP	•. <b>▼</b> /	151	COUL AND DOOK DE	CODIDTION		LEV	DRIVE DEPT	н в	LOW CO	OUNT	BLOWS	PER FOO	T	SAMP.		1:1	COUL AND DOCK	/ DECODIDITION	
(ft)	(ft)	(ft)	0.5ft	0.5ft 0	.5ft	0 25	50	75 100	NO.	МС	O G ELEV. (ft	SOIL AND ROCK DE	SCRIPTION DEPTH		(ft)	DRIVE ELEV (ft) DEPT (ft)	0.5	5ft 0.5ft	ft 0.5ft	0 25	50	75 100	NO.	моі	O I G	SOIL AND ROCK	DESCRIPTION	
1																												
45													F4.0F		-35					Mat	tch Line							
	44.2	0.0	1	2	2	1				w	44.2	GROUND SUR COASTAL PI	LAIN	0.0		<del>-</del>	1	0   10	10	• • • • • • • • • • • • • • • • • • •			T	Sat.	0000	GREEN ABD GRAY, SAND, WITH TRAC	MEDIUM GRAINED	
	42.7 41.2	3.0	2	2	3	<b>9</b> 5					42.2	BROWN, FINE GRAINE BROWN, FINE GRAINE		2.0		ļ ‡ <u>-</u>				:::;/: :::::		.			0000	O/MD, WITH HAVE	L CIET (Commuca)	
40	39.7 -	4.5	1	1	1	<b>6</b> 2			-	Sat.	0000	SOME SIL			-40	-39.3 + 83.5	5	6	7	13				Sat.	-40	0.8		85.
	38.2	6.0	4		12 10	21				Sat.	0000					‡					1	'				Boring Terminated at Medium De	Elevation -40.8 ft in	
25	36.7 35.2	7.5 9.0	3		6	21				Sat.	35.2			,		‡										Wediani Be	onse Gana	
35		9.0	3	3	2	•5			1	Sat.	33.2	GRAY, SILTY FINE GR	RAINED SAND	,.o		+												
		‡				1					31.7_		12	2.5		‡												
30	30.7	13.5	2	4	5	./		.		Sat.	0000	TAN, FINE GRAINI	ED SAND			1									ΙŁ			
		ł				. ¶ <sup>9</sup>				Out.						İ									1 E			
	25.7	18.5									0000					Ŧ									1 F			
25		F 10.5	2	3	7	<b>♦</b> 10	1		-	Sat.	0000					Ŧ									1 F			
		F									0000					Ŧ									F			
20	20.7	23.5														‡												
20	-	<u> </u>	4	5	6	<b>•</b> 11			1	Sat.	0000					‡									-			
		‡									0000					‡												
15	15.7	28.5	5	5	4	- <del> </del>				Sat.	0000														ΙĿ			
		<u> </u>				: <b>/</b> 5° : :   : : : :		.		"	0000					<u> </u>									1 <u>E</u>			
	10.7 -	33.5				/: : :   : : : :					11.7	GRAY, FINE GRAINED	SANDY SII T - 32	2.5		1									1 E			
10	10.7	33.3	WOH	1	1	<b>\$</b> 2	1		-	w		Order, Find Ordanded	0,4451 0121			Ŧ									1 F			
		F						.			7.5		36	<u>5.7</u>		Ŧ									1 F			
5	5.7	38.5	WOH	WOH W	/OU							GRAY, FINE GRAINED SOME SILT AND	D SAND WITH D CLAY			‡									F			
	-	F	WOII	vvOi i vv		0			SS-92	2 Sat.						Ŧ									l F			
		‡ . <u>.</u> _														‡									F			
0	0.7	43.5	4	2	1	•3			4	Sat.						#												
		<u> </u>														‡												
_	-4.3	48.5									-3.3	DARK GRAY, SILTY FI	INE GRAINED 47	7.5		‡												
-5	-	<u> </u>	WOH	WOH	1	1			1	Sat.		SAND				‡									-			
		<u> </u>				\					-8.3		52	2.5		‡									1			
-10	-9.3	53.5	WOH	2	2	1				l w	WE	GRAY, SILT WITH SOME SAND	FINE GRAINED			1									ΙŁ			
		ł								"		0,12				İ									1 E			
	-143	50.5									-13.3	TAN, FINE TO MEDIUM	GRAINED SAND	7. <u>5</u>		+									1 -			
-15	-14.5	50.5	8	17 2	24	41	+		-	Sat.	0000	TAN, THE TO MEDION	OTO WINED OF WAD			Ŧ									1 F			
		F				: : : :   : ;/: :		.			0000					Ŧ									1 F			
-20	-19.3	63.5	_	11	16	: : : :   ;/: : :				_	0000					‡									F			
	-	<u> </u>	5	11	16	27			1	Sat.	0000					‡									F			
		ļ.				:::;/ :::::					0000					‡												
-25	-24.3	68.5	5	7	7	<b>/</b>			-	Sat.	0 0 0 0					‡												
		‡						.			0000					‡												
	-29.3 ·	73.5					<del> </del> :				-28.3	GREEN AND GRA	<u></u>	2.5		‡												
-30		- 5.5	100/0.4				<del> </del>	100/0.4	•		0000	3	•			1									-			
		ł							i		-33.3		77	7.5		<u> </u>									[			
25	-34.3	78.5					+	: <del> </del> -	1					· 🌂 📗		l I									1 [			

<b>WBS</b> 40191	TIP U-4751 COUNT	Y NEW HANOVER	GEOLOGIST J. Daniel		<b>WBS</b> 40191	TIP U-4751 COUN	ITY NEW HANOVER	GEOLOGIST J. Daniel	
SITE DESCRIPTION Bridge No. 2	02 on -L- (Military Cutoff Road) ov	er -Y2- (Ogden Park Drive)		GROUND WTR (ft)	SITE DESCRIPTION Bridge No.	202 on -L- (Military Cutoff Road) of	over -Y2- (Ogden Park Drive)		GROUND WTR (ft)
BORING NO. EB2-C	STATION 63+60	OFFSET 2 ft RT	ALIGNMENT -L-	<b>0 HR.</b> 3.5	BORING NO. EB2-C	STATION 63+60	OFFSET 2 ft RT	ALIGNMENT -L-	<b>0 HR.</b> 3.5
COLLAR ELEV. 43.7 ft	TOTAL DEPTH 104.0 ft	<b>NORTHING</b> 191,744	<b>EASTING</b> 2,353,487	<b>24 HR.</b> 1.2	COLLAR ELEV. 43.7 ft	TOTAL DEPTH 104.0 ft	<b>NORTHING</b> 191,744	<b>EASTING</b> 2,353,487	<b>24 HR.</b> 1.2
DRILL RIG/HAMMER EFF./DATE MID19	904 CME-45B 80% 10/22/2014	DRILL METHOD Mu	d Rotary HAMME	ER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MID	1904 CME-45B 80% 10/22/2014	DRILL METHOD MU	ud Rotary HAMM	ER TYPE Automatic
DRILLER M. Coogan	<b>START DATE</b> 10/16/14	COMP. DATE 10/17/14	SURFACE WATER DEPTH N/A	4	DRILLER M. Coogan	<b>START DATE</b> 10/16/14	COMP. DATE 10/17/14	SURFACE WATER DEPTH N/A	A
ELEV (ft)		75 400     /   0	SOIL AND ROCK DESC	CRIPTION DEPTH (ft)	ELEV DRIVE ELEV (ft) DEPTH (ft) 0.5ft 0.5ft	UNT BLOWS PER FOO 0.5ft 0 25 50	OT	SOIL AND ROCK DES	CRIPTION
45  43.7 - 0.0  42.2 - 1.5  40.7 - 3.0  39.2 - 4.5  37.7 - 6.0  36.2 - 7.5  36.3  36.3  37.7 - 9.0  2 4  30  30.2 - 13.5  2 3  25  25  25.2 - 18.5  2 2  20  20.2 - 23.5  4 2  15  15.2 - 28.5  4 3  10  10.2 - 33.5  1 WOH  5  5.2 - 38.5  WOH WOH	2	Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	GROUND SURFA COASTAL PLA GRAY AND DARK BRO GRAINED SAN  The state of t	AIN DWN, FINE ID	-35	Match Line  10  20  28  7  416  7  413  118  8  114  118  119	Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	GRAY AND GREEN, SIL GRAINED SAND, WITH L FRAGMENTS (con:  -43.8  GRAY AND BROWN, FIN SANDY SILT, WITH LIT GRAINED SAND AND T  GRAINED SAND AND T  FRIABLE SANDSTONE F Boring Terminated at Eleva Very Dense Sa  Other Samples: ST-3 (50.0 - 52.0)	ITTLE SHELL tinued)  IE GRAINED ITLE FINE RACE MICA  DWITH LITTLE RAGMENTS RAGMENTS 104.0 ation -60.3 ft in
0 0.2 43.5 WOH WOH V	VOH 0	Sat. Sat.	-3.8 DARK GRAY, CLAYEY FII	LT <u> 49.5</u>					
-10 -9.8 53.5 2 2	2	· · · · · · · · · · · · · · · · · · ·	DARK GRAY, FINE GRAII SILT	NED SANDY				- - - - -	
-15 -14.8 - 58.5 16 40 - 1	48		TAN, FINE GRAINED	<u>57.5</u> D SAND				- - - -	
-20 -19.8 <del>-</del> 63.5 10 28	30	Sat	· - - -					- - -	
-25 -24.8 - 68.5 20 14	15	Sat.	_					<u>-</u> -	
-30 -29.8 73.5 5 4	9 613	Sat.	GRAY AND GREEN, SIL GRAINED SAND, WITH LI FRAGMENTS	ITTLE SHELL				- - - -	

#### 40191

#### BRIDGE NO. 202 ON -L- (MILITARY CUTOFF ROAD) OVER -Y2- (OGDEN PARK DRIVE)

#### **EB1-C**

					SC	OIL '	TEST .	RESU	LTS						
SAMPLE															
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-51	5 RT	62+42	48.5 - 50.0	A-7-5	62	19	1	3	33	63	100	99	97	62.3	-

#### EB2-A

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY WE	IGHT		% PA	SSING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
ST-2	63 LT	63+98	40.0 - 42.0	A-3	NP	NP	0	95	2	3	100	100	7	22.1	-

NP- Non Plastic

#### *EB2-B*

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO					% PASSING (SIEVES)			%	%		
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-92	42 RT	63+40	38.5 - 40.0	A-2-4	NP	NP	1	87	4	8	100	100	16	19.4	-

NP- Non Plastic

#### *EB2-C*

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO			% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
S-123	2 RT	63+60	88.5 - 90.0	A-4	27	4	1	67	24	9	100	100	54	26.5	-
ST-3	2 RT	63+60	50.0 - 52.0	A-4	24	4	0	68	15	16	100	100	38	19.7	-

## SITE PHOTOGRAPHS BRIDGE NO. 202 ON -L- (MILITARY CUTOFF ROAD) OVER -Y2- (OGDEN PARK DRIVE)



View of -Y2- (Ogden Park Drive), looking west.



View of path in woods between boreholes along End Bent 2, looking to the east.
-Y2- (Ogden Park Drive) is located to the right of the photograph.