

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.22	1	8

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.12.R.22 (17BP12R22) F.A. PROJ. _____
COUNTY CLEVELAND
PROJECT DESCRIPTION BRIDGE 255 OVER BRANCH ON
SR 1207 (WOOD RD.)

SITE DESCRIPTION _____

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2-2A	LEGEND
3	SITE PLAN
4-7	BORE LOGS
8	SITE PHOTOGRAPH(S)

PERSONNEL

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INVESTIGATED BY J.E. BEVERLY

CHECKED BY C.B. LITTLE

SUBMITTED BY C.B. LITTLE

DATE MAY 2012

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

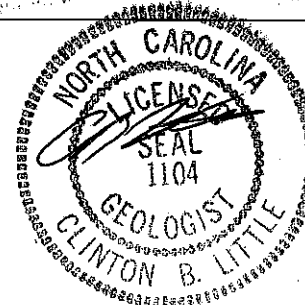
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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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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.

DRAWN BY: J.K. McCLURE



5-15-12

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
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 PNEUMER 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 ($\leq 35\%$ 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		
SYMBOL																					
% PASSING # 10 # 40 # 200	50 MX 30 MX 15 MX	50 MX 30 MX 15 MX	51 MN 31 MN 16 MN		35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN								
LIQUID LIMIT PLASTIC INDEX	6 MX		NP		40 MX 10 MN	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	40 MX 10 MN	41 MN 11 MN	40 MX 10 MN	41 MN 11 MN	40 MX 11 MN								
GROUP INDEX	0		0		4 MX				8 MX	12 MX	16 MX	16 MX	NO MX								
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILT OR CLAYEY GRAVEL AND SAND				SILT SOILS		CLAYEY SOILS										
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR						FAIR TO POOR		POOR		UNSATISFACTORY		
PI OF A-7-5 SUBGROUP IS $\leq$ LL - 30 ; PI OF A-7-6 SUBGROUP IS $>$ LL - 30																					

PI OF A-7-5 SUBGROUP IS $\leq$ LL - 30 ; PI OF A-7-6 SUBGROUP IS $>$ LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (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	MM	305	75	2.0		0.25		0.075		0.0075			
SIZE	IN.	12	3										

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
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

<u>ORGANIC MATERIAL</u>	GRANULAR SOILS	SILT - CLAY SOILS	<u>OTHER MATERIAL</u>
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 <u>24</u> HOURS
	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
	SPRING OR SEEP

MISCELLANEOUS SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA. - MICACEOUS	WEA. - WEATHERED
CL - CLAY	MOD. - MODERATELY	W - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	W _u - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	<u>SAMPLE ABBREVIATIONS</u>
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING
HL. - HIGHLY	V - VERY	RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS: ☐ MOBILE B- ____ ☐ BK-51 ☐ CME-45C ☒ CME-550 ☐ PORTABLE HOIST ☐ _____ ☐ _____	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 ☐ _____
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SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ROCK DESCRIPTION		TERMS AND DEFINITIONS	
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 60 BLOWS 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:		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 DISLOOED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FMJ.) - 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 PARALLBL. 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 IN (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 60 BLOWS 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.	
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 YIELD 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 SL.)	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 (SL.)	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. <u>IF TESTED, WOULD YIELD SPT REFUSAL.</u>		
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. <u>IF TESTED, YIELDS SPT N VALUES > 100 BPF.</u>		
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. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPF.</u>		
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. COUGES 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 COUGED 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 COUGED 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 FINGER NAIL.		
FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 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.		

BENCH MARK: BM-1: RAILROAD SPIKE IN NORTH SIDE OF 24' SWEET GUM STA. 13+79 -EL- 32' RT.	
N 535460 E 1179446	ELEVATION: 780.96 FT.
NOTES:	

BENCH MARK: BM-1 RAILROAD SPIKE IN NORTH SIDE OF 24" SWEET GUM
STA. 13+79 -EL- 32' RT.
N 535460 E 1179446 **ELEVATION: 780.96 FT.**

NOTES:

CLEVELAND COUNTY LOW IMPACT BRIDGE

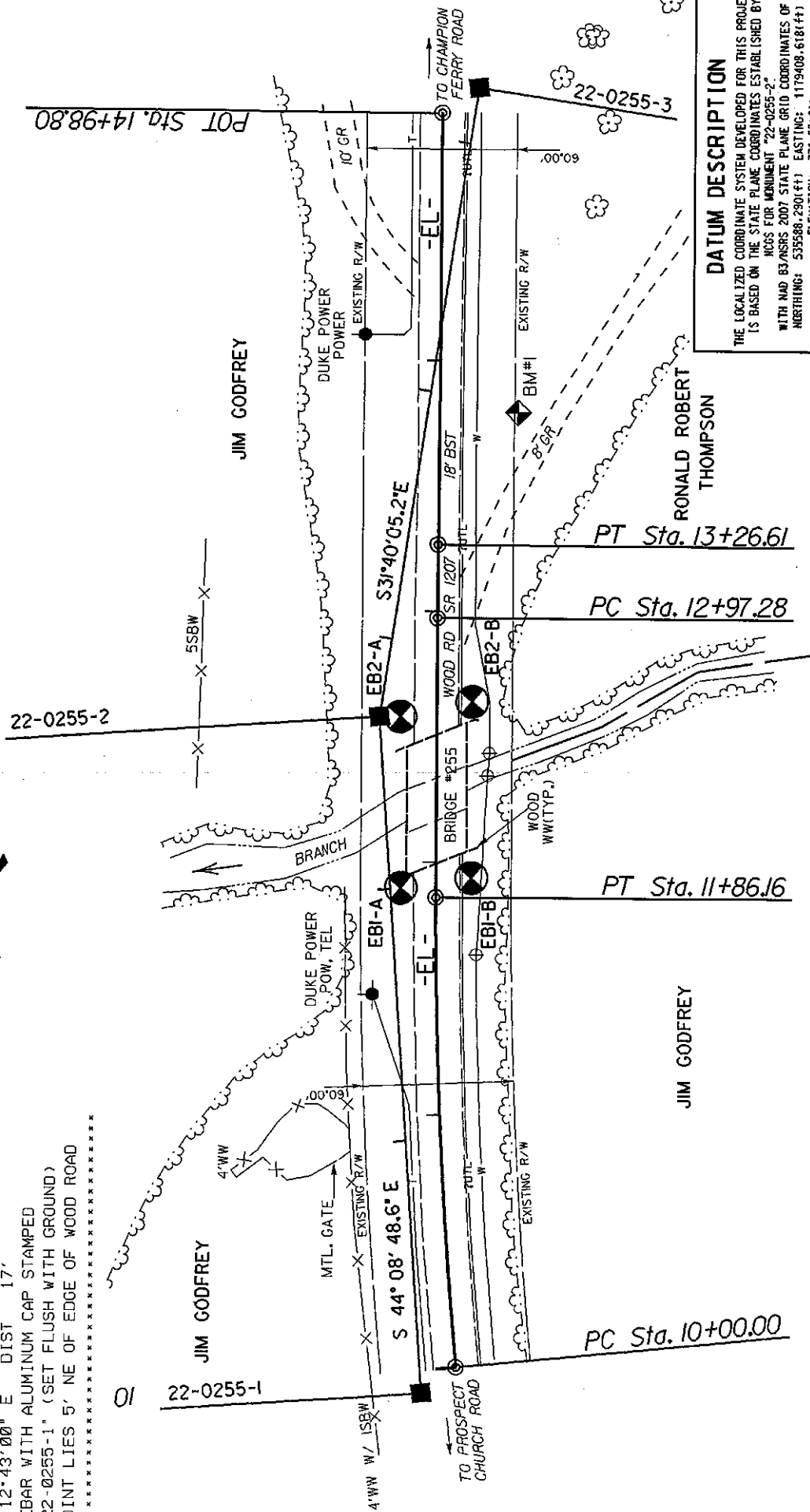
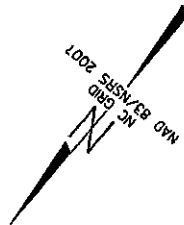
STRUCTURE 220255
LS 12-11-055
WBS 17BP.12.R.22
TIP 22-0255

PROJECT REFERENCE NO.	SHEET
17BP.12.R.22	3
SITE PLAN	
0	60
	120
	FEET

BENCHMARKS (NAVD88)

 BM#1 ELEVATION = 780.96'
 N 535460 E 1179446
 EL STATION 13+79.00 32' RIGHT
 RR SPIKE IN NORTH SIDE OF 24" SWEET GUM

 BM#2 ELEVATION = 783.73'
 N 535781 E 1179222
 EL STATION 10+00 TO BM#2
 N 12°43'00" E DIST 17'
 REBAR WITH ALUMINUM CAP STAMPED
 "22-0255-1" (SET FLUSH WITH GROUND)
 POINT LIES 5' NE OF EDGE OF WOOD ROAD



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCOS FOR MONUMENT "22-0255-2" WITH NAD 83/ASRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 535588.2901(FT) EASTING: 1179408.6181(FT) ELEVATION: 776.531(FT)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9998410885

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "22-0255-2" TO "EL" STATION 10+00 IS N 47°18'32.8" W 259.55'

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

BL	POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	22-0255-1		535780.9534	1179221.6086	783.73		
2	22-0255-2		535588.2900	1179408.6180	776.53		
3	22-0255-3		535372.1467	1179541.9447	799.08		
						OUTSIDE PROJECT LIMITS	
						12+57.89	22.80 LT
						OUTSIDE PROJECT LIMITS	



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 4

WBS 17BP.12.R.22		TIP 17BP12R22		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION BRIDGE 255 OVER BRANCH ON SR 1207 (WOOD RD.)							GROUND WTR (ft)					
BORING NO. EB1-A		STATION 11+90		OFFSET 14 ft LT		ALIGNMENT -EL-						
COLLAR ELEV. 776.8 ft		TOTAL DEPTH 36.1 ft		NORTHING 535,634		EASTING 1,179,358						
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic		0 HR. 7.5						
DRILLER Smith, C. L.		START DATE 04/19/12		COMP. DATE 04/19/12		24 HR. NM						
SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		ELEV. (ft) DEPTH (ft)
780												
775												
770	772.6	4.2	0	1	2							776.8 GROUND SURFACE 0.0
765	767.6	9.2	5	3	4							ROADWAY EMBANKMENT RED-ORANGE V. SOFT TO SOFT MOIST SANDY SILTY CLAY (A-7) 772.6 4.2
760	762.6	14.2	4	6	7							ALLUVIAL BRN-GRAY SOFT TO MED. STIFF MOIST SANDY SILTY CLAY (A-7) 766.1 10.7
755	757.6	19.2	8	8	10							RESIDUAL BRN-TAN-GRAY-WHITE MED. DENSE MOIST MICA. CLAYEY SILTY F. SAND (A-2)
750	752.6	24.2	10	14	12							
745	747.6	29.2	18	56	44/0.2							747.1 29.7
	742.6	34.2	14	21	79/0.3							WEATHERED ROCK SEV. WEATH. CRYSTALLINE ROCK 740.7 36.1
												Boring Terminated BY AUGER REFUSAL at Elevation 740.7 ft ON CRYSTALLINE ROCK

NCDOT BORE SINGLE 023&000 GEO_BH_BRDG0255_CLEVELAND.GPJ NC_DOT.GDT 5/4/12



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 5

WBS 17BP.12.R.22		TIP 17BP12R22		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.	
SITE DESCRIPTION BRIDGE 255 OVER BRANCH ON SR 1207 (WOOD RD.)							GROUND WTR (ft)
BORING NO. EB1-B		STATION 11+94		OFFSET 14 ft RT		ALIGNMENT -EL-	
COLLAR ELEV. 776.8 ft		TOTAL DEPTH 40.8 ft		NORTHING 535,613		EASTING 1,179,339	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Smith, C. L.		START DATE 04/19/12		COMP. DATE 04/19/12		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
780																
775	772.7	4.1	1	2	1										776.8	0.0
770	767.7	9.1	3	3	3										772.7	4.1
765	762.7	14.1	8	18	13										762.7	14.1
760	757.7	19.1	14	4	13											
755	752.7	24.1	8	10	17											
750	747.7	29.1	12	14	21											
745	742.7	34.1	12	20	37											
740	737.7	39.1	25	75/0.4											737.7	39.1
															736.0	40.8

100/0.9

WEATHERED ROCK
GRAY-WHITE-TAN-ORANGE SEV. WEATH. CRYSTALLINE ROCK
Boring Terminated BY AUGER REFUSAL at Elevation 736.0 ft ON CRYSTALLINE ROCK

NCDOT BORE SINGLE 0238000 GEO BH BRDG0255 CLEVELAND.GPJ NC DOT.GDT 5/4/12



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 7

WBS 17BP.12.R.22		TIP 17BP12R22		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.	
SITE DESCRIPTION BRIDGE 255 OVER BRANCH ON SR 1207 (WOOD RD.)							GROUND WTR (ft)
BORING NO. EB2-B		STATION 12+64		OFFSET 14 ft RT		ALIGNMENT -EL-	0 HR. 7.5
COLLAR ELEV. 776.4 ft		TOTAL DEPTH 29.5 ft		NORTHING 535,560		EASTING 1,179,385	24 HR. NM
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Smith, C. L.		START DATE 04/19/12		COMP. DATE 04/19/12		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
780																
775															776.4	GROUND SURFACE
																ROADWAY EMBANKMENT
																RED-ORANGE V. SOFT TO SOFT MOIST SANDY SILTY CLAY (A-7)
	772.6	3.8													771.4	5.0
770																ALLUVIAL
																LAYERED GRAY-BRN SOFT MOIST SILTY CLAY (A-7)
	767.6	8.8													768.4	8.0
765																ALLUVIAL
																BRN-GRAY-WHITE MED. DENSE MOIST TO WET SILTY SAND (A-2) W/ GRAVEL
	762.6	13.8													763.9	12.5
760																RESIDUAL
																LAYERED GRAY-WHITE-TAN-ORANGE MED. DENSE MOIST CLAYEY SILTY F. SAND (A-2)
	757.6	18.8														
755																
	752.6	23.8														
750																
	747.6	28.8													747.6	28.8
															746.9	29.5
																WEATHERED ROCK
																GRAY-WHITE DRY SEV. WEATH. CRYSTALLINE ROCK
																Boring Terminated BY AUGER REFUSAL at Elevation 746.9 ft ON CRYSTALLINE ROCK

NCDOT BORE SINGLE 023&000 GEO BH BRD0255 CLEVELAND.GPJ NC DOT.GDT 5/4/12

BENCHMARKS (NAVD88)

BM-1 ELEVATION = 780.96'
 N 535460 E 1179446
 EL STATION 13-79.00 32' RIGHT
 RR SPIKE IN NORTH SIDE OF 24" SWEET GUM

 BM-2 ELEVATION = 783.73'
 N 535781 E 1179222
 EL STATION 10-00 TO BM-2
 N 12° 43' 00" E DIST 17'
 REBAR WITH ALUMINUM CAP STAMPED
 "22-0255-1" (SET FLUSH WITH GROUND)
 POINT LIES 5' NE OF EDGE OF WOOD ROAD

CLEVELAND COUNTY LOW IMPACT BRIDGE

STRUCTURE 220255
 LS 12-11-055
 WBS 17BP12R.22
 TIP 22-0255

PROJECT REFERENCE NO.	SHEET
17BP12R.22	8
Aerial Photo	
0	60
	120
	FEET



22-0255-2

22-0255-1

BRANCH

S 44° 08' 48.6" E

S 31° 40' 05.2" E



22-0255-3

POT Sta. 14+98.80

BM-1

PT Sta. 13+26.61

PC Sta. 12+97.28

PT Sta. 11+86.16

PC Sta. 10+00.00

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
 IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
 THE N.C. DEPARTMENT OF TRANSPORTATION
 WITH MAD 83/MS 2007 STATE PLANE GRID COORDINATES OF
 NORTING: 535588.290 (E) EASTING: 1179408.618 (N)
 ELEVATION: 776.53 (M)
 THE AVERAGE CORRECTION GRID FACTOR USED ON THIS PROJECT
 (GROUND TO GRID) IS: 0.999940885
 THE N.C. "LAMBERT GRID BEARING AND
 LOCALIZED HORIZONTAL GROUND DISTANCE FROM
 "22-0255-2" TO "EL STATION 10+00 IS
 N 47° 10' 32.8" W 258.35'
 ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
 VERTICAL DATUM USED IS MVD 88

BL	POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	22-0255-1		535780.9534	1179221.6086	783.73		
2	22-0255-2		535588.2900	1179408.6180	776.53	12+57.89	OUTSIDE PROJECT LIMITS
3	22-0255-3		535372.1467	1179541.9447	799.08	22+80 LT	OUTSIDE PROJECT LIMITS