

PROJECT: 34442.1.5 ID: R-2514D

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02	LEGEND
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04-05	PROFILES
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22	SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34442.1.5 (R-2514D)	01	22

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

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

PROJ. REFERENCE NO.: 34442.1.5 F.A. PROJ. N/A

COUNTY: Jones

PROJECT DESCRIPTION: US 17 from North of NC 58 to the New Bern

Bypass

SITE DESCRIPTION: Dual Bridges on -L- over Goshen Branch

PERSONNEL:

COREY FUTRAL

CHARLES BRAKE

BENJAMIN J. ASHBA, LG

SEAN O'NEIL, PE

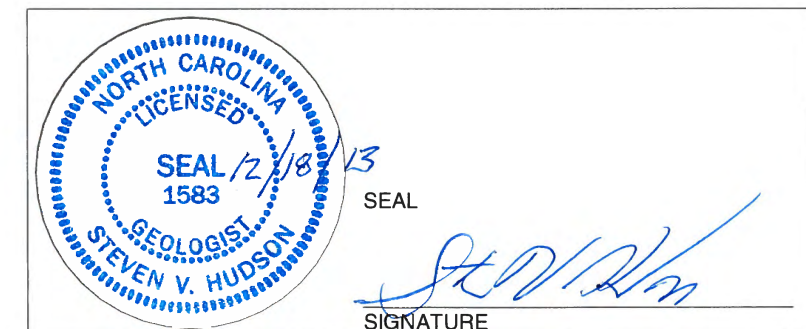
D. SEAN LEGGETT, RLS

INVESTIGATED BY: CATLIN ENGINEERS AND SCIENTISTS

CHECKED BY: STEVEN V. HUDSON, LG, CWD

SUBMITTED BY: STEVEN V. HUDSON, P.G., CWD

DATE: December, 2013



DRAWN BY: STEVEN V. HUDSON, LG, CWD

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.

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS



ID	WBS ELEMENT	SHEET NO.	TOTAL SHEETS
R-2514D	34442.1.5	02	22

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																													
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND 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										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.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN 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 AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS WHICH 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 WHICH 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 (F.P.) - 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. HYDRAULIC PUSH (HP) - ADVANCEMENT OF SAMPLING TOOLS UTILIZING MECHANICAL/HYDRAULIC DOWN-FORCE OF DRILLING MACHINE. 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 (R.Q.D.) - 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 WHICH 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, WHICH 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 (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																													
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES >100 BLOWS PER FOOT																													
MINERALOGICAL COMPOSITION										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.																			
COMPRESSIONIBILITY										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																													
PERCENTAGE OF MATERIAL										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.																			
ORGANIC MATERIAL										MODERATE (MOD.)										MODERATELY SEVERE (MOD. SEV.)										SEVERE (SEV.)										VERY SEVERE (V. SEV.)										COMPLETE									
GROUND WATER										MISCELLANEOUS SYMBOLS										ROCK HARDNESS										FRACTURE SPACING										BEDDING																			
CONSISTENCY OR DENSENESS										ROADWAY EMBANKMENT WITH SOIL DESCRIPTION										VERY HARD										VERY WIDE										VERY THICKLY BEDDED																			
TEXTURE OR GRAIN SIZE										SOIL SYMBOL										HARD										WIDE										THICKLY BEDDED																			
BOULDER (BLDR.)										ARTIFICIAL FILL OTHER THAN ROADWAY EMBANKMENTS										MODERATELY HARD										MODERATELY CLOSE										VERY THINLY BEDDED																			
GRAIN SIZE										INFERRED SOIL BOUNDARIES										MEDIUM HARD										CLOSE										VERY THINLY BEDDED																			
SOIL MOISTURE - CORRELATION OF TERMS										INFERRED ROCK LINE										SOFT										VERY CLOSE										THICKLY LAMINATED																			
PLASTICITY										ALLUVIAL SOIL BOUNDARY										VERY SOFT										VERY CLOSE										THINLY LAMINATED																			
COLOR										DIP/DIP DIRECTION OF ROCK STRUCTURES										INDURATION										INDURATION										INDURATION																			
EQUIPMENT USED ON SUBJECT PROJECT										DIP/DIP DIRECTION OF ROCK STRUCTURES										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.																			
DRILL UNITS:										ADVANCING TOOLS:										HAND TOOLS:										NOTES:																													
<input type="checkbox"/> DIEDRICH D-50										<input type="checkbox"/> CLAY BITS										<input type="checkbox"/> POST HOLE DIGGER										Coordinate System = North Carolina State Plane 1983																													
<input checked="" type="checkbox"/> DIEDRICH D-25										<input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER										<input type="checkbox"/> HAND AUGER										Project Datum = North American Datum 1983 (Conus)																													
<input checked="" type="checkbox"/> CME-45B ATV										<input checked="" type="checkbox"/> 8" HOLLOW AUGERS										<input type="checkbox"/> SOUNDING ROD										Zone = North Carolina 3200																													
<input checked="" type="checkbox"/> CME-550										<input type="checkbox"/> HARD FACED FINGER BITS										<input type="checkbox"/> VANE SHEAR TEST										Geoid Model = GEOID 12 (Conus)																													
<input type="checkbox"/> PORTABLE HOIST										<input type="checkbox"/> TUNG.-CARBIDE INSERTS										<input type="checkbox"/> OTHER										All Units = US Feet																													
<input type="checkbox"/> AMS POWER PROBE										<input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ADVANCER																				GPS Elevation = North American Vertical Datum 1988																													
<input type="checkbox"/> OTHER										<input checked="" type="checkbox"/> TRICONE 2 7/8" STEEL TEETH																																																	
										<input checked="" type="checkbox"/> TRICONE 2 7/8" TUNG.-CARBIDE																																																	
										<input checked="" type="checkbox"/> CORE BIT																																																	
										<input type="checkbox"/> OTHER																																																	

CATLIN #: 213104.03

BENCH MARK: Survey conducted using RTK with Trimble 5800 GPS and Trimble TSC2 Data Collector. Additional survey conducted using NCDOT BL-40 marker. BL-40 = 16.7ft. (N:464341 / E:2530426)

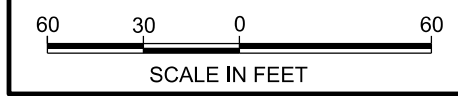
NOTES:
ADAPTED FROM NCDOT FILE "Geotechnical_English.cdf" named "Lgd_1" Rev. 9/23/09
Coordinate System = North Carolina State Plane 1983
Project Datum = North American Datum 1983 (Conus)
Zone = North Carolina 3200
Geoid Model = GEOID 12 (Conus)
All Units = US Feet
GPS Elevation = North American Vertical Datum 1988

NAD 83/NSRS 2007

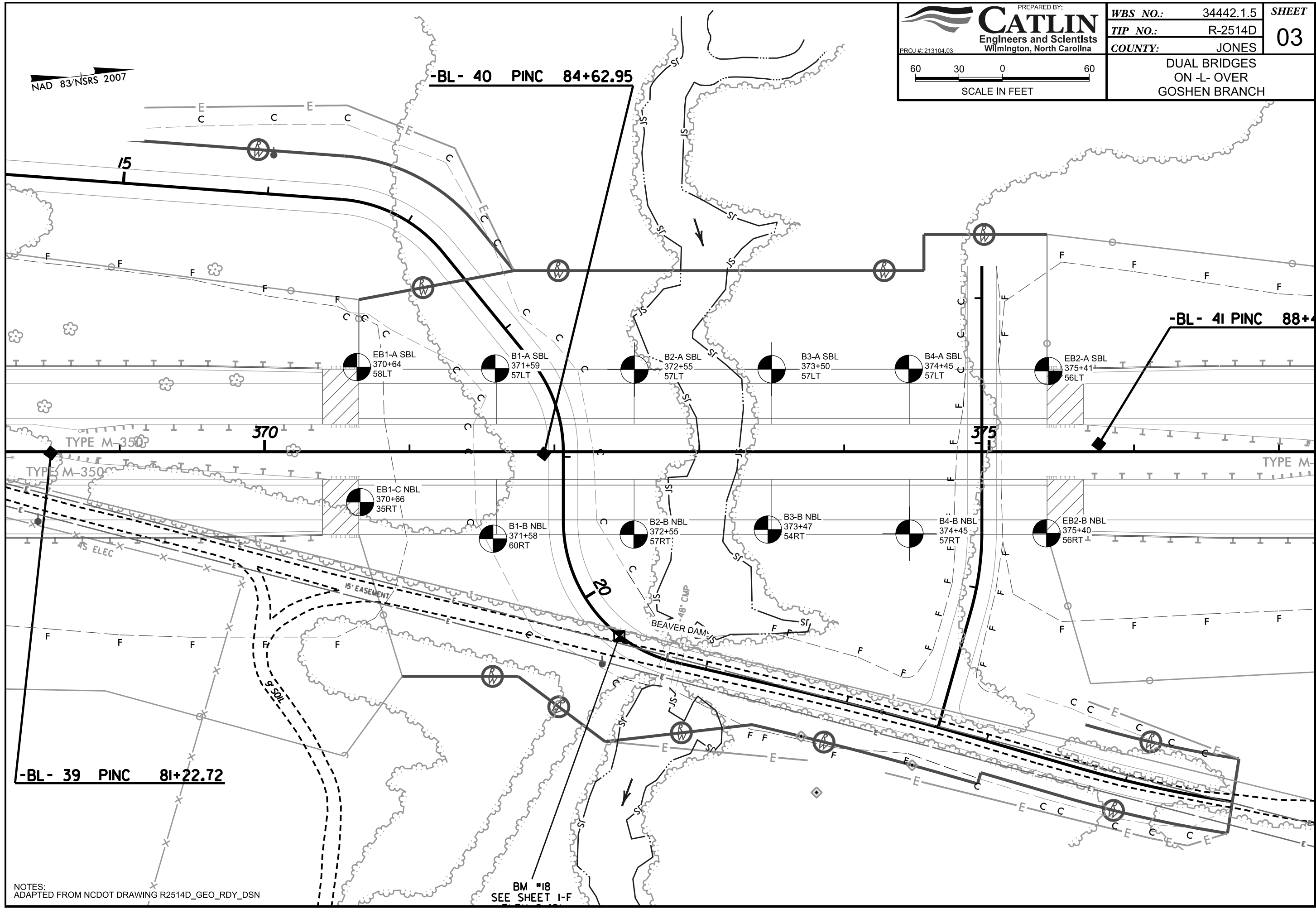
PREPARED BY:
CATLIN
Engineers and Scientists
Wilmington, North Carolina

WBS NO.: 34442.1.5
TIP NO.: R-2514D
COUNTY: JONES

SHEET
03



DUAL BRIDGES
ON -L- OVER
GOSHEN BRANCH

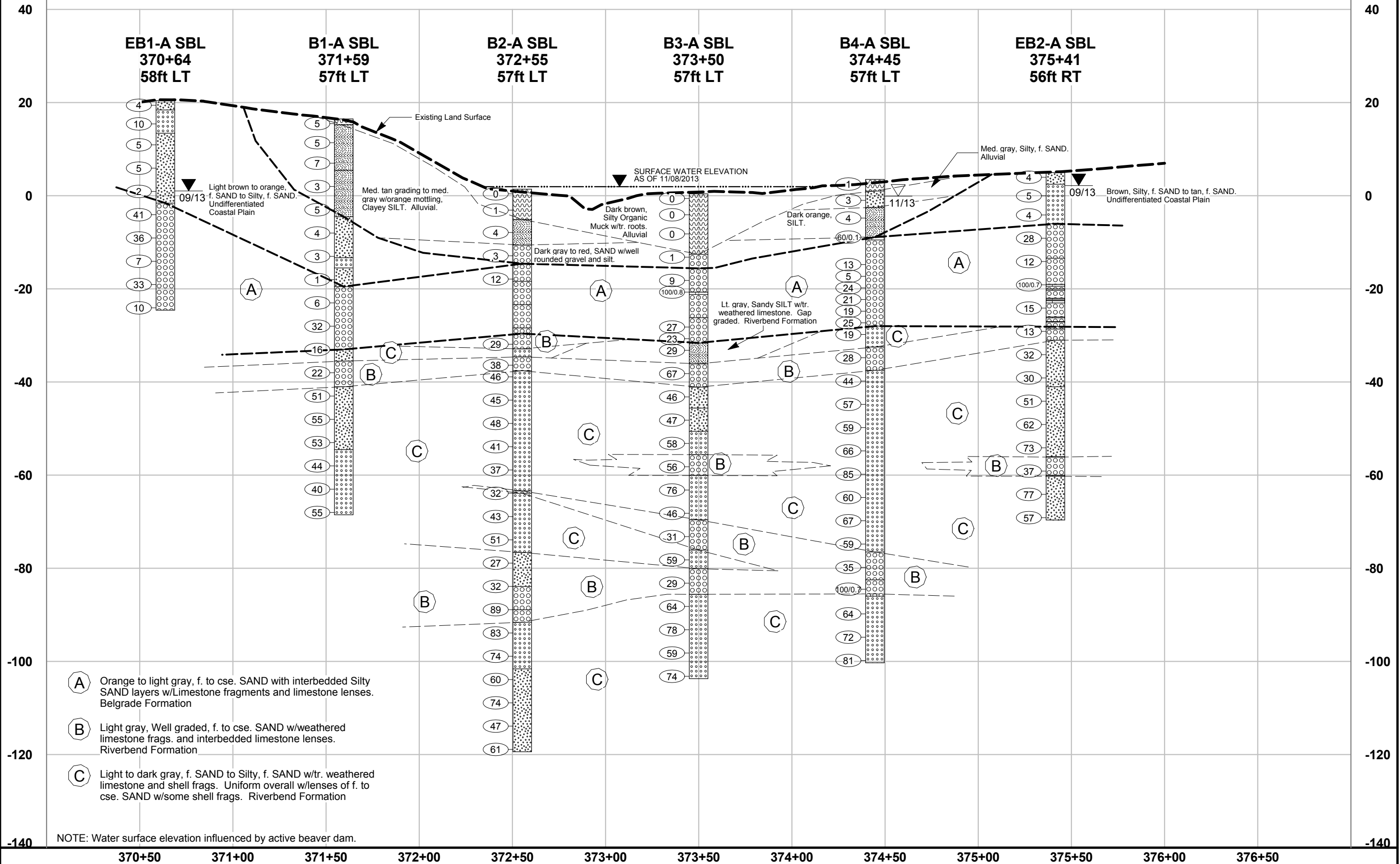


NOTES:
ADAPTED FROM NCDOT DRAWING R2514D_GEO_RDY_DSN

BM #18
SEE SHEET I-F

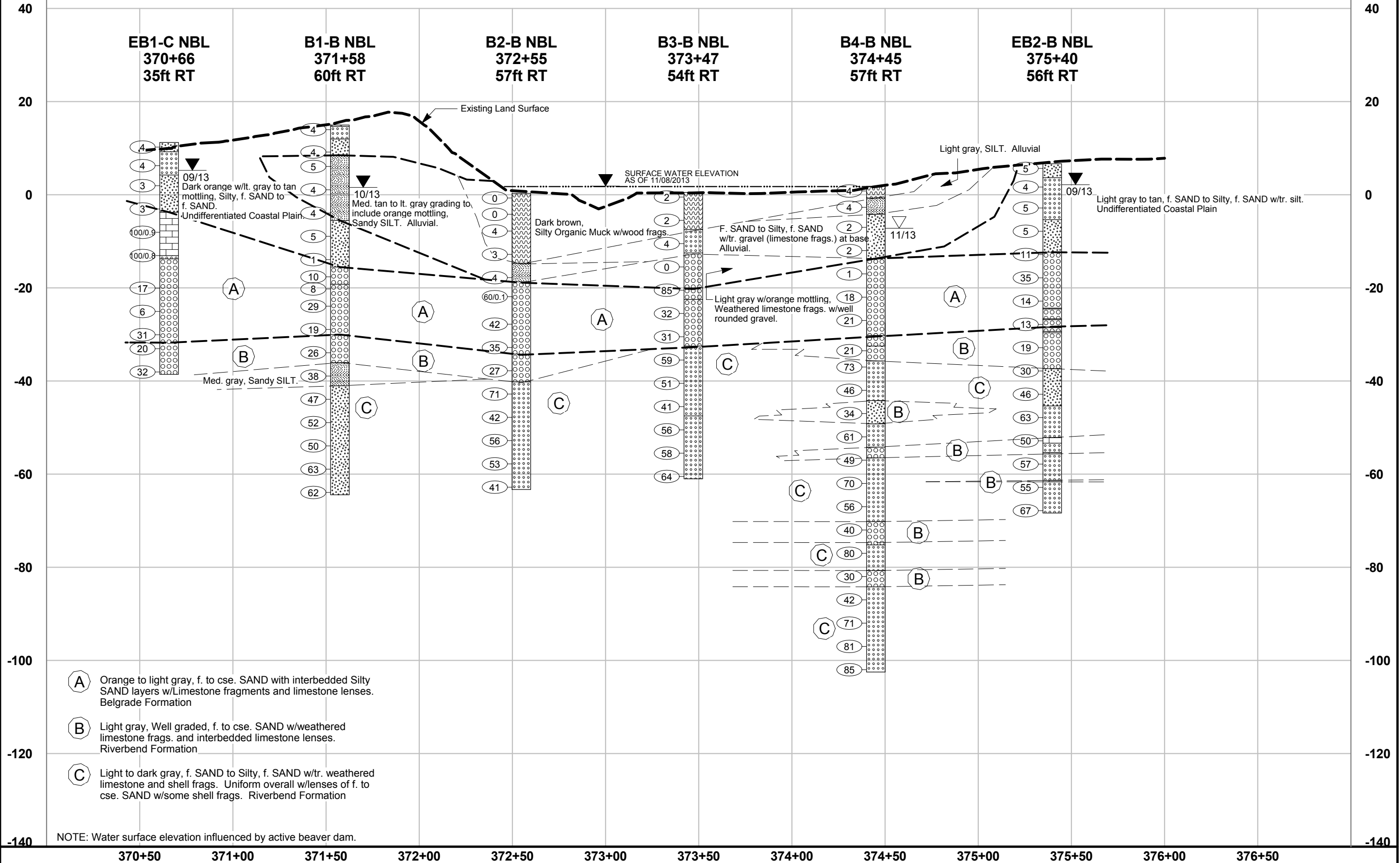
PROFILE SOUTH BOUND LANE 57 FEET LEFT OF -L-

V.E. = 2.5



PROFILE NORTH BOUND LANE 57 FEET RIGHT OF -L-

V.E. = 2.5

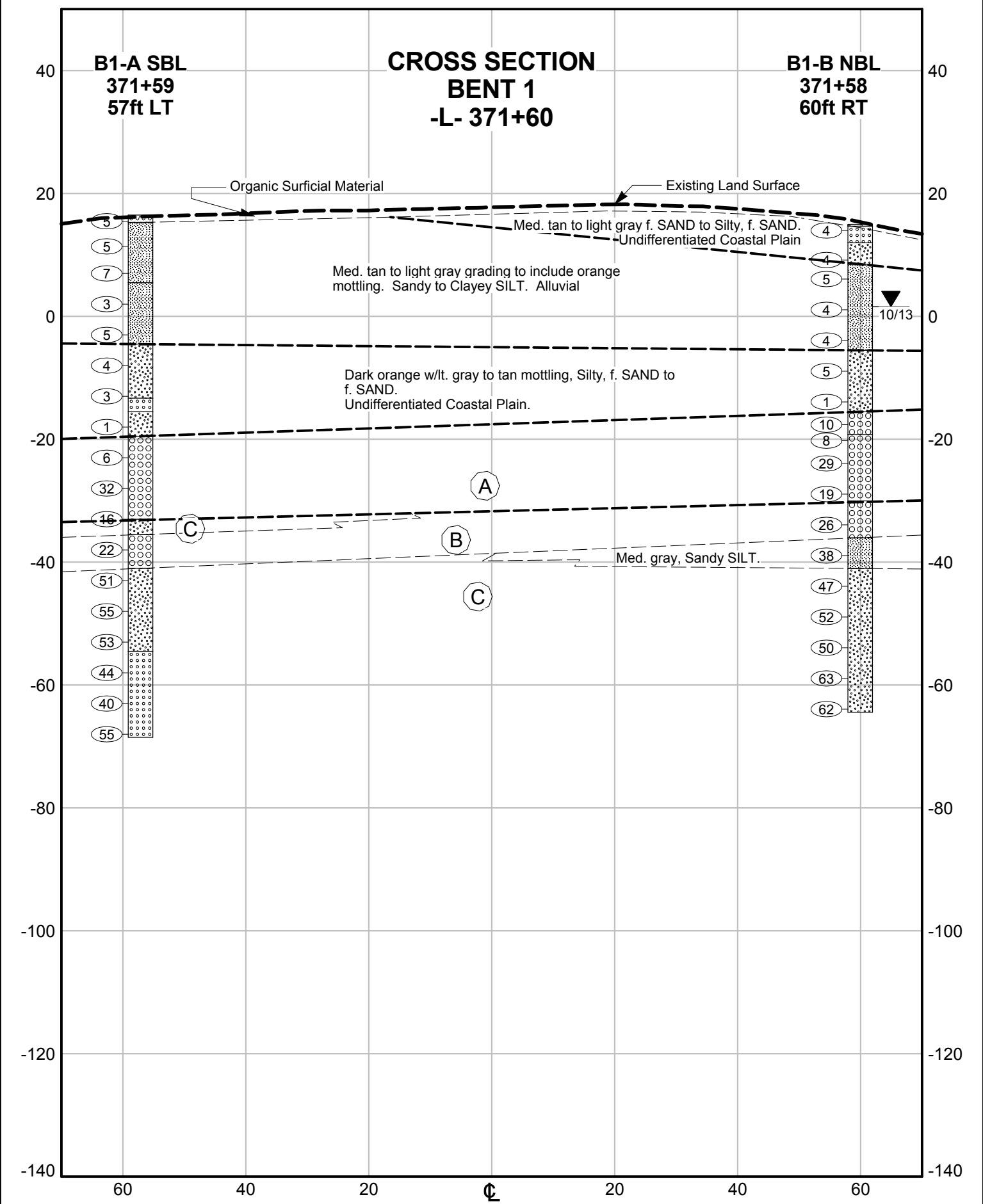
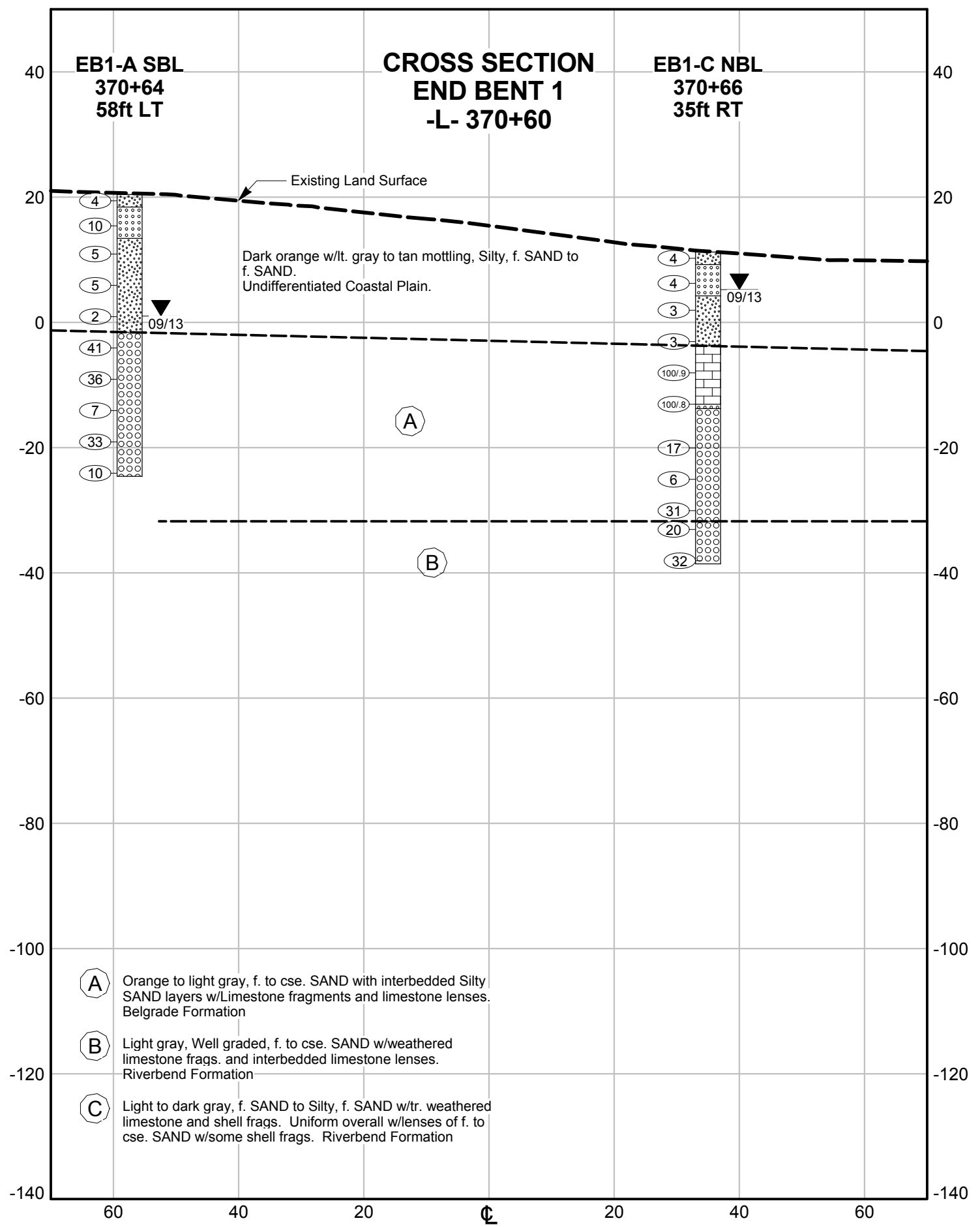


V.E. = 1



DESCRIPTION:
Dual Bridges on -L- over Goshen Branch

SHEET NO.: 06 of 22
PROJ. NO.: 34442.1.5
TIP NO.: R-2514D
COUNTY: Jones

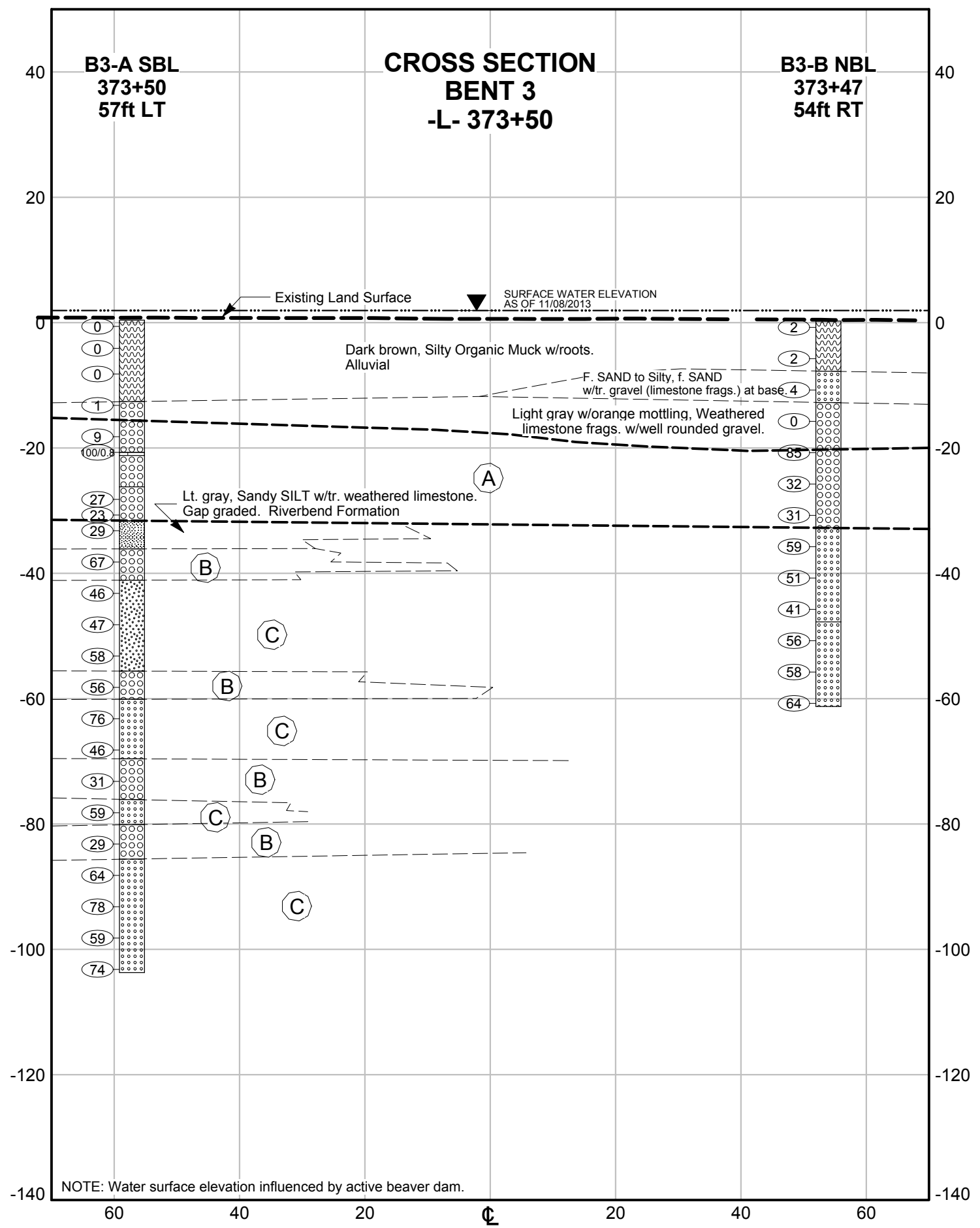
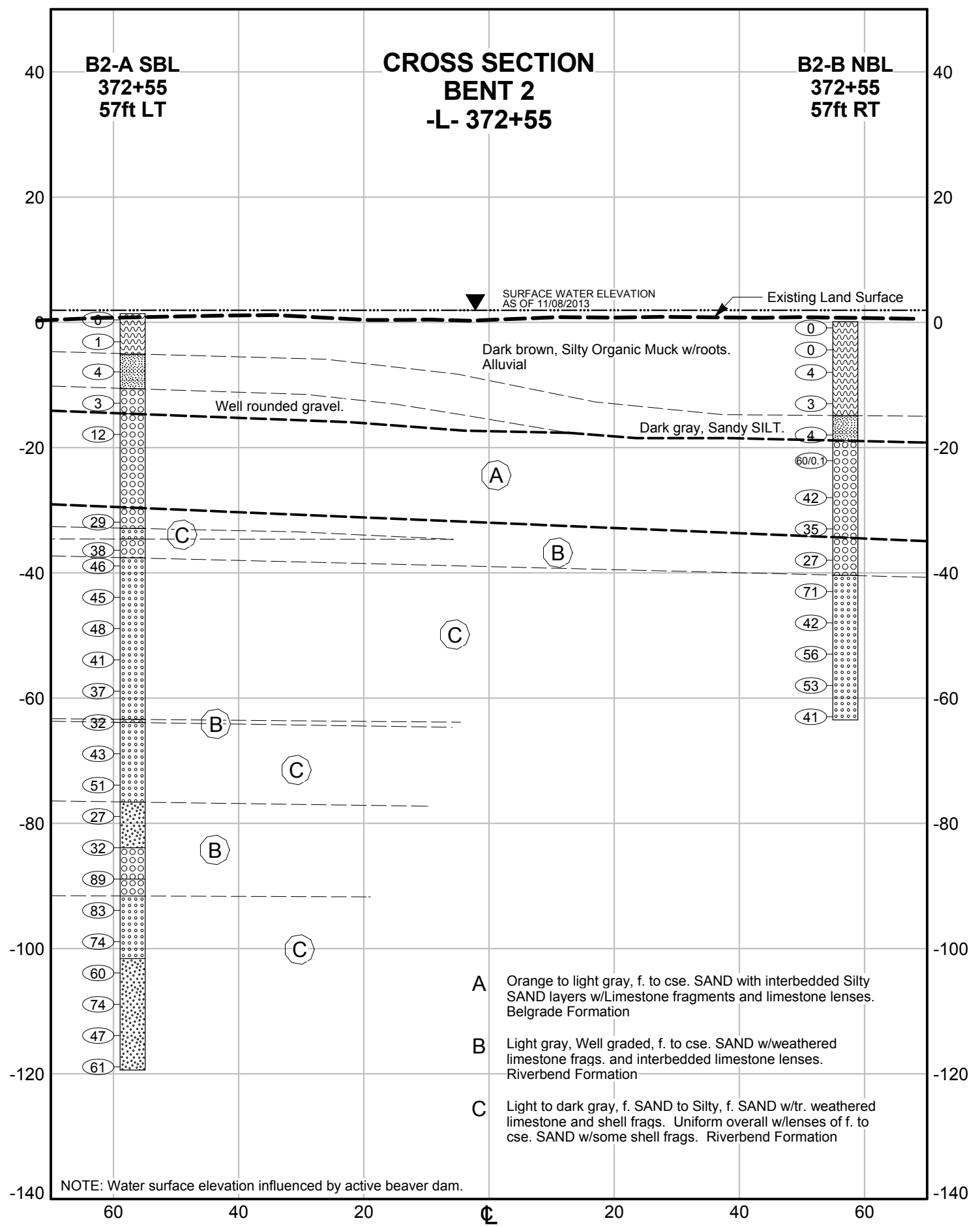


V.E. = 1



DESCRIPTION:
Dual Bridges on -L- over Goshen
Branch

SHEET NO.: 07 of 22
PROJ. NO.: 34442.1.5
TIP NO.: R-2514D
COUNTY: Jones

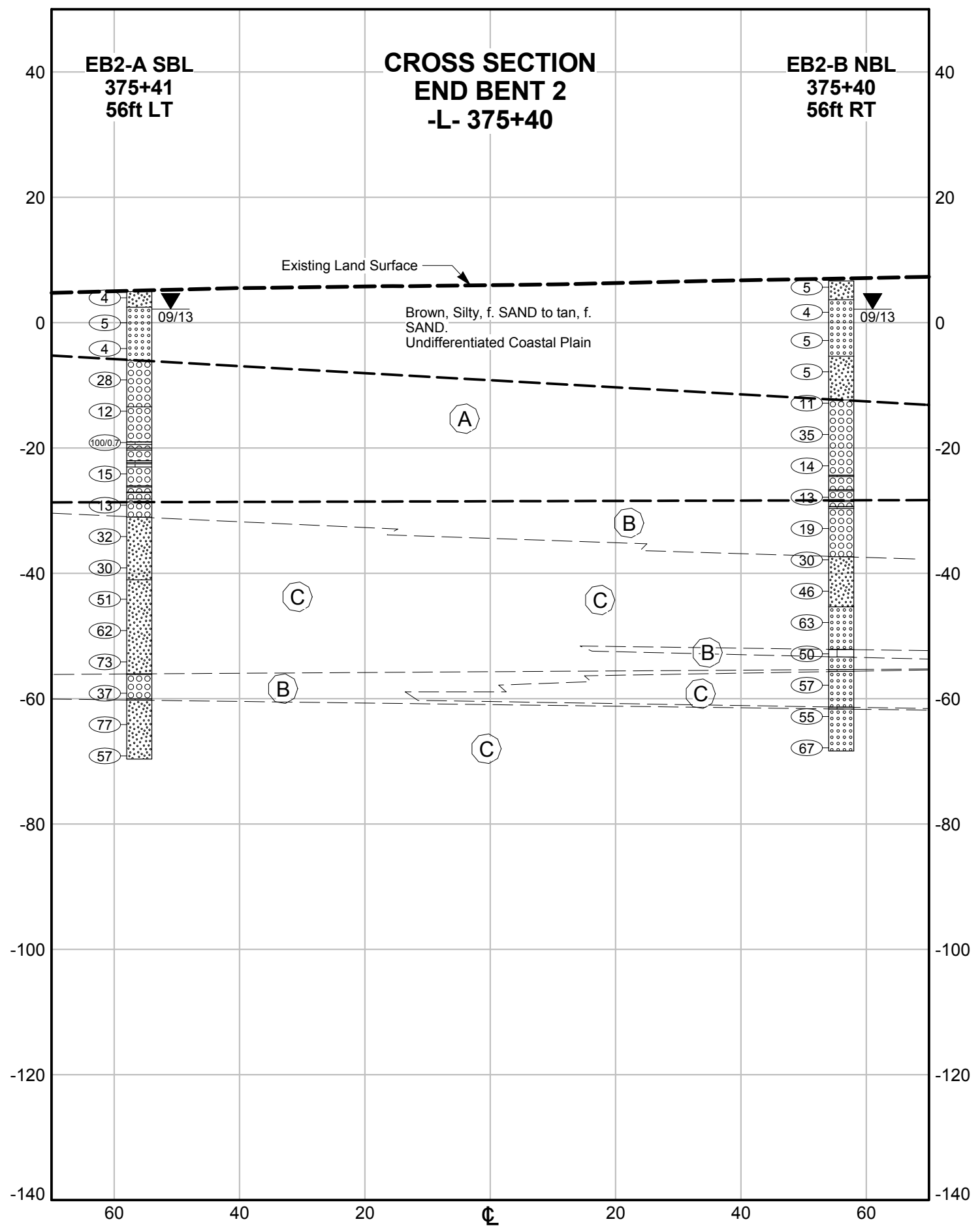
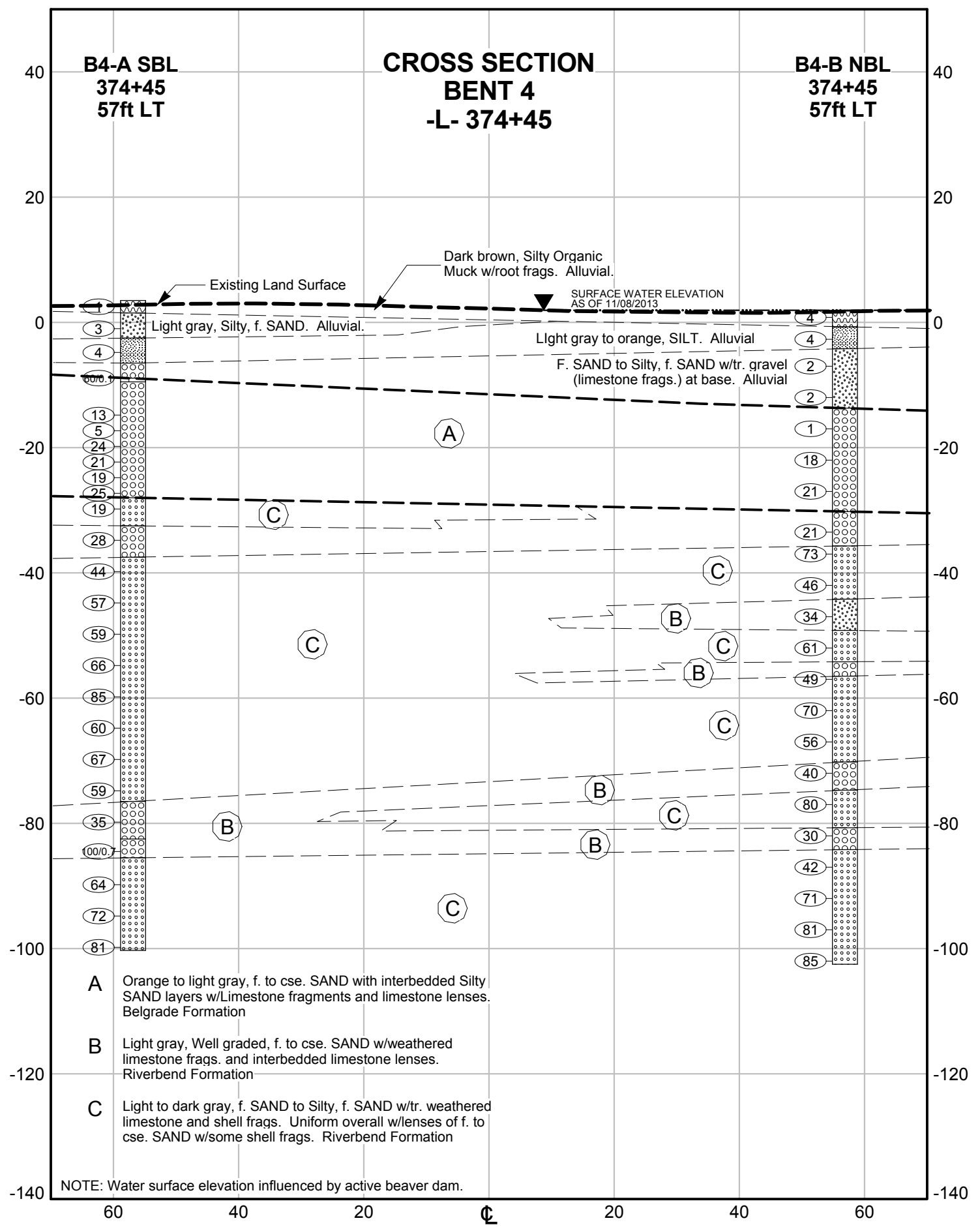


V.E. = 1



DESCRIPTION:
Dual Bridges on -L- over Goshen
Branch

SHEET NO.: 08 of 22
PROJ. NO.: 34442.1.5
TIP NO.: R-2514D
COUNTY: Jones

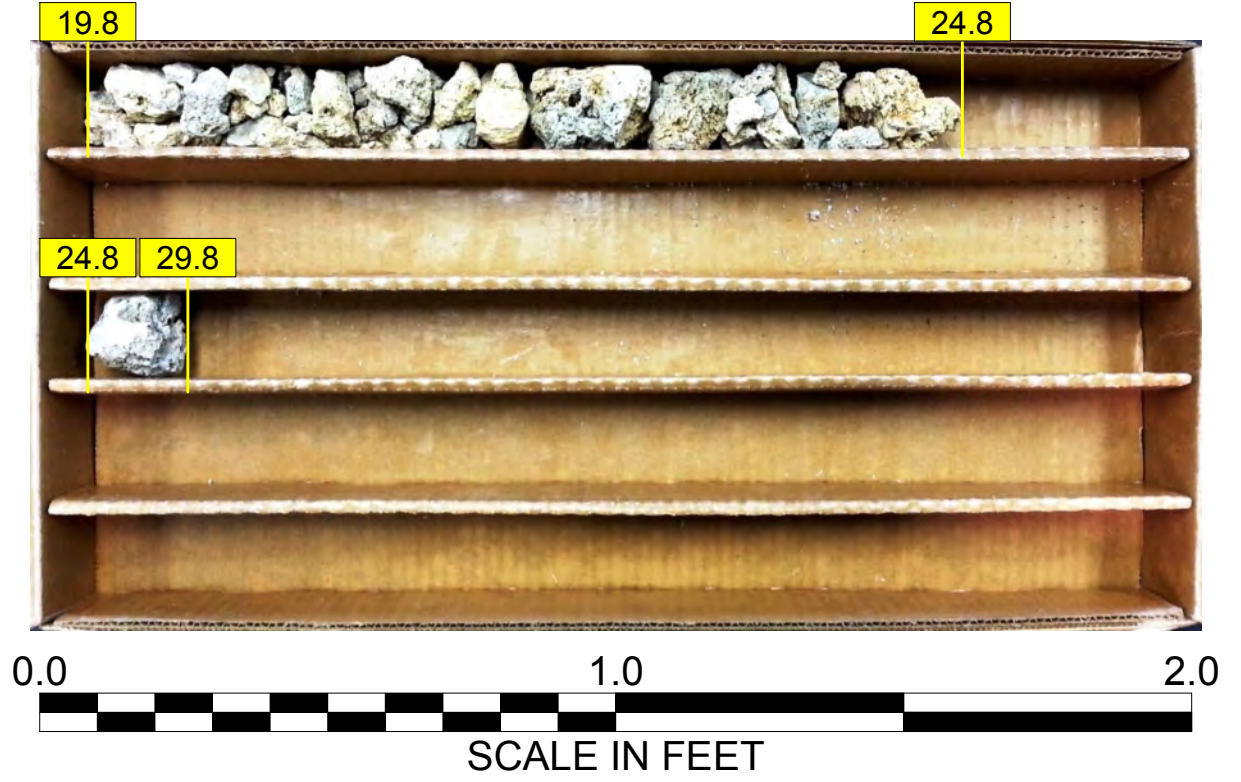




NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral					
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)				
BORING NO. B2-A SBL		STATION 372+55		OFFSET 57ft LT		ALIGNMENT -L-					
COLLAR ELEV. 1.4 ft		TOTAL DEPTH 120.8 ft		NORTHING 464,411		EASTING 2,530,376					
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER N/A		START DATE 10/29/13		COMP. DATE 10/30/13		SURFACE WATER DEPTH 0.4ft					
CORE SIZE NQ		TOTAL RUN 10.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %			
-18.4	-18.4	19.8	5.0	00:38/1.0 00:15/1.0 00:26/1.0 00:30/1.0 00:11/1.0	(1.6) 32%	N/A	(1.6) 32%	N/A	OOOO	Begin Coring @ 19.8 ft	19.8
-20	-23.4	24.8	5.0	01:14/1.0 00:30/1.0 00:25/1.0 00:20/1.0 02:49/1.0	(0.1) 2%	N/A	(0.1) 2%	N/A	OOOO	Tan to brown gray, Sandy, Weathered Limestone. Thin (<0.2ft.) lenses of friable material. Vuggy and sli. foss.	19.8
-25	-28.4	29.8	5.0						OOOO	Light gray, f. Sandy Limestone lens. Sli. foss. Well indurated.	24.8
-30									OOOO		29.8

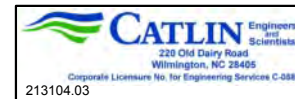
B2-A SBL
BOX 1 of 1
ELEV. -18.4 to -28.4 FT



NCDOT CORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT 11/15/13



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT



SHEET: 14 OF 22
 PROJ. NO.: 34442.1.5
 TIP NO.: R-2514D
 COUNTY: Jones

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral											
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)										
BORING NO. B2-B NBL		STATION 372+55		OFFSET 57ft RT		ALIGNMENT -L-											
COLLAR ELEV. 0.3 ft		TOTAL DEPTH 63.6 ft		NORTHING 464,397		EASTING 2,530,489											
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
DRILLER N/A		START DATE 10/24/13		COMP. DATE 10/25/13		SURFACE WATER DEPTH 1.4ft											
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)		
5																	
0	0.3	0.0													0.3	WATER BOTTOM 0.0	
-5	-3.2	3.5	WOH	WOH	WOH											ALLUVIAL Dark brown, Silty, Org. Muck. No recovery on additional samples. Logged from cuttings.	
-10	-6.8	7.1	WOH	3	1												
-15	-11.8	12.1	3	1	2												
-20	-16.8	17.1	2	3	1										-14.7	Med. gray to med. brown, Clayey SILT. 15.0	
-25	-21.8	22.1	60/1												-18.7	COASTAL PLAIN Lt. gray to lt. brown, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags. and sporadic limestone lenses (0.1 - 0.2ft thick). Belgrade Formation 19.0	
-30	-26.8	27.1	11	12	30												
-35	-31.8	32.1	5	11	24												
-40	-36.8	37.1	11	16	11										-34.2	Lt. gray, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags., and sporadic limestone lenses. Riverbend Formation 34.5	
-45	-41.8	42.1	28	34	37										-40.2	Med. gray, f. SAND. Uniform. 40.5	
-50	-46.8	47.1	16	18	24												
-55	-51.8	52.1	17	30	26												
-60	-56.8	57.1	14	24	29												
	-61.8	62.1	18	11	30												
															-63.3	Boring Terminated at Elevation -63.3 ft in f. SAND. Riverbend Formation 63.6	

NCDOT BORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ CATLIN.GDT 12/17/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT



SHEET: 15 OF 22
 PROJ. NO.: 34442.1.5
 TIP NO.: R-2514D
 COUNTY: Jones

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral										
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)									
BORING NO. B3-A SBL		STATION 373+50		OFFSET 57ft LT		ALIGNMENT -L-										
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 104.1 ft		NORTHING 464,505		EASTING 2,530,387										
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic										
DRILLER N/A		START DATE 10/30/13		COMP. DATE 10/31/13		SURFACE WATER DEPTH 4.6ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
0	0.4	0.0	WOH	WOH	WOH									0.4		0.0
-5	-3.1	3.5	WOH	WOH	WOH											
-10	-7.2	7.6	WOH	WOH	WOH											
-15	-12.2	12.6	WOH	1	0											
-20	-17.2	17.6	2	3	6											
-25	-19.7	20.1	23	17	83/3											
-30	-27.2	27.6	4	7	20											
-35	-29.7	30.1	7	9	14											
-40	-32.2	32.6	12	14	15											
-45	-37.2	37.6	15	31	36											
-50	-42.2	42.6	14	19	27											
-55	-47.2	47.6	20	30	17											
-60	-52.2	52.6	30	28	30											
-65	-57.2	57.6	11	23	33											
-70	-62.2	62.6	13	30	46											
-75	-67.2	67.6	13	20	26											
	-72.2	72.6	35	11	20											

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral										
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)									
BORING NO. B3-A SBL		STATION 373+50		OFFSET 57ft LT		ALIGNMENT -L-										
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 104.1 ft		NORTHING 464,505		EASTING 2,530,387										
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012			DRILL METHOD NW Casing W/SPT & Core			HAMMER TYPE Automatic										
DRILLER N/A		START DATE 10/30/13		COMP. DATE 10/31/13		SURFACE WATER DEPTH 4.6ft										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75																
-80	-77.2	77.6	14	25	34											
-85	-82.2	82.6	16	12	17											
-90	-87.2	87.6	10	28	36											
-95	-92.2	92.6	17	32	46											
-100	-97.2	97.6	17	27	32											
	-102.2	102.6	19	32	42											

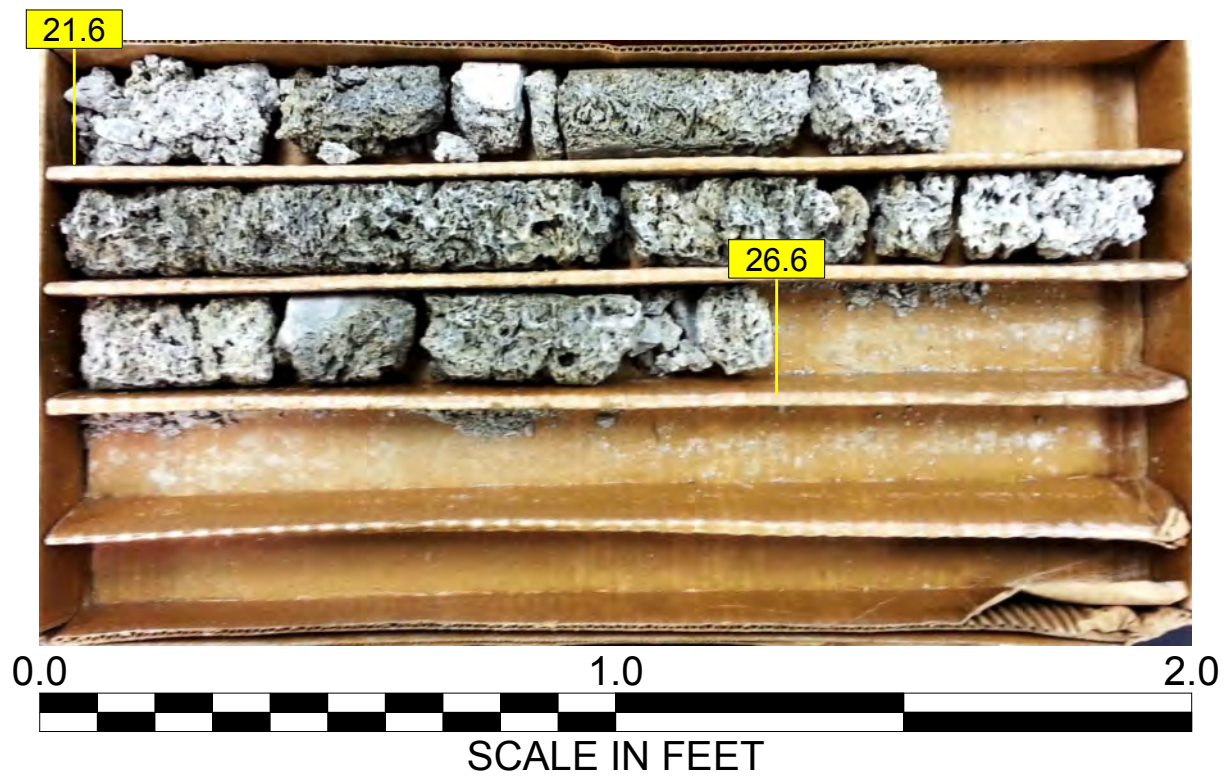
NCDOT BORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT 12/17/13



NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral					
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)				
BORING NO. B3-A SBL		STATION 373+50		OFFSET 57ft LT		ALIGNMENT -L-					
COLLAR ELEV. 0.4 ft		TOTAL DEPTH 104.1 ft		NORTHING 464,505		EASTING 2,530,387					
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER N/A		START DATE 10/30/13		COMP. DATE 10/31/13		SURFACE WATER DEPTH 4.6ft					
CORE SIZE NQ		TOTAL RUN 5.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (%)	REC. (ft)	RQD (%)			
-21.2	-21.2	21.6	5.0	1:03/1.0 5:00/1.0 0:20/1.0 0:23/1.0 1:32/1.0	(4.6) 92%	N/A	(4.6) 92%	N/A	OOO OOO OOO OOO OOO	Begin Coring @ 21.6 ft	21.6
-25	-26.2	26.6							OOO OOO OOO OOO OOO	Gray brown, Foss. Limestone. Vuggy. Mod. indurated w/numerous sand lenses. High porosity.	26.6
-30											
-35											
-40											
-45											
-50											
-55											
-60											
-65											
-70											
-75											
-80											
-85											
-90											
-95											
-100											

B3-A SBL
BOX 1 of 1
ELEV. -21.2 to -26.2 FT



NCDOT CORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT 11/15/13

NCDOT CORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT 11/15/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT



SHEET: 17 OF 22
 PROJ. NO.: 34442.1.5
 TIP NO.: R-2514D
 COUNTY: Jones

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral										
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)									
BORING NO. B3-B NBL		STATION 373+47		OFFSET 54ft RT		ALIGNMENT -L-										
COLLAR ELEV. 0.5 ft		TOTAL DEPTH 61.5 ft		NORTHING 464,489		EASTING 2,530,497										
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic										
DRILLER N/A		START DATE 10/24/13		COMP. DATE 10/24/13		SURFACE WATER DEPTH 1.9ft										
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)		
5																
0	0.5	0.0	1	1	1	2								0.5		0.0
-5	-4.5	5.0	1	1	1	2										
-10	-9.5	10.0	2	1	3	4								-7.5		8.0
-15	-14.5	15.0	1	0	0	0								-12.5		13.0
-20	-19.5	20.0	4	7	78	0								-20.0		20.5
-25	-24.5	25.0	40	20	12	85								-22.5		23.0
-30	-29.5	30.0	7	15	16	32								-32.5		33.0
-35	-34.5	35.0	5	22	37	31								-32.5		33.0
-40	-39.5	40.0	13	21	30	59								-32.5		33.0
-45	-44.5	45.0	10	20	21	51								-32.5		33.0
-50	-49.5	50.0	15	28	28	41								-47.5		48.0
-55	-54.5	55.0	19	26	32	56								-47.5		48.0
-60	-59.5	60.0	18	31	33	58								-61.0		61.5
						64								-61.0		61.5

NCDOT BORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT 12/17/13

Boring Terminated at Elevation -61.0 ft in f. SAND. Riverbend Formation



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral										
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)									
BORING NO. B4-A SBL		STATION 374+45		OFFSET 57ft LT		ALIGNMENT -L-										
COLLAR ELEV. 3.5 ft		TOTAL DEPTH 103.8 ft		NORTHING 464,599		EASTING 2,530,398										
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER N/A		START DATE 10/31/13		COMP. DATE 11/01/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
5																
	3.5	0.0														
			WOH	WOH	1											
0	0.0	3.5	1	2	1											
-5	-3.8	7.3	WOH	WOH	4											
-10	-8.8	12.3			60/0.1											
-15	-13.8	17.3	2	6	7											
-20	-16.3	19.8	3	2	3											
-25	-18.8	22.3	8	10	14											
-30	-21.3	24.8	9	10	11											
-35	-23.8	27.3	7	9	10											
-40	-26.3	29.8	12	17	8											
-45	-28.8	32.3	7	9	10											
-50	-33.8	37.3	12	10	18											
-55	-38.8	42.3	17	21	23											
-60	-43.8	47.3	17	26	31											
-65	-48.8	52.3	17	27	32											
-70	-53.8	57.3	19	32	34											
-75	-58.8	62.3	16	35	50											
-80	-63.8	67.3	18	26	34											
-85	-68.8	72.3	24	35	32											
-90	-73.8	77.3	16	25	34											

WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral										
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)									
BORING NO. B4-A SBL		STATION 374+45		OFFSET 57ft LT		ALIGNMENT -L-										
COLLAR ELEV. 3.5 ft		TOTAL DEPTH 103.8 ft		NORTHING 464,599		EASTING 2,530,398										
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER N/A		START DATE 10/31/13		COMP. DATE 11/01/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
-75																
-80	-78.8	82.3	8	17	18											
-85	-83.8	87.3	83	177.2												
-90	-88.8	92.3	16	27	37											
-95	-93.8	97.3	16	30	42											
-100	-98.8	102.3	18	36	45											

NCDOT BORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ_CATLIN.GDT_12/17/13

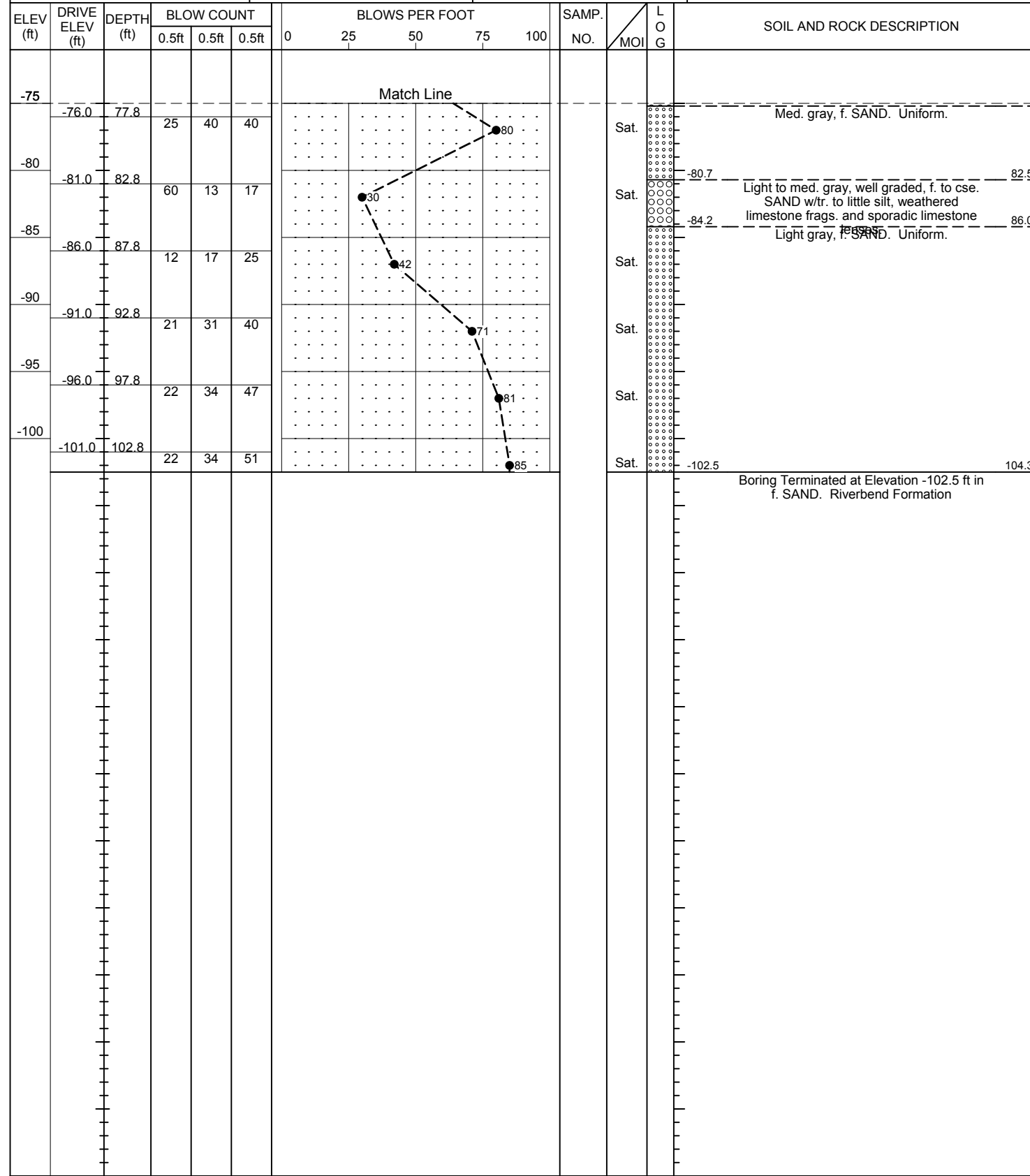
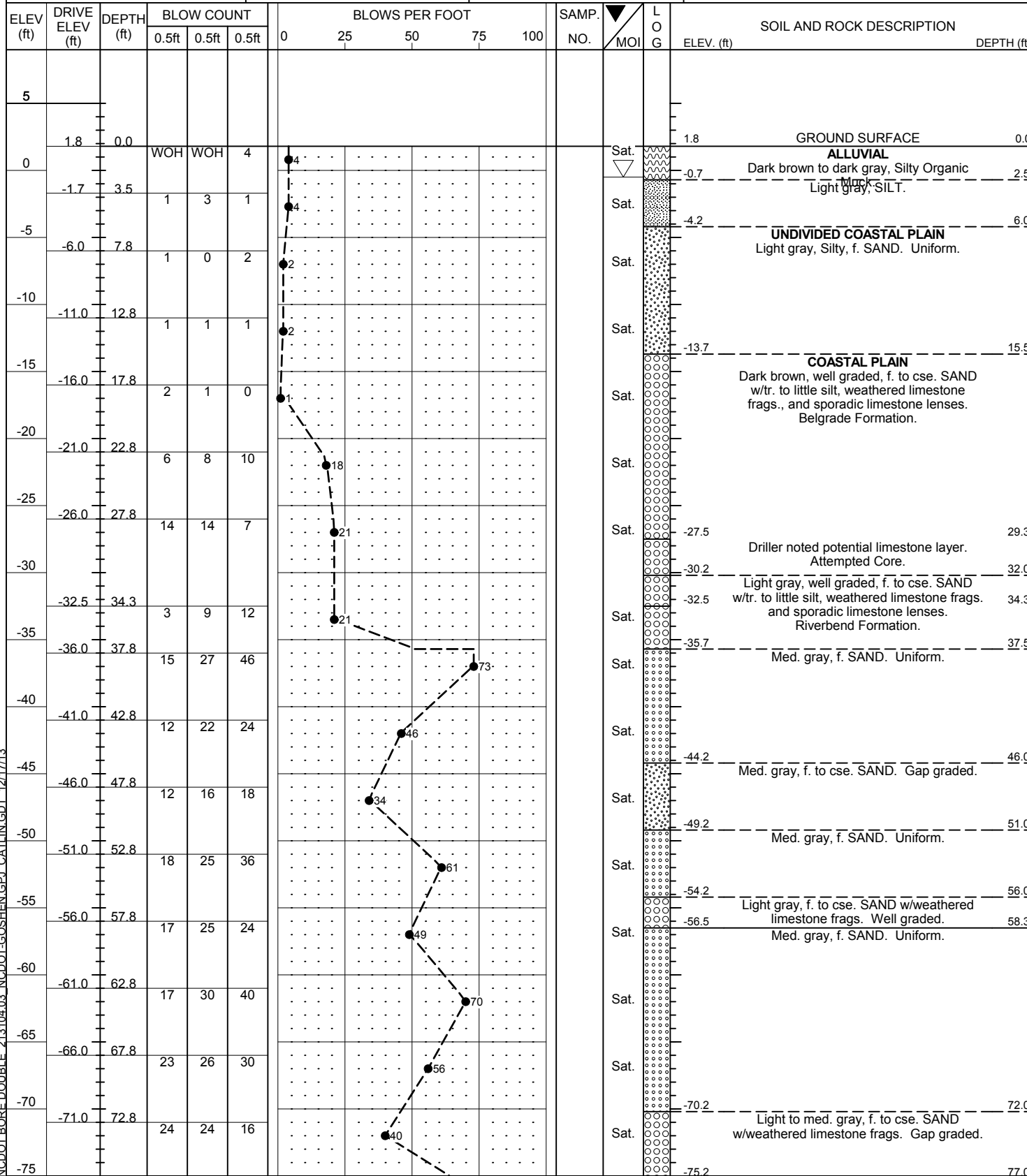


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34442.1.5	TIP R-2514D	COUNTY Jones	GEOLOGIST Corey Futral
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch			GROUND WTR (ft)
BORING NO. B4-B NBL	STATION 374+45	OFFSET 57ft RT	ALIGNMENT -L-
COLLAR ELEV. 1.8 ft	TOTAL DEPTH 104.3 ft	NORTHING 464,586	EASTING 2,530,511
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER N/A	START DATE 11/04/13	COMP. DATE 11/05/13	SURFACE WATER DEPTH N/A

WBS 34442.1.5	TIP R-2514D	COUNTY Jones	GEOLOGIST Corey Futral
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch			GROUND WTR (ft)
BORING NO. B4-B NBL	STATION 374+45	OFFSET 57ft RT	ALIGNMENT -L-
COLLAR ELEV. 1.8 ft	TOTAL DEPTH 104.3 ft	NORTHING 464,586	EASTING 2,530,511
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER N/A	START DATE 11/04/13	COMP. DATE 11/05/13	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE 213104.03 NCDOT-GOSHEN.GPJ CATLIN.GDT 12/17/13



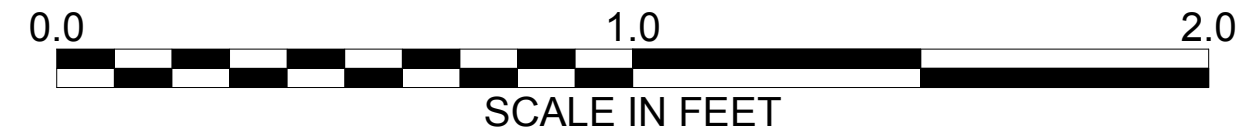
NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT

CATLIN Engineers and Scientists 220 Old Dairy Road Wilmington, NC 28405 Corporate License No. for Engineering Services C-6885 213104.03	SHEET: 20 OF 22 PROJ. NO.: 34442.1.5 TIP NO.: R-2514D COUNTY: Jones
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WBS 34442.1.5		TIP R-2514D		COUNTY Jones		GEOLOGIST Corey Futral					
SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch							GROUND WTR (ft)				
BORING NO. B4-B NBL		STATION 374+45		OFFSET 57ft RT		ALIGNMENT -L-					
COLLAR ELEV. 1.8 ft		TOTAL DEPTH 104.3 ft		NORTHING 464,586		EASTING 2,530,511					
DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER N/A		START DATE 11/04/13		COMP. DATE 11/05/13		SURFACE WATER DEPTH N/A					
CORE SIZE NQ		TOTAL RUN 5.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
-27.5	-27.5	29.3	5.0	0:30/1.0	(0.0)	N/A	(0.0)	N/A	OOO	Begin Coring @ 29.3 ft	
-30				0:18/1.0	0%		0%		OOO	COASTAL PLAIN (continued)	
				1:10/1.0					OOO	NO RECOVERY	32.0
	-32.5	34.3		0:27/1.0					OOO		
				0:33/1.0					OOO		34.3
-35											
-40											
-45											
-50											
-55											
-60											
-65											
-70											
-75											
-80											
-85											
-90											
-95											
-100											

B4-B NBL
BOX 1 of 1
ELEV. -27.5 to -32.5 FT

NO RECOVERY

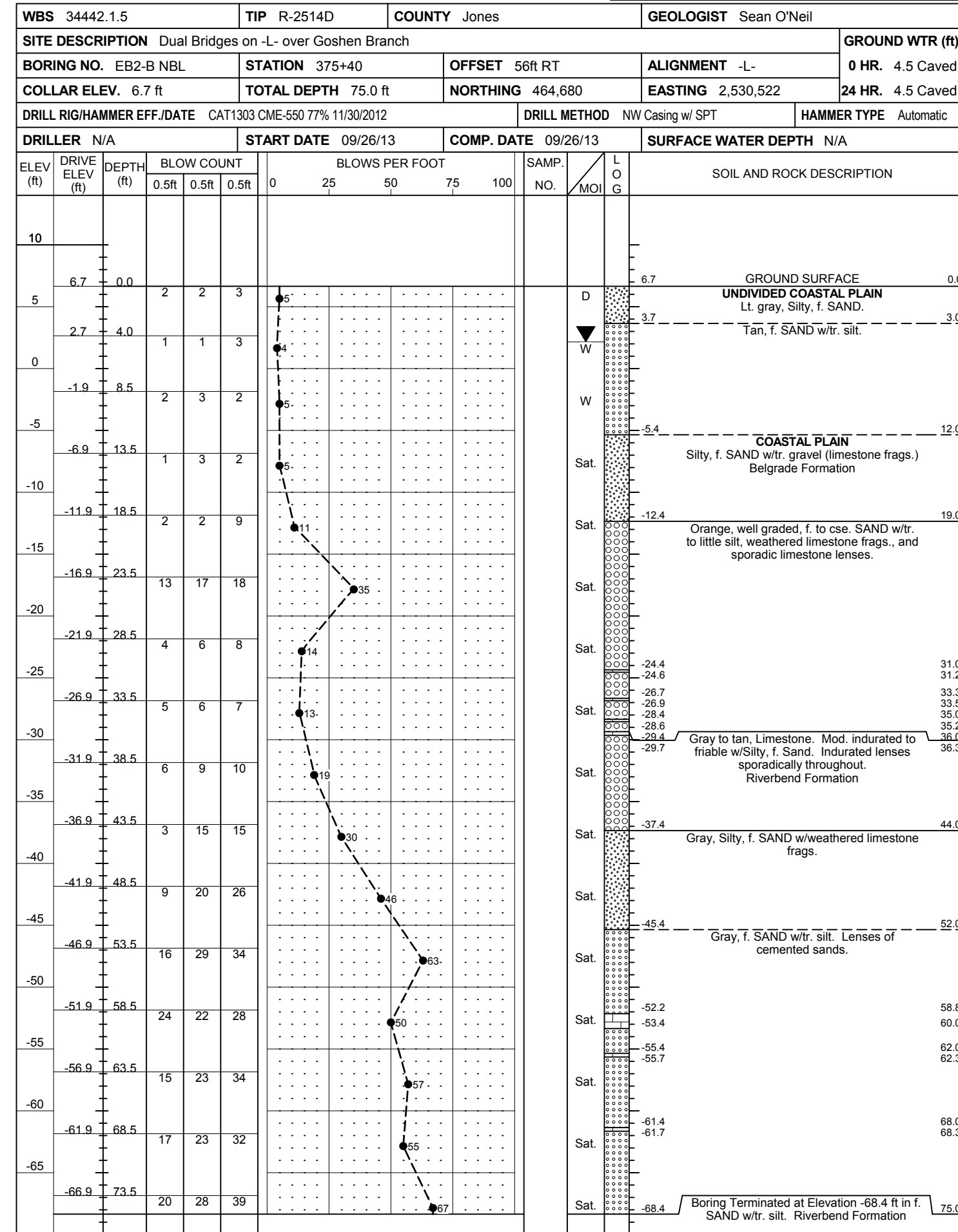
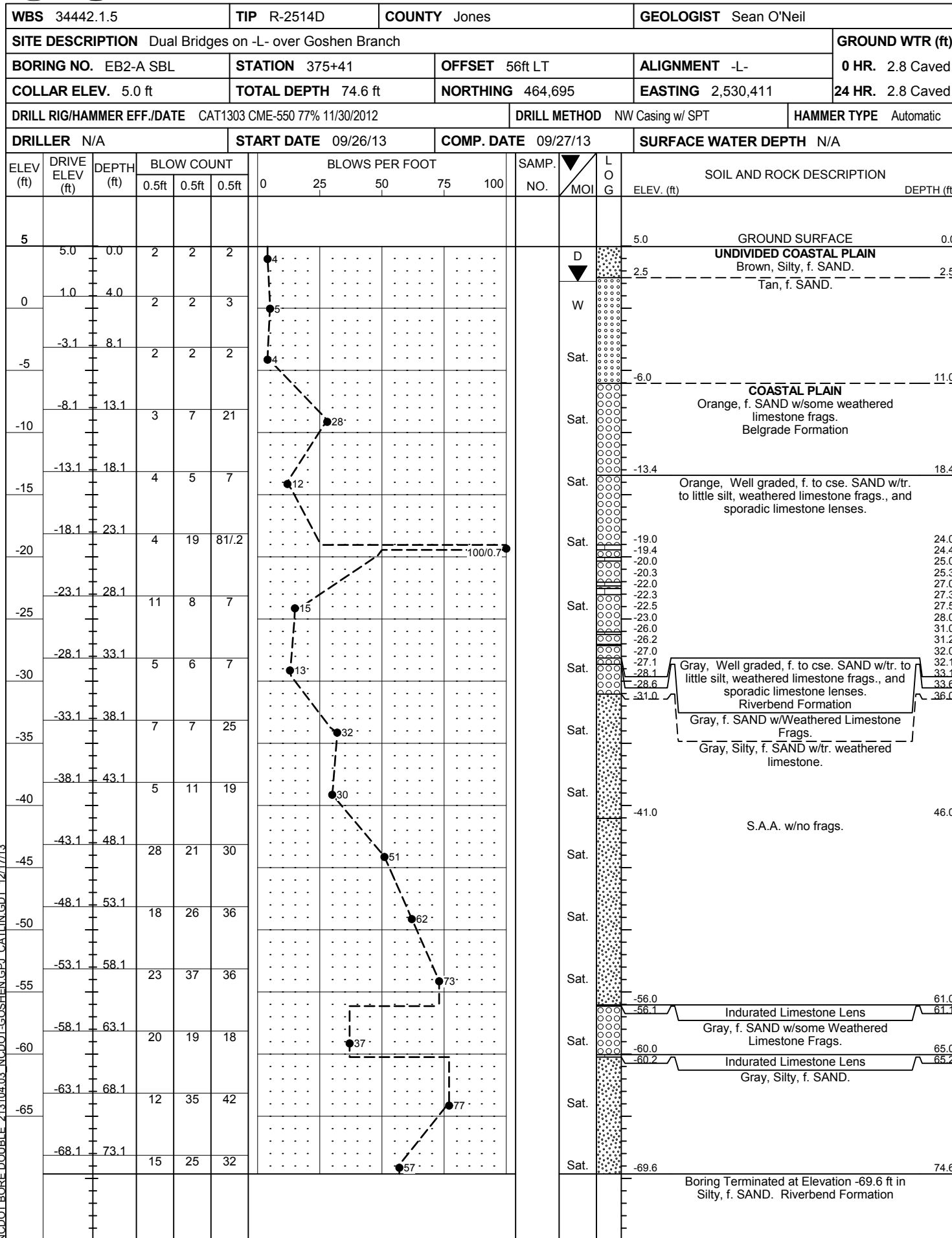


NCDOT CORE DOUBLE 213104.03_NCDOT-GOSHEN.GPJ CATLIN.GDT 11/15/13



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

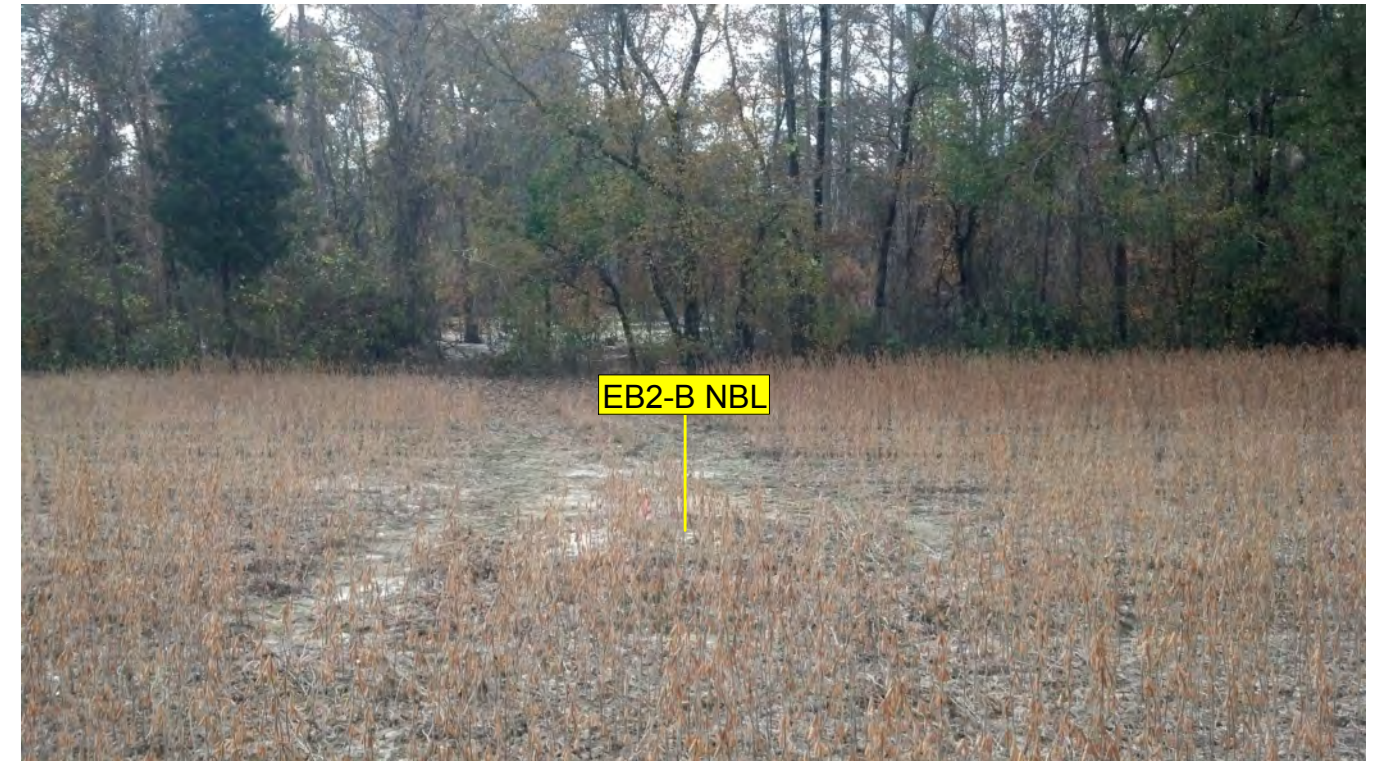


NCDOT BORE DOUBLE 213104.03 NCDOT-GOSHEN.GPJ CATLIN.GDT 12/17/13

SITE PHOTOGRAPHS



NORTH ALONG -L-
END BENT 1 IN FOREGROUND



FACING SOUTH ALONG -L-
END BENT 2 IN FOREGROUND



BENT 1 FACING NORTH ALONG -L-



EAST OF -L- FACING WEST
BENT 2 AND BENT 3