

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. B-3919(33353.1.1) F.A. PROJ. BRZ-2053(1)
COUNTY WAKE
PROJECT DESCRIPTION BRIDGE NO. 448 OVER AUSTIN CREEK
AND BRIDGE NO. 140 OVER SMITH'S CREEK ON SR 2053
(JONES DAIRY RD.)

INVENTORY

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CAUTION NOTICE

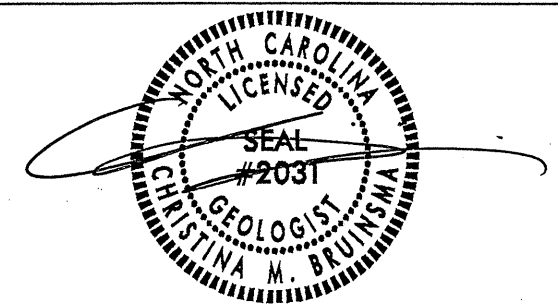
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PERSONNEL
C.M. BRUINSMA
H.R. CONLEY
J.R. MATULA

INVESTIGATED BY C.M. BRUINSMA
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE JANUARY 2009



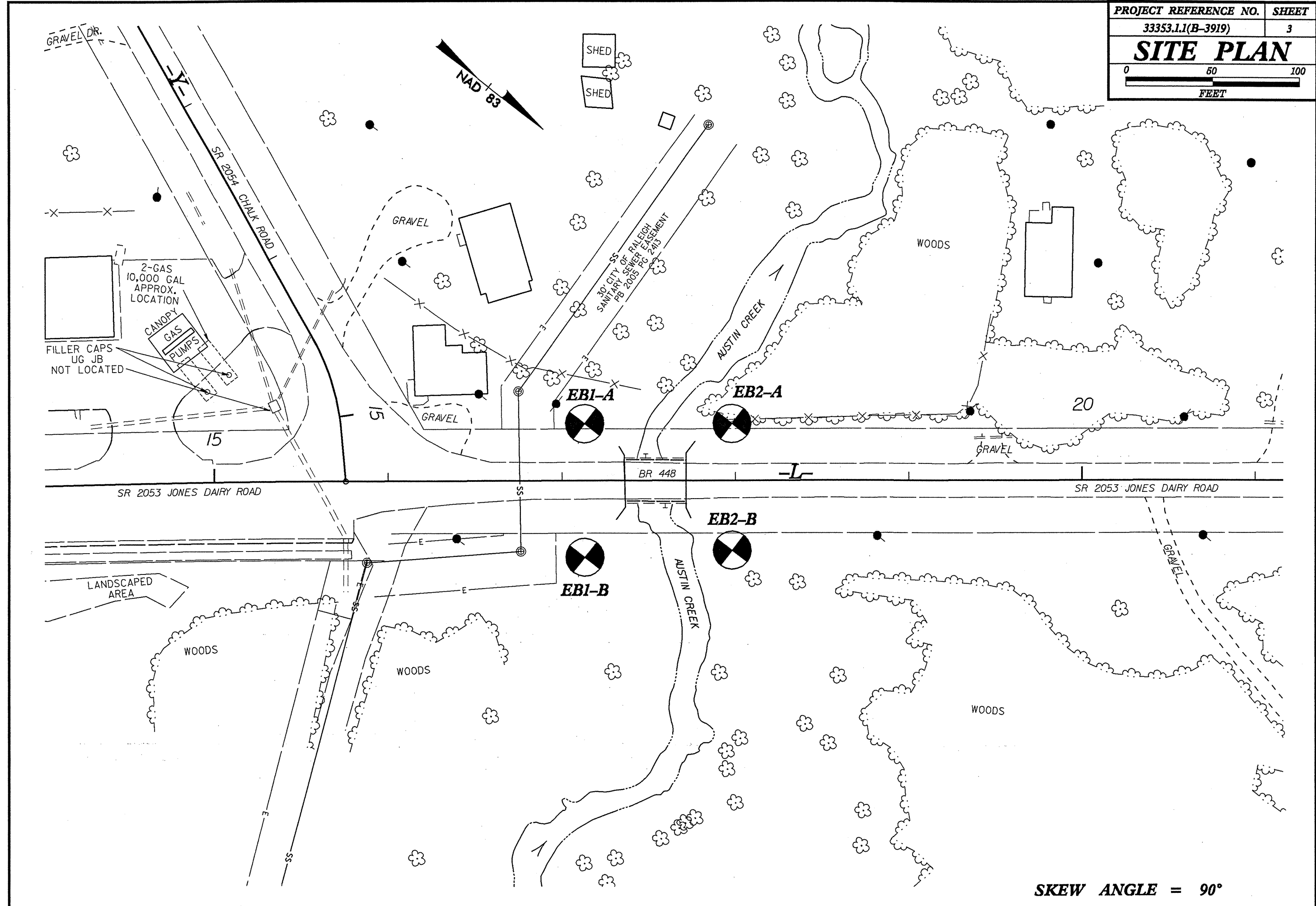
PROJECT: 33353.1.1 ID: B-3919

DRAWN BY: T.T. WALKER

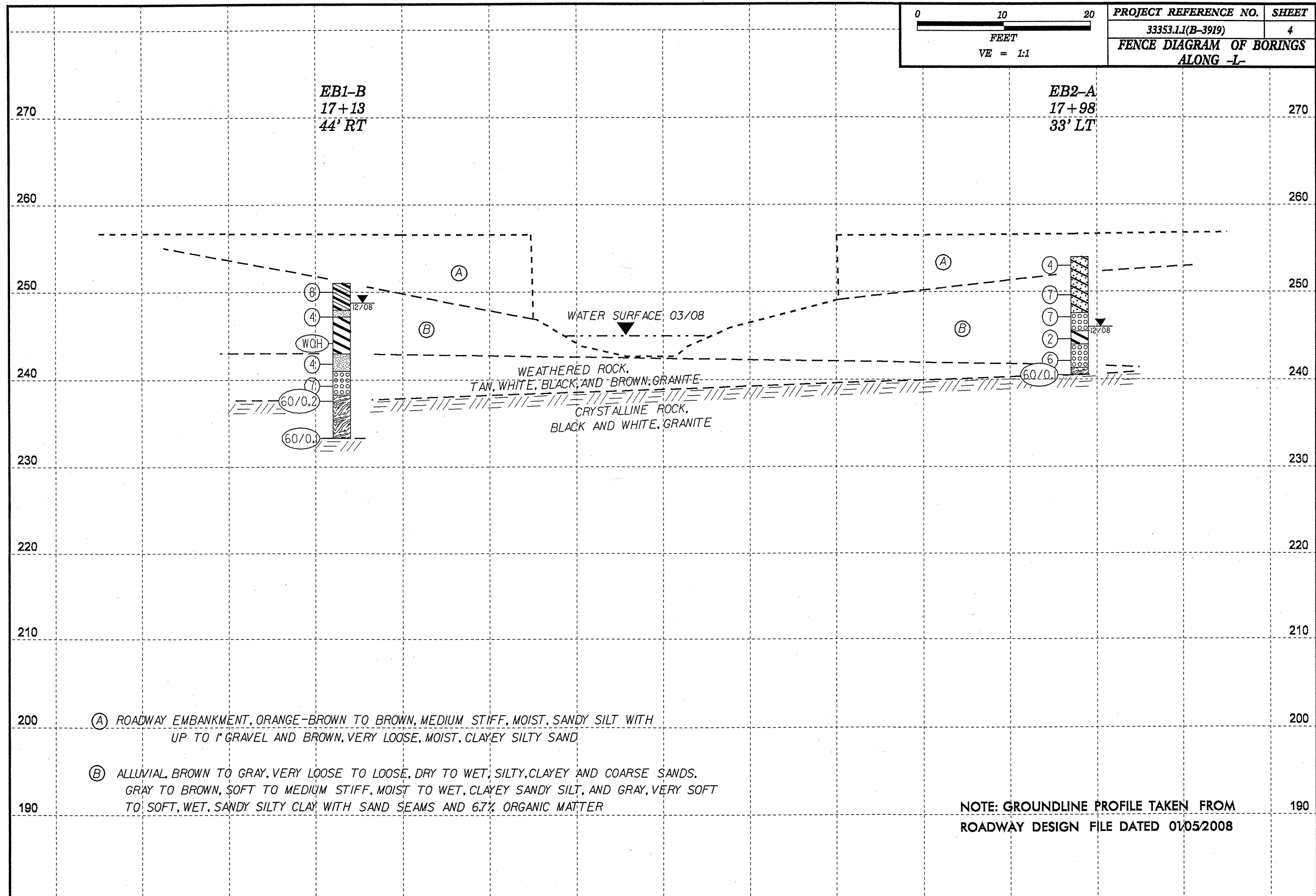
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NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PROJECT REFERENCE NO.	SHEET
33353.1.1(B-3919)	3
SITE PLAN	



SKEW ANGLE = 90°



270
260
250
240
230
220
210
200
190

270
260
250
240
230
220
210
200
190

EB1-B
17+13
44' RT

EB2-A
17+98
33' LT

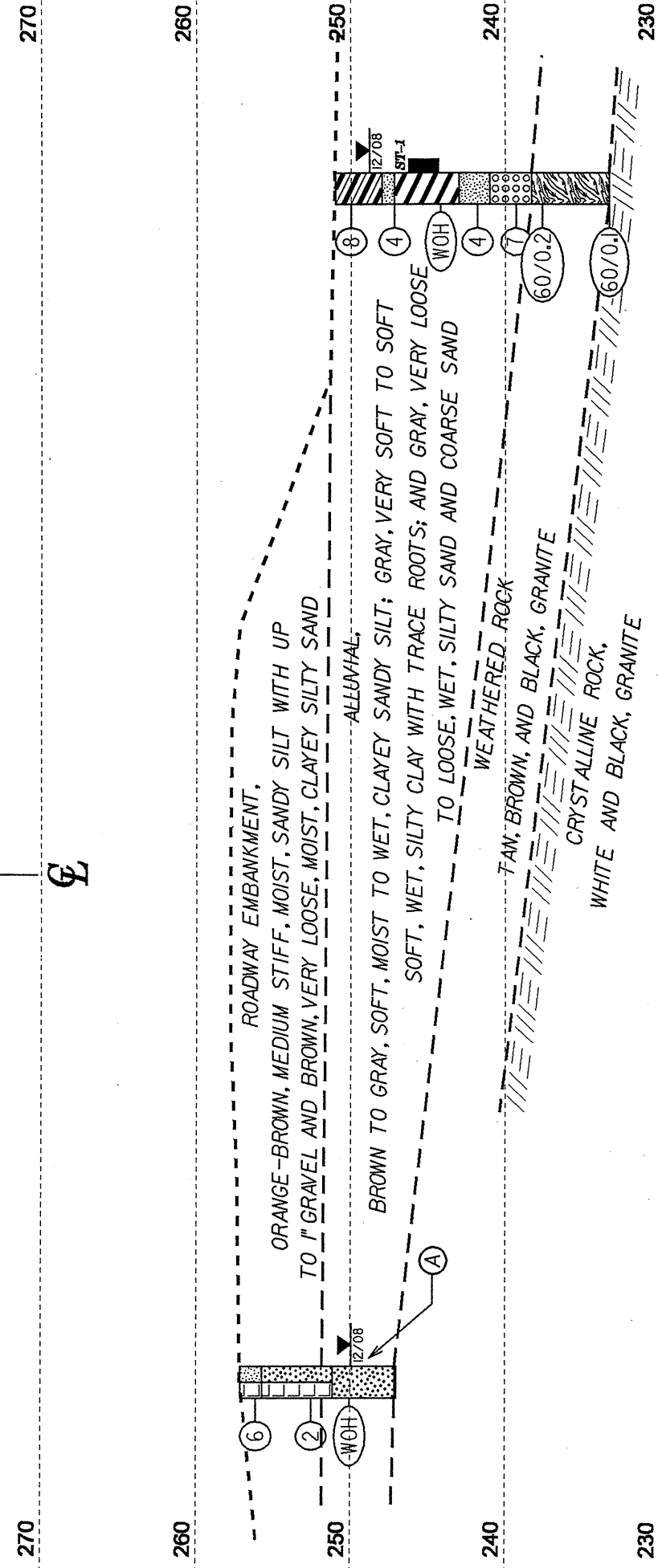
WEATHERED ROCK,
TAN, WHITE, BLACK, AND BROWN GRANITE
CRYSTALLINE ROCK,
BLACK AND WHITE GRANITE

- Ⓐ ROADWAY EMBANKMENT, ORANGE-BROWN TO BROWN, MEDIUM STIFF, MOIST, SANDY SILT WITH UP TO 1" GRAVEL AND BROWN, VERY LOOSE, MOIST, CLAYEY SILTY SAND
- Ⓑ ALLUVIAL, BROWN TO GRAY, VERY LOOSE TO LOOSE, DRY TO WET, SILTY, CLAYEY AND COARSE SANDS. GRAY TO BROWN, SOFT TO MEDIUM STIFF, MOIST TO WET, CLAYEY SANDY SILT, AND GRAY, VERY SOFT TO SOFT, WET, SANDY SILTY CLAY WITH SAND SEAMS AND 6.7% ORGANIC MATTER

**NOTE: GROUNDLINE PROFILE TAKEN FROM
ROADWAY DESIGN FILE DATED 01/05/2008**

EB1-A
17+13
33' LT

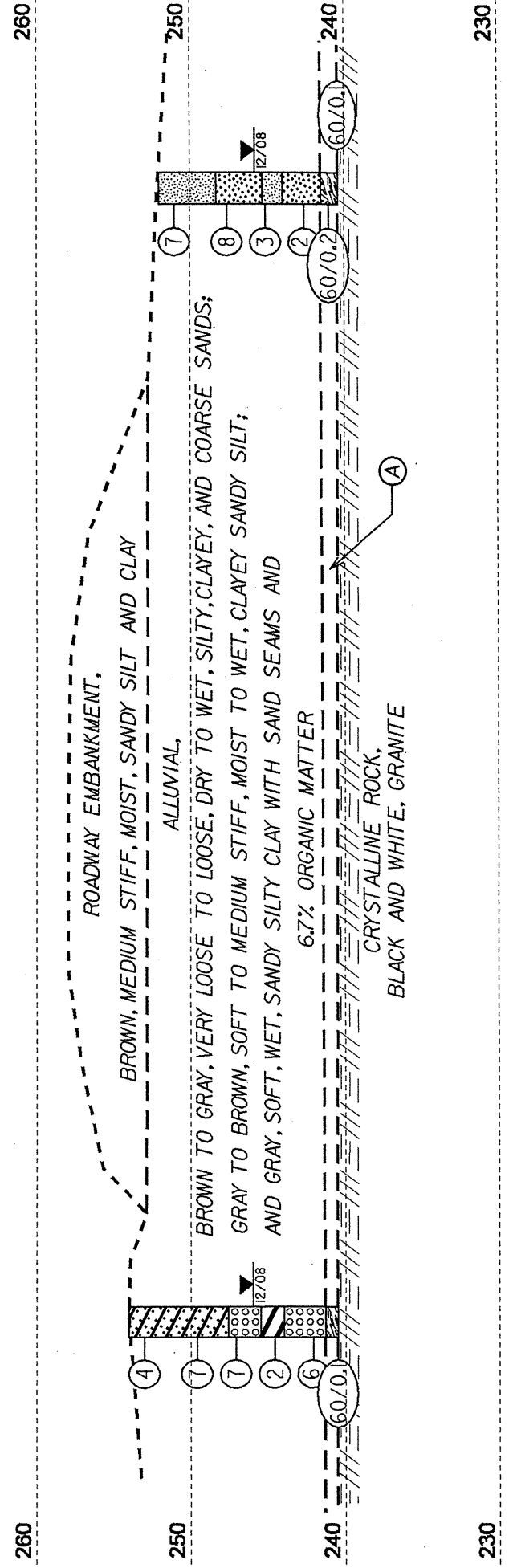
EB1-B
17+13
44' RT



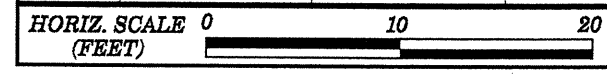
(A) ALLUVIAL SANDS CONTAMINATED, STRONG PETROCHEMICAL ODOR

EB2-A
17+98
33' LT

EB2-B
17+98
40' RT

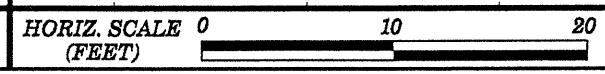


(A) WEATHERED ROCK, TAN, WHITE, AND BLACK, GRANITE



VE = 1:1

CROSS SECTION THROUGH END BENT 1



VE = 1:1

CROSS SECTION THROUGH END BENT 2



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 448 over Austin Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 17+13	OFFSET 33ft LT	ALIGNMENT -L-
COLLAR ELEV. 257.1 ft	TOTAL DEPTH 10.1 ft	NORTHING 806,868	EASTING 2,150,920
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/04/08	COMP. DATE 12/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
260															
	257.1	0.0												257.1	0.0
			1	2	4									255.7	1.4
255	253.5	3.6	1	1	1									251.1	6.0
	251.0	6.1	1	1	WOH									247.1	10.0
250														247.0	10.1
245															
240															
235															
230															
225															
220															
215															
210															
205															
200															
195															
190															
185															
180															

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 448 over Austin Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 17+13	OFFSET 44ft RT	ALIGNMENT -L-
COLLAR ELEV. 251.0 ft	TOTAL DEPTH 17.7 ft	NORTHING 806,948	EASTING 2,150,966
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/04/08	COMP. DATE 12/04/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.6 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
255															
	251.0	0.0												251.0	0.0
250			2	5	3									248.0	3.0
	247.8	3.2	WOH	2	2									247.2	3.8
245	245.2	5.8	WOH	WOH	WOH									243.0	8.0
	242.8	8.2	WOH	2	2									241.0	10.0
240	240.3	10.7	WOH	3	4									238.3	12.7
	237.8	13.2	60/0.2											233.4	17.6
235	233.4	17.6	60/0.1											233.3	17.7
230															
225															
220															
215															
210															
205															
200															
195															
190															
185															
180															
175															

NCDOT BORE DOUBLE B3919_GEO_BH_448.GPJ NC_DOT.GDT 01/27/09

As SPT was terminated due to CONTAMINATED soil conditions AT 7.6', a bridge rod sounding was performed through the boring to refusal. Sounding refusal at 10.1' on WR: granite

Other Samples:
ST-1 (4.7 - 6.7)

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 448 over Austin Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 17+98	OFFSET 33ft LT	ALIGNMENT -L-
COLLAR ELEV. 254.0 ft	TOTAL DEPTH 13.5 ft	NORTHING 806,959	EASTING 2,150,873
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/05/08	COMP. DATE 12/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 13.4 ft

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 448 over Austin Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB2-B	STATION 17+98	OFFSET 40ft RT	ALIGNMENT -L-
COLLAR ELEV. 252.1 ft	TOTAL DEPTH 11.6 ft	NORTHING 807,039	EASTING 2,150,921
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/05/08	COMP. DATE 12/05/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 11.5 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
255	254.0	0.0												GROUND SURFACE	0.0
			WOH	2	2									ALLUVIAL	
	250.6	3.4	4	4	3									RED BROWN TO ORANGE BROWN, SILTY CLAYEY SAND, SLIGHTLY MICACEOUS	
250	248.1	5.9	5	4	3										
	245.6	8.4	1	1	1									ORANGE BROWN TO GRAY, SLIGHTLY SILTY COARSE SAND	8.5
245	243.1	10.9	2	3	3									GRAY, SANDY SILTY CLAY W/ SAND SEAMS AND LITTLE ORGANIC MATTER (ORG. CONTENT = 6.7%)	10.0
	240.6	13.4												GRAY TO BROWN, SLIGHTLY SILTY COARSE SAND	12.7
240														WEATHERED ROCK	13.4
														GRAY AND WHITE, GRANITE	13.5
														CRYSTALLINE ROCK	
														GRAY AND WHITE, GRANITE	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 240.5 ft in CR: Granite	
														Rootmat 0.3'	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
255	252.1	0.0												GROUND SURFACE	0.0
			1	3	4									ALLUVIAL	
	248.7	3.4	4	3	5									BROWN, CLAYEY SANDY SILT	3.7
250	246.2	5.9	2	2	1									BROWN, SILTY SAND	6.7
	243.7	8.4	1	1	1									DARK GRAY, SANDY CLAYEY SILT, W/ SAND LENSES AND TRACE ORGANICS	8.0
245	241.3	10.8												DARK GRAY, SILTY SAND W/ CLAY LENSES	10.5
	240.6	11.5												WEATHERED ROCK	11.5
240														TAN, WHITE AND BLACK, GRANITE	11.6
														CRYSTALLINE ROCK	
														TAN, WHITE AND BLACK, GRANITE	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 240.5 ft in CR: Granite	
														Rootmat 0.2'	

NCDOT BORE DOUBLE B3919_GEO BH_448.GPJ NC_DOT_GDT_01/27/09

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	44' RT	17+13	0.0-1.5	A-6(4)	34	12	28.2	18.1	23.4	30.2	95	75	56	-	-
SS-2A	44' RT	17+13	3.2-3.8	A-4(0)	27	3	16.7	40.7	22.4	20.2	100	97	50	-	-
SS-2B	44' RT	17+13	3.8-4.7	A-7-6(16)	42	14	2.6	3.0	41.9	52.4	100	99	96	-	-
SS-3	44' RT	17+13	8.2-9.7	A-4(0)	20	NP	20.2	49.0	12.7	18.1	100	94	37	-	-
SS-4	44' RT	17+13	10.7-12.2	A-1-b(0)	25	NP	72.3	23.1	1.6	3.0	71	29	5	-	-

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-5	33' LT	17+13	0.0-1.5	A-4(0)	33	8	37.3	17.3	21.2	24.2	81	58	40	-	-
SS-6	33' LT	17+13	3.6-5.1	A-2-4(0)	28	8	54.6	19.0	8.3	18.1	93	53	28	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-8	40' RT	17+98	0.0-1.5	A-4(0)	30	8	44.0	17.5	12.3	26.2	93	61	39	-	-
SS-9	40' RT	17+98	3.7-4.9	A-2-4(0)	24	3	46.4	25.8	11.7	16.1	89	57	28	-	-
SS-10	40' RT	17+98	6.7-7.4	A-4(6)	38	10	24.4	10.3	31.0	34.3	96	78	65	-	-
SS-11	40' RT	17+98	8.4-9.9	A-2-4(0)	33	7	49.4	18.1	16.3	16.1	93	56	34	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-12	33' LT	17+98	0.0-1.5	A-2-6(0)	35	12	42.7	25.4	9.7	22.2	91	63	32	-	-
SS-15	33' LT	17+98	8.5-9.9	A-7-6(12)	41	13	6.0	14.5	39.1	40.3	100	96	85	-	6.7
SS-16	33' LT	17+98	10.9-12.4	A-1-b(0)	17	NP	75.2	17.5	3.2	4.0	90	39	8	-	-



**FIELD
 SCOUR REPORT**

WBS: 33353.1.1 TIP: B-3919 COUNTY: Wake

DESCRIPTION(1): Br. No. 448 over Austin Creek on SR 2053 (Jones Dairy Road)

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) Hydro Report

Bridge No.: 448 Length: 35 Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Driven wooden piles, wooden beam, concrete deck

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: southwestern corner of bridge has scour evident from drainage to creek. Has scoured down in excess of 5 to 10 feet beginning approx. 20 upstation of current endbent.

Interior Bents: none evident

Channel Bed: none evident

Channel Bank: Cut banks have scoured to rock outcrop downstream of structure, banks are 4 to 6 feet in depth

EXISTING SCOUR PROTECTION

Type(3): minimal rip rap placement

Extent(4): adjacent to abutments

Effectiveness(5): effective at structure. No rip rap at drainage area on the SE corner of bridge. 4' deep by 3' wide.

Obstructions(6): none

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): sand with gravel up to 2 inch in diameter

Channel Bank Material(8): silty clay and clayey silt with silty sand lenses

Channel Bank Cover(9): grasses, shrubs and young to moderately aged trees

Floodplain Width(10): approx. 250 feet

Floodplain Cover(11): grasses, shrubs and young to moderately aged trees

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): southeast

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet _____ Meters _____

	BENTS										
	B1	B2	B3	B4							
SB Lanes, Lt											
SB Lanes, Rt											
NB Lanes, Lt											
NB Lanes, Rt											

Comparison of DSE to Hydraulics Unit theoretical scour: _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank	BANK	BANK	BANK	CHANNEL	CHANNEL	BANK
Sample No.	SS-1	SS-2A	SS-2B	SS-4	SS-9	SS-12
Retained #4	-	-	-	6	2	-
Passed #10	95	100	100	71	89	91
Passed #40	75	97	99	29	57	63
Passed #200	56	50	96	5	28	32
Coarse Sand	28.2	16.7	2.6	72.3	46.4	42.7
Fine Sand	18.1	40.7	3	23.1	25.8	25.4
Silt	23.4	22.4	41.9	1.6	11.7	9.7
Clay	30.2	20.2	52.4	3	16.1	22.2
LL	34	27	42	25	24	35
PI	12	3	14	NP	3	12
AASHTO	A-6(4)	A-4(0)	A-7-6(16)	A-1-b(0)	A-2-4(0)	A-2-6(0)
Station	17+13	17+13	17+13	17+13	17+98	17+98
Offset	44' RT	44' RT	44' RT	44' RT	40' RT	33' LT
Depth	0.0 - 1.5	3.2 - 3.8	3.8 - 4.7	8.2 - 9.7	3.4 - 4.9	1.0 - 1.5

Reported by: 
 Christina M. Bruinsma, L.G.

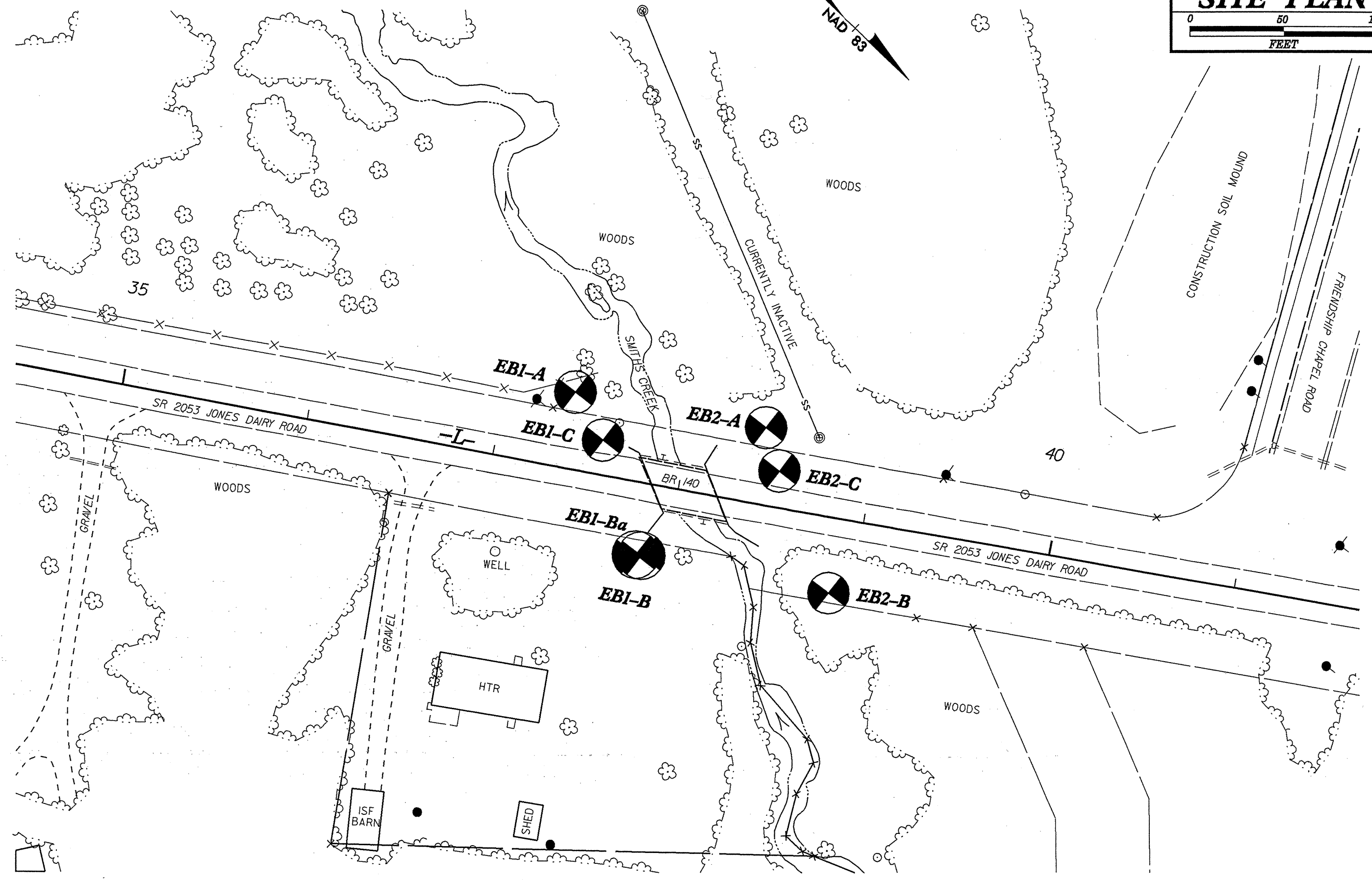
Date: 12/4/2009

SITE PHOTO

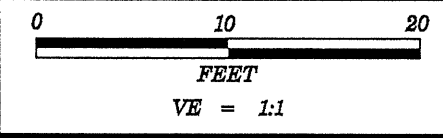
BRIDGE NO. 448 OVER AUSTIN CREEK ON SR 2053 (JONES DAIRY RD.) AT -L- 17+50



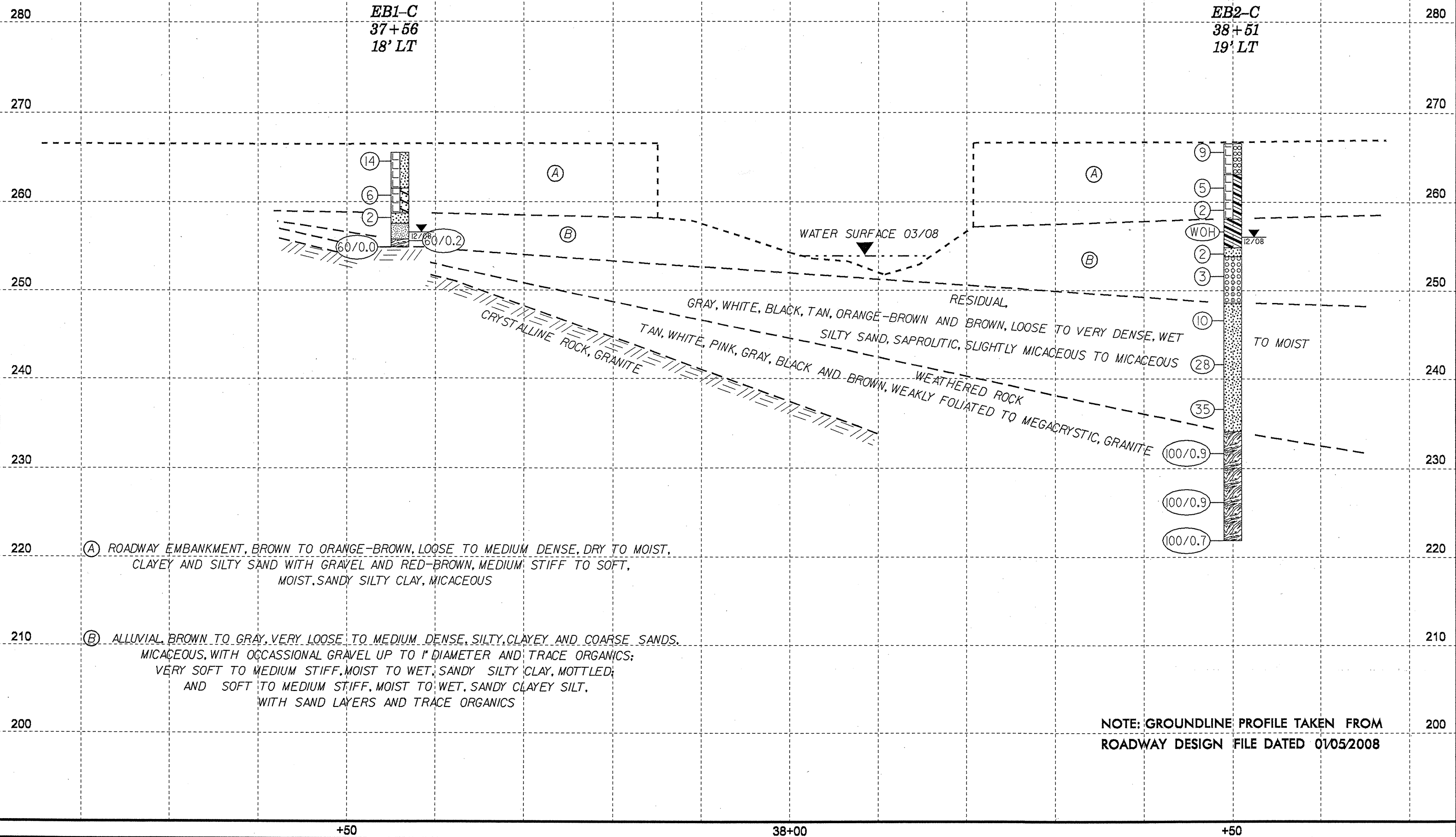
LOOKING NORTH



SKREW ANGLE = 60°



PROJECT REFERENCE NO.	SHEET
33353.1.1(B-3919)	12
FENCE DIAGRAM OF BORINGS ALONG -L-	



EB1-C
37+56
18' LT

EB2-C
38+51
19' LT

WATER SURFACE 03/08

RESIDUAL,
GRAY, WHITE, BLACK, TAN, ORANGE-BROWN AND BROWN, LOOSE TO VERY DENSE, WET
SILTY SAND, SAPROLITIC, SLIGHTLY MICACEOUS TO MICACEOUS
WEATHERED ROCK
TAN, WHITE, PINK, GRAY, BLACK AND BROWN, WEAKLY FOLIATED TO MEGACRYSTIC, GRANITE
CRYSTALLINE ROCK, GRANITE

(A) ROADWAY EMBANKMENT, BROWN TO ORANGE-BROWN, LOOSE TO MEDIUM DENSE, DRY TO MOIST,
CLAYEY AND SILTY SAND WITH GRAVEL AND RED-BROWN, MEDIUM STIFF TO SOFT,
MOIST, SANDY SILTY CLAY, MICACEOUS

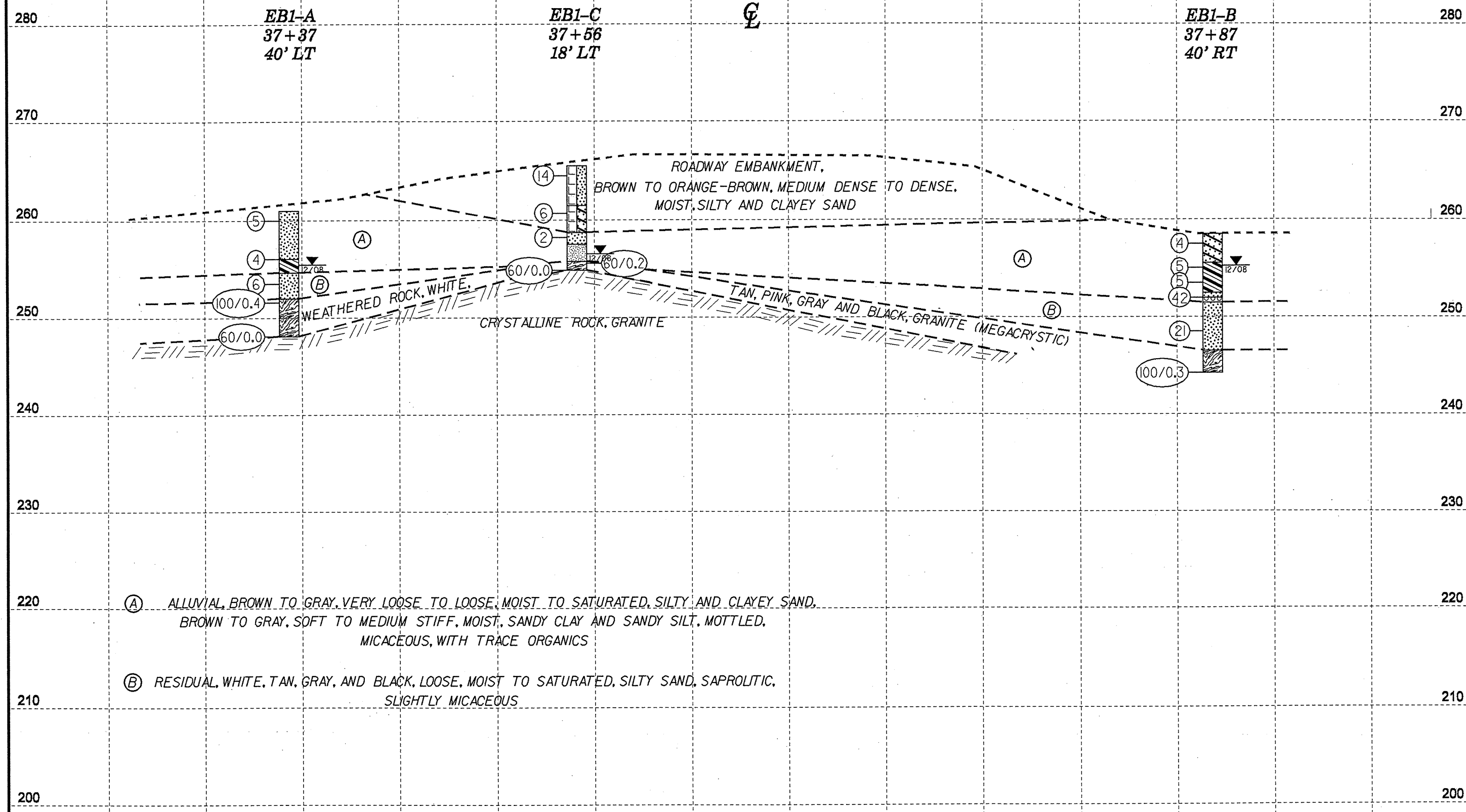
(B) ALLUVIAL, BROWN TO GRAY, VERY LOOSE TO MEDIUM DENSE, SILTY, CLAYEY AND COARSE SANDS,
MICACEOUS, WITH OCCASSIONAL GRAVEL UP TO 1" DIAMETER AND TRACE ORGANICS;
VERY SOFT TO MEDIUM STIFF, MOIST TO WET, SANDY SILTY CLAY, MOTTLED;
AND SOFT TO MEDIUM STIFF, MOIST TO WET, SANDY CLAYEY SILT,
WITH SAND LAYERS AND TRACE ORGANICS

NOTE: GROUNDLINE PROFILE TAKEN FROM
ROADWAY DESIGN FILE DATED 01/05/2008

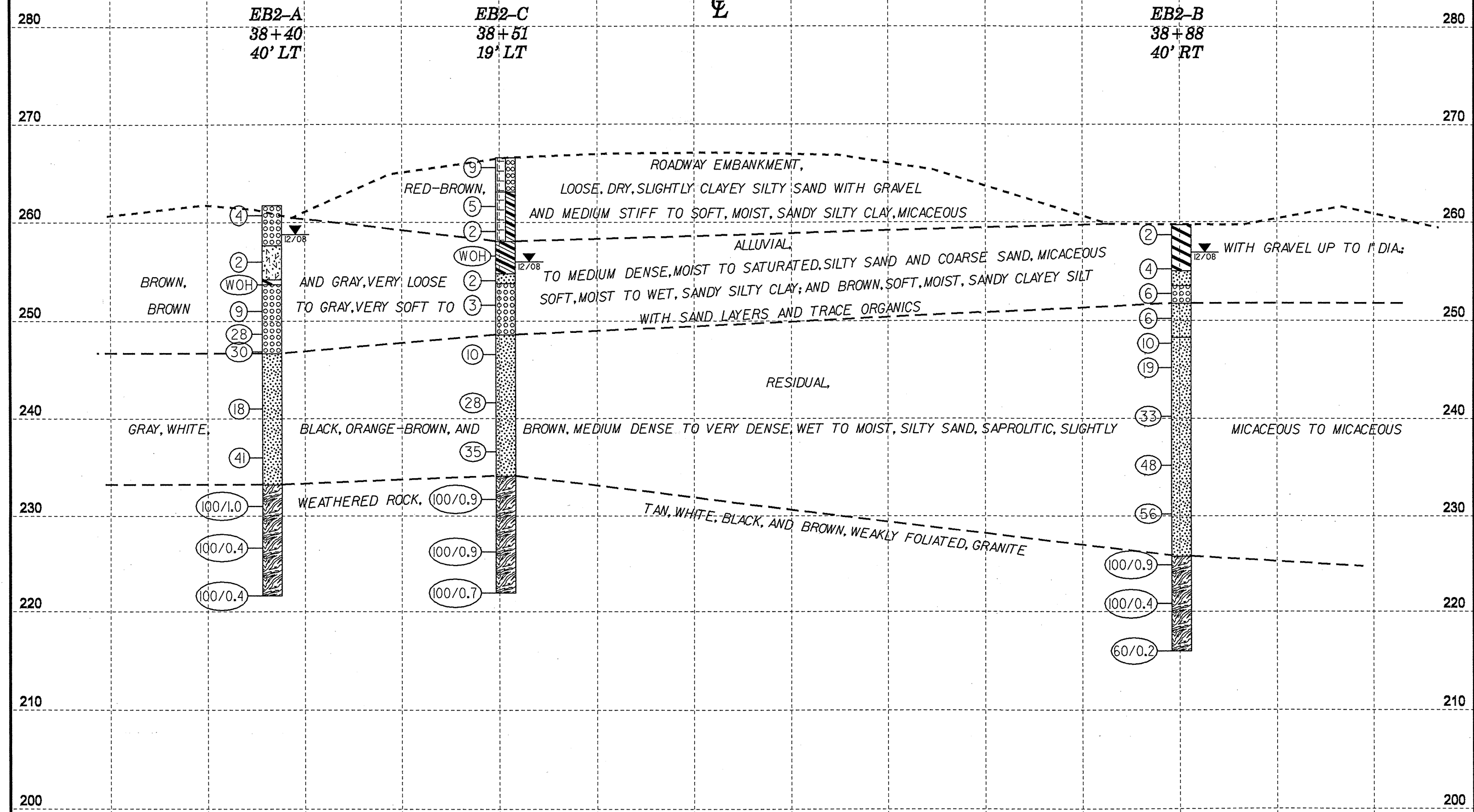
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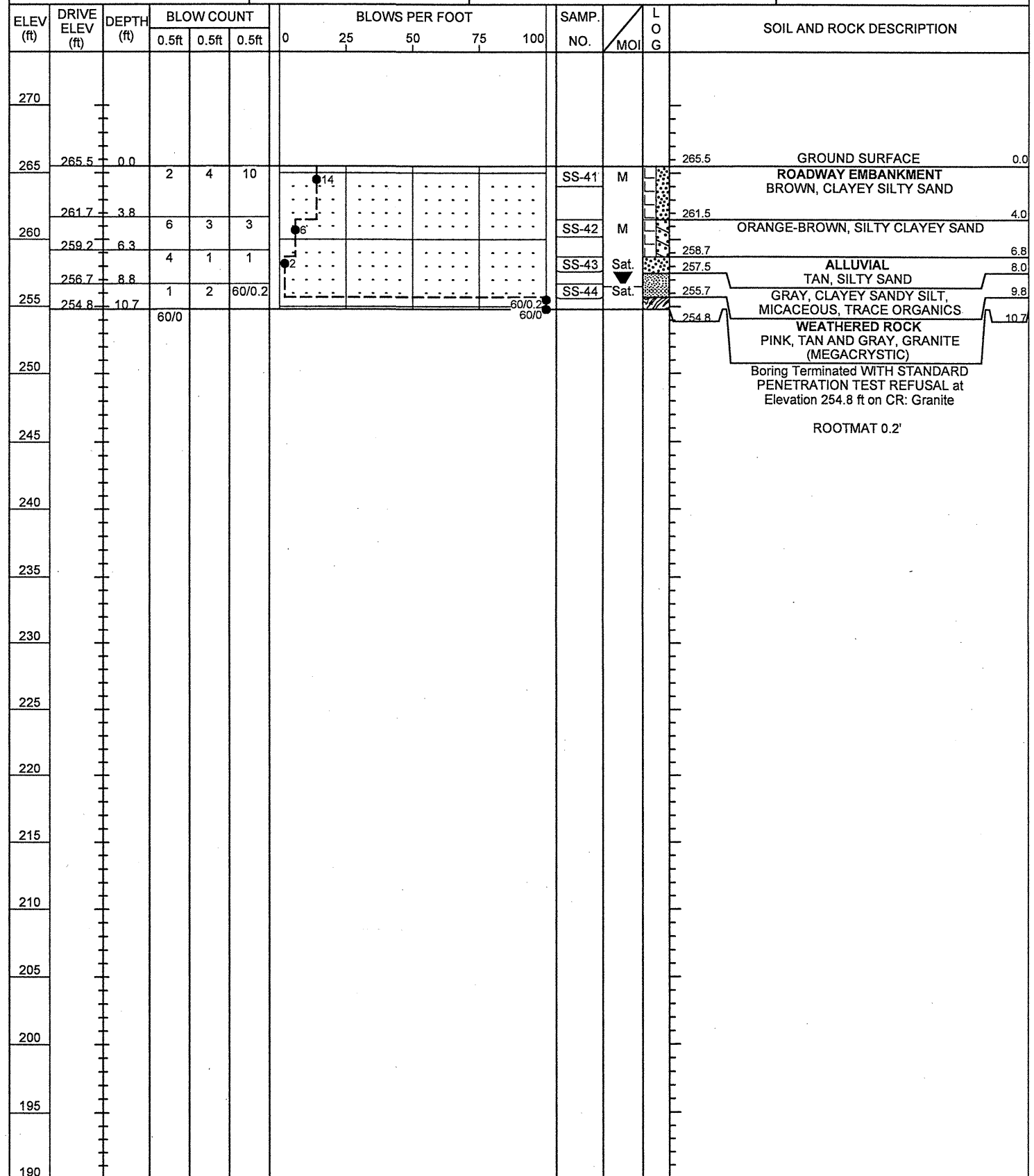
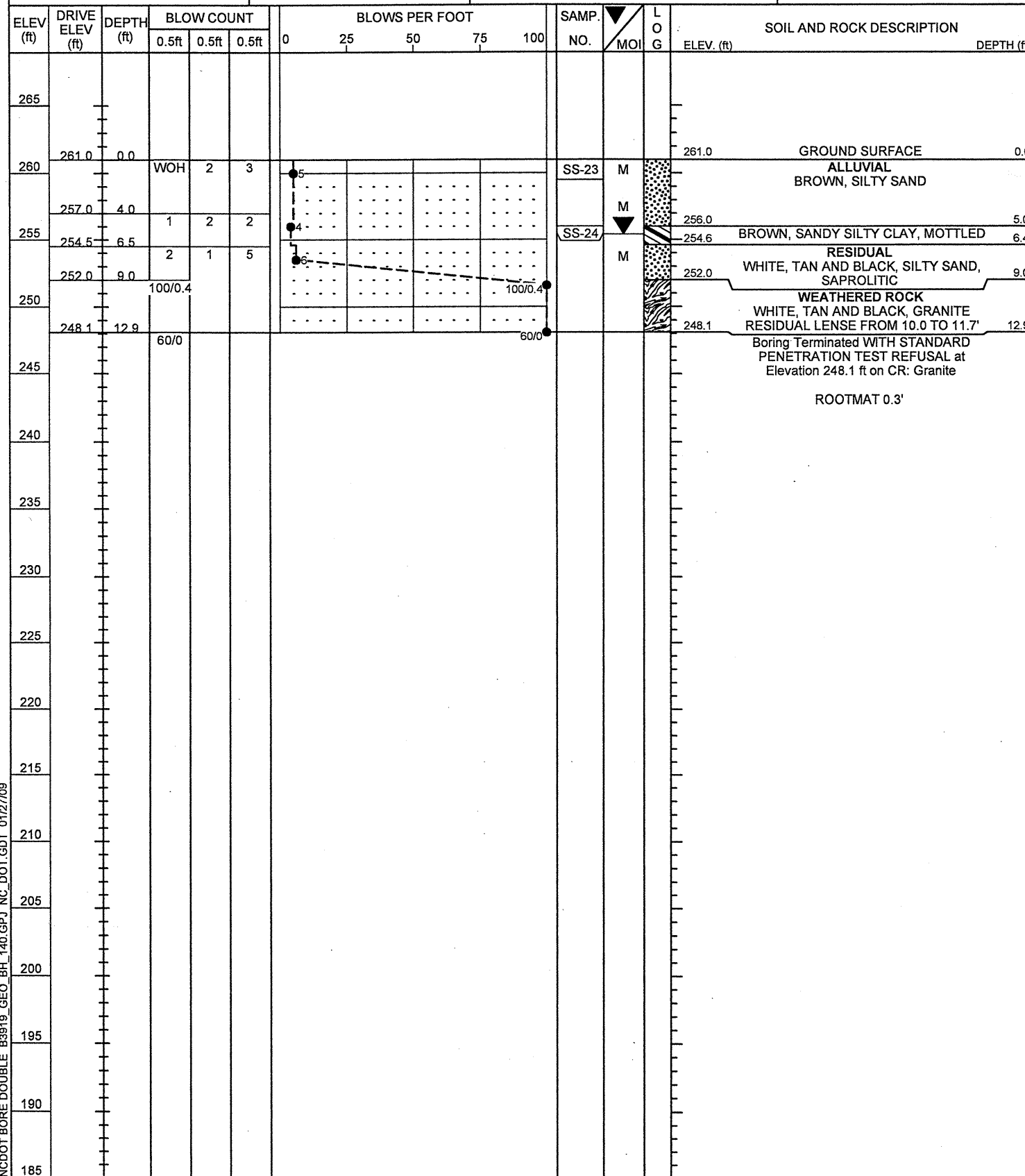


NOTE: GROUND LINE ALONG 60 DEGREE SKEW



PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-A	STATION 37+37	OFFSET 40ft LT	ALIGNMENT -L-
COLLAR ELEV. 261.0 ft	TOTAL DEPTH 12.9 ft	NORTHING 806,868	EASTING 2,150,920
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers	
START DATE 12/09/08		COMP. DATE 12/09/08	
SURFACE WATER DEPTH N/A		DEPTH TO ROCK 12.9 ft	

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-C	STATION 37+56	OFFSET 18ft LT	ALIGNMENT -L-
COLLAR ELEV. 265.5 ft	TOTAL DEPTH 10.7 ft	NORTHING 806,895	EASTING 2,150,931
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers	
START DATE 12/15/08		COMP. DATE 12/15/08	
SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.7 ft	



NCDOT BORE DOUBLE B3919_GEO_BH_140.GPJ NC_DOT_GDT_01/27/09

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-B	STATION 37+87	OFFSET 40ft RT	ALIGNMENT -L-
COLLAR ELEV. 258.5 ft	TOTAL DEPTH 14.3 ft	NORTHING 806,949	EASTING 2,150,968
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/08/08	COMP. DATE 12/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB1-Ba	STATION 37+84	OFFSET 38ft RT	ALIGNMENT -L-
COLLAR ELEV. 258.5 ft	TOTAL DEPTH 8.7 ft	NORTHING 806,946	EASTING 2,150,968
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/08/08	COMP. DATE 12/08/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 8.7 ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
260		0.0													258.5	GROUND SURFACE	0.0
	258.5		WOH	2	2											ALLUVIAL BROWN, SILTY CLAYEY SAND	
255	255.4	3.1													255.5	BROWN TO BLUE GRAY, SILTY SANDY CLAY	3.0
	254.5	4.0		2	1	4									252.5	GRAY-BLUE, SILTY SAND, SLIGHTLY MICACEOUS	6.0
	252.9	5.6		4	3	2									252.0	RESIDUAL WHITE, GRAY AND BLACK, SLIGHTLY SILTY SAND, SAPROLITIC	6.5
250		9.0		4	2	40									251.5	RESIDUAL WHITE, GRAY AND BLACK, SLIGHTLY SILTY SAND, SAPROLITIC	7.0
	249.5			7	10	11									246.5	RESIDUAL WHITE AND GRAY, SILTY SAND, SLIGHTLY MICACEOUS, SAPROLITIC	12.0
245		14.0													244.2	WEATHERED ROCK WHITE, TAN AND BLACK, GRANITE	14.3
	244.5		100/0.3													Boring Terminated at Elevation 244.2 ft in WR: Granite	
240																BORING TERMINATED DUE TO LOSS OF AUGER. ROCK LINE IS STEEPLY DIPPING DOWNWARDS, MOVING UPSTATION, MAY EFFECT DRIVABILITY OF PILES	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
260															258.5	GROUND SURFACE	0.0
																ALLUVIAL BROWN TO GRAY SANDY CLAY	
255															251.5	WEATHERED ROCK WHITE AND GRAY, GRANITE	7.0
250	249.8	8.7													249.8	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 249.8 ft on CR: Granite	
																ROCK LINE IS STEEPLY DIPPING UPSTATION, MAY EFFECT DRIVABILITY OF PILES	

NCDOT BORE DOUBLE B3919_GEO_BH_140.GPJ NC_DOT_GDT_01/27/09

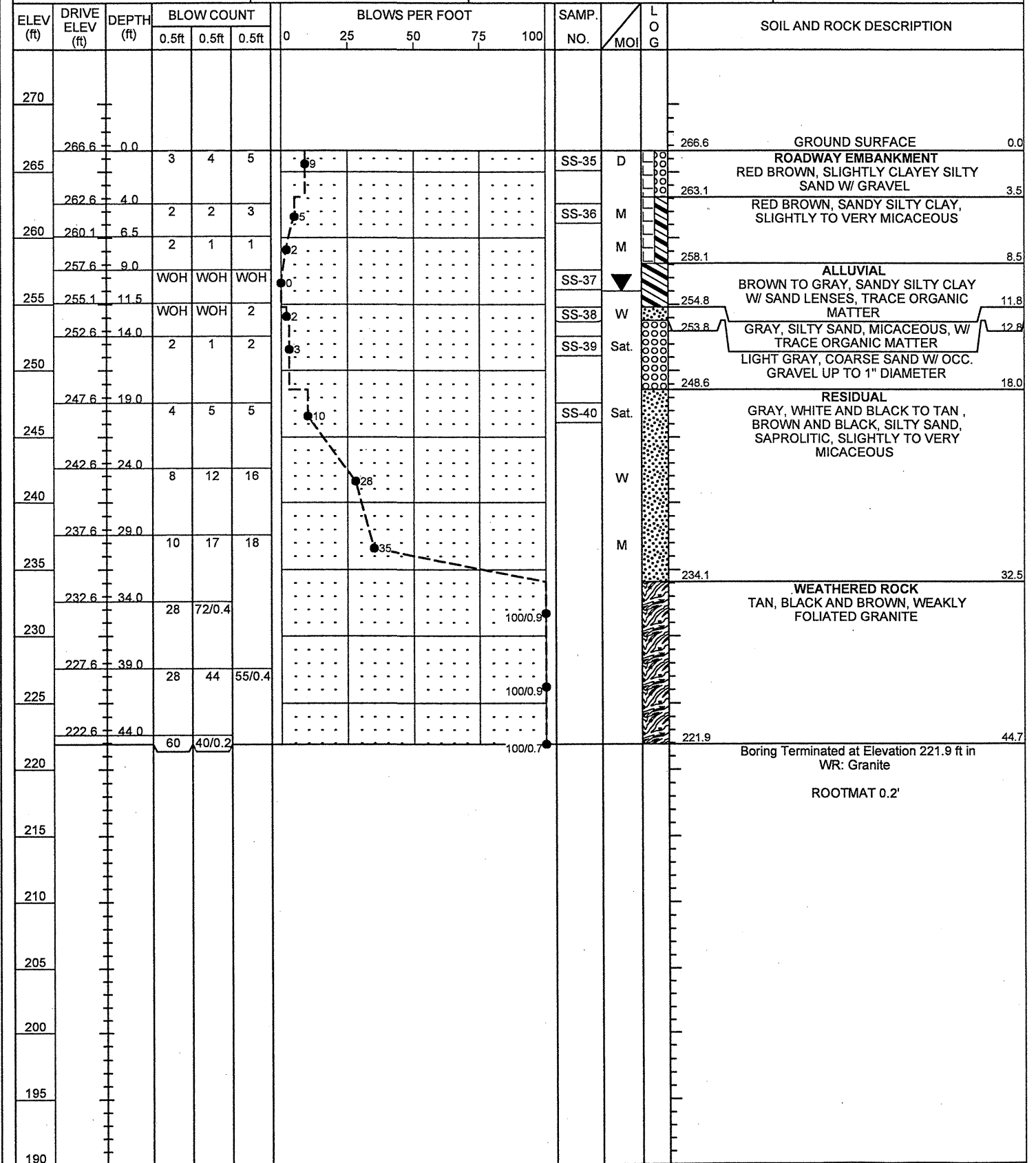
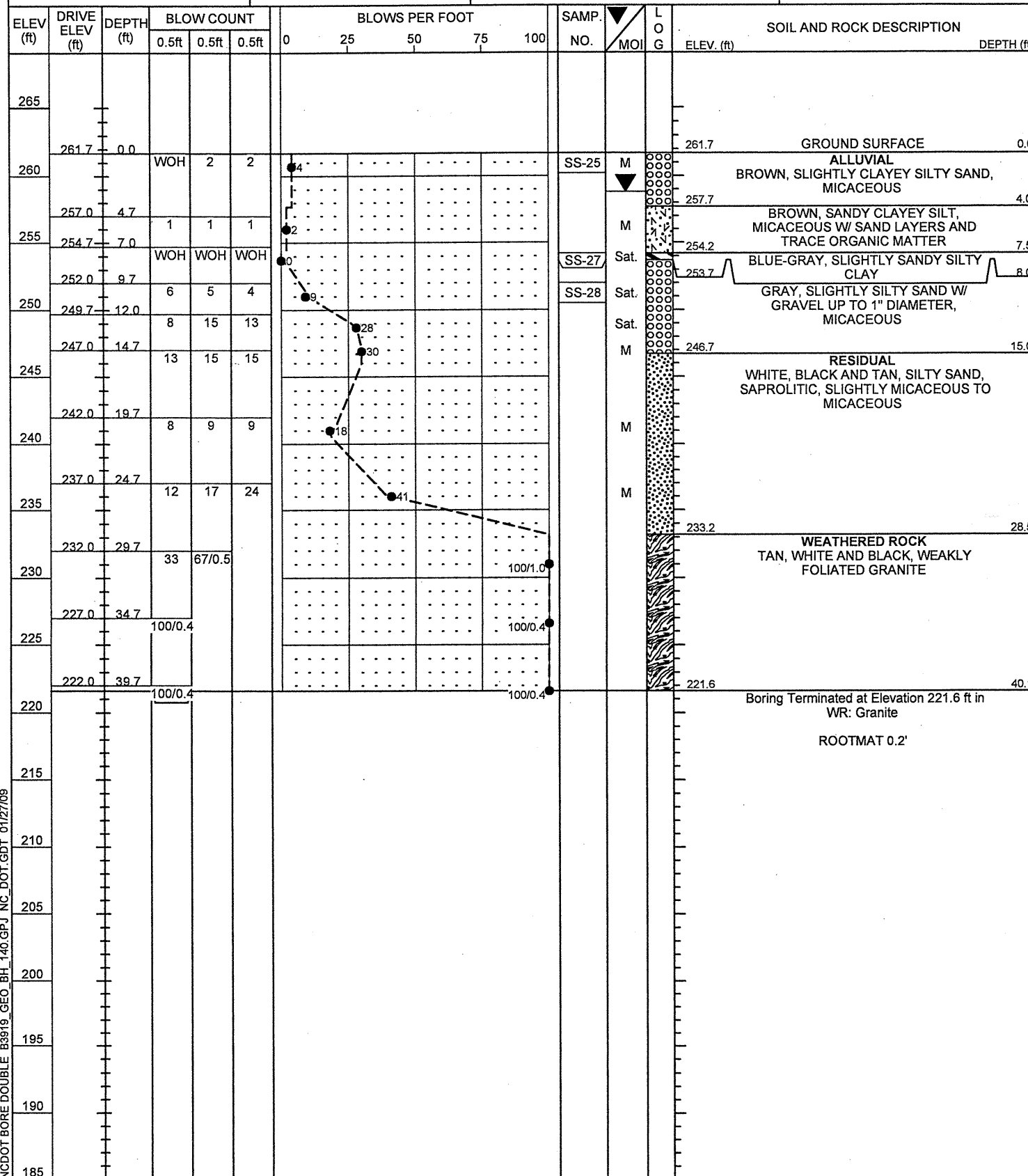


NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB2-A	STATION 38+40	OFFSET 40ft LT	ALIGNMENT -L-
COLLAR ELEV. 261.7 ft	TOTAL DEPTH 40.1 ft	NORTHING 806,959	EASTING 2,150,873
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/09/08	COMP. DATE 12/09/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

PROJECT NO. 33353.1.1	ID. B-3919	COUNTY Wake	GEOLOGIST Bruinsma, C. M.
SITE DESCRIPTION Bridge No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)			GROUND WTR (ft)
BORING NO. EB2-C	STATION 38+51	OFFSET 19ft LT	ALIGNMENT -L-
COLLAR ELEV. 266.6 ft	TOTAL DEPTH 44.7 ft	NORTHING 806,979	EASTING 2,150,886
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 12/15/08	COMP. DATE 12/15/08	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A



NCDOT BORE DOUBLE B3919_GEO_BH_140.GPJ NC_DOT.GDT 01/27/09

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-23	40' LT	37+37	0.0-1.5	A-2-4(0)	19	NP	56.7	28.2	7.1	8.1	87	53	16	-	-
SS-24	40' LT	37+37	5.0-5.5	A-6(8)	39	16	15.5	25.0	23.2	36.3	98	89	63	-	-

EB1-C

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-41	18' LT	37+56	0.0-1.5	A-2-4(0)	18	1	50.2	25.2	14.5	10.1	89	55	26	-	-
SS-42	18' LT	37+56	4.0-5.3	A-2-6(0)	29	12	46.8	18.3	12.7	22.2	86	54	32	-	-
SS-43	18' LT	37+56	6.8-7.8	A-2-4(0)	15	NP	51.6	23.6	12.7	12.1	87	53	24	-	-
SS-44	18' LT	37+56	8.8-9.8	A-4(4)	35	9	12.1	32.7	33.1	22.2	98	94	61	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-18	38' RT	37+87	3.1-4.6	A-6(2)	39	16	41.7	21.8	12.3	24.2	100	76	40	-	-
SS-19A	38' RT	37+87	6.0-6.5	A-2-4(0)	30	10	60.8	18.1	7.0	14.1	93	57	21	-	-
SS-21	40' RT	37+87	4.0-5.5	A-6(7)	40	16	17.7	28.4	21.6	32.3	99	92	58	-	-
SS-22	40' RT	37+87	9.0-10.5	A-2-4(0)	28	NP	56.1	26.8	11.0	6.0	91	53	20	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-25	40' LT	38+40	0.0-1.5	A-1-b(0)	26	NP	62.1	21.6	10.3	6.0	78	40	14	-	-
SS-27	40' LT	38+40	7.5-8.5	A-7-6(7)	41	17	15.9	31.5	16.3	36.3	100	92	57	-	-
SS-28	40' LT	38+40	9.7-11.2	A-1-b(0)	24	NP	76.4	16.2	3.3	4.0	62	26	5	-	-

EB2-C

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-35	19' LT	38+51	0.0-1.5	A-1-b(0)	22	2	52.0	24.6	13.3	10.1	66	41	18	-	-
SS-36	19' LT	38+51	4.0-5.5	A-6(2)	40	17	42.9	18.1	12.7	26.2	89	60	37	-	-
SS-37	19' LT	38+51	9.0-10.5	A-6(3)	35	11	24.8	25.8	25.2	24.2	97	82	52	-	-
SS-38	19' LT	38+51	11.8-12.8	A-2-4(0)	27	2	38.5	38.1	13.3	10.1	95	71	26	-	-
SS-39	19' LT	38+51	14.0-15.5	A-1-b(0)	24	NP	86.5	10.0	1.5	2.0	76	22	3	-	-
SS-40	19' LT	38+51	19.0-20.5	A-2-5(0)	41	NP	55.8	29.2	12.9	2.0	98	64	18	-	-

EB2-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-30	40' RT	38+88	0.0-1.5	A-7-5(17)	52	19	7.7	15.1	36.9	40.3	97	93	79	-	-
SS-31	40' RT	38+88	3.5-4.7	A-2-4(0)	22	3	33.5	39.5	12.9	14.1	92	75	29	-	-
SS-32	40' RT	38+88	6.2-7.5	A-1-b(0)	23	NP	64.0	25.5	4.4	6.0	81	46	10	-	-



**FIELD
 SCOUR REPORT**

WBS: 33353.1.1 TIP: B-3919 COUNTY: Wake

DESCRIPTION(1): Br. No. 140 over Smiths Creek on SR 2053 (Jones Dairy Road)

EXISTING BRIDGE

Information from: Field Inspection Microfilm _____ (reel _____ pos: _____)
 Other (explain) Hydro Report

Bridge No.: 140 Length: 36 Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
 Foundation Type: Driven wooden piles, wooden beam, concrete deck

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: none evident

Interior Bents: none evident

Channel Bed: none evident

Channel Bank: banks are in excess of 4 feet vertical

EXISTING SCOUR PROTECTION

Type(3): rip rap placement at end bents

Extent(4): adjacent to abutments, within some drainage ditches adjacent to the slopes

Effectiveness(5): effective at structure

Obstructions(6): none

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): sand with gravel up to 2 inches in diameter

Channel Bank Material(8): silty clay, clayey silt, and silty sand

Channel Bank Cover(9): grasses, shrubs and young to moderately aged trees

Floodplain Width(10): approx. 250 feet

Floodplain Cover(11): grasses, shrubs and young to moderately aged trees

Stream is(12): Aggrading _____ Degrading X Static _____

Channel Migration Tendency(13): east

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet _____ Meters _____

	BENTS												
	B1	B2	B3	B4									
SB Lanes, Lt													
SB Lanes, Rt													
NB Lanes, Lt													
NB Lanes, Rt													

Comparison of DSE to Hydraulics Unit theoretical scour: _____

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

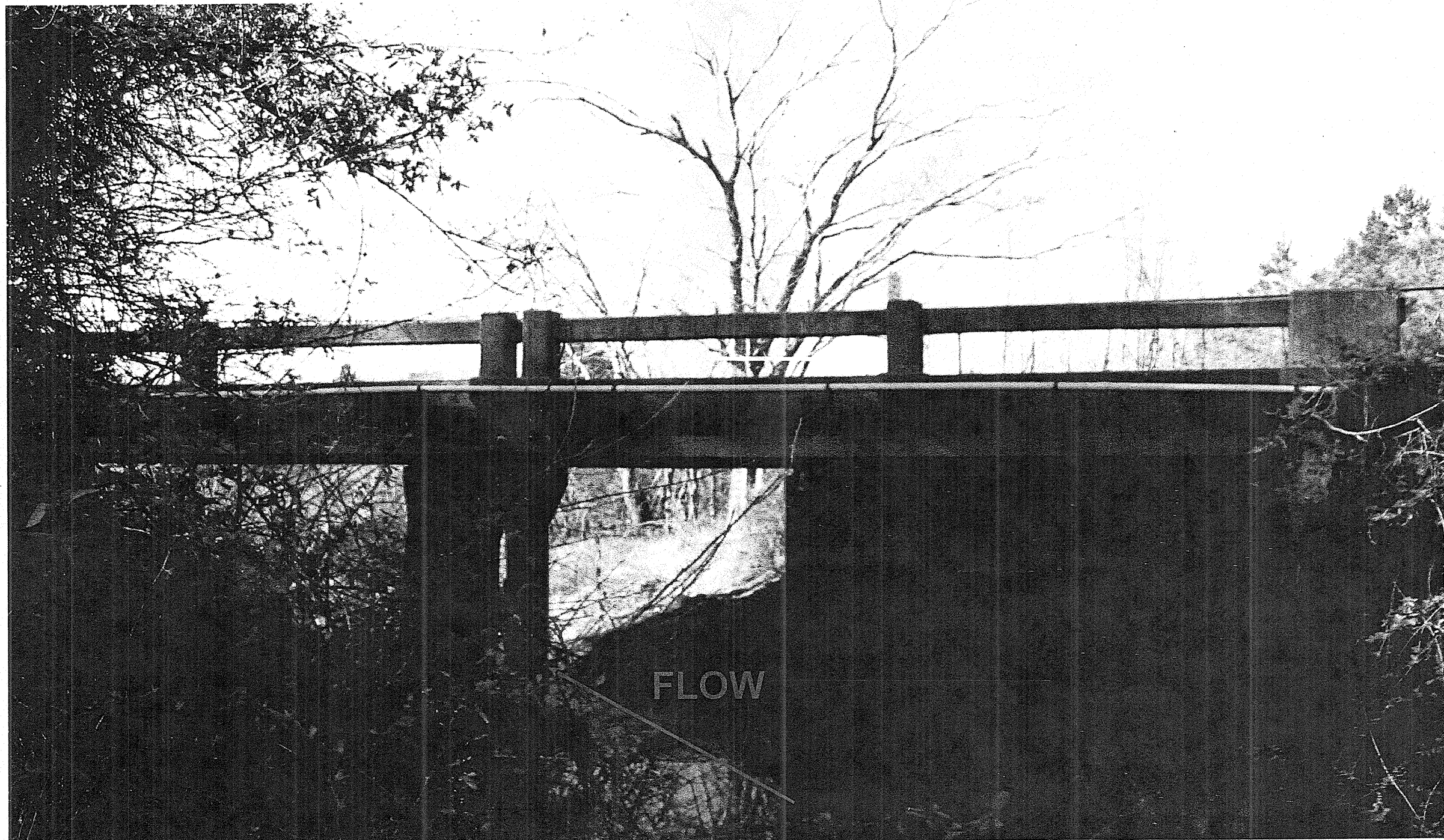
Bed or Bank	BANK	BANK	CHANNEL				
Sample No.	SS-18	SS-23	SS-39				
Retained #4	-	-	9				
Passed #10	100	87	76				
Passed #40	76	53	22				
Passed #200	40	16	3				
Coarse Sand	41.7	56.7	86.5				
Fine Sand	21.8	28.2	10				
Silt	12.3	7.1	1.5				
Clay	24.2	8.1	2				
LL	39	19	24				
PI	16	NP	NP				
AASHTO	A-6(2)	A-2-4 (0)	A-1-b(0)				
Station	37+87	37+37	38+51				
Offset	38' RT	40' LT	19' LT				
Depth	3.1 - 4.6	0.0 -1.5	14.0 - 15.5				

Reported by:
 Christina M. Bruinsma, L.G.

Date: 12/9/2009

SITE PHOTO

BRIDGE NO. 140 OVER SMITH'S CREEK ON SR 2053 (JONES DAIRY RD.) AT -L- 38+00



LOOKING NORTH