

STRUCTURE GEOTECHNICAL REPORT

059-2517

Culvert carrying IL 4 over ditch S. of Mound St near Girard HS
FAP 662 (IL 4)
Section (D) CR
Macoupin County

D-96-075-09
Contract 72C80

REVISED December 21, 2015

Prepared By: Sadie Jones
IDOT Region 4 District 6
Geotechnical Unit
217-782-6703

Date: January 27, 2014

Checked By:

Approved By:


Brian Laningham, P.E.
D-6 Geotechnical Engr.

Date:


12-21-15

Prepared For: Rick Allender
Allen Henderson
& Associates
(217)544-8033

Attachments: Preliminary TSL
Subsurface Profile
Boring Logs
Special Provisions

This Report has been prepared based on a preliminary general plan sheet received December 2012. Contact the author if there are any questions regarding this Report or if there are modifications to structure location, size, geometry, or vertical alignment.

Electronic copies of boring logs are available upon request for inclusion in the plans. Calculations are also available upon request.

This Report has been prepared according to AASHTO Standard Specifications for Highway Bridges 17th Edition 2002 and the 2012 IDOT BBS Bridge Manual.

Project Description and Proposed Structure Information

This project consists of the removal of the existing single barrel box culvert and its replacement with a triple 8ft wide by 5ft high box culvert. Work will be performed under staged construction.

The proposed culvert is 46± ft long and will be constructed on a 10° skew. The average fill height over the culvert is 1.0 ft.

Existing Structure and Site Investigation

The existing structure is a 8 ft wide by 5 ft high concrete box culvert. Existing wingwalls appear integral to the barrel. Archived existing plan information has not been obtained.

The surrounding terrain is level and the land use is primarily residential. The existing channel is a drainage tributary. The channel banks have a uniform 2H:1V or steeper vegetated slope with no indications of severe erosion.

A boring was advanced near the center of the proposed culvert. The boring was advanced approximately 10 ft below streambed by the District 6 drill crew according to AASHTO T 206 and the IDOT Geotechnical Manual.

Boring data indicates approximately 10ft of silty clay over 7± ft of clay loam till. The boring data indicates groundwater was not encountered. However, local groundwater elevation may be approximated as the surface water elevation.

Geotechnical Evaluation

Settlement. The proposed box culvert is founded on till with a Q_u of 1.1tsf or greater. Empirical settlement calculations show no settlement. Settlement problems are not anticipated.

Slope Stability. The stability of a 10 ft high 1:1 temporary construction slope has been analyzed. The resulting factor-of-safety is 6.8.

Seismic Considerations. Seismic events are not a significant design consideration for culverts.

Scour. Scour elevations are no longer required per ABD 14.2.

Mining Activity. ISGS records indicates an abandoned underground mine in the area of the proposed project. The mine was in operation from 1882 to 1923.

Foundation Evaluation

Culvert Barrel. A pre-cast culvert is feasible at this site. A minimum of 6 inches of cover is required between the top of the proposed culvert and the bottom of the proposed pavement. If the cover cannot be achieved then a cast in place culvert must be used.

Wingwalls. The proposed wingwall dimensions (10'-9" long) & (7'-9" short) are within the limits allowed for a horizontal cantilever design. Horizontal cantilever wingwalls are recommended. If the pre-cast culvert option is used, wingwalls must be cast in place.

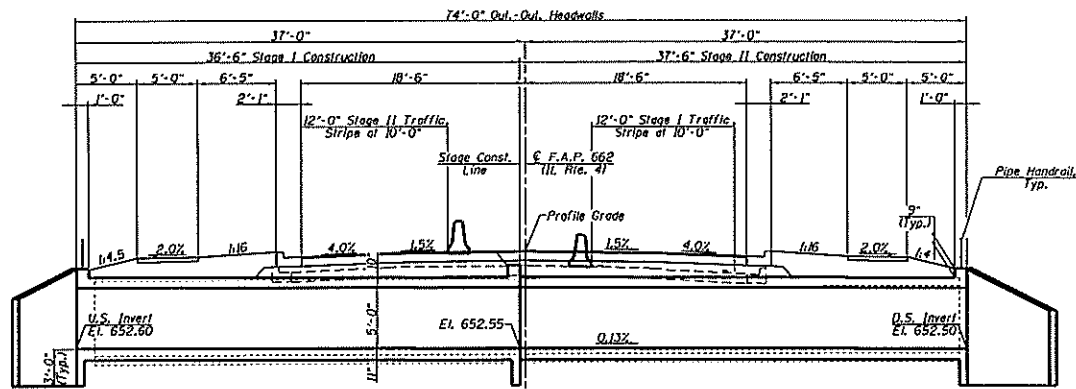
Construction Considerations

Stage Construction. This project will be constructed under stage construction

Temporary Soil Retention. Temporary retention will be required to facilitate stage construction. The estimated maximum retained height is 8 ft. A stiff clay loam till layer may prevent adequate embedment of temporary sheet pile. Temporary Soil Retention System should be utilized.

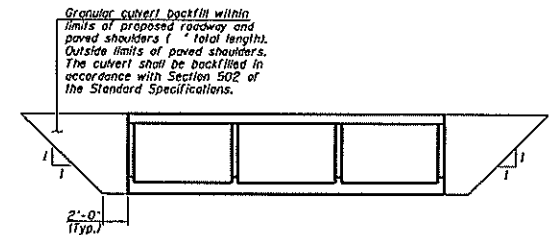
Backfill. Backfill should consist of granular culvert backfill. The special provision is attached. A detail showing pay limits should be included. Pay limits include the temporary excavation limits in a section along the roadway and from edge of shoulder to edge of shoulder in a section along the culvert.

Ground Improvement. No ground improvement appears necessary

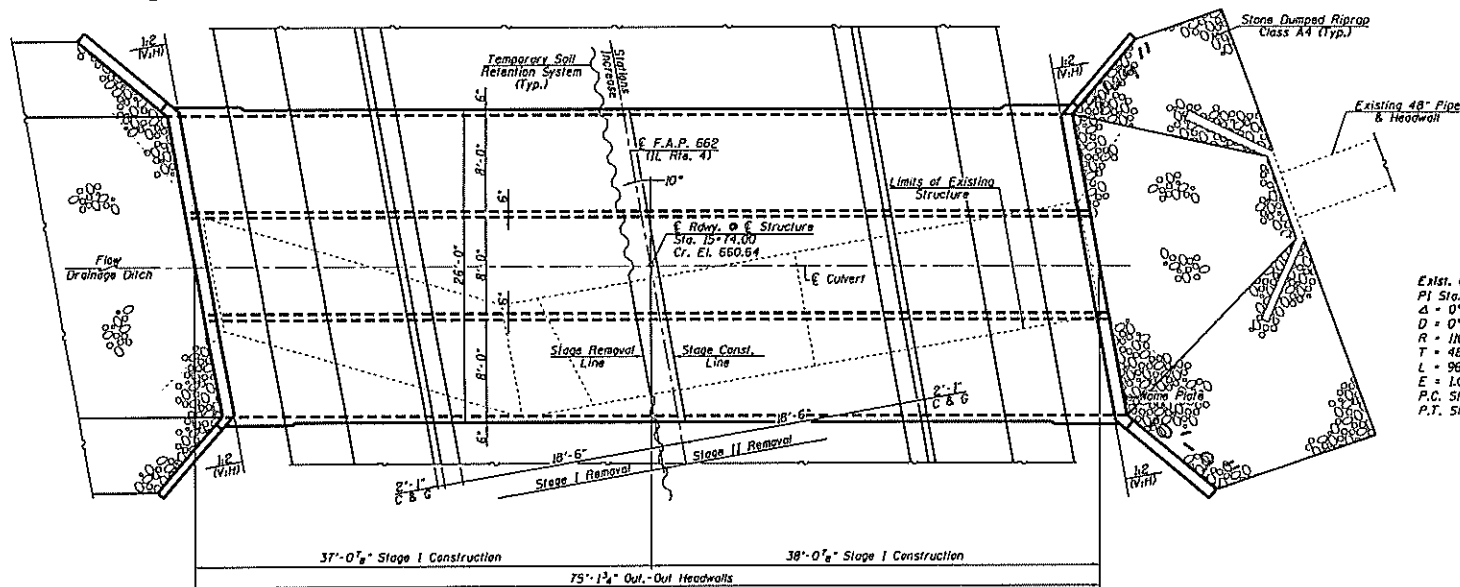


1-SE

LONGITUDINAL SECTION



SECTION THRU BARREL



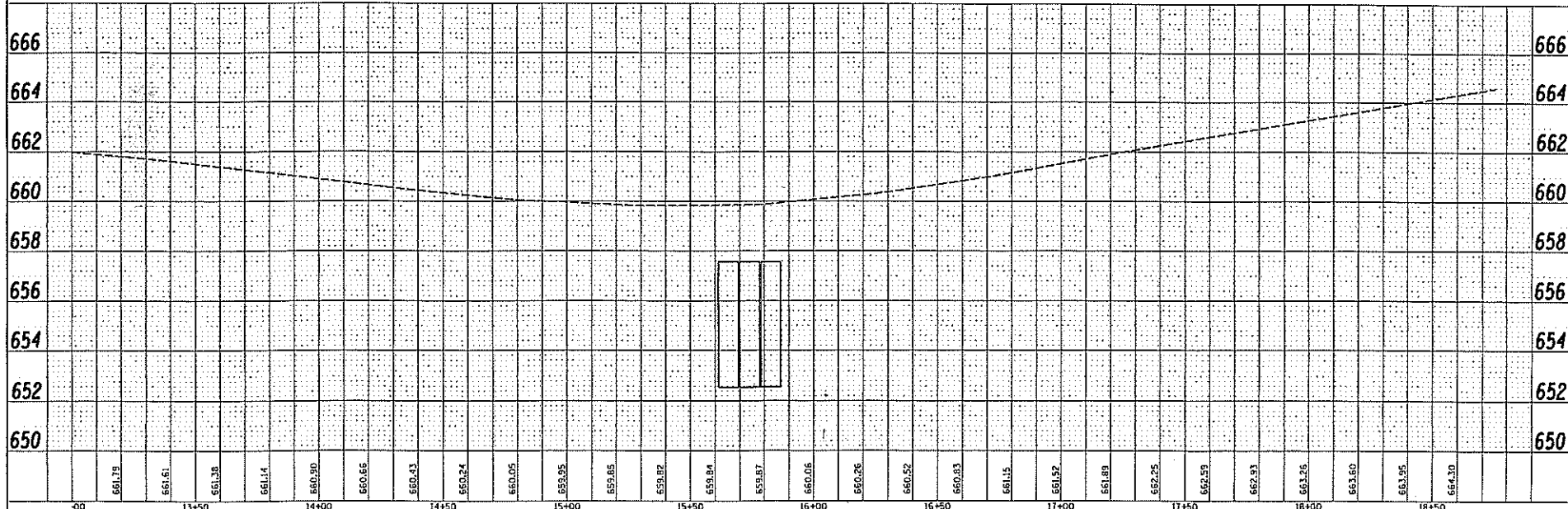
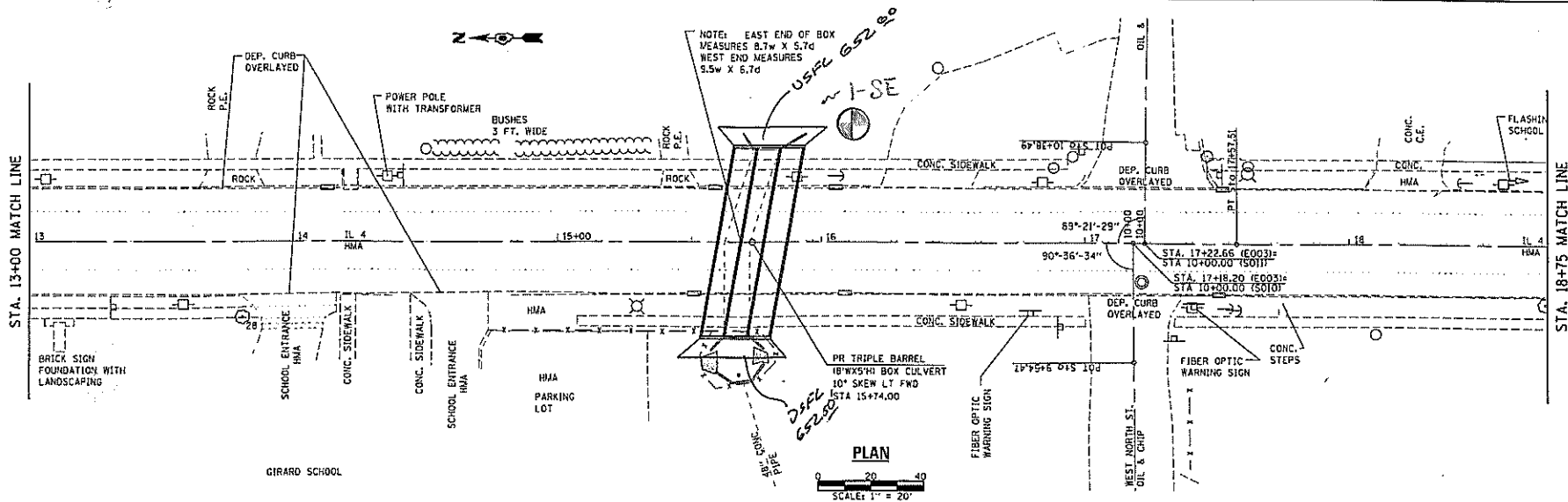
Exst. Curve Data
 P1 Sta. = 12+74.11
 Δ = 0° 28' 33" (RI.)
 D = 0° 02' 57"
 R = 116,392.40'
 T = 483.40'
 L = 966.79'
 E = 1.00'
 P.C. Sta. = 7+90.71
 P.T. Sta. = 17+57.51

GENERAL PLAN & ELEVATION
 F.A.P. ROUTE 662 (IL. ROUTE 4)
 SECTION (D/C)
 MACQUIN COUNTY
 STA. 15+74.00
 STRUCTURE NO. 059-2517

P.L.C. NAME *	USER NAME *	DESIGNED -	REVISED -	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	GENERAL PLAN & ELEVATION	SHEET NO. 1 OF 1 SHEET	F.A.P. 662	SECTION 101C	COUNTY MACQUIN	TOTAL SHEET NO. 72C80
	PLAT ECH. *	CHECKED -	REVISED -							
	PLAT DATE *	DRAWN -	REVISED -							
		CHECKED -	REVISED -							

PLAN	DATE	BY
REVISION		
NOTED		
DATE		
BY		

PROFILE	DATE	BY
REVISION		
NOTED		
DATE		
BY		



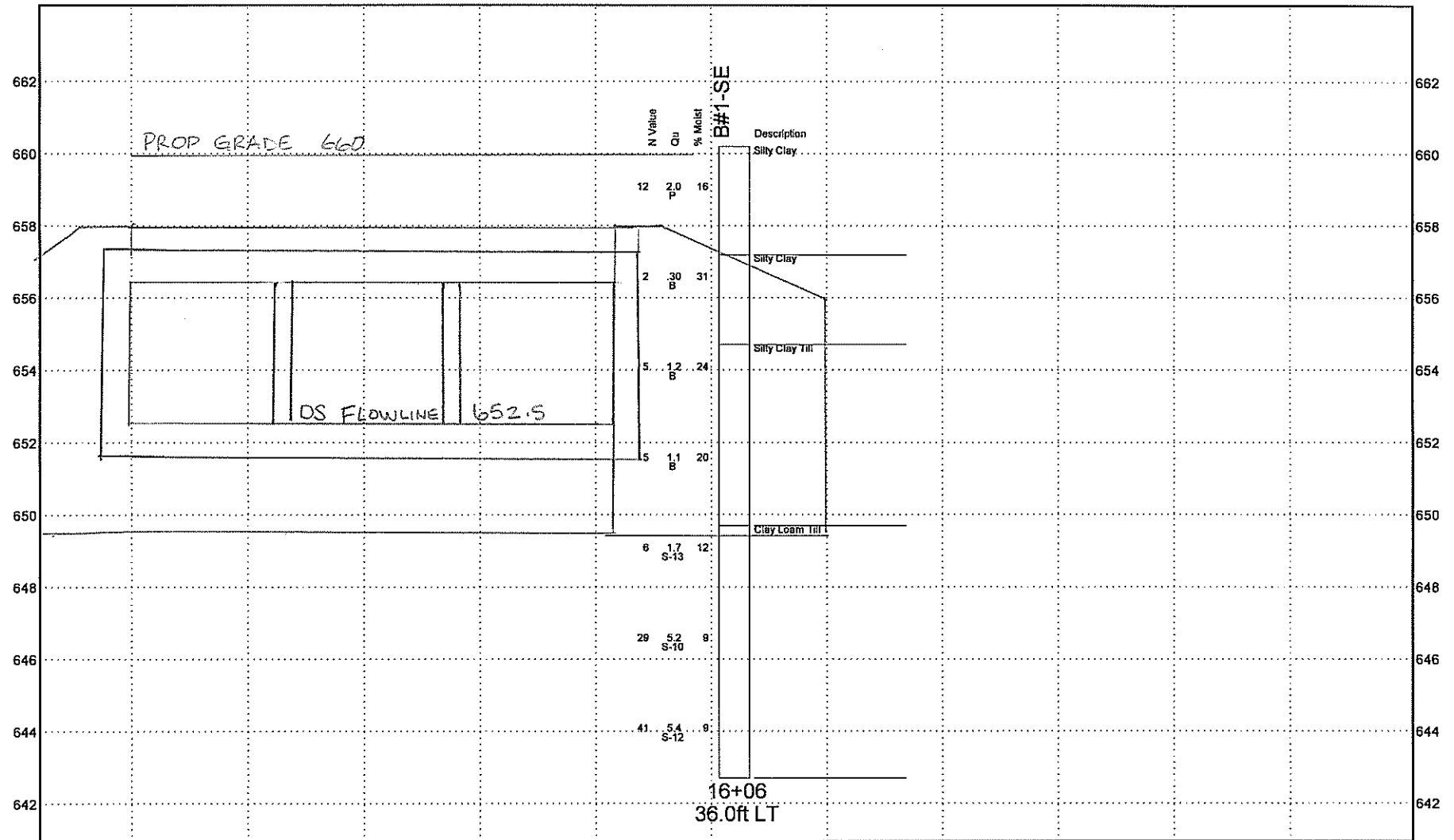
DESIGNED -	REVISION -
CHECKED -	REVISION -
DRAWN -	REVISION -
CHECKED -	REVISION -



Allen Henderson & Associates, Inc.
Civil and Structural Engineers Springfield, IL
62703 Phone: (217)544-8033 IL Design Firm
No. 184-001907

SECTION	COUNTY	TOTAL SHEET NO.
662	MACCLUPIN	CONTRACT NO. 72C80
SCALE: 1" = 20'	SHEET NO. 2 OF 3 SHEETS	STA. 13+00 TO STA. 18+75

Structure Number 059-7007 Over Unnamed Ditch
 Located in the NE 1/4 of Section 32, Township 12N, Range 6W of the 3 P.M.



NOT TO HORIZONTAL SCALE

VARIATIONS IN SUBSURFACE
 CONDITIONS MAY EXIST
 BETWEEN BORINGS

Groundwater
 y First Encounter
 y Completion
 y after (refer to log) hours

Abbreviations
 WOH - Sampler Advanced by Weight
 of Hammer, WOP - Weight of Pipe
 B.S. - Before Sealing

SUBSURFACE DATA PROFILE

Route: IL RT 4
 Section: D(CR)
 County: Macoupin



**Illinois Department
 of Transportation**
 Division of Highways
 I DOT



Illinois Department of Transportation

Division of Highways
Illinois Department of Transportation

SOIL BORING LOG

Page 1 of 1

Date 11/30/11

ROUTE IL RT 4 DESCRIPTION Over Unnamed Ditch LOGGED BY M. Tappan

SECTION D(CR) LOCATION NE 1/4, SEC. 32, TWP. 12N, RNG. 6W, 3 PM

COUNTY Macoupin DRILLING METHOD HSA HAMMER TYPE 140 # Auto

STRUCT. NO. 059-7007
Station 15+69

BORING NO. 1-SE
Station 16+06
Offset 36.0ft LT
Ground Surface Elev. 660.2 ft

D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)	Surface Water Elev. <u>653.7</u> ft	D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
				Stream Bed Elev. <u>652.7</u> ft				
				Groundwater Elev.: ▽ First Encounter _____ ft				
				▽ Upon Completion <u>Dry</u> ft				
				▽ After _____ Hrs. <u>Plugged</u> ft				

Grayish Brown Moist SILTY CLAY
with Cinders and Brick (Fill)

2			
6	2.0	16	
6	P		

657.20

Gray Very Moist SILTY CLAY (Fill)

0			
1	.30	31	
1	B		

654.70

Brown and Gray Moist SILTY
CLAY (Till)

2			
2	1.2	24	
3	B		
2			
2	1.1	20	
3	B		

649.70

Brown moist CLAY LOAM (Till)

0			
2	1.7	12	
4	S-13		

Gray and Brown

4			
6	5.2	9	
23	S-10		
5			
13	5.4	9	
28	S-12		

642.70

Boring Completed
Drill Broke Down
Abandoned Hole

Ref. STA. to CL of Ex. Culvert
CL STA = 15+69
STA. Increase to South
Ref. ELEV to CHSLD X on Fire
Hydrant to South
BM ELEV = 665.0

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer, E-Estimated)
Abbreviations W.O.H - Sampler Advanced By Weight of Hammer, W.O.P - Advanced by Weight of Pipe, B.S. - Before Seating
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206) BBS, from 137 (Rev. 8-99)

GRANULAR CULVERT BACKFILL 3/2/10

This work consists of backfilling box culverts or three-sided structures with granular materials. This work shall be performed at locations shown on the plans or as directed by the Engineer.

Backfilling shall be performed according to Article 502.10. The backfill material shall meet the requirements of Article 1004.05, except the gradation shall be CA-06 or CA-10.

Granular Culvert Backfill will be measured for payment in cubic yards compacted in place. Additional material required to backfill excavation outside the limits shown on the plans will not be measured for payment. This work shall be paid for at the contract unit price per cubic yard for GRANULAR CULVERT BACKFILL.

