STRUCTURE GEOTECHNICAL REPORT

Proposed SN: 033-2009

Existing SN: 033-0024

F.A.S. Route 882 (Blairsville Rd.)
over Unnamed Stream
4.4 miles north of McLeansboro
Section 102B-3
Hamilton County

PTB 145 - ITEM 32
D-99-049-08
Contract # 78080

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ORIGINAL **Date:** August 31st, 2009
REVISED DATE: DEC. 10, 2009

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Exhibits:
1) Location Map
2) Boring Locations
3) Subsurface Data Profile
4) Boring Logs
5) Special Provisions
6) Slope Stability Output

Project Description and Proposed Structure Information

The recommended scope of work will include a complete removal and replacement of the existing bridge with a triple barrel box culvert. Complete removal of the existing structure is required because of its age, poor live load ratings, and presence of untreated timber piles. The horizontal and vertical alignment of the existing roadway/structure will remain the same; however, the centerline of the proposed culvert will be shifted approximately 3 feet to the east to accommodate the IL 242/CH 10 intersection improvements and channel re-alignment. The widening of the CH 10 entrance will keep one lane open and prevent complete closures along Blairsville Road during stage construction operations. The proposed culvert is a triple barrel reinforced concrete box culvert with the west barrel measuring 15' x 5'-6" and the center and east barrels measuring 12' x 5'-6". The centerline of the proposed culvert will be perpendicular the centerline of Blairsville Rd., and will have an out-to-out of headwall length of 68'-6".

Stage construction requires a temporary sheet pile system for removal, excavation, and construction activities. Temporary pavement will need to be installed on both sides of Blairsville Rd. to accommodate stage I and stage II traffic. The structure will have 9'-6" long horizontal cantilever type wingwalls, on the east side, that retain 1:2 (V:H) embankment slopes. The west wingwalls will be permanent sheet pile with a concrete cap, approximately ±18'-2" in length. There will be a fill height of ±1'-2" above the proposed culvert. On the USGS Belle Prairie City quadrangle map, the project area falls within section 27 of Township 4 S and Range 6 E of the 3rd PM. A *Location Map* of the structure is presented as Exhibit 1.

Existing Information

The existing bridge was constructed in 1941 under S.B.I. Route 142, Section 102-B-1; there has not been any rehabilitation work done during its lifespan. The structure is a two span (22'-0", 22'-0") reinforced haunched concrete slab bridge on closed abutments with spread footings. Dimensions of the bridge are 45'-0" bk. to bk. abutments on a zero degree skew, 33'-0" out to out width with a 30'-0" clear width between curbs.

The existing superstructure is a continuously reinforced concrete slab that is approximately 10" thick. Beneath the superstructure lies a 5" thick haunched area that extends 5' from each side of the pier. In addition, there are thickened edge beams located along the longitudinal joint (centerline of bridge).

The closed abutments and pier are supported by spread footings with untreated timber piles. The abutment walls contain reinforcement on the front face only and the timber piles are ±18'-0" in length. The original wingwalls are T-type retaining walls at approximately 5'-0" in length and built at 45 degree angles. The untreated timber piles have a 15 ton capacity with 20 piles required for each abutment and pier. According to the existing plans, the base of existing footings are at Elev. 384.6.

Existing F.A.S Route 882 was built on a horizontally tangent alignment with a 0.00% vertical grade across the structure. Stationing along the roadway, near the culvert, increases from west to east. There are two 12'-0" lanes in each direction and 3'-0" shoulders across the structure. The existing approach roadway consists of 21' pavement with aggregate/earth shoulders.

Site Investigation, Subsurface Exploration and Generalized Subsurface Conditions

The site is located in a rural area surrounded by agricultural fields. An oversized ditch along the east side of IL 242 carries the unnamed stream under the bridge to the north. Ditches are present along the north and south sides of Blairsville Rd. connecting to the unnamed stream. The west approach slab of the existing bridge is approximately 20 feet in length and extends to the edge of pavement of IL 242. Removal of the slab and west abutment must be done carefully to minimize the impact on IL 242. Overhead utility lines are present in the SW and SE quadrants of the proposed construction site. Buried fiber optic and telephone utilities are present on the west side of IL 242 adjacent to the site.

By visual inspection, the accumulation of debris and detrimental scour do not appear to affect the existing structure. The abutments and wingwalls show minor cracking and leaching due to their age, and do not appear to be from settlement or movement. The approach pavement does not appear to show any signs of settlement.

The subsurface investigation consisted of two borings (1-S and 2-S) drilled by IDOT District 9 personnel in October 2007. Boring 1-S is located 13 feet left of the centerline at station 10+16 and Boring 2-S is located 11 feet right of the centerline at the station 11+00. Beginning at the ground surface, standard penetration tests (SPT) were conducted every 2.5 feet according to AASHTO T 206. Boring 1-S was terminated approximately 60 feet below the ground surface while 2-S was terminated 51 feet below the ground surface. While drilling, groundwater was encountered at 20 feet below the ground surface for Boring 1-S and at 22 feet below the ground surface for Boring 2-S, while the local water surface elevation was recorded as 6.3 feet below the ground surface. Beneath the 1 foot shoulder material, the borings encountered about 20 feet of moist to very moist clay to silty clay loam material with Standard Penetration Number (N) values ranging from 3 to 8 blows per foot. Then the borings encountered approximately 3 feet of loose, moist, fine sand with silty layers with Standard Penetration Number (N) values ranging from 4 to 8 blows per foot. Boring 1-S encountered 25 feet of very stiff, hard, damp clay loam with (N) values ranging from 22(top) to 93(bottom) blows per foot before terminating in hard, dry to damp, Clay Shale with N as 100 blows per 2 inch. Boring 2-S encountered 10 feet of stiff, moist clay to clay loam with (N) values ranging from 12(top) to 38(bottom) blows per foot before terminating into 14 feet of hard, damp clay loam with (N) values ranging from 80 to 110 blows per foot. Further descriptions of the soil conditions encountered in the borings are presented in the *Boring Logs* attached in Exhibit 4 and the *Subsurface Data Profile* in Exhibit 3. *Boring Locations* can be found in Exhibit 2.

Geotechnical Evaluations

Settlement. Based on the proposed project plan and profile, the proposed box culvert lies in an area that spans the existing streambed. At the east end, the culvert will extend behind the existing abutment into the embankment. The existing soil beneath the streambed between the foundation elements will have an increase in soil pressure due to the weight of the culvert and fill. The soils beneath the existing embankments should not be affected, but proposed embankment outside at the existing limits will cause an increase in soil pressures. To prevent differential settlement from occurring, it is

recommended that the streambed soils beneath the proposed culvert be removed down to Elev. 381.0 and replaced with Rockfill-Foundation material.

Slope Stability. Stability analyses were performed using a temporary excavation 1:1 slope model which rendered a factor of safety over 3.

Seismic Considerations. No problems affecting serviceability are anticipated following a seismic event.

Liquefaction. There is a 2.5 to 3.5 foot thick layer of loose and wet sands below the water table found during drilling and approximately 14 feet below the proposed base of culvert. Due to the relatively small thickness of the layer and based on the proposed structure type no further analyses are necessary.

Scour. The design scour elevations should correspond to the bottom of toe wall elevation on the upstream and downstream ends of the culvert as shown in the table below. The 10-year velocity through the existing bridge is 3.64 fps and 2.00 fps through the proposed culvert.

Design Scour Elevation (ft.)	U.S. Invert	D.S. Invert
	382.75	382.59

Mining Activity. The Illinois State Geological Survey (ISGS) "Directory of Coal Mines in Illinois" indicates that no mining activity has occurred near the project location.

Box Culvert Evaluation and Design Recommendations

Culvert Barrel. The use of a 3-sided structure is not an option due to the opening requirements and clearance issues. Also, multiple spans would likely be required, and stage construction would be further complicated.

A cast-in-place culvert appears to be the most appropriate construction option for the given site conditions, and due to the need for cast-in-place wingwalls and headwalls. Additionally, the District has stated that they would prefer to use cast-in-place structures whenever feasible, although a precast culvert appears to be feasible.

With the large foundation footprint, and also the Rockfill-Foundation material at the culvert base, the allowable bearing capacity at the base of foundation was found to be more than adequate for resistance of the estimated gross pressures. Without accounting for the Rockfill-Foundation material, the allowable bearing capacity of the existing soils is estimated to be 3000 psf.

Wingwalls. Based on the 0° skew, 1:2 (V:H) slope, and an estimated H_L of 7'-2", the wingwall length chart gives a typical wall length of 9'-6" at the east side. For the east side, the horizontal cantilever is the most appropriate design choice according to the IDOT Culvert Manual. At the west side there is a need for longer walls (±18'-2") to stabilize the roadway embankment. Appropriate options are L-Type vertical cantilever and sheet pile wall based on the length and relatively short retained height, it was found to be more economical and feasible to use permanent sheet piling with a concrete cap at

this location. The recommended active earth pressure as an equivalent fluid pressure on the wing walls according to the proposed design is 40 pcf.

Hydraulics. Class A4 riprap should be provided at each end of the culvert. The estimated water surface elevation (EWSE) is 392.7 computed from the procedure in Section 2.3.6.4.2 of the IDOT Bridge Manual and based on the water surface elevation given in the soil boring logs.

Construction Considerations

Cofferdams and Underwater Structure Excavation Protection. In order to maintain a dry construction area, dewatering techniques may be necessary. However, based on hydraulic conditions, a temporary cofferdam is not expected to be necessary. Stream diversion could be utilized to facilitate construction. With the presence of moist silty clay materials in the streambed, seepage is likely to occur which can lead to unstable pumping of the soils.

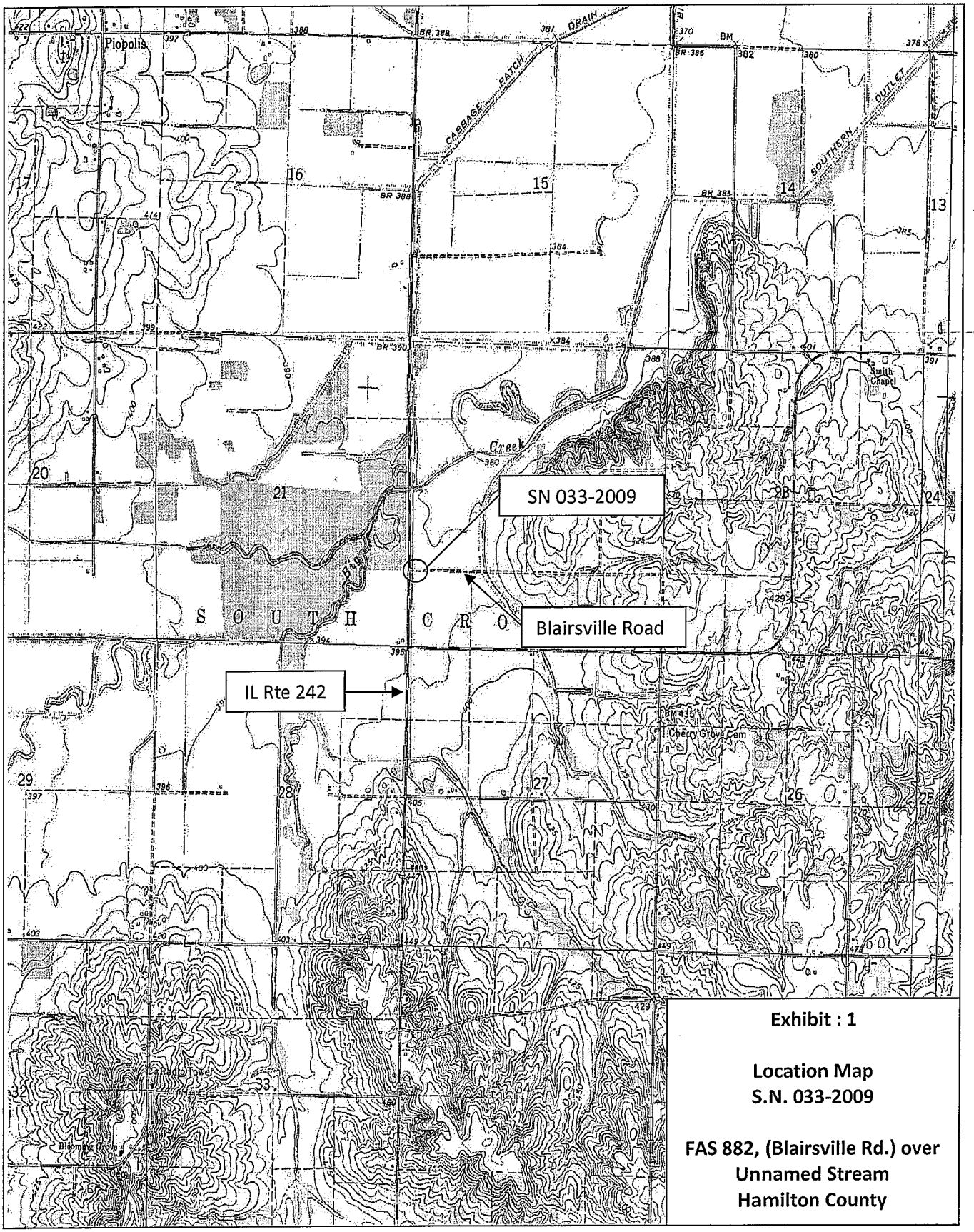
Stage Construction. In order to maintain traffic, stage construction shall be utilized. To retain the fill over the top slab during stage construction it is recommended that temporary timber blocking be used.

Temporary Soil Retention. A temporary sheet piling design was considered using Design Guide Chart 3.13.1 for cohesive soils from the IDOT Bridge Manual. Assuming a retained height of approximately 8 feet, the average unconfined compressive strength of 1.6 tsf for the assumed embedment depth gives a required embedment length of 6.0 feet for the structure. A required section modulus of the sheet piling is 3.3 cubic inches per foot. The temporary sheeting should extend away from the back of the existing abutments until no longer required.

Ground Improvement. The limits and quantities of removal and replacement previously described are based on boring data and may be modified by the District Geotechnical and Field Engineers for variable subsurface conditions encountered in the field.

Excavation. A 1:1 temporary excavation slope for construction clearance has an adequate factor of safety. This factor of safety is limited to 1:1 slopes and steeper slopes should not be used.

Backfill. Backfill within the limits of the paved surface to the top of culvert elevation should be performed according to the special provision for Granular Culvert Backfill. The pay limits of Granular Culvert Backfill include the 1:1 temporary excavation and a line projected down from the edge of shoulder. All other backfill may be composed of soil materials excavated from the project site placed and compacted according to the Standard Specifications.


SN 033-2009
Blairsville Road
IL Rte 242
Creek
SOUTH CRO
Exhibit : 1
Location Map
S.N. 033-2009
FAS 882, (Blairsville Rd.) over
Unnamed Stream
Hamilton County

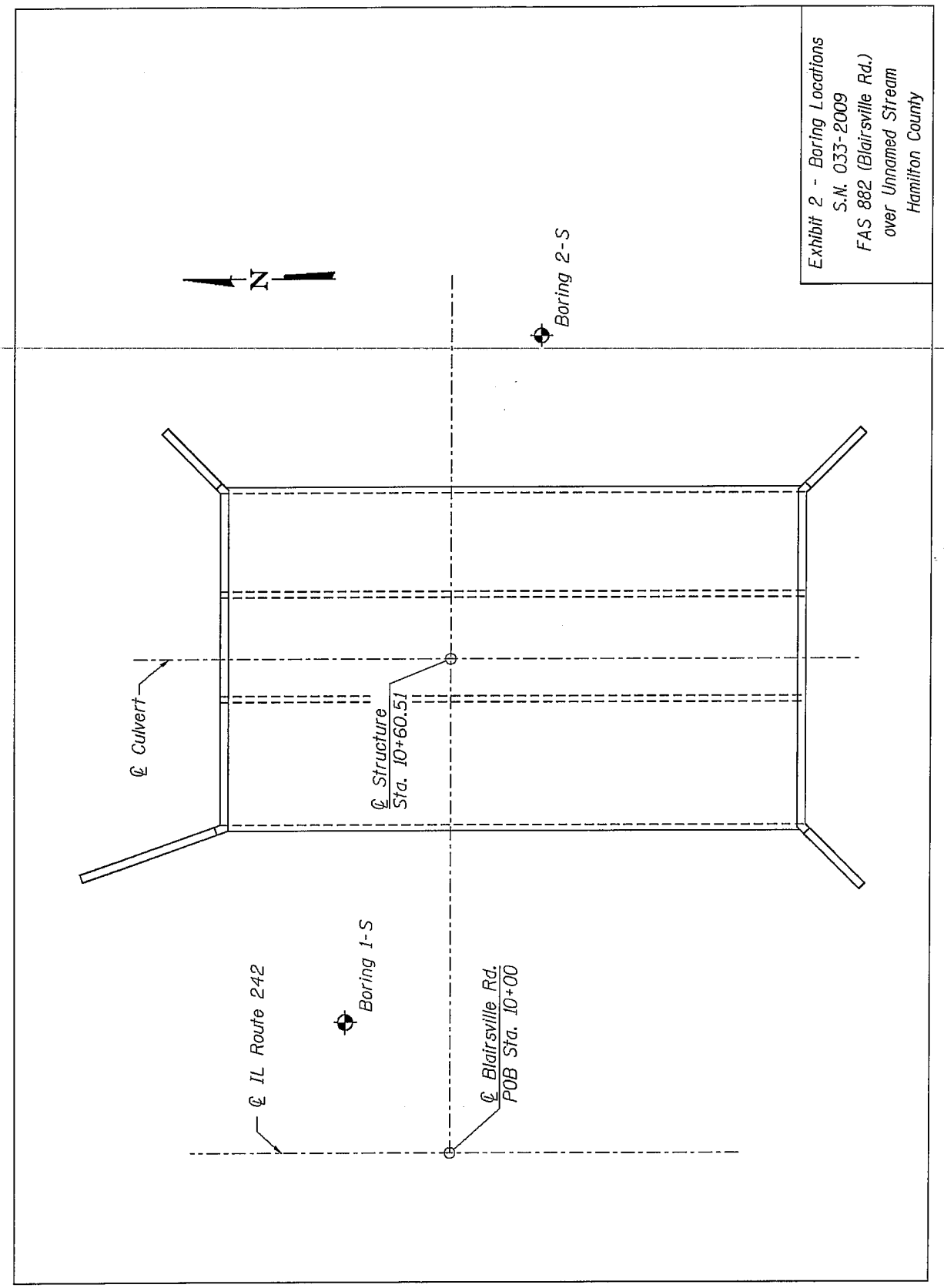
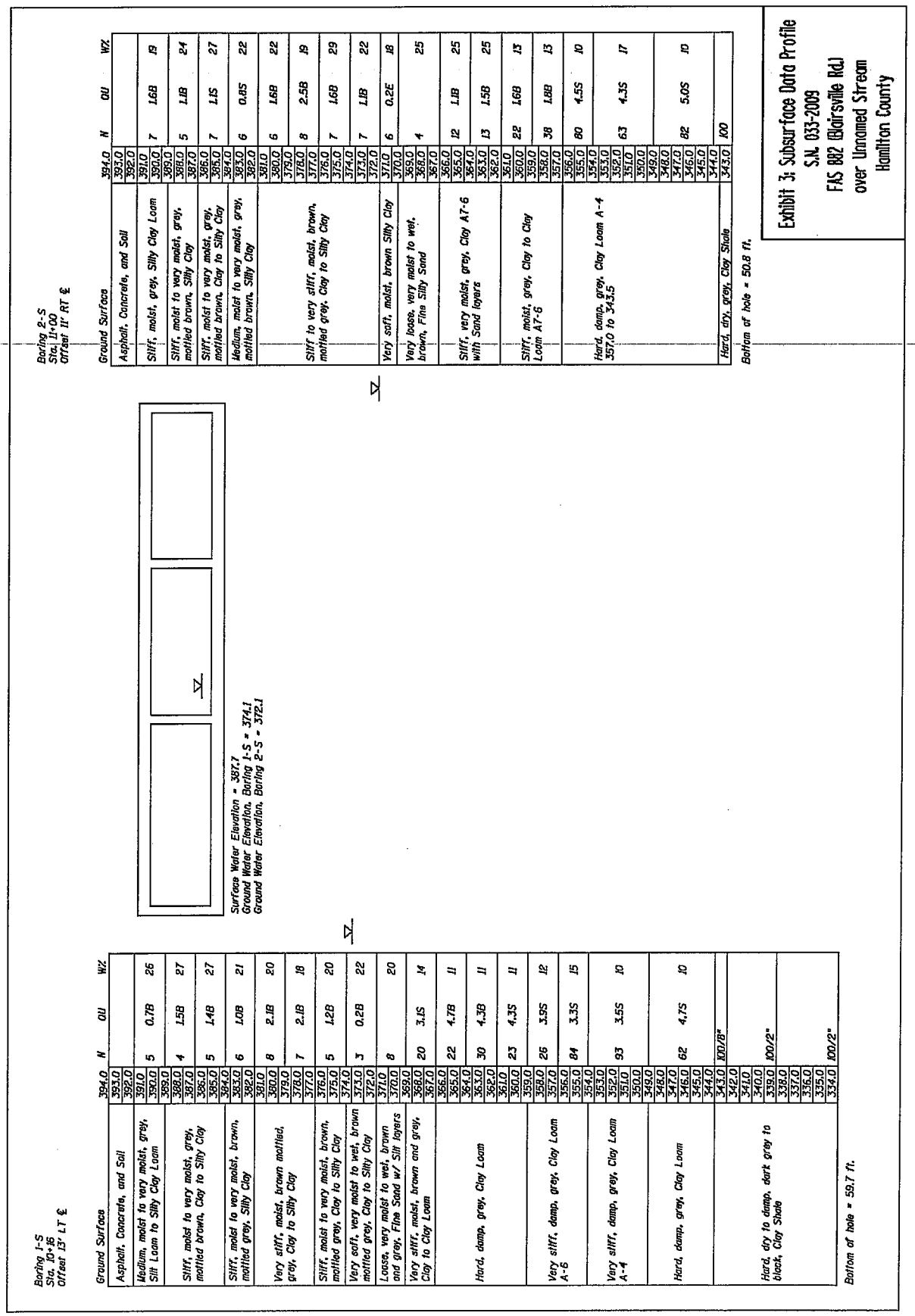


Exhibit 2 - Boring Locations
S.N. 033-2009
FAS 882 (Blairsville Rd.)
over Unnamed Stream
Hamilton County
N
Boring 2-S
℄ Culvert
℄ Structure
Sta. 10+60.51
Boring 1-S
℄ IL Route 242
℄ Blairsville Rd.
POB Sta. 10+00



Ground Surface	394.0	N	QU	WX
Asphalt, Concrete, and Soil	393.0			
	392.0			
Medium, moist to very moist, grey, Silt Loam to Silty Clay Loam	391.0	5	0.7B	26
	390.0			
	389.0			
Stiff, moist to very moist, grey, mottled brown, Clay to Silty Clay	388.0	4	1.5B	27
	387.0			
	386.0	5	1.4B	27
	385.0			
	384.0			
Stiff, moist to very moist, brown, mottled grey, Silty Clay	383.0	6	1.0B	21
	382.0			
	381.0	8	2.1B	20
Very stiff, moist, brown mottled, grey, Clay to Silty Clay	380.0			
	379.0			
	378.0	7	2.1B	18
	377.0			
Stiff, moist to very moist, brown, mottled grey, Clay to Silty Clay	376.0	5	1.2B	20
	375.0			
Very soft, very moist to wet, brown mottled grey, Clay to Silty Clay	374.0			
	373.0	3	0.2B	22
	372.0			
Loose, very moist to wet, brown and grey, Fine Sand w/ Silt layers	371.0	8		20
	370.0			
Very stiff, moist, brown and grey, Clay to Clay Loam	369.0			
	368.0	20	3.1S	14
	367.0			
	366.0			
Hard, damp, grey, Clay Loam	365.0	22	4.7B	11
	364.0			
	363.0	30	4.3B	11
	362.0			
	361.0			
	360.0	23	4.3S	11
	359.0			
	358.0	26	3.9S	12
Very stiff, damp, grey, Clay Loam A-6	357.0			
	356.0	84	3.3S	15
	355.0			
	354.0			
	353.0			
Very stiff, damp, grey, Clay Loam A-4	352.0	93	3.5S	10
	351.0			
	350.0			
	349.0			
	348.0			
	347.0			
Hard, damp, grey, Clay Loam	346.0	62	4.7S	10
	345.0			
	344.0			
	343.0	100/8"		
	342.0			
	341.0			
	340.0			
Hard, dry to damp, dark grey to black, Clay Shale	339.0	100/2"		
	338.0			
	337.0			
	336.0			
	335.0			
	334.0	100/2"		

Bottom of hole = 59.7 ft.

Ground Surface	394.0	N	QU	WX
Asphalt, Concrete, and Soil	393.0			
	392.0			
Stiff, moist, grey, Silty Clay Loam	391.0	7	1.6B	19
	390.0			
	389.0			
Stiff, moist to very moist, grey, mottled brown, Silty Clay	388.0	5	1.1B	24
	387.0			
Stiff, moist to very moist, grey, mottled brown, Clay to Silty Clay	386.0	7	1.1S	27
	385.0			
	384.0			
Medium, moist to very moist, grey, mottled brown, Silty Clay	383.0	6	0.8S	22
	382.0			
	381.0	6	1.6B	22
	380.0			
	379.0			
	378.0	8	2.5B	19
Stiff to very stiff, moist, brown, mottled grey, Clay to Silty Clay	377.0			
	376.0	7	1.6B	29
	375.0			
	374.0			
	373.0	7	1.1B	22
	372.0			
Very soft, moist, brown Silty Clay	371.0	6	0.2E	18
	370.0			
Very loose, very moist to wet, brown, Fine Silty Sand	369.0	4		25
	368.0			
	367.0			
	366.0			
Stiff, very moist, grey, Clay A7-6 with Sand layers	365.0	12	1.1B	25
	364.0			
	363.0	13	1.5B	25
	362.0			
	361.0	22	1.6B	13
Stiff, moist, grey, Clay to Clay Loam A7-6	360.0			
	359.0			
	358.0	38	1.8B	13
	357.0			
	356.0	80	4.5S	10
	355.0			
	354.0			
Hard, damp, grey, Clay Loam A-4 357.0 to 343.5	353.0			
	352.0	63	4.3S	17
	351.0			
	350.0			
	349.0			
	348.0			
	347.0			
	346.0	82	5.0S	10
	345.0			
	344.0			
Hard, dry, grey, Clay Shale	343.0	100		

Bottom of hole = 50.8 ft.

ILLINOIS DEPARTMENT OF TRANSPORTATION
District Nine Materials

Bridge Foundation Boring Log
Sheet 1 of 2

.S 882 (Blairsville Road) Over stream
ıute:) 882 Structure Number: 033-0024 (existing) Date: 9/28/2007
ıction 102-B-1 Bored By: RM
ıunty: Hamilton Location: Intersection IL 242 & Blairsville Rd Checked By: RM

ıring No 1-S
ıation 10+16
ffset 13' Lt CL
ound Surface 394.0 Ft

Surf Wat Elev: 387.7
Ground Water Elevation
when Drilling 374.1
At Completion
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
sphalt, Concrete and soil				Very stiff, moist, brown and grey, Clay to Clay Loam A-6	8	3.1S	14
					12		
392.0				367.0			
edium, moist to very moist,	2			Hard, damp, grey, Clay Loam	3		
ey, Silt Loam to Silty Clay	2	0.7B	26	A-6	9	4.7B	11
oam A-4	3				13		
389.5							
tiff, moist to very moist, grey 5.0	1			30.0	3		
ottled brown, Clay to Silty Clay	2	1.5B	27		13	4.3B	11
7-6	2				17		
	1				4		
	2	1.4B	23		11	4.3S	11
	3				12		
384.5				359.5			
tiff, moist to very moist, brown 10.0	1			Very stiff, damp, grey, Clay Loam 35.0	3		
ottled grey, Silty Clay A-6	3	1.0B	21	A-6	11	3.9S	12
	3				14		
382.0							
ery stiff, moist, brown mottled	1				8		
rey, Clay to Silty Clay A7-6	3	2.1B	20		34	3.3S	15
	5				50		
				354.5			
15.0	1			Very stiff, damp, grey, Clay Loam 40.0	12		
	3	2.1B	18	A-4	43	3.5S	10
	4				50		
377.0							
tiff, moist to very moist, brown	1						
ottled grey, Clay to Silty Clay	2	1.2B	20				
7-6	3						
374.5				349.5			
ery soft, very moist to wet, 20.0	WH			Hard, damp, grey, Clay Loam 45.0	8		
rown mottled grey, Silty Clay to	1	0.2B	22	A-4	27	4.7S	10
ilty Clay Loam A-6	2				35		
372.0							
oose, very moist to wet, brown	WH						
nd grey, Fine Sand w/ Silt layers	2		20				
	6						
74% Sand, 17% Silt, 6% Clay							
369.5							
25.0	3			344.0	50.0	5	

I-Std Pentr Test: 2" OD Sampler,
.40# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

Sheet 2 of 2

ute:) 882
Date: 9/28/2007
otion: 102-B-1
unty: Hamilton

ring No: 1-S
ation: 10+16
fset: 13' Lt CL
ound Surface: 394.0 Ft

DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
ard, dry to damp, dark grey to ack, Clay Shale	100/8"						
55.0	100/2"			80.0			
334.0 60.0	100/2"			85.0			
ottom of hole = 59.7 feet							
ree water observed at 20.0 ft							
levation referenced to plans; r Elevation = 395.0 feet							
o convert "N" values to "N60" alues multiply by 1.25							
65.0				90.0			
70.0				95.0			
75.0				100.0			

N-Std Pentr Test: 2" OD Sampler,
140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

ILLINOIS DEPARTMENT OF TRANSPORTATION
District Nine Materials

Bridge Foundation Boring Log

S 882 (Blairsville Road) Over stream — Sheet 1 of 2

ute:) 882 — Structure Number: 033-0024 (existing) — Date: 10/2/2007

ction 102-B-1 — Bored By: RM

unty: Hamilton — Location: Intersection IL 242 & Blairsville Rd — Checked By: RM

ring No 2-S
ation 11+00
fset 11' Rt CL
ound Surface 394.0 Ft

Surf Wat Elev: 387.7
Ground Water Elevation
when Drilling 372.1
At Completion
At: Hrs:

DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
sphalt, Concrete and soil				Very loose, very moist to wet, brown, Fine Silty Sand 86% Sand, 11% Silt, 3% Clay	1 3		25
392.0				367.0			
iff, moist, grey, Silty Clay Loam -6	2 4 3	1.6B	19	Stiff, very moist, grey, Clay A7-6 with Sand layers	6 4 8	1.1B	25
389.5							
liff, moist to very moist, grey ottled brown, Silty Clay A-6	5.0 1 2 3	1.1B	24	30.0	2 5 8	1.5B	25
387.0				362.0			
tiff, moist to very moist, grey ıottled brown, Clay to Silty Clay -6	1 3 4	1.1S	27	Stiff, moist, grey, Clay to Clay Loam A7-6	2 11 11	1.6B	13
384.5							
ledium, moist to very moist, rey mottled brown, Silty Clay -6	10.0 1 3 3	0.8S	22	35.0	4 20 18	1.8B	13
382.0				357.0			
tiff to very stiff, moist, brown ıottled-grey, Clay to Silty Clay 7-6	1 3 3	1.6B	22	Hard, damp, grey, Clay Loam A-4	10 34 46	4.5S	10
	15.0 2 3 5	2.5B	19	40.0	9 28 35	4.3S	17
	2 3 4	1.6B	29				
	20.0 1 3 4	1.1B	22	45.0	15 42 40	5.0S	10
372.0							
Very soft, very moist, brown, Silty Clay to Silty Clay Loam A-4	1 2 4	0.2E	18				
370.5							
Very loose, very moist to wet, brown, Fine Silty Sand 86% Sand, 11% Silt, 3% Clay	25.0 WH			50.0	7		

S-Std Pentr Test: 2" OD Sampler,
140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

Sheet 2 of 2

ute:) 882
ction: 102-B-1
unty: Hamilton
Date: 10/2/2007

ring No: 2-S
ation: 11+00
fset: 11' Rt CL
ound Surface: 394.0 Ft

DEPTH	BLOWS	Qu tsf	W%	DEPTH	BLOWS	Qu tsf	W%
ard, damp, gr, Clay Loam 343.5	27						
ard, dry, grey, Clay Shale 343.0	73						
				80.0			
55.0							
				85.0			
60.0							
				90.0			
65.0							
				95.0			
70.0							
				100.0			
75.0							

ottom of hole = 50.8 feet

ee water observed at 23.0 ft

levation referenced to plans;
r elevation = 395.0 feet

o convert "N" values to "N60"
alues multiply by 1.25

N-Std Pentr Test: 2" OD Sampler,
140# Hammer, 30" Fall (Type Fail. B-Bulge S-Shear E-Estimated P-Penetrometer)

GRANULAR CULVERT BACKFILL 4/10/06

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 1004.06, 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.

ROCKFILL - FOUNDATION 4/22/05

This work consists of constructing a layer of rockfill below culverts or spread footings having unstable or unsuitable soil conditions. When shown on the plans, the rockfill limits and thickness shall be confirmed by the Engineer prior to excavating below the theoretical top of rockfill line.

Materials shall meet the requirements of the following Articles of the Standard Specifications:

CA-6 and CA-7	.....	1004.04
Rockfill	.....	1005.01

All rockfill shall be well graded. The gradation of rockfill shall be selected based on layer thickness as shown below:

Less than or equal to 1 ft	.....	Gradations with a max size of 4 inches[b]
Greater than 1 ft	.....	Primary Crusher Run
Greater than 3 ft	.....	Primary Crusher Run or Shot Rock (18" max size)

[b] Gradations with a maximum size of 2 inches or smaller shall have less than 6% passing the No. 200 sieve.

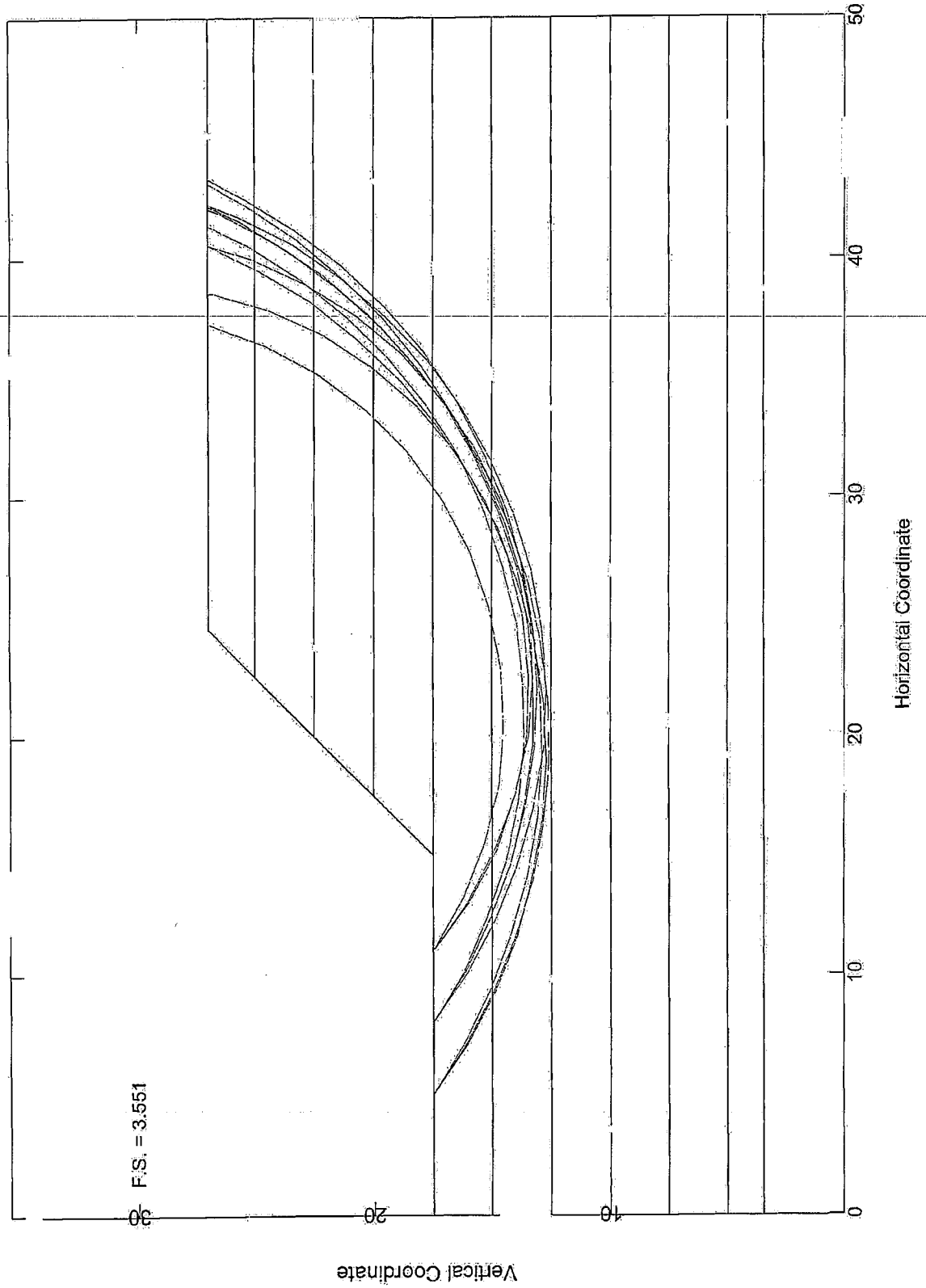
Excavation shall be performed according to Section 202 of the Standard Specifications. Excavated material may be placed in fills according to Article 202.03 with the approval of the Engineer.

The method of rockfill placement shall be approved by the Engineer. Rockfill shall be capped according to application as shown below:

Spread Footing	.....	4 to 6 inches CA-6
Cast-In-Place Box Culverts	.....	4 to 6 inches CA-7
Pre-Cast Box Culverts	.....	Porous Granular Bedding Material (Article 540.06)
Pre-Cast Pipe Culverts	.....	4 to 6 inches Fine Aggregate (Article 542.04(c))

In spread footing applications, the CA-6 cap shall be compacted to the satisfaction of the Engineer. No compaction of rockfill is required for culvert applications.

This work will be measured and paid for at the contract unit price per ton for ROCKFILL - FOUNDATION. The contract price for ROCKFILL-FOUNDATION shall include excavation, aggregate materials, aggregate material placement, and placement of excavated materials within right-of-way or disposal off right-of-way. *Excavation will not be measured or paid for separately or as part of EARTH EXCAVATION.* For precast concrete box culverts, porous granular bedding material and the excavation required for bedding will be paid for according to Article 540.08. For pipe culverts, the fine aggregate and the excavation required for fine aggregate shall be included in the cost per foot for PIPE CULVERTS of the class and type specified.


F.S. = 3.551
Horizontal Coordinate
Vertical Coordinate
0
10
20
30
40
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30