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Indiana Department of Transportation

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September 24, 2002

Mr. Phelps Klika, Chief
Design Division
Indiana Department of Transportation
Room N 601 - IGCN

Attention: Mrs. Hollie Pratt

Subject: Des. No's.: 9706600, 0006610 & 0006620
Project No: STP – 3229 (0053)
Structure No's: 238-29-8423 & 238-29-8422
SR 238 – From 136th Street to Michigan Street (in Fortville)
in Hamilton and Hancock Counties

Gentlemen:

The Geotechnical Investigation for the subject project has been completed and copies of the Geotechnical Report are being forwarded to those listed below.

If you have any questions concerning the above matter, please call us.

Very truly yours,

Athar A. Khan, P.E.
Chief Geotechnical Engineer

Mir Zaheer, P.E.
Senior Geotechnical Engineer

MZ
cc:
USI Consultants, Inc. – Attn: Mr. G. Wendling – Attachments
Ms. Mary Jo Hamman – Attn: Ms. Lisa Casler – Attachments
Mr. B. Davis – Attn: Mr. D. Eastin – Attachments (2)
Mr. K. Dave – Attachments
Ms. T. Jones – Attachments
Mr. D. Cohen - Attachments
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ATTACHMENT

CTL Engineering of Indiana, Inc.
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Established 1927

September 23, 2002

Indiana Department of Transportation
Materials and Tests Division
120 South Shortridge Road
P.O. Box 19389
Indianapolis, Indiana 46219

Attention: Mr. Athar Khan, P.E.

Reference: Subsurface Investigation
Des. No.: 9706600, 0006610 & 0006620
Project No.: STP-3229 (005)
Structure Nos.: 238-29-8423 & 238-29-8422
SR 238 from 136th Street to Michigan Street (in Fortville)
Hamilton and Hancock Counties
CTL Project No.: 02-050011

Dear Mr. Khan:

CTL Engineering has completed the subsurface investigation on the above referenced project. Enclosed are ten (10) copies of the report.

Thank you for the opportunity to be of service to you on this project. If you have any questions, please call our office.

Sincerely,

CTL ENGINEERING OF INDIANA, INC.

Ali Karaki, P.E.
Principal Engineer

cc Mr. Mir Zaheer, P.E.

SUMMARY OF SUBSURFACE INVESTIGATION

The project site is located on SR 238 between 136th Street and Michigan Street in Hamilton/Hancock Counties. The project involves replacement of two (2) bridges, culverts and roadway improvements on SR 238 and secondary roads.

A subsurface investigation for the subject project has been completed and a summary of our findings and recommendations is reported below. Detailed foundation recommendations and construction considerations are provided in the enclosed report.

Structure 238-29-8423 carrying SR 238 over Mud Creek

The proposed bridge may be supported on HP12x53 or 14-inch (350-mm) Steel Encased Concrete (SEC) piles. The estimated pile tip elevations are summarized in Table 3.

Structure 238-29-8422 carrying SR 238 over Thorpe Creek

The proposed bridge may be supported on HP12x53 piles driven into the bedrock to ultimate capacities. The estimated pile tip elevations are summarized in Table 5.

Major Structures

The proposed concrete box culverts may be constructed with minimum earthwork at 1+142, 5+912 and 6+520. Soft and/or undesirable soils require removal at stations 4+196 and 7+864 (refer to Table 7). Soil bearing capacity values at each major culvert are shown in Table 8.

Roadway

1. The existing subgrade soil conditions vary across the roadway profile. In sections where sandy loam soils are present, minimal earthwork is required to obtain an approved stable subgrade. However, along major portion of the roadway, the subgrade soils average 93 percent in-situ compaction.

2. For SR 238, Type "A" subgrade treatment is recommended as per ISS Section 207.04.

3. For Prairie Road, 126th Street, Florida Street, Cyntheanne Avenue, 113th Street and Connecticut Avenue, Type "E" subgrade treatment is recommended as per ISS Section 207.04 provided that AADT on these roads is less than 500 V.P.D.

4. The proposed pavement may be designed using a CBR value of 3.0.

5. Pavement subsurface drains with screened outlets should be installed. No filter fabric is needed in the area of the in-place soils. However, depending upon the type soil material that will be used as fill, a permeable filter fabric may be needed.

6. It is estimated that a total settlement of 4 inches may take place under approximately 6.8 feet of new fill at RB-30, Station 7+300. It is recommended that four (4) settlement plates be placed and monitored at stations 1+620, 4+080, 7+300 and 7+880 left or right of centerline. Monitoring of settlement plated should be per ISS. It is estimated that a waiting period of 4 to 6 weeks may be needed prior to placing any concrete pavement.

7. Retaining walls may be needed at stations 1+580, 3+620, 3+920 and 7+490 due to proximity of existing structures. Recommendations for retaining walls will be provided upon request.

SUBSURFACE INVESTIGATION

DES. NO.: 9706600, 0006610 & 0006620
PROJECT NO.: STP-3229 (005)
STRUCTURE NOS.: 238-29-8423 & 238-29-8422
SR 238 FROM 136TH STREET TO MICHIGAN STREET (IN FORTVILLE)
HAMILTON AND HANCOCK COUNTIES
CTL PROJECT NO.: 02-050011

PREPARED FOR:

INDIANA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTS DIVISION
120 SOUTH SHORTRIDGE ROAD
P.O. BOX 19389
INDIANAPOLIS, INDIANA 46219

PREPARED BY:

CTL ENGINEERING, INC.
6848 HILLSDALE COURT
INDIANAPOLIS, INDIANA 46250

SEPTEMBER 23, 2002

CTL ENGINEERING

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I. PROJECT LOCATION AND DESCRIPTION

The project site is located on SR 238 between 136th Street and Michigan Street in Hamilton/Hancock Counties, Indiana. The project involves the design and construction of the following:

1. Structure No. 238-29-8423 carrying SR 238 over Mud Creek. Bridge plans indicate that the proposed structure is a single span prestressed concrete box beam bridge with spill-through slopes. The bridge span is 25600 mm long with 11200 mm clear roadway width. The new bridge approaches require a maximum new fill height of 1.86 m (6.1'). The Q_{100} scour is expected at elevation 245.17 m and Q_{500} scour at 243.15 m.

2. Structure No. 238-29-8422 carrying SR 238 over Thorpe Creek. Bridge plans indicate that the proposed structure is a single span prestressed concrete box beam bridge with spill-through slopes. The bridge span is 20100 mm long with 11200 mm clear roadway width. The new bridge approaches require a maximum new fill height of 0.50 m (1.5'). The Q_{100} scour is expected at elevation 244.39 m and Q_{500} scour at 243.56 m.

3. Roadway improvements on SR 238, Prairie Road, 126th Street, Florida Street, Cyntheanne Avenue, 113th Street and Connecticut Avenue. The improvements involve roadway widening, overlay and full depth pavement replacement for 9.3 km. Additionally, milling of existing pavement and resurfacing is planned on SR 238 between stations 6+865 and 7+130.

   A major portion of the proposed roadway profile will be constructed at or near existing grade. Major cut and fill are at the following locations.

   Fill: Stations 1+500 to 1+820 Maximum Height = 2.0 m (6.5')
   Stations 3+975 to 4+460 Maximum Height = 2.45 m (8.0')
   Stations 7+130 to 7+450 Maximum Height = 2.1 m (7.0')
   Stations 7+650 to 7+970 Maximum Height = 2.0 m (6.5')

   Cut: Stations 3+460 to 3+740 Maximum Height = 2.8 m (9.3')
   Stations 3+850 to 3+975 Maximum Height = 1.8 m (6.0')
   Stations 7+450 to 7+650 Maximum Height = 1.8 m (6.0')

4. Culverts on SR 238. Major and minor culverts are proposed along SR 238. The major culverts are generally precast concrete box structures ranging in size between 1150mm x 760mm and 3600mm x 1500mm.

II. SUBSURFACE INVESTIGATION

Forty-nine (49) roadway borings designated as RB-01 through RB-49, and thirteen (13) structure borings designated as TB-01 through TB-13, were drilled within the proposed roadway improvements, bridges and culverts to depths ranging between 2.29 m (7.5') and 21.33 m (70'). Locations of the test borings are shown on the attached boring location plans, test boring records and are summarized below:

TB-01 and TB-02 drilled at Structure No.: 238-29-8423, SR 238 over Mud Creek.
TB-03 and TB-04 drilled at Structure No.: 238-29-8422, SR 238 over Thorpe Creek.
TB-05 through TB-13 drilled at culverts of more than 900mm in size.
RB-01 through RB-49 drilled within the limits of the roadway improvements.

The test borings were advanced with an All-Terrain Vehicle (ATV) drilling rig utilizing hollow stem augers (HSA) or solid flight augers (SFA) on April 17 through May 24, 2002. Standard Penetration tests were conducted using a 140-pound hammer falling 30 inches to drive a 2-inch O.D. split barrel sampler for 18 inches.

Soil samples obtained from the drilling operation were preserved in glass jars and visually classified in the field and laboratory. Representative soil samples were tested for natural moisture content, pH, unconfined compression, unit weight, Atterberg limits and grain size analysis.

Soil bag samples were obtained at boring RB-09 at a depth of 1.5 to 4.0 feet beneath existing grade. The soils were tested for grain size analysis, Atterberg limits, moisture density relation (Standard Proctor) and CBR.

Drilling, soil sampling, rock coring and laboratory testing have been performed following standard geotechnical engineering practices, INDOT and current ASTM procedures. Results from field tests are shown on the enclosed boring logs.

Stations, offsets and surface elevations of the test borings were interpolated from the site plan prepared by USI Consultant, Inc.

III. FINDINGS

A. Structure 238-29-8423 carrying SR 238 over Mud Creek

Test borings TB-01 and TB-02 exhibited 267mm to 381mm (10.5" to 15") of asphalt concrete pavement over 152mm (6") of base course. Below the existing pavement, TB-01 exhibited sandy loam (A-4) fill to a depth of 2.59 m (8.5') over creek sediments to a depth of 3.81m (12.5'). Below the fill in TB-01 below pavement in TB-02, test borings encountered varied sequence of cohesive and cohesionless soils over bedrock. The cohesive soils are described as brown and/or gray clay loam, sandy loam and/or loam (till) of A-2-6, A-4 and A-6 soil categories. The cohesionless soils are described as brown and/or gray sand and/or gravel. Boulders were encountered in TB-01 at a depth of 7m (23').

Standard penetration blowcount values of native soils ranged from 5 to 79 blows per foot (bpf). Blowcounts of 100 blows for several inches of penetration are due to striking on bedrock. Natural moisture content values ranged from 11 to 21 percent.

Bedrock was encountered in both borings at elevations shown in Table 1. The cored rock is described as gray, hard, highly fractured limestone with core recovery of 75 percent and a Rock Quality Designation (RQD) of 0 percent.

Table 1 – Bedrock Elevation

Boring No.	Station	Offset	Line	Limestone Bedrock Elevation (m)
TB-01A	1+671	2.5 m Lt	"A"	231.44
TB-02	1+698	3 m Rt	"A"	231.08
TB-03	3+790	3 m Lt	"A"	240.96
TB-04	3+814	3 m Rt	"A"	242.99

B. Structure 238-29-8422 carrying SR 238 over Thorpe Creek

Test borings TB-03 and TB-04 exhibited 318mm to 356mm (12.5" to 14")) of asphalt concrete pavement over 152mm (6") of base course. Below the existing pavement, sandy loam of A-4 and sand and gravel deposits were encountered over bedrock

Standard penetration blowcount values ranged from 4 to 31 blows per foot (bpf). Blowcounts in excess of 50 blows for several inches of penetration are due to striking on bedrock. Natural moisture content values ranged from 13 to 24 percent.

Bedrock was encountered in both borings at elevations shown in Table 1. The upper 1.71m (5.5') of bedrock is cored rock is described as brown with white streaks, weathered, soft limestone with shale zones. Below, bedrock is described as gray, hard, highly fractured limestone. Core recovery ranged from 37 to 78 percent and RQD values from 0 to 7 percent.

C. Culverts

Test Borings TB-05, TB-06, TB-09 and TB-10 exhibited 203 mm to 318mm (8.0" to 12.5") of asphalt concrete pavement over 102mm to 152mm (4"to 6") of base course. Test Borings TB-07, TB-08, TB-11, TB12 and TB-13 exhibited 152mm (6") of topsoil.

Below the surface cover, the test borings encountered cohesive soils consisting of clay loam, loam, sandy loam (A-2-4, A-4 and A-6) and/or sand and gravel. Soft soils described as creek sediments were in TB-13 to a depth of 3.05m (10').

Bedrock was encountered TB-08, TB-09, TB-10 and TB-11. The cored rock in TB-11 is described as light gray, hard, limestone with core recovery of 85 percent and an RQD value of 35 percent.

Refer to the attached test boring records for soil/bedrock information, standard penetration blowcounts and groundwater.

D. Roadway

The test borings drilled on the existing roadway of SR 238 exhibited 121mm to 381mm (4.75" to 15") of asphalt concrete over 0 to 406mm (0" to 16") of granular base course materials. RB-04, RB-06, RB-14 and RB-33 exhibited 102mm to 229mm (4" to 9") of topsoil. RB-42 encountered 76mm of Portland cement concrete below the asphalt concrete. RB-32 encountered 152mm (6") of gravel driveway.

Beneath the surface cover, the test borings encountered varied sequence of cohesive and cohesionless soils. The cohesive soils are described as brown and/or gray clay loam, silty clay, sandy loam, silty loam or loam of A-2-6, A-4, A-6 and A-7-6 soil categories. The cohesionless soils are described as brown and/or gray sandy loam (A-2-4) and sand and/or gravel.

Bedrock was encountered in RB-23, RB-24, RB-28 and RB-30 at depths ranging between 1.83m and 3.51m (6' and 11.5') beneath existing grade.

Standard moisture density tests indicated that the surface loam soils could attain a maximum dry density of 115.6 pcf at 14.2 percent optimum moisture content. California Bearing Ratio (CBR) values of these soils are 3.3, 4.4 and 5.6, respectively at 93, 95 and 97 percent of the maximum dry density.

The predominant soils in the upper 1.5 m (4.5') consist of clay loam, silty loam, loam and/or sandy loam. In-situ densities other than sandy loam soils range from ±85 to ±100 percent of the maximum dry density, averaging approximately 93 percent. Generally, subgrade soils consisting of sandy loam exhibit more than 100 percent compaction. The natural moisture contents of these soils varied across the roadway profile depending upon the topography. Overall, the natural moisture content values ranged between –2 to 12 percent above optimum. The test results of the subgrade soil investigation are summarized in Table 2.

Refer to the attached test boring records for soil/bedrock information, standard penetration blowcounts and groundwater.

Table 2 - In-Situ Moisture - Density

Boring No.	Sample No.	Soil Type	AASHTO	Blowcounts (bpf)	Moisture (%)	Wet Density (pcf)	Dry Density (pcf)	Max. Dry Density (pcf)	Optimum Moisture (%)	In-situ Compaction (%)	Moisture Difference (%)
RB-01	SS-1	CL LO	A-6	9	20.6	122.5	101.6	110.0	16.9	92.4	3.7
RB-02	SS-1	CL LO	A-6	7	23.2	126.6	102.7	110.0	16.9	93.4	6.3
RB-02	SS-2	SA LO	A-4	9	14.8	143.3	124.8	120.8	12.4	103.3	2.4
RB-06	SS-1	CL LO	A-6	4	18.0	126.7	107.3	115.6	14.2	92.9	3.8
RB-06	SS-2	SA LO	A-4	13	10.4	144.6	130.9	120.8	12.4	108.4	-2.0
RB-07	SS-1	SI LO	A-6	4	17.7	127.1	108.0	115.6	14.2	93.4	3.5
RB-09	SS-1	LO	A-6	4	23.5	122.5	99.2	115.6	14.2	85.8	9.3
RB-10	SS-2	CL LO	A-6	4	19.9	128.0	106.8	115.6	14.2	92.3	5.7
RB-11	SS-1	CL LO	A-6	4	25.9	137.0	108.8	115.6	14.2	94.1	11.7
RB-11	SS-2	SA LO	A-4	8	13.1	147.9	130.7	120.8	12.4	108.2	0.7
RB-12	SS-1	SI CL	A-7-6	6	27.4	119.5	93.8	102.0	21.2	92.0	6.2
RB-18	SS-1	SA LO	A-4	5	23.2	126.4	102.6	120.8	12.4	85.0	10.8
RB-19	SS-1	SI LO	A-6	6	13.1	134.6	119.0	115.6	14.2	102.9	-1.1
RB-19	SS-2	SI CL	A-7-6	8	27.4	121.9	95.7	110.0	16.9	87.0	10.5
RB-20	SS-1	SI LO	A-6	6	18.3	137.0	115.8	115.6	14.2	100.1	4.1
RB-37	SS-1	CL LO	A-6	5	15.9	135.3	116.7	115.6	14.2	101.0	1.7
RB-37	SS-2	SA LO	A-4	21	11.3	149.9	134.7	120.8	12.4	111.5	-1.1
RB-39	SS-1	CL LO	A-6	4	22.2	134.4	109.9	115.6	14.2	95.1	8.0
RB-40	SS-1	CL LO	A-6	4	22.9	122.6	99.8	110.0	16.9	90.7	6.0
RB-40	SS-2	SA LO	A-4	12	16.5	136.3	117.0	120.8	12.4	96.9	4.1
RB-41	SS-1	SI LO	A-6	4	26.0	137.4	109.1	115.6	14.2	94.4	11.8
RB-42	SS-2	CL LO	A-6	6	25.2	126.7	101.2	110.0	16.9	92.0	8.3
Average										**93.0**	**5.6**

Note: Maximum dry density and optimum moisture values for SI LO, SI CL & SA LO are estimated

IV. ANALYSIS AND RECOMMENDATIONS

A. Structure 238-29-8423 carrying SR 238 over Mud Creek

The proposed bridge may be supported on HP12x53 steel piles or 14-inch (350-mm) Steel Encased Concrete (SEC) piles. The estimated pile tip elevations for allowable design axial loads of 40, 55 and 70 tons (355, 490 and 620 kN) are summarized in Table 3. The pile loading values for geotechnical testing are shown in Table 4.

Table 3 - Pile Loading

Bent No.	Boring No.	Station Offset	Bedrock Elevation (m)	Estimated Pile Cap Elevation (m)	Pile Type	Allowable Pile Load		Estimated Pile Tip Elevation (m)
						tons	kN	
1 & 2	TB-01	1+673 3 m Lt "A"	231.44	±250.2	HP12x53	40	355	±241.0
					HP12x53	55	490	±237.7
					HP12x53	70	620	±233.7
					14" SEC	40	355	±241.5
					14" SEC	55	490	±240.5
					14" SEC	70	620	±238.5

Table 4 - Pile Loading for Geotechnical Testing

Parameter	Bents 1 & 2		
Design Load, tons (kN)	40 (355)	55 (490)	70 (620)
Factor of Safety	2.5	2.5	2.5
Factored Design Load, tons (kN)	100 (890)	137.5 (1225)	175 (1555)
Friction in Scour Zone, tons (kN)	0	0	0
Down Drag Friction, tons (kN)	0	0	0
Ultimate Load, tons (kN)	100 (890)	137.5 (1225)	175 (1555)
Testing Method	By Formula, Standard Specifications, 701		

B. Structure 238-29-8422 carrying SR 238 over Thorpe Creek

The proposed bridge may be supported on HP12x53 piles driven into the bedrock to ultimate capacities. The estimated pile tip elevations are summarized in Table 5. The pile loading values for geotechnical testing are shown in Table 6.

Table 5 - Pile Loading

Bent No.	Boring No.	Station Offset	Bedrock Elevation (m)	Estimated Pile Cap Elevation (m)	Pile Type	Allowable Pile Load		Estimated Pile Tip Elevation (m) *
						tons	kN	
1	TB-03	3+790 3 m Lt "A"	240.96		HP12x53	40	355	±240
					HP12x53	55	490	±239.5
					HP12x53	70	620	±239
2	TB-04	3+814 3 m Rt "A"	241.92		HP12x53	40	355	±241
					HP12x53	55	490	±240.5
					HP12x53	70	620	±240

* Pile tip is estimated to penetrate into bedrock based on core recovery & RQD values.

Table 6 - Pile Loading for Geotechnical Testing

Parameter	Bents 1 & 2		
Design Load, tons (kN)	40 (355)	55 (490)	70 (620)
Factor of Safety	2.5	2.5	2.5
Factored Design Load, tons (kN)	100 (890)	137.5 (1225)	175 (1555)
Friction in Scour Zone, tons (kN)	0	0	0
Down Drag Friction, tons (kN)	0	0	0
Ultimate Load, tons (kN)	100 (890)	137.5 (1225)	175 (1555)
Testing Method	By Formula, Standard Specifications, 701		

Foundation recommendations for both structures are provided in the following paragraphs.

1. Pile tip attachments should be provided for both HP and pipe piles.

2. Pre-augering is recommended through newly placed fill and if boulders are encountered such as in TB-1.

3. No corrosion protection is needed for the piles as determined by the pH values of the in-situ soils.

4. Pile driving should follow the INDOT Standard Specifications (ISS), Section 701 and related sections.

5. Embankments placed and compacted against existing embankments should be benched according to ISS.

6. End slopes and spill-through slopes constructed at a rate of 2:1 (Horizontal to Vertical) are considered marginal against sliding and slope failure. Based upon the low blowcounts obtained from the drilling operation, sloughing and localized failure in the spill-through slopes may occur with time. However, the use of a piling foundation system and riprap would improve the stability of these slopes.

7. The bridge spill-through slopes should be protected with a minimum of 18 inches (450 mm) of riprap over permeable geotextile fabric. A riprap key should be provided at the toe of the spill-through slopes.

C. Major Structures

1. The major structures consist mainly of concrete box culverts. The soil conditions at each structure location are summarized in Table 7 and are shown on the enclosed test boring records. Footings constructed at 4 feet (1.2m) below each culvert flowline may be proportioned using the allowable bearing capacity values shown in Table 8. These values apply to all design loads.

Table 7 - Soil Condition at Culvert Locations

Culvert Size	Station	Invert Elevation (m)	Boring No.	Soil Conditions at/or below Invert Elevation
18.8m of 1150mm x 730mm	1+142	255.49 255.41	TB-05	Minimum earthwork is required. Medium dense sandy loam soils are expected at invert elevation. No groundwater is expected.
31 m of 3600mm x 1500mm	4+196	252.60 252.30	TB-06 & TB-07	Soft sandy loam soils may require to be removed to elev. 251.90 between 5m Rt & 17m Lt. Minimum earthwork may be required between 5m & 15m Rt. Groundwater may be encountered depending upon rainfall.
21.8m of 3000mm x 1200mm	5+912	246.30 246.25	TB-08 & TB-09	Minimum earthwork may be required. Medium stiff sandy soils are expected at invert elevation. Groundwater and/or surface water may be encountered.
18.6m of 1200mm x 600mm	6+520	241.34 241.21	TB-10 & TB-11	Minimum earthwork may be required. Loose to medium dense sand & gravel deposits are expected at invert elevation. Groundwater is expected.
36m of 1200mm x 1200mm	7+864	252.95 252.60	TB-12 & TB-13	Soft soils mixed with wood fragments should be removed to elev. 251.75 between 5m & 18m Rt. Also, soft soils should be removed to elev. 252.95 between 5m & 19m Lt. Groundwater may be encountered.

Table 8 – Bearing Capacity & Foundation Recommendation at Culvert Locations

Culvert Size	Station	Invert Elevation (m)	Boring No.	Allowable Bearing Capacity		Footing Width		Remarks
				psf	kPa	feet	m	
18.8m of 1150mm x 730mm	1+142	255.49 255.41	TB-05	5000	240	1.33*	0.400*	Bearing soil should be inspected prior to placement of footings.
31 m of 3600mm x 1500mm	4+196	252.60 252.30	TB-06 & TB-07	5000	240	1.33*	0.400*	Bearing soil should be inspected prior to placement of footings.
21.8m of 3000mm x 1200m	5+912	246.30 246.25	TB-08 & TB-09	2100	100	1.33*	0.400*	Footings may be founded on decomposed rock at outlet and on sandy loam at inlet. Least bearing capacity is provided to simplify design of footings. Bearing soil/rock should be inspected prior to placement of footings. Refer to Foundation recommendations in Appendix E.
18.6m of 1200mm x 600mm	6+520	241.34 241.21	TB-10 & TB-11	1600	77	2	0.610	Soft clay soils at outlet should be removed and replaced with lean concrete or extend footing to decomposed rock. It is estimated that 1-foot (0.3m) of soft soil may require removal. Footings at inlet may be founded on sand. Design of footings on sand governs. Bearing soil/rock should be inspected prior to placement of footings. Refer to Foundation recommendations in Appendix E.
				1800	87	3	0.914	
				2000	99	4	1.219	
				2200	109	5	1.524	
				2400	118	6	1.829	
36m of 1200mm x 1200m	7+864	252.95 252.60	TB-12 & TB-13	3000	140	1.33*	0.400*	Bearing soil should be inspected prior to placement of footings.

2. The pH values obtained from the laboratory testing indicate that the in-situ soils have minor to no corrosion effect on the proposed culvert.

3. Temporary excavations in excess of 1.2 m (4.0 feet) in depth should be sloped or shored according to OSHA requirements.

4. Removal of existing structures and wingwalls, and existing pavement should be performed according to ISS.

5. Borrow type and placement, and drainage structure installations should conform to ISS along with the following recommendations.

   - Where hand compactors are used, the backfill should be placed in layers not exceeding 6 inches (150 mm) in loose thickness. When larger compaction equipment is used, it should run parallel to the axis of the structure starting at the outside edge of the excavation and progressing toward the structure.

   - When the level of fill reaches the top of the structure, two lifts should be carefully spread and hand compacted over the structure without traversing the structure with heavy equipment. Compaction with heavy equipment should not begin until a minimum of two lifts have been placed, hand compacted, and tested. The compaction equipment should traverse the drainage structure perpendicular to the axis in accordance with the culvert manufacturer recommendations.

   - Riprap and a permeable filter fabric should be used at the ends of the structure to protect the exposed structure backfill above the existing ground.

D. Minor Structures

1. The test borings indicate that installation of minor cross structures is feasible. The underlying soil beneath the existing grade consists mainly of soft to stiff cohesive soils. Sand and/or sand and gravel layers may be encountered in isolated locations.

2. Groundwater and/or trapped water within sand and/or gravel pockets may be encountered in isolated locations during placement of these structures.

3. Installation of minor structures should be performed in accordance with ISS.

E. Roadway

1. Pavement Considerations

The existing subgrade soil conditions vary across the roadway profile. In sections where sandy loam soils are present, minimal earthwork is required to obtain an approved stable subgrade. However, along major portion of the roadway, the subgrade soils average 93 percent compaction.

The projected AADT is 9390 V.P.D in 2025. A major portion of the roadway will be constructed at grade or in cut. It is estimated that cut area, at grade and in cut to fill transition of the proposed subgrade is greater than 10, 000 Sq. Yds. The subgrade is mainly sandy loam of A-6 and A-4 soil categories.

It is assumed that AADT is less than 500 V.P.D on each of Prairie Road, 126th Street, Florida Street, Cyntheanne Avenue, 113th Street and Connecticut Avenue. Also, it is assumed that cut area, at grade and in cut to fill transition of the proposed subgrade is less than 10, 000 Sq. Yd.

Based upon the above considerations, the following recommendations are provided.

a. For SR 238, Type "A" subgrade treatment is recommended as per ISS Section 207.04.

b. For Prairie Road, 126th Street, Florida Street, Cyntheanne Avenue, 113th Street and Connecticut Avenue, Type "E" subgrade treatment is recommended as per ISS Section 207.04 provided that the assumptions stated above are valid.

c. The proposed pavement may be designed using a CBR value of 3.0.

d. Pavement subsurface drains with screened outlets should be installed. No filter fabric is needed in the area of the in-place soils. However, depending upon the type soil material that will be used as fill, a permeable filter fabric may be needed along the sides and bottom of the trench to limit the contamination of the permeable backfill around the underdrains.

e. Settlement of new embankments may vary across the roadway due to variations in soil composition, soil void ratio and height and type of proposed fill. It is estimated that a total settlement of 4 inches may take place under approximately 6.8 feet of new fill at RB-30, Station 7+300 (critical soils at this location). It is estimated that settlement of the soil beneath the new fill will take place immediately in the sand and gravel or shortly after fill placement in loamy soils.

We recommend that the settlement be monitored using four (4) settlement plates in the maximum fill areas at stations 1+620, 4+080, 7+300 and 7+880 left or right of centerline. Monitoring of settlement plates should be per ISS. It is estimated that a waiting period of 4 to 6 weeks may be needed prior to placing any concrete pavement.

2. Site Preparation & Earthwork

a. Clearing, grubbing and removal of surface objects, existing pavement, vegetation, trees, tree stumps, topsoil and roots located within the construction limits, should be performed according to ISS.

b. Excavation into the underlying soils to the proposed subgrade may be accomplished using conventional excavation equipment.

c. During earthwork operations, adequate drainage should be provided on the surface soils. Absorption of heavy rainfall, accumulations of water and heavy construction traffic may result in softening these soils, hence, severely weakening the strength of the subgrade soils.

c. Backfill materials required for embankment construction should be placed and compacted following ISS.

d. Where a new embankment fill is placed on or adjacent to existing natural slopes or existing embankments with slope rates of 4:1 (Horizontal to Vertical) or steeper, benches with a minimum width of 10 feet should be cut into the existing slopes prior to placement of the new fill. Where shallow embankment heights preclude the use of 10-foot wide benches, 4-foot minimum width benches should be used. All benching should be performed according to ISS.

e. Embankment side slopes constructed at a rate no steeper than 2:1 (Horizontal to Vertical) are considered safe against sliding and slope failure. These slopes should be seeded and growth of vegetation permitted to limit soil erosion and sloughing. Roadside ditches sloping at a rate of 3 percent or greater should be seeded and/or protected with riprap or other erosion protection.

Retaining walls may be needed at stations 1+580, 3+620, 3+920 and 7+490 due to proximity of existing structures. Recommended retaining wall type and soil parameters will be provided upon request.

f. Excavation more than 4.0 feet (1.2 m) in depth should be sloped and/or shored according to OSHA requirements.

V. CHANGED CONDITIONS

Should the layout plans for the proposed bridges, culverts and improvements be changed from those used in preparing this report, CTL Engineering should be notified to make the necessary modifications in our recommendations to account for the changed conditions.

VI. TESTING AND OBSERVATION

Experience shows that the subsurface soil conditions in an area sometimes vary from the ones indicated by the borings at their specific locations. It is therefore recommended that an Engineering Technician, under the supervision of a qualified Geotechnical Engineer, be retained on the site to monitor all earthwork and footing bearing surfaces.

VII. CLOSURE

CTL Engineering, Inc. has prepared this report for your use in accordance with generally accepted soil and foundation engineering practices. Analysis, conclusions and other work product of CTL are instruments of service for this project only.

Soil samples will be retained in our laboratory for 60 days, after which they will be discarded unless instructions are received from you as to their disposal.

CTL Engineering assignment does not include, nor does this geotechnical report address the environmental aspects of this site.

Sincerely,

CTL ENGINEERING, INC.

Ali Karaki, P.E.
Principal Engineer
Indiana Reg. No. 60900551

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REGISTERED
No.
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Paul L. Douglass, P.E.
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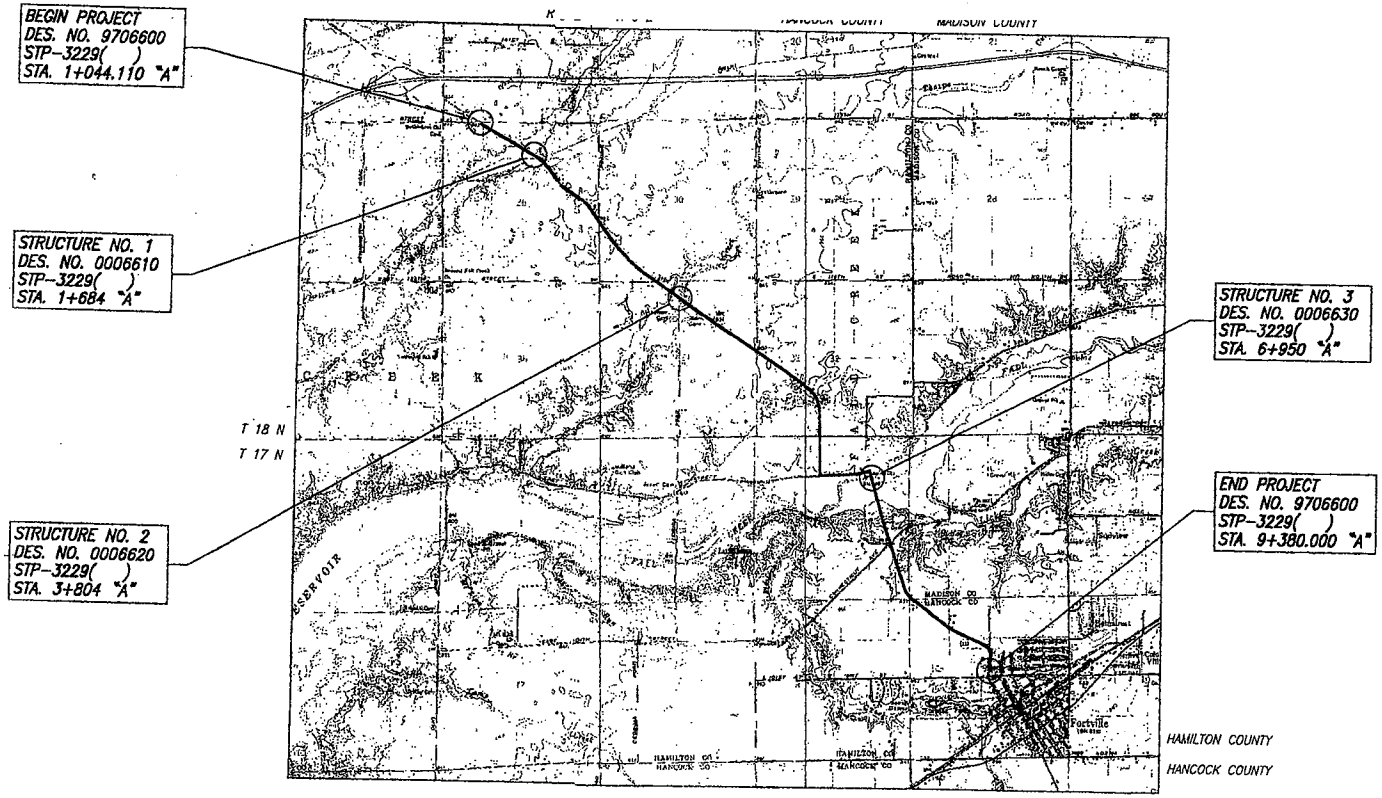
CTL ENGINEERING

APPENDIX A

GENERAL SITE PLAN
BORING LOCATION PLANS

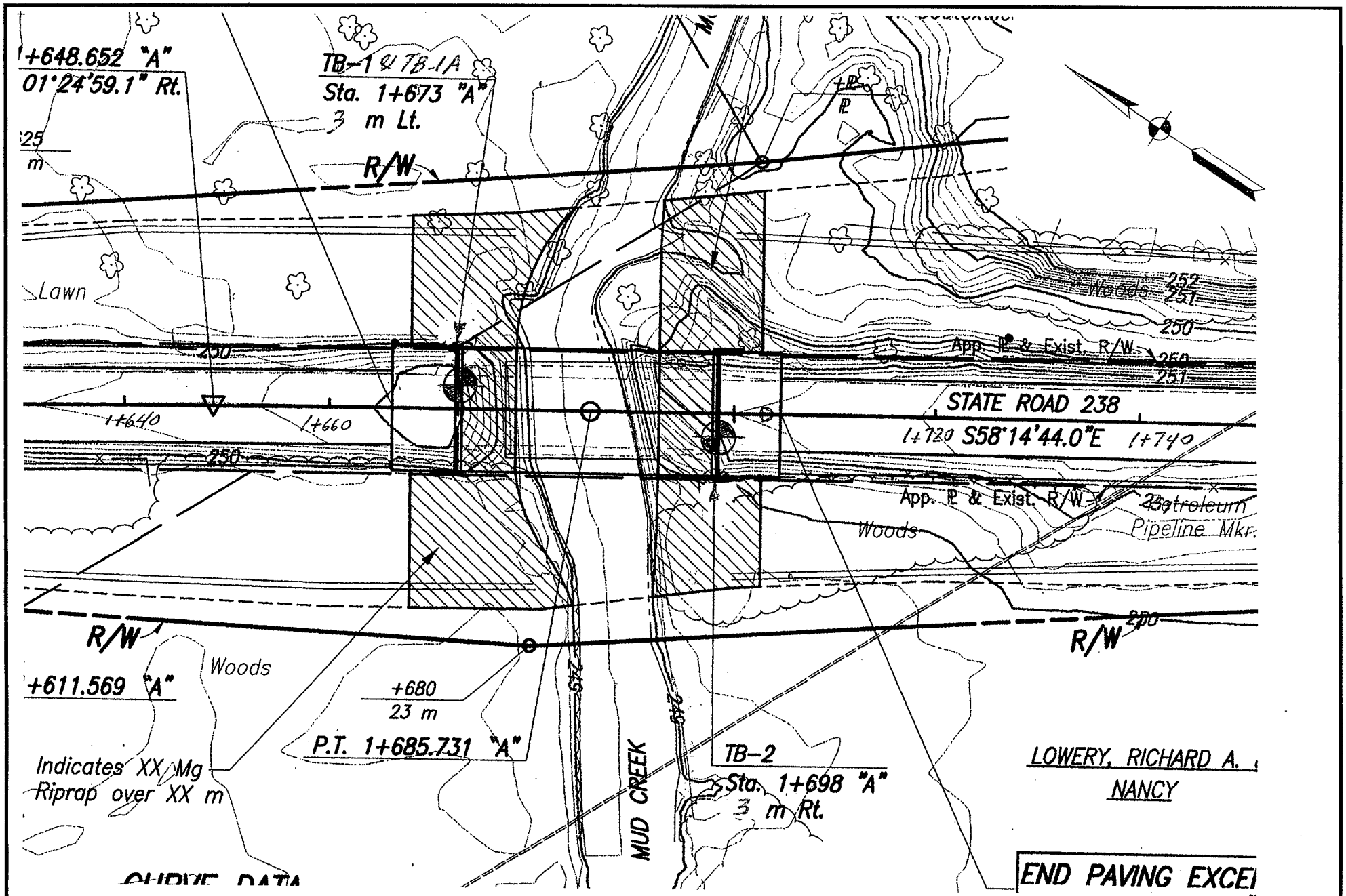


GENERAL SITE PLAN

SR 238 with New bridges on Mud Creek & Thorpe Creek

From 136th Street to Michigan Street in Hamilton/Hancock Counties

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

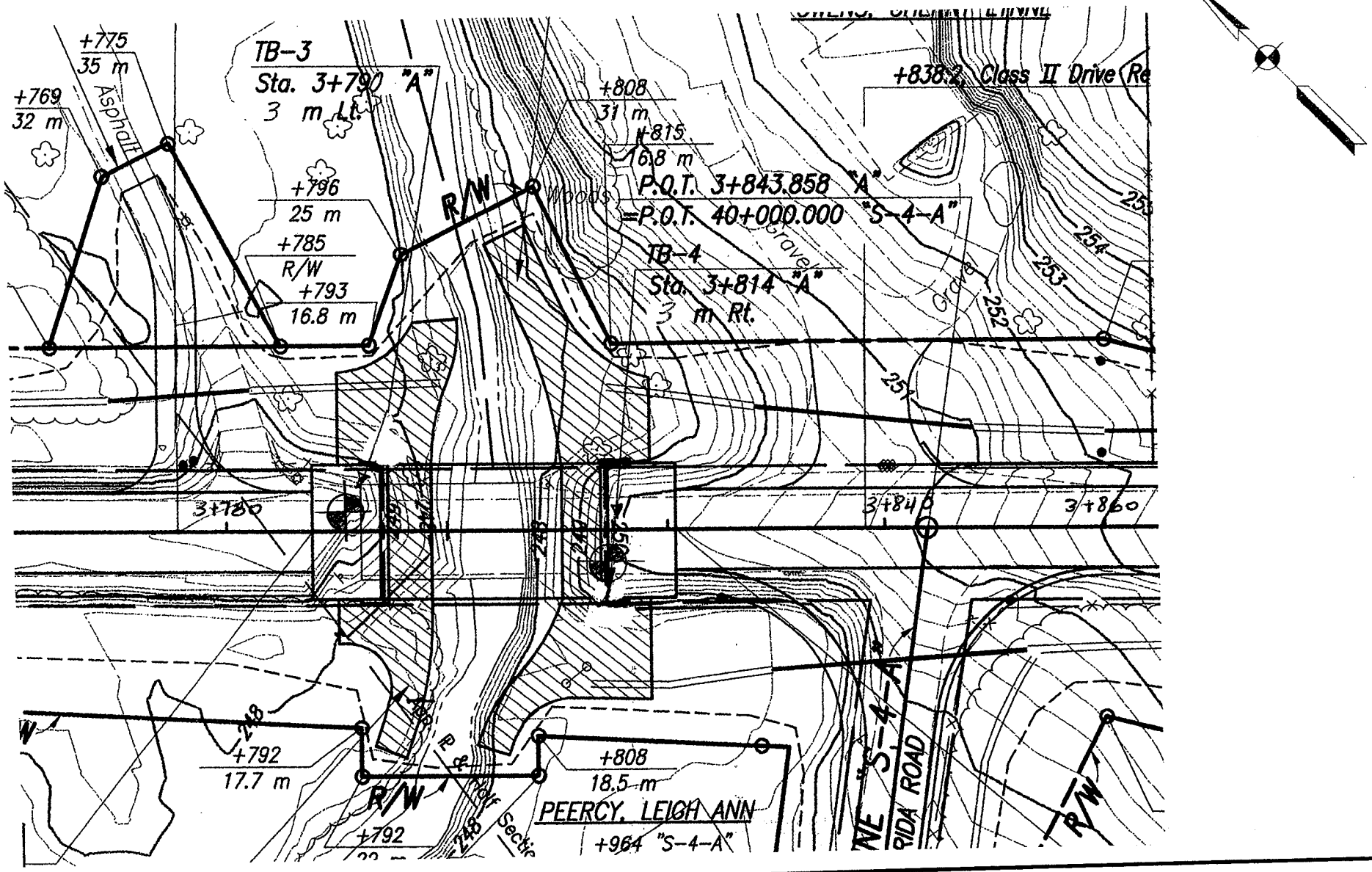


BRIDGE BORING LOCATION PLAN

SR 238 over Mud Creek in Hamilton County

Structure No.: 238-29-8423

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011



BRIDGE BORING LOCATION PLAN

SR 238 over Thorpe Creek in Hamilton County

Structure No.: 238-29-8422

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-25
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 04-18-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 04-18-02

BORING	ELEVATION : 248.69 USC&GS	BORING METHOD : HSA		HAMMER : Automatic	
	STATION : 6+060	RIG TYPE : ATV 550		DRILLER : KO	
	OFFSET : 3 m Rt	CASING DIA. : 83 mm		TEMPERATURE : 80° F	
	LINE : "A"	CORE SIZE : ---		WEATHER : Sunny	
	DEPTH : 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading Dry @ 24 hours Caved in at 1.19 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
248.46		**ASPHALT CONCRETE** (229mm) (Visual)	0.23										
248.39		**SAND & GRAVEL BASE** (127mm) (Visual)	0.30										
		Brown, Moist, Soft to Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-1	3 2 3	5	100	20					
	1.5			SS-2	3 3 3	6	33						
247.01			1.68										
		Brown, Slightly Moist to Moist, Loose **SAND** (Visual)		SS-3	2 3 4	7	100						
246.40			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-26
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 244.30 USC&GS
STATION : 6+340
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading Dry @ 24 hours ▣ Caved in at 1.10 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
244.00		**ASPHALT CONCRETE** (305mm) (Visual)	0.30										
243.95		**SAND & GRAVEL BASE** (51mm) (Visual)	0.35	SS-1A	5								
243.69		Brown & Gray, Moist, Stiff, **CLAY LOAM** A-6 As Lab 1	0.61	SS-1B	5	11	100						
				SS-1C	6								
					10								
	1.5	Brown, Slightly Moist, Medium Dense, **SAND AND GRAVEL** (Visual)		SS-2	5	12	89						
					7								
					4								
				SS-3	9	20	100						
242.01			2.29		11								
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	RB-27
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 04-19-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 04-19-02

BORING	ELEVATION : 242.32 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 6+680	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 3 m Lt	CASING DIA.	: 83 mm	TEMPERATURE	: 70° F
	LINE : "A"	CORE SIZE	: ---	WEATHER	: Sunny
	DEPTH : 3.05 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.45 m ▽ Delayed Reading 1.40m @ 6 days ▣ Caved in at 2.07 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
242.07		**ASPHALT CONCRETE** (254m) (Visual)	0.25										
242.02		**SAND & GRAVEL BASE** (51mm) (Visual)	0.30										
		Brown, Moist,Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1	5 4 5	9	67	10					
241.41			0.91										
	1.5	Brown, Moist to Wet, Medium Stiff to Very Soft, **SILTY LOAM** A-6 As Lab 5		SS-2	4 5 6	11	67	30					
		Two attempts in SS-3 - No recovery due to wet condition.		SS-3	1 1 2	3		0					
239.42			2.90	SS-4A	4 8	23	100	40					
239.27	3.0	Light Brown, Wet, Medium Dense, **SAND & GRAVEL** (Visual)	3.05	SS-4B	15								
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	RB-28
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 04-18-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 04-18-02

BORING	ELEVATION : 245.46 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 6+840	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 4 m Rt	CASING DIA.	: 83 mm	TEMPERATURE	: 70° F
	LINE : "A"	CORE SIZE	: ---	WEATHER	: Sunny
	DEPTH : 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours ▨ Caved in at 1.71 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
245.34		**ASPHALT CONCRETE** (121mm) (Visual)	0.12										
245.11		**SAND & GRAVEL BASE** (229mm) (Visual)	0.35	SS-1A	5	10	100						
		Light Brown & Gray, Moist, Loose, **SANDY LOAM** A-4 As Lab 4		SS-1B	5			13					
244.55			0.91		5								
		Light Brown, Moist, Loose, **SAND & GRAVEL** (Visual)		SS-2	4 5 5	10	67						
	1.5												
243.78			1.68										
		Light Brown, Moist, very Stiff, **SILTY LOAM** A-6 As Lab 5		SS-3A	6 13	27	100	13					
243.33			2.13										
243.17		Possible Limestone Bedrock (Visual)	2.29	SS-3B	14								
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-29
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 04-18-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 04-18-02

BORING ELEVATION : 244.80 USC&GS
STATION : 7+140
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours ▣ Caved in at 1.16 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
244.62		**ASPHALT CONCRETE** (178mm) (Visual)	0.18										
244.29		**SAND & GRAVEL BASE** (330mm) (Visual)	0.51	SS-1A	9 8	14	100						
				SS-1B	6			10					
					3								
	1.5	Brown, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	6 9	15	100						
					2								
242.51			2.29	SS-3	5 7	12	89	14					
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-30
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 246.68 USC&GS
STATION : 7+300
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 4.57 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 2.59 m ▼ At Completion 2.65 m ▽ Delayed Reading 2.44m @ 24 hours ▣ Caved in at 2.74 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
246.50		**ASPHALT CONCRETE** (254mm) (Visual)	0.18										
246.25		**SAND & GRAVEL BASE** (179mm) (Visual)	0.43	SS-1A	6	8	100						
		Brown, Moist, Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1B	5 3								
245.77			0.91										
	1.5	Brown, Moist, Soft to Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-2	1 1 4	5	100	23					
				SS-3	4 4 3	7	44						
244.09 ▼			2.59										
	3.0	Brown, Wet, Very Soft, **SANDY LOAM** A-4 As Lab 3		SS-4	1 1 2	3	100	22					
243.17			3.51	SS-5	6 49 50/3"		88						
		Light Brown, Very Moist, Highly Decomposed **SHALE** (Visual)											
	4.6			SS-6	85 100/3"		100						
241.96			4.72										
		Bottom of Boring at 4.72 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-31
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 257.80 USC&GS
STATION : 7+460
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading 0.91m @ 24 hours ▣ Caved in at 1.01 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
257.50		**ASPHALT CONCRETE** (305mm) (Visual)	0.30										
257.29		**SAND & GRAVEL BASE** (203mm) (Visual)	0.51	SS-1A	5	9	100						
					4								
				SS-1B	5			12					
					6								
				SS-2	7	16	33						
	1.5	Brownish Gray to Gray, Moist, Medium Stiff to Very Stiff, **LOAM** A-4 As Lab 7			9								
					5								
		Two attempts in SS-2		SS-3	7	17	100						
					10								
					4								
				SS-4	7	17	100	11					
254.75	3.0		3.05		10								
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-32
SHEET 1 OF 2
DATE STARTED : 05-09-02
DATE COMPLETED : 05-09-02

BORING ELEVATION : 261.60 USC&GS
STATION : 7+490
OFFSET : 7.6 m Lt
LINE : "A"
DEPTH : 9.14 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast/Rain

GROUNDWATER: ▼ Encountered at 1.68 m ▽ At Completion 1.74 m ▽ Delayed Reading 1.52m @ 24 hours ▣ Caved in at 2.83 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.45		**SAND & GRAVEL BASE** (152mm) (Visual)	0.15										
		Brown, Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-1	5 2 2	4	56	27					
260.84			0.76										
		Brown, Very Moist, Medium Stiff, **SANDY LOAM** A-4 As Lab 3		SS-2	3 3 4	7	100	14					
	1.5												
259.92 ▼			1.68										
		Brown, Wet, Medium Dense to Dense, **SAND AND GRAVEL** (Visual)		SS-3	7 4 7	11	89						
				SS-4	7 21 22	43	50						
	3.0												
257.94			3.66										
		Brown, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-5A	9 12	27	75						
257.18			4.42										
	4.6			SS-5B	15			14					
		Gray, Moist, Very Stiff to Hard, **LOAM** A-4 As Lab 7		SS-6	9 11 18	29	100	12	148.1	7.6 @ 21.3%			
	6.1												

Continued on next page

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation — BORING NO.: RB-32

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek — SHEET 2 OF 2

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
		Gray, Moist, Very Stiff to Hard, **LOAM**			12								
		A-4 As Lab 7		SS-7	18	38	89						
	7.6				20								
253.22			8.38										
		Brown, Moist, Medium Dense, **SANDY LOAM**											
		A-4 As Lab 4		SS-8A	5								
252.61			8.99		6	15	100	16					
252.46	9.1	Brown, Very Moist, Medium Dense, **SAND AND GRAVEL** (Visual)	9.14	SS-8B	9								
		Bottom of Boring at 9.14 meters											
		Boring backfilled with soil cuttings.											
	10.6												
	12.2												
	13.7												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-33
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-08-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-08-02

BORING					
ELEVATION	: 260.90 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 7+540	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 12.2 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 60° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast/Rain
DEPTH	: 4.57 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.30m @ 24 hours ▩ Caved in at 1.68 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
260.75		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown, Moist, Soft, **CLAY LOAM** with Traces of Roots A-6 As Lab 1		SS-1	0 1 3	4	100	27					
				SS-2	2 2 3	5	100	26	127.7	2.7 @ 13.9%			
259.38	1.5		1.52										
		Light Brown, Slightly Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-3	8 11 15	26	100	11					
	3.0			SS-1	6 10 15	25	100						
257.09			3.81										
		Gray, Slightly Moist, Very Stiff, **LOAM** A-4 As Lab 7		SS-2	9 10 11	21	100	13					
256.33	4.6		4.57										
		Bottom of Boring at 4.57 meters Boring backfilled with soil cuttings. Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-34
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 04-18-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 04-18-02

BORING				
ELEVATION	: 261.50 USC&GS	BORING METHOD	: HSA	HAMMER : Automatic
STATION	: 7+640	RIG TYPE	: ATV 550	DRILLER : KO
OFFSET	: 10 m Rt	CASING DIA.	: 83 mm	TEMPERATURE : 70° F
LINE	: "A"	CORE SIZE	: ---	WEATHER : Sunny
DEPTH	: 2.29 m			

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.22m @ 24 hours Caved in at 1.37 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.30		**ASPHALT CONCRETE** (203mm) (Visual)	0.20										
261.14		**SAND & GRAVEL BASE** (152mm) (Visual)	0.36										
		Brown & Gray, Moist, Medium Stiff, **CLAY LOAM** A-6 As Lab 1		SS-1	5 3 5	8	100	23					
260.59			0.91										
	1.5	Light Brown & Gray, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	4 5 7	12	100	18					
				SS-3	3 6 5	11	100						
259.21		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

INDIANA_METRIC_02-5011.GPJ_CTLMET.GDT_9/20/02

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-35
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-02-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-02-02

BORING ELEVATION	: 257.42 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 7+800	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 4 m Lt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Sunny
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.86m @ 6 days ▣ Caved in at 1.37 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
257.23		**ASPHALT CONCRETE** (191mm) (Visual)	0.19										
257.13		**SAND & GRAVEL BASE** (102mm) (Visual)	0.29										
		Brown & Gray, Moist, Medium Stiff, **CLAY LOAM** (Possible Fill) A-6 As Lab 1		SS-1	6 7 3	10	78	17					
256.51			0.91										
		Light Brown, Very Moist, Loose, **SAND** (Visual)		SS-2A	1 5	8	100						
256.05	1.5		1.37	SS-2B	3			14					
		Brownish Gray to Gray, Moist, Medium Stiff, **LOAM** A-4 As Lab 7		SS-3	2 4 6	10	100	13					
255.13			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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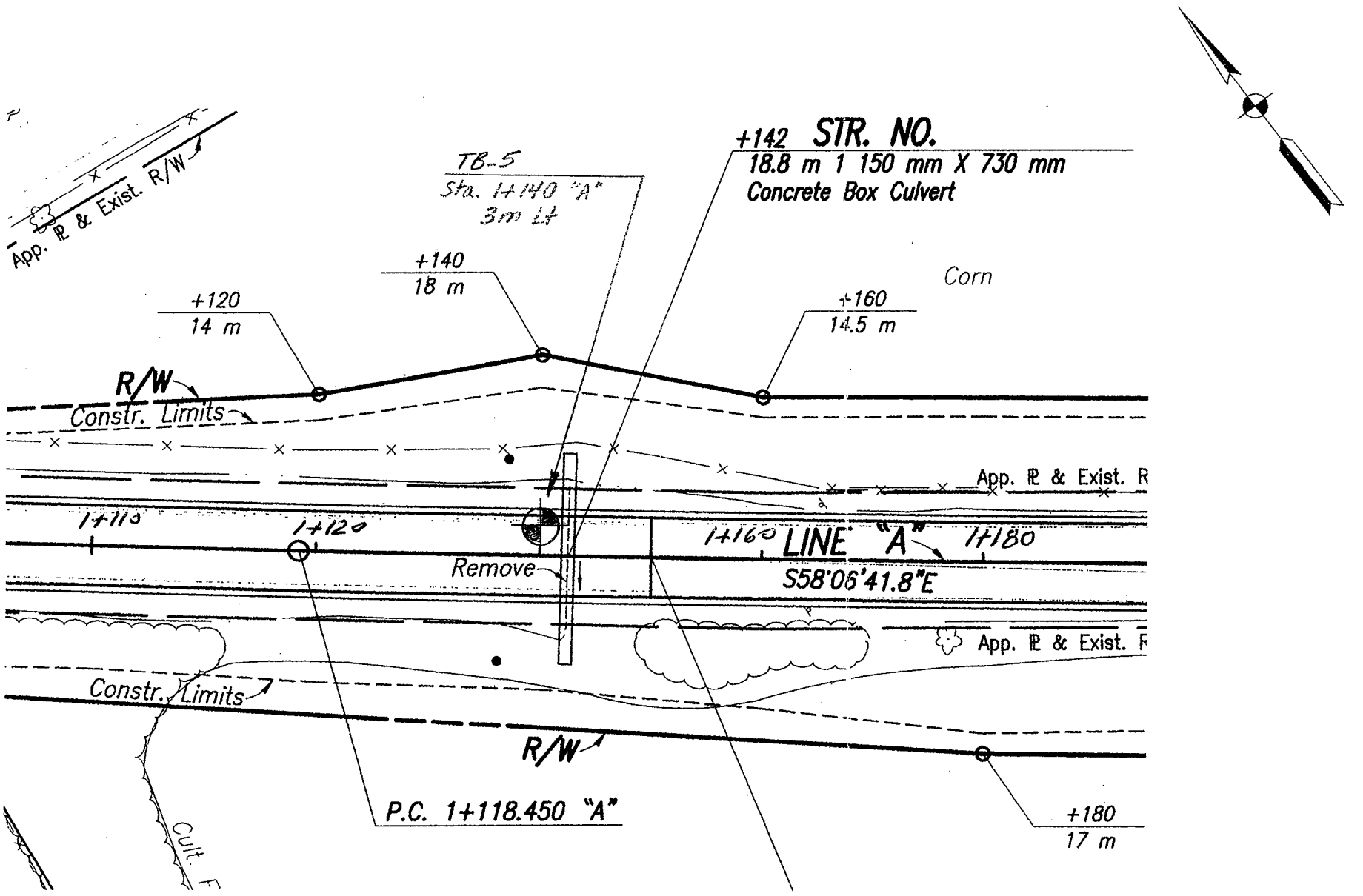
BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

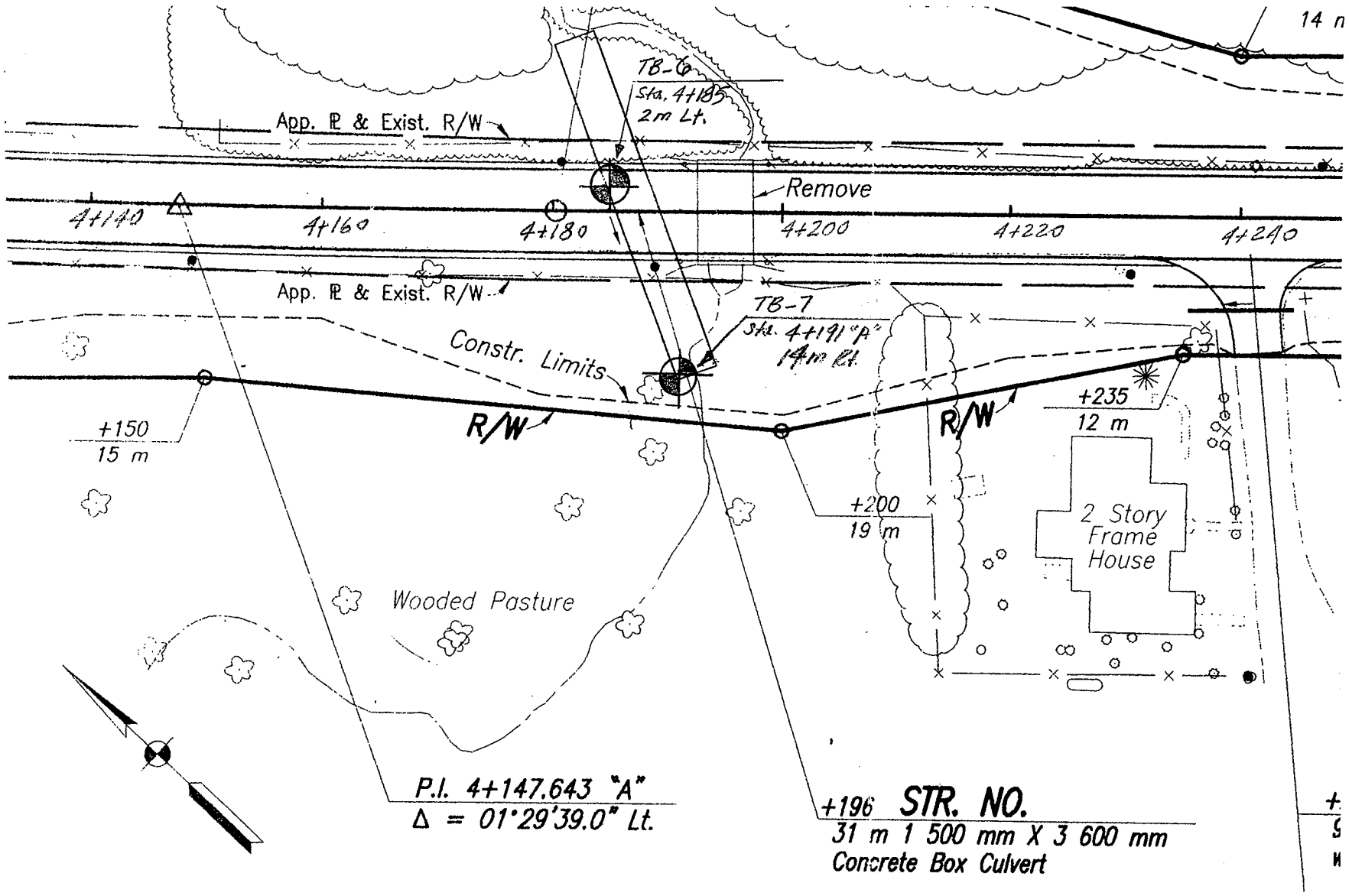


BORING LOCATION PLAN

1150 x 730 Concrete Box Culvert

Station 1+142

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

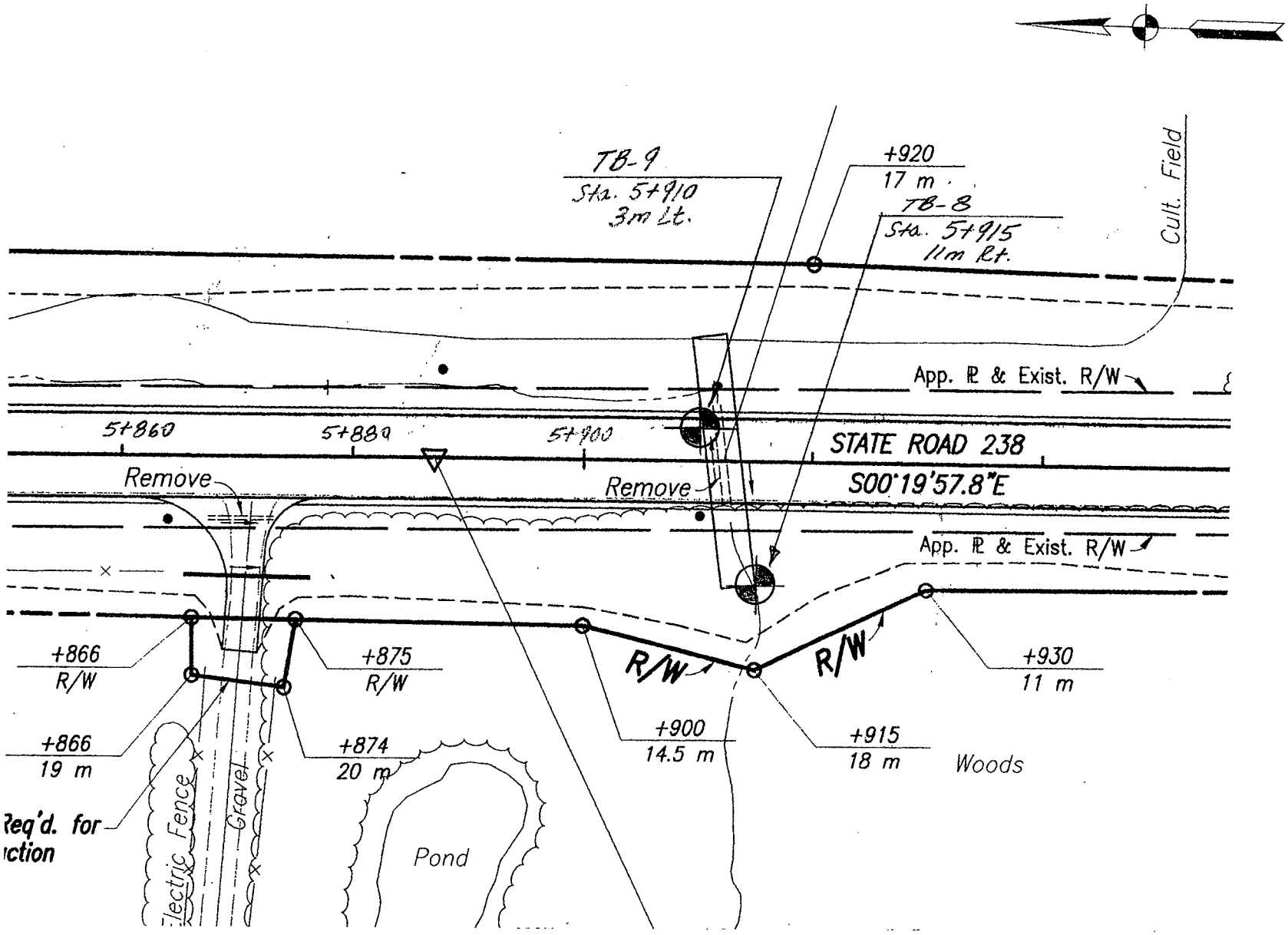


BORING LOCATION PLAN

3600 x 1500 Concrete Box Culvert

Station 4+196

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

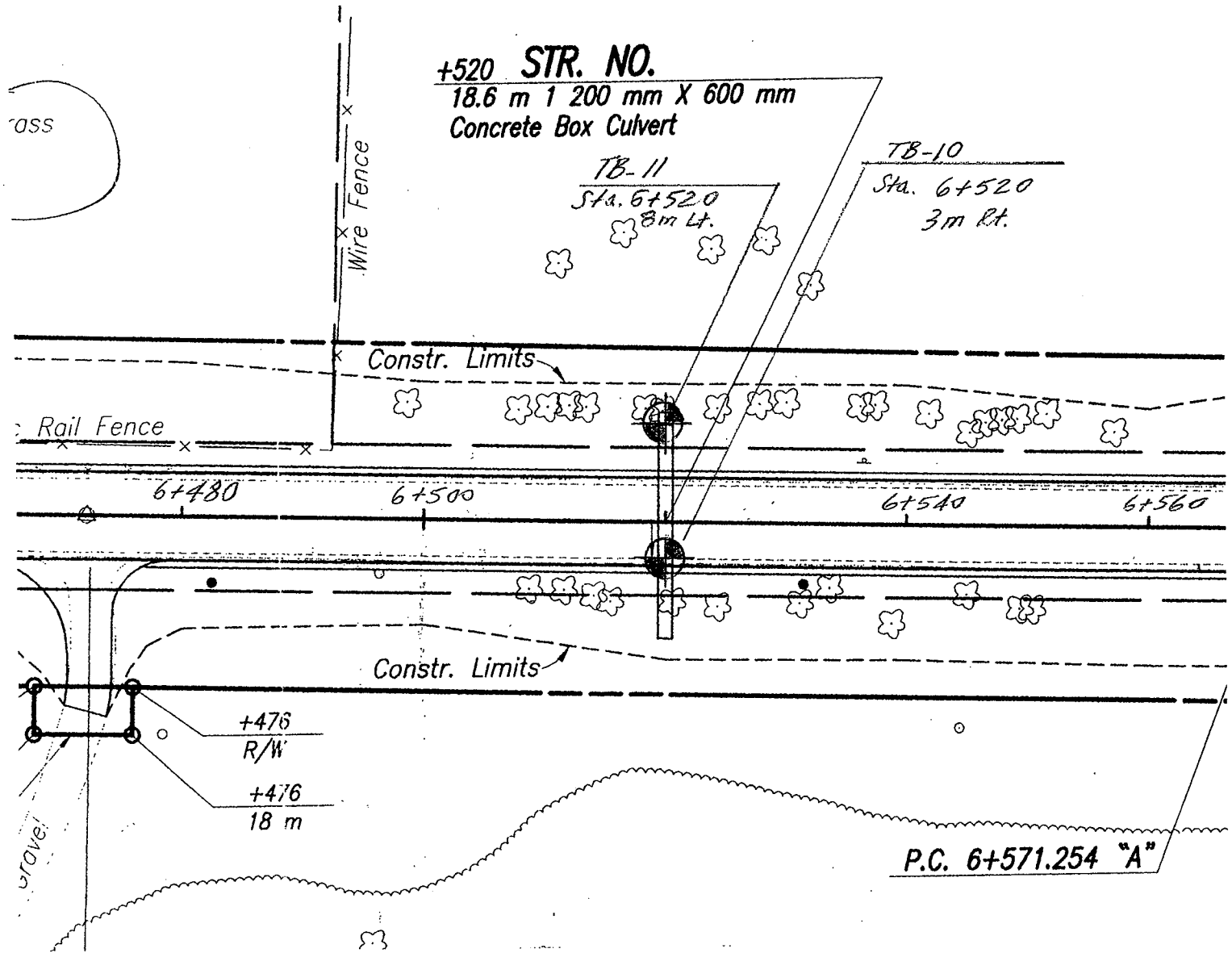


BORING LOCATION PLAN

3000 x 1200 Concrete Box Culvert

Station 5+192

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

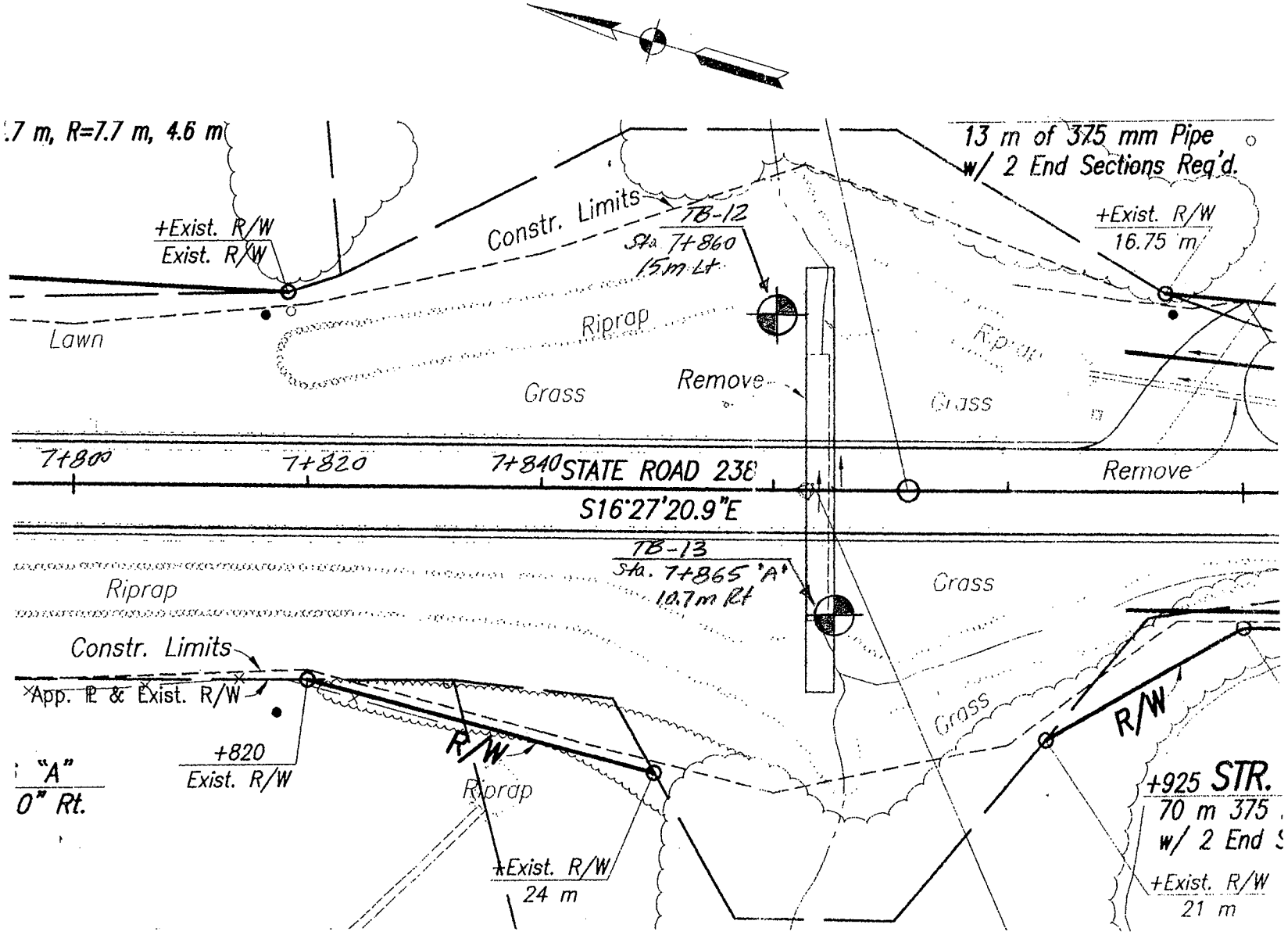


BORING LOCATION PLAN

1200 x 600 Concrete Box Culvert

Station 6+520

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011



BORING LOCATION PLAN

1200 x 1200 Concrete Box Culvert

Station 7+864

Project No.: STP-3229, Des. No.: 9706600, CTL No. 02-050011

APPENDIX B

TEST BORING RECORDS

SOIL DESCRIPTION

NON-COHESIVE SOIL DESCRIPTION	STANDARD PENETRATION BLOWCOUNTS PER FOOT (BPF)
Very Loose	0 - 5
Loose	6 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Over 50

COHESIVE SOIL DESCRIPTION	STANDARD PENETRATION BLOWCOUNTS PER FOOT (BPF)
Very Soft	0 - 3
Soft	4 - 5
Medium Stiff	6 - 10
Stiff	11 - 15
Very Stiff	16 - 30
Hard	Over 30

GRADATION COMPONENT	SIZE
Boulders	Retained on 3"
Gravel	Passing 3" Retained on #10
Coarse Sand	Passing #10 Retained on #40
Fine Sand	Passing on #40 Retained on #200
Silt	0.075 mm to 0.002 mm
Clay	Smaller Than 0.002 mm

MOISTURE TERMS	DESCRIPTION
Dry	Powdery
Slightly Moist	Below Plastic
Moist	Above Plastic, Below Liquid
Very Moist	At Liquid
Wet	Above Liquid

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-01
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-21-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-21-02

BORING					
ELEVATION	256.66 USC&GS	BORING METHOD	SFA	HAMMER	Automatic
STATION	1+080	RIG TYPE	ATV 550	DRILLER	KO
OFFSET	3 m Rt	CASING DIA.	108 mm	TEMPERATURE	50° F
LINE	"A"	CORE SIZE	---	WEATHER	Sunny
DEPTH	2.29 m				

GROUNDWATER: ▼ Encountered at 2.13 m ▼ At Completion 1.98 m ▽ Delayed Reading 1.40m @ 24 hours ⊠ Caved in at 1.62 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
256.38		**ASPHALT CONCRETE** (279mm) (Visual)	0.28										
256.23		**SAND & GRAVEL BASE** (152mm) (Visual)	0.43		6								
		Brownish Gray, Moist, Medium Stiff, **CLAY LOAM** A-6 As Lab 1		SS-1	5 4	9	100	21	122.5				
255.75			0.91										
		Light Brown & Gray, Moist, Medium Stiff, **SILTY CLAY** A-7-6 (23) Lab 2		SS-2	2 3 4	7	100	28			46	20	26
	1.5												
254.98			1.68										
		Light Brown, Very Moist to Wet, Medium Stiff, **SANDY LOAM** A-4(0) Lab 3		SS-3	1 2 4	6	100	23			22	17	5
254.37			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-02
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-02-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-02-02

BORING					
ELEVATION	: 256.48 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 1+300	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 40° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast/Rain
DEPTH	: 2.29 m				

GROUNDWATER: Encountered at Dry At Completion Dry Delayed Reading 0.03m @ 4 days Caved in at 0.82 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
256.16		**ASPHALT CONCRETE** (318mm) (Visual)	0.32										
256.14		**SAND & GRAVEL BASE** (25mm) (Visual)	0.34										
255.87		Brownish Gray, Moist, Medium Stiff, **CLAY LOAM** A-6(14) Lab 1	0.61	SS-1A	3	7	100	23	126.6		39	20	19
					3								
				SS-1B	4								
					3								
		Light Brown & Gray changing to Light Brown, Moist to Slightly Moist, Loose to Medium Dense, **SANDY LOAM** A-4 (0) Lab 4		SS-2	4	9	100	15	143.3		21	18	3
	1.5				5								
					5								
				SS-3	15	30	83						
254.19			2.29		15								
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	- Hollow Stem Auger	SS	- Split Spoon Sample	*	- Hand Penetrometer
SFA	- Solid Flight Auger	ST	- Shelby Tube Sample	LL	- Liquid Limit
RC	- Rock Coring	RC	- Rock Core Sample	PL	- Plastic Limit
MD	- Mud Drilling	BS	- Bag Sample	PI	- Plasticity Index
WD	- Wash Drilling	AC	- Auger Cuttings	SPT	- Standard Penetration Test
HA	- Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-03
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-02-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-02-02

BORING					
ELEVATION	: 251.08 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 1+580	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 40° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 3.05 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.52 m ▽ Delayed Reading Dry @ 4 days Caved in at 1.28 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
250.77		**ASPHALT CONCRETE** (311mm) (Visual)	0.31										
250.67		**SAND & GRAVEL BASE** (102mm) (Visual)	0.41		7								
		Brown, Moist, Medium Dense, **SANDY LOAM** A-2-4 (0) Lab 6		SS-1	5 6	11	100	11			14	10	4
250.01			1.07		4								
	1.5			SS-2	5 6	11	78						
		Brown, Very Moist to Wet, Loose to Medium Dense, **SAND & GRAVEL** (Visual)		SS-3	3 3 5	8	100						
				SS-4	5 10 8	18	100						
248.03	3.0		3.05										
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	**RB-04**
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 05-21-02
PROJECT NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 05-21-02

BORING	ELEVATION : 250.60 Feet	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 1+580	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 15 m Rt	CASING DIA.	: 3.25	TEMPERATURE	: 50° F
	LINE : "A"	CORE SIZE	: ---	WEATHER	: Overcast
	DEPTH : 15.0 Feet				

GROUNDWATER: Encountered at 3.0' At completion 3.5' Delayed Reading 1.07m @ 24 hours Caved in at 4.0'

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
250.3		TOPSOIL (102mm) (Visual)	0.3										
		Brown, Moist, Loose, **SANDY LOAM** with Traces of Roots A-2-4 As Lab 6		SS-1			67	17					
248.6			2.0										
				SS-2			67						
	5			SS-3			100						
		Brown, Wet, Dense to Medium Dense, **SAND & GRAVEL** (Visual)											
				SS-4			89						
	10												
				SS-5			67						
235.6	15		15.0										
		Bottom of Boring at 4.57 meters											
		Boring backfilled with soil cuttings.											
	20												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-05
SHEET 1 OF 1
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING
ELEVATION : 251.80 USC&GS
STATION : 1+800
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 2.59 m ▼ At Completion 2.38 m ▽ Delayed Reading 1.68m @ 24 hours ⊠ Caved in at 2.13 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
251.46		**ASPHALT CONCRETE** (343mm) (Visual)	0.34										
251.30		**SAND & GRAVEL BASE** (152mm) (Visual)	0.50		9								
		Brown, Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-1	4 5	9	100						
250.81			0.99										
		Brown, Moist, Medium Dense, **SAND & GRAVEL** (Visual)		SS-2A	14 11	16	100	18					
250.43			1.37	SS-2B	5								
	1.5	Brown, Moist, Very Soft, **SILTY LOAM** A-6 (7) Lab 5		SS-3	1 1 2	3	100	18			27	14	13
249.36			2.44										
		Light Brown, Wet, Stiff, **SANDY LOAM** A-4 As Lab 3		SS-4	5 5 6	11	61	16					
248.75	3.0		3.05										
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-06
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-24-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-24-02

BORING ELEVATION	: 251.40 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 1+800	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 15 m Lt	CASING DIA.	: 108 mm	TEMPERATURE	: 60° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
251.25		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown, Moist, Soft, **CLAY LOAM** with Traces of Roots A-6 As Lab 1		SS-1	2 2 2	4	100	18	126.7				
250.64			0.76										
		Light Brown & Gray, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	3 4 9	13	100	10	144.6				
249.88	1.5		1.52										
		Light Brown, Moist, Medium Dense, **SAND** (Visual)		SS-3	9 8 9	17	100						
249.11			2.29										
		Bottom of Boring at 2.29 meters Boring backfilled with soil cuttings.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-07
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-02-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-02-02

BORING ELEVATION	: 254.32 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 1+960	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Sunny
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.91m @ 4 days ▨ Caved in at 1.49 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
253.94		**ASPHALT CONCRETE** (381mm) (Visual)	0.38										
		Brown, Moist, Soft, **SILTY LOAM** A-6 As Lab 5		SS-1	2 2 2	4	100	18	127.1				
253.41			0.91										
	1.5	Light Brown, Moist to Very Moist, Medium Dense to Loose, **SANDY LOAM** A-4 As Lab 4		SS-2	7 7 9	16	100						
				SS-3	2 3 4	7	100	13					
252.03		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-08
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-02-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-02-02

BORING		BORING METHOD		HAMMER	
ELEVATION	: 258.80 USC&GS		: SFA		: Automatic
STATION	: 2+120	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Lt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Sunny
DEPTH	: 3.05 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.30m @ 4 days ⊠ Caved in at 1.16 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.48		**ASPHALT CONCRETE** (324mm) (Visual)	0.32										
				SS-1	4 3 5	8	100	21					
				SS-2	1 4 6	10	56						
	1.5	Light Brown, Moist to Slightly Moist, Loose to Dense, **SANDY LOAM** A-4 As Lab 4		SS-3	5 7 9	16	89	18					
				SS-4	15 16 15	31	100	9					
255.75	3.0		3.05										
		Bottom of Boring at 3.05 meters Boring backfilled with soil cuttings and pavement restored with concrete patch. Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-09
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-01-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-01-02

BORING		BORING METHOD		HAMMER	
ELEVATION	: 259.01 USC&GS		: SFA		: Automatic
STATION	: 2+260	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 3.05 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▽ At Completion 0.91 m ▽ Delayed Reading 0.53m @ 24 hours ▣ Caved in at 1.40 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.68		**ASPHALT CONCRETE** (330mm) (Visual)	0.33										
258.63		**SAND & GRAVEL BASE** (51mm) (Visual)	0.38		5								
					2								
				SS-1	2	4	60	24	122.5		31	17	14
		Brown to Grayish Brown, Moist, Soft to Medium Stiff, **LOAM**			3								
		A-6 (6) Lab 8		SS-2	3	6	100	28					
	1.5				3								
257.18			1.83										
					0								
				SS-3	0	1	100	19					
		Light Brown & Gray, Wet, Very Loose, **SANDY LOAM**			1								
		A-4 As Lab 4											
				SS-4A	2	16	100						
256.11			2.90		3								
255.96	3.0	Light Brown, Wet, Medium Dense, **SAND AND GRAVEL** (Visual)	3.05	SS-4B	13								
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	- Hollow Stem Auger	SS	- Split Spoon Sample	*	- Hand Penetrometer
SFA	- Solid Flight Auger	ST	- Shelby Tube Sample	LL	- Liquid Limit
RC	- Rock Coring	RC	- Rock Core Sample	PL	- Plastic Limit
MD	- Mud Drilling	BS	- Bag Sample	PI	- Plasticity Index
WD	- Wash Drilling	AC	- Auger Cuttings	SPT	- Standard Penetration Test
HA	- Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-10
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-01-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-01-02

BORING					
ELEVATION	259.10 USC&GS	BORING METHOD	SFA	HAMMER	Automatic
STATION	2+420	RIG TYPE	ATV 550	DRILLER	KO
OFFSET	3 m Rt	CASING DIA.	108 mm	TEMPERATURE	50° F
LINE	"A"	CORE SIZE	---	WEATHER	Overcast
DEPTH	3.05 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.74 m ▽ Delayed Reading 0.20m @ 24 hours ▣ Caved in at 1.31 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.78		**ASPHALT CONCRETE** (311mm) (Visual)	0.32										
258.49		Gray, Moist, Soft, **CLAY LOAM** A-6 As Lab 1	0.61	SS-1A	3 2	4	100	20	128.0				
		Light Brown, Moist, Soft, **SILTY CLAY** A-7-6 As Lab 2		SS-1B	2								
258.03			1.07										
	1.5			SS-2	2 3 3	6	100	22					
		Light Brown & Gray, Moist to Wet, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-3	0 3 3	6	100						
				SS-4	4 5 6	11	100	14					
256.05	3.0	**Bottom of Boring at 3.05 meters**	3.05										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: RB-11
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-01-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-01-02

BORING ELEVATION	: 258.43 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 3+040	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.74 m ▽ Delayed Reading 0.15m @ 24 hours ▨ Caved in at 1.22 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.19		**ASPHALT CONCRETE** (241mm) (Visual)	0.24										
258.04		**SAND & GRAVEL BASE** (152mm) (Visual)	0.39		5								
		Brown, Moist, Soft, **CLAY LOAM** A-6 As Lab 1		SS-1	2 2	4	100	26	137.0				
257.52			0.91		2								
	1.5	Light Brown, Moist, Loose, **SANDY LOAM** A-4 As Lab 4		SS-2	4 4	8	100	13	147.9				
				SS-3	5 5 5	10	56	13					
256.14		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-12
SHEET 1 OF 1
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING ELEVATION : 256.09 USC&GS
STATION : 3+360
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.83 m ▽ At Completion 1.77 m ▽ Delayed Reading 0.51m @ 24 hours ⊠ Caved in at 0.91 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
255.76		**ASPHALT CONCRETE** (330mm) (Visual)	0.33										
		Light Brown & Gray, Medium Stiff, **SILTY CLAY** with Traces of Roots A-7-6 As Lab 2		SS-1	2 3 3	6	100	27	119.5				
	1.5			SS-2	2 3 4	7	100						
254.41		Light Brown & Gray, Very Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4	1.68	SS-3	5 7 10	17	100	17					
253.80		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-13
SHEET 1 OF 1
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING ELEVATION	: 254.02 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 3+520	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Lt	CASING DIA.	: 108 mm	TEMPERATURE	: 50° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.22m @ 24 hours ▼ Caved in at 1.43 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
253.69		**ASPHALT CONCRETE** (330mm) (Visual)	0.33										
253.64		**SAND & GRAVEL BASE** (51mm) (Visual)	0.38		3								
		Grayish Brown, Moist, Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1	4	7	100	14					
253.11			0.91		3								
					3								
				SS-2	3	6	100						
	1.5	Light Brown, Moist, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4			3								
					5								
				SS-3	6	13	100	14					
251.73			2.29		7								
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

BORING NO.: RB-14

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-08-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-08-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 254.00 USC&GS
STATION : 3+620
OFFSET : 15 m Rt
LINE : "A"
DEPTH : 6.10 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.83 m ▽ At Completion 0.46 m ▽ Delayed Reading 0.03m @ 24 hours ⊠ Caved in at 3.05 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
253.77		**TOPSOIL** (229mm) (Visual)	0.23										
		Brownish Gray, Very Soft, **SILTY CLAY** with Traces of Roots A-7-6 As Lab 2		SS-1	0 0 3	3	100	21					
253.24			0.76										
	1.5			SS-2	3 3 3	6	100						
		Brown, Moist to Wet, Loose to Medium Dense, **SANDY LOAM** with Traces of Roots in SS-4 A-4 As Lab 4		SS-3	1 1 1	2	100						
	3.0			SS-4	6 6 11	17	67	26					
250.19			3.81										
	4.6			SS-5	3 5 8	13	100	11			18	13	5
		Gray, Moist, Stiff, **LOAM** A-4 (0) Lab 7 Sand Layers in SS-6		SS-6	7 7 8	15	67						
247.90	6.1		6.10										
		Bottom of Boring at 6.10 meters Boring backfilled with soil cuttings.											

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-15
SHEET 1 OF 1
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING ELEVATION : 254.23 USC&GS
STATION : 3+660
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 4.88 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 2.59 m ▼ At Completion 1.25 m ▽ Delayed Reading 0.91m @ 24 hours ▣ Caved in at 2.38 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
253.94		**ASPHALT CONCRETE** (292mm) (Visual)	0.29										
253.84		**SAND & GRAVEL BASE** (102mm) (Visual)	0.39		8								
		Brown, Moist, Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1	4 3	7	67						
253.32			0.91										
	1.5	Brown, Moist, Loose to Very Loose, **SANDY LOAM** A-4 As Lab 4		SS-2	2 4 5	9	100	12					
				SS-3	0 1 2	3	67						
251.64			2.59										
	3.0	Brown to Grayish Brown, Wet, Very Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-4	2 2 3	5	100						
		Sand Seams @ 2.59 m		SS-5	3 4 8	12	100	10					
249.96			4.27										
	4.6	Gray, Slightly Moist, Hard, **LOAM** with Traces of Gravel A-4 As Lab 7		SS-6	11 16 22	38	100	8					
249.35			4.88										
		Bottom of Boring at 4.88 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-16
SHEET 1 OF 2
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING ELEVATION : 255.69 USC&GS
STATION : 3+920
OFFSET : 5m Lt
LINE : "A"
DEPTH : 7.62 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 4.11 m ▽ Delayed Reading Dry @ 24 hours ▨ Caved in at 3.51 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
255.39		**ASPHALT CONCRETE** (298mm) (Visual)	0.30										
255.34		**SAND & GRAVEL BASE** (51mm) (Visual)	0.35	SS-1	4 2 4	6	78	20					
	1.5	Brown, Moist to Wet, Very Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	1 1 3	4	100						
				SS-3	5 6 8	14	100						
		Sand Seam in SS-3		SS-4	8 6 4	10	33						
	3.0	Two attempts in SS-4											
	4.6			SS-5	13 16 14	30	67	16					
250.66			5.03										
		Brown, Wet, Medium Dense, **SAND & GRAVEL** (Visual)		SS-6	10 13 17	30	100	11					
	6.1												

Continued on next page

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: RB-16

SHEET 2 OF 2

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
		Brown, Wet, Medium Dense, **SAND & GRAVEL** (Visual)	7.16		8								
248.53		Brown & Gray, Slightly Moist, Hard, **LOAM** A-4 As Lab 7	7.62	SS-7	11 20	31	100	15					
248.07	7.6	**Bottom of Boring at 7.62 meters**											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	9.1												
	10.6												
	12.2												
	13.7												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-17
SHEET 1 OF 1
DATE STARTED : 05-01-02
DATE COMPLETED : 05-01-02

BORING ELEVATION : 254.73 USC&GS
STATION : 4+040
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 4.57 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading 0.97m @ 24 hours ▣ Caved in at 2.01 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
254.48		**ASPHALT CONCRETE** (254mm) (Visual)	0.25										
254.38		**SAND & GRAVEL BASE** (102mm) (Visual)	0.35										
		Brown, Moist, Soft, **SILTY LOAM** A-6 As Lab 5		SS-1	7 2 2	4	100	20					
				SS-2	1 2 4	6	100						
253.21	1.5		1.52										
		Light Brown & Gray, Moist, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-3	2 2 3	5	100	19					
	3.0			SS-4	3 6 11	17	100						
250.92			3.81										
		Gray, Slightly Moist, Hard, **LOAM** A-4 As lab 7		SS-5	11 14 18	32	100	11					
250.16	4.6		4.57										
		Bottom of Boring at 4.57											
	6.1	Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-18
SHEET 1 OF 1
DATE STARTED : 04-19-02
DATE COMPLETED : 04-19-02

BORING ELEVATION : 257.24 USC&GS
STATION : 4+340
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.91m @ 6 days Caved in at 1.16 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
256.94		**ASPHALT CONCRETE** (305mm) (Visual)	0.30										
				SS-1	3 2 3	5	100	23	126.4				
		Light Brown, Moist, Very Loose to Loose, **SANDY LOAM** A-4 As Lab 4		SS-2	3 4 5	9	100						
	1.5												
255.26			1.98	SS-3A	3	16	300						
		Light Brown, Wet, Medium Dense, **SAND** (Visual)		SS-3B	6 10								
254.95			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

INDIANA METRIC 02-5011.GPJ CTLMET.GDT 9/20/02

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-19
SHEET 1 OF 1
DATE STARTED : 04-19-02
DATE COMPLETED : 04-19-02

BORING ELEVATION : 258.70 USC&GS
STATION : 4+660
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.14m @ 6 days Caved in at 1.16 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.43		**ASPHALT CONCRETE** (267mm) (Visual)	0.27										
258.40		**SAND & GRAVEL BASE** (38mm) (Visual)	0.30		5								
		Brown, Slightly Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-1	3	6	67	13	134.6				
					3								
257.79			0.91										
					3								
				SS-2	3	8	100	27	121.9				
	1.5	Light Brown, Moist, Medium Stiff, **SILTY CLAY** A-7-6 As Lab 2			5								
		Two attempts in SS-3			4								
				SS-3	4	10	33						
256.41			2.29		6								
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-20
SHEET 1 OF 1
DATE STARTED : 04-19-02
DATE COMPLETED : 04-19-02

BORING ELEVATION : 260.29 USC&GS
STATION : 4+980
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.30m @ 6 days Caved in at 0.85 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
260.00		**ASPHALT CONCRETE** (292mm) (Visual)	0.29										
259.95		**SAND & GRAVEL BASE** (51mm) (Visual)	0.34										
		Brown, Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-1	5 3 3	6	100	18	137.0				
259.38			0.91										
	1.5	Light Brown & Gray, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	7 8 10	18	67						
				SS-3	4 6 6	12	100						
258.00		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-21
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 259.00 USC&GS
STATION : 5+300
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours ▣ Caved in at 1.22 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.64		**ASPHALT CONCRETE** (356mm) (Visual)	0.36										
258.24		**SAND & GRAVEL BASE** (406mm) (Visual)	0.76	SS-1A	6 4	7	100						
				SS-1B	3			12					
	1.5	Brown, Moist, Medium Stiff to Soft to Very Stiff, **SILTY LOAM** A-6 As Lab 5		SS-2	2 2 2	4	100						
		Two attempts in SS-3		SS-3	3 6 10	16	44						
256.56			2.44										
		Light Brown, Moist, Medium Dense, **SANDY LOAM** A-4 As lab 4											
255.95	3.0	**Bottom of Boring at 3.05 meters**	3.05	SS-4	5 6 6	12	100	13					
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-22
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 257.05 USC&GS
STATION : 5+460
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours ▩ Caved in at 1.37 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
256.78		**ASPHALT CONCRETE** (267mm) (Visual)	0.27										
256.44		**SAND & GRAVEL BASE** (343mm) (Visual)	0.61	SS-1A	11 5	8	100						
				SS-1B	3			17					
	1.5	Brown, Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-2	2 3 4	7	78						
				SS-3	3 4 6	10	100	20					
254.76		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-23
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 251.90 USC&GS
STATION : 5+620
OFFSET : 4 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.35m @ 24 hours Caved in at 1.31 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
251.52		**ASPHALT CONCRETE** (381mm) (Visual)	0.38										
251.44		**SAND & GRAVEL BASE** (76mm) (Visual)	0.46										
		Brown & Gray, Moist, Soft, **CLAY LOAM** A-6 As Lab 1		SS-1	1 2 3	5	100	19					
250.68	1.5		1.22										
		Light Brown, Slightly Moist, Decomposed, Sandy **SHALE** (Visual)		SS-2	4 39 100	139	67						
				SS-3	100/5"		100						
249.61		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

BORING NO.: RB-24

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 04-18-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 04-18-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 248.41 USC&GS
STATION : 5+780
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : —

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.22 m ▽ At Completion 1.01 m ▽ Delayed Reading 0.84m @ 24 hours ▣ Caved in at 1.37 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
248.13		**ASPHALT CONCRETE** (279mm) (Visual)	0.28										
248.11		**SAND & GRAVEL BASE** (25mm) (Visual)	0.30		3								
		Brown, Moist, Soft, **SILTY LOAM** A-6 As Lab 5		SS-1	2 3	5	100	19					
247.19			1.22	SS-2A	2	3	100						
	1.5	Brown, Very Moist to Wet, Very Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-2B	1 2								
246.58			1.83		11								
		Light Brown, Wet, Highly Decomposed Sandy **SHALE** (Visual)		SS-3	21 30	51	100	19					
246.12			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

BORING NO.: RB-36

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-02-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-02-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 258.39 USC&GS
STATION : 7+960
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : —

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.05m @ 4 days ▣ Caved in at 1.01 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.06		**ASPHALT CONCRETE** (330mm) (Visual)	0.33										
		Light Brown, Moist, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-1	4 3 4	7	100	11					
				SS-2	5 6 10	16	100						
256.71	1.5		1.68										
		Gray, Moist, Very Stiff, **LOAM** A-4 As Lab 7		SS-3	7 8 10	18	100						
				SS-4	5 8 10	18	100	13					
255.34	3.0	**Bottom of Boring at 3.05 meters**	3.05										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

BORING NO.: RB-37

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-02-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-02-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 261.60 USC&GS
STATION : 8+120
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.79m @ 4 days Caved in at 1.13 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.35		**ASPHALT CONCRETE** (254mm) (Visual)	0.25										
261.22		**SAND & GRAVEL BASE** (127mm) (Visual)	0.38										
		Brown, Slightly Moist, Soft, **CLAY LOAM** A-6 As Lab 1		SS-1	6 2 3	5	100	16	135.3				
260.69			0.91										
	1.5	Light Brown & Gray, Slightly Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	3 9 12	21	100	11	149.9				
				SS-3	7 14 15	29	100						
259.31		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-38
SHEET 1 OF 1
DATE STARTED : 05-02-02
DATE COMPLETED : 05-02-02

BORING ELEVATION : 261.91 USC&GS
STATION : 8+280
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 3.66 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.10m @ 4 days ▨ Caved in at 2.22 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.62		**ASPHALT CONCRETE** (292mm) (Visual)	0.29										
261.57		**SAND & GRAVEL BASE** (51mm) (Visual)	0.34	SS-1	4 3 3	6	78	14					
		Light Brown to Light Brown & Gray, Slightly Moist, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	3 6 9	15	100						
260.23	1.5		1.68	SS-3	7 9 14	23	100						
		Brownish Gray, Slightly Moist, Very Stiff to Hard, **LOAM** A-4 As Lab 7		SS-4	11 15 28	43	100	9					
258.25	3.0		3.66	SS-5	6 10 14	24	100						
		Bottom of Boring at 3.66 meters Boring backfilled with soil cuttings and pavement restored with concrete patch. Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

BORING NO.: RB-39

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-10-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-10-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 263.24 USC&GS
STATION : 8+560
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading 0.30m @ 3 days ⊠ Caved in at 0.94 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
263.02		**ASPHALT CONCRETE** (330mm) (Visual)	0.22										
262.86		**SAND & GRAVEL BASE** (51mm) (Visual)	0.38	SS-1	4 2 2	4	89	22	134.4				
		Grayish Brown, Moist, Soft to Medium Stiff, **CLAY LOAM** A-6 As Lab 1		SS-2	2 2 4	6	100						
261.56	1.5	Light Brown, Slightly Moist, Very Stiff, **SANDY LOAM** A-4 As Lab 4	1.68	SS-3	9 11 12	23	100	11					
260.95		**Bottom of Boring at 2.29 meters**	2.29										
	3.0	Boring backfilled with soil cuttings and pavement restored with concrete patch. Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-40
SHEET 1 OF 1
DATE STARTED : 05-10-02
DATE COMPLETED : 05-10-02

BORING ELEVATION : 263.90 USC&GS
STATION : 8+720
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.00m @ 3 days Caved in at 0.85 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
263.70		**ASPHALT CONCRETE** (203mm) (Visual)	0.20										
263.57		**SAND & GRAVEL BASE** (127mm) (Visual)	0.33										
		Grayish Brown, Moist, Soft, **CLAY LOAM** A-6 As Lab 1		SS-1	3 1 3	4	100	23	122.6				
262.99			0.91										
	1.5	Light Brown & Gray, Slightly Moist, Stiff to Medium Stiff, **SANDY LOAM** A-4 As Lab 4		SS-2	4 5 7	12	100	17	136.3				
				SS-3	4 4 4	8	100						
261.61			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

BORING NO.: RB-41

CLIENT : Indiana Department of Transportation

SHEET 1 OF 1

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-10-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-10-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 263.18 USC&GS
STATION : 9+040
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.83 m ▽ At Completion 1.52 m ▽ Delayed Reading 0.37m @ 3 days ▣ Caved in at 1.31 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
262.94		**ASPHALT CONCRETE** (241mm) (Visual)	0.24										
262.72		**SAND & GRAVEL BASE** (216mm) (Visual)	0.46	SS-1A	5	4	100						
		Brownish Gray, Moist, Soft, **SILTY LOAM** A-6 As Lab 5	0.91	SS-1B	2 2			26	137.4				
262.27		Light Brown & Gray, Moist, Medium Stiff, **SILTY CLAY** A-7-6 As Lab 2	1.83	SS-2	2 3 4	7	100						
261.35	1.5			SS-3	0 0 2	2	100	26					
		Light Brown, Very Moist to Moist, Very Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4	3.05	SS-4	3 5 6	11	100	15					
260.13	3.0	**Bottom of Boring at 3.05 meters**											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

INDIANA METRIC 02-5011.GPJ CTLMET.GDT 9/20/02

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-42
SHEET 1 OF 1
DATE STARTED : 05-10-02
DATE COMPLETED : 05-10-02

BORING ELEVATION : 261.64 USC&GS
STATION : 9+320
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading Dry @ 3 days ▣ Caved in at 1.22 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.46		**ASPHALT CONCRETE** (179mm) (Visual)	0.18										
261.39		**CEMENT CONCRETE** (76mm) (Visual)	0.25										
261.13		**SAND & GRAVEL BASE** (254mm) (Visual)	0.51	SS-1A	6	8	100						
					4								
				SS-1B	4								
		Brown, Moist, Loose, **SANDY LOAM** A-2-4 As Lab 6											
260.73			0.91										
					3								
				SS-2	3	6	67	25	126.7				
	1.5				3								
		Brown & Gray, Moist, Medium Stiff to Soft, **CLAY LOAM** A-6 As Lab 1											
					1								
				SS-3	2	5	100	23					
					3								
259.35			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-43
SHEET 1 OF 1
DATE STARTED : 05-08-02
DATE COMPLETED : 05-08-02

BORING ELEVATION : 258.90 USC&GS
STATION : 20+100
OFFSET : 3 m Lt
LINE : "S-2-A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.83 m ▽ At Completion 1.22 m ▽ Delayed Reading 0.03m @ 24 hours ▩ Caved in at 0.30 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.86		**ASPHALT CONCRETE** (38mm) (Visual)	0.04										
		SAND & GRAVEL BASE (330mm) (Visual)	0.37										
258.53		Brown & Gray, Moist, Medium Stiff, **CLAY LOAM**		SS-1	5 3 3	6	100	18					
		A-6 As Lab 1											
257.99			0.91										
				SS-2	2 4 4	8	100						
	1.5	Light Brown & Gray, Moist to Wet, Loose, **SANDY LOAM**											
		A-4 As Lab 4		SS-3	0 3 7	10	100	26					
256.61			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-44
SHEET 1 OF 1
DATE STARTED : 05-09-02
DATE COMPLETED : 05-09-02

BORING ELEVATION : 256.00 USC&GS
STATION : 29+900
OFFSET : 3 m Rt
LINE : "S-3-A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast/Rain

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 2.07 m ▽ Delayed Reading 0.58m @ 24 hours ▣ Caved in at 1.13 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
255.70		**ASPHALT CONCRETE** (254mm) (Visual)	0.30										
255.62		**SAND & GRAVEL BASE** (76mm) (Visual)	0.38		6								
		Brown, Moist, Soft, **SILTY CLAY** A-7-6 As Lab 2		SS-1	2 3	5	100						
255.09			0.91										
		Brown, Moist, Medium Stiff, **SILTY LOAM** A-6 As Lab 5		SS-2	2 4 4	8	100	23					
	1.5		1.68										
254.32		Light Brown, Wet, Medium Stiff, **SANDY LOAM** A-4 As Lab 3		SS-3	1 2 4	6	100	16					
253.71			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-45
SHEET 1 OF 1
DATE STARTED : 04-30-02
DATE COMPLETED : 04-30-02

BORING
ELEVATION : 248.70 USC&GS
STATION : 39+940
OFFSET : C/L
LINE : "S-4-A"
DEPTH : 3.05 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 0.55 m ▽ Delayed Reading 0.37m @ 24 hours ▣ Caved in at 1.46 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
248.56		**ASPHALT CONCRETE** (140mm) (Visual)	0.14										
248.40		**SAND & GRAVEL BASE** (165mm) (Visual)	0.30										
		Grayish Brown to Brown, Moist, Loose, **SANDY LOAM** (Possible Fill) A-2-4 As Lab 6		SS-1	3 5 3	8	78						
247.79			0.91										
	1.5	Brown & Gray, Moist, Very Soft, **CLAY LOAM** (Possible Fill) A-6 As Lab 1		SS-2	1 1 2	3	100	23					
246.87			1.83										
		Gray & Brown, Wet to Very Moist, Stiff to Hard, **SANDY LOAM** with Sand and Gravel mixed with Sand Seam in SS-3 (Possible Fill) A-4 As Lab 7		SS-3	4 6 8	14	67	25					
				SS-4.	14 20 25	45	100						
245.65	3.0	**Bottom of Boring at 3.05 meters**	3.05										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: **RB-46**
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 04-30-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 04-30-02

BORING					
ELEVATION	: 259.07 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
STATION	: 50+060	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 3 m Lt	CASING DIA.	: 83 mm	TEMPERATURE	: 70° F
LINE	: "S-5-A"	CORE SIZE	: ---	WEATHER	: Sunny
DEPTH	: 2.29 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.71m @ 6 days Caved in at 1.07 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
258.94		**ASPHALT CONCRETE** (127mm) (Visual)	0.13										
258.77		**SAND & GRAVEL BASE** (179mm) (Visual)	0.30										
		Brownish Gray, Slightly Moist, Medium Stiff, **SILTY CLAY** A-7-6 As Lab 2		SS-1	7 5 3	8	100	14					
258.16			0.91										
	1.5	Light Brown, Moist, Loose, **SANDY LOAM** A-4 As Lab 4		SS-2	4 3 3	6	89						
				SS-3	3 4 4	8	100	13					
256.78		**Bottom of Boring at 2.29 meters**	2.29										
	3.0	Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-47
SHEET 1 OF 1
DATE STARTED : 05-09-02
DATE COMPLETED : 05-09-02

BORING ELEVATION : 242.43 USC&GS
STATION : 59+920
OFFSET : 3 m Rt
LINE : "S-6-A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.43 m ▽ Delayed Reading 1.07m @ 24 hours ▣ Caved in at 1.40 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
242.13		**ASPHALT CONCRETE** (298mm) (Visual)	0.30										
242.03		**SAND & GRAVEL BASE** (102mm) (Visual)	0.40										
		Brown, Moist, Medium Dense, **SANDY LOAM** A-2-4 As Lab 6		SS-1	29 21 7	28	100	9					
241.52			0.91										
	1.5	Brown, Moist to Wet, Medium Stiff, **SILTY LOAM** with Gravel at bottom of SS-3 A-6 As Lab 5		SS-2	4 4 5	9	67	29					
				SS-3	1 6 15	21	78						
240.14		**Bottom of Boring at 2.29 meters**	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	- Hollow Stem Auger	SS	- Split Spoon Sample	*	- Hand Penetrometer
SFA	- Solid Flight Auger	ST	- Shelby Tube Sample	LL	- Liquid Limit
RC	- Rock Coring	RC	- Rock Core Sample	PL	- Plastic Limit
MD	- Mud Drilling	BS	- Bag Sample	PI	- Plasticity Index
WD	- Wash Drilling	AC	- Auger Cuttings	SPT	- Standard Penetration Test
HA	- Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-48
SHEET 1 OF 1
DATE STARTED : 05-08-02
DATE COMPLETED : 05-08-02

BORING ELEVATION : 261.25 USC&GS
STATION : 69+900
OFFSET : 3 m Lt
LINE : "S-7-A"
DEPTH : 2.29 m

BORING METHOD : SFA
RIG TYPE : ATV 550
CASING DIA. : 108 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.91m @ 24 hours Caved in at 1.22 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.09		**ASPHALT CONCRETE** (165mm) (Visual)	0.16										
		SAND & GRAVEL BASE (229mm) (Visual)	0.39										
260.86				SS-1	6 3 4	7	100	21					
				SS-2	5 10 14	24	100						
	1.5	Light Brown, Moist, Medium Stiff to Very Stiff, **LOAM** A-4 As Lab 7		SS-3	7 11 13	24	100	12					
258.96			2.29										
		Bottom of Boring at 2.29 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0	Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: RB-49
SHEET 1 OF 1
DATE STARTED : 04-17-02
DATE COMPLETED : 04-17-02

BORING ELEVATION : 261.58 USC&GS
STATION : 70+160
OFFSET : 3 m Rt
LINE : "S-7-A"
DEPTH : 2.29 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 0.91m @ 48 hours ▣ Caved in at 1.34 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
261.50		ASPHALT CONCRETE (76mm) (Visual)	0.08										
261.30		SAND & GRAVEL BASE (203mm) (Visual)	0.28										
		Gray & Brown, Slightly Moist, Medium Stiff, CLAY LOAM A-6 As Lab 1		SS-1	9 5 3	8	100	14					
260.67			0.91										
	1.5	Light Brown, Moist, Medium Dense to Dense, LOAM A-4 As Lab 7		SS-2	3 4 7	11	100						
				SS-3	6 14 23	37	100	11					
259.29		Bottom of Boring at 2.29 meters	2.29										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	3.0												
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-01
SHEET 1 OF 2
DATE STARTED : 05-14-02
DATE COMPLETED : 05-14-02

BORING ELEVATION : 251.10 USC&GS
STATION : 1+673
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 7.01 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 1.83 m ▽ Delayed Reading 2.06m @ 7 days ⊠ Caved in at 2.74 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
250.72		**ASPHALT CONCRETE** (381mm) (Visual)	0.38										
250.57		**SAND & GRAVEL BASE** (152mm) (Visual)	0.53	SS-1	5 10 4	14	89	16					
	1.5	Brown, Moist to Very Moist, Stiff to Very Soft, **SANDY LOAM (FILL)** A-4 As Lab 7		SS-2	3 2 2	4	67						
				SS-3	2 1 2	3	100	21					
248.51			2.59										
	3.0	Brownish Gray, Wet, Medium Dense, **SAND AND GRAVEL** mixed with Tree Roots (Creek Sediments) (Visual)		SS-4	0 24 6	30	33						
247.29			3.81										
	4.6	Gray, Very Moist, Very Stiff, **SANDY LOAM** A-4 As Lab 4 Sand & Gravel Layer @ 5.79m to 5.94m		SS-5	12 15 14	29	67						
				SS-6	19 13 9	22	100	13					
245.00	6.1		6.10										

Continued on next page

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

BORING NO.: TB-01

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

SHEET 2 OF 2

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
244.09		Gray, Very Moist, Very Stiff, **SANDY LOAM** A-4 As Lab 4 Boulders @ 7.01m	7.01										
		Bottom of Boring at 7.01 meters Auger Refusal due to Boulders @ 7.01 meters. Boring moved to TB-01A. Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	7.6												
	9.1												
	10.6												
	12.2												
	13.7												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-01-A
SHEET 1 OF 3
DATE STARTED : 05-15-02
DATE COMPLETED : 05-15-02

BORING ELEVATION : 251.10 USC&GS
STATION : 1+671
OFFSET : 2.5 m Lt
LINE : "A"
DEPTH : 21.33 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : NX

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 0.61 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
	1.5												
	3.0	Augered - Refer to TB-01 for soil & groundwater information.											
	4.6												
	6.1												

Continued on next page

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: TB-01-A

SHEET 2 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
244.09		Augered - Refer to TB-01 for soil & groundwater information.	7.01										
	7.6	Gray, Wet, Hard, **LOAM** with Gravel and Cobbles A-4 As Lab 7		SS-1	22 26 19	45	67						
	9.1			SS-2	20 23 21	44	33						
241.35			9.75										
	10.6	Gray, Wet, Very Dense to Dense, **SAND AND GRAVEL** (Visual)		SS-3	49 40 20	60	67						
	12.2			SS-4	28 23 20	43	100						
238.30			12.80										
	13.7	Gray, Wet, Dense to Very Dense, **SAND AND GRAVEL** with Sandy Loam Layers (Visual)		SS-5	15 23 25	48	100						

Continued on next page

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: TB-01-A

SHEET 3 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
				SS-6	20 25 23	48	100						
	15.2												
				SS-7	12 35 40	75	100						
	16.7	Gray, Wet, Dense to Very Dense, **SAND AND GRAVEL** with Sandy Loam Layers (Visual)											
				SS-8	29 36 40	76	100						
	18.2												
231.44	19.8		19.66	SS-9	20 45 100/2"		86						
		Light Gray, Highly Fractured, Horizontally Bedded, **LIMESTONE** (Visual)		RC-1 RQD= 0%			75						
229.77	21.3		21.33										
		Bottom of Boring at 21.34 meters Boring backfilled with soil cuttings and pavement restored with concrete patch.											

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: TB-02
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 3
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-16-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-16-02

BORING
ELEVATION : 251.35 USC&GS
STATION : 1+698
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 20.27 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 5.64 m ▽ Delayed Reading 1.10m @ 24 hours ▣ Caved in at 3.44 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
251.08		**ASPHALT CONCRETE** (267mm) (Visual)	0.27										
250.93		**SAND & GRAVEL BASE** (152mm) (Visual)	0.42										
		Brown, Moist, Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1	5 4 3	7	67	15					
	1.5			SS-2	4 4 2	6	67						
249.67			1.68										
		Brown & Gray, Moist, Soft, **CLAY LOAM** A-6 As Lab 1		SS-3	2 2 3	5	67						
248.91			2.44										
	3.0			SS-4	5 5 5	10	100	11	152.8	9.7 @ 15.7%			
		Light Brown & Gray, Moist, Medium Stiff to Hard, **SANDY LOAM** A-4 As Lab 3											
		Three attempts in SS-5 & one attempt at 4.57m. No recovery due to cobbles or possible boulder.		SS-5	13 20 25	45	0						
	4.6												
245.86			5.49										
		Brown & Gray, Wet, Medium Dense to Very Dense, **SAND AND GRAVEL** with Till Layers (Visual)		SS-6	16 19 8	27	89	13					
	6.1												

Continued on next page

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: TB-02

SHEET 2 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
					6								
				SS-7	10	26	89						
	7.6				16								
		Brown & Gray, Wet, Medium Dense to Very Dense, **SAND AND GRAVEL** with Till Layers (Visual)											
					21								
				SS-8	35	74	89						
	9.1				39								
241.44			9.91										
					16					5.4			
				SS-9	23	51	100	15	141.5	@ 10.2%			
	10.6	Gray, Very Moist, Hard, **SILT** (Visual)			28								
240.07			11.28										
					21								
		Gray, Very Moist, Hard, **LOAM** with Sand Seams		SS-10	26	60	100						
	12.2	A-4 As Lab 7			34								
238.55			12.80										
					21								
		Gray, Wet, Dense to Very Dense, **SAND AND GRAVEL**		SS-11	20	45	100						
	13.7	(Visual)			25								

Continued on next page

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BORING METHOD
- HSA - Hollow Stem Auger
- SFA - Solid Flight Auger
- RC - Rock Coring
- MD - Mud Drilling
- WD - Wash Drilling
- HA - Hand Auger

SAMPLING METHOD
- SS - Split Spoon Sample
- ST - Shelby Tube Sample
- RC - Rock Core Sample
- BS - Bag Sample
- AC - Auger Cuttings

ABBREVIATIONS
- * - Hand Penetrometer
- LL - Liquid Limit
- PL - Plastic Limit
- PI - Plasticity Index
- SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: TB-02

SHEET 3 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	Atterberg Limits PL	Atterberg Limits PI
		Gray, Wet, Dense to Very Dense, **SAND AND GRAVEL** (Visual)		SS-12	10 23 30	53	89						
235.35	15.2		16.00										
		Gray, Very Moist, Hard, **LOAM (TILL)** A-4 As Lab 7		SS-13	22 36 43	79	100	9					
	16.7			SS-14	10 21 36	57	100						
232.45	18.2		18.90										
		Gray, Wet, Dense, **SAND & GRAVEL** (Visual)		SS-15	24 24 21	45	89						
231.08	19.8		20.27										
		Bottom of Boring at 20.27 meters Auger Refusal @ 20.27 meters. Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	21.3												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	TB-03
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 2
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 05-14-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 05-14-02

BORING	ELEVATION : 249.80 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 3+790	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 3 m Lt	CASING DIA.	: 83 mm	TEMPERATURE	: 60° F
	LINE : "A"	CORE SIZE	: NX	WEATHER	: Sunny
	DEPTH : 12.04 m				

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 2.99 m ▽ Delayed Reading 2.44m @ 24 hours ⊠ Caved in at 6.10 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
249.48		**ASPHALT CONCRETE** (318mm) (Visual)	0.32										
249.33		**SAND & GRAVEL BASE** (152mm) (Visual)	0.47	SS-1	5 3 4	7	67						
	1.5			SS-2	5 5 7	12	67						
		Brown, Moist to Wet, Soft to Stiff, **SANDY LOAM** A-4 As Lab 3		SS-3	3 2 2	4	100	16					
	3.0			SS-4	1 3 3	6	100						
245.99			3.81										
245.53		Brownish Gray, Wet, Loose, **SAND & GRAVEL** (Visual)	4.27	SS-5	10 13 18	31	67						
	4.6												
		Gray, Moist, Hard to Very Stiff, **LOAM** with Silt Seams A-4 As Lab 7		SS-6	16 10 16	26	100	20					
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

BORING NO.: TB-03

SHEET 2 OF 2

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
242.64		Gray, Moist, Hard to Very Stiff, **LOAM** with Silt Seams A-4 As Lab 7	7.16										
	7.6	Gray, Wet, Medium Dense, **SAND & GRAVEL** (Visual)		SS-7	2 10 8	18	100						
240.96			8.84	SS-8 SS-9	42 100/3" 100/2"		100 0						
	9.1	Light Brown with White Streaks, Highly Fractured, Weathered, Soft, **LIMESTONE** (Visual)		RC-1 RQD= 0%			37						
239.25	10.6		10.55										
		Light Gray, Highly Fractured, Horizontally Bedded, Hard, **LIMESTONE** (Visual)		RC-2 RQD= 7%			78						
237.73	12.2	**Bottom of Boring at 12.07 meters** Boring backfilled with soil cuttings and pavement restored with concrete patch.	12.07										
	13.7												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

BORING NO.: TB-04

CLIENT : Indiana Department of Transportation

SHEET 1 OF 2

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

DATE STARTED : 05-14-02

LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties

DATE COMPLETED : 05-14-02

DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING ELEVATION : 250.15 USC&GS
STATION : 3+814
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 8.23 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 60° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 2.59 m ▽ At Completion 2.77 m ▽ Delayed Reading 1.83m @ 24 hours ▨ Caved in at 3.57 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
249.79		**ASPHALT CONCRETE** (356mm) (Visual)	0.36										
249.64		**SAND & GRAVEL BASE** (152mm) (Visual)	0.51	SS-1	5 4 2	6	100						
	1.5	Brown, Moist, Loose to Very Loose, **SANDY LOAM** A-4 As Lab 6		SS-2	4 3 4	7	100						
				SS-3	2 1 3	4	100	24					
247.56			2.59										
	3.0	Brownish Gray, Wet, Loose, **SAND & GRAVEL** (Visual)		SS-4	1 3 3	6	89						
246.34			3.81										
	4.6	Gray, Very Moist, Very Stiff, **LOAM** A-4 As Lab 7		SS-5	7 8 11	19	100	13					
244.82			5.33										
	6.1	Gray, Wet, Medium Dense, **SAND & GRAVEL** (Visual)		SS-6	7 11 12	23	100						

Continued on next page

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : Indiana Department of Transportation

BORING NO.: TB-04

PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek

SHEET 2 OF 2

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
242.99		Gray, Wet, Medium Dense, **SAND & GRAVEL** (Visual)	7.16										
	7.6	Light Brown with White Streaks, Highly Decomposed **LIMESTONE** with Shale Zones (Visual)		SS-7	39 34 31	65	100						
241.92			8.23	SS-8	100/4"		100						
		Bottom of Boring at 8.23 meters Auger Refusal @ 8.23 meters. Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	9.1												
	10.6												
	12.2												
	13.7												

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BORING METHOD		SAMPLING METHOD		ABBREVIATIONS	
HSA	Hollow Stem Auger	SS	Split Spoon Sample	*	Hand Penetrometer
SFA	Solid Flight Auger	ST	Shelby Tube Sample	LL	Liquid Limit
RC	Rock Coring	RC	Rock Core Sample	PL	Plastic Limit
MD	Mud Drilling	BS	Bag Sample	PI	Plasticity Index
WD	Wash Drilling	AC	Auger Cuttings	SPT	Standard Penetration Test
HA	Hand Auger				

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	TB-05
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 05-02-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 05-02-02

BORING	ELEVATION : 256.87 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
	STATION : 1+140	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 3 m Lt	CASING DIA.	: 108 mm	TEMPERATURE	: 40° F
	LINE : "A"	CORE SIZE	: ---	WEATHER	: Overcast
	DEPTH : 4.57 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 2.44m @ 4 days ▣ Caved in at 3.05 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
256.56		**ASPHALT CONCRETE** (318mm) (Visual)	0.31										
256.45		**SAND & GRAVEL BASE** (102mm) (Visual)	0.42	SS-1A	4	5	100						
		Brown, Moist, Soft, **CLAY LOAM**		SS-1B	2			19					
		A-6 As Lab 1			3								
255.96			0.91										
	1.5			SS-2	1 3 4	7	100						
		Light Brown, Moist, Loose to Medium Dense, **SANDY LOAM**		SS-3	4 7 10	17	100	11	149.7	6.5 @ 11.2%			
		A-4 As Lab 4											
	3.0 ▼			SS-4	11 15 14	29	100						
253.67			3.20										
		Gray, Moist, Very Stiff, **LOAM**											
		A-4 As Lab 7		SS-5	11 10 14	24	56						
252.30	4.6		4.57										
		Bottom of Boring at 4.57 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
		Recorded groundwater at Delayed Reading may be due to rain accumulated in the test hole.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-06
SHEET 1 OF 1
DATE STARTED : 04-19-02
DATE COMPLETED : 04-19-02

BORING ELEVATION : 254.35 USC&GS
STATION : 4+185
OFFSET : 2 m Lt
LINE : "A"
DEPTH : 4.57 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.83 m ▼ At Completion 2.83 m ▽ Delayed Reading 1.78m @ 6 days ▣ Caved in at 2.29 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
254.03		**ASPHALT CONCRETE** (318mm) (Visual)	0.32										
		Brown, Slightly Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 6		SS-1	7 8 9	17	100	9					
253.44			0.91										
	1.5	Brown, Moist, Soft, **SILTY LOAM** A-6 As Lab 5		SS-2	3 3 2	5	100						
252.67			1.68										
		Light Brown, Very Moist, Very Loose, **SANDY LOAM** A-4 As Lab 4		SS-3	1 1 2	3	44	21					
251.91			2.44										
	3.0			SS-4	6 9 12	21	100	12	147.0	20.5 @ 9.2%			
		Gray, Slightly Moist to Moist, Very Stiff to Hard, **LOAM** A-4 As Lab 7		SS-5	11 12 14	26	100	11					
				SS-6	15 19 18	37	78						
249.78	4.6	**Bottom of Boring at 4.57 meters**	4.57										
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
BORING NO.: TB-07
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
SHEET 1 OF 1
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DATE STARTED : 05-08-02
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011
DATE COMPLETED : 05-08-02

BORING ELEVATION	: 253.00 USC&GS	BORING METHOD	: SFA	HAMMER	: Automatic
STATION	: 4+191	RIG TYPE	: ATV 550	DRILLER	: KO
OFFSET	: 14 m Rt	CASING DIA.	: 108 mm	TEMPERATURE	: 60° F
LINE	: "A"	CORE SIZE	: ---	WEATHER	: Overcast
DEPTH	: 4.57 m				

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading Dry @ 24 hours Caved in at 4.57 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
252.85		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown & Gray, Slightly Moist to Moist, Loose to Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-1	1 2 5	7	100						
				SS-2	9 11 15	26	100						
251.48	1.5		1.52										
				SS-3	7 10 13	23	100	14	143.0	14.5 @ 7.4%			
	3.0	Gray, Slightly Moist to Moist, Very Stiff, **LOAM** A-4 As Lab 7		SS-4	9 10 12	22	100						
				SS-5	6 11 14	25	100						
				SS-6	8 12 15	27	100	12					
248.43	4.6		4.57										
		Bottom of Boring at 4.57 meters											
		Boring backfilled with soil cuttings.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-08
SHEET 1 OF 1
DATE STARTED : 04-30-02
DATE COMPLETED : 04-30-02

BORING ELEVATION : 246.95 USC&GS
STATION : 5+915
OFFSET : 11 m Rt
LINE : "A"
DEPTH : 3.32 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 50° F
WEATHER : Overcast

GROUNDWATER: ▼ Encountered at 1.68 m ▽ At Completion 1.62 m ▽ Delayed Reading Dry @ 24 hours ▣ Caved in at 1.58 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
246.80		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown, Moist to Wet, Medium Stiff, **SANDY LOAM** A-4 As Lab 3		SS-1	2 2 2	4	100						
	1.5 ▼			SS-2	2 3 4	7	100	19	137.2	2.5 @ 13.1%			
				SS-3	1 3 5	8	100						
244.21			2.74	SS-4	4 100/4"		100						
	3.0	Light Brown, Very Moist, Highly Decomposed, Sandy **SHALE** (Visual)		SS-5	100/5"		100						
243.62			3.33										
		Bottom of Boring at 3.32 meters Auger Refusal @ 3.32 meters. Boring backfilled with soil cuttings.											
	4.6												
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-09
SHEET 1 OF 1
DATE STARTED : 04-18-02
DATE COMPLETED : 04-18-02

BORING ELEVATION : 247.43 USC&GS
STATION : 5+910
OFFSET : 3 m Lt
LINE : "A"
DEPTH : 4.27 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 80° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at 1.98 m ▽ At Completion 1.52 m ▽ Delayed Reading 0.91m @ 24 hours ▣ Caved in at 1.77 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
247.23		**ASPHALT CONCRETE** (203mm) (Visual)	0.20										
247.07		**SAND & GRAVEL BASE** (152mm) (Visual)	0.36										
		Brown, Moist, Very Loose to Loose, **SANDY LOAM** A-2-4 As Lab 6		SS-1	5 2 2	4	100						
	1.5 ▽			SS-2	3 4 4	8	67	8					
245.45 ▼			1.98	SS-3	4 11 50	61	94						
	3.0	Yellowish Brown, Very Moist to Wet, Highly Decomposed, Sandy **SHALE** to **SANDSTONE** (Visual)		SS-4	77 100/2"		100						
				SS-5	100/5"		100						
243.16			4.27	SS-6	100/6"		100						
		Bottom of Boring at 4.27 meters											
	4.6	Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : Indiana Department of Transportation
PROJECT : SR 238 with New Bridges on Mud Creek & Thorpe Creek
LOCATION : From 136th Street to Michigan Street, Hamilton/Hancock Counties
DES. NO. : 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011

BORING NO.: TB-10
SHEET 1 OF 1
DATE STARTED : 04-19-02
DATE COMPLETED : 04-19-02

BORING ELEVATION : 242.40 USC&GS
STATION : 6+520
OFFSET : 3 m Rt
LINE : "A"
DEPTH : 3.05 m

BORING METHOD : HSA
RIG TYPE : ATV 550
CASING DIA. : 83 mm
CORE SIZE : ---

HAMMER : Automatic
DRILLER : KO
TEMPERATURE : 70° F
WEATHER : Sunny

GROUNDWATER: ▼ Encountered at Dry ▼ At Completion Dry ▽ Delayed Reading 1.37m @ 6 days ▣ Caved in at 2.01 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
242.10		**ASPHALT CONCRETE** (254mm) (Visual)	0.30										
241.96		**SAND & GRAVEL BASE** (140mm) (Visual)	0.44	SS-1A	5	6	91						
		Brown, Moist, Loose, **SANDY LOAM** (Possible Fill) A-2-4 As Lab 6			3								
				SS-1B	3			17					
241.49			0.91										
		Gray, Moist, Loose, **SAND AND GRAVEL** (Possible Fill) (Visual)			3								
				SS-2	2	6	67						
	1.5				4								
240.72			1.68										
		Brown & Gray, Very Moist to Wet, Soft, **CLAY LOAM** A-6 As Lab 1			2								
				SS-3	2	4	100	28	125.0	0.8 @ 6.5%			
					2								
239.73			2.67	SS-4	30		100						
		Brown, Highly Decomposed **SHALE** (Visual)			100/1"								
239.35	3.0		3.05										
		Bottom of Boring at 3.05 meters											
		Boring backfilled with soil cuttings and pavement restored with concrete patch.											
	4.6												
	6.1												

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BORING METHOD
HSA - Hollow Stem Auger
SFA - Solid Flight Auger
RC - Rock Coring
MD - Mud Drilling
WD - Wash Drilling
HA - Hand Auger

SAMPLING METHOD
SS - Split Spoon Sample
ST - Shelby Tube Sample
RC - Rock Core Sample
BS - Bag Sample
AC - Auger Cuttings

ABBREVIATIONS
* - Hand Penetrometer
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index
SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	TB-11
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 05-08-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 05-08-02

BORING	ELEVATION : 242.00 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 6+520	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 8 m Lt	CASING DIA.	: 83 mm	TEMPERATURE	: 60° F
	LINE : "A"	CORE SIZE	: NX	WEATHER	: Overcast
	DEPTH : 4.42 m				

GROUNDWATER: ▼ Encountered at 0.91 m ▽ Delayed Reading 0.70m @ 24 hours ▣ Caved in at 0.76 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
241.85		**TOPSOIL** (152mm) (Visual)	0.15										
				SS-1	3 5 8	13	100						
				SS-2	9 14 15	29	100						
	1.5	Brown, Very Moist to Wet, Medium Dense, **SAND & GRAVEL** (Visual)		SS-3	7 8 7	15	89						
239.26			2.74	SS-4	22		100						
239.10		Highly Decomposed **SHALE** (Visual)	2.90	SS-5	100/2" 100/2"		0						
	3.0	Light Gray, Fractured, Horizontally Bedded, Hard, **LIMESTONE** (Visual)		RC-1 RQD= 35%			85						
237.58			4.42										
	4.6	**Bottom of Boring at 4.42 meters** Boring backfilled with soil cuttings.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	TB-12
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 04-17-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 04-17-02

BORING	ELEVATION : 252.80 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 7+860	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 15 m Lt	CASING DIA.	: 83 mm	TEMPERATURE	: 80° F
	LINE : "A"	CORE SIZE	: —	WEATHER	: Sunny
	DEPTH : 4.57 m				

GROUNDWATER: ▼ Encountered at Dry ▽ At Completion Dry ▽ Delayed Reading 0.66m @ 48 hours ▨ Caved in at 1.74 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
252.65		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown, Moist, Very Soft, **SILTY LOAM** with Traces of Roots A-6 As Lab 5		SS-1	1 1 1	2	50	22					
252.04			0.76										
	1.5	Light Brown & Gray, Moist, Medium Dense, **SANDY LOAM** A-4 As Lab 4		SS-2	1 3 3	6	100						
				SS-3	5 6 6	12	100	12	140.2	10.9 @ 12.1%			
250.51			2.29										
	3.0	Gray to Light Brown & Gray, Moist, Very Stiff, **LOAM** A-4 As Lab 7 Two attempts in SS-4		SS-4	10 15 15	30	33						
				SS-5	6 9 11	20	67						
				SS-6	4 8 14	22	100	14					
248.23	4.6	**Bottom of Boring at 4.57 meters** Boring backfilled with soil cuttings.	4.57										
	6.1												

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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT	: Indiana Department of Transportation	BORING NO.:	TB-13
PROJECT	: SR 238 with New Bridges on Mud Creek & Thorpe Creek	SHEET	1 OF 1
LOCATION	: From 136th Street to Michigan Street, Hamilton/Hancock Counties	DATE STARTED	: 04-17-02
DES. NO.	: 9706600, 0006610 & 0006620, Project No.: STP-3229 (005), CTL No.: 02-050011	DATE COMPLETED	: 04-17-02

BORING	ELEVATION : 254.80 USC&GS	BORING METHOD	: HSA	HAMMER	: Automatic
	STATION : 7+865	RIG TYPE	: ATV 550	DRILLER	: KO
	OFFSET : 10.7 m Rt	CASING DIA.	: 83 mm	TEMPERATURE	: 70° F
	LINE : "A"	CORE SIZE	: ---	WEATHER	: Sunny
	DEPTH : 4.57 m				

GROUNDWATER: ▼ Encountered at 2.44 m ▼ At Completion 3.35 m ▽ Delayed Reading 1.47m @ 48 hours ▣ Caved in at 2.71 m

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 15cm	SPT per 30cm (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
254.65		**TOPSOIL** (152mm) (Visual)	0.15										
		Brown, Moist, Medium Stiff to Soft, **SILTY LOAM** A-6 As Lab 5		SS-1	3 2 4	6	89	18					
				SS-2	2 2 1	3	100						
253.28	1.5		1.52										
		Gray to Light Brown, Moist, Medium Stiff to Very Soft, **SANDY LOAM** with Wood Fragments (Possible Creek Sediments) (Visual)		SS-3	1 2 5	7	100	20	136.8	1.8 @ 17.8%			
				SS-4	0 0 2	2	100	26					
251.75	3.0		3.05										
		Gray, Slightly Moist, Stiff, **LOAM** A-4 As Lab 7		SS-5	3 6 9	15	100						
				SS-6	2 5 7	12	100	16	141.0	9.9 @ 18.2%			
250.23	4.6	**Bottom of Boring at 4.57 meters**	4.57										
		Boring backfilled with soil cuttings.											
	6.1												

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BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
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SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	RC - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
WD - Wash Drilling	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

APPENDIX C

LABORATORY TEST RESULTS

Summary of Classification Test Results
Grain Size Distribution Curves
Unconfined Compression Test Results
Moisture-Density Relation Test Results
CBR Test Results
Summary of Special Laboratory Test Results

Lab No.	Boring No.	Station	Offset	Line	Sample No.	Depth	Soil Classification	AASHTO Group	Percent Passing (Sieve No.)			Grain Size Distribution (%)				WC	LL	PL	PI	Max. Dry Density (pcf)	Optimum Moisture Content (%)	CBR @ 95%	CBR @ 97%
									10	40	200	Gravel	Sand	Silt	Clay								
LAB 1	RB-02	1+300	3m Rt	"A"	SS-1	0.30-0.76	CLAY LOAM	A-6 (14)	99.2	96.6	78.7	0.8	20.5	49.7	29.0	23	39	20	19				
LAB 2	RB-01	1+080	3m Rt	"A"	SS-2	1.07-1.52	SILTY CLAY	A-7-6 (23)	99.6	97.7	86.2	0.4	13.4	50.1	36.1	28	46	20	26				
LAB 3	RB-01	1+080	3m Rt	"A"	SS-3	1.83-2.29	SANDY LOAM	A-4 (0)	85.9	72.2	46.2	14.1	39.7	37.7	8.5	23	22	17	5				
LAB 4	RB-02	1+300	3m Rt	"A"	SS-2	1.07-1.52	SANDY LOAM	A-4 (0)	78.8	67.6	46.4	21.2	32.4	39.2	7.2	15	21	18	3				
LAB 5	RB-05	1+800	3m Lt	"A"	SS-3	1.83-2.29	SILTY LOAM	A-6 (7)	99.0	95.1	72.7	1.0	26.3	57.3	15.4	18	27	14	13				
LAB 6	RB-03	1+580	3m Rt	"A"	SS-1	0.30-0.76	SANDY LOAM	A-2-4 (0)	81.2	52.9	24.6	18.8	56.5	17.2	7.5	11	14	10	4				
LAB 7	RB-14	3+620	15m Rt	"A"	SS-5	4.11-4.57	LOAM	A-4 (0)	90.7	81.6	59.8	9.3	30.9	40.9	18.9	11	18	13	5				
LAB 8	RB-09	2+260	3m Rt	"A"	BS-1	0.46-1.22	LOAM	A-6 (6)	93.0	83.1	63.2	7.0	29.8	43.7	19.5	24	31	17	14	115.6	14.2	4.4	5.6

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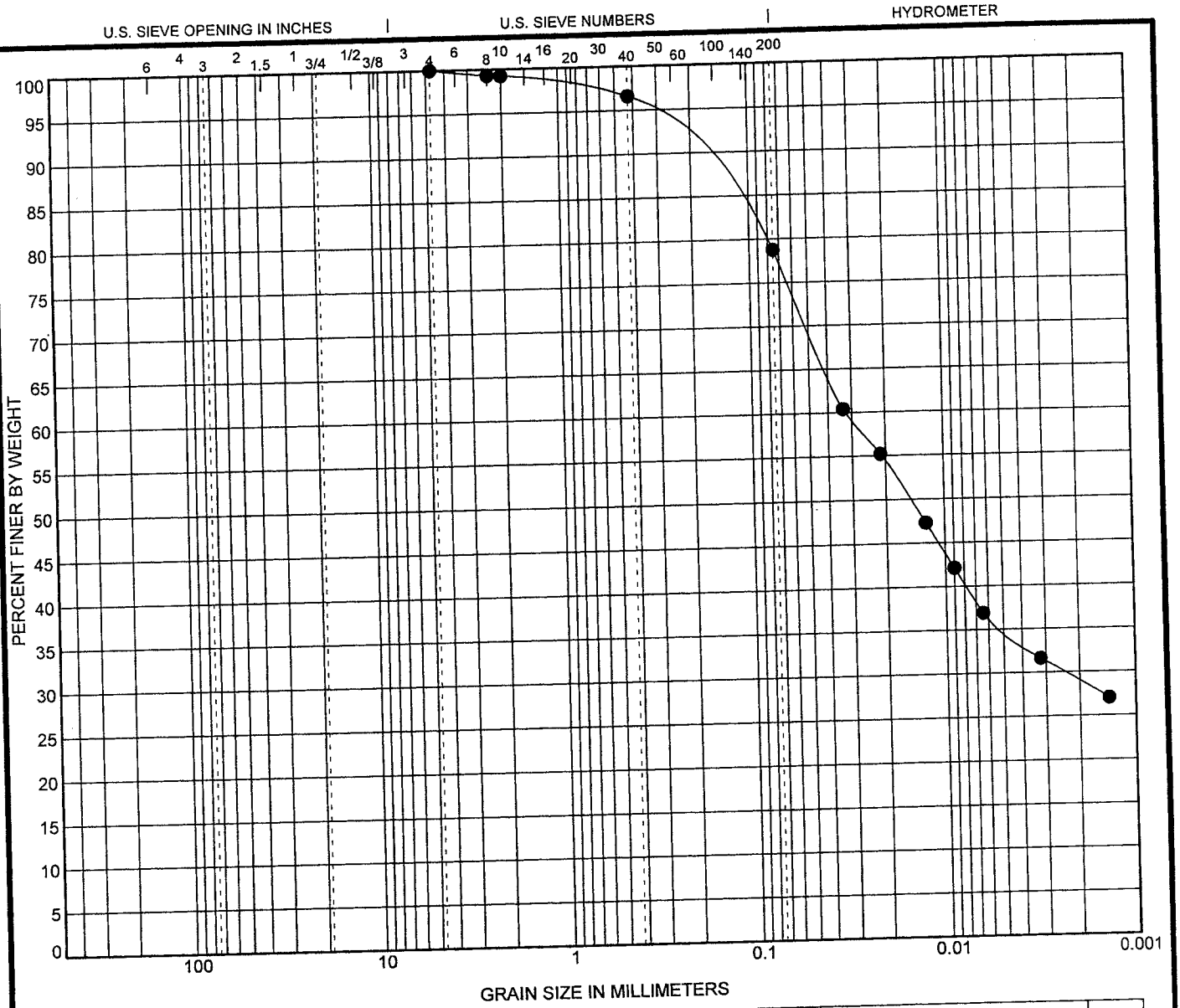
SUMMARY OF CLASSIFICATION TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

		Classification	MC	LL	PL	PI	Cc	Cu
Boring No.	RB-02	CLAY LOAM	23	39	20	19		
Sample	SS-1	A-6(14)						
Depth	0.30-0.76	LAB 1						
Station	1+300							
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	0.032	0.015	0.002		0.8	20.5	49.7	29.0

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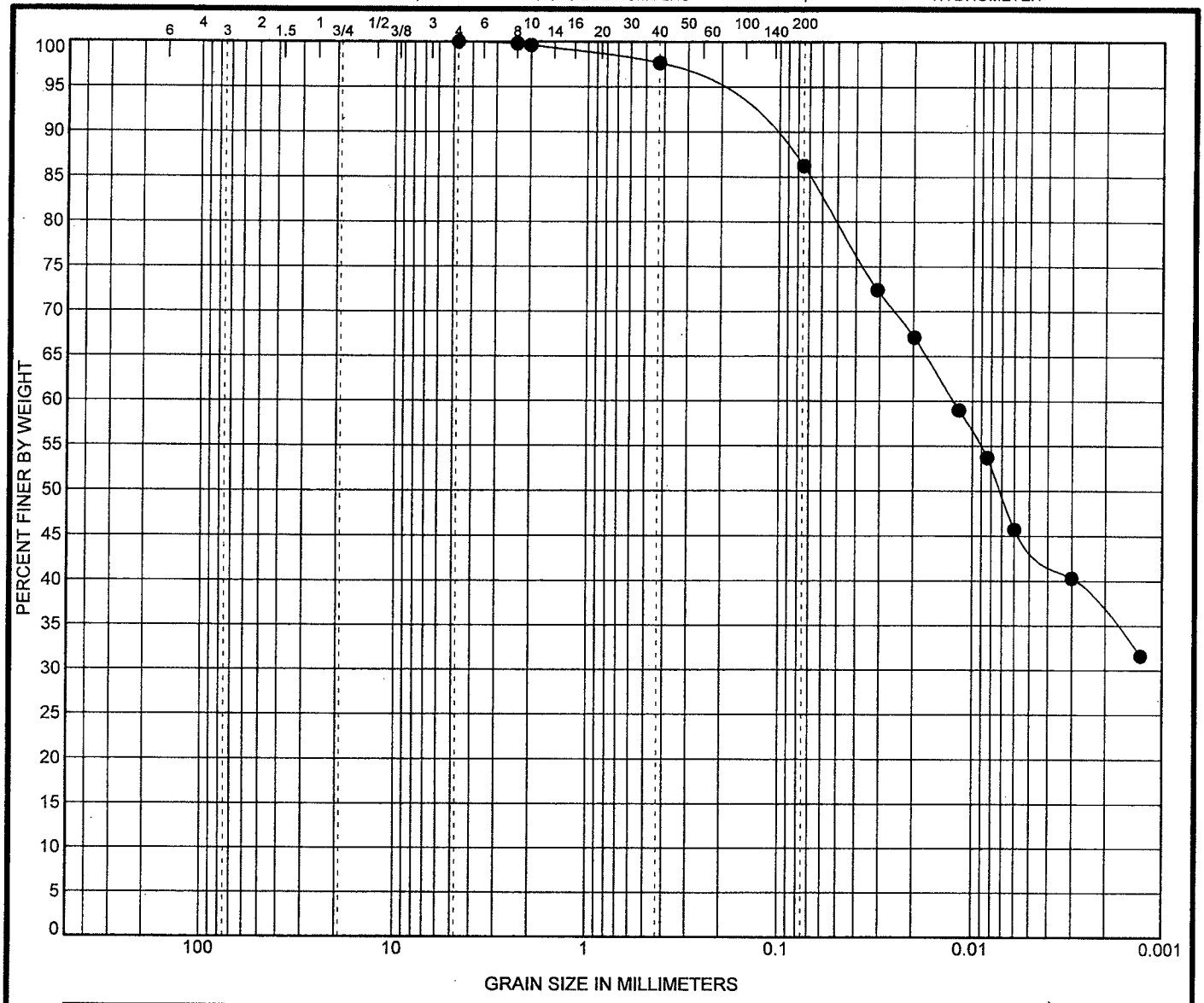
GRAIN SIZE DISTRIBUTION

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-01	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-2	SILTY LOAM	28	46	20	26		
Depth	1.07-1.52	A-7-6(23)						
Station	1+080	LAB 2						
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	0.012	0.007			0.4	13.4	50.1	36.1

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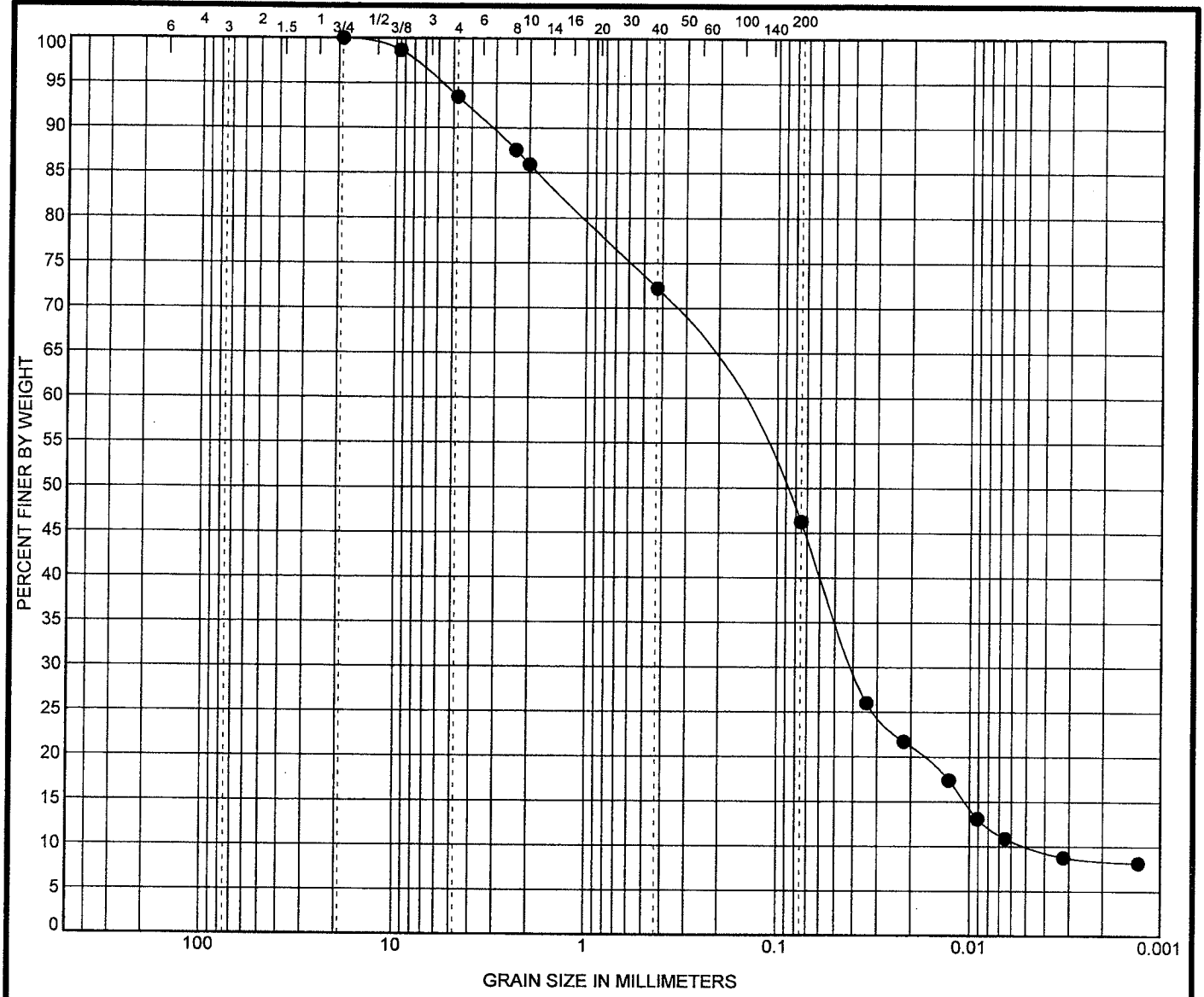
GRAIN SIZE DISTRIBUTION

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-01	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-3	SANDY LOAM	23	22	17	5	1.76	39.18
Depth	1.83-2.29	A-4(0)						
Station	1+080	LAB 3						
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.188	0.096	0.04	0.005	14.1	39.7	37.7	8.5

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GRAIN SIZE DISTRIBUTION

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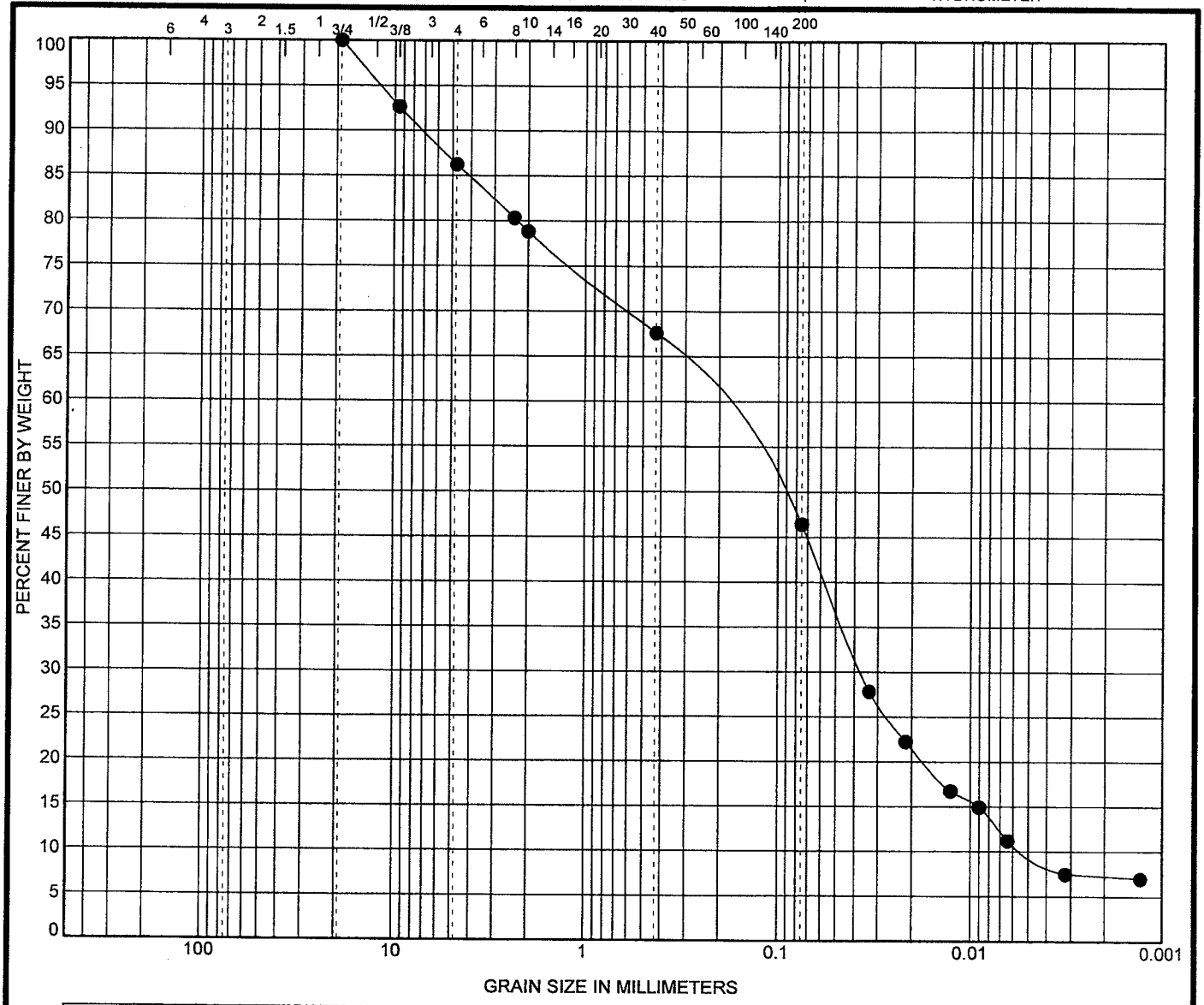
Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-02	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-2	SANDY LOAM	15	21	18	3	1.16	44.64
Depth	1.07-1.52	A-4(0)						
Station	1+300	LAB 4						
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.228	0.101	0.037	0.005	21.2	32.4	39.2	7.2

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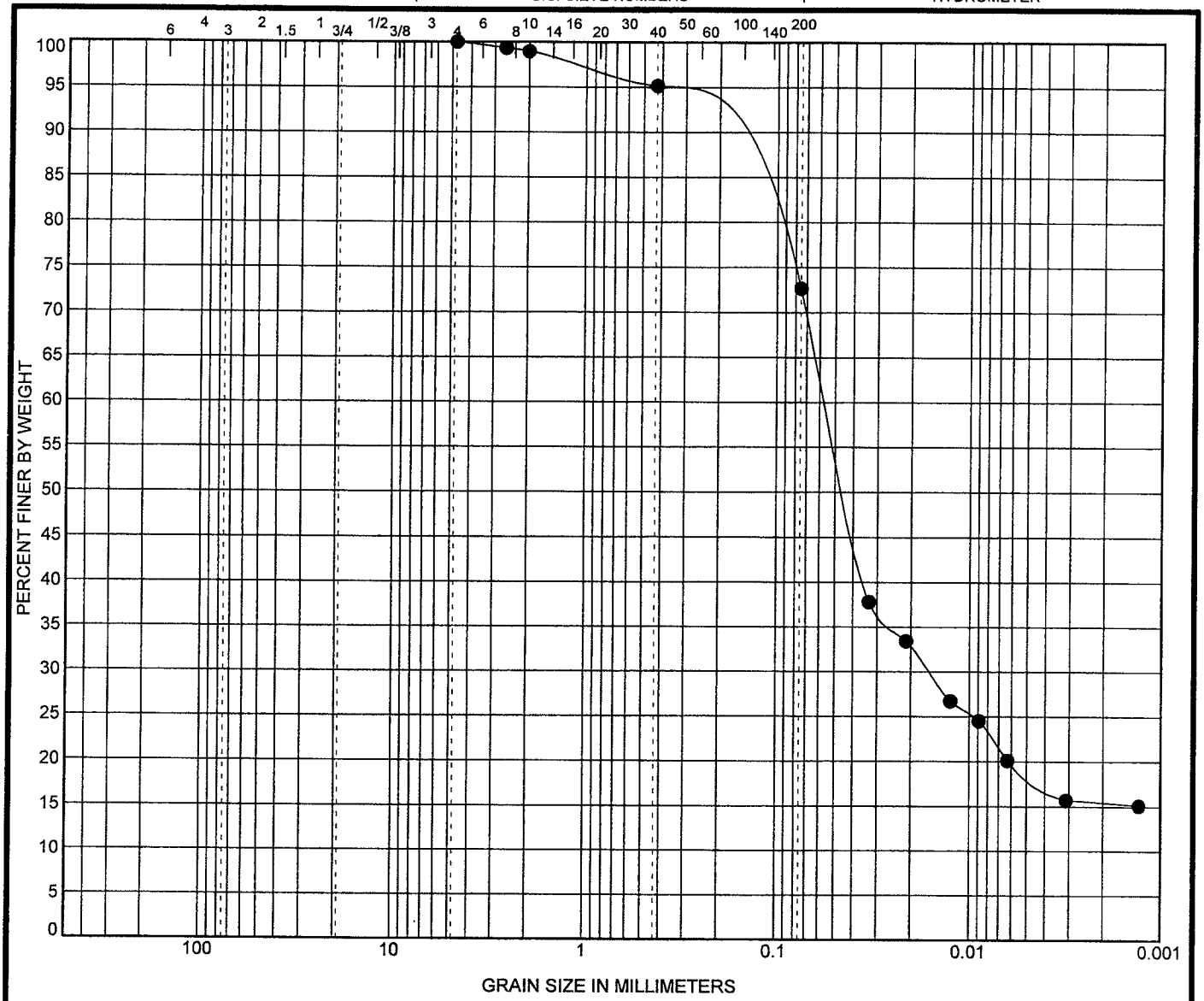
GRAIN SIZE DISTRIBUTION

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-05	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-3	SILTY LOAM	18	27	14	13		
Depth	1.83-2.29	A-6(7)						
Station	1+800	LAB 5						
Offset	3m Lt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	0.056	0.044	0.016		1.0	26.3	57.3	15.4

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GRAIN SIZE DISTRIBUTION

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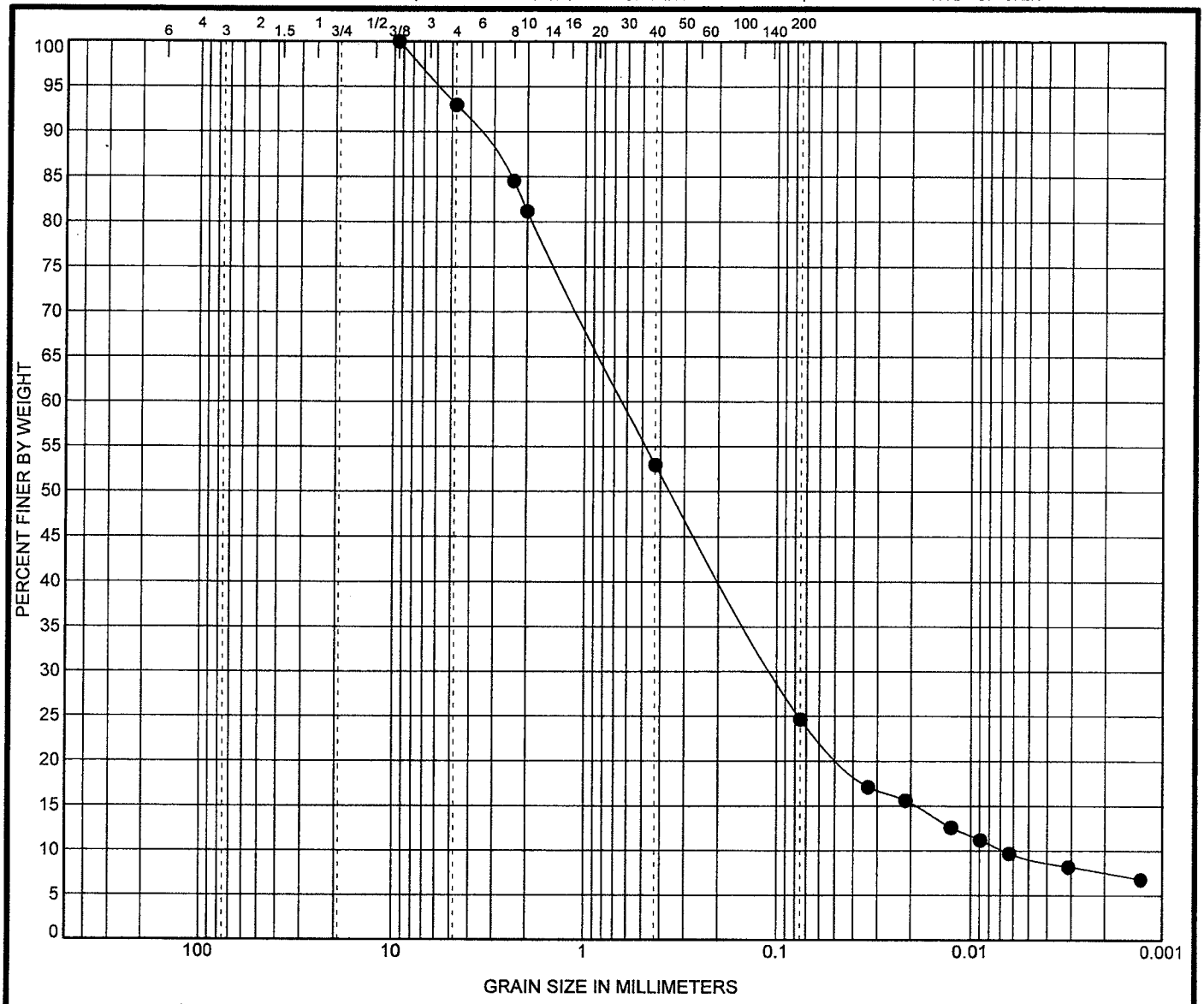
Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-03	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-1	SANDY LOAM	11	14	10	4	2.57	92.74
Depth	0.30-0.76	A-2-4(0)						
Station	1+580	LAB 6						
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.5	0.626	0.355	0.104	0.007	18.8	56.5	17.2	7.5

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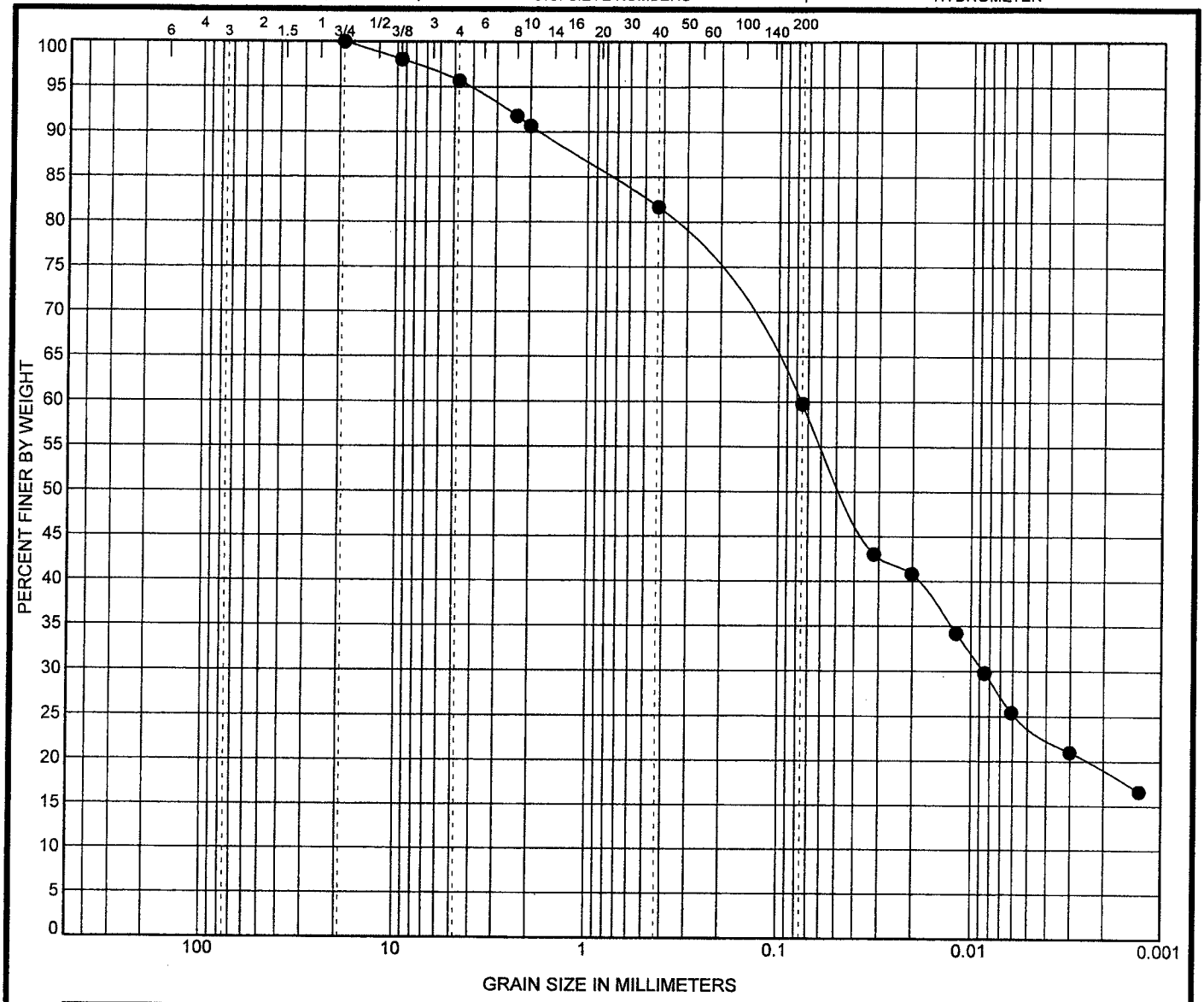
GRAIN SIZE DISTRIBUTION

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-14	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-5	LOAM	11	18	13	5		
Depth	4.11-4.57	A-4(0)						
Station	3+620	LAB 7						
Offset	15 m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.076	0.046	0.009		9.3	30.9	40.9	18.9

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GRAIN SIZE DISTRIBUTION

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Location: From 136th Street to Michigan Street, Hamilton/Hancock

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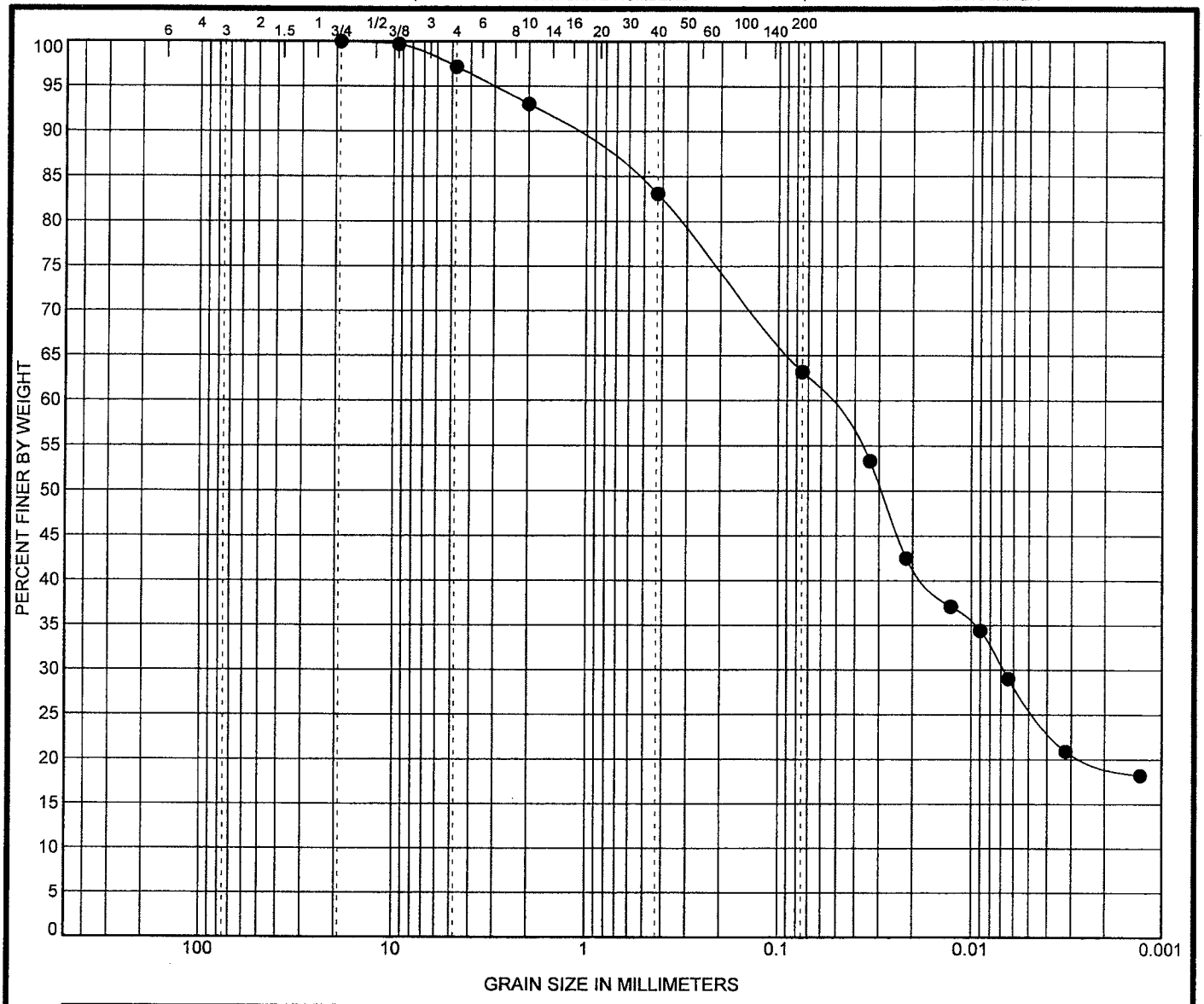

COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB-09	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	LOAM	24	31	17	14		
Depth	0.46-1.22	A-6(6)						
Station	2+260	LAB 8						
Offset	3m Rt							
Line	"A"							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.058	0.029	0.007		7.0	29.8	43.7	19.5

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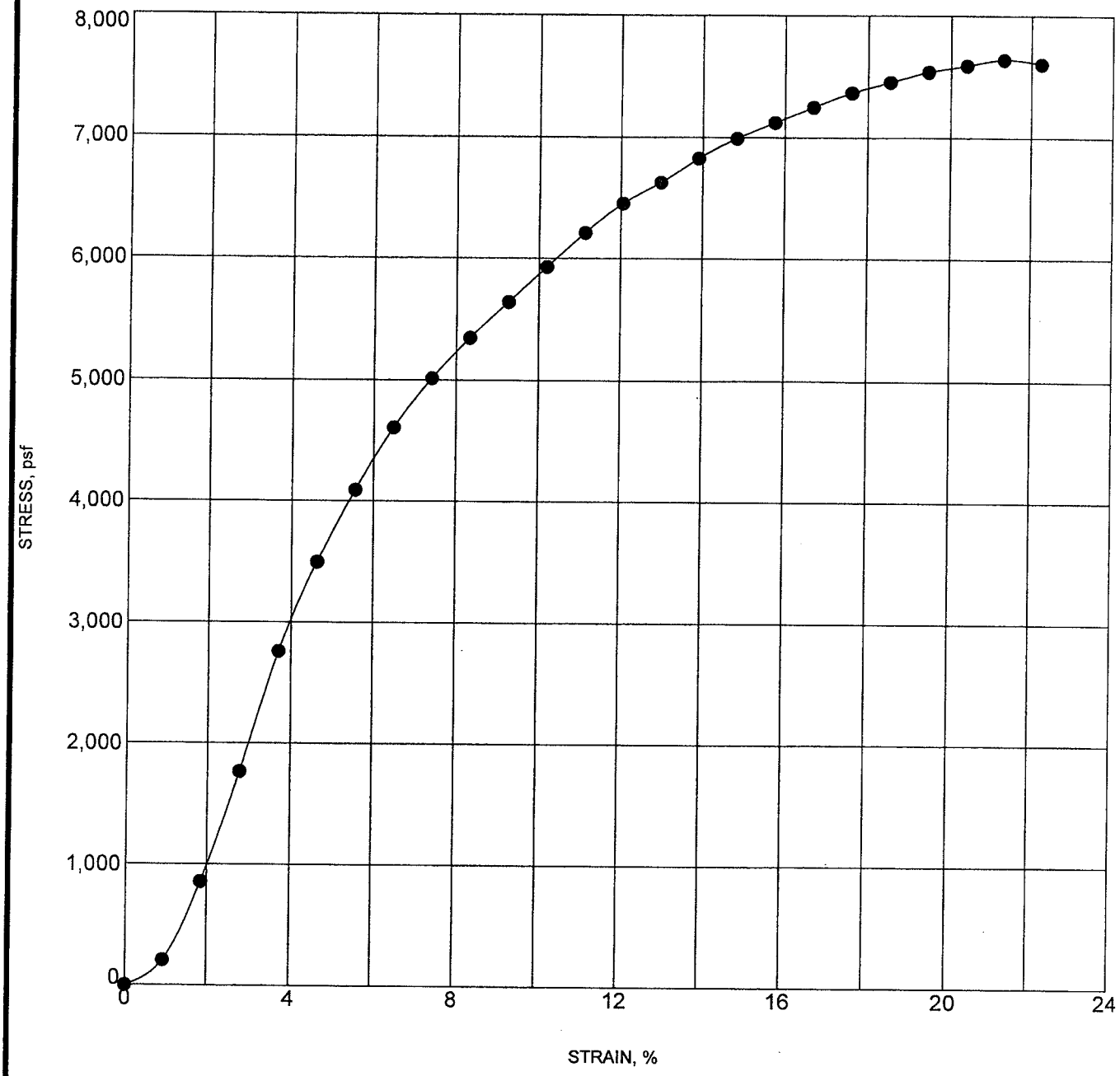

Boring Information		Test Results		
Boring No.	RB-32	Natural Moisture Content (%)	12	
Sample	SS-6	Natural Wet Density, pcf (kg/m^3)	148.1	(2374)
Depth	5.6 - 6.1	Natural Dry Density, pcf (kg/m^3)	132.3	(2120)
Station	7+490	Unconfined Compression Strength, psf (kN/m^2)	7640	(366)
Offset	7.6m Lt	Failure Strain (%)	21.3	
Line	"A"	SOIL DESCRIPTION	LOAM	

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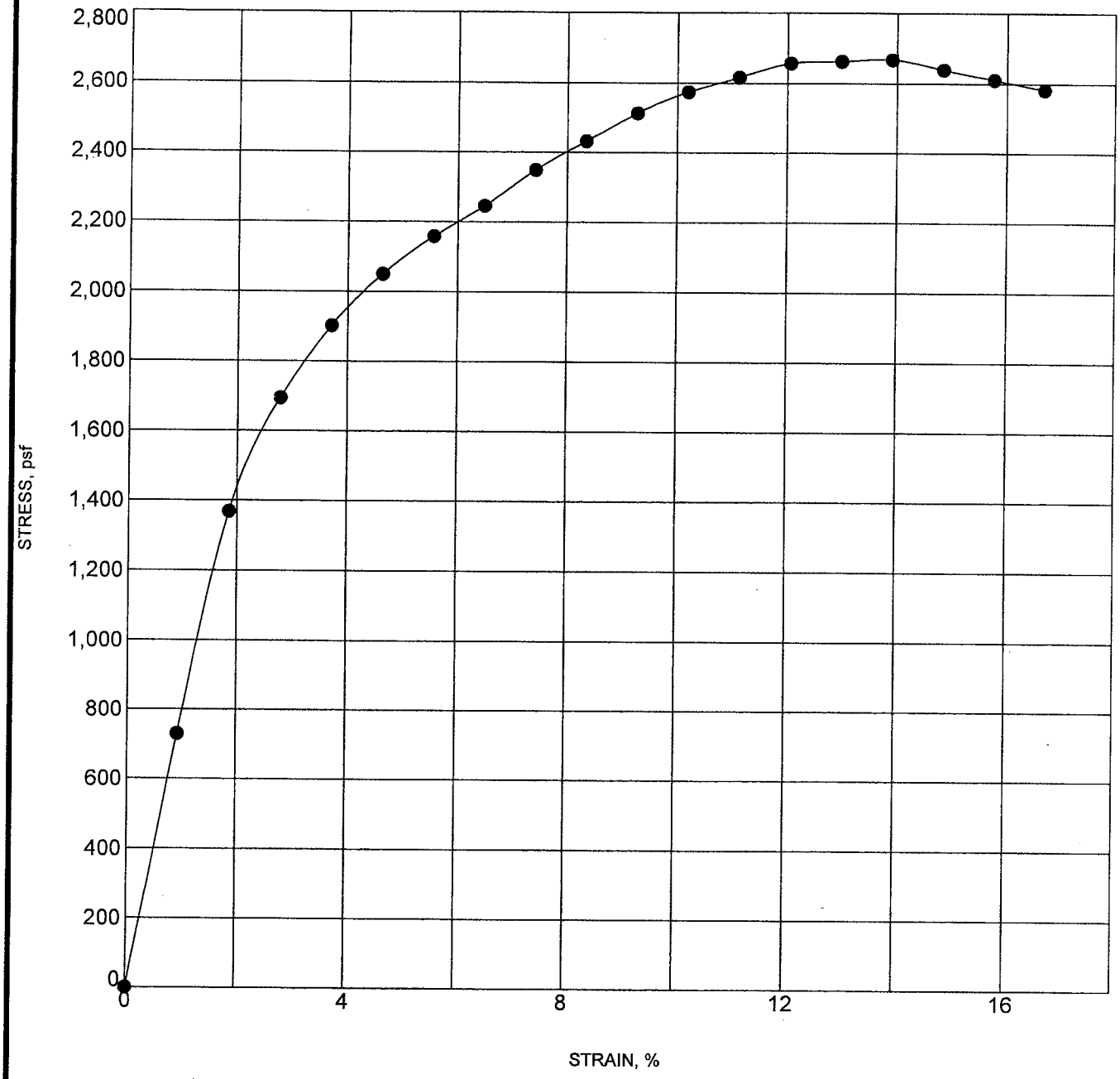
UNCONFINED COMPRESSION TEST

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011



Boring Information		Test Results		
Boring No.	RB-33	Natural Moisture Content (%)	26	
Sample	SS-2	Natural Wet Density, pcf (kg/m^3)	127.7	(2046)
Depth	0.9 - 1.4	Natural Dry Density, pcf (kg/m^3)	101.3	(1624)
Station	7+540	Unconfined Compression Strength, psf (kN/m^2)	2668	(128)
Offset	12.2m Rt	Failure Strain (%)	13.9	
Line	"A"	SOIL DESCRIPTION	CLAY LOAM	

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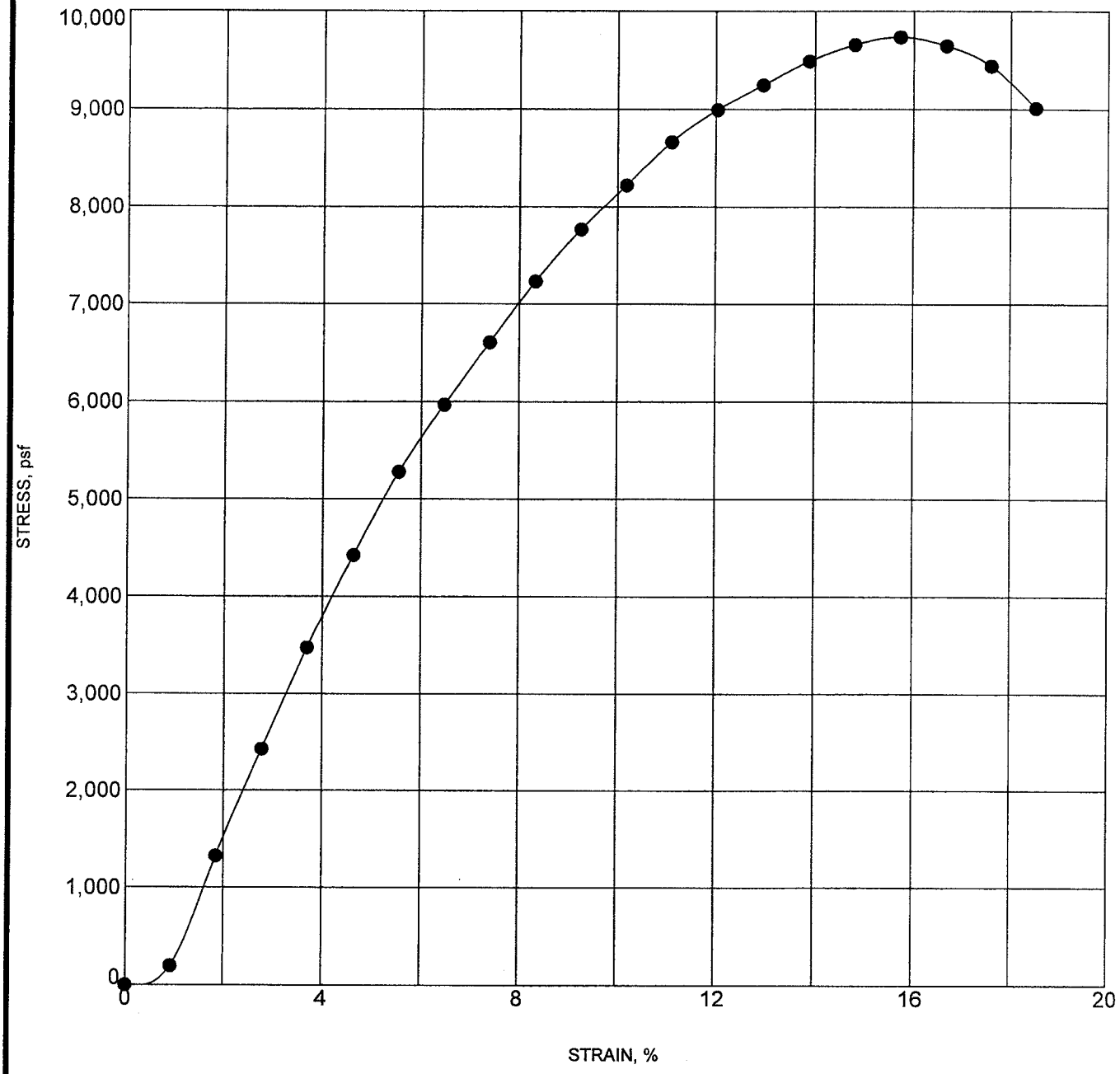

Boring Information		Test Results		
Boring No.	TB-02	Natural Moisture Content (%)	11	
Sample	SS-4	Natural Wet Density, pcf (kg/m^3)	152.8	(2448)
Depth	2.6 - 3.0	Natural Dry Density, pcf (kg/m^3)	137.6	(2206)
Station	1+698	Unconfined Compression Strength, psf (kN/m^2)	9735	(466)
Offset	3m Rt	Failure Strain (%)	15.7	
Line	"A"	SOIL DESCRIPTION	SANDY LOAM	

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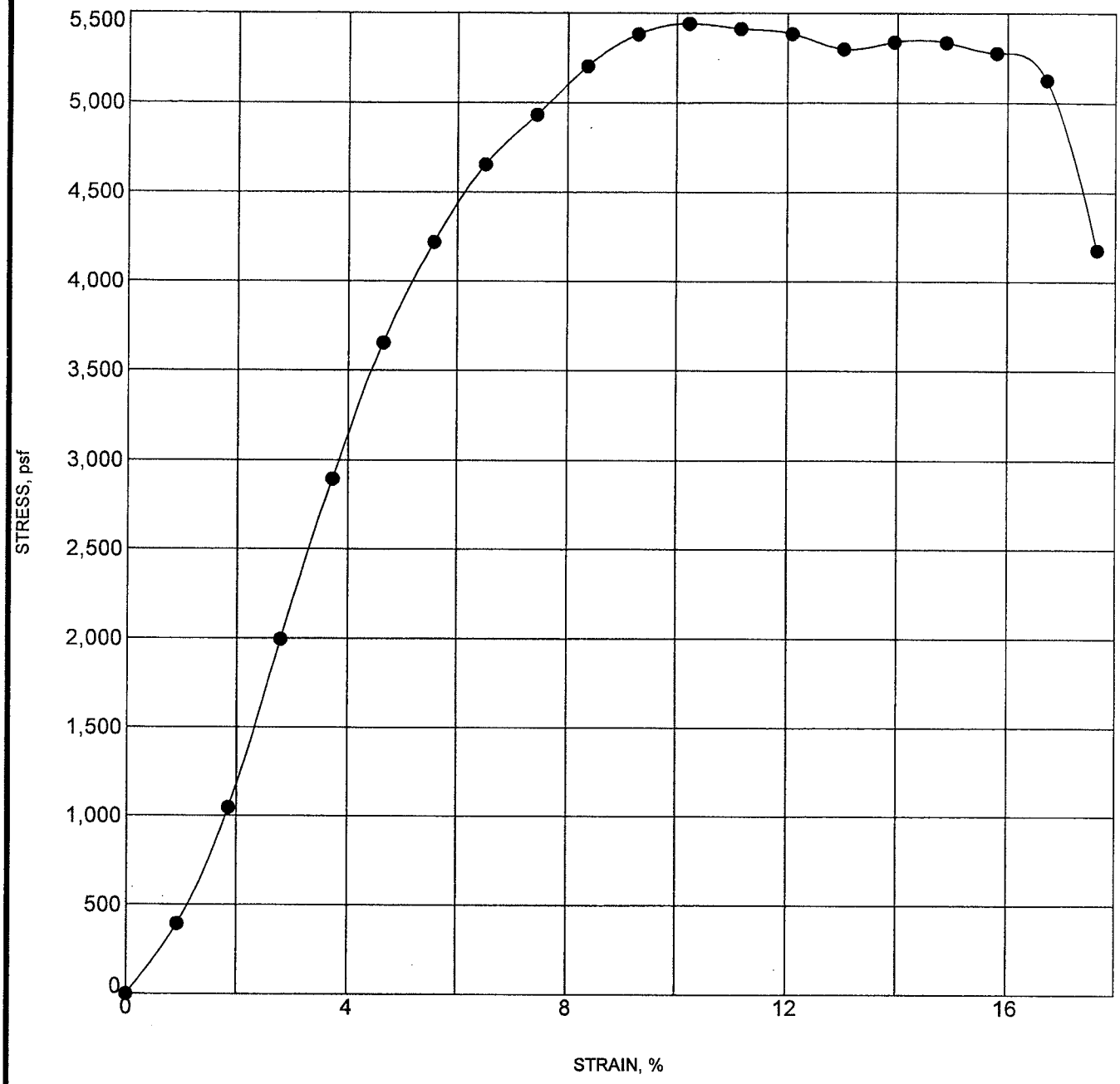

Boring Information		Test Results		
Boring No.	TB-02	Natural Moisture Content (%)	15	
Sample	SS-9	Natural Wet Density, pcf (kg/m^3)	141.5	(2268)
Depth	10.2 - 10.7	Natural Dry Density, pcf (kg/m^3)	123.1	(1972)
Station	1+698	Unconfined Compression Strength, psf (kN/m^2)	5441	(261)
Offset	3m Rt	Failure Strain (%)	10.2	
Line	"A"	**SOIL DESCRIPTION**	**SILT (Visual)**	

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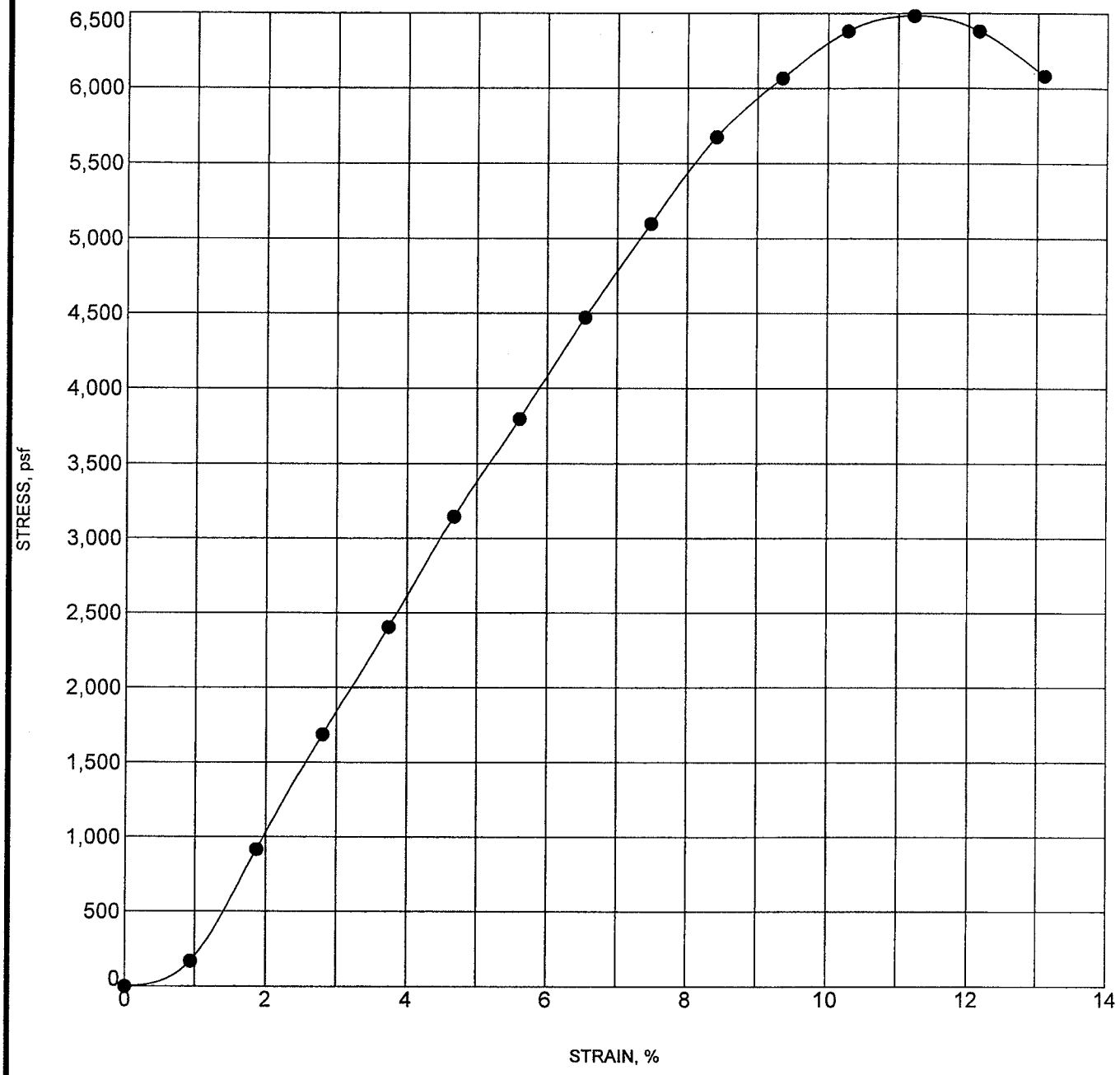

Boring Information		Test Results		
Boring No.	TB-05	Natural Moisture Content (%)	11	
Sample	SS-3	Natural Wet Density, pcf (kg/m^3)	149.7	(2399)
Depth	1.8 - 2.3	Natural Dry Density, pcf (kg/m^3)	134.9	(2161)
Station	1+140	Unconfined Compression Strength, psf (kN/m^2)	6483	(310)
Offset	3m Lt	Failure Strain (%)	11.2	
Line	"A"	SOIL DESCRIPTION	SANDY LOAM	

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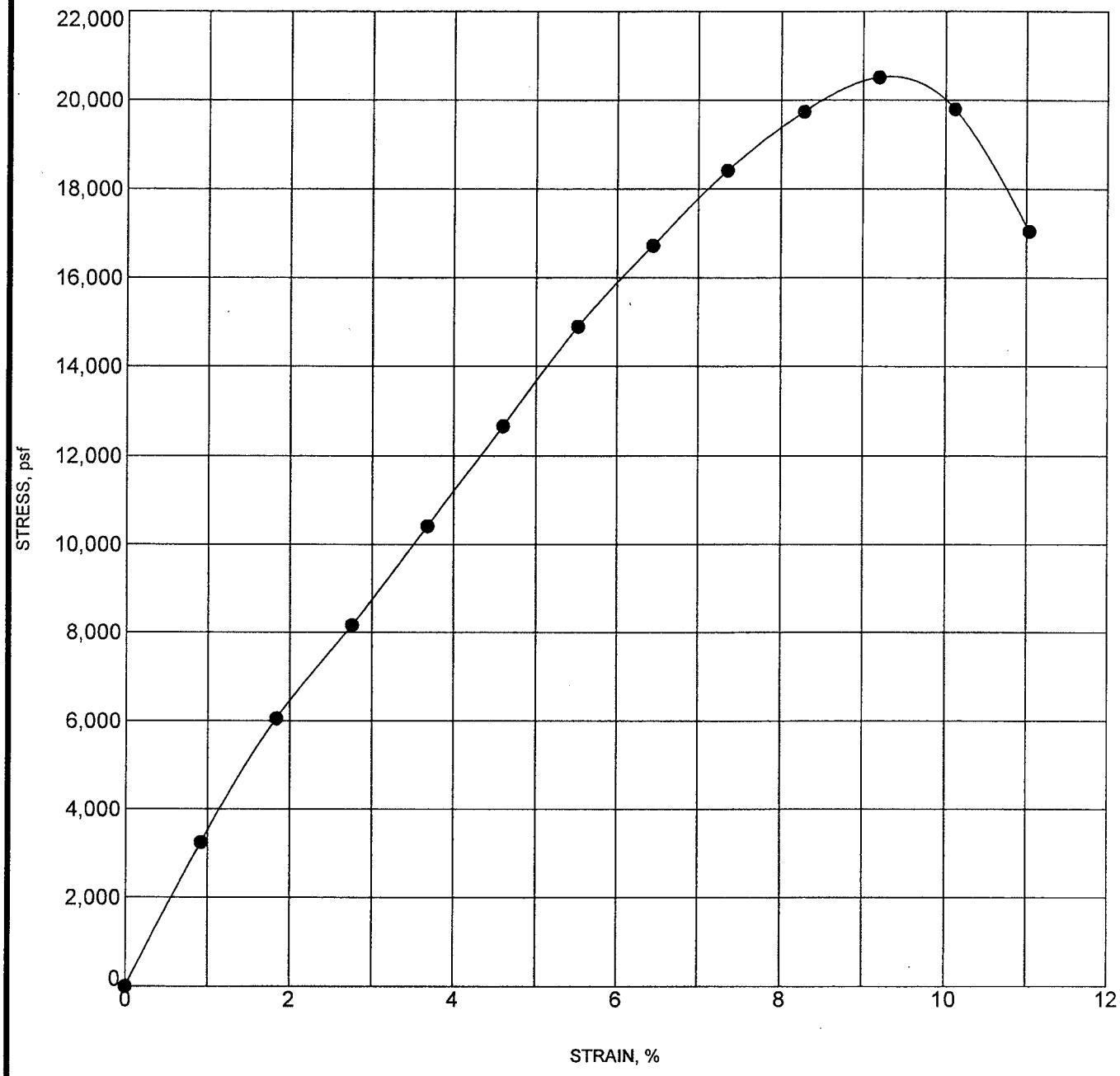

Boring Information		Test Results		
Boring No.	**TB-06**	Natural Moisture Content (%)	**12**	
Sample	**SS-4**	Natural Wet Density, pcf (kg/m^3)	**147.0**	**(2356)**
Depth	**2.6 - 3.0**	Natural Dry Density, pcf (kg/m^3)	**131.3**	**(2103)**
Station	**4+185**	Unconfined Compression Strength, psf (kN/m^2)	**20517**	**(982)**
Offset	**2m Lt**	Failure Strain (%)	**9.2**	
Line	**"A"**	**SOIL DESCRIPTION**	**LOAM**	

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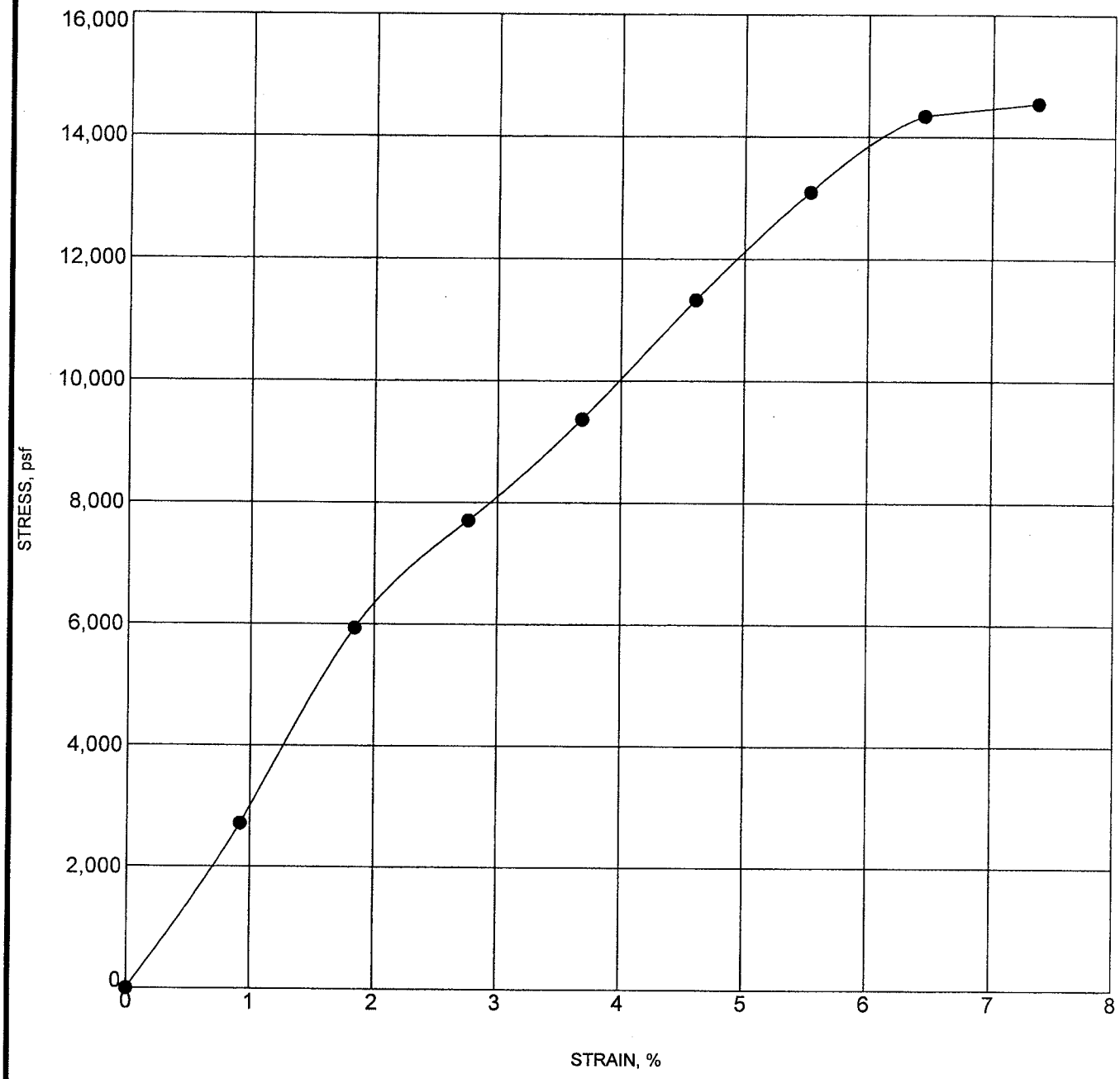

Boring Information		Test Results		
Boring No.	TB-07	Natural Moisture Content (%)	14	
Sample	SS-3	Natural Wet Density, pcf (kg/m^3)	143.0	(2292)
Depth	1.8 - 2.3	Natural Dry Density, pcf (kg/m^3)	125.5	(2011)
Station	4+191	Unconfined Compression Strength, psf (kN/m^2)	14545	(696)
Offset	14m Rt	Failure Strain (%)	7.4	
Line	"A"	SOIL DESCRIPTION	LOAM	

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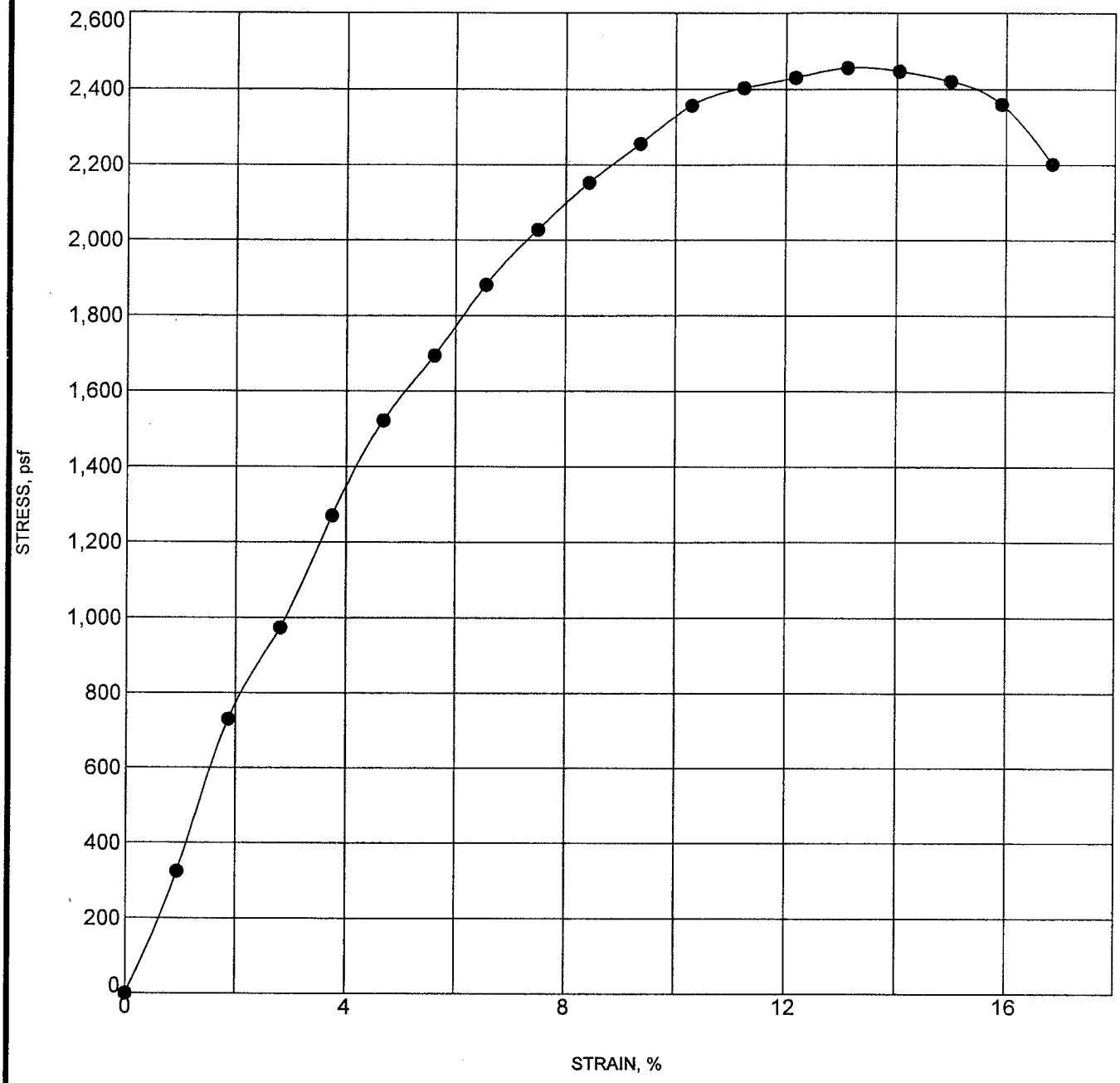

Boring Information		Test Results		
Boring No.	TB-08	Natural Moisture Content (%)	19	
Sample	SS-2	Natural Wet Density, pcf (kg/m^3)	137.2	(2199)
Depth	0.9 - 1.4	Natural Dry Density, pcf (kg/m^3)	115.3	(1848)
Station	5+910	Unconfined Compression Strength, psf (kN/m^2)	2456	(118)
Offset	3m Lt	Failure Strain (%)	13.1	
Line	"A"	SOIL DESCRIPTION	SANDY LOAM	

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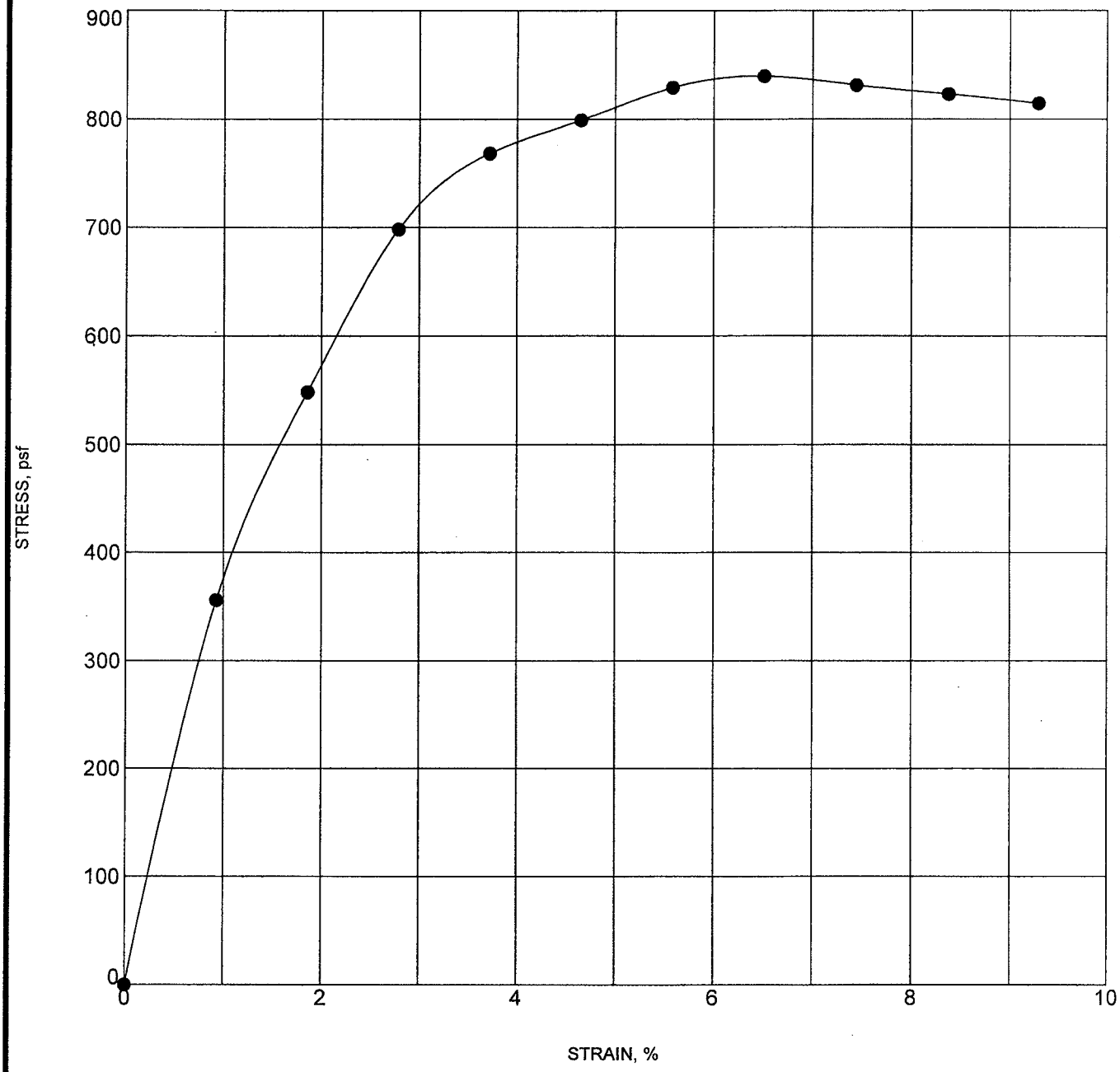

Boring Information		Test Results		
Boring No.	TB-10	Natural Moisture Content (%)	28	
Sample	SS-3	Natural Wet Density, pcf (kg/m^3)	125.0	(2003)
Depth	1.8 - 2.3	Natural Dry Density, pcf (kg/m^3)	97.6	(1565)
Station	6+520	Unconfined Compression Strength, psf (kN/m^2)	840	(40)
Offset	3m Rt	Failure Strain (%)	6.5	
Line	"A"	SOIL DESCRIPTION	SILTY CLAY	

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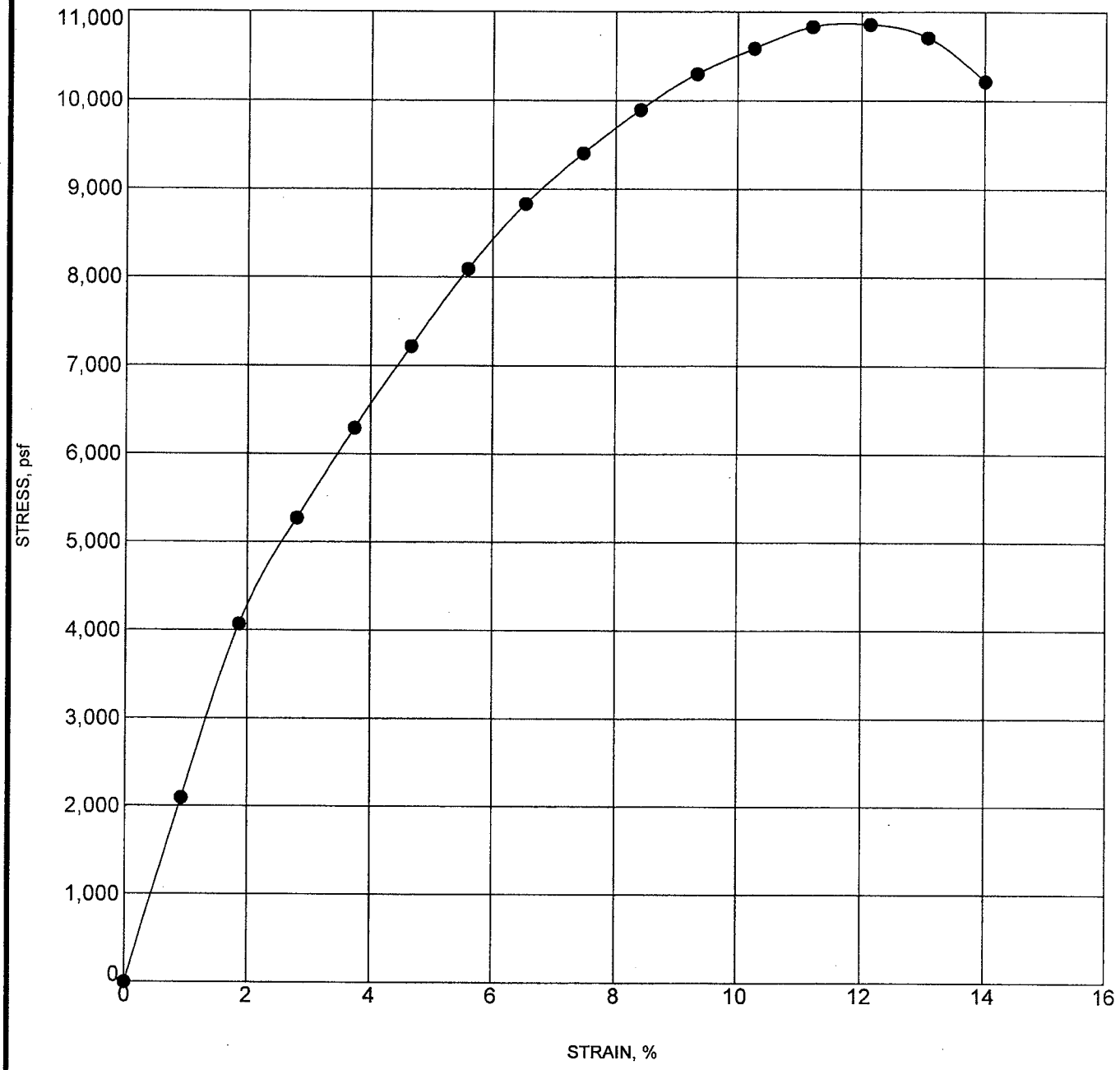

Boring Information		Test Results		
Boring No.	TB-12	Natural Moisture Content (%)	12	
Sample	SS-3	Natural Wet Density, pcf (kg/m^3)	140.2	(2247)
Depth	1.7 - 2.1	Natural Dry Density, pcf (kg/m^3)	125.2	(2006)
Station	7+860	Unconfined Compression Strength, psf (kN/m^2)	10858	(520)
Offset	15m Lt	Failure Strain (%)	12.1	
Line	"A"	SOIL DESCRIPTION	LOAM	

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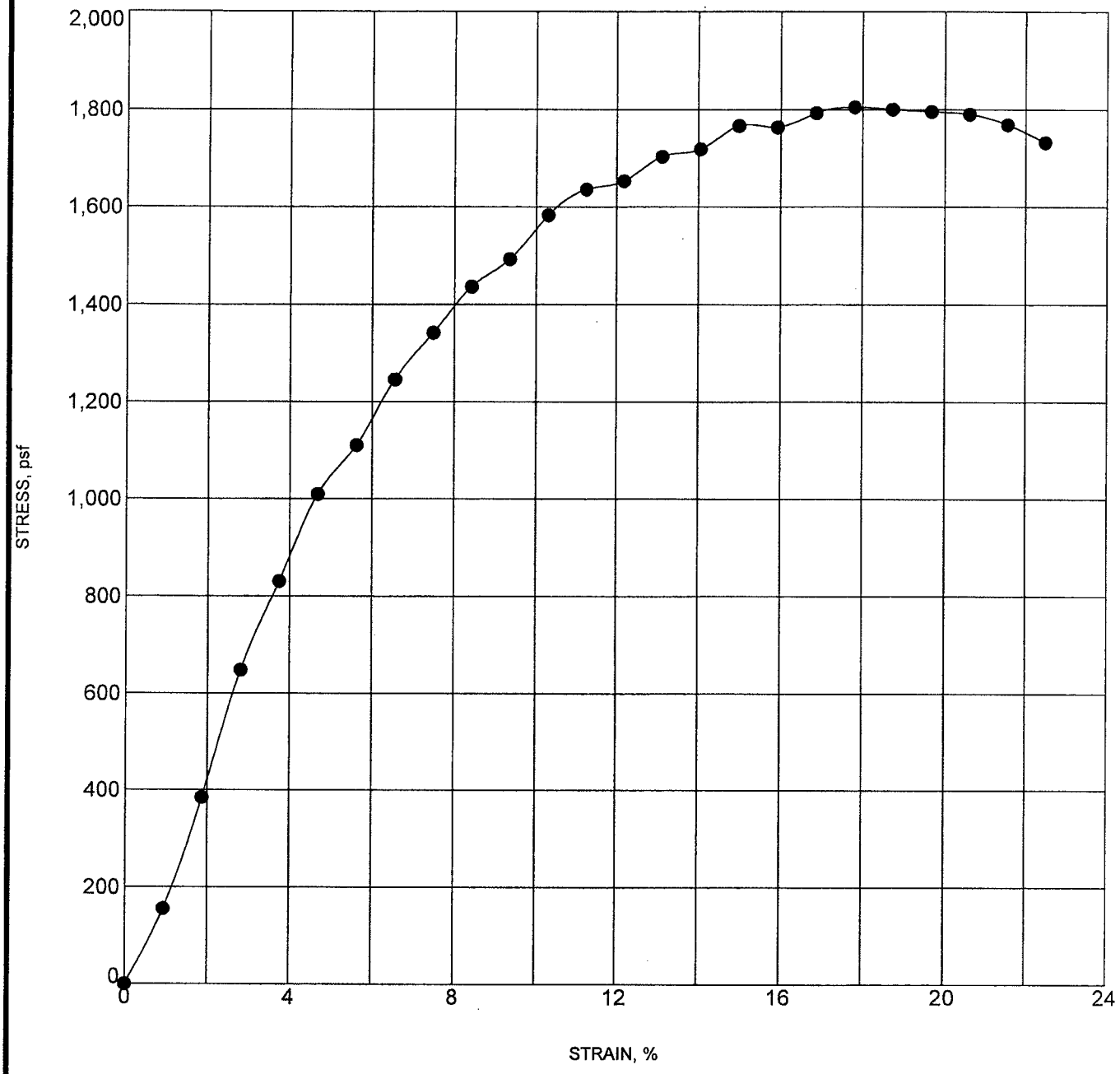

Boring Information		Test Results		
Boring No.	TB-13	Natural Moisture Content (%)	20	
Sample	SS-3	Natural Wet Density, pcf (kg/m^3)	136.8	(2193)
Depth	1.7 - 2.1	Natural Dry Density, pcf (kg/m^3)	114.0	(1827)
Station	7+865	Unconfined Compression Strength, psf (kN/m^2)	1805	(86)
Offset	10.7 m Rt	Failure Strain (%)	17.8	
Line	"A"	SOIL DESCRIPTION	SILTY LOAM (Peat Like)	

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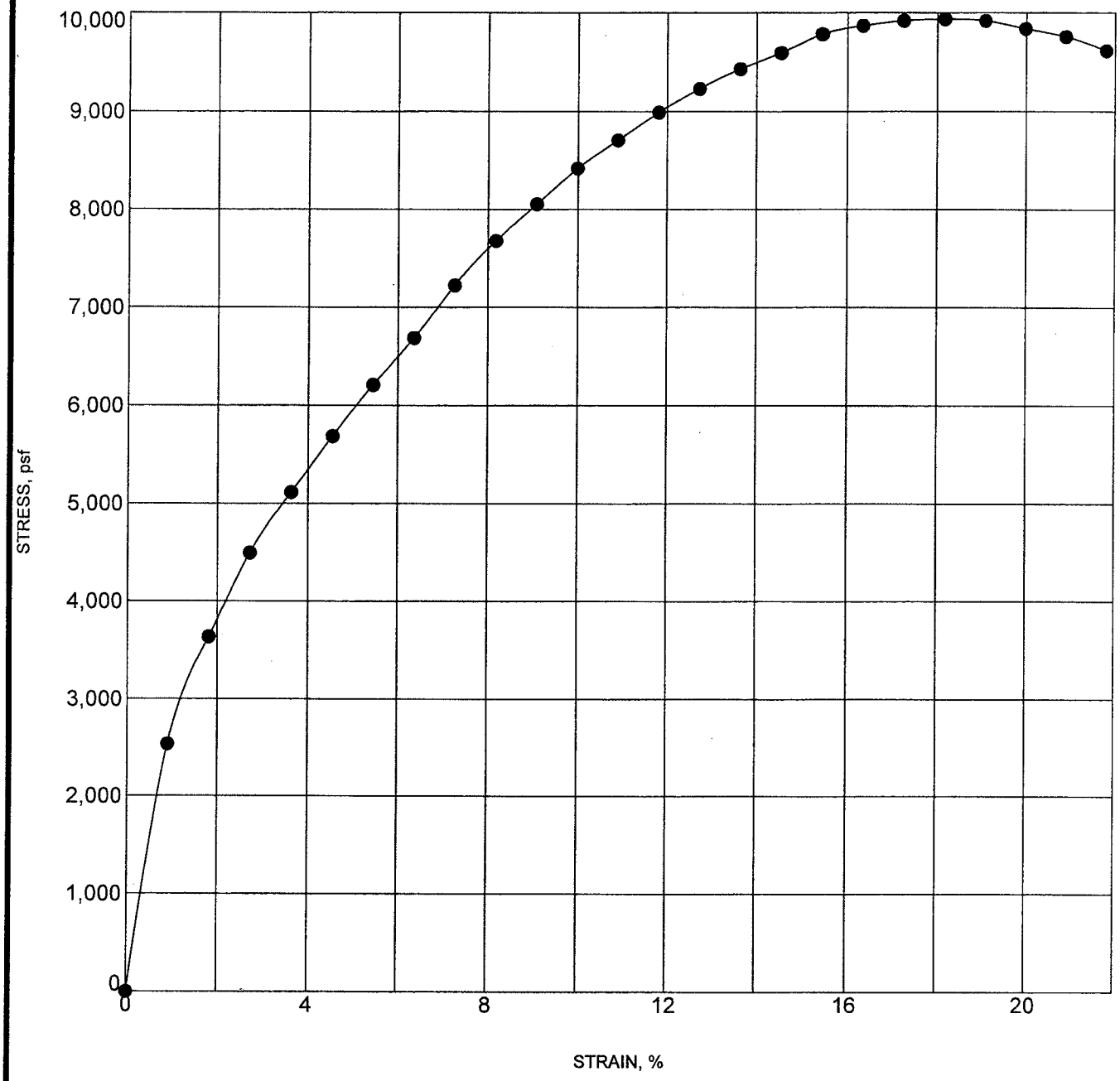

Boring Information		Test Results		
Boring No.	TB-13	Natural Moisture Content (%)	16	
Sample	SS-6	Natural Wet Density, pcf (kg/m^3)	141.0	(2259)
Depth	4.1 - 4.6	Natural Dry Density, pcf (kg/m^3)	121.5	(1947)
Station	7+865	Unconfined Compression Strength, psf (kN/m^2)	9935	(476)
Offset	10.7 m Rt	Failure Strain (%)	18.2	
Line	"A"	SOIL DESCRIPTION	LOAM	

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Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

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PROCTOR TEST RESULTS

CTL ENGINEERING OF INDIANA, INC.
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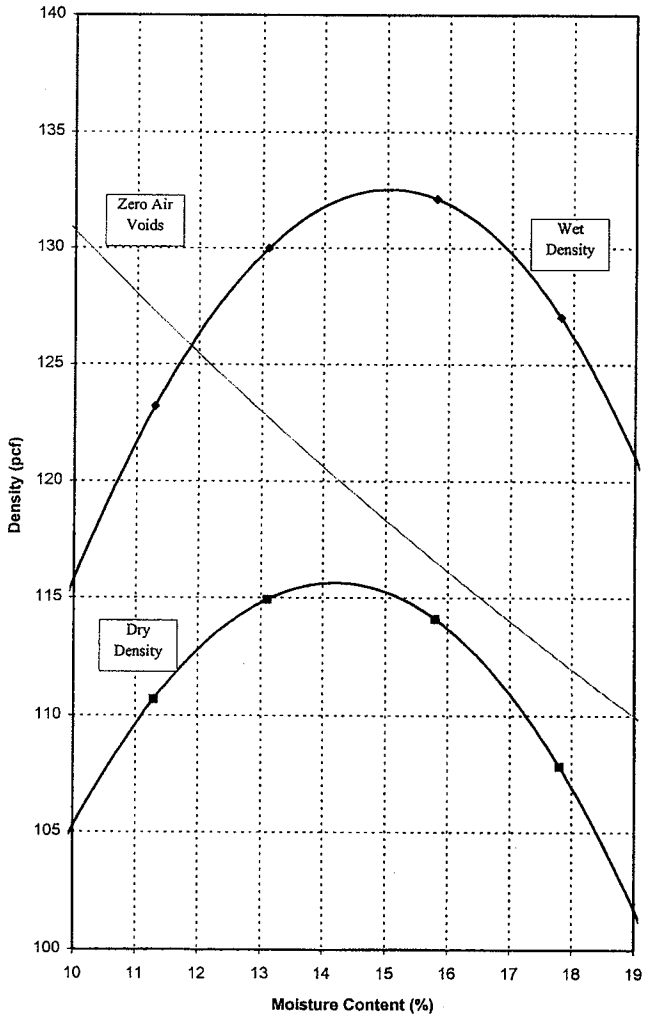
CLIENT: Indiana Department of Transportation

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek, Hamilton/Hancock Counties

Sample ID: Bag Sample - BS-1
Obtained from 1.5' to 4.0' at RB-9

Classification: LOAM
A-6 (6)

Project No.: 02-050011
Lab Code No.: 02-050782
Date: June 4, 2002



R = 1.000

Standard Proctor (ASTM D 698)

Max. Dry Density (pcf)	115.6
Optimum Moisture (%)	14.2

Grading (ASTM D422)

% Gravel	7.0
% Sand	29.8
% Silt	43.7
% Clay(<0.002 mm	19.5

Atterberg Limits (ASTM D 4318)

Liquid Limit	31
Plastic Limit	17
Plasticity Index	14

Moisture Content (ASTM D2216)

Natural Moisture (	24

Specific Gravity (ASTM D854)

S.G.	2.65

Classification

USCS:	
AASHTO:	A-6 (6)

Reviewed by: RE

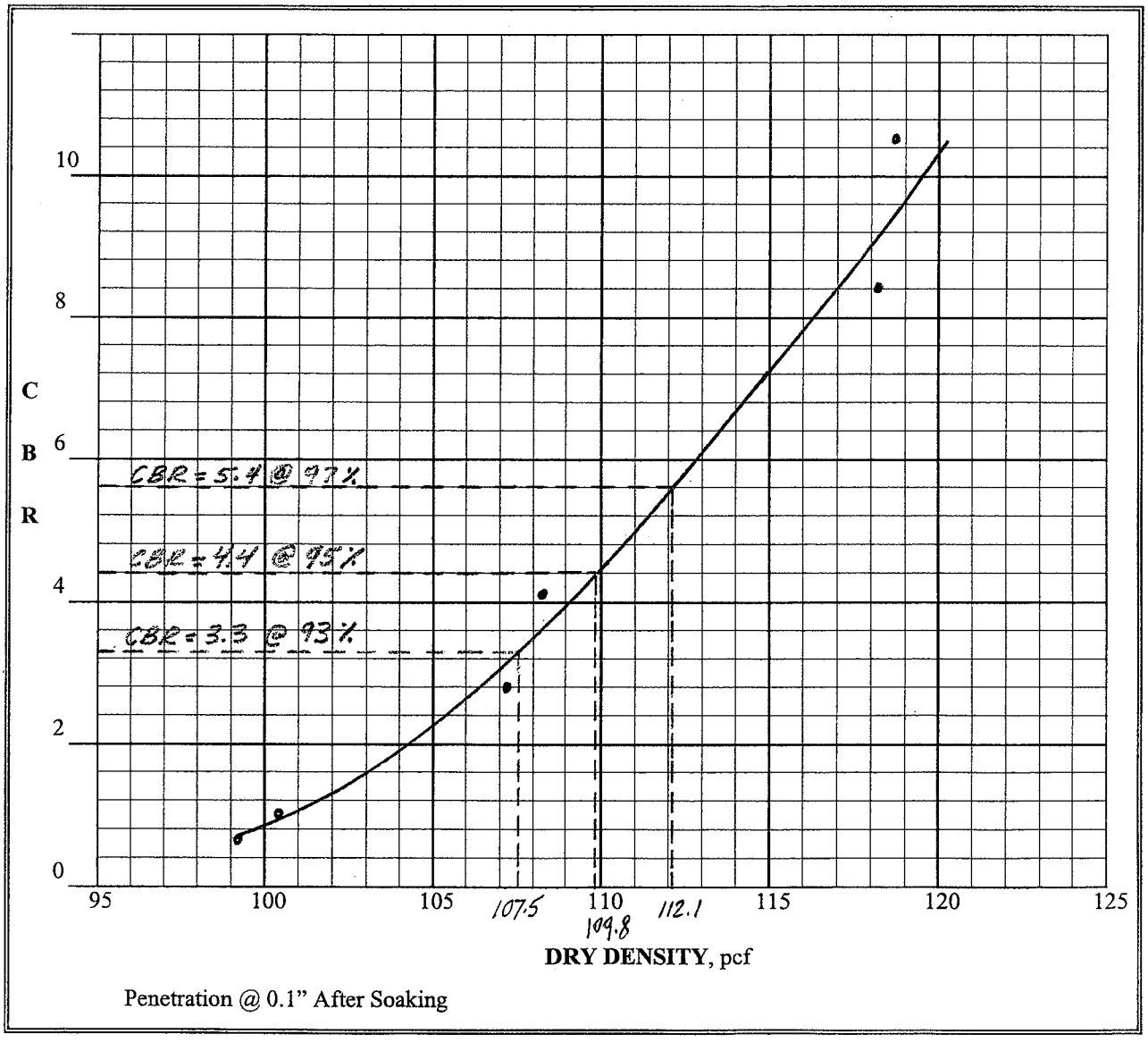
SUMMARY OF CBR TEST RESULTS

Client: Indiana Department of Transportation
Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek
Project No: 02-050011
Sample No.: BS-1, Soil bag sample at a depth ranging from 1.5' to 4.0' at RB-9
Soil Description: Silty Clay Loam A-7-6 (22)

Maximum Wet Density, pcf: 132.0
Maximum Dry Density, pcf: 115.6
Optimum Moisture Content, %: 14.2
Surcharge Weight for Soaking, lbs: 25

CBR @ 93% = 3.3
CBR @ 95% = 4.4
CBR @ 97% = 5.6

Specimen No.	Blows Per Layer	Average Water Content (%)		Initial Dry Density (pcf)	Percent Maximum Dry Density	Swell (%)	CBR (%)			
		As Molded	After Soaking				Before Saturation		After Saturation	
							0.1"	0.2"	0.1"	0.2"
1	15	12.8	21.4	99.1	85.7	0.6	4.2	3.9	0.6	0.5
2	15	13.1	15.6	100.5	86.9	0.5	6.1	5.2	1.0	1.2
3	30	13.0	18.1	107.2	92.7	0.6	6.6	6.0	2.8	2.6
4	30	13.3	18.3	108.3	93.7	0.9	9.6	8.8	4.1	3.4
5	60	12.8	15.6	118.2	102.3	0.5	11.9	10.5	8.4	7.5
6	60	12.8	14.8	118.8	102.8	0.5	14.4	12.7	10.5	9.6



Boring No.	Station	Offset	Line	Sample No.	Depth	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Compression (psf)	Failure Strain (%)	Loss on Ignition (%)	pH
RB-01	1+080	3 m Rt	"A"	SS-1	0.30-0.76	21	122.5					
RB-01	1+080	3 m Rt	"A"	SS-2	1.07-1.52	28						8.02
RB-01	1+080	3 m Rt	"A"	SS-3	1.83-2.29	23						8.11
RB-02	1+300	3 m Rt	"A"	SS-1A	0.30-0.61	23	126.6					7.77
RB-02	1+300	3 m Rt	"A"	SS-2	1.07-1.52	15	143.3					8.37
RB-03	1+580	3 m Rt	"A"	SS-1	0.30-0.76	11						8.73
RB-04	1+580	15 m Rt	"A"	SS-1	0.15-0.61	17						
RB-05	1+800	3 m Lt	"A"	SS-2A	1.07-1.37	18						
RB-05	1+800	3 m Lt	"A"	SS-3	1.83-2.29	18						7.85
RB-05	1+800	3 m Lt	"A"	SS-4	2.59-3.05	16						
RB-06	1+800	15 m Lt	"A"	SS-1	0.15-0.61	18	126.7					
RB-06	1+800	15 m Lt	"A"	SS-2	0.91-1.37	10	144.6					
RB-07	1+960	3 m Rt	"A"	SS-1	0.30-0.76	18	127.1					
RB-07	1+960	3 m Rt	"A"	SS-3	1.83-2.29	13						
RB-08	2+120	3 m Lt	"A"	SS-1	0.30-0.76	21						
RB-08	2+120	3 m Lt	"A"	SS-3	1.83-2.29	18						
RB-08	2+120	3 m Lt	"A"	SS-4	2.59-3.05	9						
RB-09	2+260	3 m Rt	"A"	SS-1	0.30-1.07	24	122.5					7.68
RB-09	2+260	3 m Rt	"A"	SS-2	1.07-1.52	28						
RB-09	2+260	3 m Rt	"A"	SS-3	1.83-2.29	19						
RB-10	2+420	3 m Rt	"A"	SS-1A	0.30-0.61	20	128.0					
RB-10	2+420	3 m Rt	"A"	SS-2	1.07-1.52	22						
RB-10	2+420	3 m Rt	"A"	SS-4	2.59-3.05	14						
RB-11	3+040	3 m Rt	"A"	SS-1	0.30-0.76	26	137.0					
RB-11	3+040	3 m Rt	"A"	SS-2	1.07-1.52	13	147.9					
RB-11	3+040	3 m Rt	"A"	SS-3	1.83-2.29	13						
RB-12	3+360	3 m Rt	"A"	SS-1	0.30-0.76	27	119.5					
RB-12	3+360	3 m Rt	"A"	SS-3	1.83-2.29	17						
RB-13	3+520	3 m Lt	"A"	SS-1	0.30-0.76	14						
RB-13	3+520	3 m Lt	"A"	SS-3	1.83-2.29	14						
RB-14	3+620	15 m Rt	"A"	SS-1	0.30-0.76	21						
RB-14	3+620	15 m Rt	"A"	SS-4	2.59-3.05	26						
RB-14	3+620	15 m Rt	"A"	SS-5	4.11-4.57	11						7.89
RB-15	3+660	3 m Rt	"A"	SS-2	1.07-1.52	12						

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SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011

Boring No.	Station	Offset	Line	Sample No.	Depth	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Compression (psf)	Failure Strain (%)	Loss on Ignition (%)	pH
RB-15	3+660	3 m Rt	"A"	SS-5	3.51-3.96	10						
RB-15	3+660	3 m Rt	"A"	SS-6	4.42-4.88	8						
RB-16	3+920	5m Lt	"A"	SS-1	0.30-0.76	20						
RB-16	3+920	5m Lt	"A"	SS-5	4.11-4.57	16						
RB-16	3+920	5m Lt	"A"	SS-6	5.64-6.10	11						
RB-16	3+920	5m Lt	"A"	SS-7	7.16-7.62	15						
RB-17	4+040	3 m Rt	"A"	SS-1	0.30-0.76	20						
RB-17	4+040	3 m Rt	"A"	SS-3	1.83-2.29	19						
RB-17	4+040	3 m Rt	"A"	SS-5	4.11-4.57	11						
RB-18	4+340	3 m Rt	"A"	SS-1	0.30-0.76	23	126.4					
RB-19	4+660	3 m Rt	"A"	SS-1	0.30-0.76	13	134.6					
RB-19	4+660	3 m Rt	"A"	SS-2	1.07-1.52	27	121.9					
RB-20	4+980	3 m Rt	"A"	SS-1	0.30-0.76	18	137.0					
RB-21	5+300	3 m Rt	"A"	SS-1B	0.76-0.91	12						
RB-21	5+300	3 m Rt	"A"	SS-4	2.74-3.20	13						
RB-22	5+460	3 m Lt	"A"	SS-1B	0.61-0.76	17						
RB-22	5+460	3 m Lt	"A"	SS-3	1.83-2.29	20						
RB-23	5+620	4 m Rt	"A"	SS-1	0.46-0.91	19						
RB-24	5+780	3 m Lt	"A"	SS-1	0.30-0.76	19						
RB-24	5+780	3 m Lt	"A"	SS-3	1.83-2.29	19						
RB-25	6+060	3 m Rt	"A"	SS-1	0.30-0.76	20						
RB-27	6+680	3 m Lt	"A"	SS-1	0.30-0.76	10						
RB-27	6+680	3 m Lt	"A"	SS-2	1.07-1.52	30						
RB-27	6+680	3 m Lt	"A"	SS-3	1.83-2.29	0						
RB-27	6+680	3 m Lt	"A"	SS-4A	2.59-2.90	40						
RB-28	6+840	4 m Rt	"A"	SS-1B	0.36-0.76	13						
RB-28	6+840	4 m Rt	"A"	SS-3A	1.83-2.13	13						
RB-29	7+140	3 m Lt	"A"	SS-1B	0.51-0.76	10						
RB-29	7+140	3 m Lt	"A"	SS-3	1.83-2.29	14						
RB-30	7+300	3 m Rt	"A"	SS-2	1.07-1.52	23						
RB-30	7+300	3 m Rt	"A"	SS-4	2.59-3.05	22						
RB-31	7+460	3 m Lt	"A"	SS-1B	0.51-0.76	12						
RB-31	7+460	3 m Lt	"A"	SS-4	2.59-3.05	11						
RB-32	7+490	7.6 m Lt	"A"	SS-1	0.15-0.61	27						

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SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011

Boring No.	Station	Offset	Line	Sample No.	Depth	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Compression (psf)	Failure Strain (%)	Loss on Ignition (%)	pH
RB-32	7+490	7.6 m Lt	"A"	SS-2	0.91-1.37	14						
RB-32	7+490	7.6 m Lt	"A"	SS-5B	4.42-4.57	14						
RB-32	7+490	7.6 m Lt	"A"	SS-6	5.64-6.10	12	148.1	132.3	7640	21.3		
RB-32	7+490	7.6 m Lt	"A"	SS-8A	8.69-8.99	16						
RB-33	7+540	12.2 m Rt	"A"	SS-1	0.15-0.61	27						
RB-33	7+540	12.2 m Rt	"A"	SS-2	0.91-1.37	26	127.7	101.3	2668	13.9		
RB-33	7+540	12.2 m Rt	"A"	SS-3	1.68-2.13	11						
RB-33	7+540	12.2 m Rt	"A"	SS-2	4.11-4.57	13						
RB-34	7+640	10 m Rt	"A"	SS-1	0.30-0.76	23						
RB-34	7+640	10 m Rt	"A"	SS-2	1.07-1.52	18						
RB-35	7+800	4 m Lt	"A"	SS-1	0.30-0.76	17						
RB-35	7+800	4 m Lt	"A"	SS-2B	1.37-1.52	14						
RB-35	7+800	4 m Lt	"A"	SS-3	1.83-2.29	13						
RB-36	7+960	3 m Rt	"A"	SS-1	0.30-0.76	11						
RB-36	7+960	3 m Rt	"A"	SS-4	2.59-3.05	13						
RB-37	8+120	3 m Lt	"A"	SS-1	0.30-0.76	16	135.3					
RB-37	8+120	3 m Lt	"A"	SS-2	1.07-1.52	11	149.9					
RB-38	8+280	3 m Rt	"A"	SS-1	0.30-0.76	14						
RB-38	8+280	3 m Rt	"A"	SS-4	2.59-3.05	9						
RB-39	8+560	3 m Rt	"A"	SS-1	0.30-0.76	22	134.4					
RB-39	8+560	3 m Rt	"A"	SS-3	1.83-2.29	11						
RB-40	8+720	3 m Lt	"A"	SS-1	0.30-0.76	23	122.6					
RB-40	8+720	3 m Lt	"A"	SS-2	1.07-1.52	17	136.3					
RB-41	9+040	3 m Rt	"A"	SS-1B	0.46-0.76	26	137.4					
RB-41	9+040	3 m Rt	"A"	SS-3	1.83-2.29	26						
RB-41	9+040	3 m Rt	"A"	SS-4	2.59-3.05	15						
RB-42	9+320	3 m Rt	"A"	SS-2	1.07-1.52	25	126.7					
RB-42	9+320	3 m Rt	"A"	SS-3	1.83-2.29	23						
RB-43	20+100	3 m Lt	"S-2-A"	SS-1	0.30-0.76	18						
RB-43	20+100	3 m Lt	"S-2-A"	SS-3	1.83-2.29	26						
RB-44	29+900	3 m Rt	"S-3-A"	SS-2	1.07-1.52	23						
RB-44	29+900	3 m Rt	"S-3-A"	SS-3	1.83-2.29	16						
RB-45	39+940	C/L	"S-4-A"	SS-2	1.07-1.52	23						
RB-45	39+940	C/L	"S-4-A"	SS-3	1.83-2.29	25						

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SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011

Boring No.	Station	Offset	Line	Sample No.	Depth	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Compression (psf)	Failure Strain (%)	Loss on Ignition (%)	pH
RB-46	50+060	3 m Lt	"S-5-A"	SS-1	0.30-0.76	14						
RB-46	50+060	3 m Lt	"S-5-A"	SS-3	1.83-2.29	13						
RB-47	59+920	3 m Rt	"S-6-A"	SS-1	0.30-0.76	9						
RB-47	59+920	3 m Rt	"S-6-A"	SS-2	1.07-1.52	29						
RB-48	69+900	3 m Lt	"S-7-A"	SS-1	0.30-0.76	21						
RB-48	69+900	3 m Lt	"S-7-A"	SS-3	1.83-2.29	12						
RB-49	70+160	3 m Rt	"S-7-A"	SS-1	0.30-0.76	14						
RB-49	70+160	3 m Rt	"S-7-A"	SS-3	1.83-2.29	11						
TB-01	1+673	3 m Lt	"A"	SS-1	0.30-0.76	16						
TB-01	1+673	3 m Lt	"A"	SS-3	1.83-2.29	21						
TB-01	1+673	3 m Lt	"A"	SS-6	5.64-6.10	13						
TB-02	1+698	3 m Rt	"A"	SS-1	0.30-0.76	15						
TB-02	1+698	3 m Rt	"A"	SS-4	2.59-3.05	11	152.8	137.6	9735	15.7		
TB-02	1+698	3 m Rt	"A"	SS-6	5.64-6.10	13						
TB-02	1+698	3 m Rt	"A"	SS-9	10.21-10.67	15	141.5	123.1	5441	10.2		
TB-02	1+698	3 m Rt	"A"	SS-13	16.31-16.76	9						
TB-03	3+790	3 m Lt	"A"	SS-3	1.83-2.29	16						
TB-03	3+790	3 m Lt	"A"	SS-6	5.64-6.10	20						
TB-04	3+814	3 m Rt	"A"	SS-3	1.83-2.29	24						
TB-04	3+814	3 m Rt	"A"	SS-5	4.11-4.57	13						
TB-05	1+140	3 m Lt	"A"	SS-1B	0.41-0.76	19						
TB-05	1+140	3 m Lt	"A"	SS-3	1.83-2.29	11	149.7	134.9	6483	11.2		
TB-06	4+185	2 m Lt	"A"	SS-1	0.30-0.76	9						
TB-06	4+185	2 m Lt	"A"	SS-3	1.83-2.29	21						
TB-06	4+185	2 m Lt	"A"	SS-4	2.59-3.05	12	147.0	131.3	20517	9.2		
TB-06	4+185	2 m Lt	"A"	SS-5	3.35-3.81	11						
TB-07	4+191	14 m Rt	"A"	SS-3	1.83-2.29	14	143.0	125.5	14545	7.4		
TB-07	4+191	14 m Rt	"A"	SS-6	4.11-4.57	12						
TB-08	5+915	11 m Rt	"A"	SS-2	0.91-1.37	19	137.2	115.3	2456	13.1		
TB-09	5+910	3 m Lt	"A"	SS-2	1.07-1.52	8						
TB-10	6+520	3 m Rt	"A"	SS-1B	0.44-0.87	17						
TB-10	6+520	3 m Rt	"A"	SS-3	1.83-2.29	28	125.0	97.6	840	6.5		
TB-12	7+860	15 m Lt	"A"	SS-1	0.15-0.61	22						
TB-12	7+860	15 m Lt	"A"	SS-3	1.68-2.13	12	140.2	125.2	10858	12.1		

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SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011

Boring No.	Station	Offset	Line	Sample No.	Depth	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Compression (psf)	Failure Strain (%)	Loss on Ignition (%)	pH
TB-12	7+860	15 m Lt	"A"	SS-6	4.11-4.57	14						
TB-13	7+865	10.7 m Rt	"A"	SS-1	0.15-0.61	18						
TB-13	7+865	10.7 m Rt	"A"	SS-3	1.68-2.13	20	136.8	114.0	1805	17.8		
TB-13	7+865	10.7 m Rt	"A"	SS-4	2.44-2.90	26						
TB-13	7+865	10.7 m Rt	"A"	SS-6	4.11-4.57	16	141.0	121.5	9935	18.2		

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SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Project: SR 238 with New Bridges on Mud Creek & Thorpe Creek

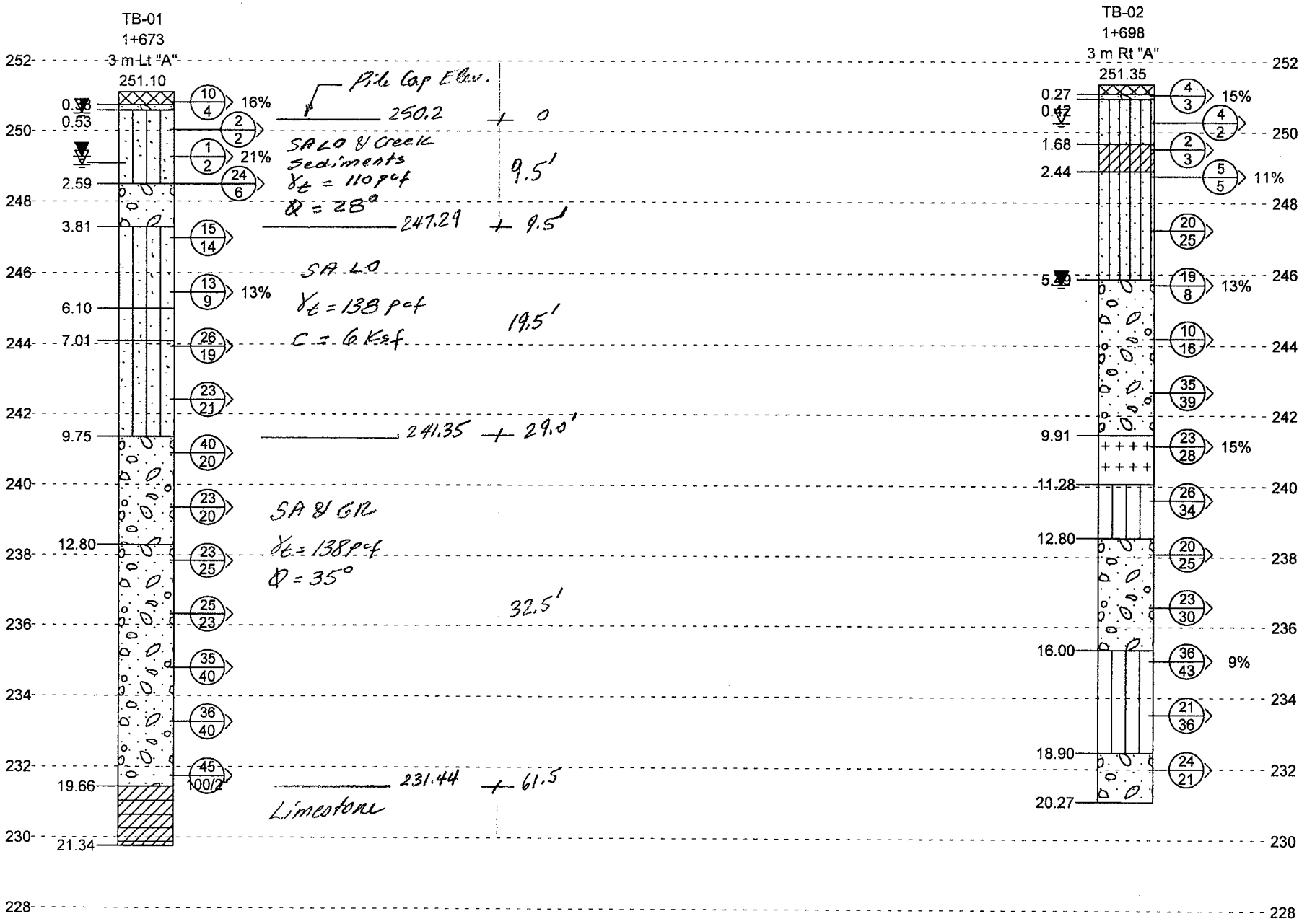
Location: From 136th Street to Michigan Street, Hamilton/Hancock

Project No.: STP-3229 (005), CTL No.: 02-050011

APPENDIX D

SR 238 OVER MUD CREEK

GENERALIZED SOIL PROFILE
PILE ANALYSES



GENERALIZED SOIL PROFILE
SR 238 over Mud Creek, Hamilton County
STP-3229 (005), CTL No.: 02-050011

INDOT ENG_HOR_SR238.GPJ_CTLMET.GDT 8/13/02

ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration

Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name	: SR238 over Mud Creek	Client	: INDOT
File Name	: Bent 1	Project Manager	: AK
Date	: 8/14/10	Computed by	: AK

Depth of Top of Pile = 0.00 ft. Pile length = 30.00 ft.
Depth to Water Table = 0.00 ft.
Type of Pile = H Pile
HP 12x53

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.97
2	Cohesive	19.50	1189.30	---	--	3.97
3	Cohesionless	1.00	1964.20	35.00	--	3.97

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	21.09	2.25
2	Cohesive	3000.00	1500.00	----	-----	116.15
3	Cohesionless	--	--------	----	26.36	3.56

Total Side Friction : 121.95

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Internal Friction Angle	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
2002.00	35.00	-----	0.99	64.00	84.60

Limiting End Bearing Resistance : 106.02

Ultimate Static Pile Capacity : 206.55

$Q_{ult} = 206.55^{K}$ $Q_{all} \approx 40^{T}$ For F.S = 2.5

Pile tip elev. $= 250.2 - \frac{30}{3.281} = \pm 241$ ($\pm$ 1.5 m)

HP-1

+-------- ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration --------+

Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name : SR238 over Mud Creek Client : INDOT
File Name : Bent 1 Project Manager : AK
Date : 8/14/10 Computed by : AK

Depth of Top of Pile = 0.00 ft. Pile length = 41.00 ft.
Depth to Water Table = 0.00 ft.
Type of Pile = H Pile
HP 12x53

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.97
2	Cohesive	19.50	1189.30	---	--	3.97
3	Cohesionless	12.00	2380.00	35.00	--	3.97

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	21.09	2.25
2	Cohesive	3000.00	1500.00	----	-----	116.15
3	Cohesionless	--	--------	----	26.36	51.69

Total Side Friction : 170.09

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Internal Friction Angle	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
2833.60	35.00	-----	0.99	64.00	118.43

Limiting End Bearing Resistance : 106.02

Ultimate Static Pile Capacity : 276.11

+----- Hit arrow keys to display next screen. <F8> Print. <F10> Main Menu -----+

$Q_{ult} = 276.11$ $Q_{all} \approx 55^{T}$ For F.S = 2-5

$P.L.\ tip\ elev = 250.2 - \frac{41}{3.281} = \pm 237.7$

ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration

Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name : SR238 over Mud Creek Client : INDOT
File Name : Bent 1 Project Manager : AK
Date : 8/14/10 Computed by : AK

Depth of Top of Pile = 0.00 ft. Pile length = 54.00 ft.
Depth to Water Table = 0.00 ft.
Type of Pile = H Pile
HP 12x53

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.97
2	Cohesive	19.50	1189.30	---	--	3.97
3	Cohesionless	25.00	2871.40	35.00	--	3.97

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	21.09	2.25
2	Cohesive	3000.00	1500.00	----	-----	116.15
3	Cohesionless	--	--------	----	26.36	129.93

Total Side Friction : 248.33

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Internal Friction Angle	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
3816.40	35.00	-----	0.99	64.00	158.84

Limiting End Bearing Resistance : 106.02

Ultimate Static Pile Capacity : 354.35

Hit arrow keys to display next screen. <F8> Print. <F10> Main Menu

$Q_{ult} = 354.35^{k}$ $Q_{all} \approx 70T$ for F.S = 2-5

Pile tip elev = $250.2 - \frac{54}{3.281} = \pm 233.7$

HP-3

ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration

Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name	: SR238 over Mud Creek	Client	: INDOT
File Name	: Bent 1	Project Manager	: AK
Date	: 8/14/10	Computed by	: AK

Depth of Top of Pile = 0.00 ft. Pile length = 28.00 ft.
Depth to Water Table = 0.00 ft.
Diameter of pile = 14.00 in.
Type of Pile = Pipe Pile

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.67
2	Cohesive	18.50	1151.50	---	--	3.67

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	18.66	2.28
2	Cohesive	4000.00	2400.00	----	-----	162.73

Total Side Friction : 165.01

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Undrained Shear Strength (psf)	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
1850.80	4000.00	----	1.07	----	38.48

Ultimate Static Pile Capacity : 203.50

+----- Hit arrow keys to display next screen. <F8> Print. <F10> Main Menu -----+

$Q_{ult} = 203.50^{K}$ $Q_{all} \cong 40^{T}$ w/ FS = 2.5

Pile tip elev. = $250.2 - \frac{28}{3.281} \approx 241.5$ m

ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration
Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name	: SR238 over Mud Creek	Client	: INDOT
File Name	: Bent 1	Project Manager	: AK
Date	: 8/14/10	Computed by	: AK

Depth of Top of Pile = 0.00 ft.   Pile length = 31.00 ft.
Depth to Water Table = 0.00 ft.
Diameter of pile = 14.00 in.
Type of Pile = Pipe Pile

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.67
2	Cohesive	19.50	1189.30	---	--	3.67
3	Cohesionless	2.00	2002.00	35.00	--	3.67

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	18.66	2.28
2	Cohesive	4000.00	2400.00	----	-----	171.53
3	Cohesionless	--	--------	----	23.33	8.32

Total Side Friction : 182.13

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Internal Friction Angle	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
2077.60	35.00	-----	1.07	64.00	95.72

Limiting End Bearing Resistance : 115.03

Ultimate Static Pile Capacity : 277.85

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Qult = 277.85k Qall ≅ 55T w/ FS = 2.5

Pile tip elev = 250.2 - 31/3.281 ≅ 240.5 m

SEC-2

ULTIMATE STATIC PILE CAPACITY/Federal Highway Administration
Nordlund (1963, 1979) and Tomlinson (1979, 1980) methods

Project Name	: SR238 over Mud Creek	Client	: INDOT
File Name	: Bent 1	Project Manager	: AK
Date	: 8/14/10	Computed by	: AK

Depth of Top of Pile = 0.00 ft.
Depth to Water Table = 0.00 ft.
Diameter of pile = 14.00 in.
Type of Pile = Pipe Pile

Pile length = 37.00 ft.

SKIN FRICTION CONTRIBUTION

Layer	Soil Type	Thickness (ft)	Effective Stress (psf)	Internal Friction Angle	N-SPT	Pile Perimeter (ft)
1	Cohesionless	9.50	226.10	28.00	--	3.67
2	Cohesive	19.50	1189.30	---	--	3.67
3	Cohesionless	8.00	2228.80	35.00	--	3.67

Layer	Soil Type	Undrained Shear Strength (psf)	Adhesion	Pile Taper	Sliding Friction Angle	Skin Resistance (Kips)
1	Cohesionless	--	--------	----	18.66	2.28
2	Cohesive	4000.00	2400.00	----	-----	171.53
3	Cohesionless	--	--------	----	23.33	37.04

Total Side Friction : 210.85

POINT RESISTANCE CONTRIBUTION

Effective Stress at pile Tip (psf)	Internal Friction Angle	SPT Value	Pile End Area (ft*ft)	Bearing Capacity Factor Nq	End Bearing Resistance (Kips)
2531.20	36.00	-----	1.07	77.60	144.80

Limiting End Bearing Resistance : 162.06

Ultimate Static Pile Capacity : 355.65

+----- Hit arrow keys to display next screen. <F8> Print. <F10> Main Menu -----+

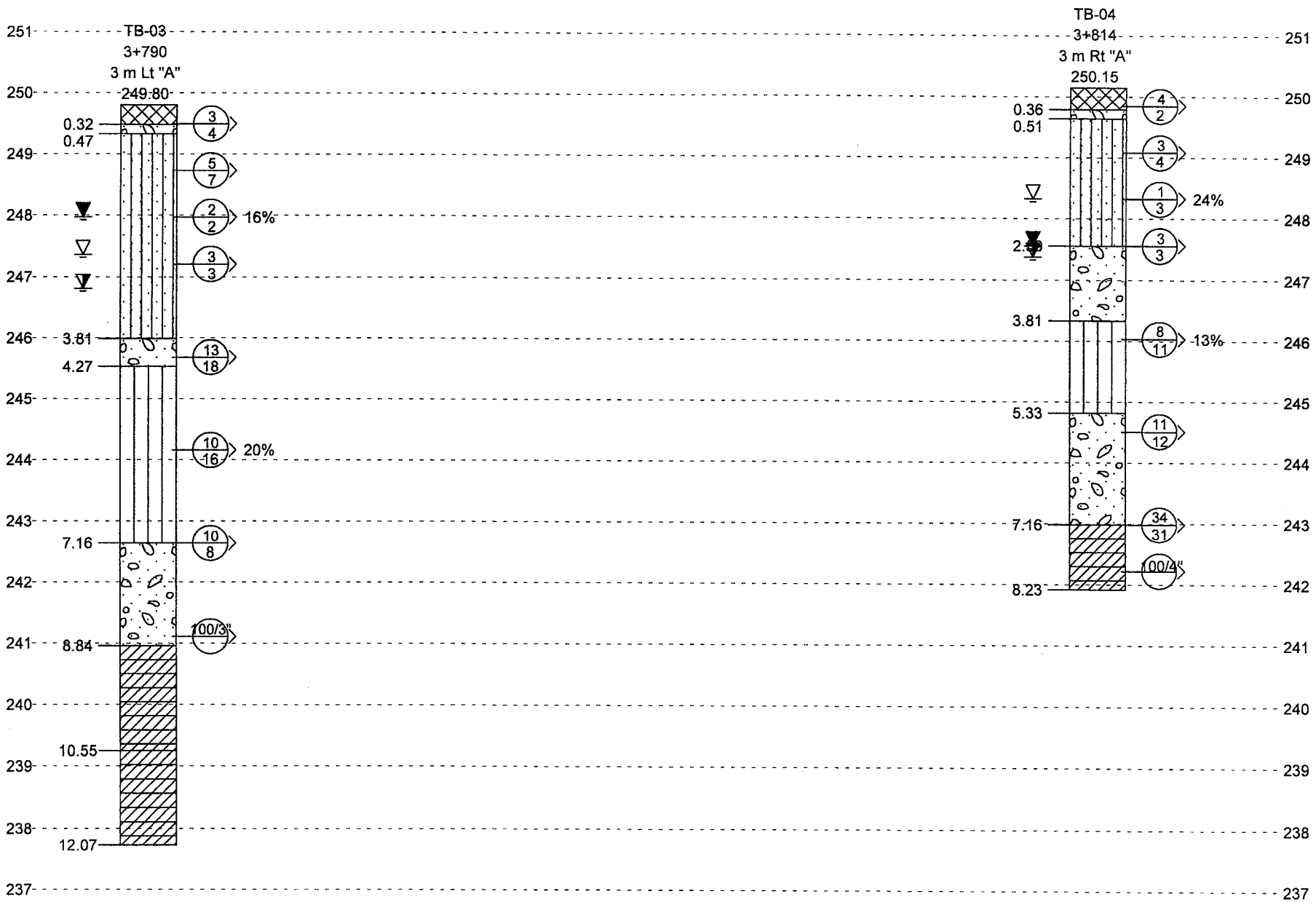
Pult = 355.65 k Pall = 70 T w/ F.S. = 2.5

Pile tip elev = 250.2 - 22/3.281 = 238.5 m

SEC-3

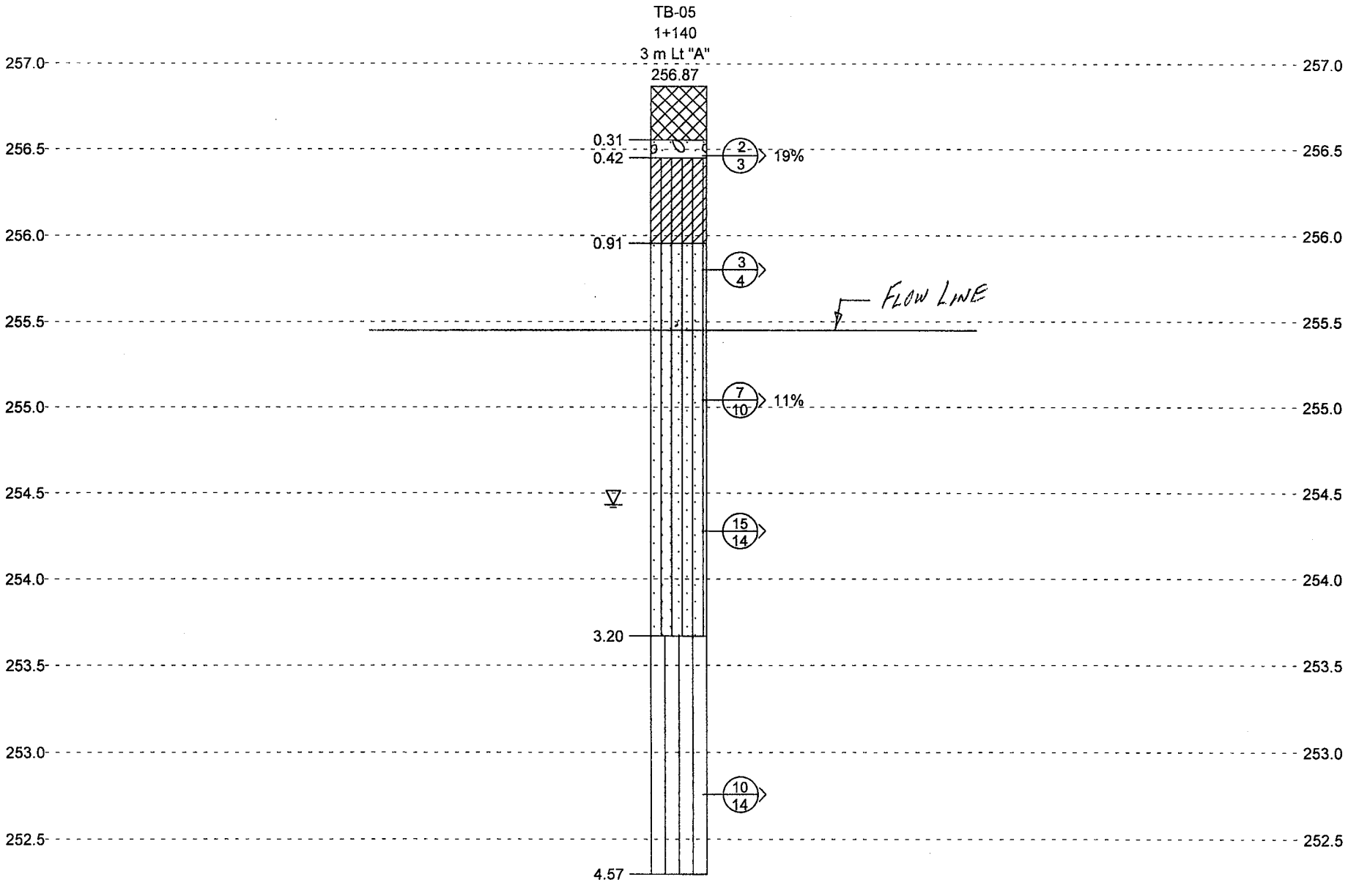
APPENDIX E

GENERALIZED SOIL PROFILE & FOUNDATION RECOMMENDATIONS



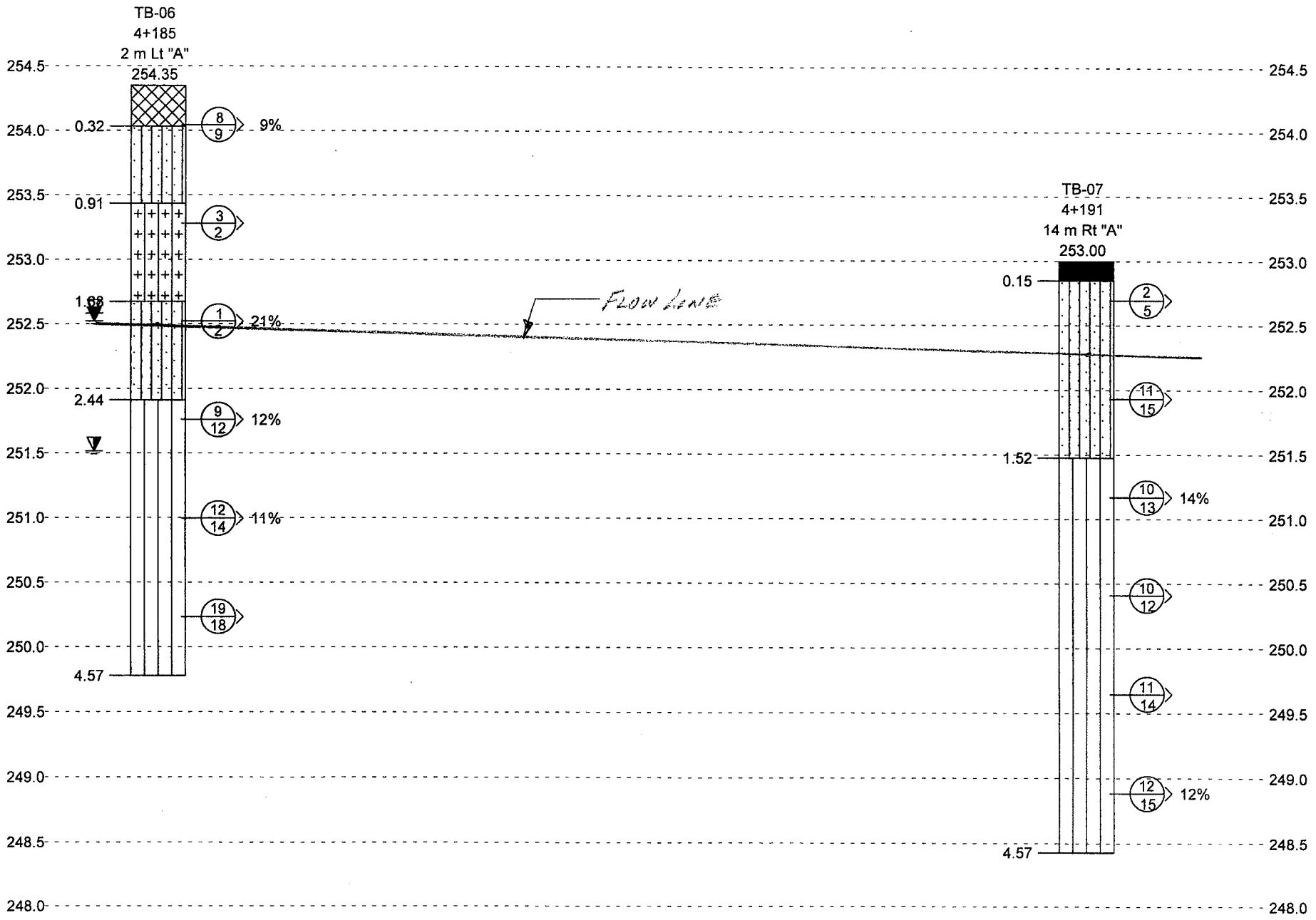
GENERALIZED SOIL PROFILE
SR 238 over Thorpe Creek, Hamilton County
STP-3229 (005), CTL No.: 02-050011

INDOT ENG HOR SR238.GPJ CTLMET.GDT 8/13/02



GENERALIZED SOIL PROFILE
1150 X 730 Concrete Box Culvert at Station 1+142
STP-3229 (005), CTL No.: 02-050011

INDOT ENG_HOR_SR238.GPJ_CTLMET.GDT 8/13/02



GENERALIZED SOIL PROFILE
3600 X 1500 Concrete Box Culvert at Station 4+196
STP-3229 (005), CTL No.: 02-050011

INDOT ENG_HOR_SR238.GPJ_CTLMET.GDT 8/13/02

FOUNDATION RECOMMENDATIONS

Structure:	3600mm x 1500mm of Precast Concrete Box Culvert @ Station 4+196
Location:	SR 238
Project No.:	STP-3229 (005)
Des. No.:	9706600, 0006610 & 0006620
CTL No.:	02-050011

DATA

1. Box Culvert 3600mm x 1500mm (11.8' x 5') to be placed at Station 4+196 with Flow Line @ Elev. 252.60 to 252.30.

2. Assume wingwalls will be placed on continuous footings at 4' (1.20 m) below flow line corresponding to elevation 251.4 to 251.1. Wingwall footings will be placed on stiff to hard loam (till).

3. Surface water and/or groundwater may be encountered during construction. Sump pumps or any dewatering system suggested by Contractor and approved by Engineer may be used.

BOX CULVERT

1. The box culvert may be placed on existing soils provided that all soft/very loose sandy loam soils are removed and replaced with "B" Borrow. Limits of soil removal are estimated between 5m Rt and 17m Lt to Elev. 251.90.

2. Groundwater and surface water may be encountered during construction.

WINGWALLS

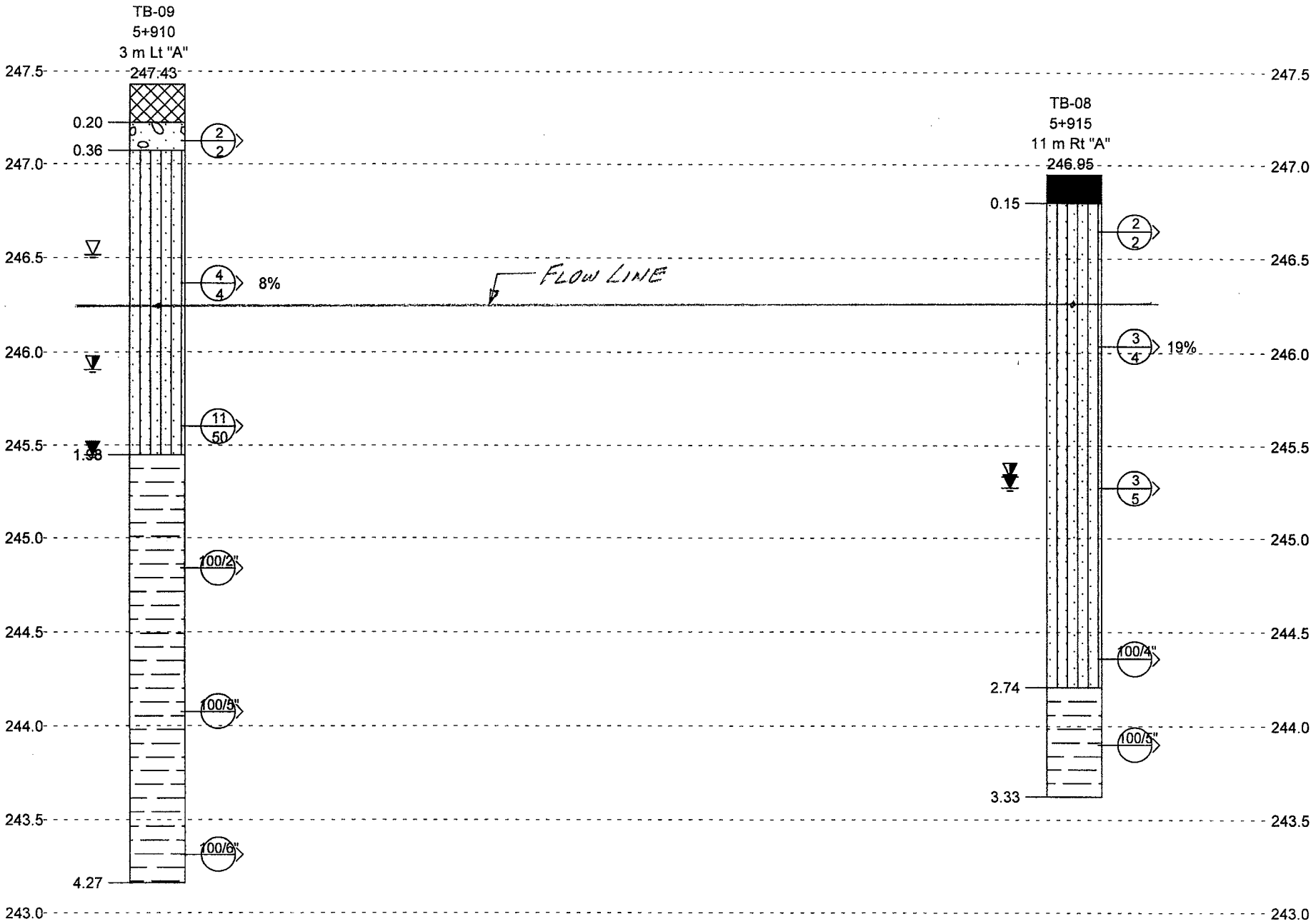
Footings are expected on Very stiff loam (till)$\Rightarrow$
$q_u > 10000$ psf (tested samples of TB-06/SS-4 & TB-07/SS 3) $\Rightarrow$
For $\phi = 0$, $C = 10000 \div 2 \approx 5000$ psf, $\gamma_t = 140$ pcf
For $\phi = 0 \Rightarrow N_c = 5.14$ (Meyerhof)

ALLOWABLE BEARING CAPACITY

Ultimate Bearing Capacity, q_{ult} $= C N_c$
$= 10000 \times 5.14$
$= 51400$ psf
Allowable Bearing Capacity, q_{all} $= q_{ult} \div FS = 51400 \div 3 \cong 17000$ psf

USE 5000 psf (240 kPa) to limit settlement. Width of footings should be no less than 400mm (16 inches) to limit puncture shear.

****



GENERALIZED SOIL PROFILE
3000 X 1200 Concrete Box Culvert at Station 5+912
STP-3229 (005), CTL No.: 02-050011

INDOT.ENG.HOR SR238.GPJ CTLMET.GDT 8/13/02

FOUNDATION RECOMMENDATIONS

Structure: 3000mm x 1200mm of Precast Concrete Box Culvert @ Station 5+912
Location: SR 238
Project No.: STP-3229 (005)
Des. No.: 9706600, 0006610 & 0006620
CTL No.: 02-050011

DATA

1. Box Culvert 3000mm x 1200mm (9.8' x 4') to be placed at Station 5+912 with Flow Line @ Elev. 246.30 to 246.25.

2. Assume wingwalls will be placed on continuous footings at 4' (1.20 m) below flow line corresponding to elevation 245.1 to 245.05. Wingwall footings will be placed on medium stiff sandy loam at inlet and possibly on decomposed shale/sandstone at outlet.

3. Surface water and/or groundwater may be encountered during construction. Sump pumps or any dewatering system suggested by Contractor and approved by Engineer may be used.

BOX CULVERT

1. The box culvert may be placed on existing soils provided that all soft/very loose sandy loam soils are removed and replaced with "B" Borrow.

2. Groundwater and surface water may be encountered during construction.

WINGWALLS

Footings are expected on decomposed rock or medium stiff sandy loam; sandy loam governs $\Rightarrow$
q_u = 2450 psf (tested sample of TB-08/SS-2) $\Rightarrow$
For $\phi = 0$, C = 2450 $\div$ 2 $\approx$ 1225 psf, γ_t =137 pcf
For $\phi = 0 \Rightarrow N_c = 5.14$ (Meyerhof)

ALLOWABLE BEARING CAPACITY

Ultimate Bearing Capacity, q_{ult} $= C N_c$
$= 1225 \times 5.14$
$= 6300$ psf
Allowable Bearing Capacity, q_{all} $= q_{ult} \div FS = 6300 \div 3 \cong 2100$ psf; **USE 2100 psf (100 kPa)**

Width of footings on decomposed rock should be no less than 400mm (16 inches). No swell test was performed on shale. However based on visual observation of recovered samples, the shale rock is mixed with sandstone (sandy shale) that may be less susceptible to shrinkage/swell. Footings on rock should be verified during construction.

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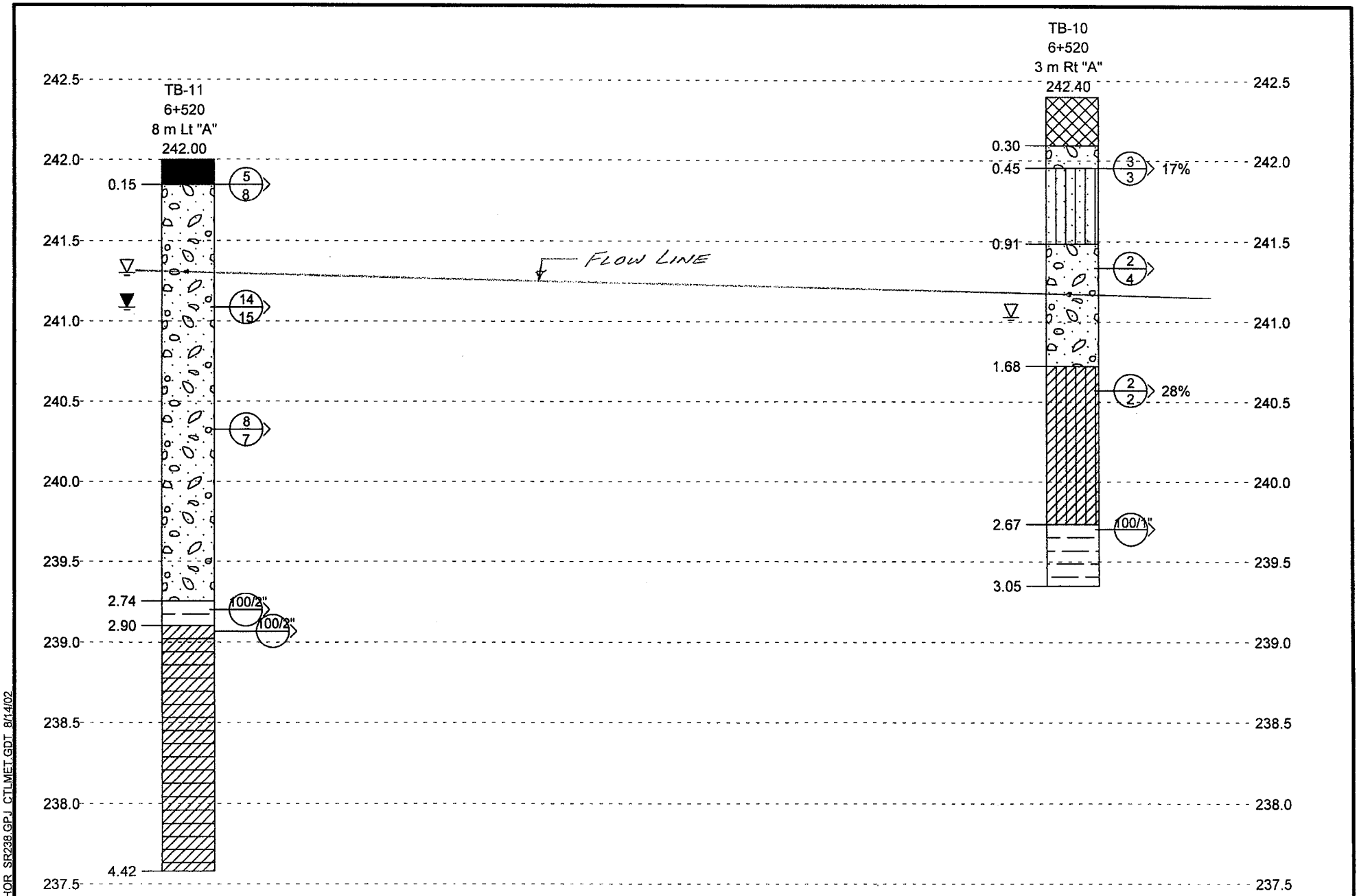

GENERALIZED SOIL PROFILE

1200 X 600 Concrete Box Culvert at Station 6+520

STP-3229 (005), CTL No.: 02-050011

INDOT ENG_HOR_SR238.GPJ_CTLMET.GDT_8/14/02

FOUNDATION RECOMMENDATIONS

Structure No.: 1200mm x 600mm of Precast Concrete Box Culvert @ Station 6+520
Location: SR 238
Project No.: STP-3229 (005)
Des. No.: 9706600, 0006610 & 0006620
CTL No.: 02-050011

DATA

1. Box Culvert 1200mm x 60mm to be placed at Station 6+520 with Flow Line @ Elev. 241.34 to 241.21.

2. Assume wingwalls will be placed on continuous footings at 4' (1.20 m) below flow line corresponding to elevations ranging between 240.14 and 240.01. Wingwall footings will be placed on medium dense sand or soft clay.

3. Groundwater and/or surface water flowing through existing structure are expected. Sump pumps or any dewatering system suggested by Contractor and approved by Engineer may be used.

BOX CULVERT

1. The box culvert may be placed on existing soils provided that all loose sand and gravel are densified with a vibratory roller or removed and replaced with "B" Borrow to a minimum depth of 24 inches. The upper 24 inches should be compacted 100% of the maximum dry density.

2. Groundwater and/or surface water is expected during construction.

WINGWALLS

1. Footings are expected:

   On medium dense sand (TB-11)
   N = 15 bpf in sand $\Rightarrow$ Estimated $\phi = 30°$, c = 0, γ_t =120 pcf & γ_{sub} = 115 - 62.4 = 57.6 pcf

   Or on soft clay soils (TB-10)
   q_u = 840 psf (tested sample of TB-10/SS-3) $\Rightarrow$
   For $\phi = 0$, C = 840 ÷ 2 $\approx$ 420 psf, γ_t =125 pcf
   For $\phi = 0 \Rightarrow N_c = 5.14$ (Meyerhof)

2. Water expected above footings (longterm)

ALLOWABLE BEARING CAPACITY

Footings on Sand

Assume depth of footings, D_f = At ±4' below flow line, and
B = 2'
B = 3'
B = 4'
B = 5'
B = 6'

Ultimate Bearing Capacity, $q_{ult} = c\,N_c + \gamma_{sub}\,D_f\,N_q + 0.5\,\gamma_{sub}\,B\,N_\gamma$
Allowable Bearing Capacity, $q_{all} = (q_{ult} - \gamma_{sub}\,D_f) \div FS$

ϕ	c	N_c	N_q	N_γ	D_f	B	γ_t	γ_{sub}	FS	q_{ult}	q_{all}	Recommended q_{all}	
												psf	kPa
30	0	30.14	18.40	22.40	4	2	115	52.6	3	5050	1613	**1600**	**75**
30	0	30.14	18.40	22.40	4	3	115	52.6	3	5639	1809	**1800**	**85**
30	0	30.14	18.40	22.40	4	4	115	52.6	3	6228	2076	**2000**	**100**
30	0	30.14	18.40	22.40	4	5	115	52.6	3	6817	2272	**2200**	**110**
30	0	30.14	18.4	22.4	4	6	115	52.6	3	7406	2469	**2400**	**120**

N_c, N_q, N_γ after Meyerhof

Footings on Clay

Ultimate Bearing Capacity, q_{ult} = $C\,N_c$
= 420 x 5.14
= 2158 psf
Allowable Bearing Capacity, q_{all} = $q_{ult} \div FS$ = 2158 ÷ 3 ≅ **700 psf (35 kPa)** (very low)

CONCLUSIONS & RECOMMENDATIONS

Footings will be founded on sand at inlet and on soft clay at outlet. Due to low bearing capacity of clay soils (700 psf) at outlet, it is recommended that all soft clay soils be removed to decomposed rock or stiffer materials. The cavity resulted from over-excavation may be backfilled with lean concrete. Bearing capacity values tabulated above may be used at both ends of culvert for identical footing design.

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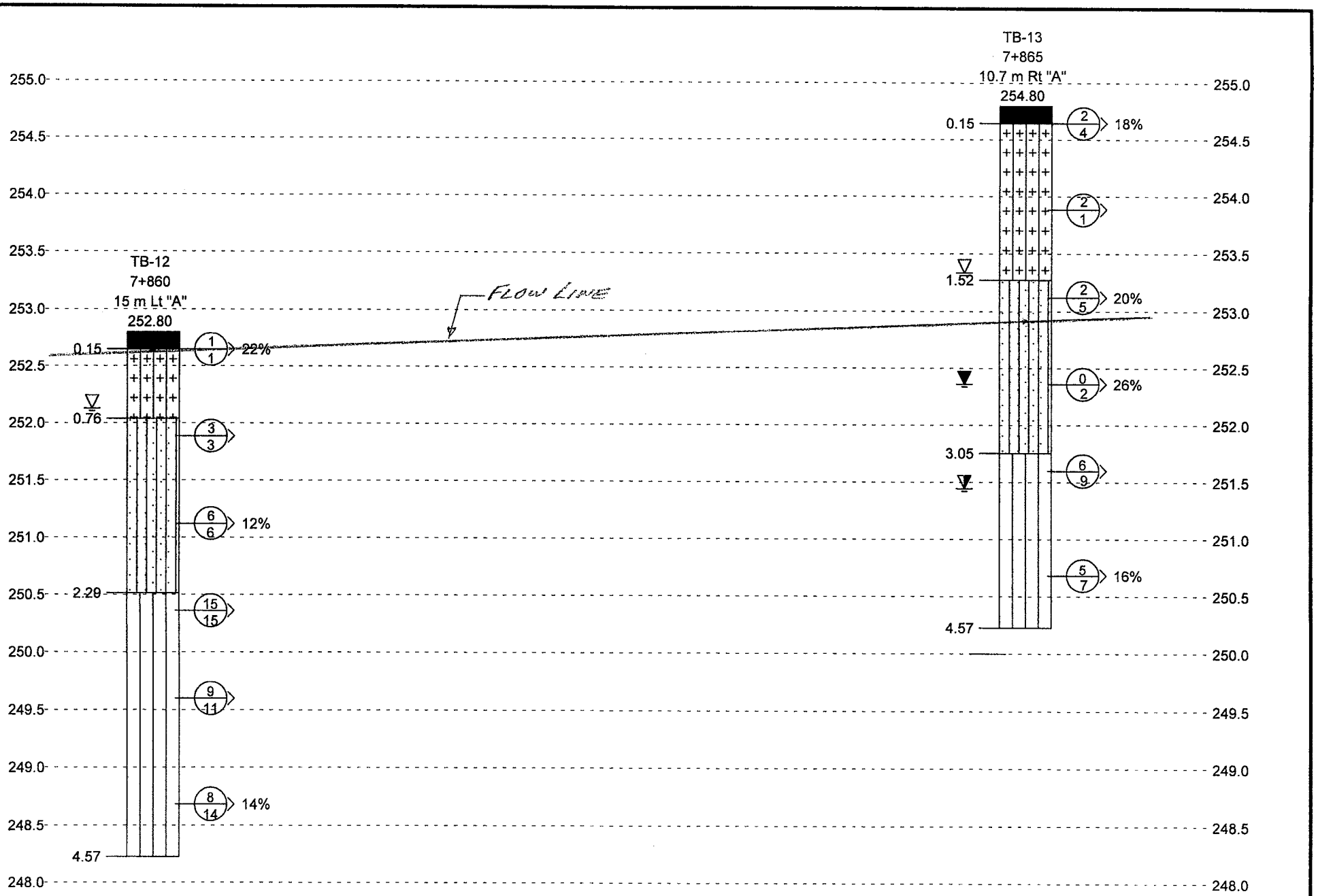


GENERALIZED SOIL PROFILE

1200 X 1200 Concrete Box Culvert at Station 7+864

STP-3229 (005), CTL No.: 02-050011

INDOT.ENG.HOR SR238.GPJ CTLMET.GDT 8/13/02

APPENDIX F

SETTLEMENT ANALYSIS OF NEW EMBANKMENT

SETTLEMENT ANALYSIS OF EMBANKMENT FILL

SR 238 from 136th Street to Michigan Street
Station 7+300
Project No.: STP-3229 (005), CTL No.: 02-050011

Refer to Page No. 152 of FHWA Publications

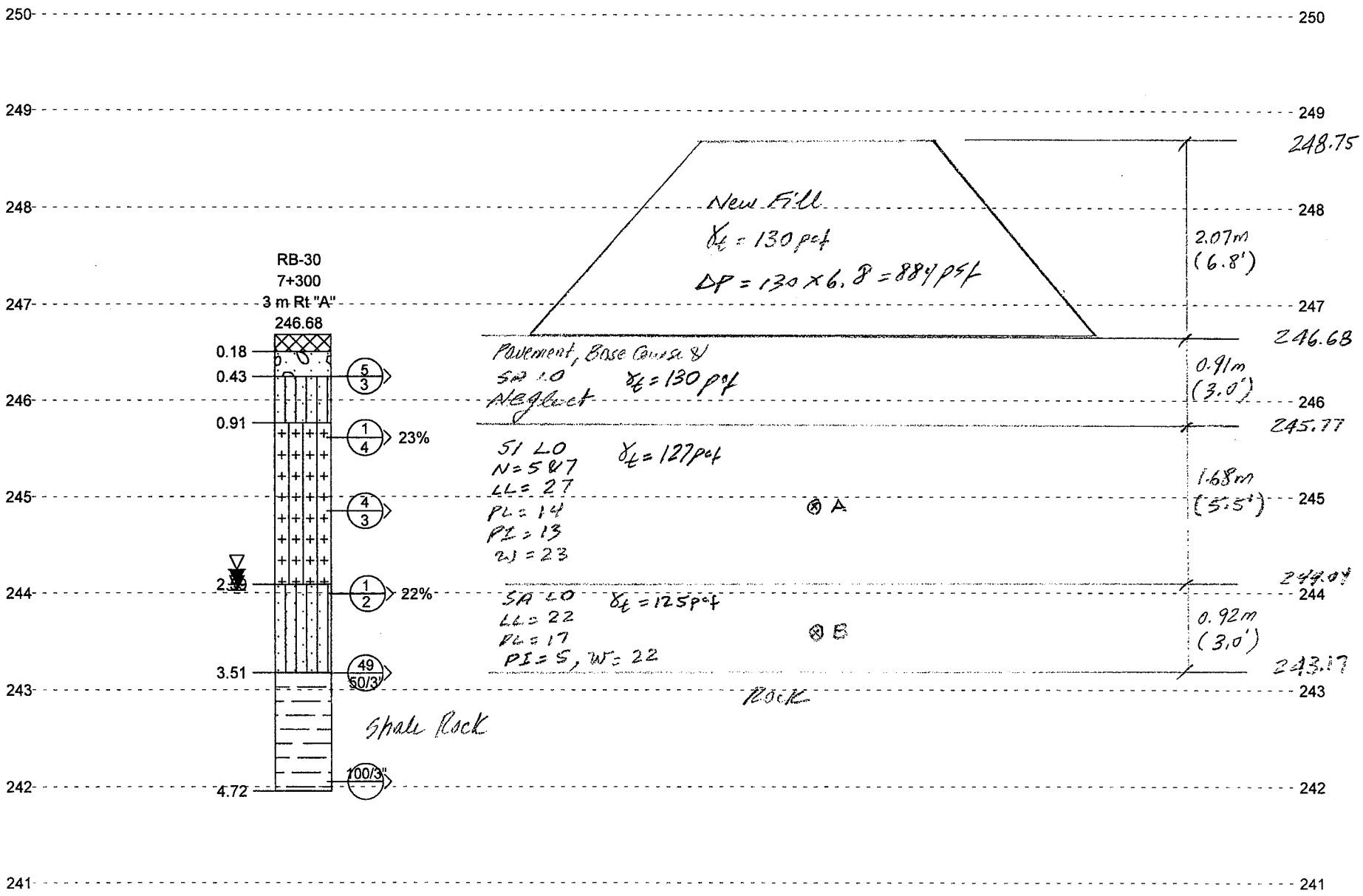
At A: LI = (w-PL)/PI = (23 - 14) / 13 = 0.692 Normally Consolidated
e_o = (Gs * w) / 100 = (2.69*23) / 100 = 0.619
Cc = w / 100 = 23 / 100 = 0.230

At B: LI = (w-PL)/PI = (22 -17) / 5 = 1.000 Normally Consolidated
e_o = (Gs * w) / 100 = (2.67*22) / 100 = 0.587
Cc = w / 100 = 22 / 100 = 0.220

Equation used to calculate settlement:

$H = H [C_c / (1 / e_o)] \log [(P_o + \text{Delta P}) / P_o)]$ Normally Consolidated

Point	Material Type	Layer Thicknes (feet)	Unit Weight (pcf)	Cc	e_o	P_o (psf)	Delta P (psf)	Settlement (inches)
A	SI LO	5.5	135	0.230	0.619	740	884	3.20
B	SA LO	3.0	135	0.220	0.587	1180	884	1.21
TOTAL ESTIMATED SETTLEMENT								**4.41**



SETTLEMENT ANALYSIS
New Embankment on SR 238
Stations 7+130 to 7+450
STP-3229 (005), CTL No.: 02-050011

INDOT ENG HOR SR238.GPJ CTLMET.GDT 8/14/02

2 of 3

Settlement Computation For Cohesive Soils

1. Analyse consolidation test data to determine:

   a. Preconsolidation pressure (Pc)

   b. Initial void ratio (e_o) at Po

   c. Compression and recompression indices (Cc and Cr)

1. (ALT.) In the absence of consolidation test data, settlement may be approximated using Atterberg limit and moisture content data. This method is only recommended for use in final design if soils exist which are not suited for lab testing, i.e., surface muck deposits.

   a. Soil may be assumed to be preconsolidated to pressures above typical embankment loadings if the liquidity index ([moisture content minus plastic limit] divided by plastic index) is less than 0.7.

   b. Initial void ratio, e_o, determined by multiplying the moisture content by the specific gravity and dividing by 100.

   c. Cc and Cr are determined by dividing the moisture content by 100 and 1,000 respectively.

   Example: moisture content 30, liquid limit 50, plastic limit 25, specific gravity 2.75

$$\text{Liquidity index} = \frac{30 - 25}{50 - 25} = 0.2 \quad \text{(preconsolidated, see "a" above)}$$

$$e_o = \frac{(2.75)\ (30)}{100} = 0.825$$

$$Cr = \frac{30}{1000} = 0.03$$

$$Cc = \frac{30}{100} = 0.30$$

2. Compute settlement in 10' $\pm$ increments of depth or at soil layer boundaries using:

$$\Delta H = H \left(\frac{Cc}{1 + e_o} \right) \log \frac{PF}{Po}$$

(for normally consolidated soils only, see page 154 for preconsolidated soils)

FOUNDATION RECOMMENDATIONS

Structure:	3600mm x 1500mm of Precast Concrete Box Culvert @ Station 4+196
Location:	SR 238
Project No.:	STP-3229 (005)
Des. No.:	9706600, 0006610 & 0006620
CTL No.:	02-050011

DATA

1. Box Culvert 3600mm x 1500mm (11.8' x 5') to be placed at Station 4+196 with Flow Line @ Elev. 252.60 to 252.30.

2. Assume wingwalls will be placed on continuous footings at 4' (1.20 m) below flow line corresponding to elevation 251.4 to 251.1. Wingwall footings will be placed on stiff to hard loam (till).

3. Surface water and/or groundwater may be encountered during construction. Sump pumps or any dewatering system suggested by Contractor and approved by Engineer may be used.

BOX CULVERT

1. The box culvert may be placed on existing soils provided that all soft/very loose sandy loam soils are removed and replaced with "B" Borrow. Limits of soil removal are estimated between 5m Rt and 17m Lt to Elev. 251.90.

2. Groundwater and surface water may be encountered during construction.

WINGWALLS

Footings are expected on Very stiff loam (till)$\Rightarrow$
$q_u > 10000$ psf (tested samples of TB-06/SS-4 & TB-07/SS 3) $\Rightarrow$
For $\phi = 0$, $C = 10000 \div 2 \approx 5000$ psf, $\gamma_t = 140$ pcf
For $\phi = 0 \Rightarrow N_c = 5.14$ (Meyerhof)

ALLOWABLE BEARING CAPACITY

Ultimate Bearing Capacity, q_{ult} $= C N_c$
$= 10000 \times 5.14$
$= 51400$ psf
Allowable Bearing Capacity, q_{all} $= q_{ult} \div FS = 51400 \div 3 \cong 17000$ psf

USE 5000 psf to limit settlement. Width of footings should be no less than 400mm (16 inches) to limit puncture shear.

****

FOUNDATION RECOMMENDATIONS

Structure: 3000mm x 1200mm of Precast Concrete Box Culvert @ Station 4+912
Location: SR 238
Project No.: STP-3229 (005)
Des. No.: 9706600, 0006610 & 0006620
CTL No.: 02-050011

DATA

1. Box Culvert 3000mm x 1200mm (9.8' x 4') to be placed at Station 5+912 with Flow Line @ Elev. 246.30 to 246.25.

2. Assume wingwalls will be placed on continuous footings at 4' (1.20 m) below flow line corresponding to elevation 245.1 to 245.05. Wingwall footings will be placed on medium stiff sandy loam at inlet and possibly on decomposed shale/sandstone at outlet.

3. Surface water and/or groundwater may be encountered during construction. Sump pumps or any dewatering system suggested by Contractor and approved by Engineer may be used.

BOX CULVERT

1. The box culvert may be placed on existing soils provided that all soft/very loose sandy loam soils are removed and replaced with "B" Borrow.

2. Groundwater and surface water may be encountered during construction.

WINGWALLS

Footings are expected decomposed rock or medium stiff sandy loam; sandy loam governs $\Rightarrow$
q_u = 2450 psf (tested sample of TB-08/SS-2) $\Rightarrow$
For $\phi = 0$, C = 2450 $\div$ 2 $\approx$ 1225 psf, γ_t =137 pcf
For $\phi = 0 \Rightarrow N_c = 5.14$ (Meyerhof)

ALLOWABLE BEARING CAPACITY

Ultimate Bearing Capacity, q_{ult} $= C N_c$
$= 1225 \times 5.14$
$= 6300$ psf
Allowable Bearing Capacity, q_{all} $= q_{ult} \div FS = 6300 \div 3 \cong 2100$ psf; **USE 2000 psf**

Width of footings on decomposed rock should be no less than 400mm (16 inches). No swell test was performed on shale. However based on visual observation of recovered samples, the shale rock is mixed with sandstone (sandy shale) that may be less susceptible to shrinkage/swell. Footings on rock should be field verified during construction.

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Indiana Department of Transportation

Materials and Tests Division
120 South Shortridge Road P.O. Box 19389
Indianapolis, Indiana 46219-0389
Phone: (317) 232-5280 Fax: (317) 356-9351

December 31, 2001

Mr. Phelps Klika, Chief
Division of Design
Room N642 - IGCN

Attention: Ms Hollie Bays
Project Coordinator

Subject: Geotechnical Investigation (IN-HOUSE)
Des No: 9706630
Project No: STP- 5348()
Structure No. N/A
SR 238 (Michigan Street) in Fortville from Merrill Street to Madison Street
County: Hancock
District: Greenfield

Gentlemen:

The subject project involves Road reconstruction including pavement widening and pavement replacemen for the relocation of SR 238. The limits of the project are from Station 10+003 Line "A" to Station 10+648 Line "A"..

Six borings were performed with split spoon sampling during the field investigation. A boring log was prepared for each boring showing soil classification and stratification as well as other pertinent data. Laboratory tests were performed to identify the soils and to determine their strength characteristics. Copies of the General Site Plan, Boring logs and laboratory test results are transmitted herewith.

Following are the findings and recommendations of the INDOT Geotechnical Section:

ROADWAY

Findings:

Borings RB-1 through RB-6 encountered primarily brown and gray medium stiff to very stiff silty clay and loose to dense sandy loam and sand. All borings were dry at completion.

Recommendations:

1. Special Subgrade treatment for a depth of 400 mm (16") is recommended with CBR value of 4.0 for this project.

2. A subsurface drain with filter fabric is recommended for this project.

SEWERS

1. Any unsuitable soil encountered in the excavation for the sewers should be removed and replaced with compacted "B" Borrow to achieve a stable base.

2. Water levels should be maintained below the sewer trench excavation bottom. A proper dewatering system should be kept ready. If necessary, groundwater control in the near surface soils can likely be achieved through the use of sump pumps or shallow well points. It should be noted that any dewatering program should consider the potential for damage to existing structures in the vicinity.

3. The "B" Borrow for structure backfill should be placed around the drainage structure in uniform layers, not exceeding 150mm loose lift thickness, and mechanically compacted thoroughly to produce the required dry density. The backfill material should be placed and compacted in layers simultaneously on each side of the structure.

4. Some of the excavations for the sewers will be in sandy soils. These excavations will require cut slopes adequate to prevent cave-ins or subsidence, or sheeting for safe construction operation. The method used will probably be dictated by final design and field conditions at the time of construction. It should be noted that Indiana Occupational Safety and Health Administration (IOSHA) regulations will not allow unprotected open cuts beyond approximately 1.5 m. Therefore trenches deeper than 1.5 m will require adequate sheeting, shoring, flattened slopes or a "safety box". If sheeting or boxes are required, they should be used in a way as not to disturb the embedment materials within two pipe diameters on each side of the pipe or within twice the width of the culvert. Excavated material should not be stored immediately adjacent to the top of the cut.

GENERAL RECOMMENDATIONS

1. Where existing ditches will be covered by embankment construction, all soft sediments should be stripped and replaced with "B" Borrow to an elevation 0.6 m (2') above ground water level. If ground water is not encountered during the removal operations, the backfill shall be accordance with 203.09.

2. Proofrolling of the natural ground surface should be specified in accordance with Standard Specifications, Section 203.26, within all areas where new fill will be placed. Any soft soils encountered during the proofrolling operations, which will not readily compact, should be removed and replaced with "B" Borrow to an elevation 0.6 m (2') above ground water level, if ground water is encountered. Otherwise, backfilling should be accomplished in accordance with Section 203.09.

3. Cohesionless granular material should not be used in ditches or within 305 mm (12") of the required finished surface of fill slopes. The material required to encase the surface slope should be non-erodible material free from clods, debris, and stones and suitable for sustaining vegetation.

General soil strata descriptions and indicated boundaries are based on a engineering interpretation of all available subsurface information by the Geotechnical Section of the INDOT and may not necessarily reflect the actual variation in subsurface conditions between borings and samples. Detailed data and field interpretation of conditions encountered in individual borings are shown on the boring logs.

The observed water levels and/or conditions indicated on the boring logs are as recorded at the time of exploration. These water levels and/or conditions may vary considerably, with time, according to the prevailing climate, rainfall or other factors and are otherwise dependent on the duration of, and methods used, in the exploration program.

If you have any questions, please contact us.

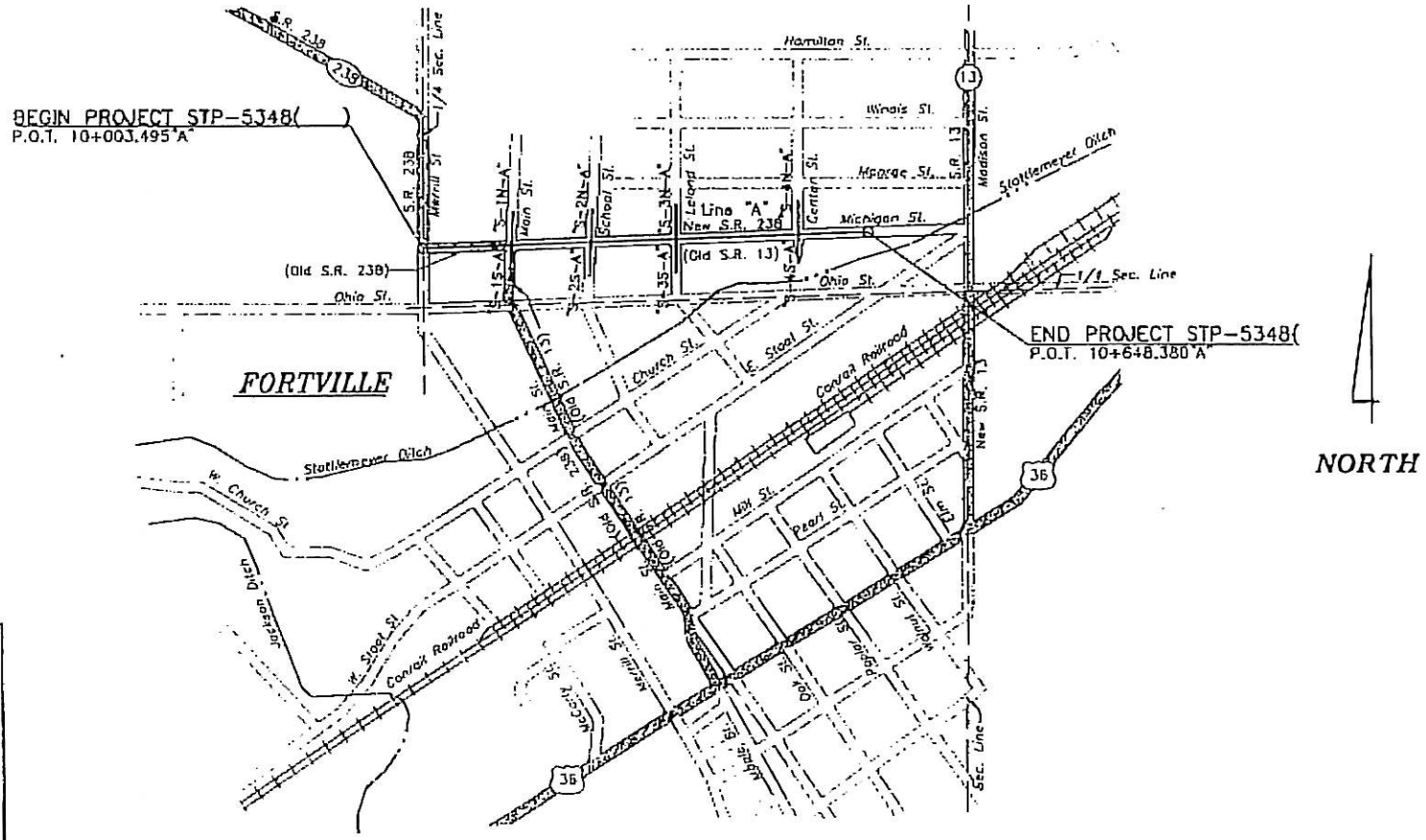
Very truly yours,

S. S. Hamman
for Athar A. Khan
Chief Geotechnical Engineer

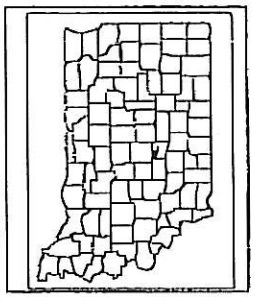
Steve Morris
Steve Morris
Geotechnical Engineering Group Leader

KJ
cc: The Corradino Group-Attn: Mr. David M. Pluckebaum-Attachments.
Mr. D. Cohen- Attachments
Mr. D. Eastin - Attn: Mr. B. Davis - Attachments (2)
Ms. Mary Jo Hamman-Attn: Mr. S. Nezovich-Attachments.
Mr. Dave Andrewski – Attachments
Mr. J. Schneider-Attachments
Attachments
H:rpts/KJ/ 9611030

GENERAL SITE LOCATION PLAN



NOT TO SCALE



GEOTECHNICAL ENGINEERING SECTION

DES NO: 9706630
PROJECT NO: STP-5348( )
STRUCTURE NO: N/A/
LOCATION: S.R.238 (MICHIGAN ST.)
IN THE TOWN OF FORTVILLE.
COUNTY: HANCOCK

PREPARED BY: R.C.W.
CHECKED BY: K.J.
DATE: 12/31/2001

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: RB-1
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 262.1 m
STATION/OFFSET/LINE 10 + 050 3.0m RT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DRY : AFTER 24 HRS: BACKFILLED CAVED: 2.53m

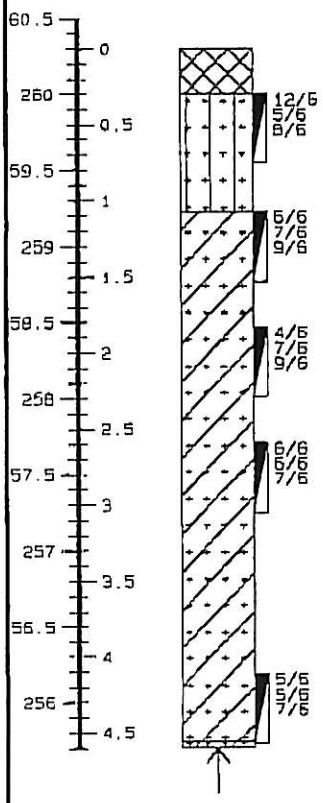
ELEV. / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
262 / 0	2/6 4/6 4/6	ASPHALT (VISUAL)				
261.5 / 0.5		GRAY, MOIST, MEDIUM STIFF TO STIFF, CLAY LOAM #01-10427 & #01-10480		SS-1	70	
261 / 1	4/6 5/6 8/6			SS-2	75	
260.5 / 1.5						
260 / 2	3/6 4/6 5/6			SS-3	100	
259.5 / 2.5	21/6 25/6 23/6	BROWN, WET, DENSE, SANDY LOAM W/GRAVEL (VISUAL)		SS-4	100	
259 / 3						
258.5 / 3.5						
258 / 4	6/6 8/6 8/6	GRAY, MOIST, VERY STIFF, SILTY CLAY (VISUAL)		SS-5	100	
257.5 / 4.5		BTH 4.57m (15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 50 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: AB-2
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 260.3 m
STATION/OFFSET/LINE 10 + 140 3.0m RT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DAY : AFTER 24 HRS: BACKFILLED CAVED: 2.59m

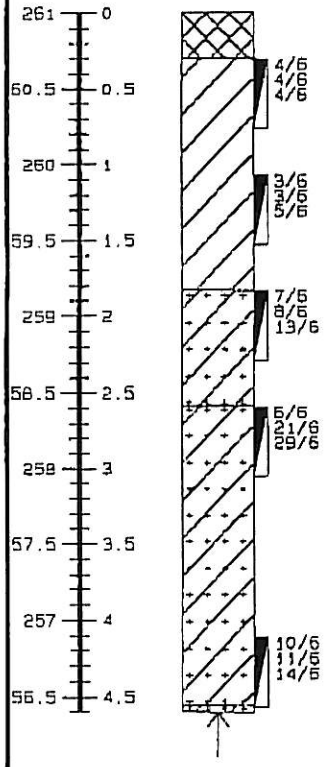


ELEV. / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
		ASPHALT (VISUAL)				
		GRAY, MOIST, MEDIUM DENSE, SILTY LOAM W/GVL (VISUAL)		SS-1	50	
		GRAY & BROWN, MOIST, VERY STIFF TO STIFF, SILTY CLAY (VISUAL)		SS-2	100	
				SS-3	100	
				SS-4	100	
				SS-5	100	
		BTH 4.57m(15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: RB-3
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 261.0 m
STATION/OFFSET/LINE 10 + 230 3.0m RT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DAY : AFTER 24 HRS: BACKFILLED CAVED: 2.32m



ELEV. / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
		ASPHALT (VISUAL)				
		GRAY, MOIST, MEDIUM STIFF, CLAY #01-10445		SS-1	60	
				SS-2	100	
		BROWN, MOIST, VERY STIFF, SILTY CLAY W/TR ORGANICS		SS-3	40	
		GRAY, MOIST, HARD TO STIFF SILTY CLAY (VISUAL)		SS-4	80	
				SS-5	100	
		BTH 4.57m (15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: RB-4
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 260.4 m
STATION/OFFSET/LINE 10 + 380 3.0m RT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DRY : AFTER 24 HRS: BACKFILLED CAVED: 2.38m

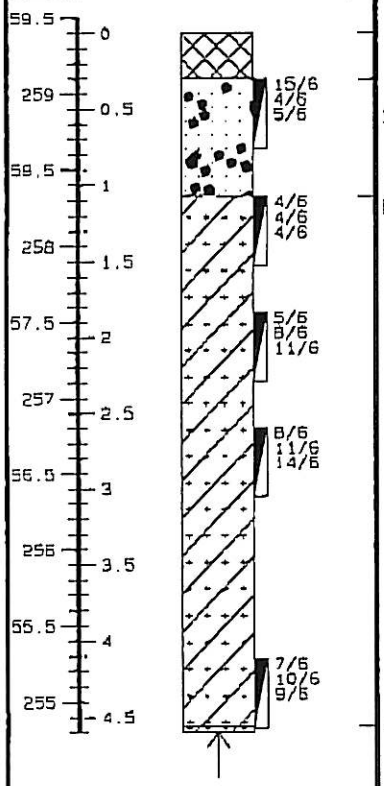
ELEV. / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
260.4 / 0		ASPHALT (VISUAL)				
260 / 0.5	4/6 3/6 5/6	GRAY, MOIST, MEDIUM STIFF, SILTY CLAY (VISUAL)		SS-1	70	
259.5 / 1	4/6 5/6 5/6	GRAY, MOIST, MEDIUM STIFF TO VERY STIFF, SILTY CLAY (VISUAL)		SS-2	10	
259 / 1.5						
258.5 / 2	4/6 5/6 5/6			SS-3	100	
258 / 2.5						
257.5 / 3	5/6 6/6 17/6			SS-5	100	
257 / 3.5						
256.9 / 4	10/6 10/6 10/6			SS-5	30	
256 / 4.5		BTH 4.57m (15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: BB-5
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 259.4 m
STATION/OFFSET/LINE 10 + 500 1.0m LT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DAY : AFTER 24 HRS: BACKFILLED CAVED: 2.29m



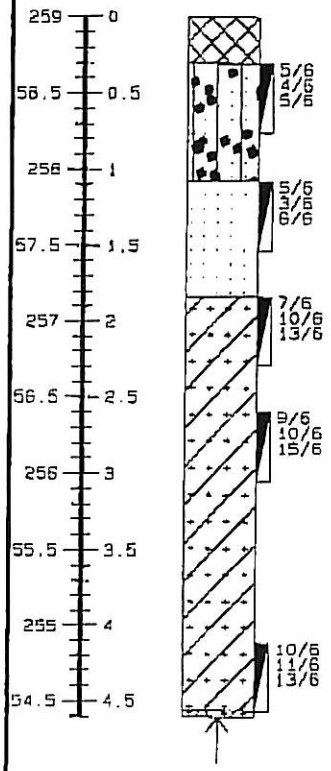
Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
ASPHALT (VISUAL)				
BROWN, MOIST, LOOSE, SAND & GRAVEL W/CLAY SEAM (VISUAL)		SS-1	100	
BROWN & GRAY, MOIST, MEDIUM STIFF TO VERY STIFF, SILTY CLAY (VISUAL)		SS-2	20	
		SS-3	80	
		SS-4	100	
		SS-5	25	
BTH 4.57m(15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: RB-6
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 259.0 m
STATION/OFFSET/LINE 10 + 620 OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.DAY : AFTER 24 HRS: BACKFILLED CAVED: 2.68m



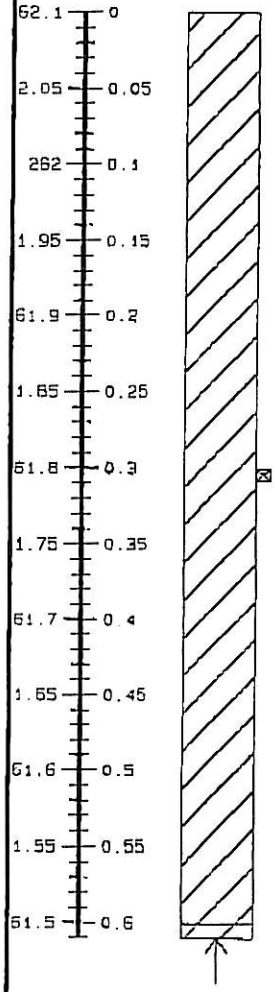
Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
ASPHALT (VISUAL)				
GRAY, MOIST, LOOSE, SANDYLOAM W/GRAVEL (VISUAL)		SS-1	90	
BROWN, MOIST, LOOSE, MEDIUM DENSE, SAND (VISUAL) W/SI-CL SEAM AT 1.37m	STIFF AT 1.37m SI-CL SEAM	SS-2	100	
GRAY, MOIST, VERY STIFF, SILTY CLAY W/GVL (VISUAL)		SS-3	100	
		SS-4	100	
		SS-5	100	
BTH 4.57m (15.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

INDIANA DEPARTMENT OF TRANSPORTATION

PROJECT NO: STP-5348( ) DES NO: 9706630 BORING No: CBR-1
STRUCTURE NO: N/A COUNTY: HANCOCK ROAD NO: S.R.238
PROJECT LOCATION: S.R.238 IN THE CITY OF FORTVILLE, IN. ELEV: 262.1 m
STATION/OFFSET/LINE 10 + 050 4.0m RT OF LINE "A" START 11/05/01
BORING METHOD @ RIG TYPE: HSA/TRUCK .20m DIA.BORING. FINISH 11/05/01
WATER DEPTH @ COMP.N/A : AFTER 24 HRS: BACKFILLED CAVED: N/A

ELEV. / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	Description	Remarks	SAMPLE NO:	RECOV %	Qu Kpa
62.1 / 0		CBR BAG SAMPLE TAKEN ONLY FROM .30m TO .61m				
2.05 / 0.05						
262 / 0.1						
1.95 / 0.15						
61.9 / 0.2						
1.85 / 0.25						
61.8 / 0.3				CBR-1	100	
1.75 / 0.35						
61.7 / 0.4						
1.65 / 0.45						
61.6 / 0.5						
1.55 / 0.55						
61.5 / 0.6		BTH .61m (2.0')				

DRILLER: DT INSPECTER: JP DATUM: USC & GS
WEATHER: SUNNY TEMP: 52 F PAGE: 1 OF 1

DIVISION OF MATERIALS AND TESTS

SUMMARY OF CLASSIFICATION TEST RESULTS

DES. NO. 9706610
PROJECT NO. STP-5349()
STRUCTURE NO. NA
COUNTY Hancock

LABORATORY NUMBER	PART	BORING NUMBER	STATION	OFFSET LINE	SAMPLE NUMBER	SAMPLE DEPTH	TEXTURAL/ UNIFIED	AASHTO	NO. 10	NO. 40	NO. 200	GRAVEL 76.2 - 2.00 mm	SAND 2.00- 0.074 mm	SILT 0.074- 0.002 mm	CLAY BELOW 0.002 mm	BELOW 0.001 mm	LL	PL	PI
'079110427		RB-1	10+050	3m RT of A	SS 2 T	3.5-5.0'	CLAY LOAM	A-4(4)	96.5	93.4	75.1	3.5	21.4	47.5	27.6	20.5	24.8	15.8	9.0
'079110445		RB-3	10+230	3m RT of A	SS 1 T	1.0-2.5'	CLAY	A-7-6(21)	99.3	98.4	79.3	0.7	20.6	44.2	35.1	30.1	45.0	18.2	26.
079110449		RB-3	10+230	3m RT of A	SS 3 T	6.0-7.5'	SOIL W/TR ORGANICS												
079110480		CBR-1	10+050	4m RT of A	CBR-1	1.0-2.0'	CLAY LOAM	A-6(5)	93.6	87.2	64.8	6.4	28.8	41.4	23.4	17.1	26.1	14.5	11.

2/13/01

ES NO. 9706630

SUMMARY OF SPECIAL LABORATORY TEST RESULTS

DES. NO. 9706630
PROJECT NO. STP-5348()
STRUCTURE NO. NA
COUNTY Hancock

LABORATORY NUMBER	PART	BORING NUMBER	SAMPLE NUMBER	DEPTH	NATURAL WATER CONTENT (%)	pH VALUE	LOI (%)	CA & MG (%)	NATURAL WET DENSITY (pcf)	NATURAL DRY DENSITY (pcf)	MAX DRY DENSITY (pcf)	OPT. MOIST (%)	CBR @93%	CBR @97%	COHESION (Qu/2) (psf)
17079110426		RB-1	SS 1 B	1.0-2.5'	16.5										
17079110427		RB-1	SS 2 T	3.5-5.0'	12.6	7.7									
.7079110445		RB-3	SS 1 T	1.0-2.5'	21.5	7.8									
.7079110449		RB-3	SS 3 T	6.0-7.5'	15.1		3.3								
7079110455		RB-4	SS 1 B	1.0-2.5'	22.3				127.0	103.8					1682
7079110457		RB-4	SS 3 T	6.0-7.5'	14.9				138.1	120.2					
7079110459		RB-4	SS 4 T	8.5-10.0'	12.0				143.7	128.3					4613
7079110465		RB-5	SS 3 T	6.0-7.5'	16.9										
7079110467		RB-5	SS 4 T	8.5-10.0'	9.7										
7079110469		RB-5	SS 5 T	13.5-15.0'	16.4										
7079110473		RB-6	SS 2 B	3.5-5.0'	14.4				139.7	122.1					2316
7079110478		RB-6	SS 5 T	13.5-15.0'	9.2				148.0	135.5					8232
7079110480		CBR-1	CBR-1	1.0-2.0'	11.5	7.7					123.1	11.8	3.2	4.6	