CTL Engineering, Inc.
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Consulting Engineers – Testing – Inspection Services – Analytical Laboratories

July 17, 2023

American Structurepoint, Inc.
9025 River Road, Suite 200
Indianapolis, IN 46240

Attention: Nicholas R. Murphy, PE

Reference: Geotechnical Investigation
Des No.: 2005FFE
Fortville Pike and CR 300 N Roundabout
Hancock County, Indiana
CTL Project No.: 22050123IND

Dear Mr. Murphy:

In accordance with your authorization to proceed, CTL Engineering, Inc. has completed the geotechnical investigation on the above referenced site. The report includes the results of the field and laboratory testing, and pavement considerations for the roundabout construction.

Thank you for the opportunity to be of service to you on this project. If you have any questions or need further information, please contact us at (317) 295-8650.

Sincerely,

CTL ENGINEERING, INC.

Anthony L. Mason, PE
Senior Geotechnical Engineer

GEOTECHNICAL INVESTIGATION

DES NO: 2005FFE
FORTVILLE PIKE AND CR 300 N ROUNDABOUT
HANCOCK COUNTY, INDIANA
CTL PROJECT NO.: 22050123IND

PREPARED FOR:

AMERICAN STRUCTUREPOINT, INC.
9025 RIVER ROAD, SUITE 200
INDIANAPOLIS, IN 46240

PREPARED BY:

CTL ENGINEERING, INC.
1310 S. FRANKLIN ROAD
INDIANAPOLIS, INDIANA 46239

JULY 17, 2023

EXECUTIVE SUMMARY

Des No: 2005FFE
Fortville Pike and CR 300 N Roundabout
Hancock County, Indiana

Project Description: The project involves the construction of a new roundabout at the intersection of Fortville Pike and CR 300 N. Plans for the roundabout construction and the traffic data were not available at the time of this report preparation.

Subsurface Conditions: The test borings drilled on the travel lanes of CR 300 N and Fortville Pike exhibited full depth hot mix asphalt pavement at the surface with approximate thickness of 12 inches overlying subbase consisting of sand and gravel and crushed stone and ranging in thickness of 6 to 18 inches. Highly fractured concrete was encountered between HMA and subbase layer in RB-5. RB-7 encountered topsoil at the surface with approximate thickness of 5.5 inches. Below the existing pavement and/or surficial soil, the test borings encountered soils classified as loam, clay loam, sandy clay loam and sandy clay loam of A-4 and A-6 soil categories.

Pavement Considerations: Subsequent to removal of existing pavement and site grading, the exposed foundation soils should be proofrolled in accordance with INDOT Standard Specifications (ISS) 203.26, where applicable. Depending upon the time of construction and amount of precipitation, the foundation soils may exhibit unstable condition under proofrolling. In such an event, the foundation soils shall be improved before the subgrade treatment is performed. Foundation soil improvement may be performed in general accordance with ISS 203.09. Foundation improvement will be at the discretion of the Engineer.

Based on these considerations and soil data obtained from field and laboratory testing, the new pavement may be designed using the soil parameters below in Table A. The recommended subgrade treatment should be performed in accordance with INDOT Standard Specifications Section 207.

Table A– Soil Parameters for Pavement Design

Resilient Modulus (M_R) of Prepared Subgrade	10,000
Resilient Modulus (M_R) of Natural Subgrade	3,000
Predominant Soil Type	Sandy Clay Loam (A-6)
Percent Passing #200	60.1
% Silt	38.7
LL	28.5
PL	16.3
PI	12.2
Depth to Water Table	> 7.5 feet below existing grade
Natural Density (pcf) of Natural Subgrade	127
% Moisture of Natural Subgrade	18
Organic Content	---
Marl Content	---
Sulfate Content (ppm)	---
Rock Depth	> 15 feet below existing grade
Filter Fabric Required for Underdrains	918.02(b) Type 1A (NW) *
Subgrade Treatment	Type IBC

* Underdrains depth < 3 feet.

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LIST OF APPENDICES

I. PROJECT LOCATION AND DESCRIPTION

The project is located at the intersection of Fortville Pike and CR 300 N in the city of Greenfield, Hancock County, Indiana. The project involves the construction of a new roundabout.

Plans for the roundabout construction and the traffic data were not available at the time of this report preparation. However, based on site observations and conversations with American Structurepoint, it is assumed cut/fill for the grade preparation will be less than 3 feet. Once the design plans become available, CTL should be provided the opportunity to review the recommendations within this report.

II. SUBSURFACE INVESTIGATION

Seven roadway test borings, designated as RB-1 through RB-7, were drilled to depths ranging from 7.5 to 15 feet below the existing grade. Test Borings RB-1 through RB-4 were drilled on CR 300 N and Fortville Pike and borings RB-5, RB-6 and RB-7 were drilled within the proposed roundabout area. An offset boring RB-3A was drilled next to the adjacent boring for the purpose of obtaining Shelby tube sample.

The test borings were advanced with a truck mounted drilling rigs utilizing hollow stem augers (HSA) between February 20th and February 22nd, 2023. Standard Penetration tests were conducted using 140-pound automatic hammer falling 30 inches to drive a 2-inch O.D. split barrel samplers for 18 inches.

Soil samples obtained from the drilling operation were preserved in glass jars, visually classified in the field by the drilling crew and in the laboratory by a geotechnical engineer. The recovered soil samples were tested for Natural Moisture Content. Representative soil samples were tested for Grain Size Distribution, Atterberg Limits, Unconfined Compressive Strength, and pH. Standard proctor test was performed on the bulk (bag) samples and resilient modulus test was performed on the Shelby tube samples and remolded bulk samples.

Drilling, soil sampling and laboratory testing were performed following standard geotechnical engineering practices, INDOT and current AASHTO/ASTM procedures. Results from field tests are shown on the enclosed Test Boring Records in Appendix B and laboratory test sheets in Appendix C.

Latitude and longitude coordinates of the test borings were estimated from Google Earth and located in the field using a Trimble Geo7X GPS System. The elevations of the test borings were estimated from the county GIS map. The boring locations and surface

elevations shown on the Boring Location Plans in Appendix A and Test Boring Records in Appendix B should be considered approximate

III. FINDINGS

A. Subsurface Conditions

The test borings drilled on the travel lanes of CR 300 N and Fortville Pike exhibited full depth hot mix asphalt (HMA) pavement with approximate thickness of 12 inches overlying subbase consisting of sand and gravel and crushed stone and ranging in thickness of 6 to 18 inches. Highly fractured concrete was encountered between the HMA and subbase layer in RB-5. RB-7 encountered surficial soil (topsoil) at the surface with an approximate thickness of 5.5 inches.

Below the existing pavement and/or surficial soil, the test borings encountered cohesive soils classified as loam, clay loam, sandy clay loam and sandy clay loam of the A-4 and A-6 soil categories. The cohesive soils exhibited Liquid Limit (LL) values ranging from 19 to 33 percent and Plasticity Index (PI) values of 4 to 16 percent. Natural moisture content values of the foundation soils ranged from 9 to 22 percent. Detailed information of soil type and standard penetration values are shown in the Test Boring Records in Appendix B, laboratory test results in Appendix C and summarized below in Table 1.

Resilient modulus value of 1,649 psi was obtained from the resilient modulus test performed on undisturbed soil samples (Shelby Tubes). Standard proctor test was performed on the bulk samples and resilient modulus test was performed on re-molded bulk samples. The test results are included in Appendix C and summarized in Table 2.

The pH values of the subgrade soils ranged from 6.4 to 6.9. Test results are shown on the Summary of Special Laboratory Test Results in Appendix C. Generalized soil profiles of the subsurface conditions are included in Appendix D.

B. Groundwater

Groundwater levels and soil cave-in depths were recorded during and following the drilling operation as shown on the enclosed Test Boring Records in Appendix B and summarized below in Table 3. It should be noted that groundwater levels recorded during this subsurface investigation may not be a reliable indication of long-term groundwater levels as it can take hours or days for groundwater within a borehole to equilibrate and due to fluctuations in groundwater levels due to seasonal variations of precipitation and other factors.

Table 1– Summary of Foundation Soil Testing

Boring No.	Northing	Easting	Lab No.	Classification	AASHTO	LL	PL	PI	% Passing #200	% Silt	% Clay	Natural Density (pcf)	% Moisture
RB- 1	39.82819	-85.79542	Lab 1	Sandy Clay Loam	A-6	29.9	16	13.9	42.2	21.8	20.4	—	20.1
RB- 2	39.82866	-85.79676	Lab 1	Sandy Clay Loam	A-6	29.9	16	13.9	42.2	21.8	20.4	130.1	18.9
RB- 3	39.82815	-85.79742	Lab 4	Clay Loam	A-4	25	16.8	8.2	69.4	46	23.4	124.9	22.1
RB- 4	39.8275	-85.79606	Lab 1	Sandy Clay Loam	A-6	29.9	16	13.9	42.2	21.8	20.4	—	14.4
RB- 5	39.82825	-85.79658	Lab 3	Loam	A-4	19.3	14.9	4.4	53.8	40.4	13.4	—	9.4
RB- 6	39.82807	-85.79624	Lab 2	Silty Clay Loam	A-6	32.9	17.2	15.7	85.4	59.5	25.9	—	21.2
RB- 7	39.82833	-85.7963	Lab 2	Silty Clay Loam	A-6	32.9	17.2	15.7	85.4	59.5	25.9	—	20.7
Average						**28.5**	**16.3**	**12.2**	**60.1**	**38.7**	**21.4**	**127.5**	**18.1**
Minimum						19.3	14.9	4.4	42.2	21.8	13.4	124.9	9.4
Maximum						32.9	17.2	15.7	85.4	59.5	25.9	130.1	22.1
Standard Deviation						4.9	0.8	4.3	19.9	17.2	4.3	3.7	4.6

Table 2 – Summary of Density and Resilient Modulus Testing

Boring No.	RB-3	RB-7
Sample Type	Shelby Tube	Bag Sample
Sample No.	ST-1	BS-1
Soil Classification	Clay Loam	Silty Clay Loam
AASHTO Classification	A-4 (3)	A-6 (12)
Liquid Limit (LL)	25.0	32.9
Plastic Limit (PL)	16.8	17.2
Plasticity Index (PI)	8.2	15.7
Sulfate Content (ppm)	<20	---
Specific Gravity	2.717	---
Loss On Ignition (%)	---	---
Calcium Carbonate (%)	---	---
Maximum Wet Density (pcf)	---	129.7
Maximum Dry Density (pcf)	---	111.4
Optimum Moisture Content (%)	---	16.4
Natural Dry Density (pcf)	102.3	---
Resilient Modulus (psi)	1,649	11,232[(1)]
- Natural State at Moisture Content (%)	22.1	16.8 [(1)]

[(1)] Resilient Modulus performed at optimum moisture content and within 95% of maximum dry density.

Table 3 –Groundwater Readings

Boring No.	Boring Depth (feet)	Latitude	Longitude	Weather	Groundwater Readings (feet)		Cave-in depth (feet)
					During Drilling	At Completion	
RB- 1	7.5	39.828191	-85.795418	Sunny	Dry	Dry	5.7
RB- 2	7.5	39.828661	-85.796764	Sunny	Dry	Dry	6.0
RB- 3	7.5	39.828151	-85.797417	Sunny	Dry	Dry	6.0
RB- 4	7.5	39.827500	-85.796061	Sunny	Dry	Dry	5.3
RB- 5	15	39.828248	-85.796578	Sunny	Dry	Dry	13.2
RB- 6	15	39.828072	-85.796236	Sunny	Dry	Dry	13.0
RB- 7[(1)]	15	39.828329	-85.796301	Rain	Dry	Dry	6.0

[(1)] *Light rain was observed at the time of drilling.*

IV. DISCUSSION AND RECOMMENDATIONS

A. Pavement Considerations

The project involves the construction of a new roundabout at the intersection of Fortville Pike and CR 300 N. Plans for the roundabout construction and the traffic data were not available at the time of this report preparation. The recommendations in this report assume cut/fill heights will be less than 3 feet. Once plans become available, CTL should be provided the opportunity to review the recommendations within this report.

Subsequent to removal of existing pavement and site grading, the exposed foundation soils should be proofrolled in accordance with INDOT Standard Specifications (ISS) 203.26, where applicable. Depending upon the time of construction and amount of precipitation, the foundation soils may exhibit unstable condition under proofrolling. In such an event, the foundation soils shall be improved prior to the subgrade treatment could be performed. Foundation soil improvement may be performed in general accordance with ISS 203.09. Foundation improvement will be at the discretion of the Engineer.

Based on these considerations and soil data obtained from field and laboratory testing, the new pavement may be designed using the soil parameters below in Table 4. The recommended subgrade treatment should be performed in accordance with INDOT Standard Specifications Section 207.

Based on the field and laboratory testing, areas of concern were identified at the locations referenced in Table 5. The general criteria for identifying areas of concern is based on soils having Liquid Limit greater than 50 percent, consistency of less than 5 blows per foot, organic matter of more than 3 percent, undocumented fill and/or in-place moisture content value of 4 percent above the optimum moisture content within approximately 24 inches below existing pavement. The foundation soils in these areas may need improvement in accordance with 203.09.

Table 4 – Soil Parameters for Pavement Design

Resilient Modulus (M_R) of Prepared Subgrade	10,000
Resilient Modulus (M_R) of Natural Subgrade	3,000
Predominant Soil Type	Sandy Clay Loam (A-6)
Percent Passing #200	60.1
% Silt	38.7
LL	28.5
PL	16.3
PI	12.2
Depth to Water Table	> 7.5 feet below existing grade
Natural Density (pcf) of Natural Subgrade	127
% Moisture of Natural Subgrade	18
Organic Content	---
Marl Content	---
Sulfate Content (ppm)	---
Rock Depth	> 15 feet below existing grade
Filter Fabric Required for Underdrains	918.02(b) Type 1A (NW) *
Subgrade Treatment	Type IBC

* Underdrains depth < 3 feet.

Table 5 – Summary of Areas of Concern

Boring No.	Soil Type	Lat	Long	Undocumented Fill	Liquid Limit (%)	Blowcount SPT N-Value (bpf)	Organic Matter (%)	Moisture (%)
RB-7	Silty Clay Loam	39.828329	-85.796301	NA	NA	3	NA	NA

B. General Site Preparation and Earthwork

General site preparation and earthwork and pavement considerations are provided in the following paragraphs.

1. All surface objects, pavement, grass, vegetation, topsoil and roots located within the construction limits, shall be cleared and grubbed in accordance with ISS Section 201.

2. Subsequent to removal of existing pavement and site grading, the exposed pavement foundation soils should be proofrolled following ISS procedures, where applicable. Soft and/or wet foundation soils not meeting the proofrolling requirements may be encountered within the construction limits, especially in the area of Test Boring RB-7. Unsuitable soils shall be removed and treated in general accordance with ISS 203.09.

3. During earthwork operations, care should be taken to provide adequate drainage on the exposed soils. Ditches must be kept open at all times, and the subgrade should be graded at the end of each day, to facilitate good drainage.

4. Borrow material needed in fill areas should be in accordance with ISS Section 211. Topsoil and/or organically contaminated materials are not acceptable for use as backfill.

5. The backfill should be placed and compacted in accordance with ISS Section 203. The engineered fill should not be placed in a frozen condition or over a frozen subgrade.

6. All subgrade soils and pavement materials should conform to the latest issue of INDOT Construction and Material Specifications.

V. CONCLUDING REMARKS

The evaluations, conclusions, and recommendations in this report are based on our interpretation of the field and laboratory data obtained during the exploration, information available at the time of this report, our understanding of the project scope at the time of the report and our experience with similar sites and subsurface conditions using generally accepted geotechnical engineering practices. Although individual test borings are representative of the subsurface conditions at the boring locations on the dates drilled, they are not necessarily representative of the subsurface conditions between boring locations or subsurface conditions during other seasons of the year. If the scope of

the project changes the recommendations may change and may require additional investigation.

During the design process, it is recommended that CTL work with the project designers to confirm that the geotechnical recommendations are properly incorporated into the final plans and specifications, and to assist with establishing criteria for the construction observation and testing. CTL is not responsible for independent conclusions, opinions and recommendations made by others based on the data and the recommendations provided in this report.

The report was prepared by CTL Engineering, Inc. (Consultant) solely for the use of the Client in accordance with an executed contract. The Client's use of or reliance on this report is limited by the terms and conditions of the contract and by the qualifications and limitations stated in the report. It is also acknowledged that the Client's use of and reliance of this report is limited for reasons which include: actual site conditions that may change with time; hidden conditions, not discoverable within the scope of the assessment, may exist at the site; and the scope of the investigation may have been limited by time, budget and other constraints imposed by the Client.

Neither the report, nor its contents, conclusions nor recommendations are intended for the use of any party other than the Client. Consultant and the Client assume no liability for any reliance placed on this report by such party. The rights of the Client under contract may not be assigned to any person or entity, without the consent of the Consultant which consent shall not be unreasonably withheld.

This geotechnical report does not address the environmental conditions of the site. The Consultant is not responsible for consequences or conditions arising from facts that were concealed, withheld, or not fully disclosed at the time the assessment was conducted.

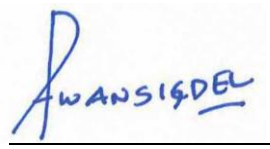
To the fullest extent permitted by law, the Consultant and Client agree to indemnify and hold each other, and their officers and employees harmless from and against claims, damages, losses and expenses arising out of unknown or concealed conditions. Furthermore, neither the Consultant nor its employees shall be liable to the Owner in an amount in excess of the available professional liability insurance coverage of the Consultant. In addition, Client and Consultant agree neither shall be liable for any special, indirect or consequential damages of any kind or nature.

The Consultant's services have been provided consistent with its professional standard of care. No other warranties are made, either expressed or implied.

Sincerely,

CTL ENGINEERING, INC.

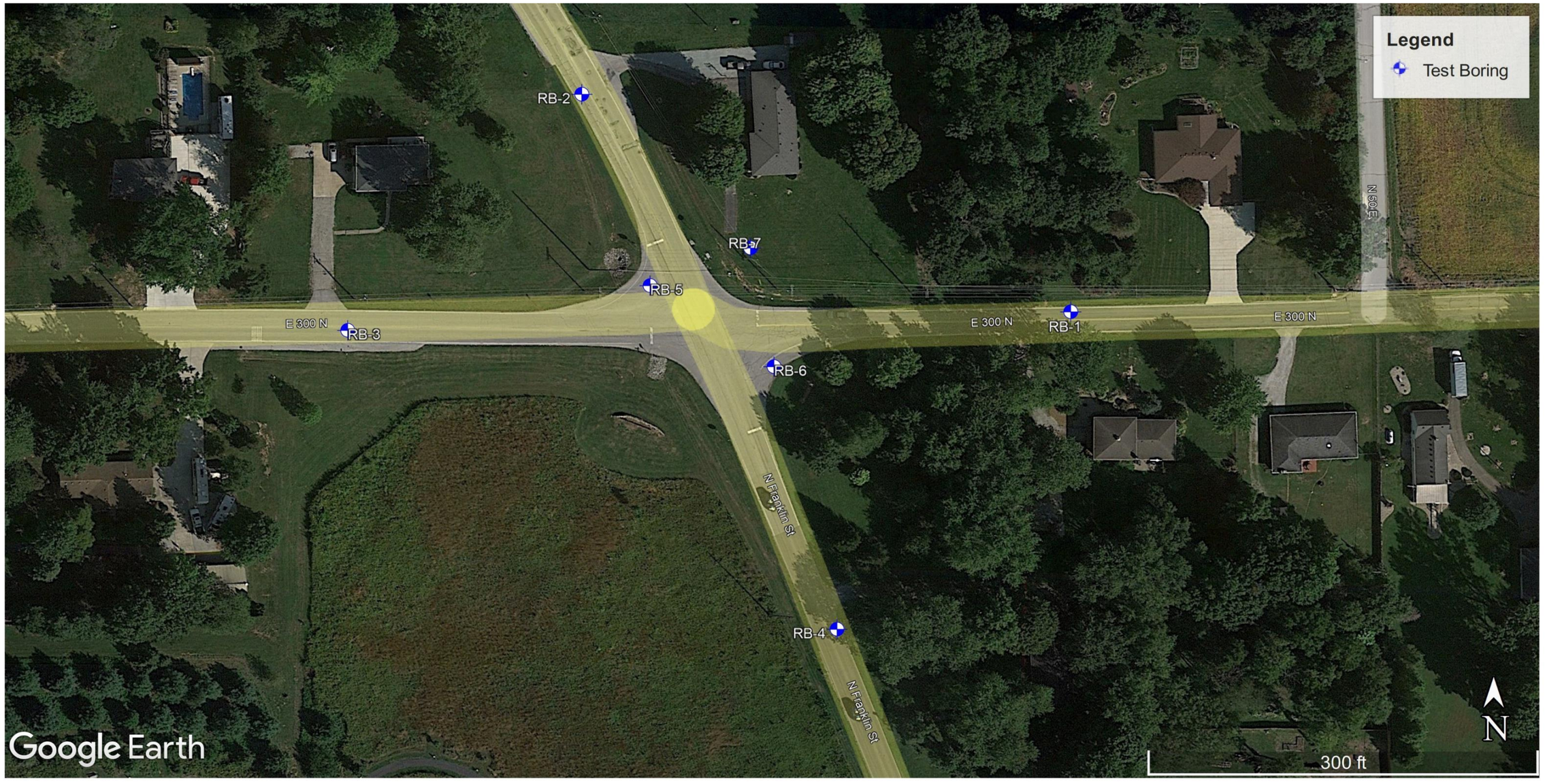
Anthony L. Mason, P.E.
Senior Geotechnical Engineer



Pawan Sigdel, PhD, PE
Project Engineer

APPENDIX A

BORING LOCATION PLAN



BORING LOCATION PLAN					
Source: Google Earth		**Date** 4/3/2023	Fortville Pike and CR 300 N Roundabout Des No. 2005FFE Hancock County, IN		
	CTL ENGINEERING, INC. GEOTECHNICAL ENGINEERS TESTING * INSPECTION LABORATORY SERVICES	**Scale** None			
		Drawn By PS	**Reviewed By** AM	**Page** 1 of 1	**Project No.** 22050123IND

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 8"
Cobbles	Passing 8" Retained on 3"
Gravel	Passing 3" Retained on #10
Sand	Passing #10 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 Limit
Moist	Above Plastic, Below Liquid
Very Moist	At Liquid
Wet	Above Liquid

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 1**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 909.0 feet
Latitude : 39.828191
Longitude -85.795418
Boring Depth : 7.5 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 45° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 5.7 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
908.0		**ASPHALT CONCRETE** (12")	1.0										
907.0		**SAND AND GRAVEL BASE** (12")	2.0	SS-1	12 9 3	12	100	6.5					
906.0	2.5	Brown, Moist, Stiff to Soft, **SANDY CLAY LOAM** A-6, As Lab 1	3.0	SS-2	3 2 2	4	67	20.1					
	5.0	Brown, Moist, Soft to Medium Stiff, **SILTY CLAY LOAM** A-6, As Lab 2		SS-3	3 3 4	7	100	29.7					
901.5	7.5	**Bottom of Boring at 7.5 feet** Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.	7.5	SS-4	3 4 4	8	100	24.6					
	10.0												
	12.5												
	15.0												

CTL Engineering, Inc.
Phone: 317-295-8650

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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 2**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 913.0 feet
Latitude : 39.828661
Longitude -85.796764
Boring Depth : 7.5 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 50° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 6.0 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
912.0		**ASPHALT CONCRETE** (12")	1.0										
		CRUSHED STONE (18")		SS-1	17 14 8	22	100	4.3					
910.5	2.5	Thin sand layer encountered from 4.0 feet to 4.5 feet	2.5	SS-2	7 6 5	11	83	18.9	130.1	5.216 @ 15.0%	30	16	14
	5.0	Brown, Moist, Stiff to Soft, **SANDY CLAY LOAM** A-6 (2), Lab 1		SS-3	3 3 3	6	100	15.9					
				SS-4	3 2 3	5	100	17.6					
905.5	7.5	**Bottom of Boring at 7.5 feet** Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.	7.5										
	10.0												
	12.5												
	15.0												

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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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 3**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 904.0 feet
Latitude : 39.828151
Longitude -85.797417
Boring Depth : 7.5 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 40° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 6.0 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
903.0		**ASPHALT CONCRETE** (12")	1.0										
		SAND AND GRAVEL BASE (12")			15								
902.0			2.0	SS-1	18	23	100	17.3					
	2.5				5								
					3								
				SS-2	4	7	100	26.2					
					3								
		Brown, Very Moist, Medium Stiff, **CLAY LOAM** A-4, As Lab 4			3								
	5.0			SS-3	3	6	83	29.5					
					3								
					3								
				SS-4	3	7	100	27.5					
896.5	7.5		7.5		4								
		Bottom of Boring at 7.5 feet											
		Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.											
	10.0												
	12.5												
	15.0												

CTL Engineering, Inc.
Phone: 317-295-8650

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	DCP	Dynamic Cone Penetrometer Test
HA	Hand Auger	SBS	Subbase Sample		

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 3A**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 904.0 feet
Latitude : 39.828151
Longitude -85.797417
Boring Depth : 4.0 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 40° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at --- ▼ At completion ---

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
903.0		**ASPHALT CONCRETE** (12")	1.0										
902.0		**SAND AND GRAVEL BASE** (12")	2.0										
	2.5	Brown, Moist, **CLAY LOAM** A-4 (3), Lab 4		ST-1			100	22.1	124.9		25	17	8
900.0		**Bottom of Boring at 4.0 feet**	4.0										
	5.0	Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.											
	7.5												
	10.0												
	12.5												
	15.0												

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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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 4**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 904.0 feet
Latitude : 39.827500
Longitude -85.796061
Boring Depth : 7.5 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 50° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 5.3 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
903.0		**ASPHALT CONCRETE** (12")	1.0										
902.3		**SAND AND GRAVEL** (8")	1.7		11								
		Brown, Moist, Medium Stiff, **SANDY CLAY LOAM**		SS-1	5	8	100	14.4					
901.5	2.5	A-6, As Lab 1	2.5		3								
					3								
				SS-2	4	8	100	24.8					
					4								
					3								
	5.0	Brown, Moist, Medium Stiff, **SILTY CLAY LOAM**		SS-3	3	7	67	15.0					
		A-6, As Lab 2			4								
					3								
				SS-4	3	6	83	20.7					
896.5	7.5	**Bottom of Boring at 7.5 feet**	7.5		3								
		Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.											
	10.0												
	12.5												
	15.0												

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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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 5**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 909.0 feet
Latitude : 39.828248
Longitude -85.796578
Boring Depth : 15.0 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 50° F
Weather : Sunny

GROUNDWATER: Encountered at Dry At completion Dry Caved in at 13.2 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
908.0		**ASPHALT CONCRETE** (12")	1.0										
907.5		**CEMENT CONCRETE** (6") (Higly fractured and deteriorated)	1.5	SS-1	50/3"		17	5.8					
906.5	2.5	**SAND AND GRAVEL BASE** (12")	2.5										
		Brown and Gray, Moist, Medium Stiff to Soft, **LOAM** A-4, Lab 3 (Sand layer with decomposed wood fragment encountered from 3.5 to 4.5 feet druing drilling)		SS-2	5 5 3 4	8	83	9.4			19	15	4
	5.0			SS-3	2 2	4	83	43.5					
903.0			6.0										
	7.5			SS-4	2 3 4	7	100	25.0					
		Brown, Moist, Medium Stiff to Soft, **SILTY CLAY LOAM** A-6, As Lab 2		SS-5	2 2 3	5	100	27.3					
	10.0												
897.0			12.0										
	12.5												
		Brown, Moist, Stiff, **LOAM (TILL)** A-4, As Lab 5		SS-6	4 6 8	14	100	11.2					
894.0	15.0	**Bottom of Boring at 15.0 feet**	15.0										
		Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.											
	17.5												
	20.0												

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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	DCP	Dynamic Cone Penetrometer Test
HA	Hand Auger	SBS	Subbase Sample		

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 6**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-20-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-20-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 908.0 feet
Latitude : 39.828072
Longitude -85.796236
Boring Depth : 15.0 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency : 84.4
Driller/Inspector : ED/PS
Temperature : 50° F
Weather : Sunny

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 13.0 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
907.0		**ASPHALT CONCRETE** (12")	1.0										
906.5		**SAND AND GRAVEL** (6")	1.5		8								
				SS-1	6	11	83	21.2					
	2.5				5								
		Brown, Moist, Medium Stiff to Stiff, **SILTY CLAY LOAM** A-6, As Lab 2			3								
				SS-2	3	7	100	13.3					
					4								
					5								
903.0	5.0		5.0	SS-3	6	14	83	12.0					
					8								
					5								
				SS-4	8	19	100	11.4					
	7.5				11								
					5								
		Brown, Slightly Moist, Stiff to Very Stiff, **LOAM (TILL)** A-4, As Lab 5		SS-5	9	22	100	10.2					
	10.0				13								
	12.5												
					6								
893.5			14.5	SS-6	10	23	100	7.0					
893.0	15.0	Brown, Slightly Moist, Medium Dense, **GRAVELLY SAND** (Visual)	15.0		13								
		Bottom of Boring at 15.0 feet											
		Boring backfilled in accordance with INDOT requirements and pavement restored with concrete patch.											
	17.5												
	20.0												

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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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

TEST BORING RECORD

CLIENT : American Structurepoint, Inc.
BORING NO. : **RB- 7**
PROJECT : Fortville Pike & CR 300N Roundabout
SHEET : 1 OF 1
ROUTE NO. : Fortville Pike and CR 300 N
COUNTY : Hancock
DATE STARTED : 02-22-23
LOCATION : Greenfield, Indiana
DATE COMPLETED : 02-22-23
DES NO. : 2005FFE
PROJECT NO:
CTL PROJECT NO : 22050123IND

Boring Elevation: 912.0 feet
Latitude : 39.828329
Longitude: -85.796301
Boring Depth : 15.0 feet
Station :
Offset :
Line :
Boring Method : HSA
Rig Type : B-57 Truck
Casing Diameter : 3.25" ID
Core Size : ---
Hammer : Automatic
Hammer Efficiency: 84.4
Driller/Inspector : ED/PS
Temperature : 46° F
Weather : Rain

GROUNDWATER: ▽ Encountered at Dry ▼ At completion Dry ▨ Caved in at 6.0 feet

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12"	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits LL	PL	PI
911.5		**TOPSOIL** (5.5")	0.5										
				SS-1	1 2	3	67	20.7					
	2.5	Brown, Moist, Very Soft to Medium Stiff, **SILTY CLAY LOAM** A-6, As Lab 2		BS-1	1 2		100	16.8	129.4		33	17	16
				SS-2	1 3	4	78	15.0					
	5.0			SS-3	2 4	6	78	27.6					
906.5		▨	5.5										
				SS-4	4 5 9	14	100	12.5					
	7.5												
				SS-5	9 15 17	32	100	9.3			20	14	6
	10.0	Brown, Moist to Slightly Moist, Stiff to Hard, **LOAM (TILL)** A-4 (1), Lab 5											
	12.5												
898.0			14.0		23								
		Brown, Slightly Moist, Very Dense, **SAND** with Silt (Visual)		SS-6	29	52	100	8.6					
897.0	15.0		15.0		23								
		Bottom of Boring at 15.0 feet											
		Boring backfilled in accordance with INDOT requirements.											
	17.5												
	20.0												

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	DCP - Dynamic Cone Penetrometer Test
HA - Hand Auger	SBS - Subbase Sample	

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APPENDIX C

LABORATORY TESTING

Summary of Classification Test Results
Grain Size Distribution Curves
Unconfined Compressive Strength Test Results
Standard Proctor Test Results
Resilient Modulus Test Results
Topsoil Analysis Results
Specific Gravity Test Results
Summary of Special Laboratory Test Results

Lab No.	Boring No.	Sample No.	Depth (feet)	Textural Classification	AASHTO Classification	Gravel %	Sand %	Silt %	Clay %	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Moisture %
Lab 1	RB- 2	SS-2	2.5-4.0	SANDY CLAY LOAM	A-6 (2)	5.4	52.4	21.8	20.4	29.9	16.0	13.9	18.9
Lab 2	RB- 7	BS-1	0.0-5.0	SILTY CLAY LOAM	A-6 (12)	3.2	11.3	59.5	25.9	32.9	17.2	15.7	16.8
Lab 3	RB- 5	SS-2	2.5-4.0	LOAM	A-4 (0)	4.5	41.7	40.4	13.4	19.3	14.9	4.4	9.4
Lab 4	RB- 3A	ST-1	2.0-4.0	CLAY LOAM	A-4 (3)	2.9	27.7	46.0	23.4	25.0	16.8	8.2	22.1
Lab 5	RB- 7	SS-5	8.5-10.0	LOAM	A-4 (1)	10.9	31.2	39.8	18.1	20.3	14.3	6.0	9.3

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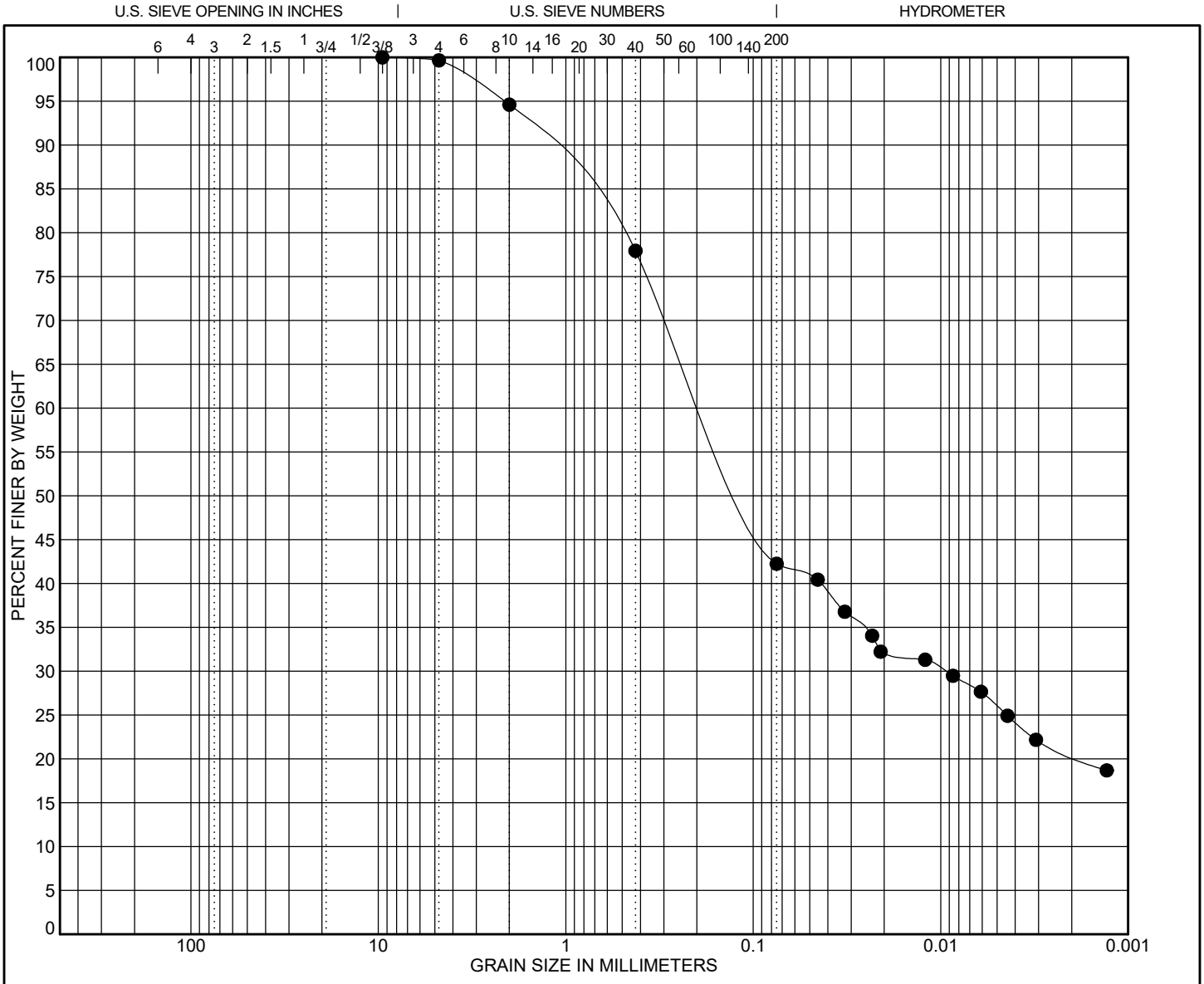
SUMMARY OF CLASSIFICATION TEST RESULTS

Des. No. : 2005FFE
Project No. :
Project Type : Fortville Pike & CR 300N Roundabout
County : Hancock
Route : Fortville Pike and CR 300 N
CTL Proj. No. : 22050123IND
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB- 2	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-2	SANDY CLAY LOAM	18.9	29.9	16.0	13.9		
Depth	2.5-4.0	A-6(2)						
Latitude	39.828661	Lab 1						
Longitude	-85.796764							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.525	0.178	0.109	0.009		5.4	52.4	21.8	20.4

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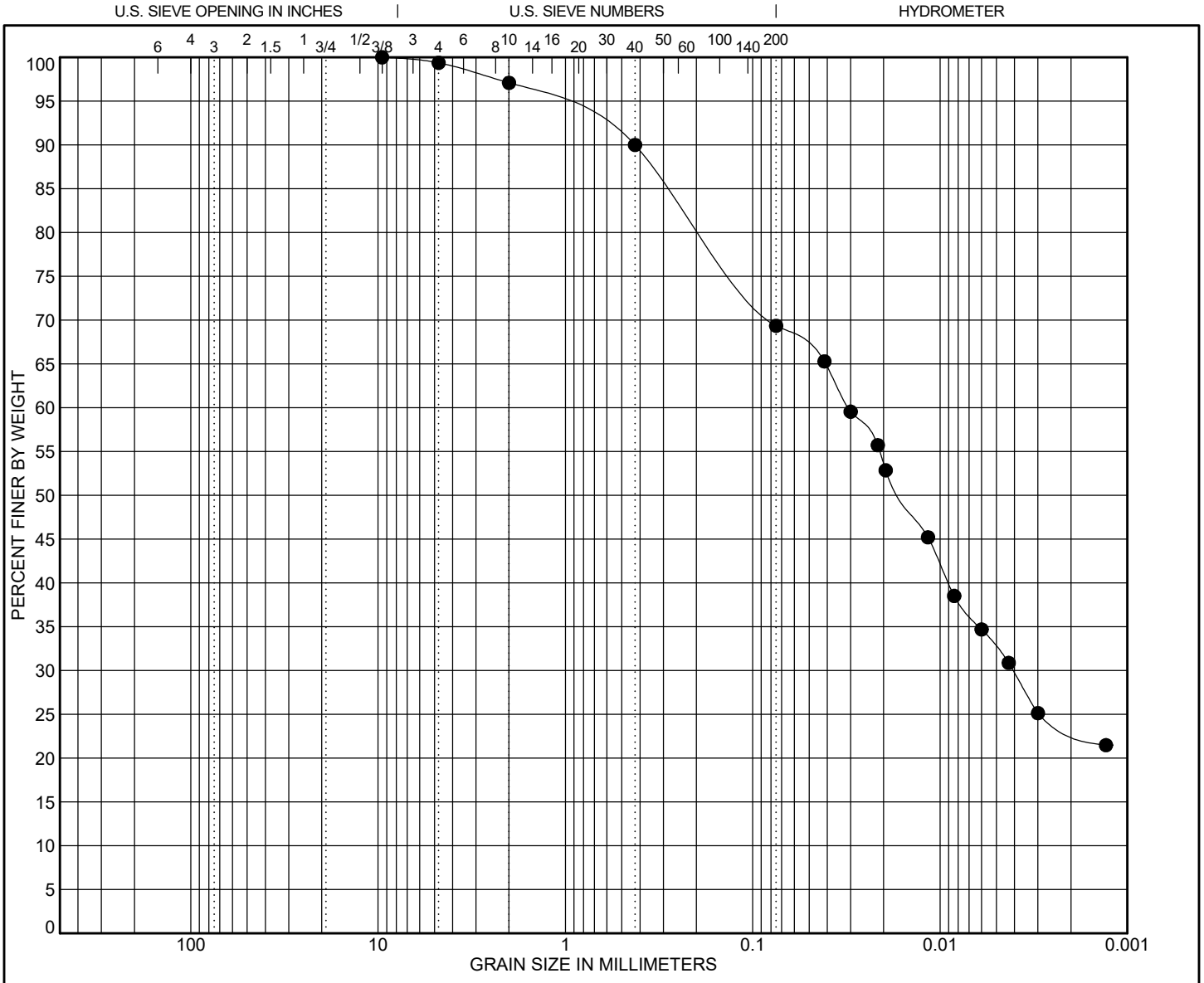
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB- 3A	Classification	MC	LL	PL	PI	Cc	Cu
Sample	ST-1	CLAY LOAM	22.1	25.0	16.8	8.2		
Depth	2.0-4.0	A-4(3)						
Latitude	39.828151	Lab 4						
Longitude	-85.797417							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.525	0.031	0.016	0.004		2.9	27.7	46.0	23.4

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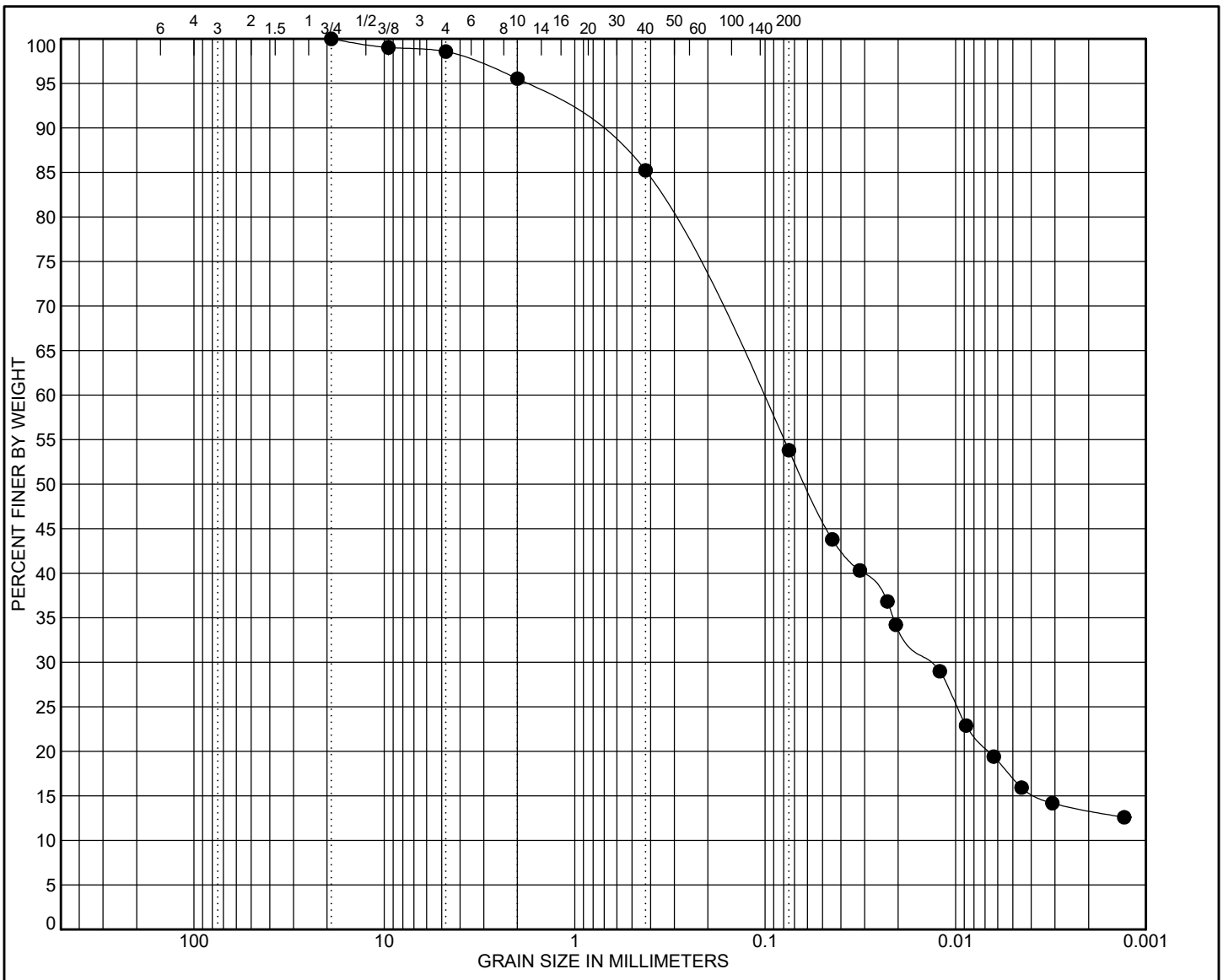
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB- 5	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-2	LOAM	9.4	19.3	14.9	4.4		
Depth	2.5-4.0	A-4(0)						
Latitude	39.828248	Lab 3						
Longitude	-85.796578							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.106	0.061	0.013		4.5	41.7	40.4	13.4

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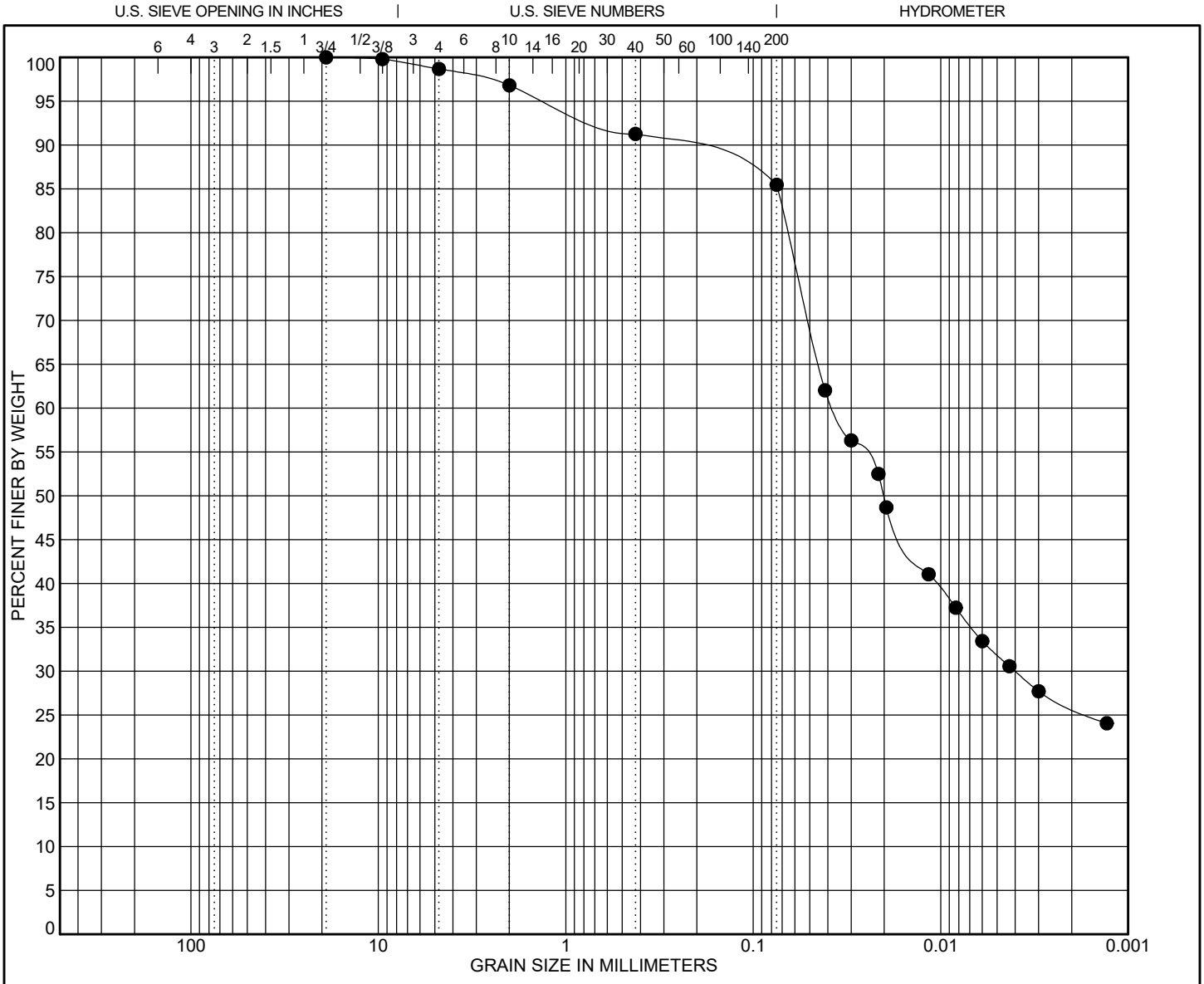
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB- 7	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	SILTY CLAY LOAM	16.8	32.9	17.2	15.7		
Depth	0.0-5.0	A-6(13)						
Latitude	39.828329	Lab 2						
Longitude	-85.796301							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.037	0.02	0.004		3.2	11.3	59.6	25.9

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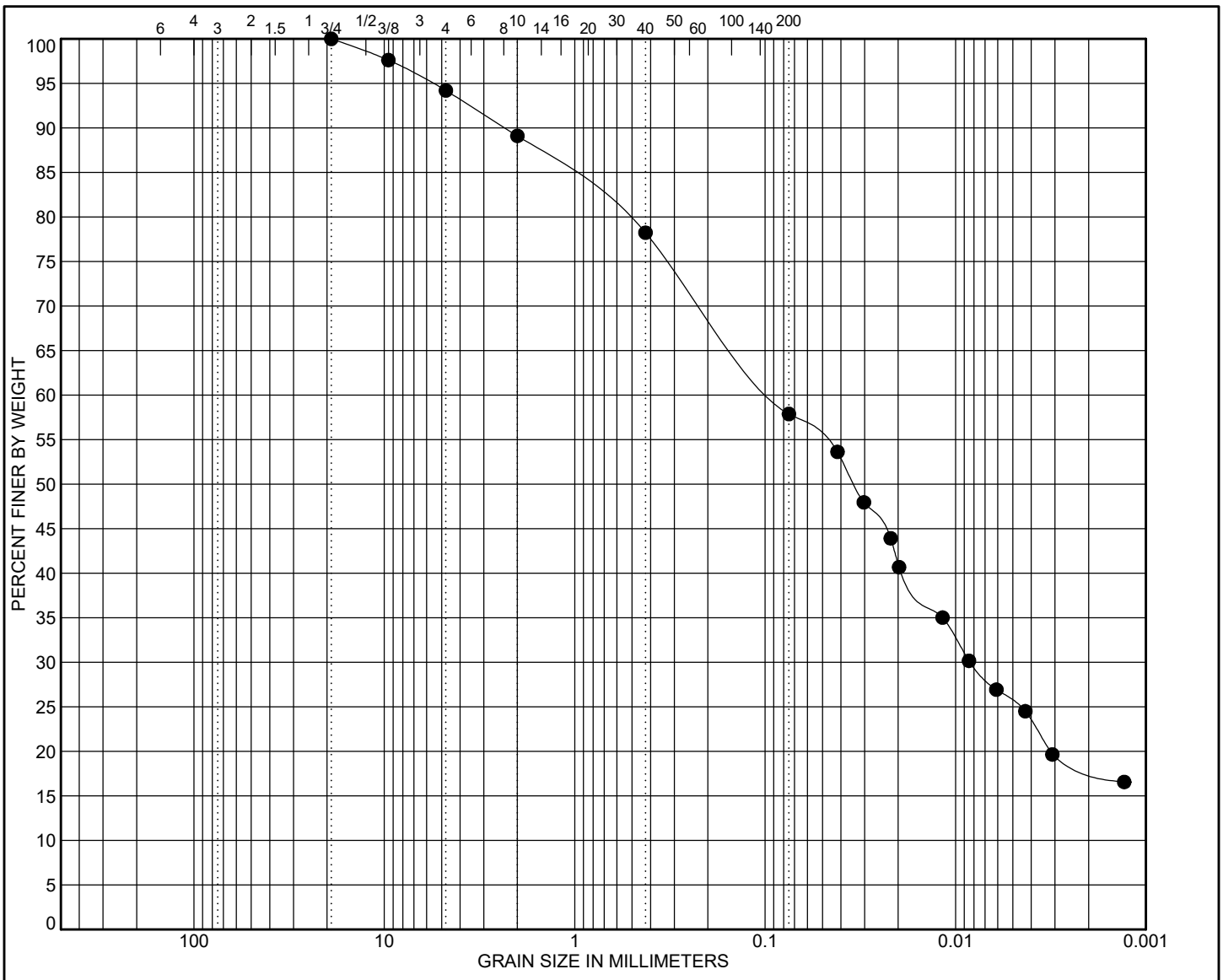
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	RB- 7	Classification	MC	LL	PL	PI	Cc	Cu
Sample	SS-5	LOAM	9.3	20.3	14.3	6.0		
Depth	8.5-10.0	A-4(1)						
Latitude	39.828329	Lab 5						
Longitude	-85.796301							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.09	0.034	0.008		10.9	31.2	39.8	18.1

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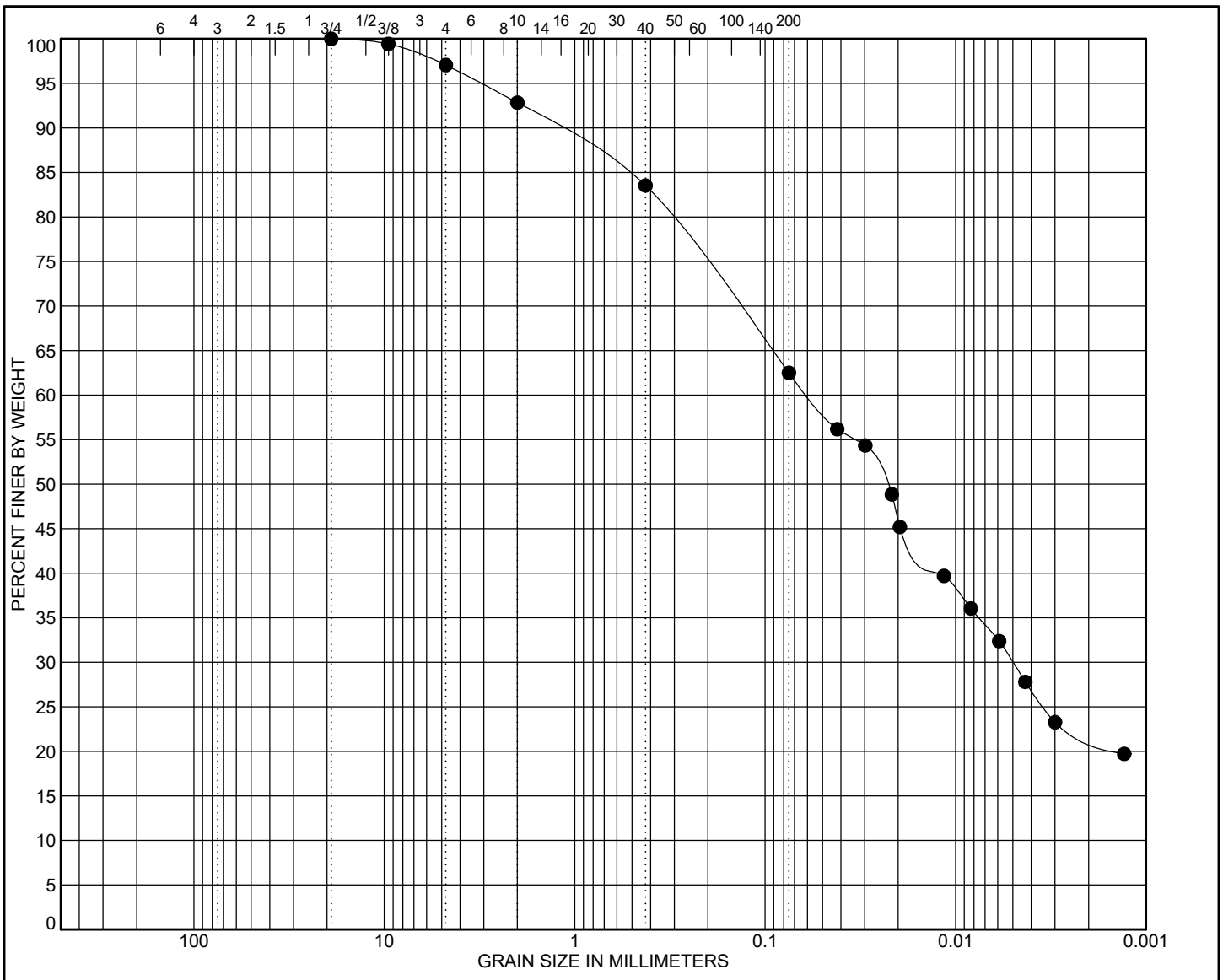
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	TS- 1	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	CLAY LOAM	21.6					
Depth	0.0-0.3	(0)						
Latitude	39.828374	Lab 6						
Longitude	-85.796670							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	0.06	0.023	0.005		7.2	30.3	41.0	21.5

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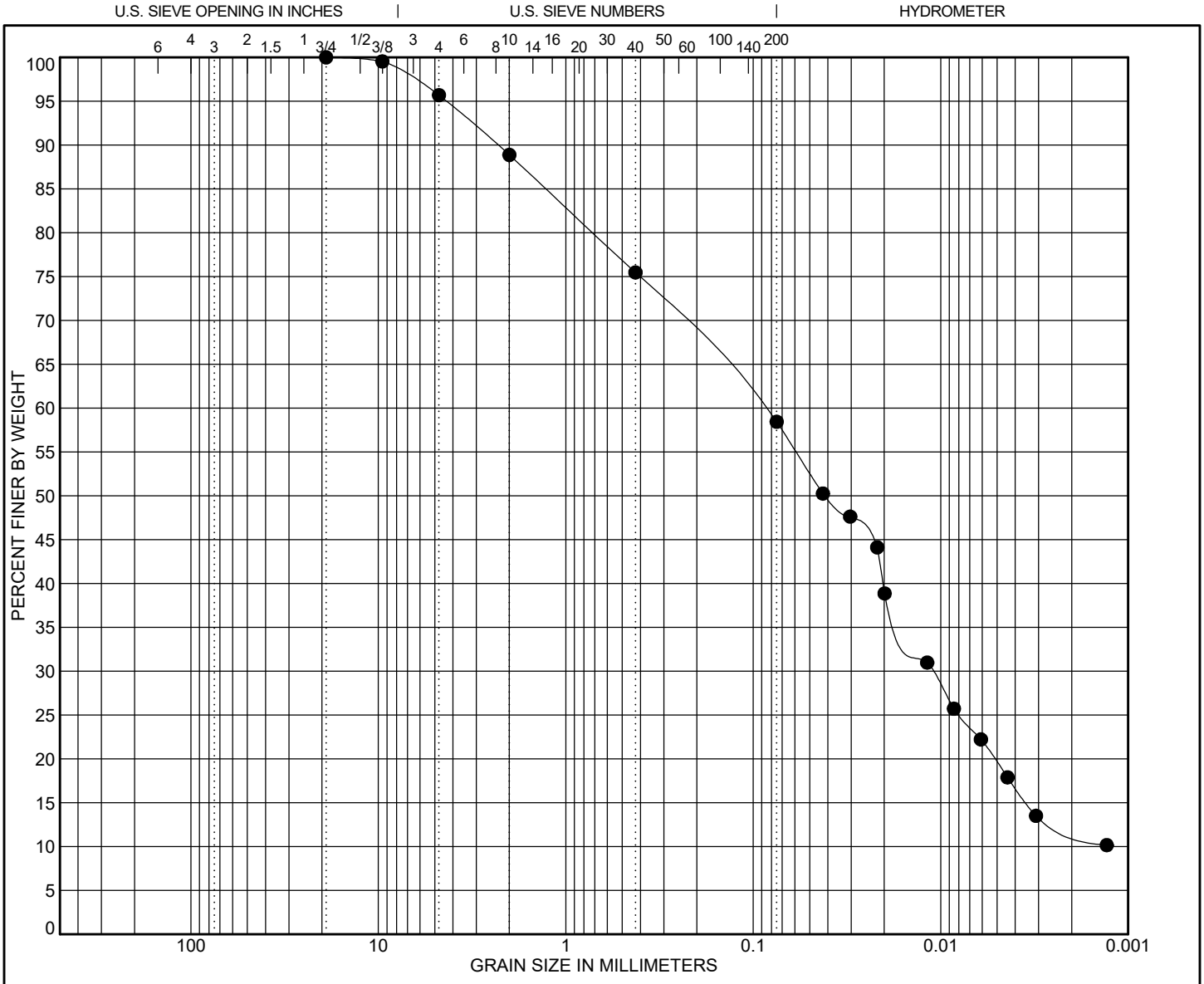
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	TS- 2	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	**LOAM**	**18.3**					
Depth	**0.0-0.3**	**(0)**						
Latitude	**39.827978**	**Lab 7**						
Longitude	**-85.796486**							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	19	**0.088**	**0.041**	**0.011**		**11.1**	**30.4**	**46.7**	**11.8**

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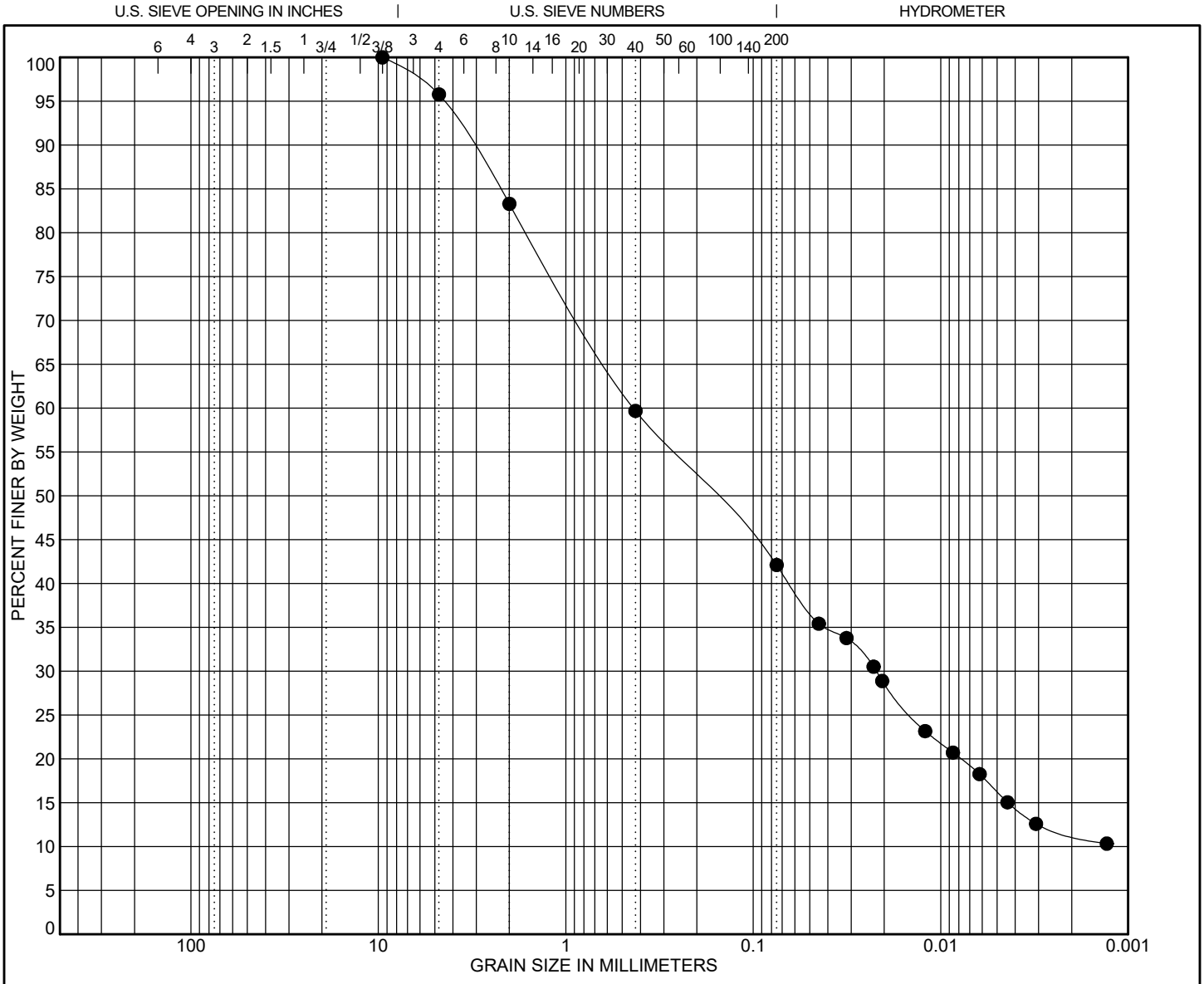
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

Boring No.	TS- 3	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	**SANDY LOAM**	**14.5**					
Depth	**0.0-0.3**	**(0)**						
Latitude	**39.828015**	**Lab 8**						
Longitude	**-85.796193**							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.525	**0.434**	**0.163**	**0.022**		**16.7**	**41.2**	**30.6**	**11.5**

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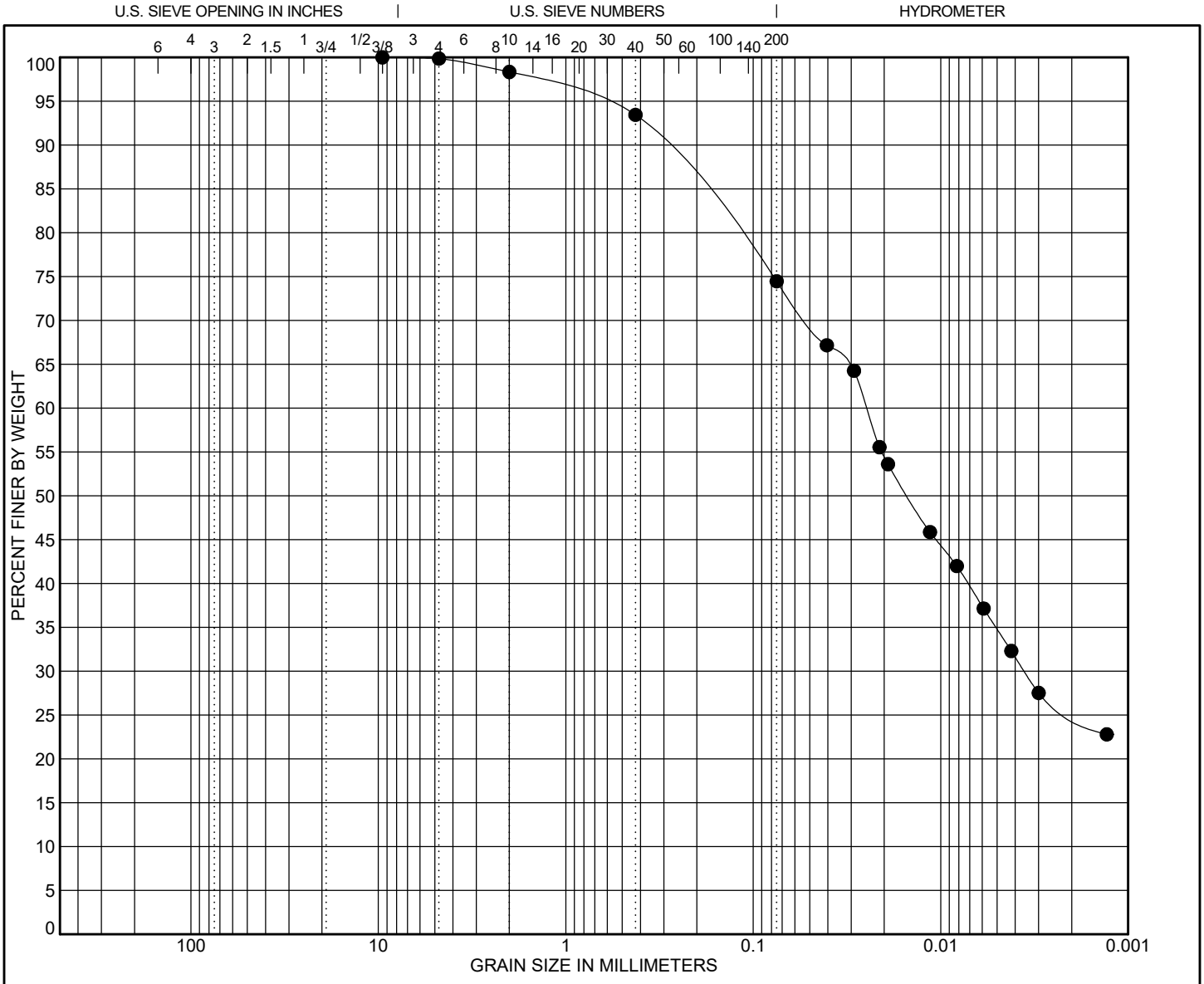
GRAIN SIZE DISTRIBUTION

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



COBBLES	GRAVEL	SAND		SILT	CLAY
		coarse	fine		

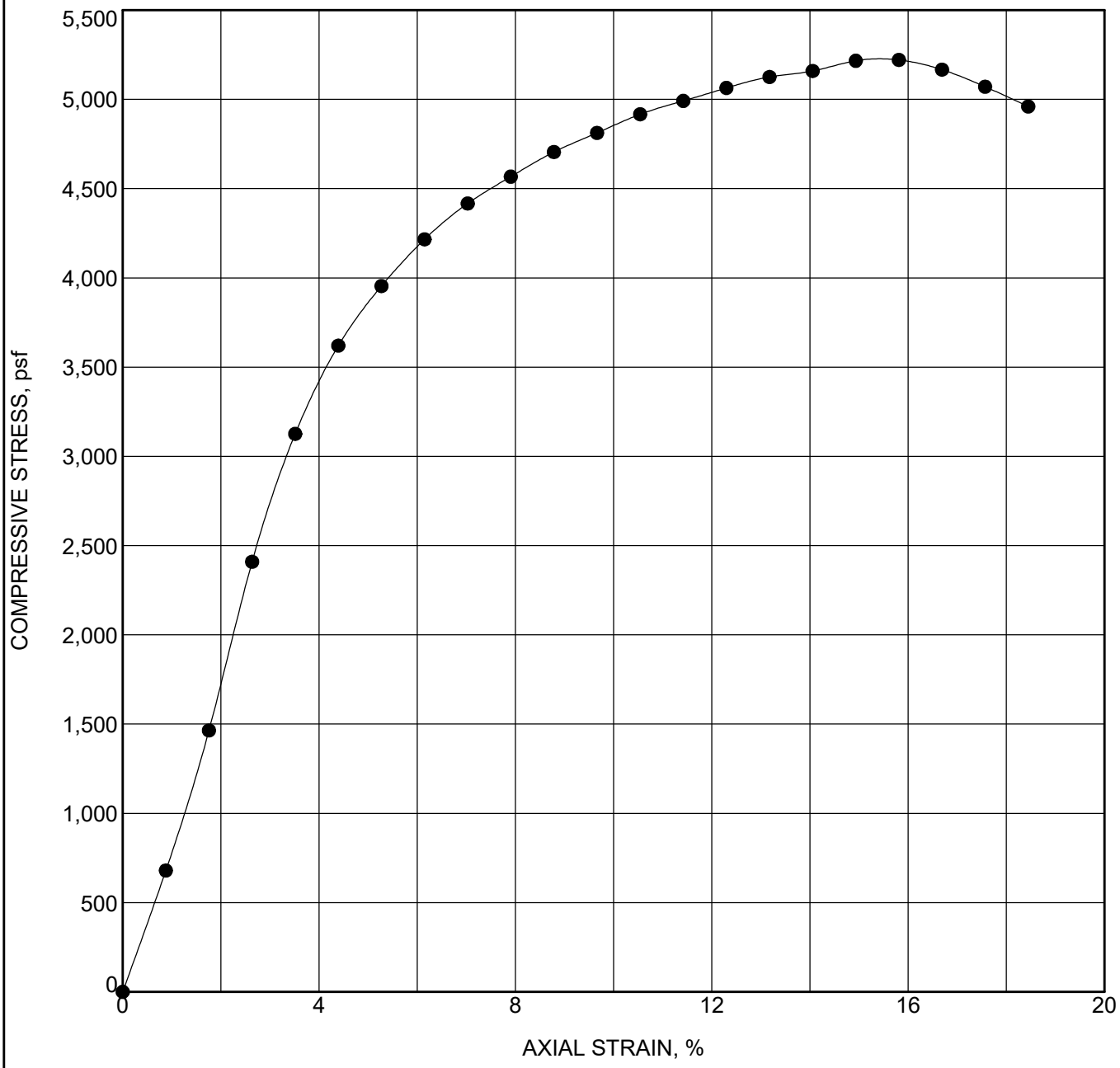
Boring No.	TS- 4	Classification	MC	LL	PL	PI	Cc	Cu
Sample	BS-1	CLAY LOAM	21.1					
Depth	0.0-0.3	(0)						
Latitude	39.828398	Lab 9						
Longitude	-85.796429							

Remarks	D100	D60	D50	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.525	0.025	0.015	0.004		1.7	23.9	49.2	25.2

GRAIN SIZE DISTRIBUTION

CTL Engineering, Inc.
Phone: 317-295-8650

Client : American Structurepoint, Inc.
Des No. : 2005FFE
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



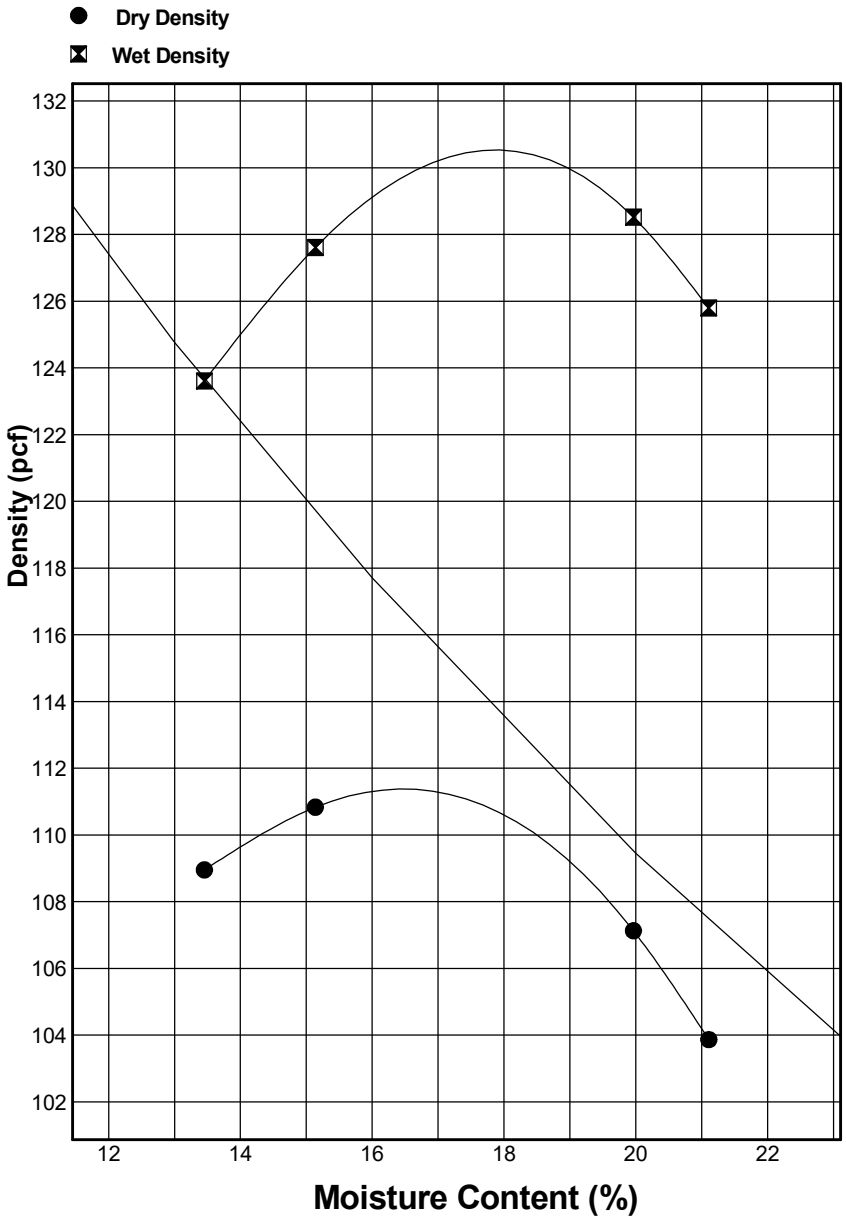
Boring No.	Sample No.	Depth	Classification
RB- 2	**SS-2**	**2.5 - 4.0**	**Sandy Clay Loam (A-6)**

Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Unconfined Strength (psf)	Strain Rate (%)	Failure Strain (%)
17.1	**130.1**	**111.1**	**5216**	**1.1**	**15.0**
Shear Strength (psf)	Saturation (%)	Void Ratio	Specimen Diameter (mm)	Specimen Height (mm)	Height/Diameter Ratio
2608	**96**	**0.544**	**34.5**	**72.3**	**2.1**

CTL ENGINEERING
CTL Engineering, Inc.
Phone: 317-295-8650

UNCONFINED COMPRESSIVE STRENGTH TEST

Des. No. : 2005FFE
Project No. :
Route : Fortville Pike and CR 300 N
County : Hancock
Location : Greenfield, Indiana



TEST RESULTS

CTL Project No.:	22050123IND
Sample Source:	RB- 7
Sample No.:	BS-1
Depth (feet):	0.0-5.0
Lab No.:	Lab 2
Date Received:	02/22/23
Date Reported:	

Test Method (AASHTO T99 Method A)

Max Dry Density (pcf)	111.4
Optimum Moisture (%)	16.4

Oversize Correction (AASHTO T 224)

Max Dry Density (pcf)	
Optimum Moisture (%)	

Particle-Size Analysis (AASHTO T 88)

% Gravel	3.2
% Sand	11.3
% Silt	59.5
% Clay	25.9

Atterberg Limits (AASHTO T 89 & T 90)

Liquid Limit (LL)	32.9
Plastic Limit (PL)	17.2
Plasticity Index (PI)	15.7

Classification

AASHTO: SILTY CLAY LOAM
A-6 (12)

Natural Moisture (AASHTO T 265)

% Moisture Content	16.8

Specific Gravity (AASHTO T 100)

Specific Gravity:	2.7 (Estimated)

Notes:
Standard Proctor results were used to re-mold the sample for Resilitent Modulus test.

CTL ENGINEERING
CTL Engineering, Inc.
Phone: 317-295-8650

MOISTURE-DENSITY RELATION

Client	: American Structurepoint, Inc.	Des No.	: 2005FFE
Route	: Fortville Pike and CR 300 N	County	: Hancock
Location	: Greenfield, Indiana		

Resilient Modulus of Soil (AASHTO T307)

Client:	American Structurepoint, Inc.
Project Name:	Fortville Pike & CR 300N Roundabout; Des No. 2005FFE
Location:	Greenfield, IN
CTL Project. No.:	22050123IND
Sample No.:	ST-1
Sample Location.:	RB-3
Sample Depth:	2.0' - 4.0'
Soil Description:	Clay Loam [A-4 (3)]
Sample Type	Type II

Specimen Information:

	Diameter (in)	Height (in)	Mass (gm)	Height to Diameter Ratio	Area (in^2)	Volume (in^3)
	2.840	6.058				
	2.857	6.042				
	2.853	6.032				
Average	**2.850**	**6.044**	**1266.5**	2.12	6.38	38.56

Moisture Data & Specimen Properties

Wet Soil mass with tare (gm)	139.90
Dry Soil mass with tare (gm)	120.49
Tare mass (gm)	32.60
Moisture %	**22.08**

Natural Wet Density (lbs/ft^3)	**124.86**
Dry Density (lbs/ft^3)	**102.28**

Liquid Limit	25
Plastic Limit	17
Plasticity Index	8

Permanent Strain:

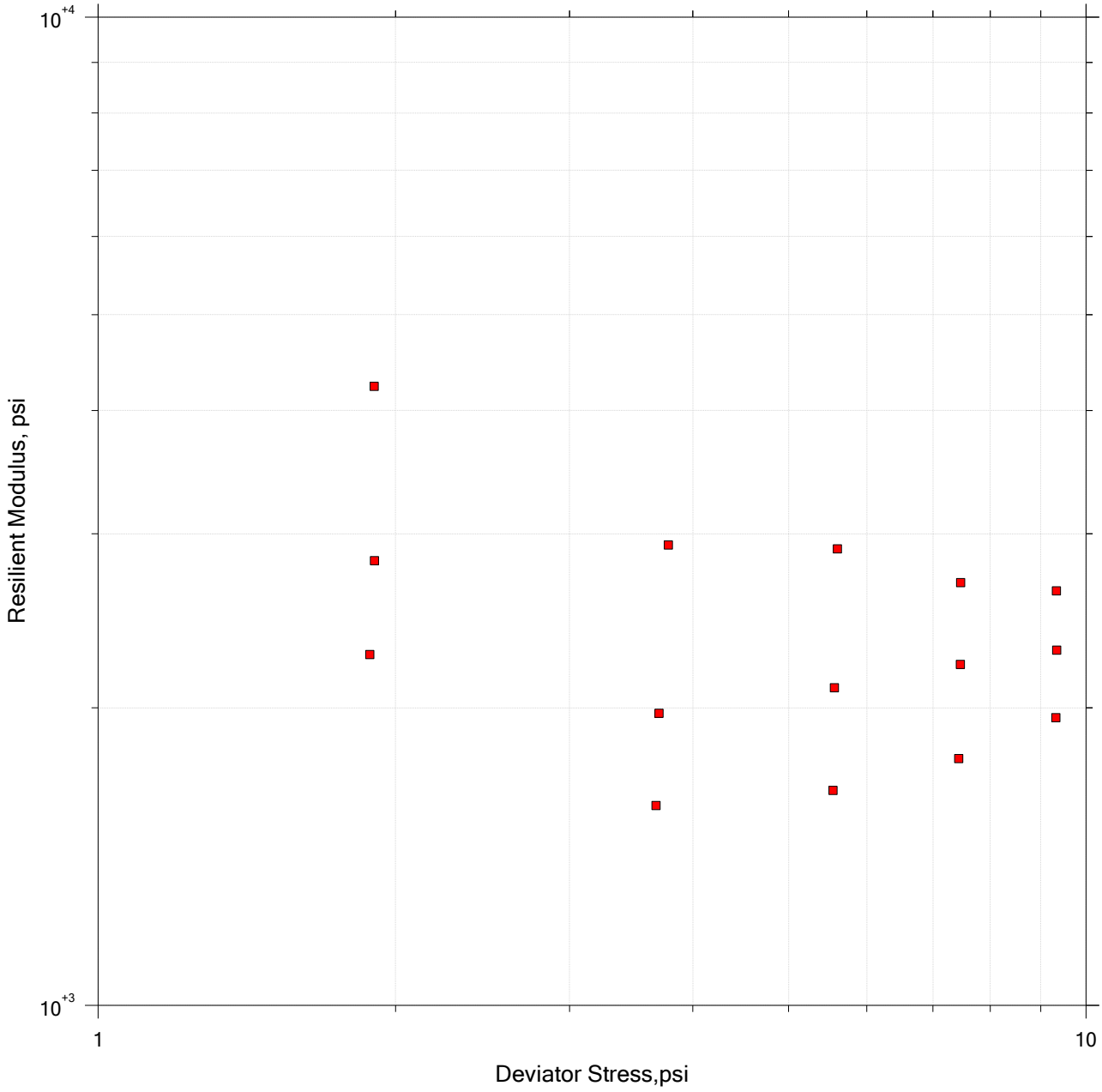
	(%)
After Conditioning Sequence	0.59
At test Completion	2.21

Remarks / Notes:

RM TEST

Summary Data

$Mr = 2999.9 * Sd^{-0.162}$ r = -0.3651



CTL ENGINEERING INC.	Project Name: Fortville Pike & CR 300N	Location: Greenfield, IN	Project Number: 22050123IND
	Boring Number: RB-3	Tester: JO	Checker: SM
	Sample Number: ST-1	Test Date: 3/23/23	Depth: 2.0' - 4.0'
	Test Number: Lab 4	Preparation:	Elevation:
	Description:		
	Remarks:		

RM TEST

Summary Data

Confining Stress S3 psi	Nom. Max. Deviator Stress psi	Mean Deviator Stress psi	Std. Dev. Deviator Stress psi	Mean Bulk Stress psi	Mean Resilient Strain %	Std. Dev. Resilient Strain %	Mean Resilient Modulus psi	Std. Dev. Resilient Modulus psi
5.976	2.000	1.903	0.0067	19.83	0.04	0.00	4229.7	46.327
5.932	4.000	3.779	0.0092	21.58	0.12	0.00	2923.9	113.17
5.976	6.000	5.604	0.0075	23.53	0.17	0.00	2897.3	14.324
5.950	8.000	7.465	0.0172	25.32	0.25	0.00	2677.2	5.7678
5.931	10.00	9.337	0.0088	27.13	0.32	0.00	2626.1	9.6997
3.896	2.000	1.905	0.0073	13.59	0.06	0.00	2818.9	27.364
3.958	4.000	3.696	0.0098	15.57	0.17	0.00	1975.2	11.288
3.937	6.000	5.565	0.0120	17.38	0.24	0.00	2095.9	7.5708
3.923	8.000	7.463	0.0095	19.23	0.30	0.00	2213.5	2.6202
3.916	10.00	9.342	0.0087	21.09	0.36	0.00	2288.3	7.8147
1.923	2.000	1.883	0.0042	7.651	0.07	0.00	2264.1	19.183
1.878	4.000	3.670	0.0094	9.304	0.20	0.01	1593.0	66.474
1.905	6.000	5.544	0.0145	11.26	0.30	0.00	1649.9	7.2256
1.876	8.000	7.434	0.0176	13.06	0.37	0.00	1777.5	11.603
1.889	10.00	9.325	0.0085	14.99	0.42	0.00	1955.0	2.6410

CTL ENGINEERING INC

Project Name: Fortville Pike & CR 300N	Location: Greenfield, IN	Project Number: 22050123IND
Boring Number: RB-3	Tester: JO	Checker: SM
Sample Number: ST-1	Test Date: 3/23/23	Depth: 2.0' - 4.0'
Test Number: Lab 4	Preparation:	Elevation:
Description:		
Remarks:		

Resilient Modulus of Soil (AASHTO T307)

Client:	American Structurepoint, Inc.
Project Name:	Fortville Pike & CR 300N Roundabout; Des No. 2005FFE
Location:	Greenfield, IN
CTL Project. No.:	22050123IND
Sample No.:	BS-1
Sample Location.:	RB-7
Sample Depth:	0' - 5.0'
Soil Description:	Silty Clay Loam [A-6 (12)]
Sample Type	Type II

Specimen Information:

	Diameter (in)	Height (in)	Mass (gm)	Height to Diameter Ratio	Area (in^2)	Volume (in^3)
	2.807	5.165				
	2.805	5.166				
	2.804	5.168				
Average	**2.805**	**5.166**	**1087**	1.84	6.18	31.93

Moisture Data & Specimen Properties

Wet Soil mass with tare (gm)	136.60
Dry Soil mass with tare (gm)	121.64
Tare mass (gm)	32.50
Moisture %	**16.78**

Natural Wet Density (lbs/ft^3)	**129.42**
Dry Density (lbs/ft^3)	**110.82**

Liquid Limit	33
Plastic Limit	17
Plasticity Index	16

Permanent Strain:

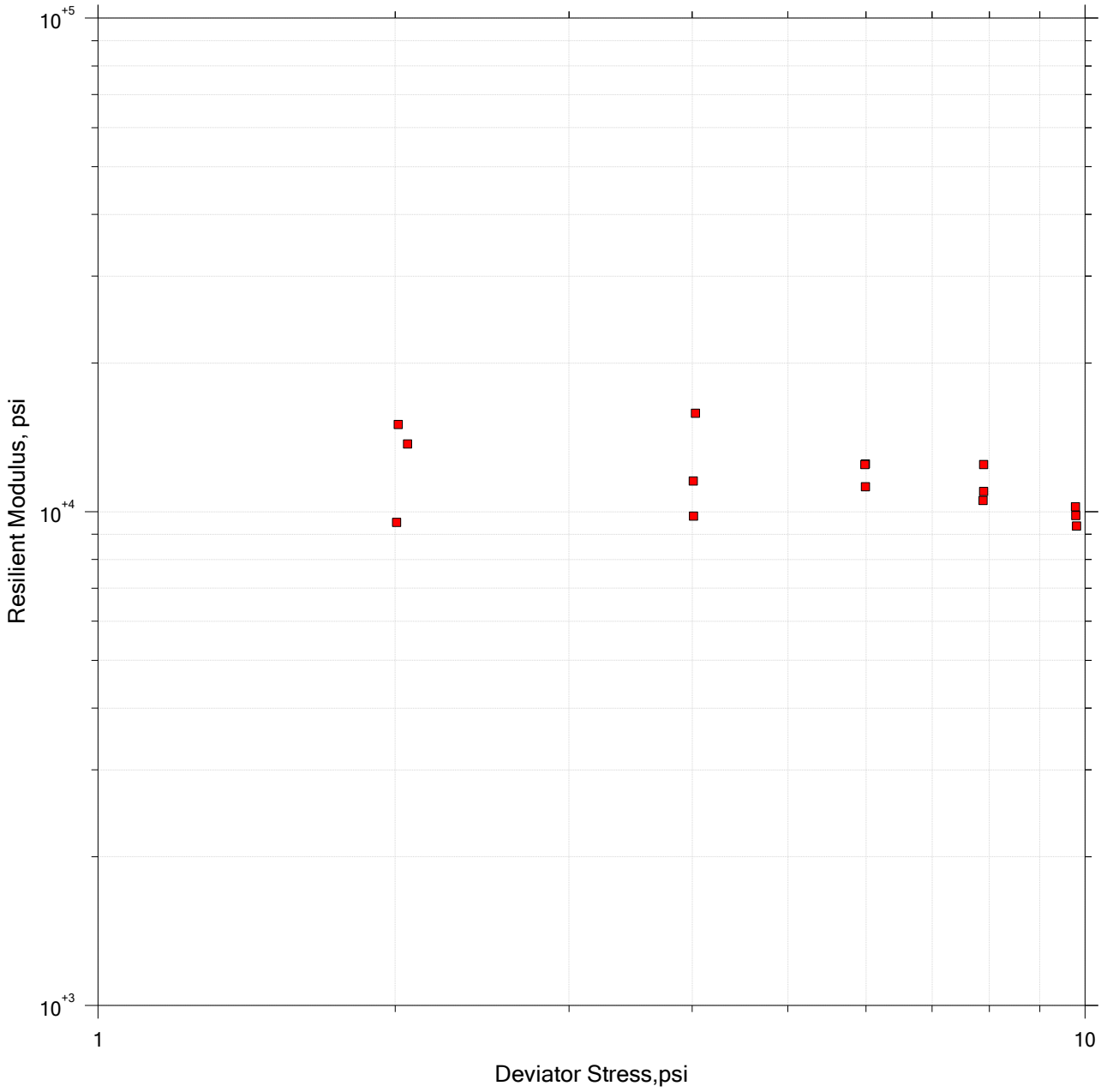
	(%)
After Conditioning Sequence	0.07
At test Completion	0.11

Remarks / Notes:

RM TEST

Summary Data

$Mr = 14160 * Sd^{-0.125}$ r = -0.44024



CTL ENGINEERING INC.	Project Name: Fortville Pike & CR 300N	Location: Greenfield, IN	Project Number: 22050123IND
	Boring Number: RB-7	Tester: JO	Checker: SM
	Sample Number: BS-1	Test Date: 3/28/23	Depth: 0' - 5.0'
	Test Number: Lab 2	Preparation:	Elevation:
	Description:		
	Remarks:		

RM TEST

Summary Data

Confining Stress S3 psi	Nom. Max. Deviator Stress psi	Mean Deviator Stress psi	Std. Dev. Deviator Stress psi	Mean Bulk Stress psi	Mean Resilient Strain %	Std. Dev. Resilient Strain %	Mean Resilient Modulus psi	Std. Dev. Resilient Modulus psi
5.861	2.000	2.059	0.0154	19.64	0.01	0.00	13715.	200.80
5.865	4.000	4.009	0.0276	21.60	0.03	0.00	11536.	112.59
5.912	6.000	5.994	0.0167	23.73	0.04	0.00	12490.	79.584
5.893	8.000	7.892	0.0040	25.57	0.06	0.00	12463.	30.926
5.917	10.00	9.806	0.0238	27.56	0.10	0.00	9359.9	20.261
3.885	2.000	2.015	0.0222	13.67	0.01	0.00	15014.	200.86
3.894	4.000	4.030	0.0274	15.71	0.02	0.00	15837.	211.31
3.900	6.000	5.983	0.0196	17.68	0.04	0.00	12467.	72.148
3.876	8.000	7.894	0.0174	19.52	0.07	0.00	10988.	50.798
3.876	10.00	9.785	0.0149	21.41	0.09	0.00	9827.4	31.002
1.912	2.000	2.007	0.0160	7.742	0.02	0.00	9515.3	223.11
1.856	4.000	4.013	0.0043	9.581	0.04	0.00	9798.4	39.686
1.918	6.000	5.991	0.0214	11.74	0.05	0.00	11232.	36.513
1.858	8.000	7.884	0.0047	13.46	0.07	0.00	10536.	34.864
1.928	10.00	9.778	0.0152	15.56	0.09	0.00	10230.	21.406

Project Name: Fortville Pike & CR 300N	Location: Greenfield, IN	Project Number: 22050123IND
Boring Number: RB-7	Tester: JO	Checker: SM
Sample Number: BS-1	Test Date: 3/28/23	Depth: 0' - 5.0'
Test Number: Lab 2	Preparation:	Elevation:
Description:		
Remarks:		

INDIANA DEPARTMENT OF TRANSPORTATION
OFFICE OF GEOTECHNICAL SERVICES
Summary of Existing Topsoil Test Results for use with Plant Growth Layer

Rev 11/17

Date: 4/4/2023
Des. No.: 2005FFE
Project: Fortville Pike & CR 300N Roundabout
Location: Hancock County, IN

REF.	LOCATION				ANALYSIS								
					AASHTO T 289	AASHTO T 88 and T 89	AASHTO T 88 and T 89	AASHTO T 88 and T 89	AASHTO T 88 and T 89	AASHTO T 267 and T 21**	Bray P-1 Equivalent	NCRRP 221, Chapt 7***
Boring Log	Latitude	Longitude	Quardant	Tested Depth (inch)	pH	Gravel*	Sand	Silt	Clay	Organic Content (% by Wt)	Phosphorus (ppm)	Potassium (ppm)
						(% by Weight)						
TS-1	39.828374	-85.796670	NW	3	6.8	7	30	41	22	3.3	30	111
TS-2	39.827978	-85.796486	SW	3	6.7	11	30	47	12	3.6	48	119
TS-3	39.828015	-85.796193	SE	3	6.9	17	41	31	12	3.2	24	100
TS-4	39.828398	-85.796429	NE	3	6.8	2	24	49	25	2.9	25	97
	Acceptable Ranges per 914.01 =				6.0 - 7.3	N/A	5 - 50%	30 - 80%	5 - 30%	3 - 10%**	20 - 80	105 - 250

***** For informational purposes only

****** In Davies, Gibson, Knox, Pike Posey, and Vanderburgh Counties, AASHTO T 21 shall also be performed. Acceptable range is 4 - 10%

******* North Central Regional Research Publication 221, Chapter 7

Note: All existing topsoil test results presented herein are for information only.

CTL Engineering, Inc.
Specific Gravity
ASTM D 854 / AASHTO T 100
Method B

Client: American Structurepoint, Inc.
Project: Fortville Pike & CR 300N Roundabout
Project #: 22050123IND
Test Number: Lab 4

Date: 4/6/2023
Tech: JO
Reviewed by: PS

Soil Classification:	Clay Loam [A-4 (3)]
Percent Passing No. 4 Sieve:	99.37
Material Excluded From Test:	None
Mass of Pycnometer ($M_{p)}$:	86.21
Mass of Pyncometer, Water and Soil Solids ($M_{pws,t}$):	360.70
Test Temperature (°C):	21.0

Sample ID	Specific Gravity (20°C)
RB-3_ST-1_2'-4'	2.716

Boring	Sample	Depth	Wet Density (pcf)	Dry Density (pcf)	Qu (ksf)	c (ksf)	Moisture %	Max Dry Density (pcf)	Optimum Moisture %	Resilient Modulus			Sulfate (ppm)	Phosphorus (ppm)	Potassium (ppm)	LOI (%)	Calcium Carbonate (%)	pH
										@ Opt.	+2% of Opt.	In-situ						
RB- 1	SS-1	1.0-2.5					6.5											
RB- 1	SS-2	2.5-4.0					20.1											
RB- 1	SS-3	4.0-5.5					29.7											
RB- 1	SS-4	6.0-7.5					24.6											
RB- 2	SS-1	1.0-2.5					4.3											
RB- 2	SS-2	2.5-4.0	130.1	111.1	5.216	2.608	18.9											7.1
RB- 2	SS-3	4.0-5.5					15.9											
RB- 2	SS-4	6.0-7.5					17.6											
RB- 3	SS-1	1.0-2.5					17.3											
RB- 3	SS-2	2.5-4.0					26.2											
RB- 3	SS-3	4.0-5.5					29.5											
RB- 3	SS-4	6.0-7.5					27.5											
RB- 3A	ST-1	2.0-4.0	124.9	102.3			22.1					1,649	0					7.0
RB- 4	SS-1	1.0-2.5					14.4											
RB- 4	SS-2	2.5-4.0					24.8											
RB- 4	SS-3	4.0-5.5					15.0											
RB- 4	SS-4	6.0-7.5					20.7											
RB- 5	SS-1	1.0-1.3					5.8											
RB- 5	SS-2	2.5-4.0					9.4											7.4
RB- 5	SS-3	4.0-5.5					43.5									8.1	2.9	
RB- 5	SS-4	6.0-7.5					25.0											
RB- 5	SS-5	8.5-10.0					27.3											
RB- 5	SS-6	13.5-15.0					11.2											
RB- 6	SS-1	1.0-2.5					21.2											
RB- 6	SS-2	2.5-4.0					13.3											
RB- 6	SS-3	4.0-5.5					12.0											

CTL Engineering, Inc.
Phone: 317-295-8650

SUMMARY OF SPECIAL LABORATORY TEST RESULTS

Des. No. : 2005FFE
Project Type : Fortville Pike & CR 300N Roundabout
Route : Fortville Pike and CR 300 N
Location : Greenfield, Indiana

Project No. :
County : Hancock
CTL Proj. No. : 22050123IND

Boring	Sample	Depth	Wet Density (pcf)	Dry Density (pcf)	Qu (ksf)	c (ksf)	Moisture %	Max Dry Density (pcf)	Optimum Moisture %	Resilient Modulus			Sulfate (ppm)	Phosphorus (ppm)	Potassium (ppm)	LOI (%)	Calcium Carbonate (%)	pH
										@ Opt.	+2% of Opt.	In-situ						
RB- 6	SS-4	6.0-7.5					11.4											
RB- 6	SS-5	8.5-10.0					10.2											
RB- 6	SS-6	13.5-15.0					7.0											
RB- 7	BS-1	0.0-5.0	129.4	110.8			16.8	111.4	16.4	11,232								7.0
RB- 7	SS-1	0.5-2.0					20.7											
RB- 7	SS-2	2.0-3.5					15.0											
RB- 7	SS-3	3.5-5.0					27.6											
RB- 7	SS-4	6.0-7.5					12.5											
RB- 7	SS-5	8.5-10.0					9.3											7.0
RB- 7	SS-6	13.5-15.0					8.6											
TS- 1	BS-1	0.0-0.3					21.6							30	111	3.3		6.8
TS- 2	BS-1	0.0-0.3					18.3							48	119	3.6		6.7
TS- 3	BS-1	0.0-0.3					14.5							24	100	3.2		6.9
TS- 4	BS-1	0.0-0.3					21.1							25	97	2.9		6.8

CTL Engineering, Inc.
Phone: 317-295-8650

SUMMARY OF SPECIAL LABORATORY TEST RESULTS

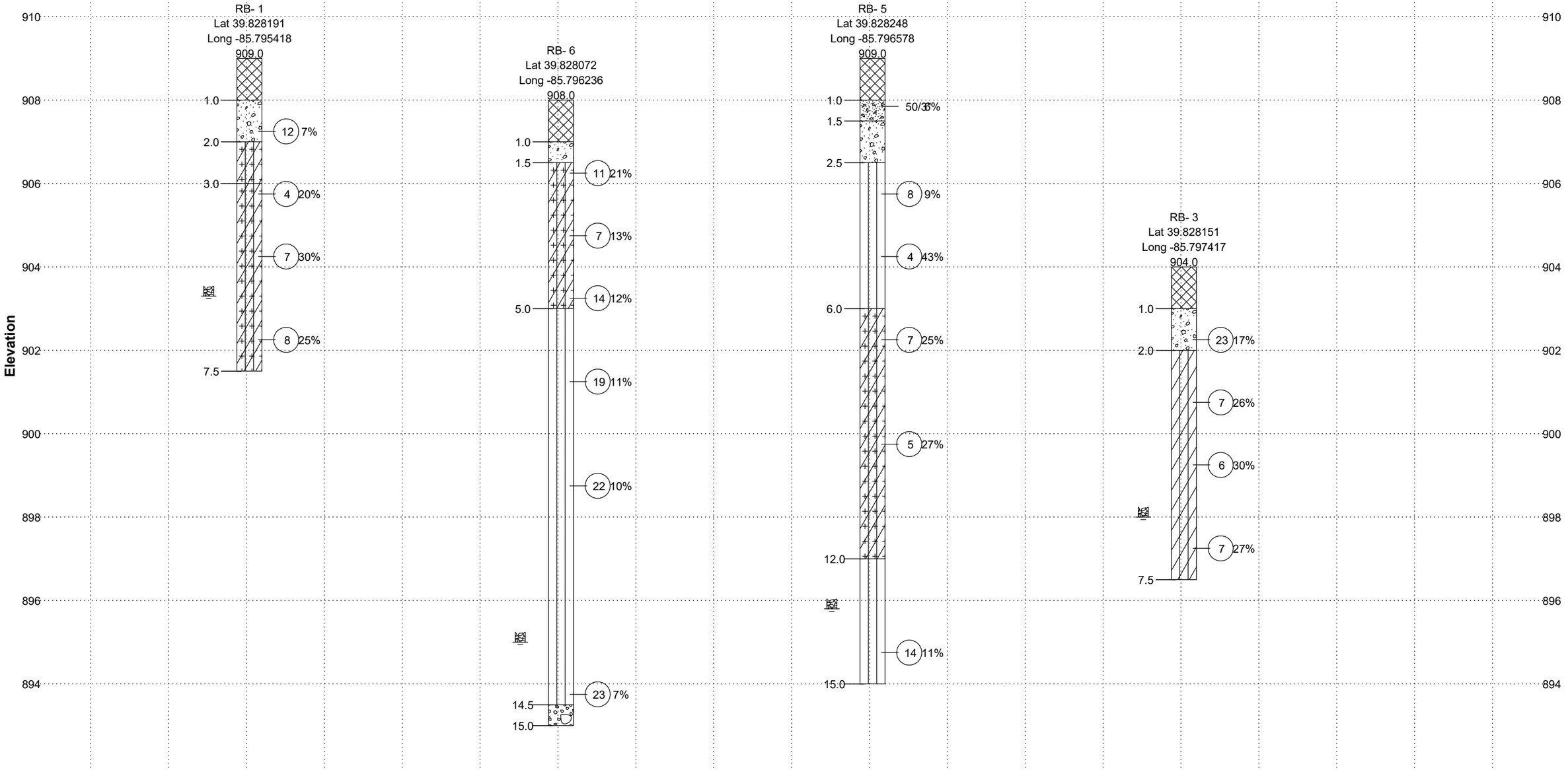
Des. No. : 2005FFE
Project Type : Fortville Pike & CR 300N Roundabout
Route : Fortville Pike and CR 300 N
Location : Greenfield, Indiana

Project No. :
County : Hancock
CTL Proj. No. : 22050123IND

APPENDIX D

SOIL PROFILES

CR 300 N



LEGEND

Asphalt
Sand & Gravel
Silty Clay Loam
Clay Loam
Concrete
Loam
Gravelly Sand

(N) STANDARD PENETRATION IN BLOWS PER FOOT (N)
W% PERCENT MOISTURE CONTENT(w)
REC PERCENT ROCK CORE RECOVERY
RQD ROCK QUALITY DESIGNATION (%)

GROUNDWATER DURING DRILLING
GROUND WATER AT COMPLETION OF DRILLING
GROUNDWATER AT "N" HOURS AFTER COMPLETION
CAVED IN DEPTH

GENERALIZED SOIL PROFILE

CTL Engineering, Inc.
www.ctleng.com

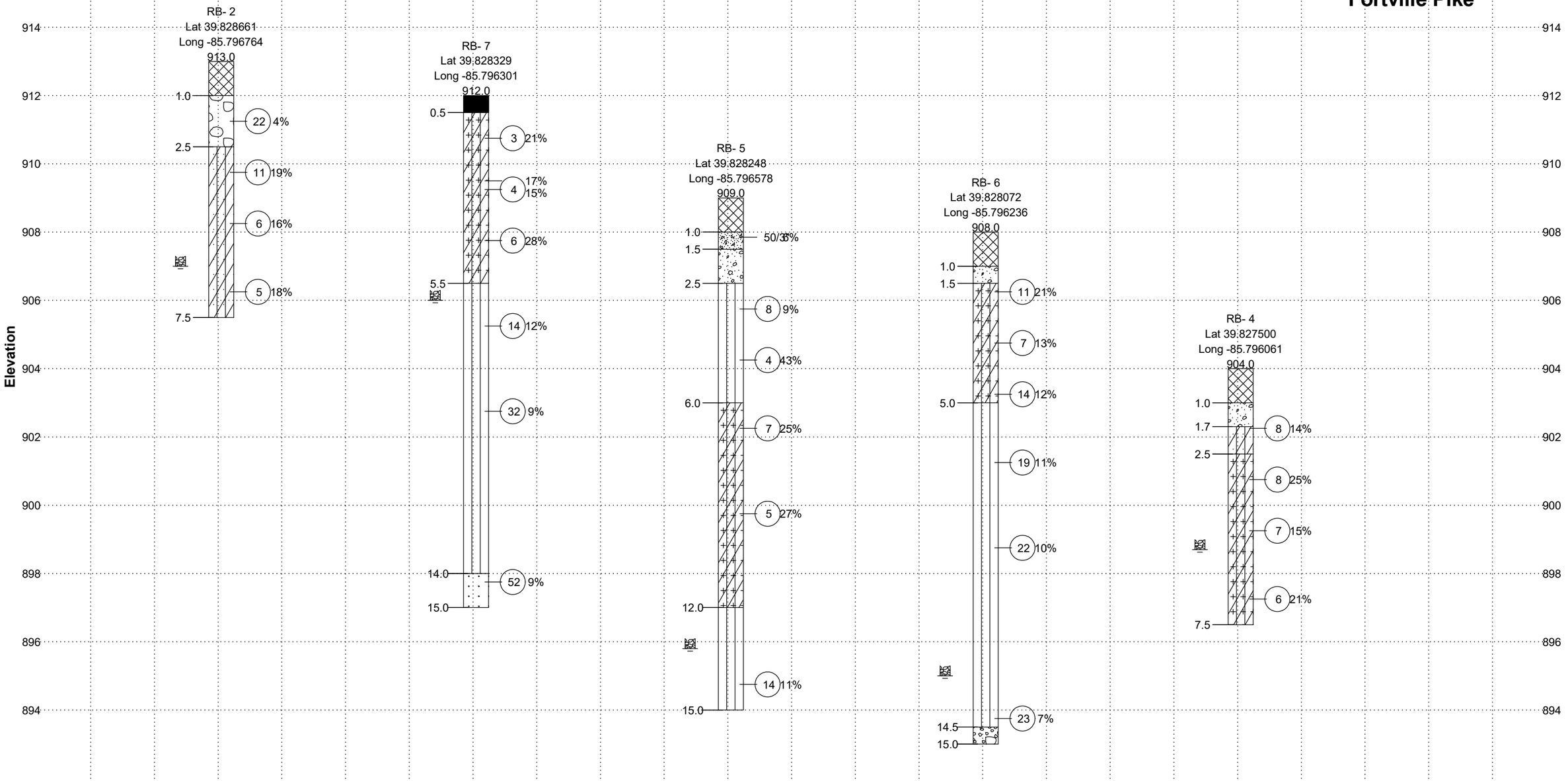
Scale	As Shown
Date	4/4/23
Drawn By	
Reviewed By	

American Structurepoint, Inc.
Fortville Pike & CR 300N Roundabout
Fortville Pike and CR 300 N
Hancock County, Indiana
Des. No.: 2005FFE

CTL Project No.: 22050123IND

Sheet 1

Fortville Pike



LEGEND

Asphalt | Concrete | Gravel | Loam | Sandy Clay Loam | Gravelly Sand | Sand & Gravel | Topsoil | Silty Clay Loam | Sand

(N) STANDARD PENETRATION IN BLOWS PER FOOT (N)

W% PERCENT MOISTURE CONTENT(w)

REC PERCENT ROCK CORE RECOVERY

RQD ROCK QUALITY DESIGNATION (%)

GROUNDWATER DURING DRILLING

GROUND WATER AT COMPLETION OF DRILLING

GROUNDWATER AT "N" HOURS AFTER COMPLETION

CAVED IN DEPTH

GENERALIZED SOIL PROFILE

CTL Engineering, Inc.
www.ctleng.com

Scale	As Shown
Date	4/4/23
Drawn By	
Reviewed By	

American Structurepoint, Inc.
Fortville Pike & CR 300N Roundabout
Fortville Pike and CR 300 N
Hancock County, Indiana
Des. No.: 2005FFE

CTL Project No.: 22050123IND

Sheet 2

INDOT_LL 22050123IND.GPJ INDOT_DATA TEMPLATE.GDT 4/4/23