



Illinois Department of Transportation

Memorandum

To: Fawad Aqueel Attn: Veselin Velichkov
From: Stephen Jones By: Giancarlo Gierbolini
Subject: Roadway Geotechnical Report*
Date: January 31, 2024

A handwritten signature in blue ink, likely belonging to Veselin Velichkov, written over the subject line.

*Route: FAP 846A (Illinois Route 53)
Location: from Arsenal Road to Hoff Road
County: Will
Section: FAP 0846A 23 Patch
Contract: 16689

Enclosed is the Roadway Geotechnical Report (RGR) prepared by IDOT District One Geotechnical Unit's consultant, Wang Engineering, dated January 24, 2024, for the above-referenced project. The report provides geotechnical recommendations for the proposed improvements to Illinois Route 53 (IL 53) between South Arsenal Road and Hoff Road in Will County. The proposed improvement will include full depth pavement patching in selected sections of roadway.

The report provides the results of the field investigation, laboratory test results, and analysis and recommendations pertaining to the proposed improvements. The report recommends increasing the thickness of the aggregate subgrade layer below the roadway from the standard 12 inches to 18 inches. We recommend including an additional quantity of aggregate subgrade to provide up to 24 inches below the proposed pavement section. This will allow for the increased 18 inches of aggregate subgrade, and also provide additional quantities of aggregate to use if necessary during field evaluation of the subgrade soils.

If you have any questions regarding this report, please contact Robert Claussen, P.E. at (847)705-4735 or Giancarlo Gierbolini, P.E. at (847) 705-4003.

Cc: IDOT Soils Engineer

Design Memorandum

To: Giancarlo Gierbolini, P.E., IDOT District One
Robert Claussen, P.E., IDOT District One
From: Mohammed (Mike) Kothawala, P.E., Sr. Geotechnical Engineer
Date: January 24, 2024
Subject: IL 53 from Arsenal to Hoff
Project: PTB 196-017, Work Order 10
Wang No. KE235396

Introduction

This design memorandum presents the results of subsurface investigation, laboratory testing, and geotechnical evaluation for the proposed roadway patching along IL Route 53 from South Arsenal Road to Hoff Road in Will County, Illinois. A *Site Location Map* is presented as Exhibit 1.

The purpose of our geotechnical work was to investigate and evaluate the subsurface soil and groundwater conditions along the roadway that would form a basis for patching recommendations.

Subsurface Exploration

A total of 16 roadway borings, designated as B-01 to B-16, were performed in December 2023. The borings were advanced to depths of 7.5 to 12.0 feet below ground surface (bgs). During a previous investigation conducted by others, a total of 16 full depth pavement cores were obtained in November 2022. Borings were proposed to be performed near previously performed core locations. However, boring locations were adjusted in the vicinity of core locations based on the pavement patch area and condition during marking in the field. Borings were performed in the outside traffic lane only. No pavement cores were obtained at the boring locations but we observed and measured the pavement composition and thicknesses in boreholes. Boring location data are presented in the *Boring Logs (Appendix A)*. The as-drilled boring locations and previously performed pavement core locations are shown in the *Boring Location Plan (Exhibit 2)*.

A Truck-mounted drilling rig, equipped with hollow stem augers, was used to advance and maintain open boreholes. Soil sampling was performed according to AASHTO T 206, “*Standard Method of Test for Penetration Test and Split-Barrel Sampling of Soils*.” Soil was continuously sampled to the termination depths.

Field boring logs, prepared and maintained by a Wang geologist, included lithological descriptions, visual-manual soil classifications (IDH textural classification), results of Rimac and pocket penetrometer unconfined compressive strength tests on cohesive soils.

Groundwater observations were made during and at the end of drilling operations. Boreholes were backfilled with soil cuttings and bentonite chips immediately upon completion and, the pavement was restored as close as possible to the original condition.

Laboratory Testing

All soil samples were tested in the laboratory for moisture content (AASHTO T 265). Selected samples were chosen for Atterberg limits (AASHTO T 89/90) and particle size (AASHTO T 88) analyses to classify major soil units. One organic content test was performed. The tested samples were classified according to the IDH and AASHTO classification systems. Field visual descriptions of the soil samples were verified in the laboratory. Laboratory test results are shown in the *Appendix A* and the in the *Laboratory Test Results (Appendix B)*.

Subsurface Soil Conditions

The surface conditions consist of 3.0 to 9.0 inches of concrete or 2.0 to 9.0 inches of asphalt pavement overlying 2.0 to 3.0 inches of sandy gravel or 3.0 to 15.5 inches of asphalt on top of 1.0 to 8.0 inches of concrete over 3.0 to 10.0 inches of gravelly sand aggregate base.

Beneath the pavement structure, up to 7 feet of granular and cohesive fill was encountered. The granular fill consists of loose to medium dense, damp sandy loam to gravelly sandy loam with N-values of 8 to 12 blows per foot. The cohesive fill consists of stiff to hard silty clay, clay loam to silty clay loam with unconfined compressive strength (Qu) values of 1.9 to greater than 4.5 tsf and moisture content values of 15 to 35%. Laboratory index testing on samples from the fill shows liquid limit (LL) values of 20 to 46% and plastic limit (PL) values of 12 to 18%. From depths of 1.0 to 7.5 feet below ground surface (bgs), up to 2 feet of stiff to hard silty clay, clay to clay loam or buried topsoil was revealed.

Beneath the fill and/or buried topsoil, at depths of 1.0 to 8.5 feet bgs, the borings encountered medium stiff to hard clay, clay loam, silty clay to silty clay loam with Qu values of 0.9 to greater than 10.3 tsf, moisture content values of 14 to 32%, LL values of 24 to 51%, and PL values of 15 to 21%. At depths of 4.3 to 4.8 feet bgs, the borings revealed loose to medium dense, damp to saturated loam, silty loam, sand to sandy loam with N-values of 7 to 17 blows per foot. At depths of 6 and 9 feet bgs, Borings B-06 and B-08 encountered dense to very dense, damp to moist gravelly sand with N-values of 32 blows per foot to greater than 50 blows per 6 inches of penetration. Auger refusal was noted at a depth of 7.5 feet bgs in Boring B-08.

Groundwater was encountered only in Borings B-06, B-07 and B-09 at depths of 4.3 to 8 feet bgs during drilling, however, were dry at the completion of drilling.

Detailed descriptions of the soil conditions encountered are presented in the attached Boring Logs.

Engineering Analysis and Recommendations

We understand that the proposed improvement of IL 53 roadway includes full depth pavement pathing in selected sections of roadway. Based on the soil conditions encountered below the pavement and laboratory test results, we conclude that the subgrade soils at most of the boring locations are frost susceptible. The failure of pavement appears to have been caused by silt and fine sand subgrade soils. As shown in Table 1 the subgrade soils mostly contain at least 65 percent of silt and fine sand which are frost susceptible. The subgrade soils are also classified as SM, SC and CL as per Unified Soil Classification System which make their frost susceptibility high to very high as per U.S. Army Corps of Engineers. Frost heave condition further continues by surface water infiltration through broken concrete pavement and freezing. At some boring locations, subgrade soils below pavement to a depth of 3 feet bgs were found with low shear strength and high moisture content.

We recommend replacing existing subgrade soils to a depth of 1.5 feet below the proposed pavement structure within the patching areas and replacing with non-frost susceptible material. We recommend using replacement material meeting the requirement of IDOT District One Special Provision for Aggregate Subgrade Improvement (D-1), Gradation CS 01. The replacement material should be placed in lift of 9-inch thickness and compacted to not less than 95 percent of the standard laboratory density. The standard laboratory density should be the maximum dry density determined according to AASHTO T 99.

During our field visit we observed that there are some other locations where concrete pavement has failed particularly in outer lanes and previously patched sections by hot mix asphalt concrete have settled. We recommend all such sections should also be included in the contract plans.

Attachments:

1. Exhibit 1, Site Location Map
2. Exhibit 2, Boring Locations Plan
4. Appendix A, Borings Logs
5. Appendix B, Laboratory Test Results

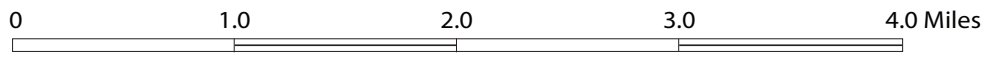
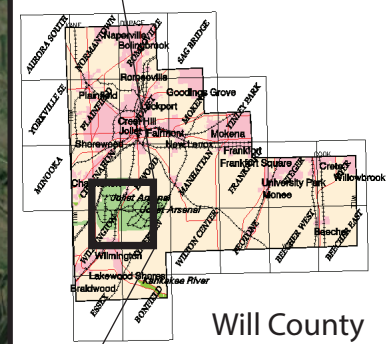
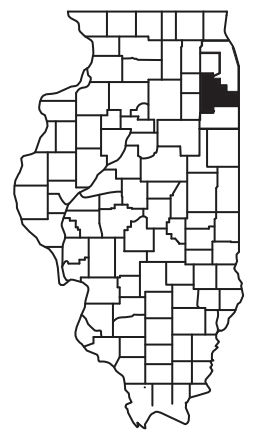
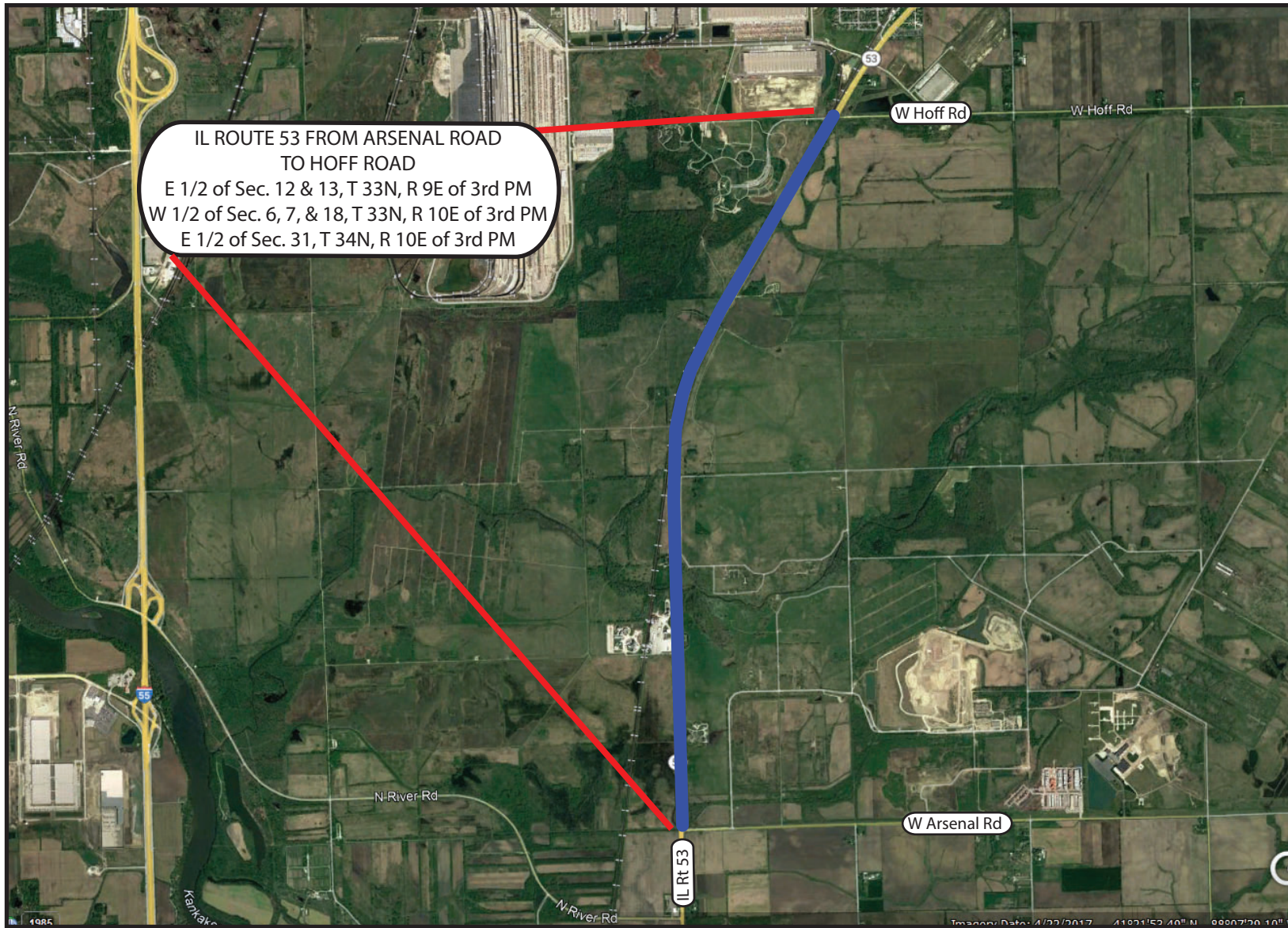
Copy To:

Corina Farez, Wang Engineering, Inc.

Table 1: Laboratory Test Results
IL 53 from Arsenal Road to Hoof Road

Boring Number	Sample Number	Depth Range Below Top of Pavement (feet)	IDH Classification	Percent Finer By weight					Atterberg Limits		Plasticity Index	Fine Sand and Silt Percent	Unified Soil Classification
				Gravel	Coarse Sand	Fine Sand	Silt	Clay	Liquid Limit	Plastic Limit			
B-01	1	1 to 3	Gravelly Sandy Loam	34.3	30.5	17.9	16	1.3	NP	NP		33.9	SM
B-02	1	1 to 3	Gravelly Sandy Loam	34.8	30.3	17.1	16.4	1.3	NP	NP		33.5	SM
B-03	1	1 to 3	Silty Clay Loam	2.2	4.2	8.8	57	27.7	27	16	11	65.8	CL
B-04	1	1 to 3	Silty Clay	0.4	1.2	6.1	58.9	33.3	45	18	27	65.0	CL
B-05	1	1 to 3	Clay Loam	0.7	4.3	20.9	48.4	25.7	51	22	29	69.3	CH
B-06	2A	3 to 5	Silty Clay	3.6	4.2	10	50.9	31.2	51	17	34	60.9	CH
B-07	1	1 to 3	Clay Loam	0.8	8.9	32.8	36.3	21.1	36	16	20	69.1	SC
B-08	1	1 to 3	Sandy Loam	2.1	13.2	56.6	17.6	10.4	20	12	8	74.2	SC
B-09	1	1 to 3	Sandy Loam	5.3	6.5	54.2	23.4	10.6	22	12	10	77.6	CL
B-10	1	2 to 4	Clay	0	0.1	1.7	38	60.1	44	21	23	39.7	CL
B-11	1	2 to 4	Silty Clay Loam	2.4	4.5	8.1	56.8	28.2	24	15	9	64.9	CL
B-12	1	2 to 4	Silty Clay	1.8	2.8	7.1	52.1	36.1	43	17	26	59.2	CL
B-13	1	2 to 4	Silty Clay	2.1	2	4.5	53.6	37.7	46	16	30	58.1	CL
B-14	1	2 to 4	Silty Clay	0.6	1.3	5	59.2	33.9	43	17	26	64.2	CL
B-15	1	1.5 to 3.5	Silty Clay	0.5	1	5	57.4	36	47	19	28	62.4	CL
B-16	1	1.5 to 3.5	Silty Clay	2.1	3.9	9.3	54.3	30.3	31	16	15	63.6	CL

EXHIBITS



SITE LOCATION MAP: ILLINOIS ROUTE 53 FROM ARSENAL ROAD TO HOFF ROAD, WO#10, PTB 196/017, WILL COUNTY, ILLINOIS

SCALE: GRAPHICAL	EXHIBIT 1	DRAWN BY: J. Bensen CHECKED BY: M. Kothawala
 Wang Engineering A Terracon Company		1145 N. Main Street Lombard, IL 60148 www.wangeng.com
FOR IDOT DISTRICT ONE		KE235396



Legend

-  Boring Location
-  Pavement Cores obtained by Others in November 2022

0 150 300 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017, WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-1

DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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Lombard, IL 60148
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KE235396



Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 100 200 Feet



BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-2

DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 150 300 Feet



BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-3

DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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KE235396



Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 100 200 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-4

DRAWN BY: M. Rojo

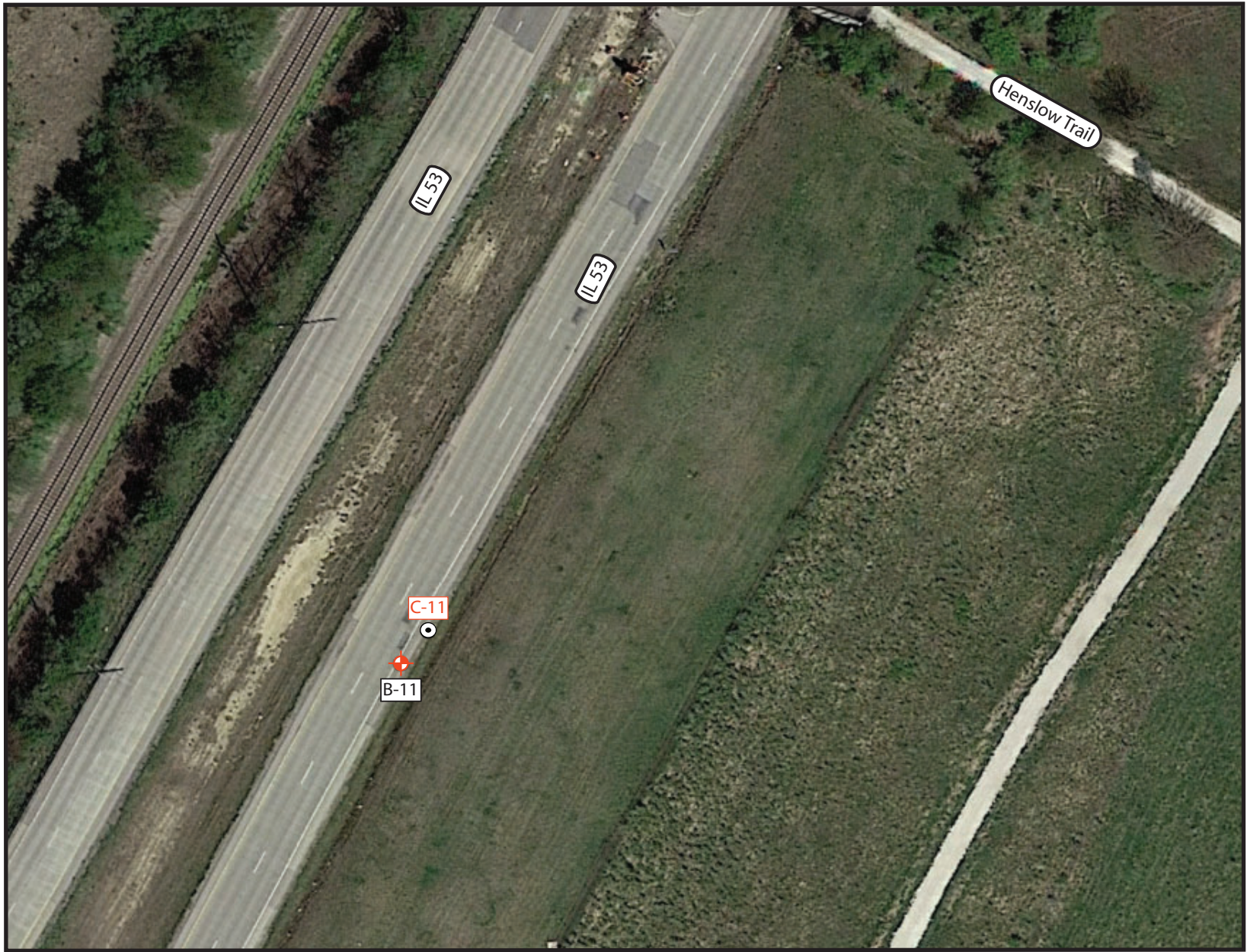
CHECKED BY: M. Kothawala



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KE235396



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Boring Location



Pavement Cores obtained by
Others in November 2022

0 100 200 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-5

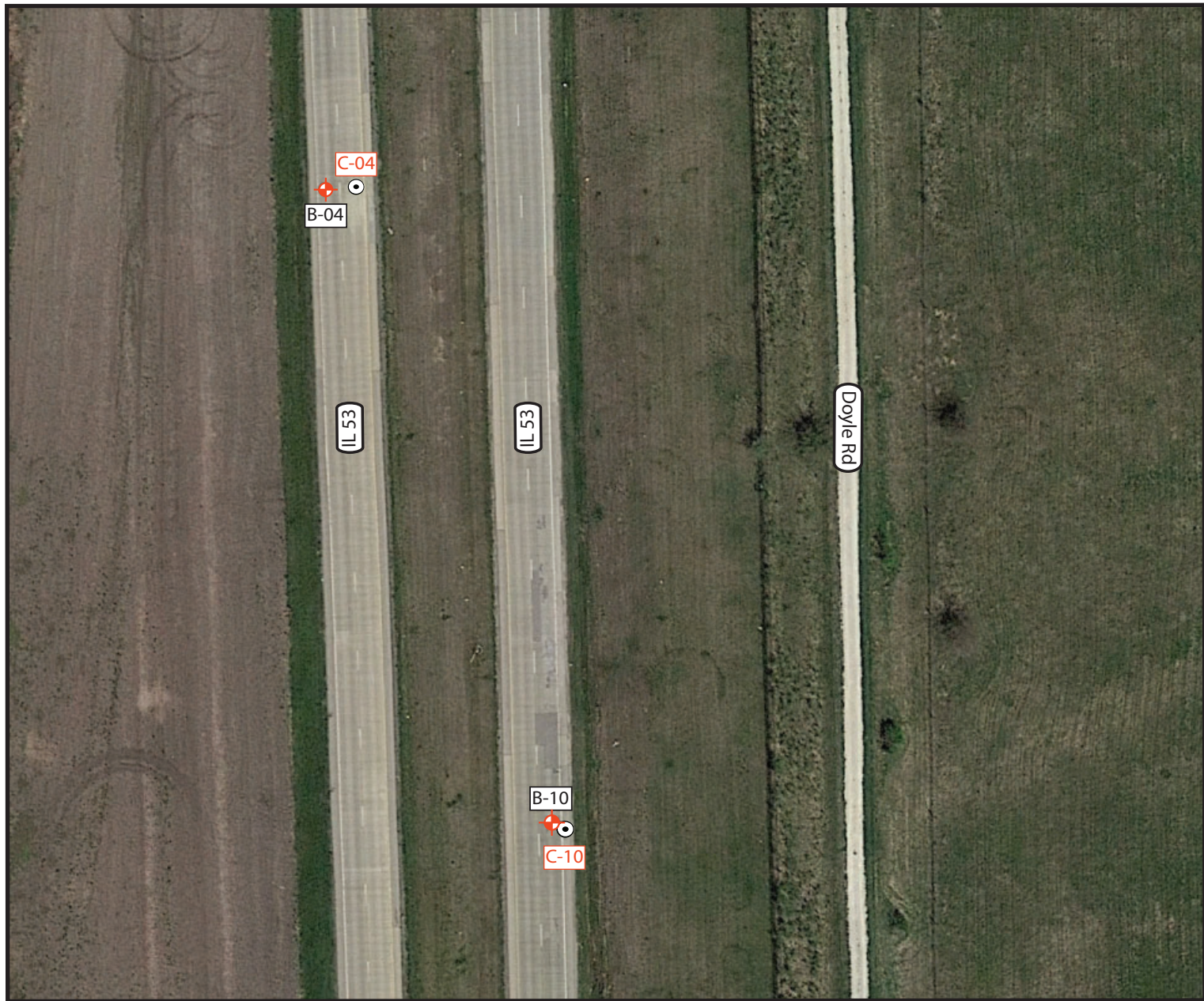
DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 100 200 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-6

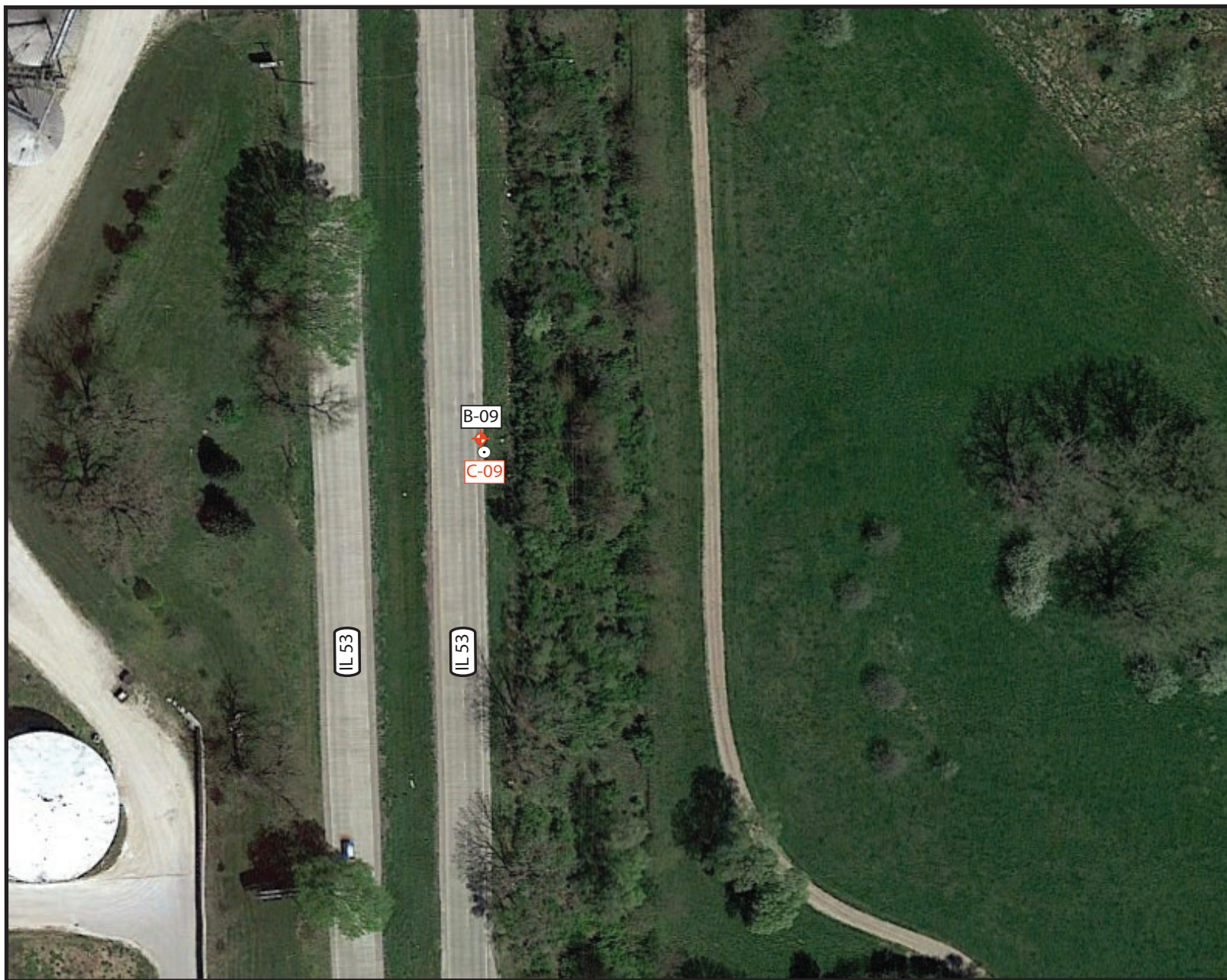
DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 150 300 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-7

DRAWN BY: M. Rojo

CHECKED BY: M. Kothawala



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Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 200 400 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-8

DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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Legend



Boring Location



Pavement Cores obtained by
Others in November 2022

0 200 400 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017,
WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-9

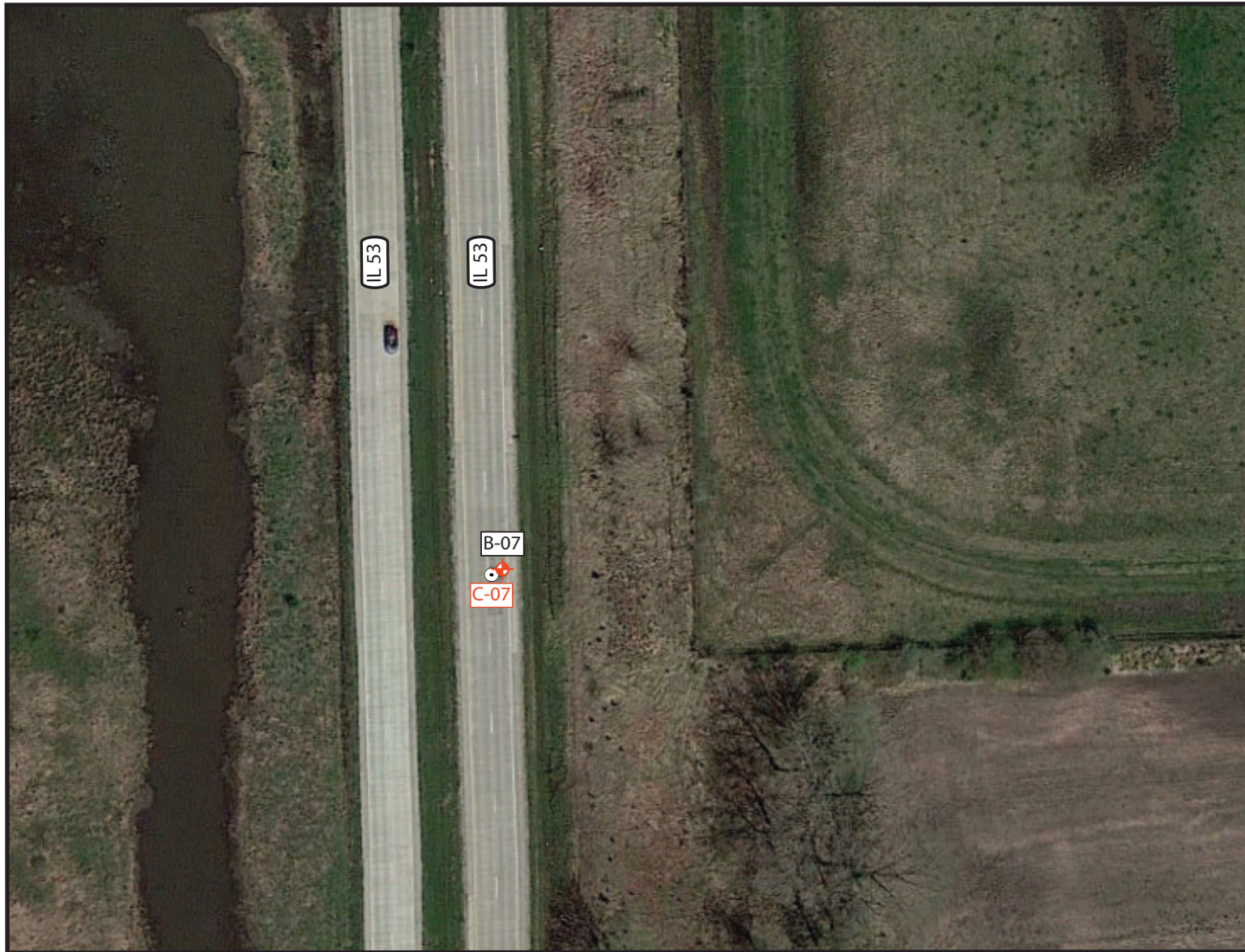
DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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KE235396



Legend

-  Boring Location
-  Pavement Cores obtained by Others in November 2022

0 150 300 Feet

BORING LOCATION PLAN: IL 53 FROM SOUTH ARSENAL RD TO HOFF RD, PTB 196/017, WO 10; WILL COUNTY ILLINOIS

SCALE: GRAPHICAL

EXHIBIT 2-10

DRAWN BY: M. Rojo
CHECKED BY: M. Kothawala



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FOR IDOT DIST. ONE

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Appendix A



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BORING LOG B-01

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1721060.85 ft
East: 1043489.23 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.3	9-inch thick CONCRETE --PAVEMENT--															
		Medium dense, brown Gravelly SANDY LOAM; damp --FILL-- --%Gravel=34.3-- --%Sand=48.4-- --%Silt=16.0-- --%Clay=1.3-- --A-1-b (0)--			1	5 4 6 4	NP	7									
	96.2				2A	9 8	NP	7									
		Very stiff, brown to gray SILTY CLAY, trace gravel; damp --FILL-- --RDR 2--	5		2B	9 8	3.50 P	23									
					3	4 6 7 5	2.25 P	17									
	93.5	Very stiff, black CLAY; damp --Buried TOPSOIL--			4	5 4 6 6	2.00 P	45									
	91.5	Stiff, gray SILTY CLAY, trace gravel; damp --RDR 2--	10		5	4 7 4 3	1.39 B	25									
	89.0	Boring terminated at 11.00 ft															

GENERAL NOTES

Begin Drilling **12-19-2023** Complete Drilling **12-19-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **DRY**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



BORING LOG B-02

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WEI Job No.: KE235396

Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1721132.89 ft
East: 1043531.70 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-19-2023	Complete Drilling	12-19-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-03

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1715440.77 ft
East: 1040255.42 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
		9-inch thick ASPHALT --PAVEMENT--															
	99.3																
	99.0	3-inch thick, brown SANDY GRAVEL --BASE COURSE--															
		Very stiff to hard, brown and gray SILTY CLAY LOAM, trace gravel; damp			1	6 9 8 12	4.50 P	15									
		--FILL-- --RDR 2-- --L _L (%)=27, P _L (%)=16-- --%Gravel=2.2-- --%Sand=13.1-- --%Silt=57.0-- --%Clay=27.7-- --A-6 (7)--			2	6 6 7 6	3.53 B	18									
					3	6 7 13 12	2.50 P	17									
	93.5	Very stiff to hard, brown to gray SILTY CLAY LOAM, trace gravel; damp			4	6 7 11 13	4.92 B	17									
		--RDR 2--			5	11 14 10 15	2.87 B	15									
	89.0	Boring terminated at 11.00 ft															

GENERAL NOTES

Begin Drilling **12-19-2023** Complete Drilling **12-19-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ☒ **DRY**
At Completion of Drilling ☒ **DRY**
Time After Drilling **NA**
Depth to Water ☒ **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG B-04

WEI Job No.: KE235396

Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1710050.95 ft
East: 1038912.65 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-19-2023	Complete Drilling	12-19-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-05

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1702874.12 ft
East: 1039146.13 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.7	4-inch thick CONCRETE															
	99.4	--PAVEMENT--															
	99.3	3-inch thick, brown Gravelly SAND															
	99.0	2-inch thick CONCRETE															
		--PAVEMENT--															
	97.5	3-inch thick, dark brown Gravelly SAND			1	3	1.00	34									
		--BASE COURSE--				3	P										
		Stiff, black CLAY LOAM, trace gravel; damp				5											
		--Buried TOPSOIL--			2	2	2.30	18									
	95.5	--L _L (%)=51, P _L (%)=22--				3	B										
		--%Gravel=0.7--				4											
		--%Sand=25.2--															
		--%Silt=48.4--															
		--%Clay=25.7--															
		--A-7-6 (21)--			3	1	NP	13									
		Very stiff, brown and gray SILTY CLAY, trace gravel; damp				2											
		--RDR 2--				10											
		Medium dense, brown and gray LOAM, little gravel; wet				10											
		--RDR 2--			4	7	NP	11									
						8											
						7											
	91.3	Medium dense, gray SILT, trace gravel; wet				7											
		--RDR 2--				6											
					5	4	NP	19									
						11											
						7											
	89.0	Boring terminated at 11.00 ft															

GENERAL NOTES

Begin Drilling **12-19-2023** Complete Drilling **12-19-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **5.00 ft**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG B-06

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1702252.78 ft
East: 1039164.53 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.7	4-inch thick CONCRETE															
	99.5	--PAVEMENT--															
	99.3	2-inch thick, brown Gravelly SAND															
	99.0	3-inch thick CONCRETE															
		--PAVEMENT--															
		3-inch thick, brown Gravelly SAND															
		--BASE COURSE--															
		Medium stiff to stiff, brown and gray SILTY CLAY, trace gravel; moist															
	95.8	--L _L (%)=51, P _L (%)=17--															
	95.2	--%Gravel=3.6--															
		--%Sand=14.3--															
		--%Silt=50.9--															
		--%Clay=31.2--															
		--A-7-6 (28)--															
	94.2	Brown SANDY LOAM, trace gravel; saturated															
	93.3	Stiff, brown and gray SILTY CLAY															
		Medium dense, brown, medium SANDY LOAM, little gravel; saturated															
		--RDR 2--															
	91.0	Stiff, gray SILTY CLAY LOAM, trace gravel; moist															
		--RDR 2--															
		Dense, gray Gravelly SAND; moist															
		--RDR 2--															
	89.0	Boring terminated at 11.00 ft															

GENERAL NOTES

Begin Drilling **12-19-2023** Complete Drilling **12-19-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **4.25 ft**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG B-07

WEI Job No.: KE235396

Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1701310.18 ft
East: 1039263.80 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-19-2023	Complete Drilling	12-19-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		7.00 ft
At Completion of Drilling		DRY
Time After Drilling		NA
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



BORING LOG B-08

WEI Job No.: KE235396

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Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1704359.56 ft
East: 1039180.18 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-20-2023	Complete Drilling	12-20-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-09

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1706426.55 ft
East: 1039130.63 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.8	2-inch thick CONCRETE															
	99.3	7-inch thick ASPHALT															
	99.0	3-inch thick CONCRETE															
		--PAVEMENT--															
		Loose, brown SANDY LOAM, trace gravel; damp			1	4	NP	16									
		--FILL--				5											
		--L _L (%)=22, P _L (%)=12--				4											
	97.3	--%Gravel=5.3--				4	NP	6									
		--%Sand=60.8--			2	4											
		--%Silt=23.4--				5											
		--%Clay=10.6--				4											
		--A-2-4 (0)--															
	95.3	Loose, gray to white Gravelly SANDY LOAM; damp															
		--FILL--															
		Loose, brown to gray SANDY LOAM to SAND, trace gravel; damp to saturated			3	6	NP	19									
		--RDR 2--				3											
						3											
						1											
					4	2	NP	20									
						5											
						6											
						4											
					5	5	NP	13									
						12											
						17											
	89.0	Boring terminated at 11.00 ft															

GENERAL NOTES

Begin Drilling **12-20-2023** Complete Drilling **12-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **8.00 ft**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

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BORING LOG B-10

WEI Job No.: KE235396

Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1709730.58 ft
East: 1039028.74 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-20-2023	Complete Drilling	12-20-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-11

WEI Job No.: KE235396

Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1715021.27 ft
East: 1040128.69 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-20-2023	Complete Drilling	12-20-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-12

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1718097.97 ft
East: 1041886.02 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.8	3-inch thick CONCRETE															
	99.2	7-inch thick ASPHALT															
	98.5	8-inch thick CONCRETE															
	98.0	--PAVEMENT--															
	98.0	6-inch thick, brown Gravelly SAND															
		--BASE COURSE--															
		Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp			1	6 5 7 5	3.53 B	16									
		--RDR 2--															
		--L _L (%)=43, P _L (%)=17--															
		--%Gravel=1.8--															
		--%Sand=10.0--															
		--%Silt=52.1--															
		--%Clay=36.1--															
		--A-7-6 (23)--															
					2	4 6 6 5	4.50 P	19									
					3	4 3 8 5	3.20 B	25									
					4	5 6 8 9	3.00 P	26									
					5	4 6 6 7	2.46 B	25									
	88.0	Boring terminated at 12.00 ft															

GENERAL NOTES

Begin Drilling **12-20-2023** Complete Drilling **12-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **DRY**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG B-13

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1718026.20 ft
East: 1041851.52 ft
Station:
Offset:

Page 1 of 1

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.7	4-inch thick CONCRETE															
	99.1	7-inch thick ASPHALT															
	98.6	--PAVEMENT--															
		6-inch thick, brown Gravelly SAND															
		--BASE COURSE--															
		Very stiff to hard, brown and gray SILTY CLAY, trace gravel; damp			1	6 6 7 5	3.69 B	21									
		--FILL--															
		--RDR 2--															
		--L _L (%)=46, P _L (%)=16--															
		--%Gravel=2.1--															
		--%Sand=6.5--															
		--%Silt=53.6--															
		--%Clay=37.7--															
		--A-7-6 (28)--															
					2	5 5 9 7	3.00 P	23									
					3A	6 5 9	4.51 B	27									
	92.8	Hard, black SILTY CLAY, trace gravel			3B	10	4.00 P	29									
	92.0	--Buried TOPSOIL--															
		Very stiff, brown and gray SILTY CLAY, trace gravel; damp			4	5 6 9 11	2.38 B	20									
		--RDR 2--															
					5	3 5 8 8	3.36 B	18									
	88.0	Boring terminated at 12.00 ft															

GENERAL NOTES

Begin Drilling **12-20-2023** Complete Drilling **12-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **DRY**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**

The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



BORING LOG B-14

WEI Job No.: KE235396

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Client	IDOT D1
Project	ILRoute 53, PTB 196-017, WO 10
Location	Wilmington, Will County, IL

Datum: NAVD 88
Elevation: 100.00 ft
North: 1720317.55 ft
East: 1043159.77 ft
Station:
Offset:

[illegible]

GENERAL NOTES

Begin Drilling	12-20-2023	Complete Drilling	12-20-2023
Drilling Contractor	Wang Testing Services	Drill Rig	20CME55T[81%]
Driller	KG&TC	Logger	M. Rojo
		Checked by	J. Bensen
Drilling Method	2.25" ID HSA; boring backfilled upon completion		

WATER LEVEL DATA

While Drilling		DRY
At Completion of Drilling		DRY
Time After Drilling	NA	
Depth to Water		NA

The stratification lines represent the approximate boundary between soil types: the actual transition may be gradual.



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BORING LOG B-15

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1720406.16 ft
East: 1043209.62 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.3	8-inch thick ASPHALT															
	98.9	5-inch thick CONCRETE															
	98.5	--PAVEMENT--															
		5-inch thick, brown Gravelly SAND															
		--BASE COURSE--															
		Stiff to very stiff, brown and gray SILTY CLAY, trace gravel; damp			1	3 4 7 6	1.31 B	26									
		--RDR 2--															
		--L _L (%)=47, P _L (%)=19--															
		--%Gravel=0.5--			2	4 2 4 6	1.72 B	26									
		--%Sand=6.1--															
		--%Silt=57.4--															
		--%Clay=36.0--															
		--A-7-6 (28)--															
					3	2 5 6 8	2.46 B	27									
	92.5	Very stiff to hard, brown and gray SILTY CLAY LOAM, trace gravel; damp			4	5 6 8 10	7.22 B	16									
		--RDR 2--															
					5	6 6 16 10	3.28 B	17									
	88.5	Boring terminated at 11.50 ft															

GENERAL NOTES

Begin Drilling **12-20-2023** Complete Drilling **12-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling ☒ **DRY**
At Completion of Drilling ☒ **DRY**
Time After Drilling **NA**
Depth to Water ☒ **NA**
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.



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BORING LOG B-16

WEI Job No.: KE235396

Client **IDOT D1**
Project **ILRoute 53, PTB 196-017, WO 10**
Location **Wilmington, Will County, IL**

Datum: NAVD 88
Elevation: 100.00 ft
North: 1721333.20 ft
East: 1043739.75 ft
Station:
Offset:

Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)	Profile	Elevation (ft)	SOIL AND ROCK DESCRIPTION	Depth (ft)	Sample Type recovery	Sample No.	SPT Values (blw/6 in)	Qu (tsf)	Moisture Content (%)
	99.6	5-inch thick CONCRETE															
	99.1	6-inch thick ASPHALT															
	98.6	--PAVEMENT--															
		6-inch thick, brown Gravelly SAND															
		--BASE COURSE--															
		Stiff to hard, brown and gray SILTY CLAY to SILTY CLAY LOAM, trace gravel; damp			1	5	4.10	20									
		--RDR 2--				5											
		--L _L (%)=31, P _L (%)=16--				4											
		--%Gravel=2.1--				4											
		--%Sand=13.2--			2	3	3.03	17									
		--%Silt=54.3--				7											
		--%Clay=30.3--				7											
		--A-6 (11)--															
					3	5	5.99	16									
						8											
						9											
						11											
					4	4	6.97	17									
						5											
						8											
						10											
					5	4	6.15	17									
						7											
						6											
						12											
	88.5	Boring terminated at 11.50 ft															

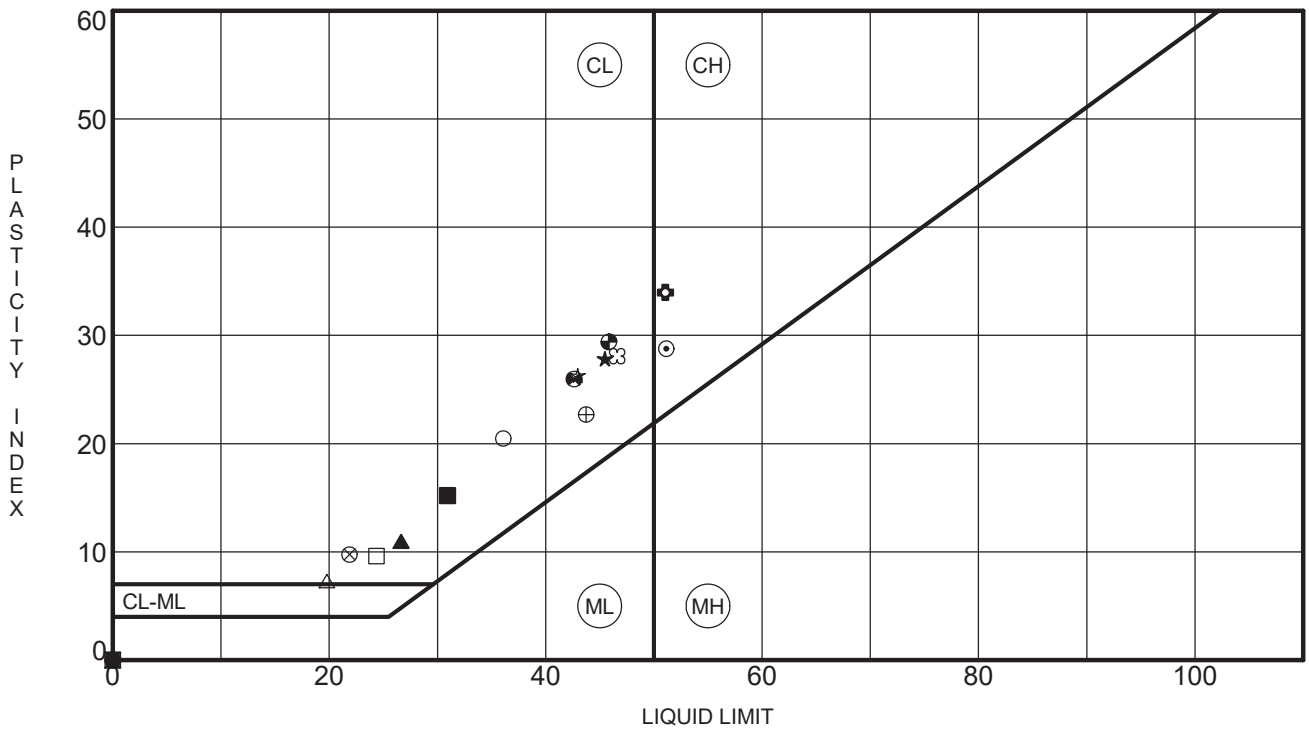
GENERAL NOTES

Begin Drilling **12-20-2023** Complete Drilling **12-20-2023**
Drilling Contractor **Wang Testing Services** Drill Rig **20CME55T[81%]**
Driller **KG&TC** Logger **M. Rojo** Checked by **J. Bensen**
Drilling Method **2.25" ID HSA; boring backfilled upon completion**

WATER LEVEL DATA

While Drilling **DRY**
At Completion of Drilling **DRY**
Time After Drilling **NA**
Depth to Water **NA**
The stratification lines represent the approximate boundary between soil types; the actual transition may be gradual.

Appendix B



Specimen Identification	LL	PL	PI	Fines	IDH Classification
● B-01#1 1.0 ft	NP	NP	NP	17	Gravelly Sandy Loam
⊠ B-02#1 1.0 ft	NP	NP	NP	18	Gravelly Sandy Loam
▲ B-03#1 1.0 ft	27	16	11	85	Silty Clay Loam
★ B-04#1 1.0 ft	45	18	27	92	Silty Clay
⊙ B-05#1 1.0 ft	51	22	29	74	Clay Loam
⊕ B-06#2A 3.0 ft	51	17	34	82	Silty Clay
○ B-07#1 1.0 ft	36	16	20	57	Clay Loam
△ B-08#1 1.0 ft	20	12	8	28	Sandy Loam
⊗ B-09#1 1.0 ft	22	12	10	34	Sandy Loam
⊕ B-10#1 2.0 ft	44	21	23	98	Clay
□ B-11#1 2.0 ft	24	15	9	85	Silty Clay Loam
⊕ B-12#1 2.0 ft	43	17	26	88	Silty Clay
⊕ B-13#1 2.0 ft	46	16	30	91	Silty Clay
☆ B-14#1 2.0 ft	43	17	26	93	Silty Clay
⊗ B-15#1 1.5 ft	47	19	28	93	Silty Clay
■ B-16#1 1.5 ft	31	16	15	85	Silty Clay



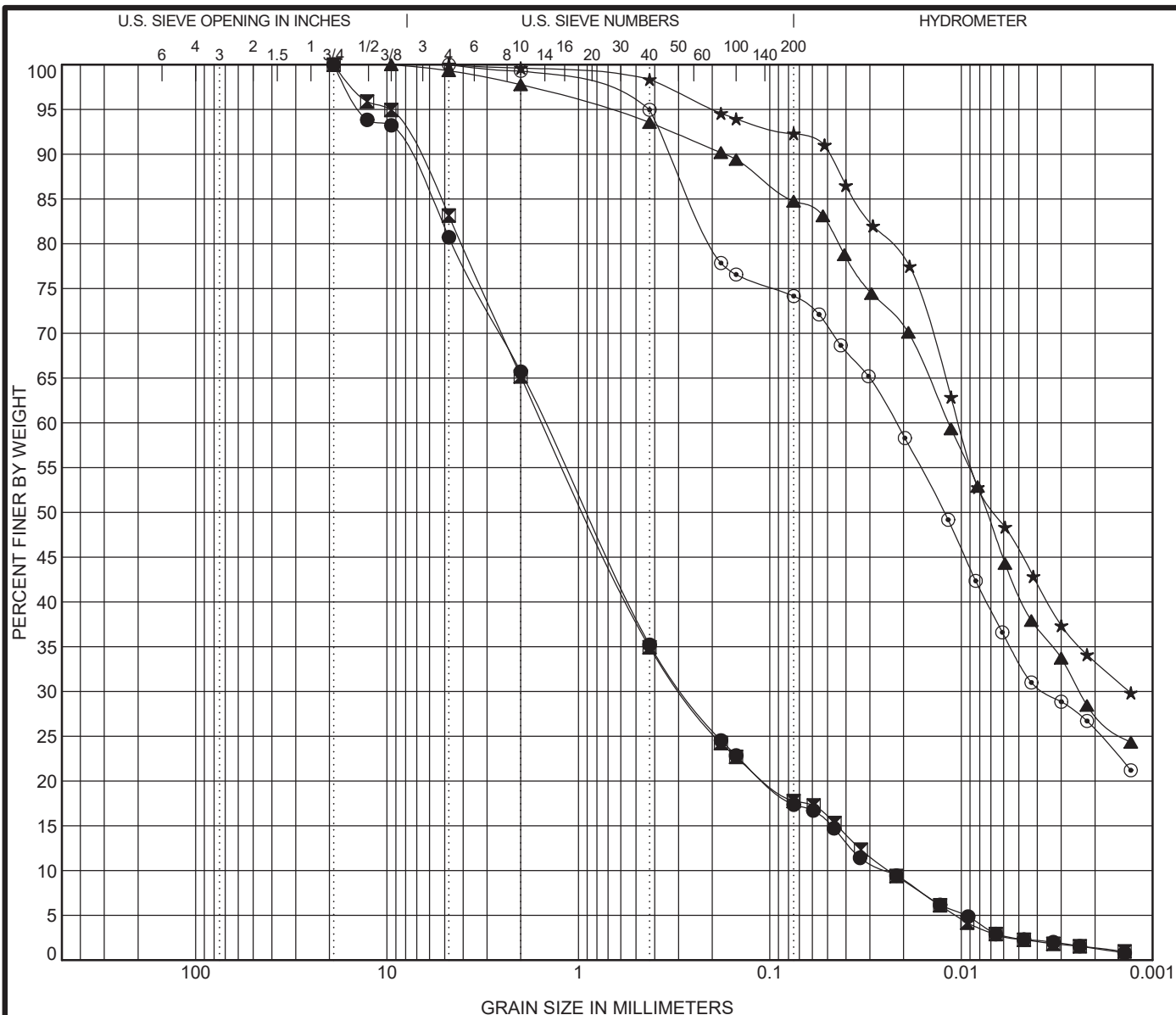
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ATTERBERG LIMITS' RESULTS

Project: ILRoute 53

Location: Wilmington, Will County, IL

Number: KE235396



Specimen Identification		IDH Classification				LL	PL	PI	Cc	Cu
●	B-01#1 1.0 ft	Gravelly Sandy Loam				NP	NP	NP	2.12	60.68
☒	B-02#1 1.0 ft	Gravelly Sandy Loam				NP	NP	NP	2.24	64.40
▲	B-03#1 1.0 ft	Silty Clay Loam				27	16	11		
★	B-04#1 1.0 ft	Silty Clay				45	18	27		
◎	B-05#1 1.0 ft	Clay Loam				51	22	29		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-01#1 1.0 ft	19	1.496	0.279	0.025	34.3	48.4	16.0	1.3	
☒	B-02#1 1.0 ft	19	1.534	0.286	0.024	34.8	47.4	16.4	1.3	
▲	B-03#1 1.0 ft	9.5	0.012	0.002		2.2	13.0	57.0	27.7	
★	B-04#1 1.0 ft	4.75	0.01	0.001		0.4	7.3	58.9	33.3	
◎	B-05#1 1.0 ft	4.75	0.022	0.004		0.7	25.2	48.4	25.7	



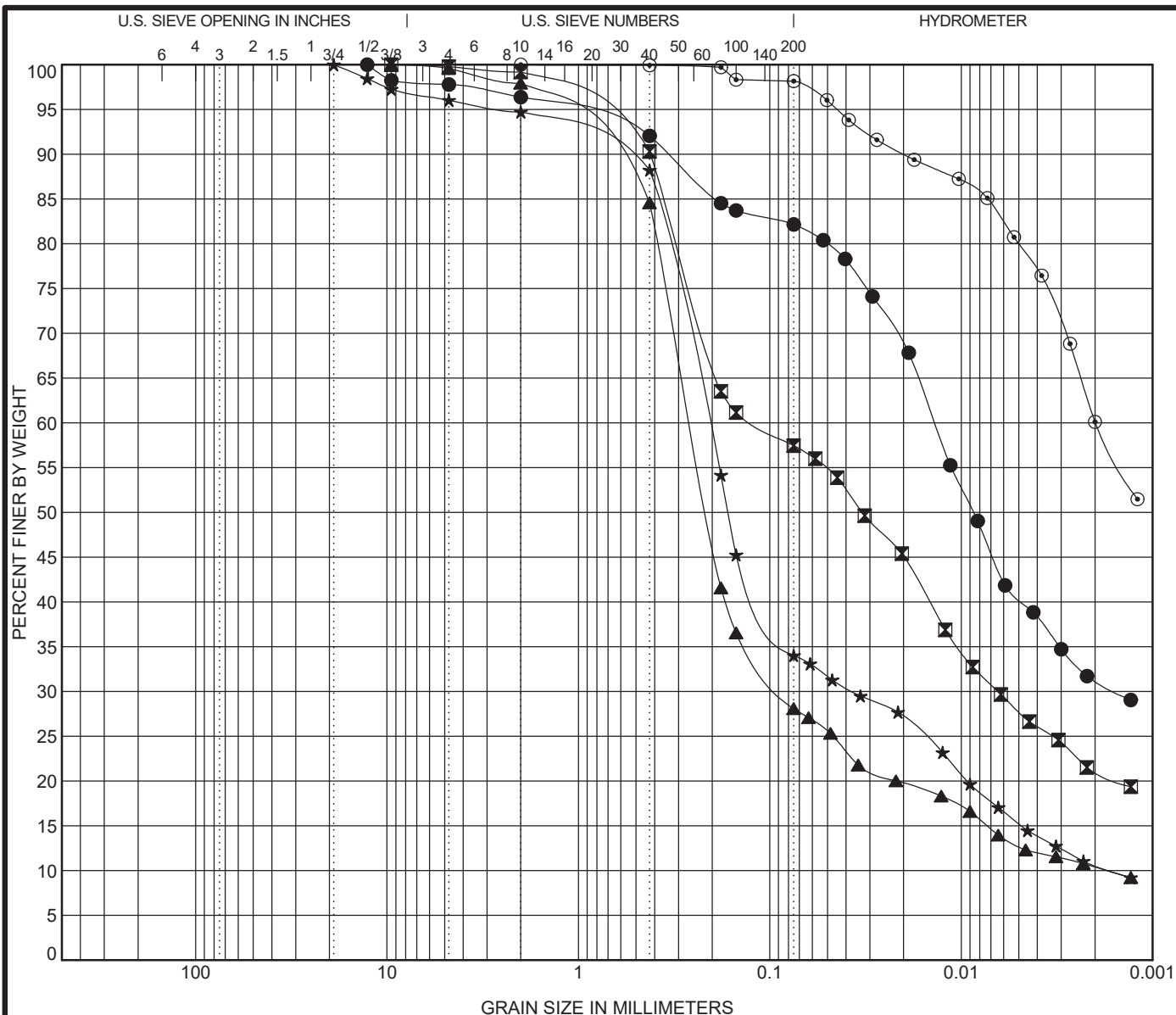
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GRAIN SIZE DISTRIBUTION

Project: ILRoute 53

Location: Wilmington, Will County, IL

Number: KE235396



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification				LL	PL	PI	Cc	Cu
●	B-06#2A	3.0 ft	Silty Clay				51	17	34		
☒	B-07#1	1.0 ft	Clay Loam				36	16	20		
▲	B-08#1	1.0 ft	Sandy Loam				20	12	8	17.06	149.95
★	B-09#1	1.0 ft	Sandy Loam				22	12	10	3.96	125.86
◎	B-10#1	2.0 ft	Clay				44	21	23		
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-06#2A	3.0 ft	12.7	0.014	0.002		3.6	14.2	50.9	31.2	
☒	B-07#1	1.0 ft	9.5	0.121	0.006		0.8	41.7	36.3	21.1	
▲	B-08#1	1.0 ft	9.5	0.26	0.088	0.002	2.1	69.8	17.6	10.4	
★	B-09#1	1.0 ft	19	0.208	0.037	0.002	5.3	60.7	23.4	10.6	
◎	B-10#1	2.0 ft	2	0.002			0.0	1.8	38.0	60.1	



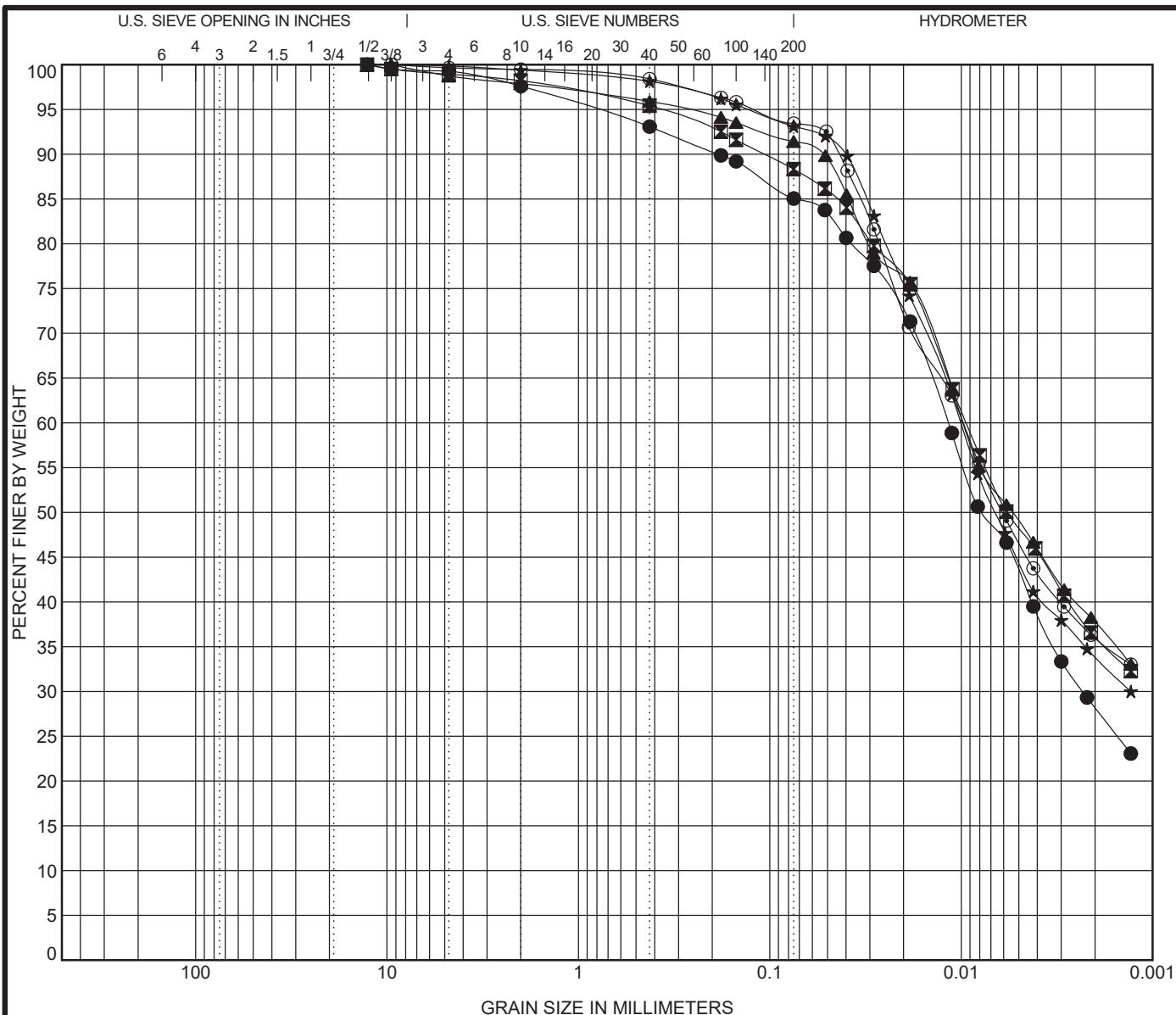
Wang Engineering, Inc.
1145 North Main St
Lombard, IL 60148
Telephone: 630 953-9928
Fax: 630 953-9938

GRAIN SIZE DISTRIBUTION

Project: ILRoute 53

Location: Wilmington, Will County, IL

Number: KE235396



COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification			IDH Classification			LL	PL	PI	Cc	Cu
●	B-11#1	2.0 ft	Silty Clay Loam			24	15	9		
☒	B-12#1	2.0 ft	Silty Clay			43	17	26		
▲	B-13#1	2.0 ft	Silty Clay			46	16	30		
★	B-14#1	2.0 ft	Silty Clay			43	17	26		
◎	B-15#1	1.5 ft	Silty Clay			47	19	28		
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-11#1	2.0 ft	12.7	0.012	0.002		2.4	12.6	56.8	28.2
☒	B-12#1	2.0 ft	12.7	0.009			1.8	9.9	52.1	36.1
▲	B-13#1	2.0 ft	9.5	0.01			2.1	6.5	53.6	37.7
★	B-14#1	2.0 ft	9.5	0.01			0.6	6.3	59.2	33.9
◎	B-15#1	1.5 ft	9.5	0.01			0.5	6.0	57.4	36.0



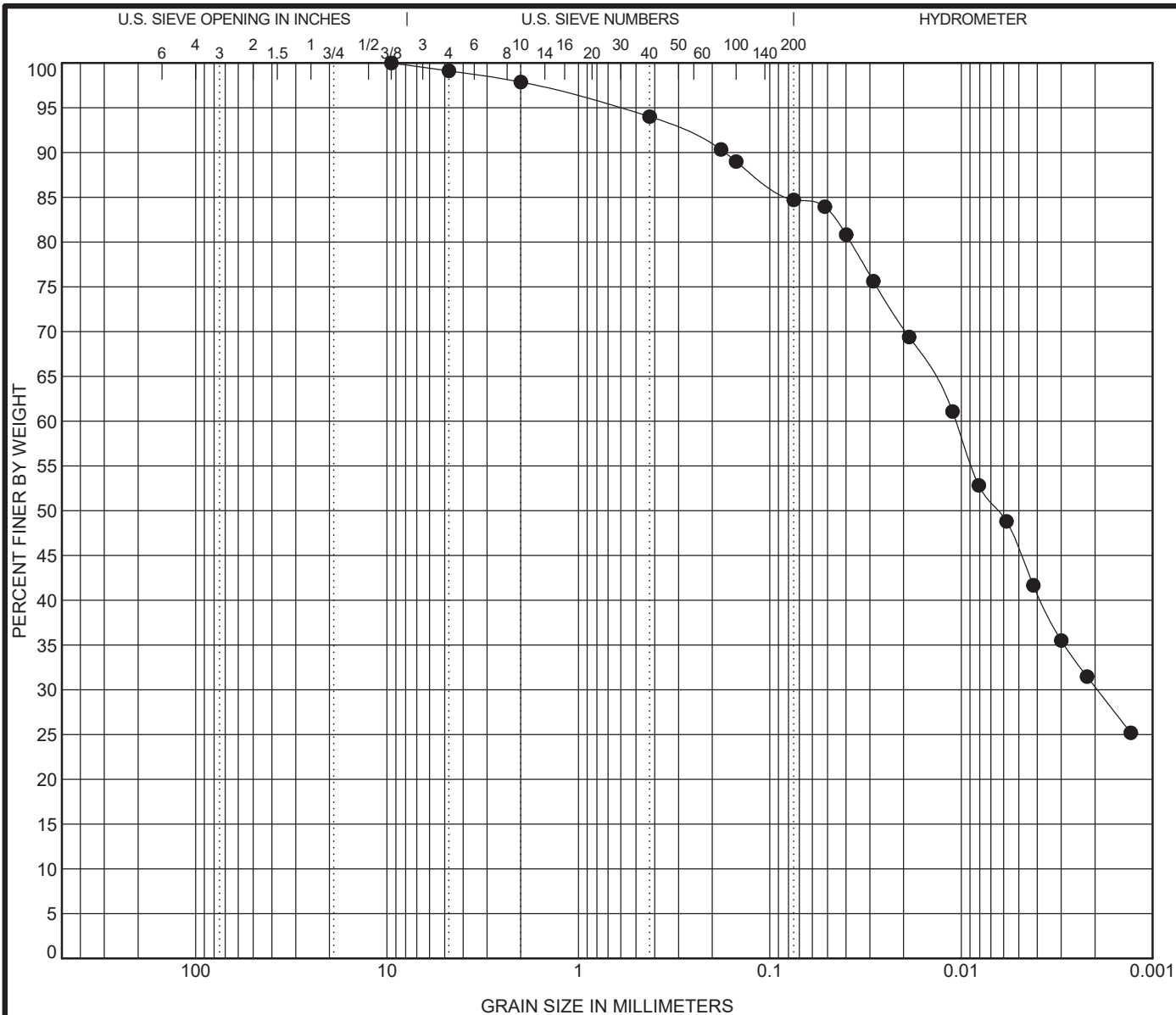
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COBBLES	GRAVEL	SAND		SILT AND CLAY
		coarse	fine	

Specimen Identification		IDH Classification				LL	PL	PI	Cc	Cu
●	B-16#1 1.5 ft	Silty Clay				31	16	15		
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
●	B-16#1 1.5 ft	9.5	0.011	0.002		2.1	13.2	54.3	30.3	



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