APPENDIX ‘A’

GEOTECHNICAL REPORT

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"Engineering and Testing Solutions That Work for You"

Date:	January 15, 2024	**File No.:**	23-035-03
Client:	WSP Canada Inc.		
Address:	1600 Buffalo Place Winnipeg, Manitoba R3T 6B8		
Attention:	Scott Suderman, P.Eng.		
Project:	Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals, Winnipeg, Manitoba Canada		

Introduction

ENG-TECH Consulting Limited (ENG-TECH) was retained by WSP Canada Inc. (WSP) to complete a geotechnical investigation inclusive of test holes and pavement cores for a future rehabilitation project along sections of Bishop Grandin Boulevard (Abinojii Mikanah) in Winnipeg, Manitoba, Canada.

Scope of Work

The scope of work for the project entailed drilling a total of 12 test holes and recovering a total of thirty-four (34) cores through the existing pavement structure, documenting findings in accordance with Appendix B – Site Investigation Requirements for Public Works Street Projects and providing a report outlining the work conducted, including photographs and pavement core summary tables showing the pavement core thicknesses and locations using UTM coordinates.

The sections of road covered in the investigation were as follows:

- Eastbound Bishop Grandin Blvd (Abinojii Mikanah) (River Road to St Anne's Road) – 12 Test Holes, 17 cores
- Westbound Bishop Grandin Blvd (Abinojii Mikanah) (Dakota Street to River Road) – 17 cores

Field Program

ENG-TECH conducted the coring and drilling program between December 4th and 13th, 2023 across the site locations previously stated. The cores were obtained by ENG-TECH at locations determined by WSP using 100mm and 150mm diameter diamond end core barrels. The test holes were drilled using a Lone Star T1A+ drill rig equipped with 100 mm diameter solid stem continuous flight augers owned and operated by ENG-TECH. The test holes were advanced to 2.5 m below the pavement structure on Eastbound Bishop Grandin Boulevard (Abinojii Mikanah) at the locations as shown on Coring and Drilling Location Plan Figures 1 to7. Soil samples were collected off the auger flights, as measured from the bottom of the pavement structure, at depth intervals of 0.6, 0.9, 1.2, 1.6, 2.0, and 2.5 m as specified in the Site Investigation Requirements for Public Works Street Projects. After sample collection the test holes were backfilled with soil auger cuttings and granular fill. ENG-TECH repaired the core apertures with a City of Winnipeg approved material (cold mix asphalt) that has been accepted on previous street renewal projects.

Laboratory Program

The soil samples collected were retained for testing in ENG-TECH'S laboratory. The moisture content of each sample depth collected was determined and select samples were tested for particle size and Atterberg Limits. The moisture content, particle size and Atterberg Limit test results are summarized on Table 3 and in the attached test hole logs. The Particle Size Analysis and Liquid Limit, Plastic Limit and Plasticity Index of Soils results with ASTM D2487 and D3282 classifications are shown on Table 3 and separate reports enclosed.

Two standard proctors (moisture-density relationships) and California Bearing Ratios (CBR) were determined on composite samples of Test Holes (TH#) 1 to 7 and TH#'s 8 to 12 to represent the 2 sections of the eastbound lanes. The results are shown on the enclosed Moisture-Density Relationship and California Bearing Ratio Reports.

The pavement core thicknesses were measured and photographed. Photographs of each core are shown in the attached Photographs 1 to 34. Select concrete pavement cores were tested for compressive strength and the results are shown on the enclosed Obtaining and Testing Drilled Cores report.

Soil Stratigraphy Summary

The pavement structure ranged from 0.25m to 0.36m. As measured from the bottom of the pavement structure, there was typically 0.9m to 1.4m of high plastic (fat) clay underlain by another layer of predominately high plastic clay with minor irregular sections of slight silty clay to 2.5m depth explored.

Closure

ENG-TECH trusts this is all the information required. If you have any questions, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

Darci Babisky, C.E.T.
Operations Manager - Laboratory
Email: WSP Canada Inc. Contact Group

Enclosures:

- Table 1 – Summary of Pavement Core Structure – EB Bishop Grandin Boulevard St Mary's Road to St Anne's Road
- Table 2 - Summary of Pavement Core Structure – WB Bishop Grandin Boulevard Dakota Street to River Road
- Table 3 – Summary of Pavement Structure – EB Bishop Grandin Boulevard River Road to St Annes's Road
- Figures 1 to 7 – Coring and Drilling Location Plan
- Specimen Photographs (34 pages)
- Test Hole Logs (12 pages)
- Obtaining and Testing Drilled Cores Report Ref. No. 23-35-3-2
- Atterberg Limits, Plastic Index and Plasticity Index of Soil Reports Ref. No.'s 23-35-3-4, 5 and 9
- Particle Size Analysis Reports Ref. No.'s 23-35-3-6, 7 and 10
- Moisture-Density Relationship Report Ref. No. 23-35-3-11 and 13
- California Bearing Ratio Report Ref. No. 23-35-3-12 and 14

Table 1 - Summary of Pavement Core Structure Eastbound Bishop Grandin Boulevard St Mary's Road to St Anne's Road						
Core No.	Lane	Test Hole Location		Pavement Surface		
		UTM (N)	14U (E)	Type	Core Diameter (mm)	Thickness (mm)
PC1	Median	5521533	635642	Asphalt	150	90
				Concrete	150	190
PC2	Acceleration	5521630	635830	Asphalt	100	105
				Concrete	100	195
PC3	Curb	5521650	635856	Asphalt	150	145
				Concrete	150	180
PC4	Median	5521811	636133	Asphalt	100	100
				Concrete	100	200
PC5	Median	5521887	636267	Asphalt	150	140
				Concrete	150	210

Table 2 - Summary of Pavement Core Structure Westbound Bishop Grandin Boulevard Dakota Street to River Road						
Core No.	Lane	Test Hole Location		Pavement Surface		
		UTM (N)	14U (E)	Type	Core Diameter (mm)	Thickness (mm)
PC6	Longitudinal Joint between Lanes	5520783	634163	Asphalt	150	90
				Concrete	150	180
PC7	Median	5520783	634164	Asphalt	100	75
				Concrete	100	175
PC8	Median	5520784	634169	Asphalt	150	68
				Concrete	150	205
PC9	Middle	5520967	634483	Asphalt	150	70
				Concrete	150	185
PC10	Middle	5520968	634484	Asphalt	100	85
				Concrete	100	190

Table 2 - Summary of Pavement Core Structure
Westbound Bishop Grandin Boulevard Dakota Street to River Road

Core No.	Lane	Test Hole Location		Pavement Surface		
		UTM (N)	14U (E)	Type	Core Diameter (mm)	Thickness (mm)
PC11	Curb	5521066	634662	Asphalt	150	80
				Concrete	150	210
PC12	Curb	5521065	634662	Asphalt	150	90
				Concrete	150	210
PC13	Curb	5521067	634662	Asphalt	100	90
				Concrete	100	190
PC14	Median	5521152	634824	Asphalt	150	120
				Concrete	150	230
PC15	Median	5521311	635199	Asphalt	150	110
				Concrete	150	220
PC16	Median	5521310	635199	Asphalt	150	130
				Concrete	150	210
PC17	Median	5521310	635200	Asphalt	100	110
				Concrete	100	190
PC18	Curb	5521634	635779	Asphalt	100	110
				Concrete	100	160
PC19	Curb	5521709	635912	Asphalt	150	100
				Concrete	150	155
PC20	Curb	5521708	635910	Asphalt	100	100
				Concrete	100	190
PC21	Curb	5521709	635912	Asphalt	150	100
				Concrete	150	190
PC22	Median	5521533	635640	Asphalt	100	110
				Concrete	100	200

Table 3
Summary of Pavement Structure
Eastbound Bishop Grandin Boulevard River Road to St Annes's Road

Test Hole	GPS Coordinates		Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
	UTM (N)	14U (E)	Type	Depth (mm)	Type	Depth (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH1	5520738	634189	Asphalt	190	Clay	2500		0.6	31.0	-	-	-	-	-	-	-
							Fat Clay	0.9	30.5	0.9	6.3	30.0	62.7	75	19	56
								1.2	31.8	-	-	-	-	-	-	-
			Concrete	155				1.6	40.3	-	-	-	-	-	-	-
								2.0	39.5	-	-	-	-	-	-	-
								2.5	44.1	-	-	-	-	-	-	-
TH2	5520855	634403	Asphalt	140	Clay	2500		0.6	31.7	-	-	-	-	-	-	-
								0.9	33.0	-	-	-	-	-	-	-
								1.2	39.1	-	-	-	-	-	-	-
			Concrete	150				1.6	41.5	-	-	-	-	-	-	-
								2.0	28.6	-	-	-	-	-	-	-
								2.5	48.6	-	-	-	-	-	-	-
TH3	5520939	634553	Asphalt	100	Clay	2500		0.6	27.6	-	-	-	-	-	-	-
								0.9	29.1	-	-	-	-	-	-	-
							Fat Clay	1.2	34.0	2.7	4.0	17.7	75.6	80	27	53
			Concrete	180				1.6	28.7	-	-	-	-	-	-	-
								2.0	25.2	-	-	-	-	-	-	-
								2.5	32.3	-	-	-	-	-	-	-
TH4	5521041	634728	Asphalt	85	Clay	2700		0.6	34.7	-	-	-	-	-	-	-
								0.9	33.5	-	-	-	-	-	-	-
								1.2	34.6	-	-	-	-	-	-	-
			Concrete	200				1.6	29.6	-	-	-	-	-	-	-
								2.0	27.9	-	-	-	-	-	-	-
								2.5	21.3	-	-	-	-	-	-	-

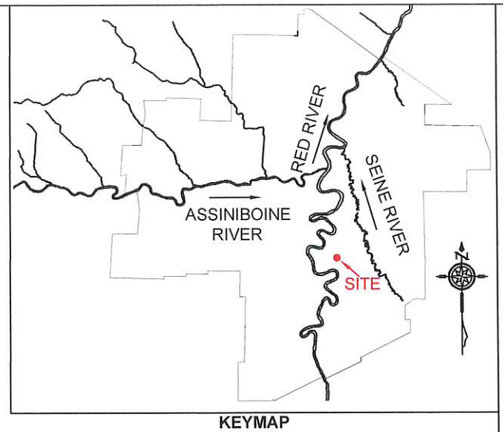
Table 3
Summary of Pavement Structure
Eastbound Bishop Grandin Boulevard Road River to St Anne's Road

Test Hole	GPS Coordinates		Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
	UTM (N)	14U (E)	Type	Depth (mm)	Type	Depth (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH5	5521147	634954	Asphalt	135	Clay	2700		0.6	40.1	-	-	-	-	-	-	-
								0.9	28.8	-	-	-	-	-	-	-
								1.2	33.1	-	-	-	-	-	-	-
			Concrete	150				1.6	34.8	-	-	-	-	-	-	-
								2.0	36.4	-	-	-	-	-	-	-
								2.5	43.7	-	-	-	-	-	-	-
TH6	5521213	635083	Asphalt	110	Clay	2500		0.6	32.0	-	-	-	-	-	-	-
								0.9	24.4	-	-	-	-	-	-	-
								1.2	22.9	-	-	-	-	-	-	-
			Concrete	200				1.6	35.4	-	-	-	-	-	-	-
								2.0	38.3	-	-	-	-	-	-	-
								2.5	44.2	-	-	-	-	-	-	-
TH7	5521313	635083	Asphalt	75	Clay	2700		0.6	39.3	-	-	-	-	-	-	-
								0.9	38.6	-	-	-	-	-	-	-
								1.2	34.8	-	-	-	-	-	-	-
			Concrete	200				1.6	29.6	-	-	-	-	-	-	-
								2.0	25.0	-	-	-	-	-	-	-
								2.5	21.9	-	-	-	-	-	-	-
TH8	5521567	636401	Asphalt	170	Clay	2500		0.6	29.2	-	-	-	-	-	-	-
								0.9	29.6	-	-	-	-	-	-	-
								1.2	29.9	-	-	-	-	-	-	-
			Concrete	195				1.6	23.3	-	-	-	-	-	-	-
								2.0	22.5	-	-	-	-	-	-	-
								2.5	32.5	-	-	-	-	-	-	-

Table 3
Summary of Pavement Structure
Eastbound Bishop Grandin Boulevard River Road to St Anne's Road

Test Hole	GPS Coordinates		Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
	UTM	14U	Type	Depth (mm)	Type	Depth (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH9	5522044	636534	Asphalt	110	Clay	2500		0.6	32.7	-	-	-	-	-	-	-
								0.9	32.9*	-	-	-	-	-	-	-
								1.2	33.7	-	-	-	-	-	-	-
			Concrete	140				1.6	40.6	-	-	-	-	-	-	-
								2.0	39.4	-	-	-	-	-	-	-
								2.5	45.8	-	-	-	-	-	-	-
TH10	5522130	636686	Asphalt	105	Clay	2500		0.6	37.3	-	-	-	-	-	-	-
							Fat Clay	0.9	32.2	0.2	6.0	19.6	74.2	88	31	57
								1.2	35.5	-	-	-	-	-	-	-
			Concrete	200				1.6	35.6	-	-	-	-	-	-	-
								2.0	36.1	-	-	-	-	-	-	-
								2.5	36.3	-	-	-	-	-	-	-
TH11	5522187	636788	Asphalt	90	Clay	2500		0.6	31.1	-	-	-	-	-	-	-
								0.9	31.0	-	-	-	-	-	-	-
								1.2	34.3	-	-	-	-	-	-	-
			Concrete	200				1.6	24.6	-	-	-	-	-	-	-
								2.0	33.8	-	-	-	-	-	-	-
								2.5	40.0	-	-	-	-	-	-	-
TH12	5522267	636929	Asphalt	95	Clay	2500		0.6	29.2	-	-	-	-	-	-	-
								0.9	33.4	-	-	-	-	-	-	-
								1.2	32.8	-	-	-	-	-	-	-
			Concrete	200				1.6	32.0	-	-	-	-	-	-	-
								2.0	29.3	-	-	-	-	-	-	-
								2.5	27.3	-	-	-	-	-	-	-

TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #1	5520738	634189	EB LANE, MEDIAN LANE, ON ℄ OF LANE
PC #6	5520783	634163	WB LANE, ON ℄ BETWEEN MEDIAN AND MIDDLE LANE
PC #7	5520783	634164	WB MEDIAN LANE, ON ℄LANE
PC #8	5520784	634169	WB MEDIAN LANE, ON ℄ OF LANE

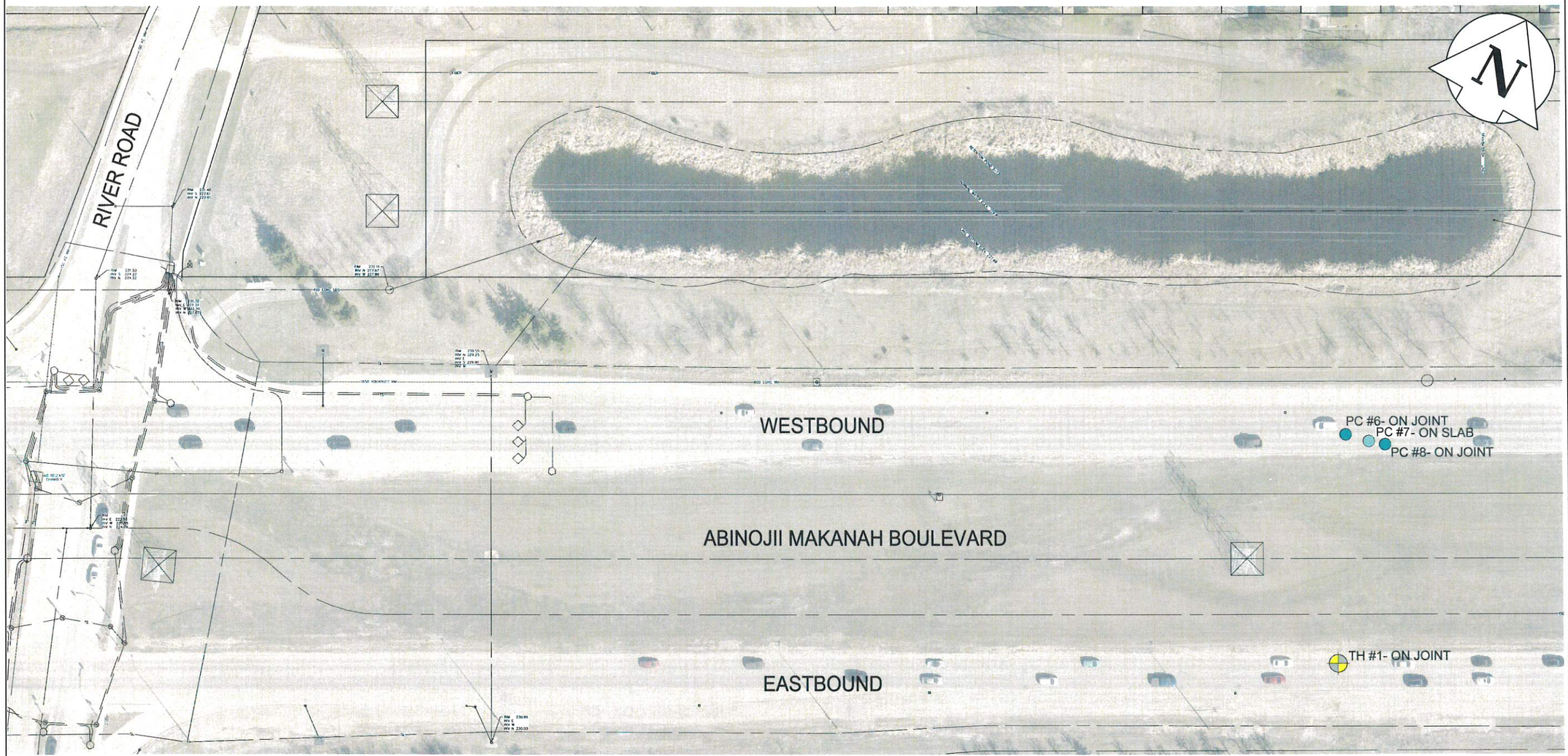


KEYMAP

LEGEND

TEST HOLE
TH #1

PAVEMENT CORING
PC #7



NOTE:

- BACKGROUND MAP REFERENCED FROM WSP DRAWING NO. CA0012525-SK-01.

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Certificate of Authorization
ENG-TECH Consulting Limited
No.2475

CLIENT:
WSP CANADA INC.

PROJECT:
BISHOP GRANDIN BOULEVARD (ABINOJII MAKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

DWG DESCRIPTION:
CORING AND DRILLING LOCATION PLAN

SCALE:
NTS

DRAWN BY:	DATE:
SG	JANUARY 2024
FILE No.:	CLIENT DWG/FIG. No.:
23-035-03	CA0012525-SK-01
ENG-TECH DWG/FIG. No.:	NO.:
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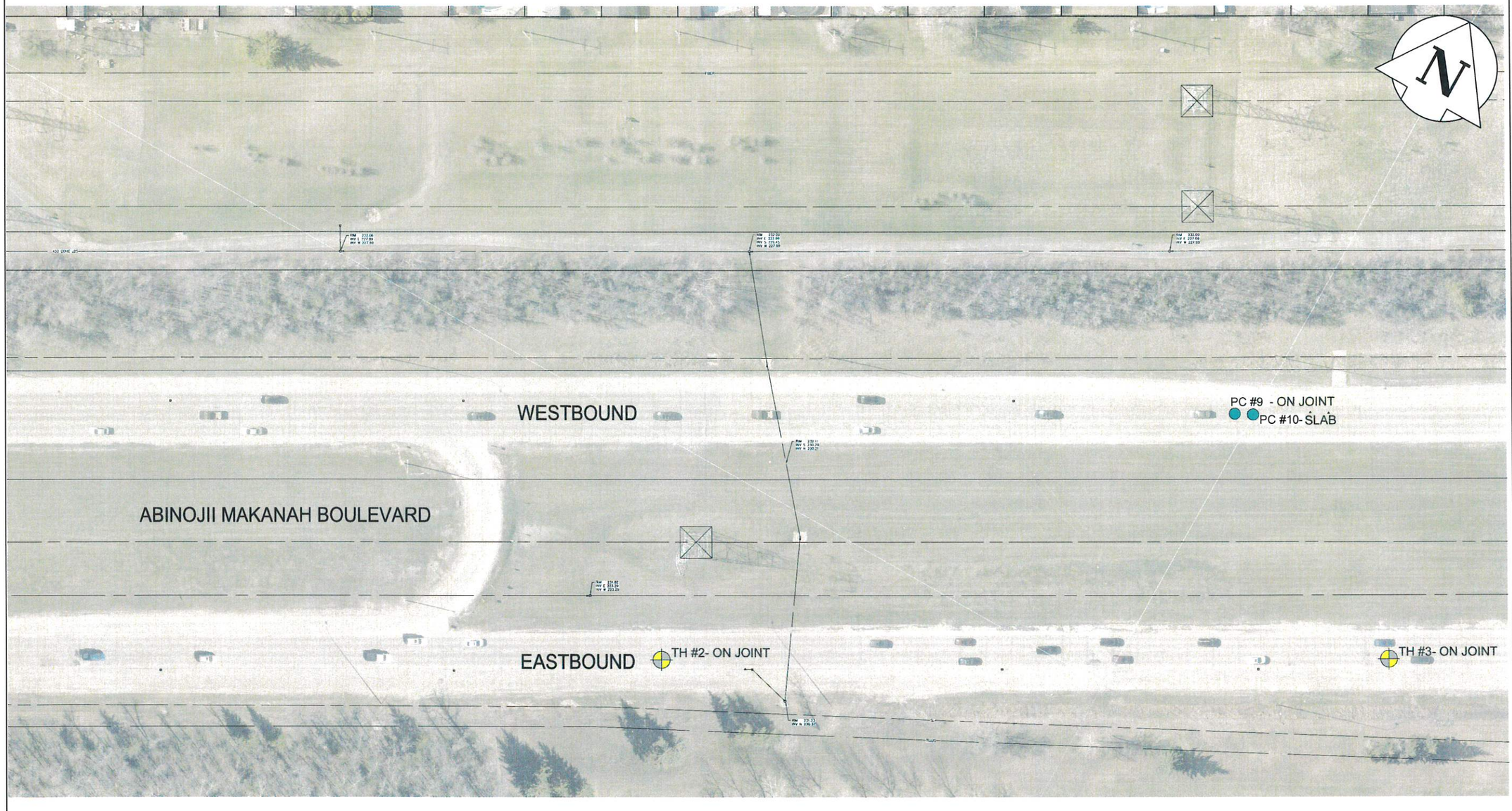
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #2	5520855	634403	EB CURB LANE, ON ℄ OF LANE
TH #3	5520939	634553	EB CURB LANE, ON ℄ LANE
PC #9	5520967	634483	WB MIDDLE LANE, ON ℄LANE
PC #10	5520968	634484	WB MIDDLE LANE, ON ℄ OF LANE



LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

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DWG DESCRIPTION:
CORING AND DRILLING LOCATION PLAN

SCALE:
NTS

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SG	JANUARY 2024
FILE No.:	CLIENT DWG/FIG. No.:
23-035-03	CA0012525-SK-02
ENG-TECH DWG/FIG. No.:	NO.:
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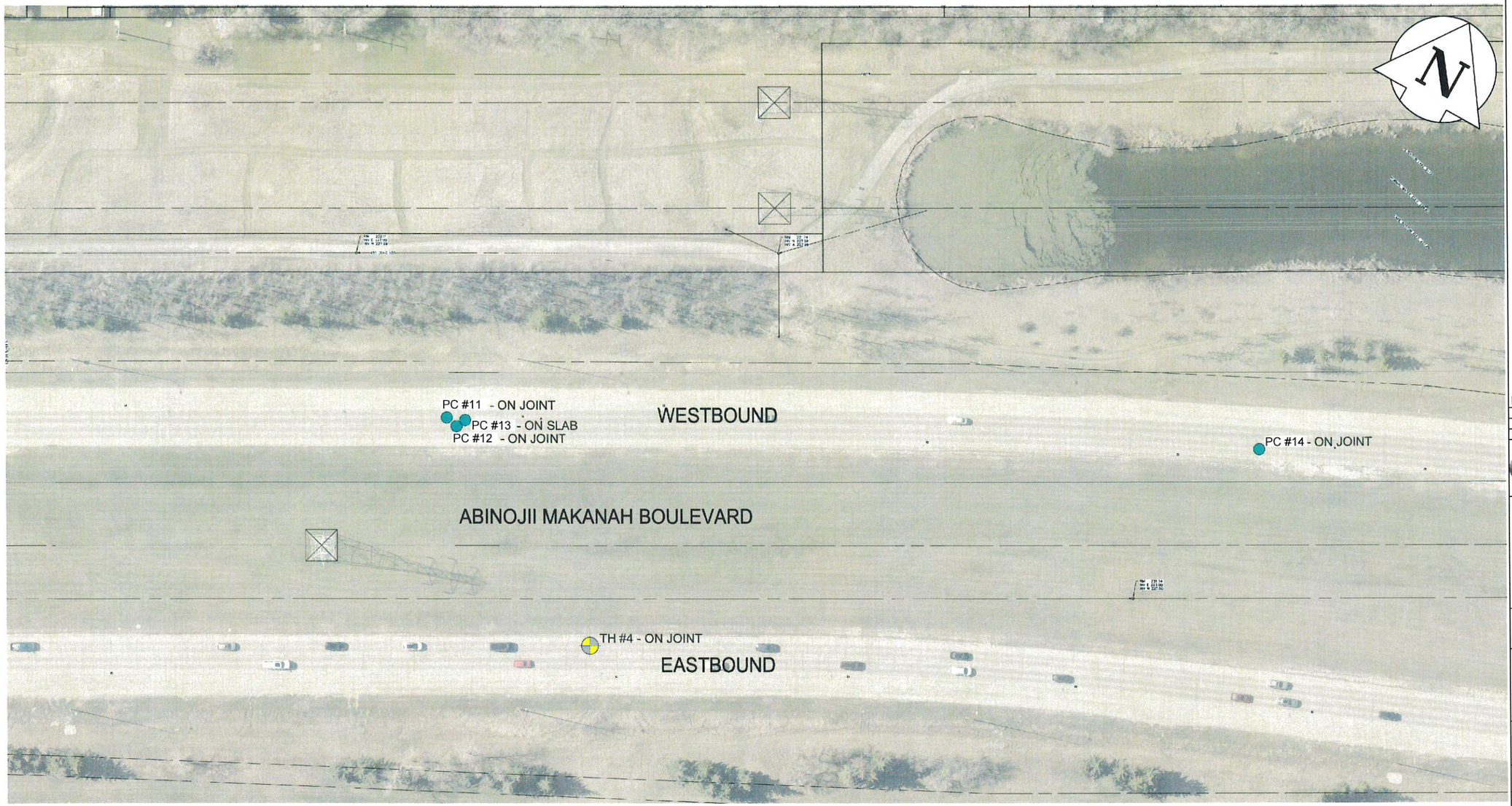
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #4	5521041	634728	EB MEDIAN LANE, ON ℄ OF LANE
PC #11	5521066	634662	WB CURB LANE, ON ℄ LANE
PC #12	5521065	634662	WB CURB LANE, ON ℄LANE
PC #13	5521067	634662	WB CURB LANE, ON ℄ OF LANE
PC #14	5521152	634824	WB MEDIAN LANE, ON ℄ OF LANE



LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

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ENG-TECH DWG/FIG. No.:	NO.:
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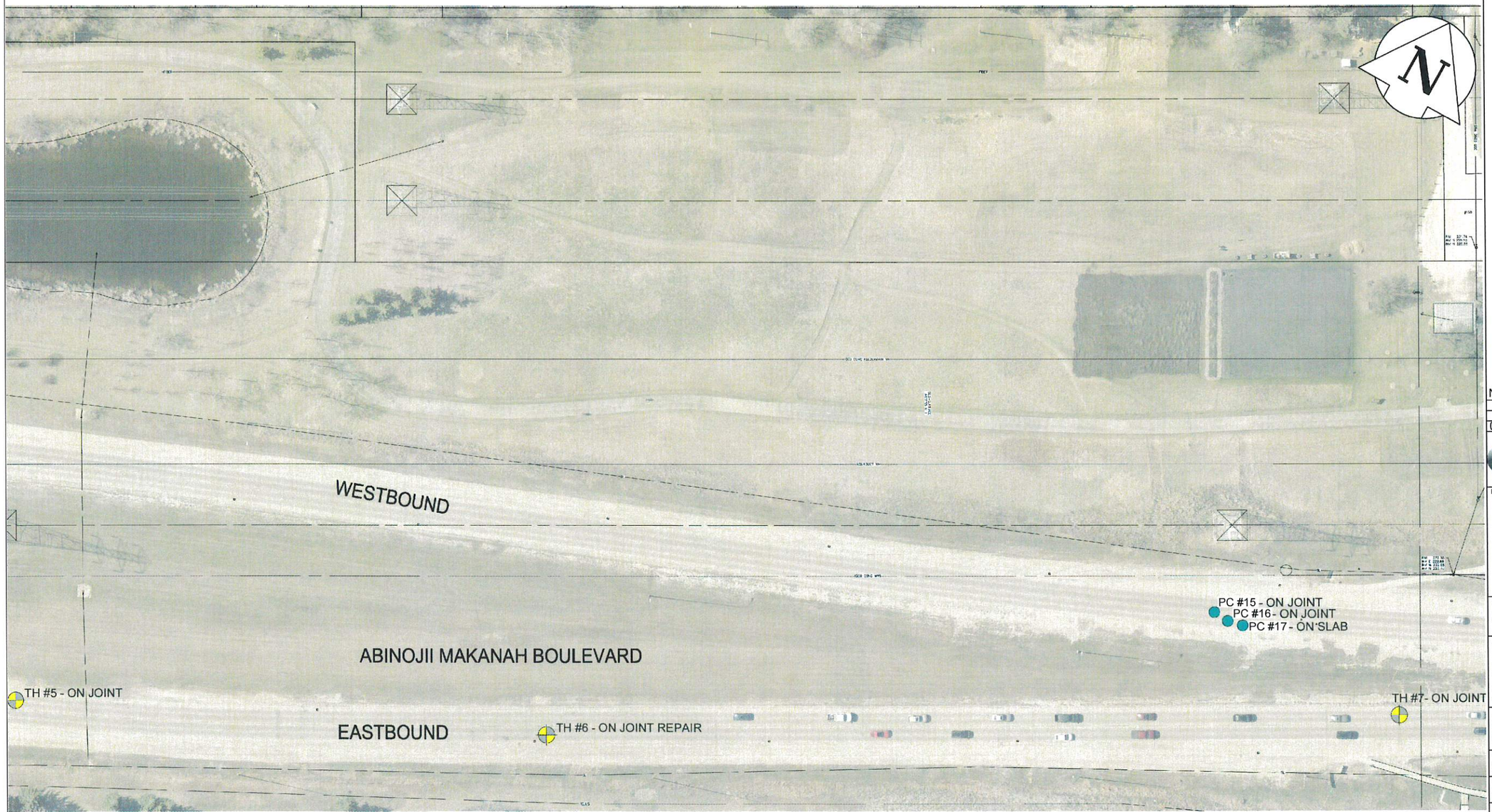
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #5	5521147	634954	EB MEDIAN LANE, ON ℄ OF LANE
TH #6	5521213	635083	EB CURB LANE, ON ℄ LANE
TH #7	5521313	635253	EB MEDIAN LANE, ON ℄LANE
PC #15	5521311	635199	WB MEDIAN LANE, ON ℄ OF LANE
PC #16	5521310	635199	WB MEDIAN LANE, 1 M NORTH ON ℄ OF LANE
PC #17	5521310	635200	WB MEDIAN LANE, ON ℄ OF LANE



LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

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SCALE:
NTS

DRAWN BY:	DATE:
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FILE No.:	CLIENT DWG/FIG. No.:
23-035-03	CA0012525-SK-04
ENG-TECH DWG/FIG. No.:	NO.:
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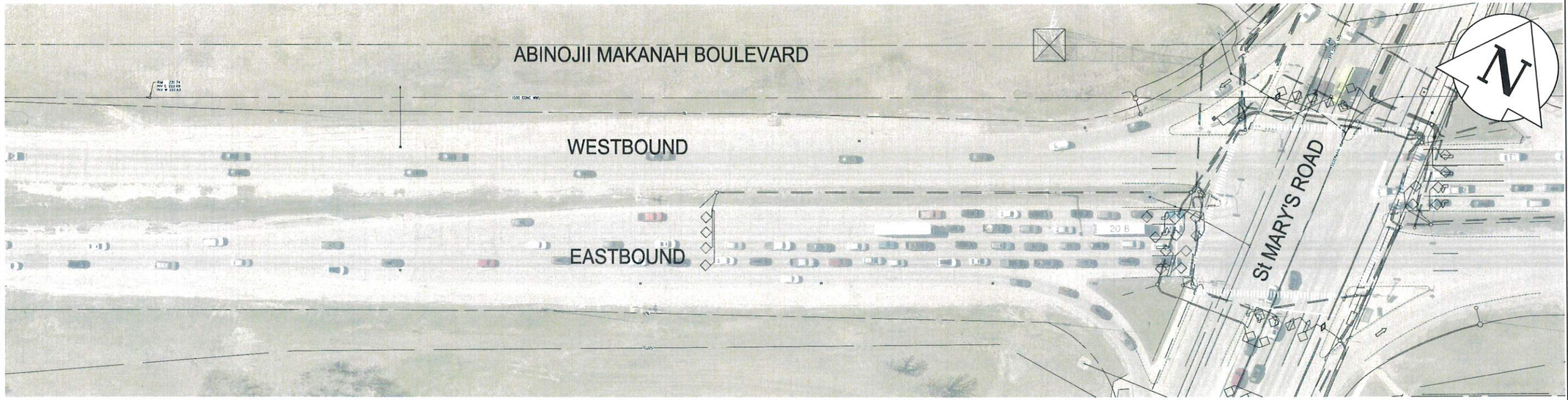
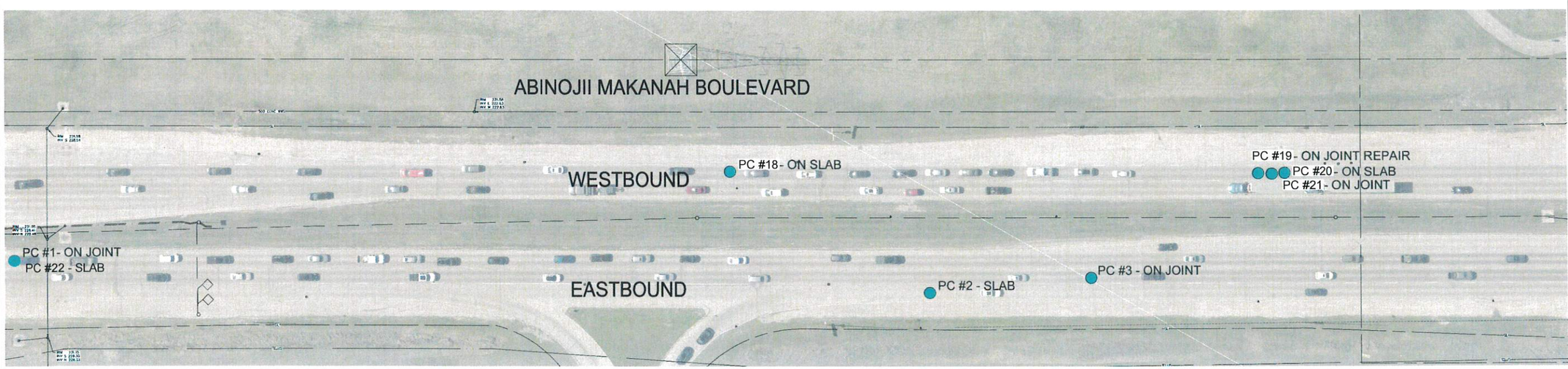
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
PC #1	5521533	635642	EB MEDIAN LANE, 0.8 M NORTH OF ℄ OF LANE
PC #2	5521630	635830	EB ACCELERATION LANE, ON ℄ LANE
PC #3	5521650	635856	EB CURB LANE, ON ℄LANE
PC #18	5521634	635779	WB CURB LANE, ON ℄ OF LANE
PC #19	5521709	635912	WB CURB LANE, ON ℄ OF LANE
PC #20	5521708	635910	WB CURB LANE, ON ℄ OF LANE
PC #21	5521709	635912	WB CURB LANE, ON ℄ OF LANE
PC #22	5521533	635642	EB MEDIAN LANE, 0.8 M NORTH OF ℄ OF LANE





LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

NOTE:

- BACKGROUND MAP REFERENCED FROM WSP DRAWING NO. CA0012525-SK-05.

NO.	DATE	ISSUE / REVISION
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CLIENT:
WSP CANADA INC.

PROJECT:
BISHOP GRANDIN BOULEVARD (ABINOJII MAKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

DWG DESCRIPTION:
CORING AND DRILLING LOCATION PLAN

SCALE:
NTS

DRAWN BY:	DATE:
SG	JANUARY 2024
FILE No.:	CLIENT DWG/FIG. No.:
23-035-03	CA0012525-SK-05
ENG-TECH DWG/FIG. No.:	NO.:
5 of 7	

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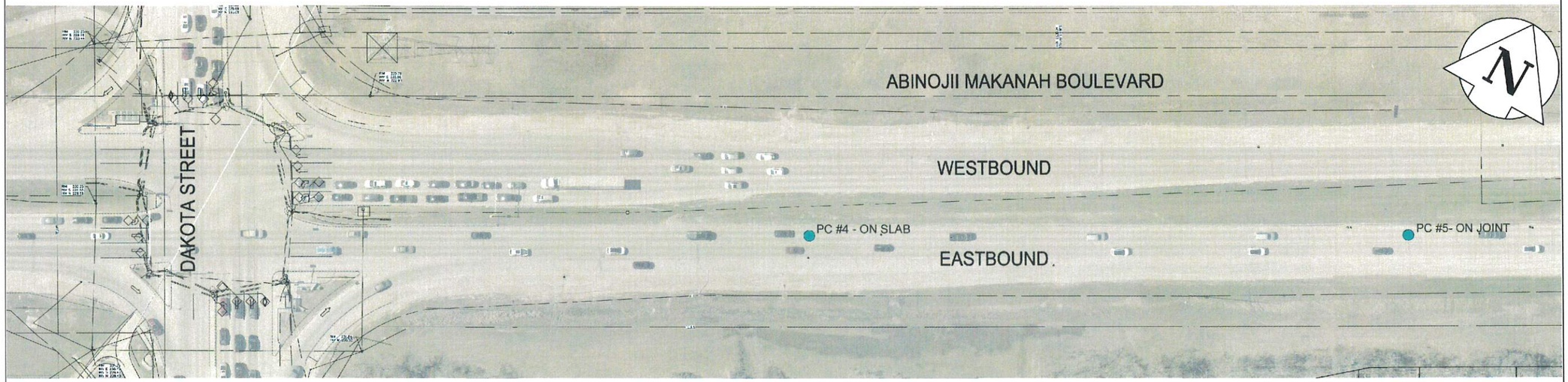
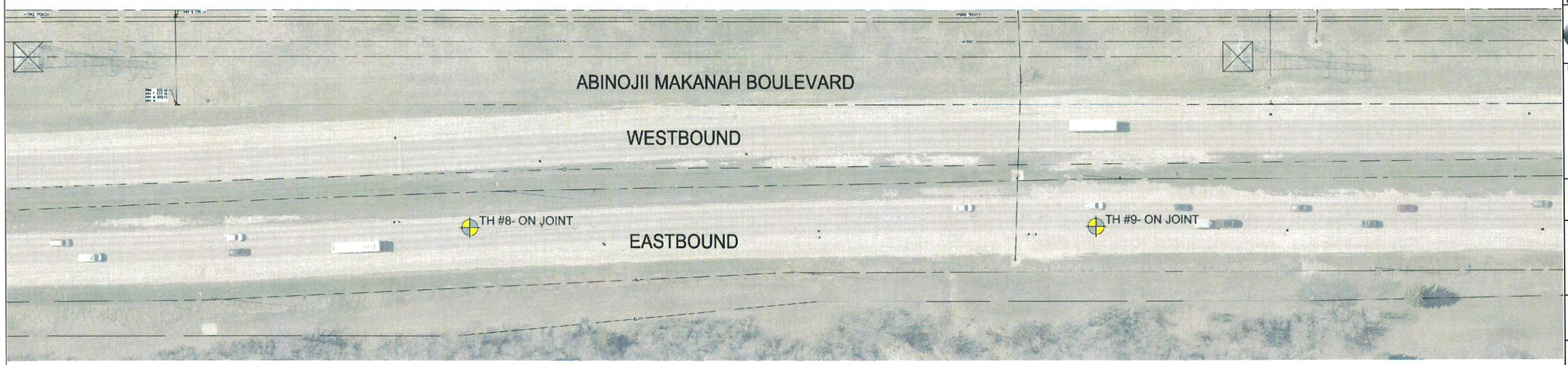
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #8	5521567	636401	EB MEDIAN LANE, 0.8 M NORTH OF ℄ OF LANE
TH #9	5522044	636534	EB CURB LANE, 0.5M NORTH OF ℄ LANE
PC #4	5521811	636133	EB MEDIAN LANE, ON ℄LANE
PC #5	5521887	636267	WB MEDIAN LANE, ON ℄ OF LANE





LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

NOTE:

- BACKGROUND MAP REFERENCED FROM WSP DRAWING NO. CA0012525-SK-06.

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CLIENT: WSP CANADA INC.

PROJECT: BISHOP GRANDIN BOULEVARD (ABINOJII MAKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

DWG DESCRIPTION: CORING AND DRILLING LOCATION PLAN

SCALE: NTS

DRAWN BY:	DATE:
SG	JANUARY 2024
FILE No.: 23-035-03	CLIENT DWG/FIG. No.: CA0012525-SK-06
ENG-TECH DWG/FIG. No.: 6 of 7	NO.:

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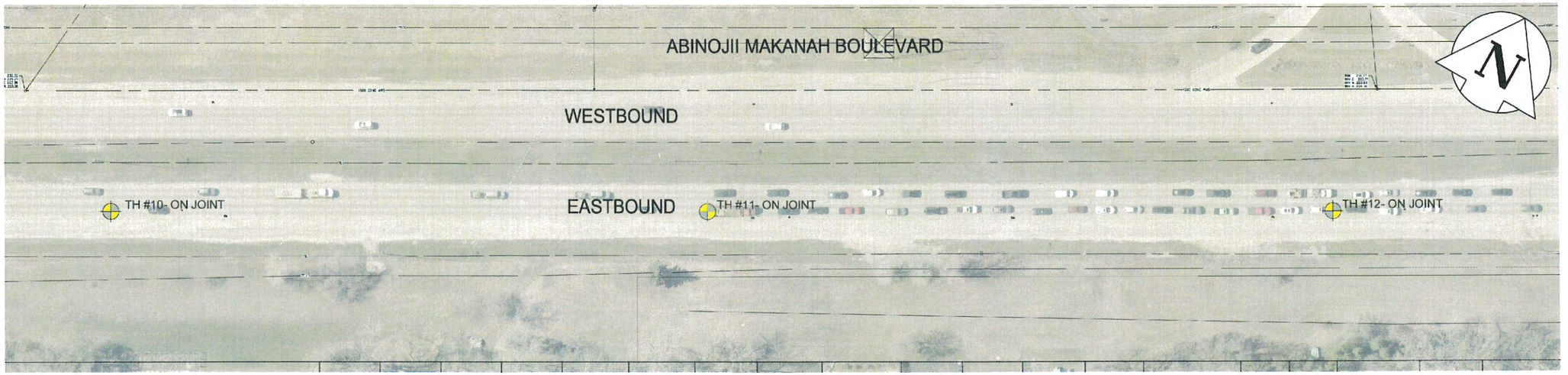
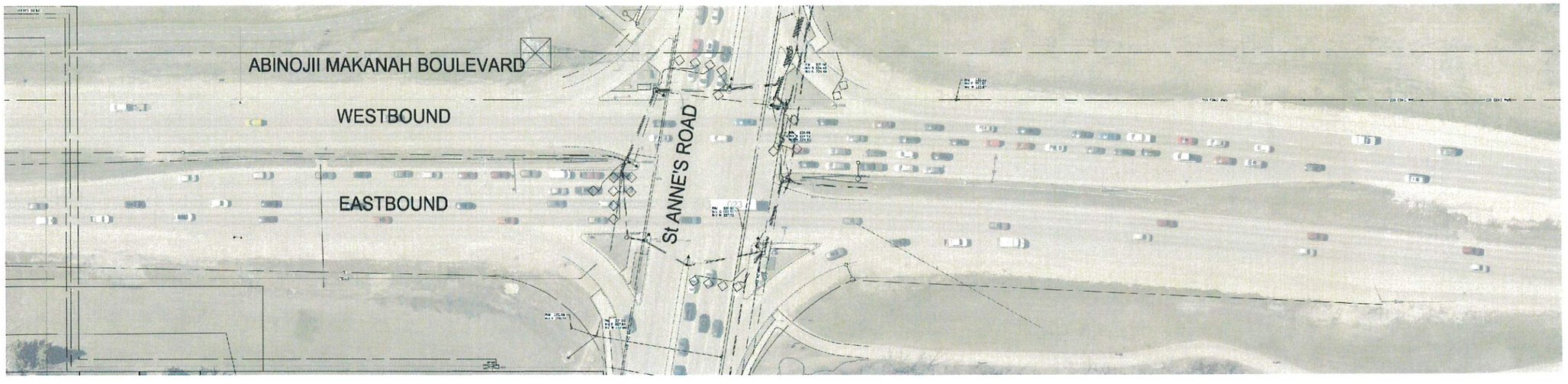
TEST HOLE & PAVEMENT CORE LOCATION TABLE			
HOLE NUMBER	CORING COMPLETED ON DECEMBER 4, 5, 6, AND 7, 2023		LOCATION DESCRIPTIONS
	UTM COORDINATE		
	UTM	14U	
TH #10	5522130	636686	EB CURB LANE, ON ℄ OF LANE
TH #11	5522187	636788	EB CURB LANE, ON ℄ LANE
PC #12	5522267	636929	EB CURB LANE, ON ℄LANE





LEGEND

TEST HOLE
TH #3

PAVEMENT CORING
PC #8

NOTE:

- BACKGROUND MAP REFERENCED FROM WSP DRAWING NO. CA0012525-SK-07.

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WSP CANADA INC.

PROJECT:
BISHOP GRANDIN BOULEVARD (ABINOJII MAKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

DWG DESCRIPTION:
CORING AND DRILLING LOCATION PLAN

SCALE:
NTS

DRAWN BY:	DATE:
SG	JANUARY 2024
FILE No.:	CLIENT DWG/FIG. No.:
23-035-03	CA0012525-SK-07
ENG-TECH DWG/FIG. No.:	NO.:
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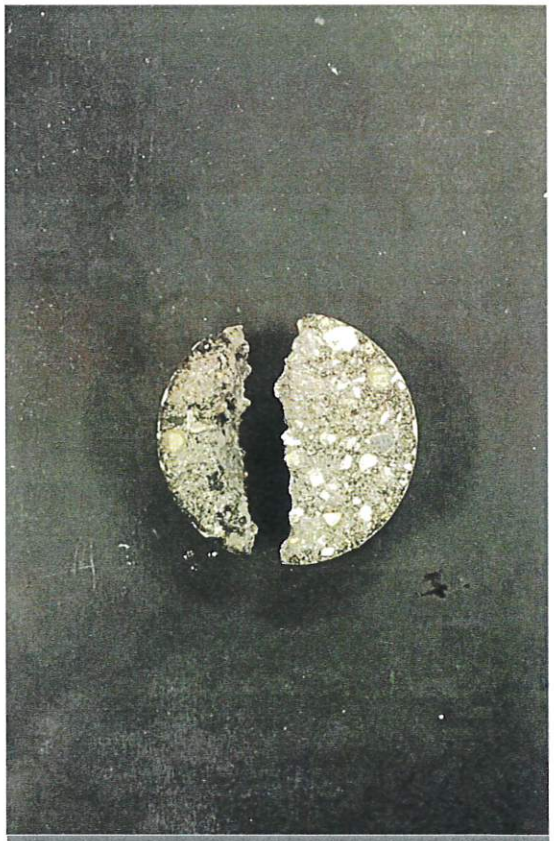
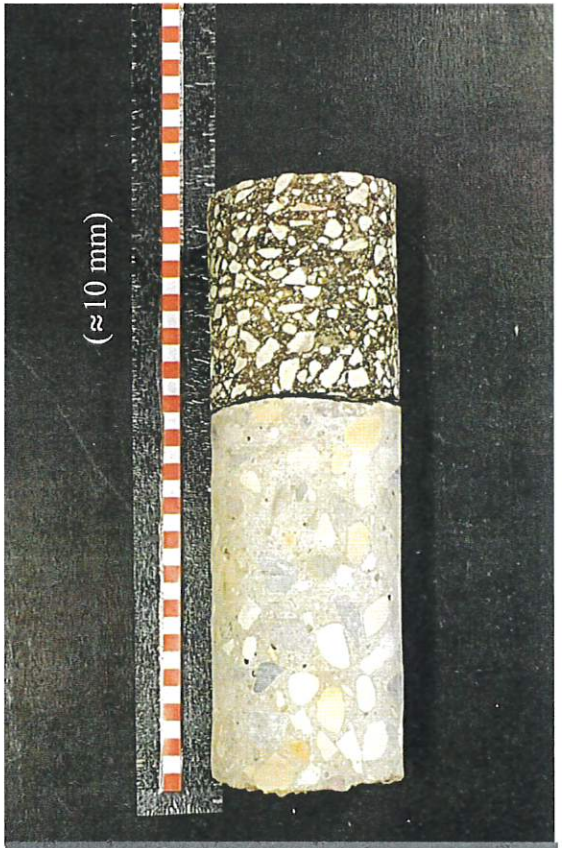
Photograph 1: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane

PC #1
Full Depth of Pavement
Ø = 150 mm



PC #1
Top of Asphalt Pavement
Ø = 150 mm

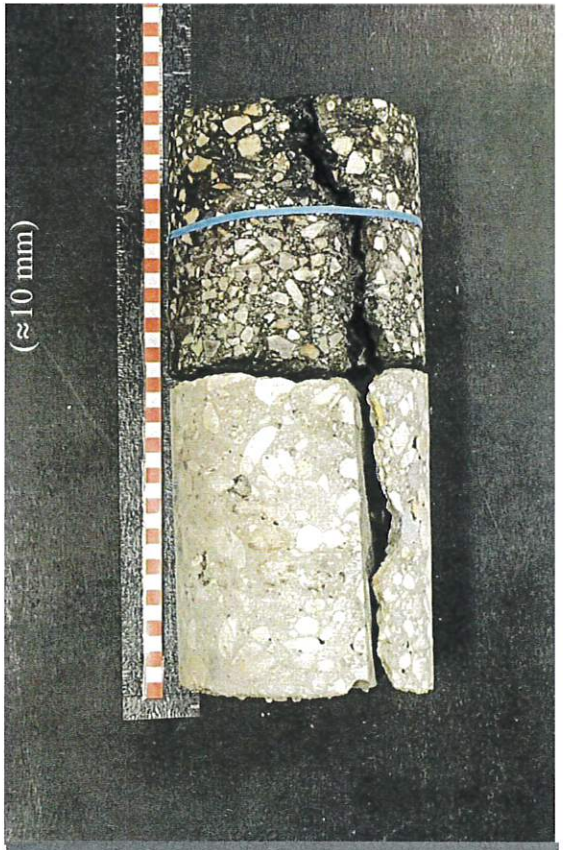
Photograph 2: Specimen from Bishop Grandin Boulevard, Eastbound Acceleration Lane



PC #2
Full Depth of Pavement
Ø = 100 mm

PC #2
Top of Asphalt Pavement
Ø = 100 mm

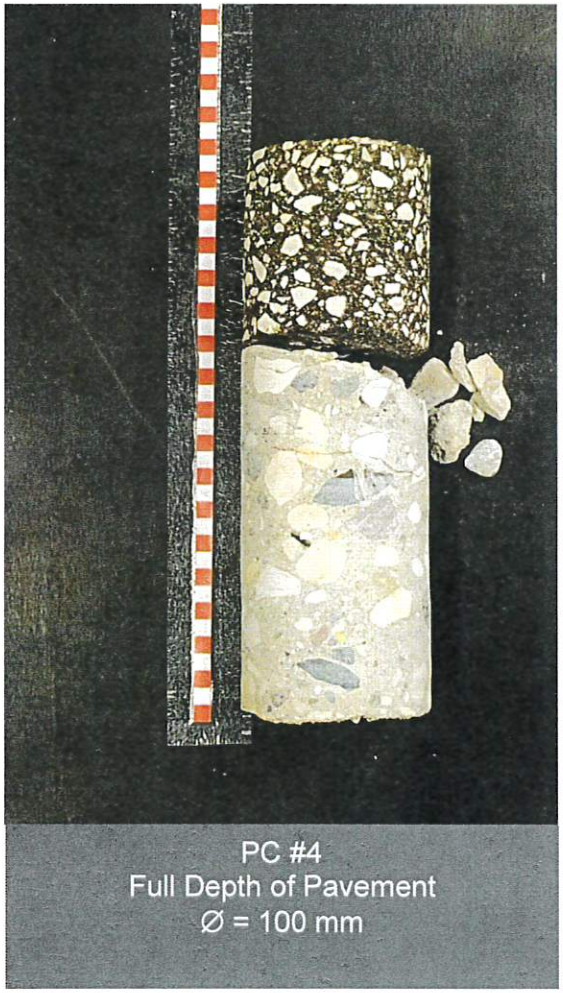
Photograph 3: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



PC #3
Full Depth of Pavement
Ø = 150 mm

PC #3
Top of Asphalt Pavement
Ø = 150 mm

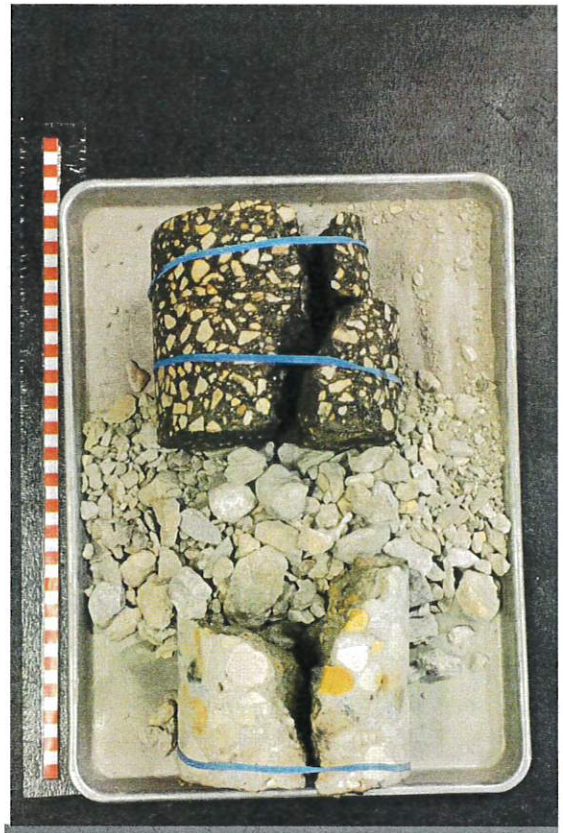
Photograph 4: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



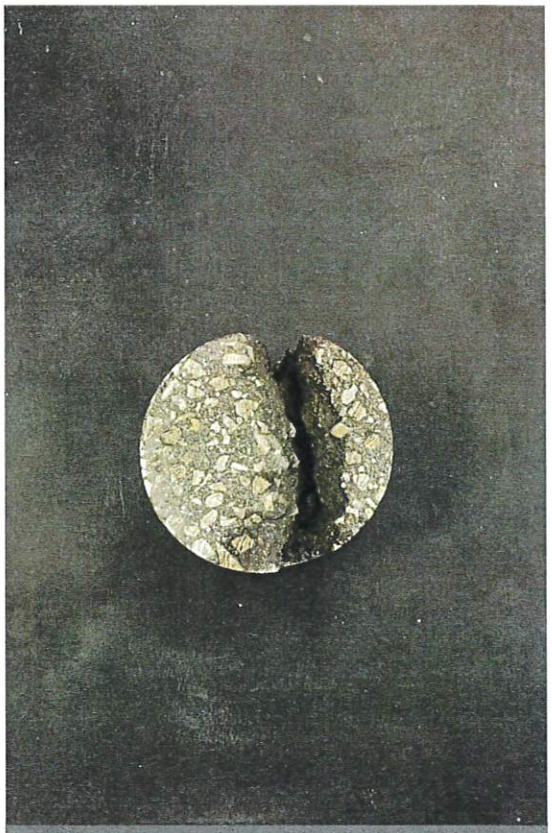
PC #4
Full Depth of Pavement
Ø = 100 mm

PC #4
Top of Asphalt Pavement
Ø = 100 mm

Photograph 5: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane

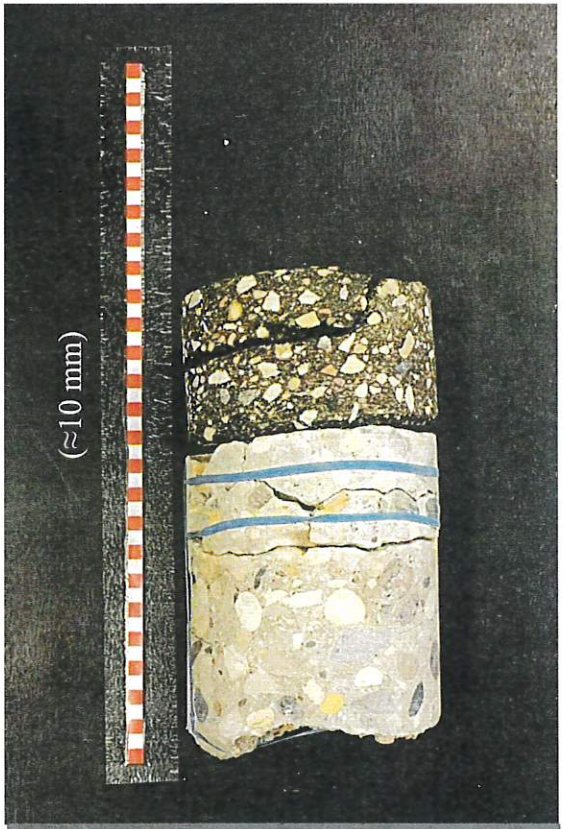


PC #5
Full Depth of Pavement
Ø = 150 mm



PC #5
Top of Asphalt Pavement
Ø = 150 mm

Photograph 6: Specimen from Bishop Grandin Boulevard, Westbound Lane Longitudinal Joint between Lanes



PC #6
Full Depth of Pavement
Ø = 150 mm

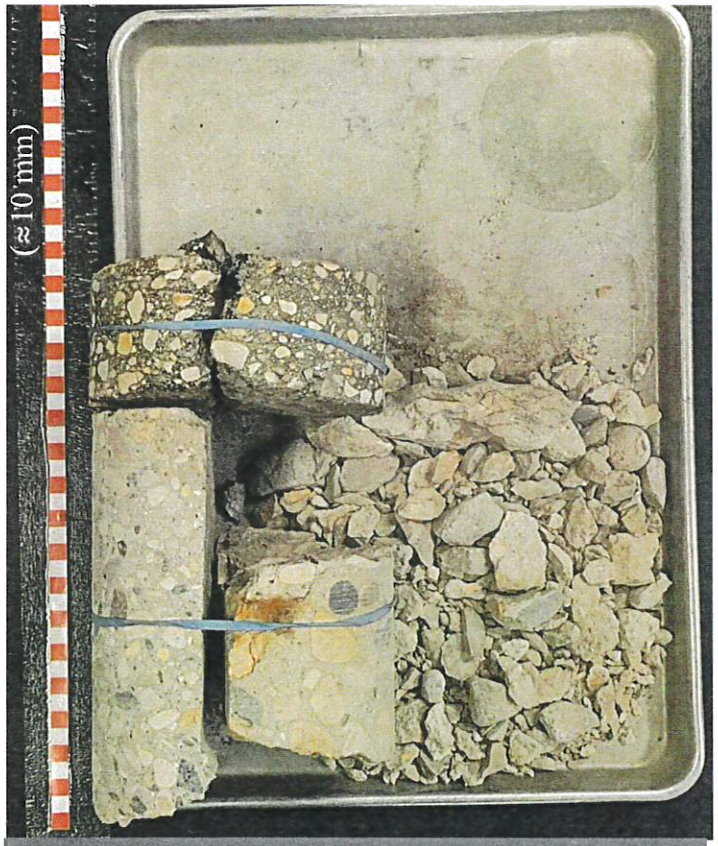
PC #6
Top of Asphalt Pavement
Ø = 150 mm

Photograph 7: Specimen from Bishop Grandin Boulevard, Westbound Median Lane

PC #7
Full Depth of Pavement
Ø = 100 mm

PC #7
Top of Asphalt Pavement
Ø = 100 mm

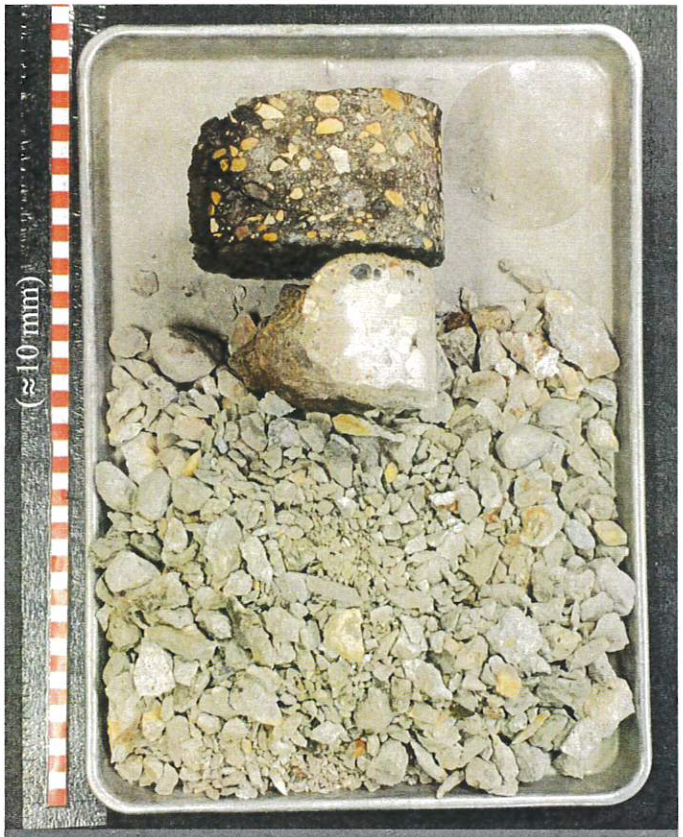
Photograph 8: Specimen from Bishop Grandin Boulevard, Westbound Median Lane



PC #8
Full Depth of Pavement
∅ = 150 mm

PC #8
Top of Asphalt Pavement
∅ = 150 mm

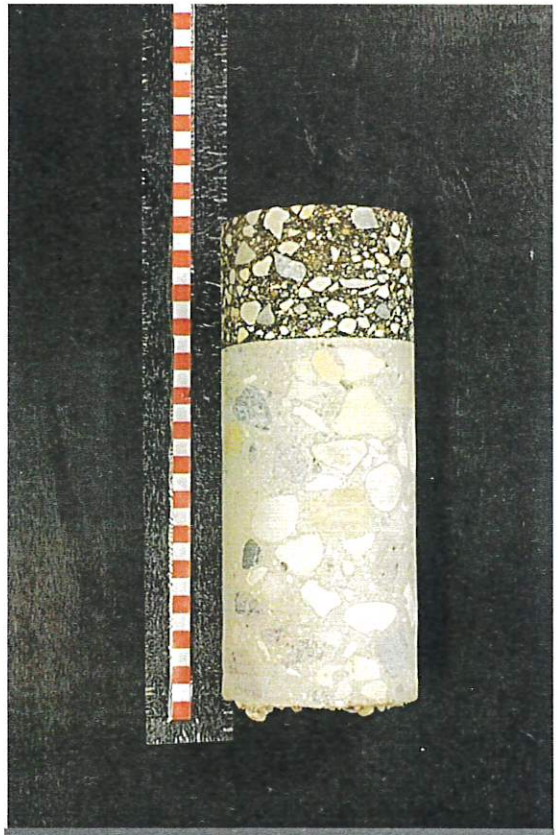
Photograph 9: Specimen from Bishop Grandin Boulevard, Westbound Middle Lane



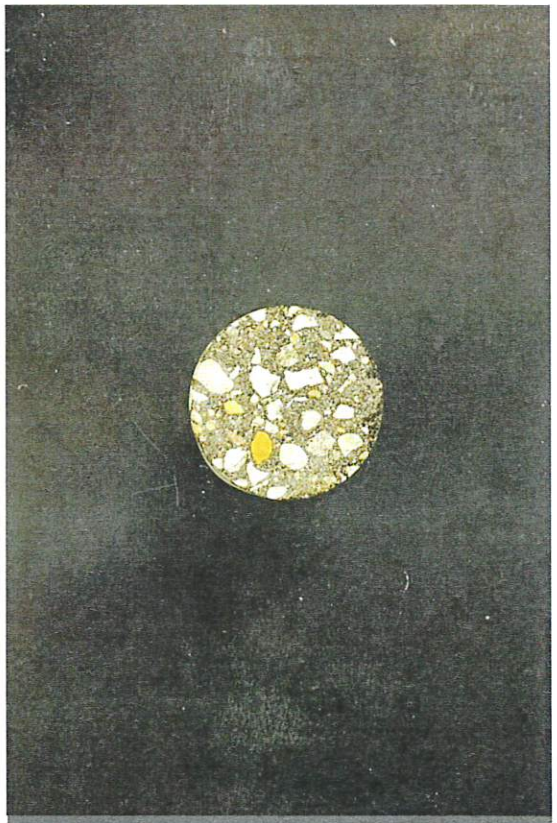
PC #9
Full Depth of Pavement
∅ = 150 mm

PC #9
Top of Asphalt Pavement
∅ = 150 mm

Photograph 10: Specimen from Bishop Grandin Boulevard, Westbound Middle Lane

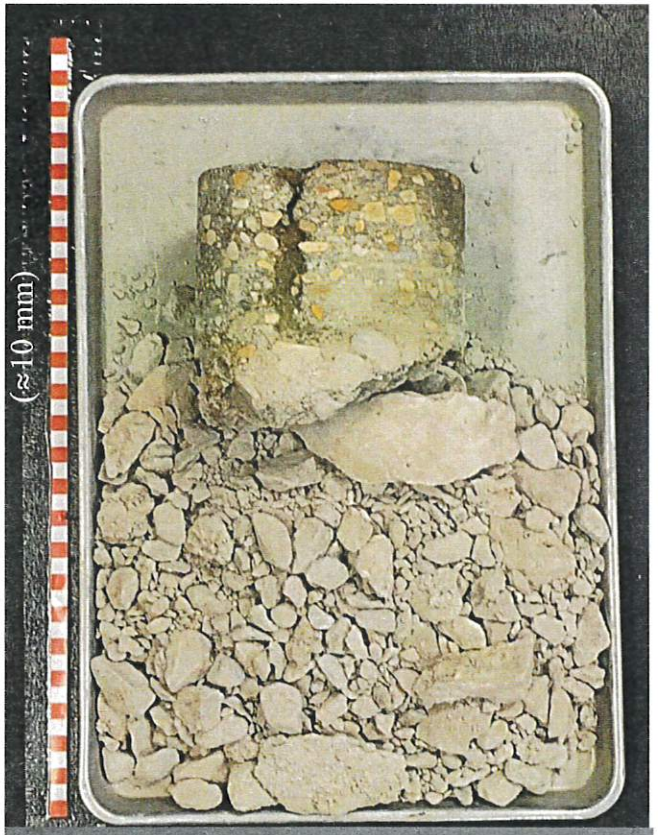


PC #10
Full Depth of Pavement
Ø = 100 mm

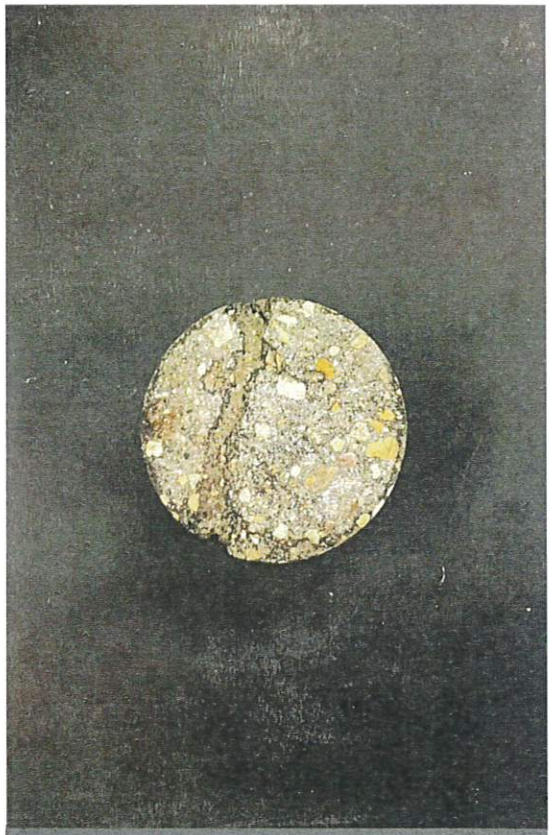


PC #10
Top of Asphalt Pavement
Ø = 100 mm

Photograph 11: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane

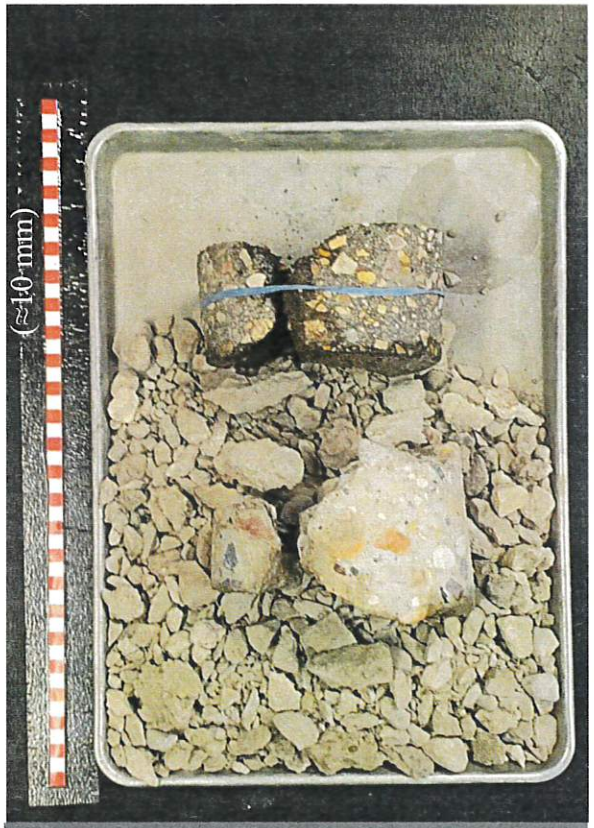


PC #11
Full Depth of Pavement
Ø = 150 mm



PC #11
Top of Asphalt Pavement
Ø = 150 mm

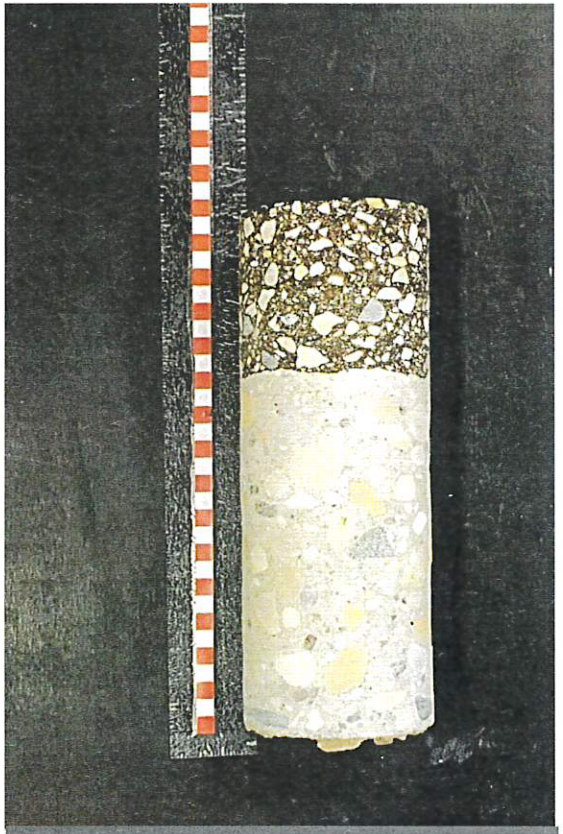
Photograph 12: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane



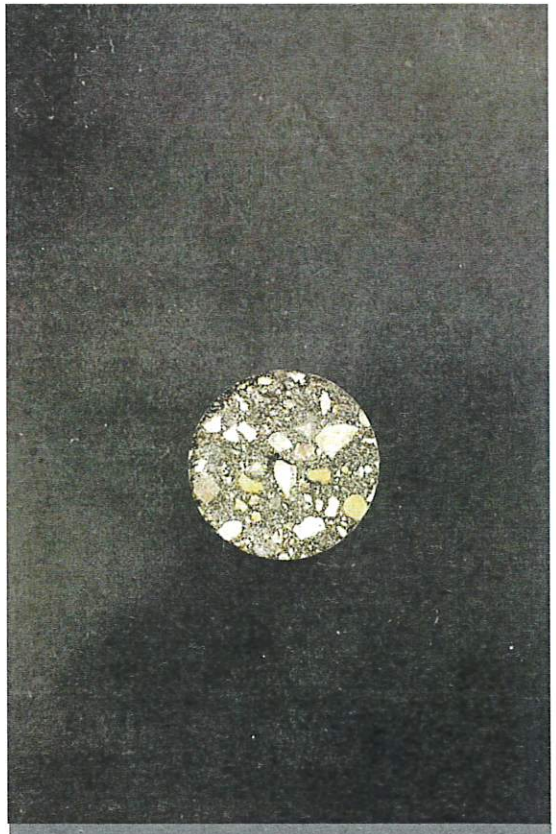
PC #12
Full Depth of Pavement
Ø = 150 mm

PC #12
Top of Asphalt Pavement
Ø = 150 mm

Photograph 13: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane



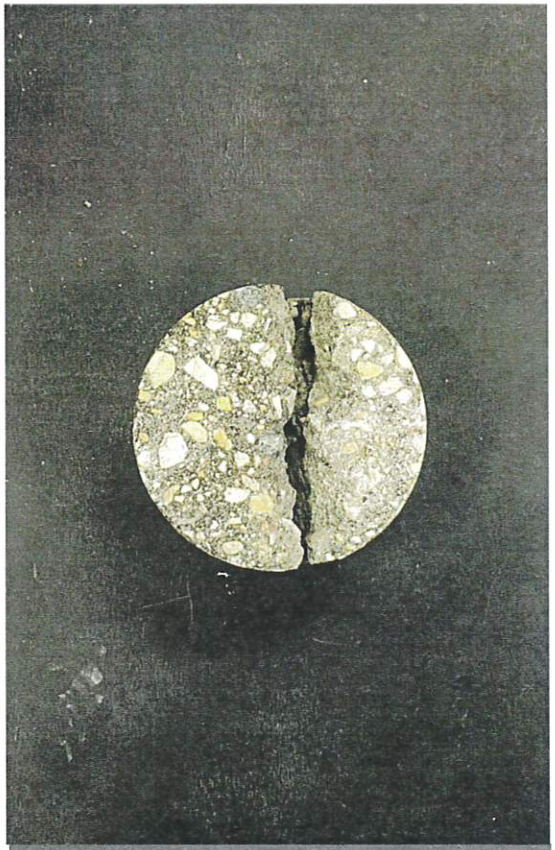
PC #13
Full Depth of Pavement
Ø = 100 mm



PC #13
Top of Asphalt Pavement
Ø = 100 mm

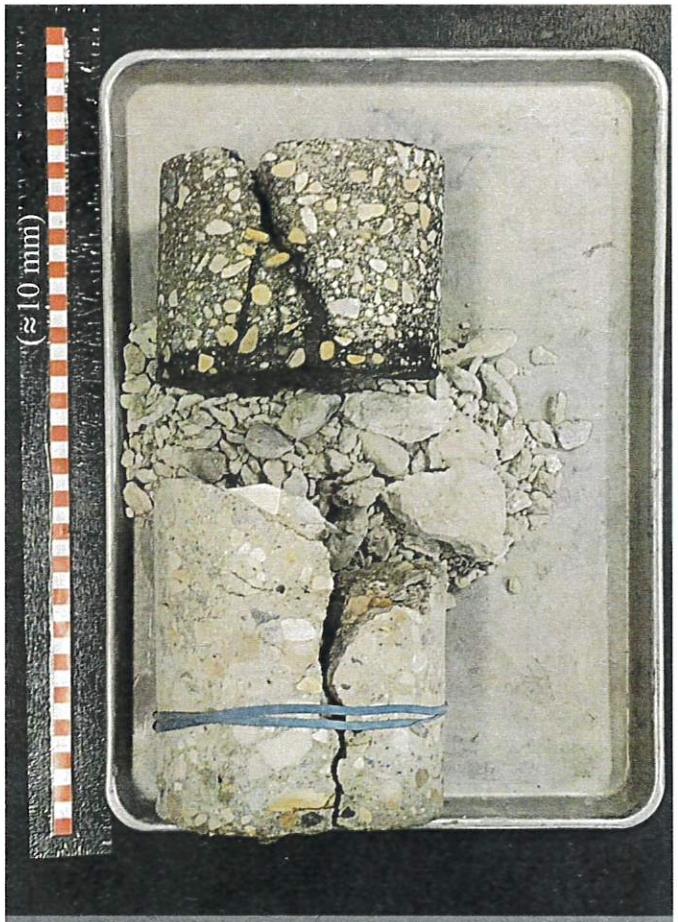
Photograph 14: Specimen from Bishop Grandin Boulevard, Westbound Median Lane

PC #14
Full Depth of Pavement
Ø = 150 mm



PC #14
Top of Asphalt Pavement
Ø = 150 mm

Photograph 15: Specimen from Bishop Grandin Boulevar, Westbound Median Lane



PC #15
Full Depth of Pavement
∅ = 150 mm

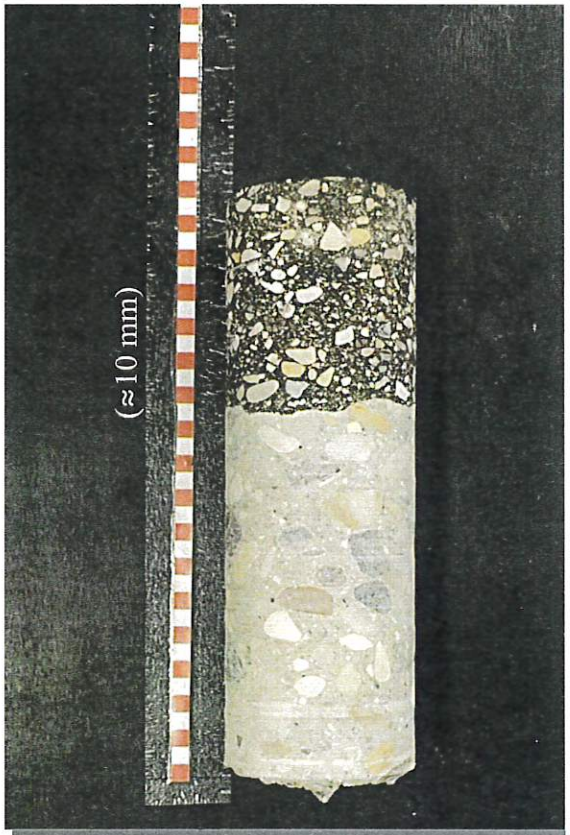
PC #15
Top of Asphalt Pavement
∅ = 150 mm

Photograph 16: Specimen from Bishop Grandin Boulevard, Westbound Median Lane

PC #16
Full Depth of Pavement
Ø = 150 mm

PC #16
Top of Asphalt Pavement
Ø = 150 mm

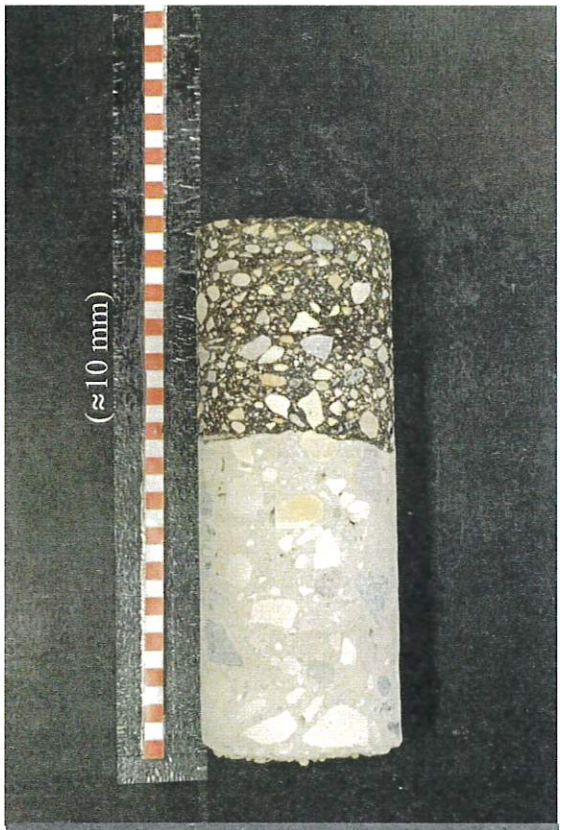
Photograph 17: Specimen from Bishop Grandin Boulevard, Westbound Median Lane



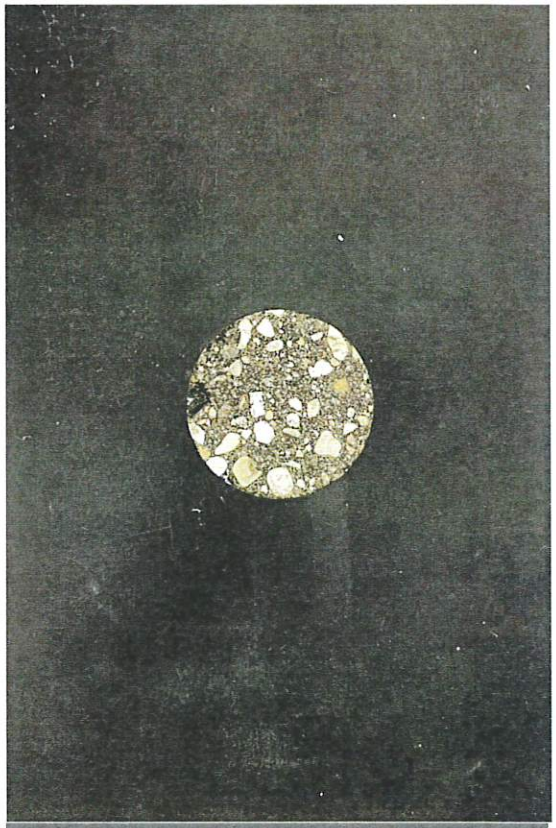
PC #17
Full Depth of Pavement
Ø = 100 mm

PC #17
Top of Asphalt Pavement
Ø = 100 mm

Photograph 18: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane



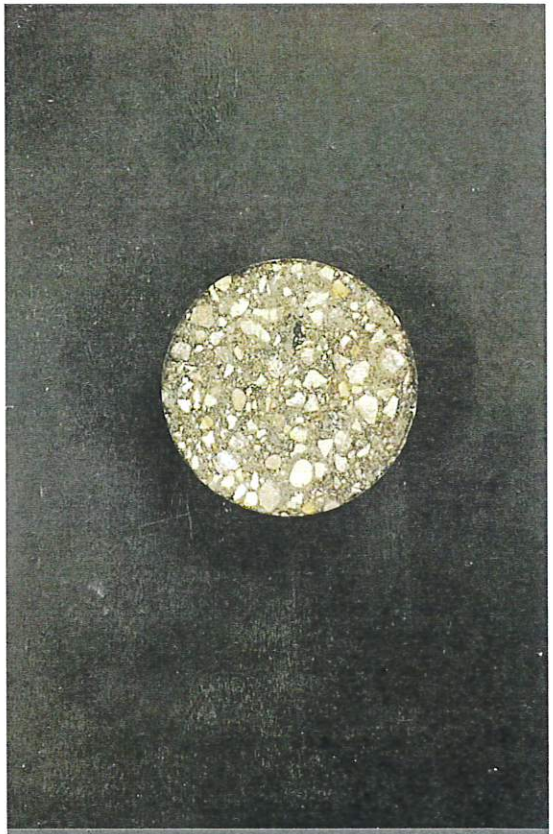
PC #18
Full Depth of Pavement
Ø = 100 mm



PC #18
Top of Asphalt Pavement
Ø = 100 mm

Photograph 19: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane

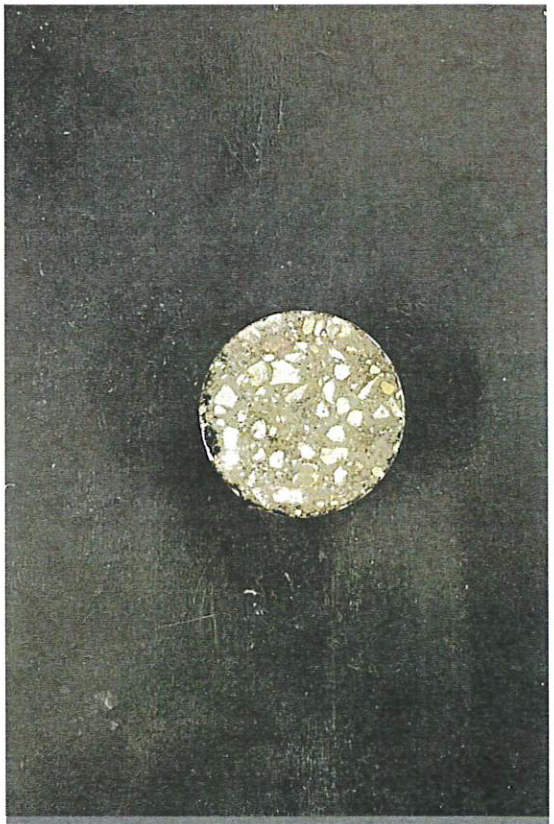
PC #19
Full Depth of Pavement
Ø = 150 mm



PC #19
Top of Asphalt Pavement
Ø = 150 mm

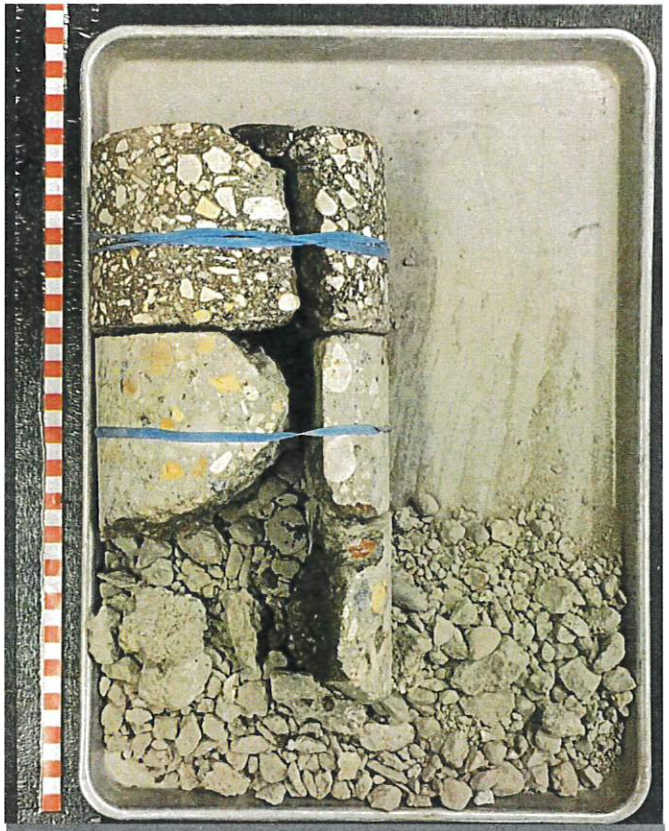
Photograph 20: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane

PC #20
Full Depth of Pavement
Ø = 100 mm



PC #20
Top of Asphalt Pavement
Ø = 100 mm

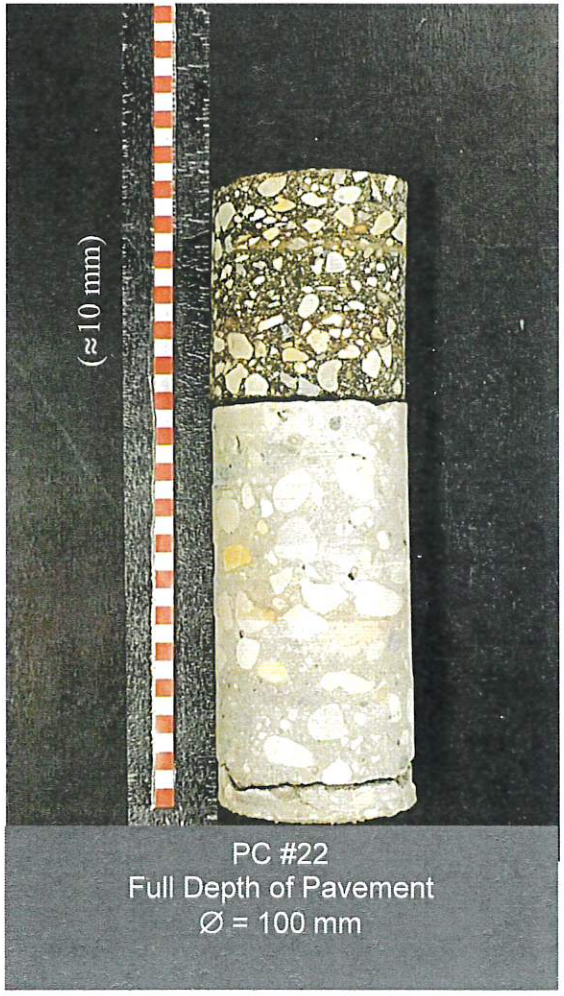
Photograph 21: Specimen from Bishop Grandin Boulevard, Westbound Curb Lane



PC #21
Full Depth of Pavement
Ø = 150 mm

PC #21
Top of Asphalt Pavement
Ø = 150 mm

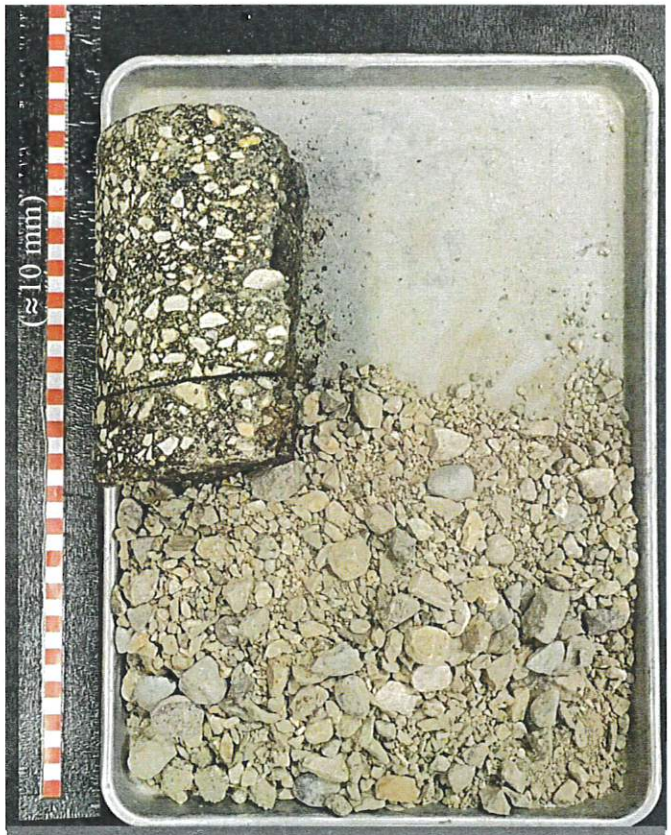
Photograph 22: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



PC #22
Full Depth of Pavement
Ø = 100 mm

PC #22
Top of Asphalt Pavement
Ø = 100 mm

Photograph 23: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



TH #1
Full Depth of Pavement
∅ = 150 mm

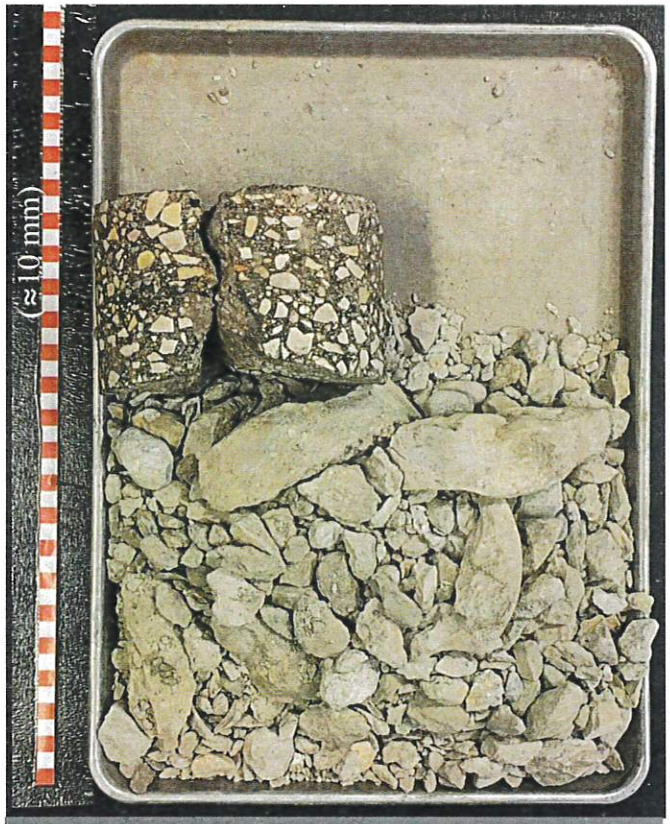
TH #1
Top of Asphalt Pavement
∅ = 150 mm

Photograph 24: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane

TH #2
Full Depth of Pavement
Ø = 150 mm

TH #2
Top of Asphalt Pavement
Ø = 150 mm

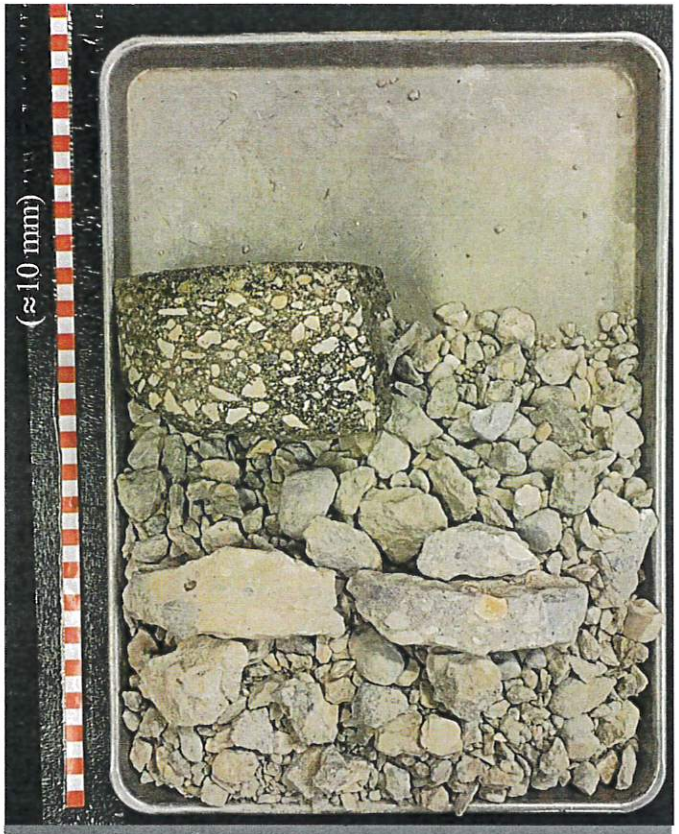
Photograph 25: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #3
Full Depth of Pavement
Ø = 150 mm

TH #3
Top of Asphalt Pavement
Ø = 150 mm

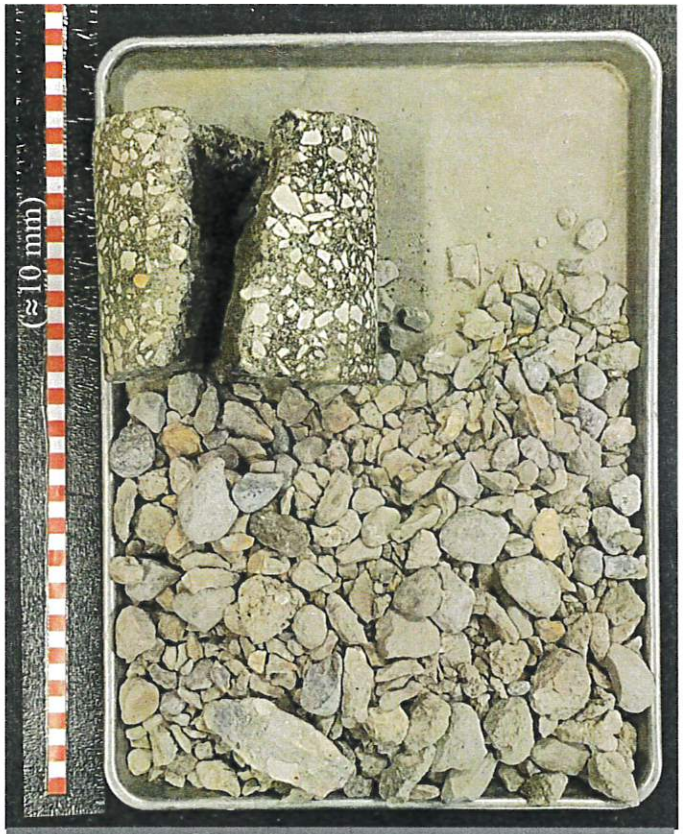
Photograph 26: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



TH #4
Full Depth of Pavement
Ø = 150 mm

TH #4
Top of Asphalt Pavement
Ø = 150 mm

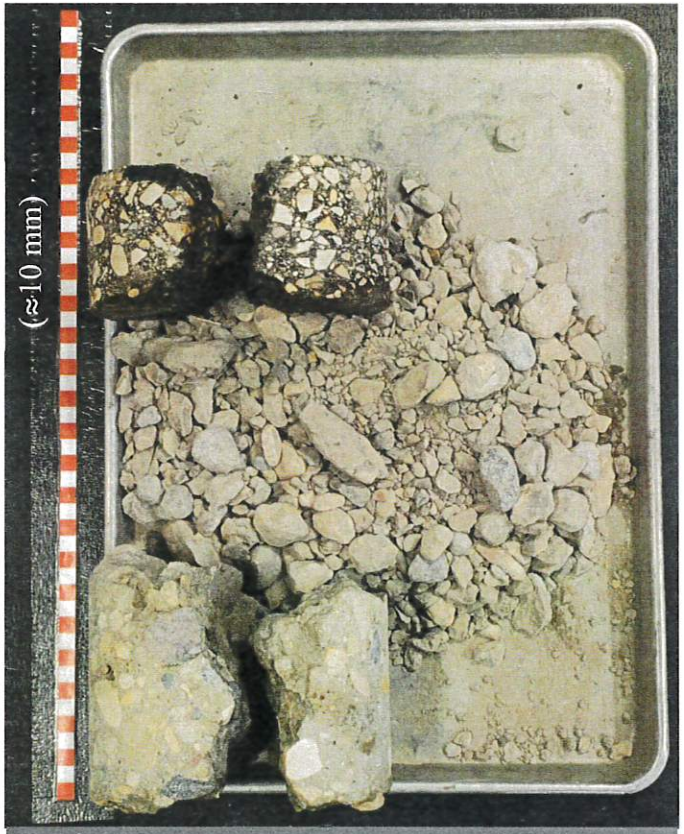
Photograph 27: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



TH #5
Full Depth of Pavement
Ø = 150 mm

TH #5
Top of Asphalt Pavement
Ø = 150 mm

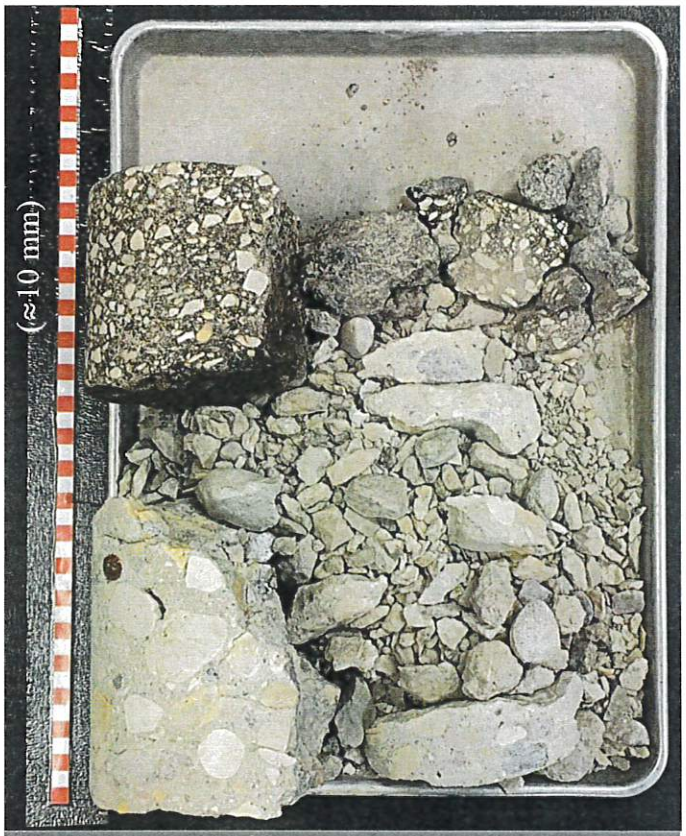
Photograph 28: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #6
Full Depth of Pavement
Ø = 150 mm

TH #6
Top of Asphalt Pavement
Ø = 150 mm

Photograph 29: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane



TH #7
Full Depth of Pavement
∅ = 150 mm

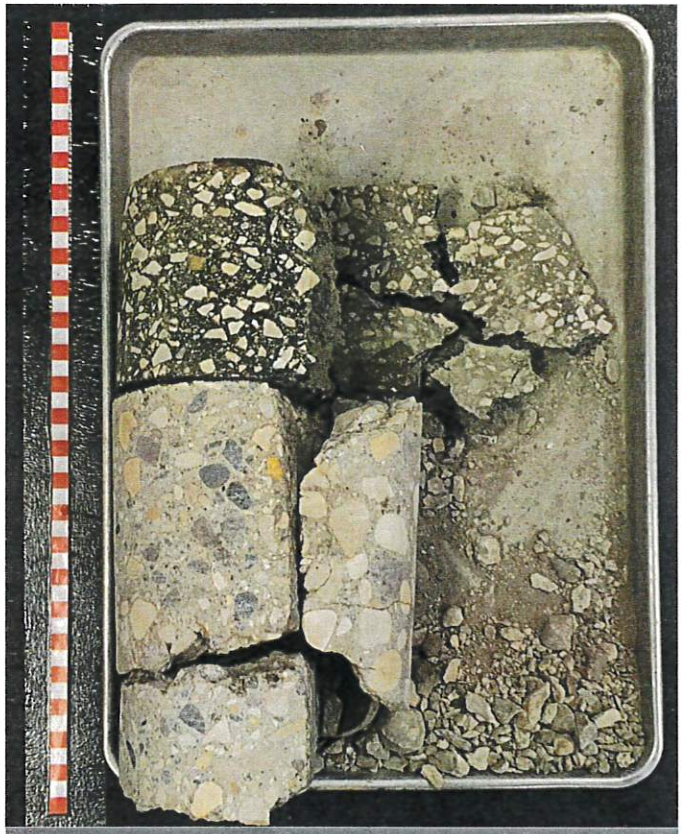
TH #7
Top of Asphalt Pavement
∅ = 150 mm

Photograph 30: Specimen from Bishop Grandin Boulevard, Eastbound Median Lane

TH #8
Full Depth of Pavement
Ø = 150 mm

TH #8
Top of Asphalt Pavement
Ø = 150 mm

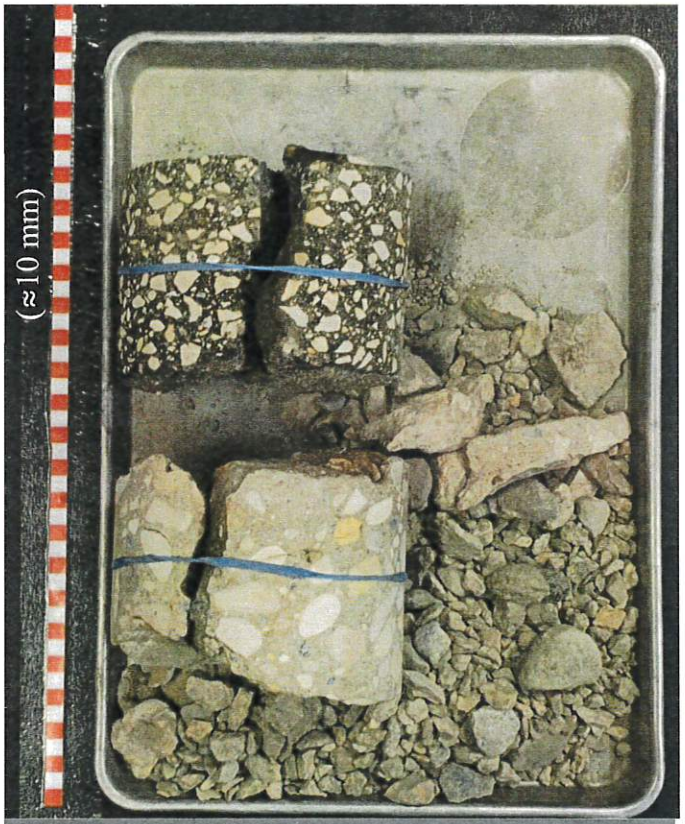
Photograph 31: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #9
Full Depth of Pavement
Ø = 150 mm

TH #9
Top of Asphalt Pavement
Ø = 150 mm

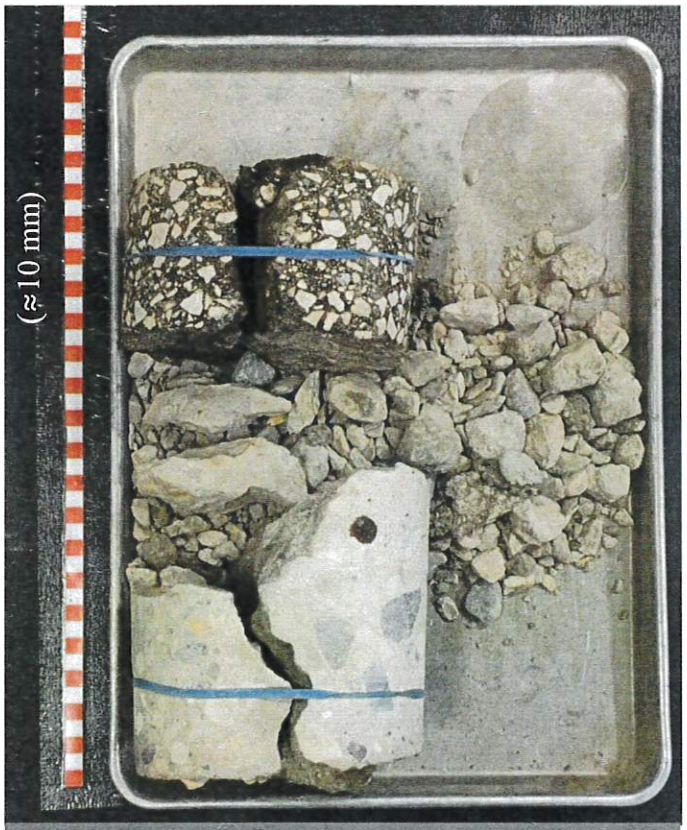
Photograph 32: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #10
Full Depth of Pavement
Ø = 150 mm

TH #10
Top of Asphalt Pavement
Ø = 150 mm

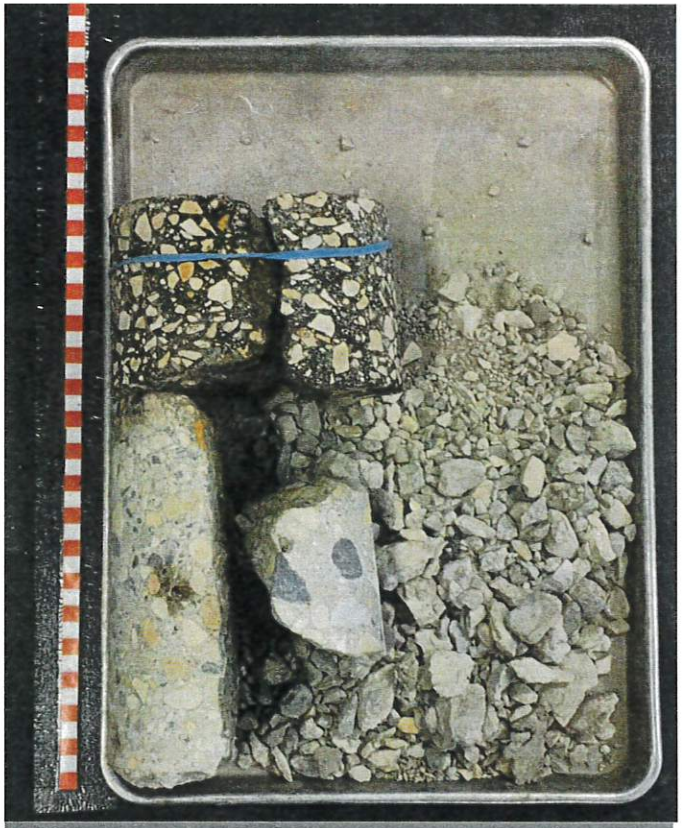
Photograph 33: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #11
Full Depth of Pavement
∅ = 150 mm

TH #11
Top of Asphalt Pavement
∅ = 150 mm

Photograph 34: Specimen from Bishop Grandin Boulevard, Eastbound Curb Lane



TH #12
Full Depth of Pavement
Ø = 150 mm

Th #12
Top of Asphalt Pavement
Ø = 150 mm

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH1

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah Blvd, Winnipeg, MB

Location: See Figure 1

Project: BIshop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

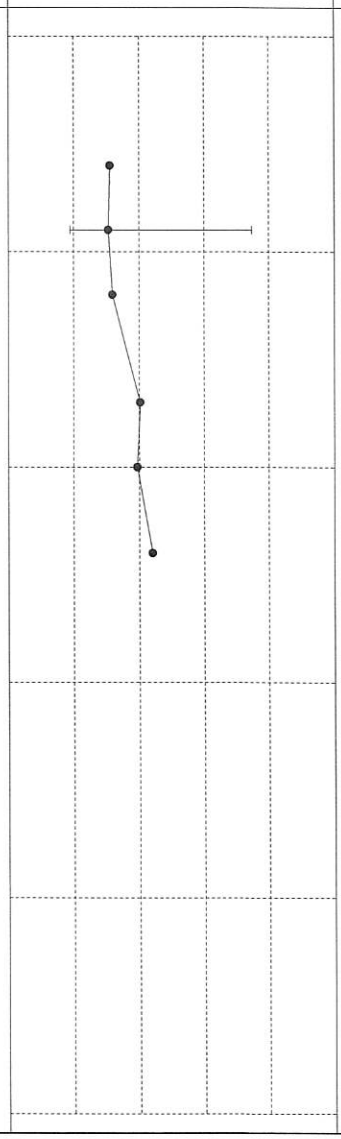
Date Drilled: December 4, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)
0.0	Ground Surface	100.0
	Asphalt (190 mm)	
	Concrete (155 mm)	
	Fat Clay - dark brown, moist, stiff, high plastic, trace silt, trace sand, trace gravel.	
1.0		99.0
	- below 1.5 m medium brown, stiff, trace silt.	
	Clay - light brown, moist, very stiff, high plastic. - below 2.2 m medium brown, stiff.	
2.0		98.0
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.	
3.0		97.0
4.0		96.0
5.0		95.0

Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
S1	Split Barrel	31.0	
S2	Split Barrel	30.5	
S3	Split Barrel	31.8	
S4	Split Barrel	40.3	
S5	Split Barrel	39.5	
S6	Split Barrel	44.1	



SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: DO

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE — SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH4

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 3

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 4, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (85 mm)					
	Concrete (200 mm)					
	Fat Clay - dark brown, moist, stiff, high plastic, silt, trace sand, trace gravel.		S1		34.7	
1.0		99.0	S2		33.5	
			S3		34.6	
			S4		29.6	
2.0	*Clay* - medium brown, moist, firm, high plastic, silty. - below 2.1 m light brown.	98.0	S5		27.9	
			S6		21.3	
	End of Test Hole - end of test hole at 2.7 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.7 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH5

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 4

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 4, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (136 mm)					
	Concrete (150 mm)					
	Fat Clay - dark brown, moist, firm, high plastic, silt, trace sand, trace gravel, trace mica.		S1		40.1	
	- below 0.8 m stiff, trace gravel.		S2		28.8	
1.0		99.0	S3		33.1	
	Clay - medium brown, moist, firm, high plastic, silty.		S4		34.8	
2.0		98.0	S5		36.4	
			S6		43.7	
	End of Test Hole - end of test hole at 2.7 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: DO

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.7 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH6

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 4

Project: Bishop Grandin Boulveard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 4, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (110 mm)					
	Concrete (200 mm)					
	Fat Clay - dark brown, moist, stiff, high plastic, silt, trace sand, trace gravel, trace mica.		S1		32.0	
1.0	- below 0.9 m very stiff, trace silt.	99.0	S2		24.4	
			S3		22.9	
			S4		35.4	
2.0	***Clay*** - medium brown, stiff, moist, high plastic.	98.0	S5		38.3	
			S6		44.2	
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: DO

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH7

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 4

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 5, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (75 mm)					
	Concrete (200 mm)					
	Fat Clay - dark brown, moist, firm, high plastic, silt, trace sand, trace gravel.		S1		39.3	
1.0		99.0	S2		38.6	
			S3		34.8	
			S4		29.6	
2.0	*Clay* - medium grey, moist, firm, high plastic, silty. -below 2.1 m, brown, firm	98.0	S5		25.0	
			S6		21.9	
	End of Test Hole - end of test hole at 2.7 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: DO

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.7 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH8

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 6

Project: Bishop Grandin Boulevard (Abinojii Mikianah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 7, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (169 mm)					
	Concrete (195 mm)					
	Fat Clay - black, moist, stiff, high plastic, silt, trace gravel.		S1		29.6	
			S2		29.6	
1.0		99.0	S3		29.6	
	Clay - light brown, moist, stiff, high plastic, silty.					
	- below 1.8 m, soft.		S4		23.3	
2.0		98.0	S5		22.5	
	- below 2.3 m, stiff.		S6		32.5	
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH9

Client: WSP Canada Inc.
Site: EB Abinojii Mikanah, Winnipeg, Manitoba
Location: See Figure 6
Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03
Date Drilled: December 7, 2023
Grade Elevation: 100.0 m
Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (107 mm)					
	Concrete (142 mm)					
	Fat Clay - dark brown, moist, very stiff, high plastic, silt, trace sand, trace gravel.		S1		32.7	
1.0		99.0	S2		32.7	
			S3		33.7	
	Clay - light brown, moist, stiff, silty.		S4		40.6	
2.0		98.0	S5		39.9	
			S6		45.8	
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited
Drill Rig: Lone Star T1A+
Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m
Completion Elevation: 97.5 m
Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH10

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 7

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 7, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (105 mm)					
	Concrete (200 mm)					
	Fat Clay - medium brown, moist, stiff, high plastic, silt, trace sand, trace mica. - below 0.7 m very stiff.		S1		37.3	
1.0		99.0	S2		32.2	
			S3		35.5	
	Clay - light brown, moist, very stiff, high plastic.		S4		35.6	
2.0		98.0	S5		36.1	
			S6		36.3	
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH11

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 7

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 7, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0	Ground Surface	100.0				
	Asphalt (90 mm)					
	Concrete (200 mm)					
	Fat Clay - medium brown, moist, stiff, silt, trace sand, trace gravel.		S1		31.1	
			S2		31.0	
1.0	- below 1.0 m black, very stiff.	99.0	S3		34.3	
	Clay - light brown, moist, stiff, silty.		S4		24.6	
	- below 1.8 m medium brown.		S5		33.8	
2.0		98.0	S6		40	
	End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0		97.0				
4.0		96.0				
5.0		95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

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Engineering And Testing Solutions That Work For You

Test Hole #: TH12

Client: WSP Canada Inc.

Site: EB Abinojii Mikanah, Winnipeg, Manitoba

Location: See Figure 7

Project: Bishop Grandin Boulevard (Abinojii Mikanah) Pavement Renewals

File No.: 23-035-03

Date Drilled: December 7, 2023

Grade Elevation: 100.0 m

Water Elevation: --

Depth (m)	Soil Symbol	Description	Elevation (m)	Sample No.	Sample Type	Moisture Content (%)	Blows/300 mm
0.0		Ground Surface	100.0				
		Asphalt (95 mm)					
		Concrete (200 mm)					
		Fat Clay - dark brown, moist, stiff, high plastic, silt, trace sand, trace gravel, trace mica.		S1		29.2	
				S2		33.4	
1.0		- below 1.0 m very stiff.	99.0	S3		32.8	
		- below 1.5 m black, firm, trace sand, trace gravel.		S4		32.0	
2.0			98.0	S5		29.3	
				S6		29.3	
		End of Test Hole - end of test hole at 2.5 m below grade. - no seepage or sloughing encountered during drilling. - test hole backfilled with auger cuttings and gravel and patched with cold mix asphalt upon completion of drilling.					
3.0			97.0				
4.0			96.0				
5.0			95.0				

Moisture Content (%): PL I----------X----------I LL (20, 40, 60, 80)

SHEAR STRENGTH (kPa): P. Pen | Torvane | UC

ENG- TECH Consulting Limited

Logged by: PZ

Reviewed by:

Drilled By: ENG-TECH Consulting Limited

Drill Rig: Lone Star T1A+

Auger Size: 100 mm Solid Stem

Completion Depth: 2.5 m

Completion Elevation: 97.5 m

Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

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OBTAINING AND TESTING DRILLED CORES

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WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

File No.: 23-035-03

Ref. No.: 23-35-3-2

Attention: Scott Suderman, C.E.T., P. Eng.

Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA CANADA

Date Cored: Dec 6 to 13/23 Cored By: ENG-TECH (Kyle Zebiere) Page: 1 of 2

Date Received: Dec 6 to13/23 Received By: ENG-TECH (Kyle Zebiere) Structure: Road pavement

Age of Concrete: - Concrete Design Strength: - Direction of Load: Parallel

Core Conditioning: As per CSA A23.2-14C Clause 7.3.1 (moist) Test Method: CSA A23.2-14C, 9C

Strength Specification: Minimum 85% of design strength on an average of 3 cores - no single core less than 75% as per CSA A23.1 Clause 4.4.2.2.2.2

Core No.	Location on Structure	Length		Average Diameter (mm)	Date Tested (m/d/y)	Compressive Strength (MPa)	Type of Fracture	Tested By ENG-TECH
		Cored (mm)	Tested (mm)					
PC #2	Eastbound acceleration lane, Northing: 5521630 Easting: 635830 Centerline of lane	195	184	100	Jan 17/24	46.53*	1	Rey Batac
PC #4	Eastbound median lane, Northing: 5521811 Easting: 636133 Centerline of lane	200	121	100	Jan 17/24	50.33*	1	Rey Batac
PC #7	Westbound median lane, Northing: 5520783 Easting: 634164 Centerline of lane	175	113	100	Jan 17/24	58.22*	1	Rey Batac
PC #10	Westbound middle lane, Northing: 5520968 Easting: 634484 Centerline of lane	190	187	100	Jan 17/24	52.65*	1	Rey Batac
PC #13	Westbound curb lane, Northing: 5521067 Easting: 634662 Centerline of lane	190	188	100	Jan 17/24	63.21*	1	Rey Batac

Reporting of these results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request.
*Denotes corrected strength for Length/Diameter ratio less than 2.0 to 1.0. Type of fracture indicated when cylinder fails to meet 85% of design strength or if different than CSA A23.2-19-9C Table 3 Type 1.

Deviations from test procedure: None

Email: WSP Canada Inc. Contact Group

ENG-TECH Consulting Limited

Per

Darci Babisky, C.E.T.
Operations Manager - Laboratory
Ph: (204) 233-1694 Fx: (204) 235-1579

Supplementary information may be provided upon request.
Restrictions and additional fees may apply.

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OBTAINING AND TESTING DRILLED CORES

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For specific tests as listed on www.ccil.com

Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA CANADA
File No.: 23-035-03
Ref. No.: 23-35-3-2
Date Cored: Dec 6/23

Core No.	Location on Structure	Length		Average Diameter (mm)	Date Tested (m/d/y)	Compressive Strength (MPa)	Type of Fracture	Tested By ENG-TECH
		Cored (mm)	Tested (mm)					
PC #17	Westbound median lane, Northing: 5521310 Easting: 635200 Centerline of lane	190	191	100	Jan 17/24	57.91*	1	Rey Batac
PC #18	Westbound curb lane, Northing: 5521634 Easting: 635779 Centerline of lane	160	147	100	Jan 17/24	66.65*	1	Rey Batac
PC #20	Westbound middle lane, Northing: 5521708 Easting: 635910 Centerline of lane	190	183	100	Jan 17/24	58.44*	1	Rey Batac
PC #22	Eastbound median lane, Northing: 5521533 Easting: 635640 0.5 meters North of centerline of lane	200	165	100	Jan 17/24	63.79*	1	Rey Batac

Comments: All core ends were trimmed prior to compressive strength testing and were end prepared using a high strength capping compound.

Deviations from test procedure: none

Email: WSP Canada Inc. Contact Group

ENG-TECH Consulting Limited

Per

Darci Babisky, C.E.T.
Operations Manager - Laboratory
Ph: (204) 233-1694 Fx: (204) 235-1579

Supplementary information may be provided upon request.
Restrictions and additional fees may apply.

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LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

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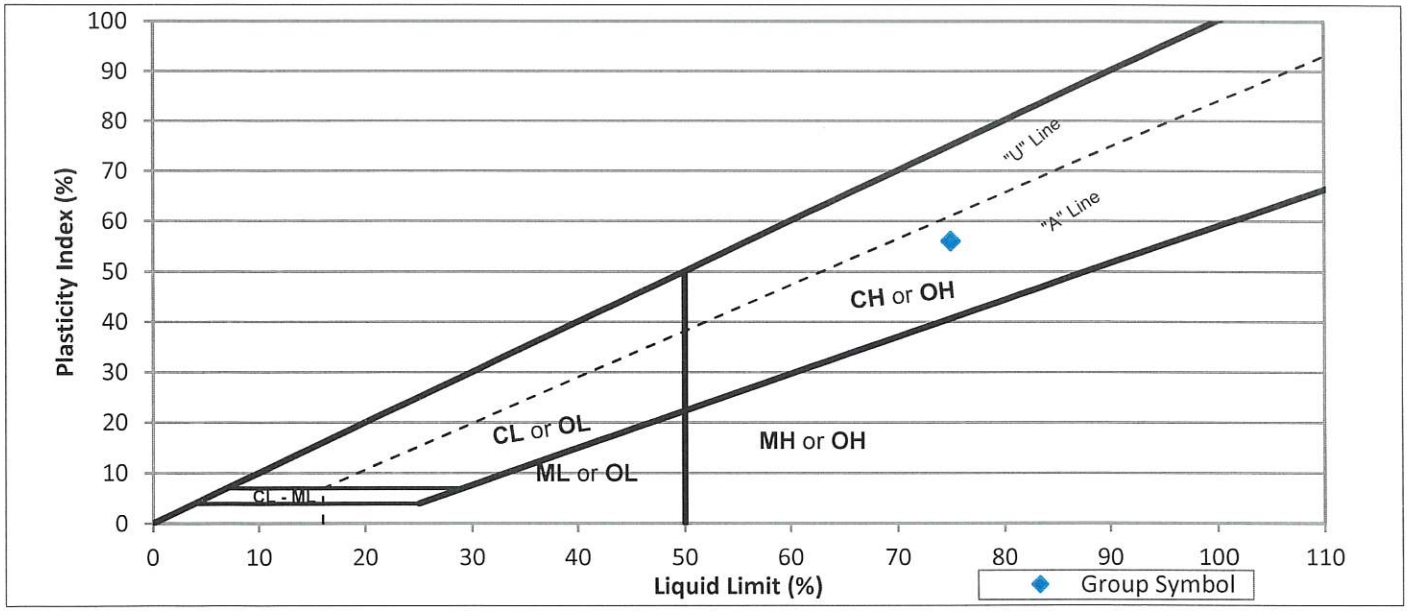
WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

File No.: 23-035-03
Ref. No.: 23-35-3-4

Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road
Material Description: Clay
Test Hole No.: 1
Sample No.: 2
Depth: 0.9 m
Test Method: ASTM D4318 - A (Multipoint)
Specimen Preparation Procedure: 2 (Dry)
Liquid Limit Device: Manual
Plastic Limit Rolling Procedure: 1 (Hand Rolled)
Date Sampled: Dec 4/23
Sampled By: ENG-TECH (Denys Ostrovskyi)
Date Received: Dec 4/23
Date Tested: Dec 20/23
Tested By: ENG-TECH (Jessica Bauer)
Sampling Method: Auger
Drying Method: Air
Grooving Tool: Metal



Liquid Limit (%): 75 **Plastic Limit (%):** 19 **Plasticity Index (%):** 56

Percentage of sand particles retained on 0.425mm sieve: 6.0

Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-6 (57)

As Received Moisture Content (%): 30.5

Comments:

ENG-TECH Consulting Limited

Per _____

Darci Babisky, C.E.T.
Operations Manager - Laboratory
Ph: (204) 233-1694 Fx: (204) 235-1579

Email: WSP Canada Inc. Contact Group

Supplementary information may be provided upon request. Restrictions and additional fees may apply.

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LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

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WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

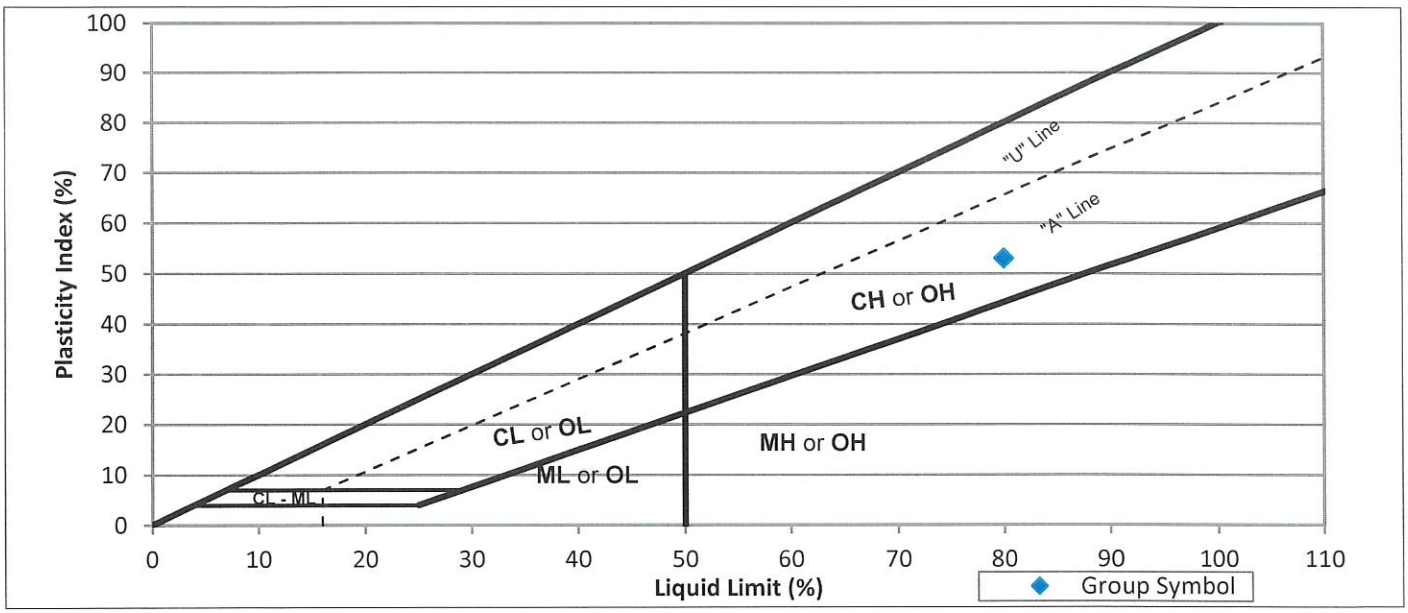
File No.: 23-035-03
Ref. No.: 23-35-3-5

Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road
Material Description: Clay
Test Hole No.: 3
Sample No.: 3
Depth: 1.2 m
Test Method: ASTM D4318 - A (Multipoint)
Specimen Preparation Procedure: 2 (Dry)
Liquid Limit Device: Manual
Plastic Limit Rolling Procedure: 1 (Hand Rolled)

Date Sampled: Dec 4/23
Sampled By: ENG-TECH (Denys Ostrovskyi)

Date Received: Dec 4/23
Date Tested: Dec 20/23
Tested By: ENG-TECH (Jessica Bauer)
Sampling Method: Auger
Drying Method: Air
Grooving Tool: Metal



Liquid Limit (%): 80 **Plastic Limit (%):** 27 **Plasticity Index (%):** 53

Percentage of sand particles retained on 0.425mm sieve: 6.0

Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-6 (57)

As Received Moisture Content (%): 34.0

Comments:

ENG-TECH Consulting Limited

Per

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LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS

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WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

File No.: 23-035-03
Ref. No.: 23-35-3-9

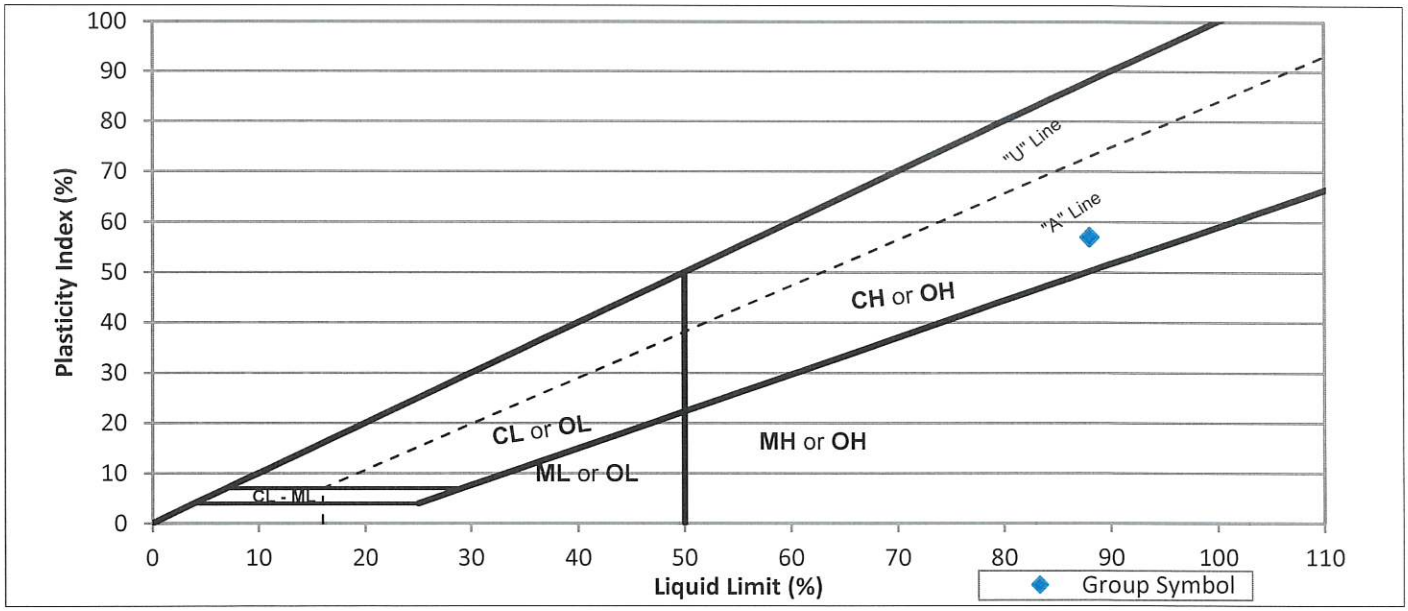
Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) Dakota Street To St. Anne's Road
Material Description: Clay

Test Hole No.: 10
Sample No.: 2
Depth: 0.9 m
Test Method: ASTM D4318 - A (Multipoint)
Specimen Preparation Procedure: 2 (Dry)
Liquid Limit Device: Manual
Plastic Limit Rolling Procedure: 1 (Hand Rolled)

Date Sampled: Dec 4/23
Sampled By: ENG-TECH (Denys Ostrovskyi)

Date Received: Dec 4/23
Date Tested: Dec 20/23
Tested By: ENG-TECH (Jessica Bauer)
Sampling Method: Auger
Drying Method: Air
Grooving Tool: Metal



Liquid Limit (%): 88 **Plastic Limit (%):** 31 **Plasticity Index (%):** 57

Percentage of sand particles retained on 0.425mm sieve: 4.0

Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-5 (64)

As Received Moisture Content (%): 32.2

Comments:

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Per _____

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PARTICLE SIZE ANALYSIS

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R3T 6B8

File No.: 23-035-03
Ref. No.: 23-35-3-6

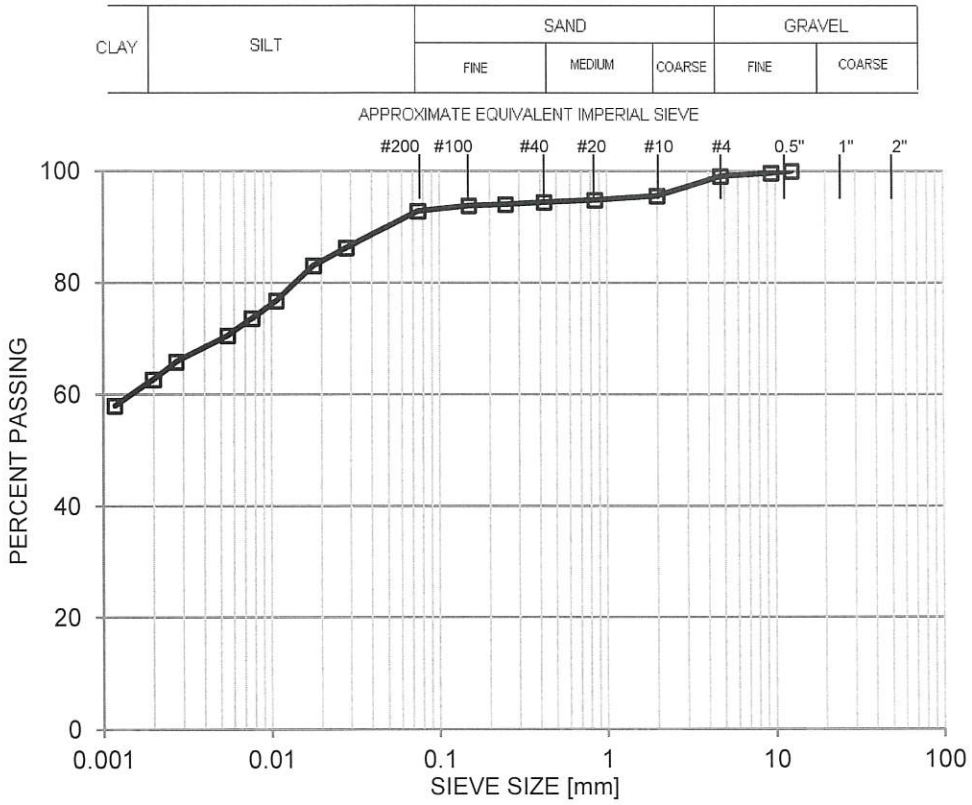
Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road
Material Description: Clay

Test Hole No.: 1
Sample No.: 2
Depth: 0.9 m
Test Method: ASTM D7928
Method Used: -
Dispersion Device: Apparatus A: Humboldt Mechanical Analysis Stirrer

Date Sampled: Dec 4/23
Date Received: Dec 4/23
Date Tested: Dec 20/23
Drying Method: Air
Dispersion Process: Stirrer / Tipping

Sampled By: ENG-TECH (Denys Ostrovskyi)
Sample Type: Auger cutting
Tested By: ENG-TECH (Tim Christensen)
Specific Gravity: Estimated 2.7
Separating Sieve Size (mm): 2.0
Dispersion Time (min.): 3



SIEVE SIZE (mm)	PERCENT PASSING
12.5	100
9.5	100
4.75	99
2.0	96
0.850	95
0.425	94
0.250	94
0.150	93.8
0.075	93
0.028	86
0.018	83
0.011	77
0.008	74
0.005	71
0.003	66
0.002	63
0.001	58

Percent of: GRAVEL (0.9 %), SAND (6.3 %), SILT (30.0 %), CLAY (62.7 %)
Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-6 (57)
As Received Moisture Content (%): 30.5
Comments:

Email: WSP Canada Inc. Contact Group

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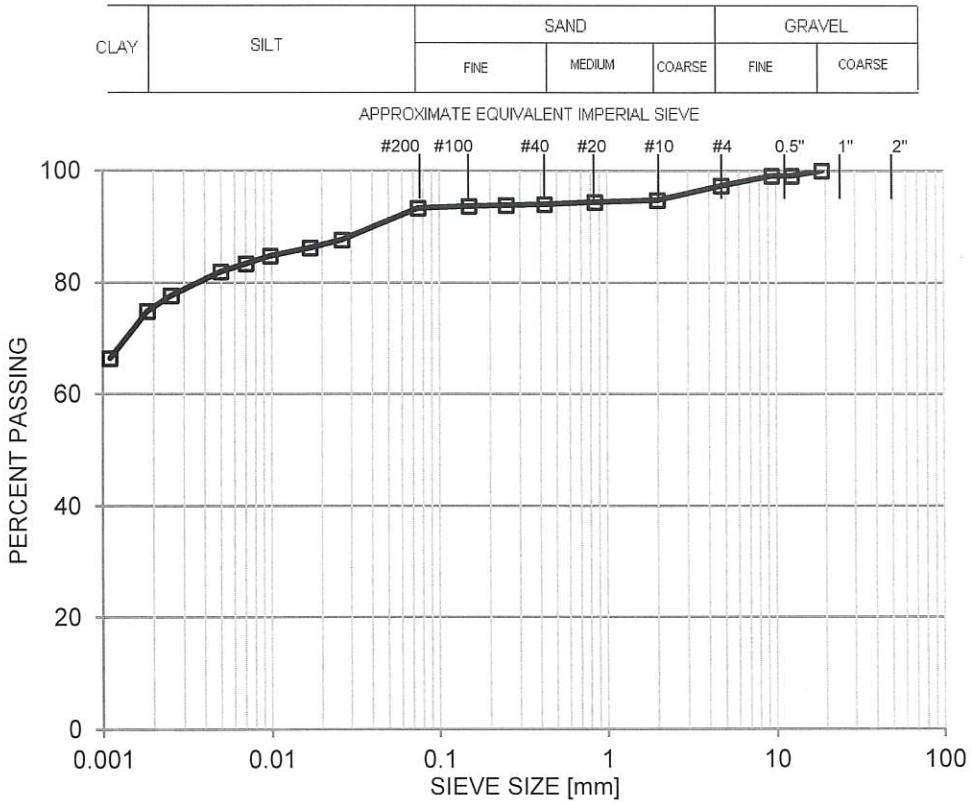
File No.: 23-035-03
Ref. No.: 23-35-3-7

Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road
Material Description: Clay

Test Hole No.:	3	**Date Sampled:**	Dec 4/23	**Sampled By:**	ENG-TECH (Denys Ostrovskyi)
Sample No.:	3	**Date Received:**	Dec 4/23	**Sample Type:**	Auger cutting
Depth:	1.2 m	**Date Tested:**	Dec 20/23	**Tested By:**	ENG-TECH (Tim Christensen)
Test Method:	ASTM D6913 & D7928	**Drying Method:**	Air	**Specific Gravity:**	Estimated 2.7
Method Used:	A	**Dispersion Process:**	Stirrer / Tipping	**Separating Sieve Size (mm):**	2.0
Dispersion Device:	Apparatus A: Humboldt Mechanical Analysis Stirrer			**Dispersion Time (min.):**	3



SIEVE SIZE (mm)	PERCENT PASSING
19.0	100
12.5	99
9.5	99
4.75	97
2.0	94.7
0.850	94
0.425	94
0.250	94
0.150	94
0.075	93.3
0.026	88
0.017	86
0.010	85
0.007	83
0.005	82
0.003	78
0.002	75
0.001	66

Percent of: GRAVEL (2.7 %), SAND (4.0 %), SILT (17.7 %), CLAY (75.6 %)
Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-6 (57)
As Received Moisture Content (%): 34.0
Comments:

Email: WSP Canada Inc. Contact Group

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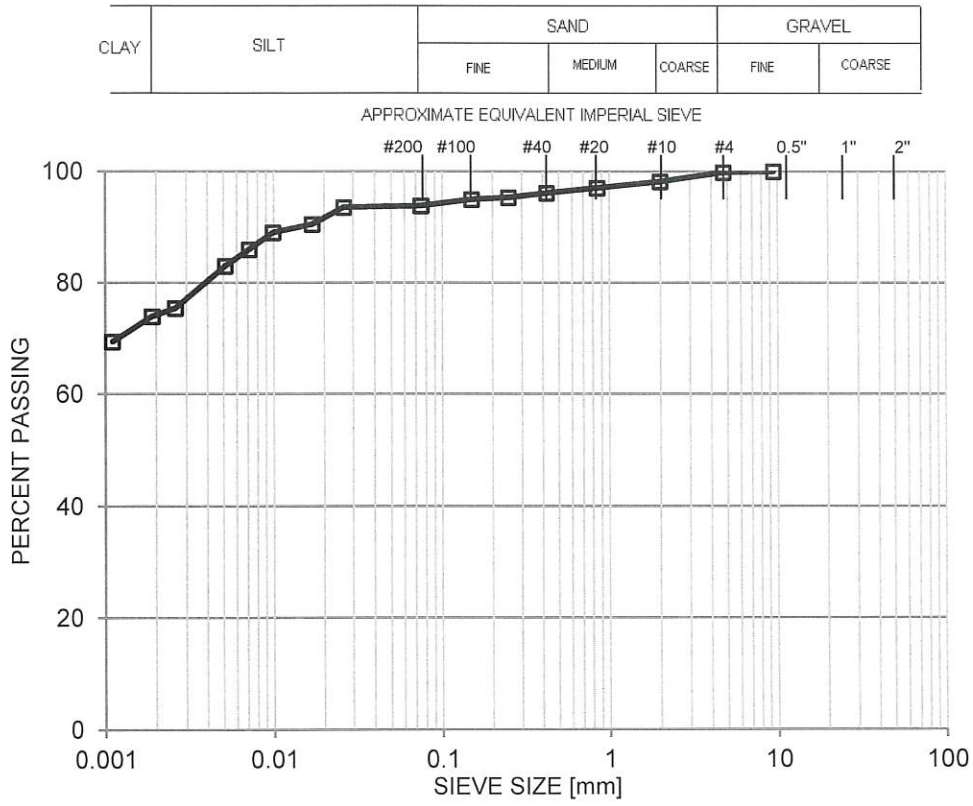
File No.: 23-035-03
Ref. No.: 23-35-3-10

Attention: Scott Suderman, C.E.T., P. Eng.
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) Dakota Street To St. Anne's Road
Material Description: Clay

Test Hole No.:	10	**Date Sampled:**	Dec 4/23	**Sampled By:**	ENG-TECH (Denys Ostrovskyi)
Sample No.:	2	**Date Received:**	Dec 4/23	**Sample Type:**	Auger cutting
Depth:	0.9 m	**Date Tested:**	Dec 20/23	**Tested By:**	ENG-TECH (Tim Christensen)
Test Method:	ASTM D7928	**Drying Method:**	Air	**Specific Gravity:**	Estimated 2.7
Method Used:	-	**Dispersion Process:**	Stirrer / Tipping	**Separating Sieve Size (mm):**	2.0
Dispersion Device:	Apparatus A: Humboldt Mechanical Analysis Stirrer			**Dispersion Time (min.):**	3



SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
4.75	100
2.0	98
0.850	97
0.425	96
0.250	95
0.150	95
0.075	93.8
0.026	94
0.017	90
0.010	89
0.007	86
0.005	83
0.003	75
0.002	74
0.001	69

Percent of: GRAVEL (0.2 %), SAND (6.0 %), SILT (19.6 %), CLAY (74.2 %)
Classification: ASTM D2487, CH, fat clay
ASTM D3282: A-7-5 (64)
As Received Moisture Content (%): 32.2
Comments:

Email: WSP Canada Inc. Contact Group

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Per _____

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MOISTURE-DENSITY RELATIONSHIP

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

File No.: 23-035-03
Ref. No.: 23-35-3-11

WSP Canada Inc.
1600 Buffalo Place
Winnipeg, Manitoba
R3T 6B8

Attention: Scott Suderman, C.E.T., P. Eng.

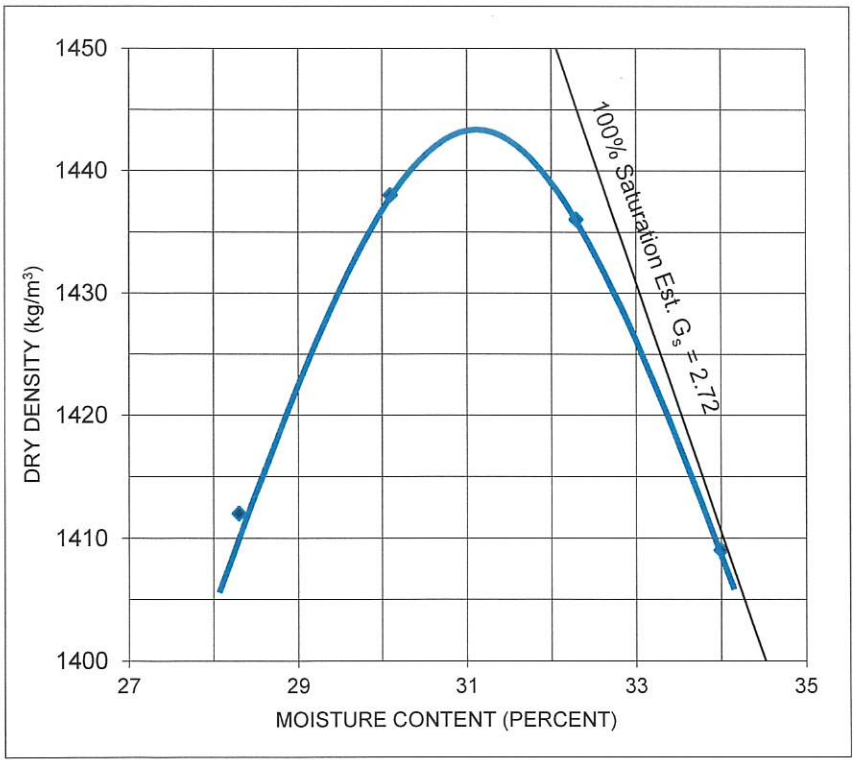
Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road. Composite sample from TH1, S3,1.2m; TH2, S2, 0.9m; TH 2, S3, 1.2m; TH3, S2, 0.9m; TH4, S2, 0.9m; TH4, S3, 1.2m; TH5, S2, 0.9m; TH5, S3, 1.2m; TH6, S2, 0.9m; TH6, S3, 1.2m; TH7, S2, 0.9m and TH7, S3, 1.2m.

Material Type: Subgrade
Description: CH, clay
Date Sampled: Dec 4 to 6/23
Date Received: Dec 12/23
Date Tested: Dec 27/23
Sampled By: ENG-TECH (Denys Ostrovskyi)
Tested By: ENG-TECH (Rey Betac)

Compaction Standard Method: [✓] ASTM D698 [ ] ASTM D1557
Correction Standard Method: [ ] ASTM D4718
Preparation Method: Moist
Compaction Method: Manual
Test Compaction Method: A

Material Oversize:
4.75 mm: 1.2 %
19.0 mm: - %



Dry Density (kg/m³)	Moisture Content (%)
1412	28.3
1438	30.1
1436	32.3
1409	34.0

Maximum Dry Density (MDD): 1448 kg/m³
Optimum Moisture (OM): 31.1 %

MDD Corrected: - kg/m³
OM Corrected: - %

Received Moisture Content: - %

Comments:

Email: WSP Canada Inc. Contact Group

ENG-TECH Consulting Limited

Per

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MOISTURE-DENSITY RELATIONSHIP

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File No.: 23-035-03
Ref. No.: 23-35-3-13

WSP Canada Inc.
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R3T 6B8

Attention: Scott Suderman, C.E.T., P. Eng.

Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA, CANADA

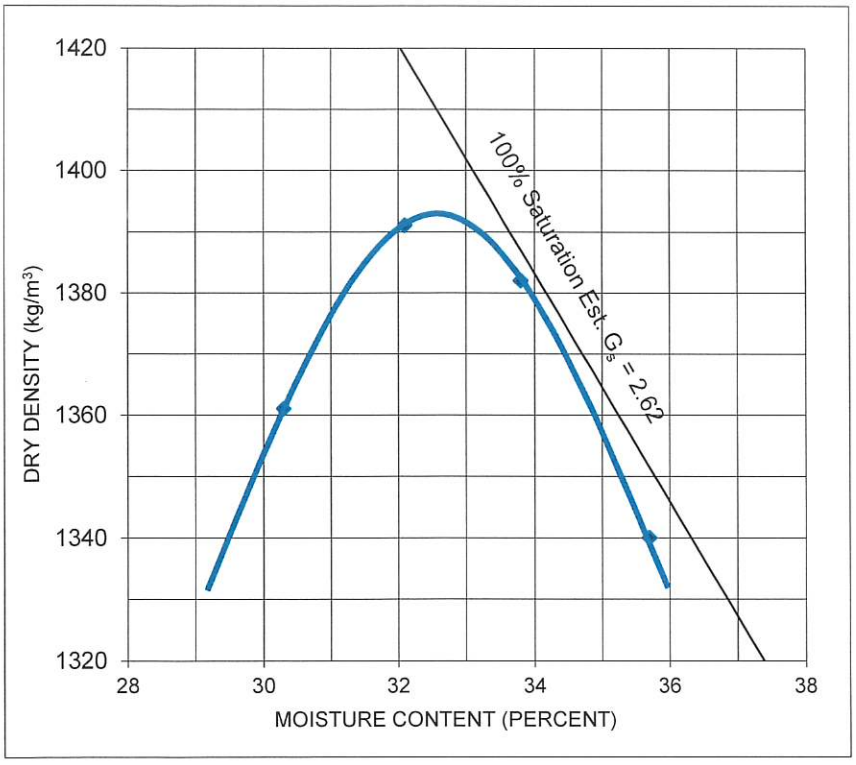
Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) Dakota Street to St. Anne's Road. Composite sample from TH8, S2, 0.9m; TH8, S3, 1.2m; TH9, S2, 0.9m; TH9, S3, 1.2m; TH10, S3, 1.2m; TH10, S4, 1.6m; TH11, S2, 0.9m; T11, S3, 1.2m; TH12, S2, 0.9m and TH12, S3, 1.2m.

Material Type: Subgrade
Description: CH, clay
Date Sampled: Dec 6 to 8/23
Date Received: Dec 12/23
Date Tested: Dec 28/23
Sampled By: ENG-TECH (Denys Ostrovskyi)
Tested By: ENG-TECH (Rey Betac)

Compaction Standard Method: [✓] ASTM D698 [ ] ASTM D1557
Correction Standard Method: [ ] ASTM D4718

Preparation Method: Moist
Compaction Method: Manual
Test Compaction Method: A

Material Oversize:
4.75 mm: 0.4 %
19.0 mm: - %



Dry Density (kg/m³)	Moisture Content (%)
1361	30.3
1391	32.1
1382	33.8
1340	35.7

Maximum Dry Density (MDD): 1393 kg/m³
Optimum Moisture (OM): 32.6 %

MDD Corrected: - kg/m³
OM Corrected: - %

Received Moisture Content: - %

Comments:

Email: WSP Canada Inc. Contact Group

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Per

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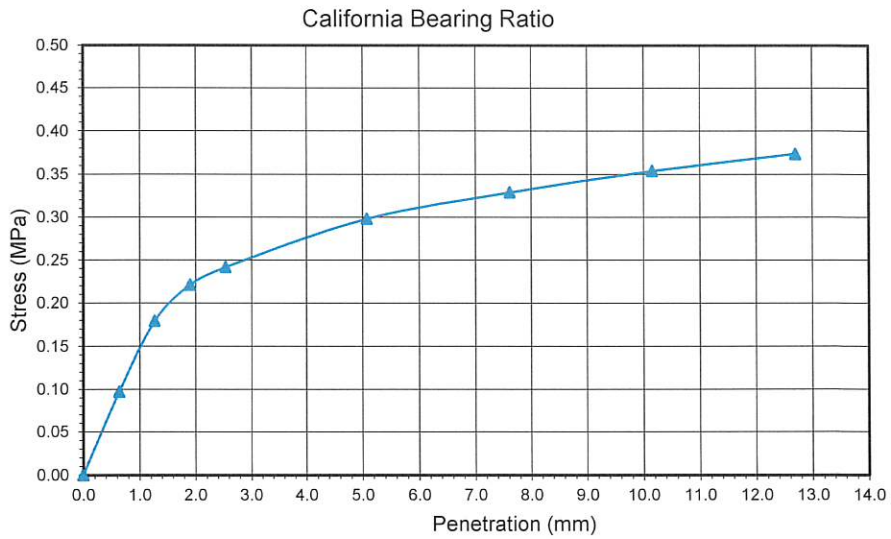
File No.: 23-035-3
Ref. No.: 23-35-3-12

Attention: Scott Suderman, C.E.T., P. Eng.

Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) River Road to St. Mary's Road. Composite sample from TH1, S3,1.2m; TH2, S2, 0.9m; TH 2, S3, 1.2m; TH3, S2, 0.9m; TH4, S2, 0.9m; TH4, S3, 1.2m; TH5, S2, 0.9m; TH5, S3, 1.2m; TH6, S2, 0.9m; TH6, S3, 1.2m; TH7, S2, 0.9m and TH7, S3, 1.2m

Material Type:	Subgrade	Date Sampled:	Dec 4 to 6/24
Material Description:	CH, clay	Date Received:	Dec 12/24
Sampled By:	ENG-TECH (Denys Ostrovskyi)	Date Tested:	Jan 3/24
Immersion Period:	94.5 hours	Tested By:	ENG-TECH (Rey Betac)
Compactive Effort (Density) Required: 95%	Actual: 94.3%	Test Methods:	ASTM D698, D1883



Test Data

	Soaked		Unsoaked	
Dry Density: As Compacted;	1366	kg/m^3	-	kg/m^3
Moisture Content: As Compacted;	31.4	%	-	%
Moisture Content: Top 25 mm;	34.8	%	-	%
CBR Values: 2.54mm (0.1in);	3.5	%	-	%
CBR Values: 5.08mm (0.2in);	2.9	%	-	%

Swell: 1.7 % of Initial Height | Oversize Correction: 1.2 % | Surcharge Mass: 4.54 kg

Maximum Load: 719.3 N | Penetration Depth: 12.7 mm

Comments:

Email: WSP Canada Inc. Contact Group

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Per

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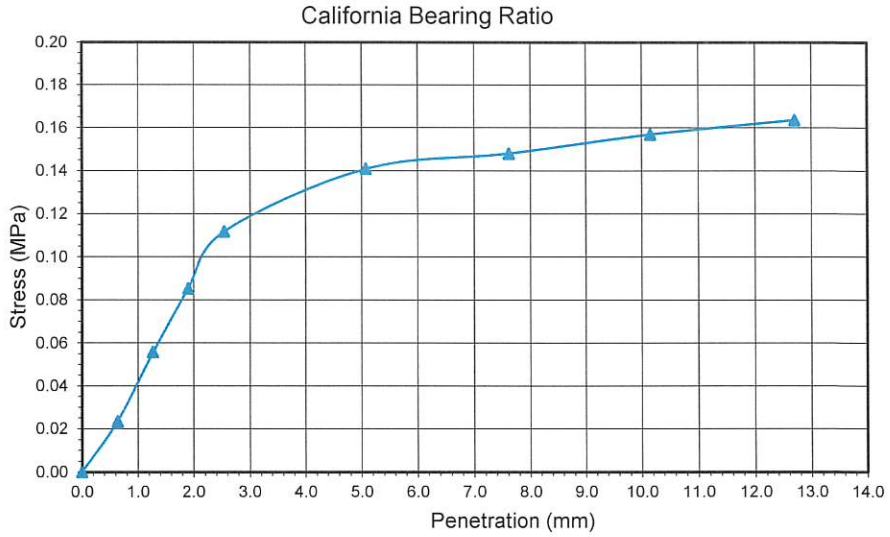
File No.: 23-035-03
Ref. No.: 23-35-3-14

Attention: Scott Suderman, C.E.T., P. Eng.

Project: BISHOP GRANDIN BOULEVARD (ABINOJII MIKANAH) PAVEMENT RENEWALS, WINNIPEG, MANITOBA CANADA

Source: Eastbound Bishop Grandin Boulevard (Abinojii Mikinah) Dakota Street to St. Anne's Road. Composite sample from TH8, S2, 0.9m; TH8, S3, 1.2m; TH9, S2, 0.9m; TH9, S3, 1.2m; TH10, S3, 1.2m; TH10, S4, 1.6m; TH11, S2, 0.9m; T11, S3, 1.2m; TH12, S2, 0.9m and TH12, S3, 1.2m

Material Type:	Subgrade	Date Sampled:	Dec 6 to 8/24
Material Description:	CH, clay	Date Received:	Dec 12/24
Sampled By:	ENG-TECH (Denys Ostrovskyi)	Date Tested:	Jan 2/24
Immersion Period:	95.5 hours	Tested By:	ENG-TECH (Rey Betac)
Compactive Effort (Density) Required: 95% Actual 94.8%		Test Methods:	ASTM D698, D1883



Test Data

	Soaked		Unsoaked	
Dry Density: As Compacted;	1321	kg/m^3	-	kg/m^3
Moisture Content: As Compacted;	32.4	%	-	%
Moisture Content: Top 25 mm;	47.5	%	-	%
CBR Values: 2.54mm (0.1in);	1.6	%	-	%
CBR Values: 5.08mm (0.2in);	1.4	%	-	%

Swell: 5.6 % of Initial Height Oversize Correction: 0.4 % Surcharge Mass: 4.54 kg

Maximum Load: 314.9 N Penetration Depth: 12.7 mm

Comments:

Email: WSP Canada Inc. Contact Group

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