INDEPENDENT TESTING TECHNOLOGIES
337 31st Avenue South • Waite Park, MN 56387 • (320) 253-4338 • www.independenttestingtech.com

AUGUST 8, 2023

ITT PROJECT 23-192
REPORT OF GEOTECHNICAL EXPLORATIONS

For

CITY PROJECT NO. 24-12
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

Prepared For:

CITY OF RAMSEY

INDEPENDENT TESTING TECHNOLOGIES
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August 8, 2023

Mr. Joe Jeriancek
City of Ramsey
7550 Sunfish Drive NW
Ramsey, MN 55303

RE: 23-192 Report of Geotechnical Exploration
City Project No. 24-12
Juniper Woods 1-3
Ramsey, Minnesota

Dear Mr. Jeriancek:

Independent Testing Technologies, Inc. is pleased to submit the results of our subsurface investigation program for this project in Ramsey, Minnesota. This report represents our work on this project as authorized by you. It includes our recommendations regarding earthwork, fill and compaction, subgrade preparation, and pavement design. An electronic copy is enclosed.

The soils encountered were mostly fine grained sandy outwash (SP, SP, SP-SM) soils. No peat (PT), organic or expansive soils were encountered in any of the borings. Groundwater was not observed in any of the borings during our investigation. The soils appear to be excellent for the proposed utility and street reconstruction.

Mr. Jeriancek, it has been our pleasure to work with you on this project. Independent Testing appreciated the opportunity to perform this geotechnical evaluation and look forward to continuing our participation during the construction phase of this project. Please contact Patrick Johnson if you have any questions regarding this report. Please contact Tyler Burkes if you would like a proposal for the materials testing services that will be needed.

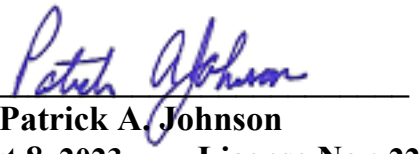
Sincerely,

Patrick A. Johnson, P.E.
Minnesota License #22037

Kevin T. Reller
President

CERTIFICATION

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Engineer under the laws of the State of Minnesota.



Patrick A. Johnson

Date: August 8, 2023 License No.: 22037

TABLE OF CONTENTS

GEOTECHNICAL EXPLORATIONS
CITY PROJECT 24-12
JUNIPER WOODS 1-3 STREET IMPROVEMENTS
RAMSEY, MINNESOTA
PROJECT 23-192

A. Introduction

This report is being prepared for use by our client on this specific project. We intend to present this report and our findings in the same logical manner that led us to arrive at our recommendations. This report is based on some general assumptions regarding the anticipated construction based on experience with similar projects. These assumptions and the entire report should be reviewed immediately upon receipt.

Purpose:

The purpose of our investigation was to evaluate the existing soil and water conditions on this site for the purpose of reconstructing the existing roadway. The project will consist of reconstruction of Ute Street NE and Tonto Street NE south of Alpine Drive NE in Ramsey, Minnesota. The streets will be reconstructed to an urban section with concrete curb and gutter. In accordance with your written authorization, we have conducted a subsurface exploration program for the proposed project.

Scope of Services:

Our authorized scope of services included the following:

1. To core the pavement at ten (10) locations to determine the existing pavement thickness.
2. To investigate the subsurface soil and water conditions encountered at those same ten (10) locations using split spoon sampling. The borings were planned to depths of just under fifteen (15) feet to eighteen (18) feet at each location.
3. To provide a report of our findings including a summary of our findings with pavement thickness at each boring location as well as recommendations regarding earthwork, fill and compaction, subgrade preparation, and pavement design with an estimated design R-value.

General Site Conditions:

The project is on Ute Street NW and Tonto Street NW, south of Alpine Drive in eastern part of the City of Ramsey. The streets are in a single family residential neighborhood. The site is relatively flat, with slopes of 2-4 percent.

Available Subsurface Information:

According to the Geologic Map of Minnesota, Quaternary Geology, prepared by Howard C. Hobbs and Joseph E. Goebel (1982, Minnesota Geological Survey), this site lies within an outwash unit not associated with a particular moraine. It is associated with the Des Moines glaciation of Pleistocene, Late Wisconsinan age. The drift is derived from parent material in North Dakota and Manitoba.

According to the Soil Survey of Anoka County prepared by the Soil Conservation Service, the site lies within the Hubbard- Nymore Soil Associations. These consist of nearly level to gently sloping, excessively drained soils that are sandy throughout. The individual soils mapped on this site are sandy and have few limitations for development of local roads and streets.

B. Exploration Program

Ten (10) split-spoon soil borings were conducted on this project. The borings were advanced to depths of just under 15 feet to 20 feet using a 3 ¼ inch I.D. hollow stem auger. Samples were obtained every 2 ½ feet for the first 10 feet and every 5 feet, thereafter, using a 2-inch O.D. split-spoon sampler in accordance with the American Society for Testing and Materials (ASTM D1586). Standard penetration values (N-values) were obtained at each sample interval by driving the sampler into the soil using a 140-pound hammer falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler 12 inches is known as the standard penetration resistance or N-value. Where the sampler cannot be driven at least 6 inches by 50 blows of the hammer, the total number of blows as well as the distance driven is reported on the boring logs.

Groundwater levels were noted during drilling and immediately after completion. The holes were backfilled with the auger cuttings and patched with bituminous cold patch. Some settlement of the bore holes may be expected. All the borings were conducted with a truck mounted rig.

Exploration Results:

The pavement was cored at each boring location prior to drilling the boring. The cores were obtained to get accurate pavement thickness. Photos of each core are included in appendix 1.

The borings were all conducted in the existing paved road and encountered 1.0 to 3.0 inches of bituminous over 3.0 to 5.5 inches of aggregate base. The depth of bituminous and aggregate encountered at each location are shown in the following table:

Boring	Bituminous	Aggregate	Boring	Bituminous	Aggregate
SB-1	1.75”	5.5”	SB-6	2.75”	4.5”
SB-2	2.75”	4.0”	SB-7	2.5”	3.0”
SB-3	2.0”	5.5”	SB-8	1.5”	4.5”
SB-4	2.5”	4.5”	SB-9	1.75”	5.0”
SB-5	3.0”	5.0”	SB-10	1.0”	4.0”

Below the pavement and aggregate, borings SB-1, SB-5 and SB-6 all encountered native, fine grained, poorly graded sand (SP) to termination at 14.9 feet. Below the pavement and aggregate, boring SB-2 encountered native, fine grained, poorly graded sand with silt (SP-SM) to 6.0 feet, followed by poorly graded sand (SP) to termination at 14.9 feet. Below the pavement and aggregate, boring SB-3 encountered native, fine grained, poorly graded sand with silt (SP-SM) to 4.0 feet, followed by poorly graded sand (SP) to termination at 14.9 feet. Below the pavement and aggregate, boring SB-4 encountered fine grained, poorly graded sand with silt (SP-SM) fill to 7.0 feet, followed by native, fine grained silty sand (SM) to 9.0 feet and then poorly graded sand (SP) to termination at 14.9 feet.

Below the pavement and aggregate, boring SB-7 encountered native, fine grained, poorly graded sand with silt (SP-SM) to 10.0 feet, followed by poorly graded sand (SP) to termination at 21.5 feet. Below the pavement and aggregate, boring SB-8 encountered native, fine grained, poorly graded sand (SP) to 4.0 feet, followed by poorly graded sand with silt (SP-SM) to 9.0 feet, followed by poorly graded sand (SP) to termination at 21.5 feet. Below the pavement and aggregate, boring SB-9 encountered native, fine grained, poorly graded sand with silt (SP-SM) to 9.0 feet, followed by poorly graded sand (SP) to termination at 14.9 feet. Below the pavement and aggregate, boring SB-10 encountered poorly graded sand (SP) fill to 4.0 feet, followed by native, fine grained, poorly graded sand with silt (SP-SM) to 6.0 feet, and then poorly graded sand (SP) to termination at 14.9 feet.

Penetration Test Results:

The blow counts in the sandy fill soils (SP, SM) ranged from 10 to 43, which are low to high, indicating they are in a loose to dense condition. The blow counts in the native, sandy soils (SP, SP-SM, SM) ranged from 2 to 22, which are very low to moderate, indicating they are in a very loose to medium dense condition. Refusal of the spoon or auger did not occur in any of the borings. Drilling was relatively easy.

Water Level Observations:

Observations of the subsurface water conditions were made during drilling operations. Groundwater was not encountered in any of the borings at the time of drilling.

The water levels were observed over a short period of time. However, we feel they are an accurate representation of the true groundwater conditions on this site due to the high permeability of the native sandy soils. It should be noted that fluctuations in the level of the groundwater can occur due to variations in rainfall, temperature, spring thaw and other factors not evident at the time of our investigation.

Mottled soils were not observed. Mottled native soils are a historical indication of a temporarily or seasonally saturated soil condition. Some greyish soils were observed. Grey native soils are an indication of a permanently saturated soil condition.

Laboratory Testing

Moisture Content Tests- Moisture content tests were performed on every split spoon sample in accordance with ASTM method D2216; *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass*. Individual test results are shown on the boring logs adjacent to the sample that was tested. The natural water contents ranged from 2.2% to 9.0%, indicating the soils are very dry.

C. Engineering Review

Discussion:

The soils encountered near the surface on this site are predominantly fine grained silty sand (SM), poorly graded sand with silt (SP-SM), and poorly graded sands (SP). They appear to mostly be outwash materials. The native sands (SP, SP-SM, SM) are considered excellent material for use as roadway subgrade material and for bituminous pavement support.

Based on our observation, it appears the roadway embankment was stable through the entire project area. Unless it is known that there is some issue in the embankment in the project area, it is our opinion that the existing roadway embankment can remain in place.

D. Recommendations

The following recommendations are based on our understanding of the proposed project. If our understanding of the project is not accurate or if changes are made to the project scope, please inform us so that our recommendations can be amended, if necessary. We have included recommendations regarding earthwork and construction that may help in cost estimates and aid in design. We should be allowed to review the proposed construction plans to provide further detailed recommendations, if necessary. Without the opportunity to review the final construction plans, the recommendations made in this report may no longer be valid.

Utility Installation:

We recommend that all utility pipes lay in non-organic mineral soils capable of supporting the pipes. Excessive over-excavation beneath the pipes should be avoided. We recommend that 2 to 6 inches of granular bedding material be placed and compacted around the pipe to aid in aligning the pipe for line and grade. The natural sand (SP) soils appear suitable for this purpose.

Compaction should be done very carefully by hand to prevent the pipe from shifting. We recommend that the backfill be compacted with a vibratory sheep's foot roller after the backfill is 2 feet above the top of the pipe. Vibratory compaction should only be used on clean sands or silty sands at or below optimum moisture.

We recommend that excavations slope at a 1.5:1 (horizontal: vertical) ratio from the bottom of

the excavation to the surface. Stockpiled material should be kept at least 2 feet from the edge of the excavation. This is the minimum required by OSHA. We recommend all construction vehicles be kept at least 5 feet from the edge of the excavation. An escape ladder should be provided at all times while workers are in the excavation. All excavations must meet OSHA standards (29 CFR1926).

Trench Backfill:

The on-site soils consisting of poorly graded sands (SP, SP-SM, SM) are considered excellent for use as utility trench backfill. These soils are generally easy to work with and compact with vibratory compaction equipment. They are dry and may require additional moisture to reach optimum moisture for compaction.

No organic soils, roots, stumps, logs, brush, etc. should be used as structural fill below any foundation or pavement section. We recommend that all fill material be free of soft, wet, or frozen soils, highly expansive soils, rubble, debris, and rocks in excess of 6 inches in diameter. The fill should be as uniform as possible both in composition and moisture content.

We recommend all fill be compacted to the minimum relative density levels shown in the table below:

Location	Recommended Compaction Level (Percent of Std. Proctor ASTM D698)
Below Pavements, deeper than 3 feet from finished subgrade	95%
Below Pavements within 3 feet of finished subgrade	100%
Landscape Areas	90%

We recommend all fill placed in the roadway areas be compacted in 8-inch loose lifts. All fill should be compacted at a moisture content within plus 2% or minus 3% of the optimum moisture as determined by a standard proctor. We recommend compaction tests be taken on any utility trench backfill at a rate of one test per 200 feet in the bottom, middle and top thirds of the trench backfill. We recommend compaction tests be taken at a rate of one test for two feet depth of embankment fill per 200 linear feet of roadway fill. We recommend compaction tests be taken at

a rate of one test per 200 linear feet on the finished roadway subgrade and aggregate base layer.

Embankment/ Road Fill:

The on-site soils consisting of fine grained, poorly graded sand (SP, SP-SM, SM) are considered excellent material for use as roadway subgrade material. These soils are easy to compact using vibratory compaction equipment near their optimum moisture contents.

We recommend that any imported fill and utility trench backfill material consist of mineral soils meeting the requirements specified below. No organic soils, roots, stumps, logs, brush, etc. should be used as structural fill below any utility structure or pavement section. We recommend that all fill and utility trench backfill material be free of soft, wet, or frozen soils, highly expansive soils, rubble, debris, and rocks in excess of 6 inches in diameter. The fill material should be as uniform as possible both in composition and moisture content.

We recommend that all embankment fill material be placed in 12-inch loose lifts and compacted to a minimum of 95% of standard proctor maximum density (ASTM D698). Any fill placed in the top 3 feet of the road subgrade should be compacted to at least 100% of standard proctor maximum density. All fill material should be compacted at a moisture content within plus 2% or minus 3% of the optimum moisture as determined by a standard proctor. We recommend compaction tests be taken at a minimum rate of one test per two feet of fill per 200 linear feet of roadway subgrade, and aggregate base material.

E. Pavement Recommendations

The poorly graded sand (SP, SP-SM, SM) outwash soils on site this site are classified as A-3 soils in accordance with the American Association of State Highway Transportation Officials (AASHTO) classification system. A-3 soils are rated as excellent material for use as roadway subgrade material. Without benefit of a laboratory R-value determination and based on Mn/Dot guidelines, we recommend an R-value of 70 be assumed for the onsite soils.

In using the above R-value for bituminous pavement design, it is essential that the subgrade be constructed of uniform soils at a moisture content and density in accordance with Mn Dot specification 2105 and capable of passing a test roll in accordance with Mn Dot specification 2111. The native, undisturbed soils may need preparation (drying and compacting) to pass a proof roll. If the subgrade is not compacted, uniform and capable of passing a test roll, then we recommend the subgrade be scarified and recompacted or subcut and geotextile fabric placed along with select granular material meeting Mn Dot specification 3149. The top of subgrade should be compacted to a minimum of 100% of standard proctor maximum density. The subgrade should be sloped towards the edges to provide drainage.

F. Closing

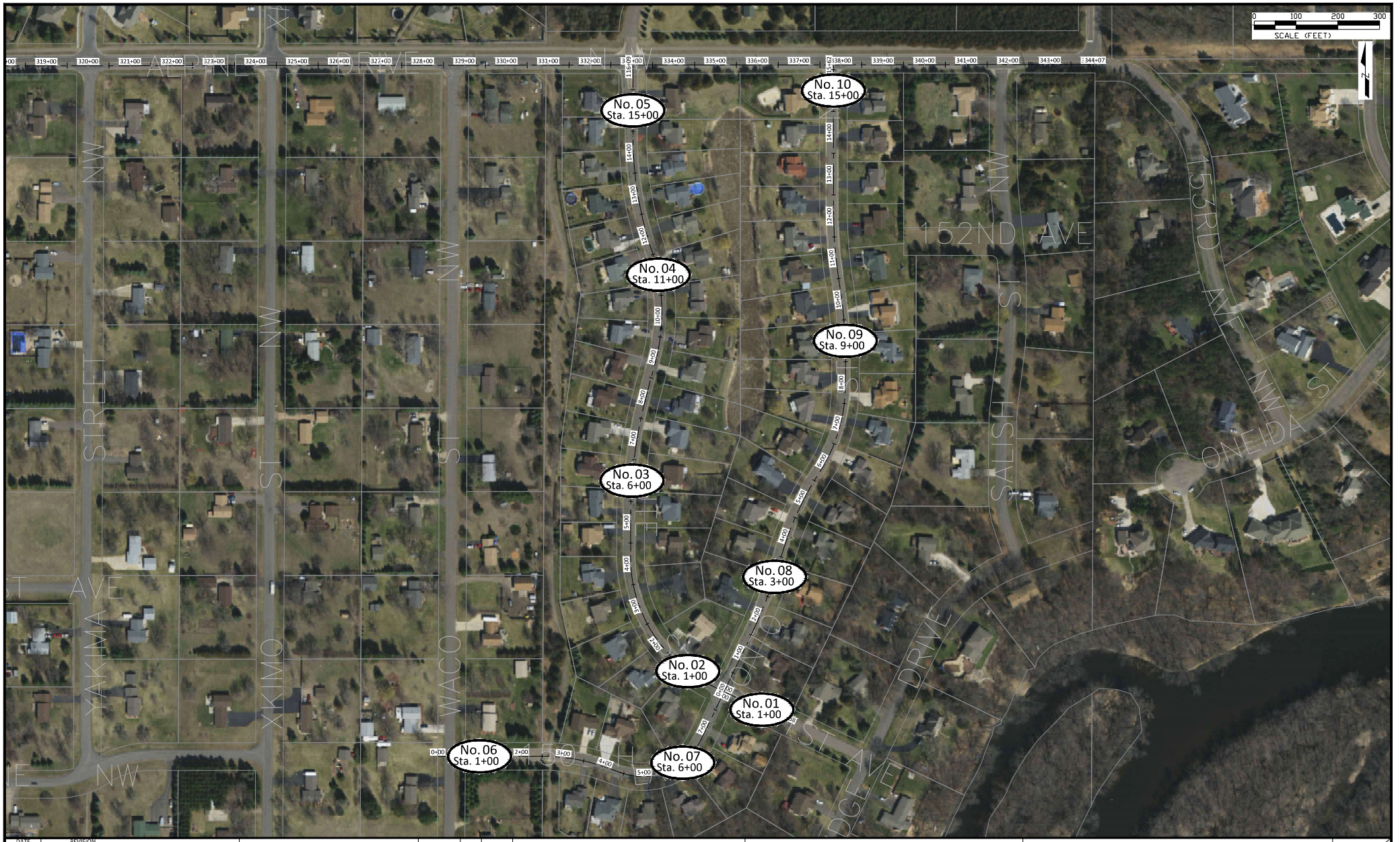
Our work was performed for geotechnical purposes only and not to document the presence or extent of any contamination on the site. We can note that our crew did not detect any obvious contamination by sight or smell during drilling operations. However, human senses are limited in terms of contamination detection and, therefore, the lack of detection through human sensing does not preclude the possibility of the presence of contamination of the site.

This report represents the result of our subsurface investigation and is based on information gathered at specific locations. Subsurface conditions can change a great deal over short horizontal distances. Also, the actual interface between strata will likely be a gradual transition rather than an abrupt change as represented on the boring logs.

Geotechnical engineering is based extensively on opinion. Therefore, the data contained in this report should be used as a guide, and we recommend that construction monitoring be performed by a qualified geotechnical engineer or technician. We recommend ITT be retained to perform construction observation and materials testing on this project due to our familiarity with the soils. Any changes in the subsurface conditions from those found during this geotechnical exploration should be brought to the attention of a soils engineer.

APPENDIX 1

BORING LOCATION PLAN



DATE	REVISION

DESIGNED BY:	---	
DRAWN BY:	LWC	DATE 05/31/23
CHECKED BY:	---	FILE 24-12

CITY OF RAMSEY
7550 SUNWOOD DRIVE
RAMSEY, MN 55303
(763) 427-1410 FAX (763) 433-9898

24-12 SOIL BORING LOCATION MAP

JUNIPER WOODS 1ST - 3RD RECONSTRUCTION CITY
PROJECT NO. 24-12 CITY OF RAMSEY, MINNESOTA

SHEET 1 OF 1 SHEETS

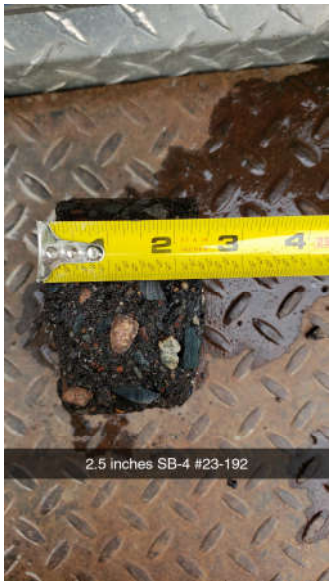
APPENDIX 2

SOIL BORING LOGS

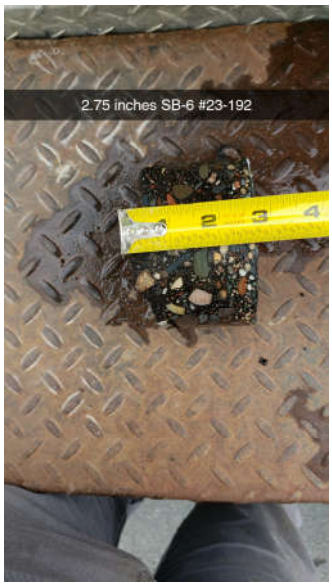

1.75 inches SB-1 #23-192


2.75 inches SB-2 #23-192


2 inch SB-3 #23-192


2.5 inches SB-4 #23-192


3 inches SB-5 #23-192


2.75 inches SB-6 #23-192


2.5 inches SB-7 #23-192


1.5 inches SB-8 #23-192


1.75 inches SB-9 #23-192


1 inch SB-10 #23-192

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-1**
START TIME: **2:50** *END TIME:* **3:20**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**
LOCATION: **151st Ave NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.25"		**1.75 inches Bituminous, 5.5 inches of Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
			1	**17**	2.3	
5.0						
			2	**8**	4.0	
		fine to medium grained				
			3	**7**	4.5	
10.0		**light greyish brown**				
			4	**9**	4.8	
			5	**12**	3.3	
14.9						
		Boring complete to 14.9 feet. **No water encountered during drilling.** **No water encountered to cave-in at 9' 4" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-2**
START TIME: **2:30** *END TIME:* **2:50**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**
LOCATION: **Ute St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
6.75"		2.75 inches Bituminous, 4.0 inches of Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, brown.				
			1	22	6.2	
5.0						
6.0			2	21	4.7	
	SP	POORLY GRADED SAND, fine grained, brown.				
			3	22	5.6	
10.0		fine to medium grained, light greyish brown.				
			4	15	5.7	
			5	11	2.9	
14.9						
		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 10' 5" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-3**
START TIME: **2:10** *END TIME:* **2:30**

METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**

LOCATION: **Ute St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.5"		2.0 inches Bituminous, 5.5 inches of Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, dark brown.				
4.0			1	15	3.3	
5.0	SP	POORLY GRADED SAND, fine grained, brown.	2	16	6.1	
			3	12	7.8	
10.0		light greyish brown.	4	6	9.3	
14.9			5	8	4.6	
		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 9' 9" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-4**
START TIME: **1:45** *END TIME:* **2:10**

METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**

LOCATION: **Ute St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.0"		2.5 inches Bituminous, 4.5 inches of Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, brown. FILL	1	10	3.4	
5.0			2	13	3.4	
7.0	SM	SILTY SAND, fine grained, brown.	3	19	4.6	
9.0	SP	POORLY GRADED SAND, fine grained, brown.	4	8	5.5	
10.0			5	4	7.7	
14.9		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 10' 2" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-5**
START TIME: **12:30** *END TIME:* **1:00**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**
LOCATION: **Ute St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
8.0"		**3.0 inches Bitumninous, 5.0 inches of Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
			1	**23**	4.9	
5.0						
			2	**12**	3.9	
		light greyish brown.				
			3	**4**	4.5	
10.0						
			4	**5**	5.7	
			5	**8**	4.9	
14.9		**fine grained**				
		Boring complete to 14.9 feet. **No water encountered during drilling.** **No water encountered to cave-in at 9' 4" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-6**
START TIME: **9:00** *END TIME:* **9:40**

METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**

LOCATION: **150th LN NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.25"		2.75 inches Bituminous, 4.5 inches of Aggregate				
	SP	POORLY GRADED SAND, fine grained, brown.				
			1	17	3.6	
5.0						
			2	9	3.4	
		light brown				
			3	9	4.6	
10.0						
		light greyish brown.	4	6	6.0	
			5	9	4.4	
14.9						
		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 9' 4" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-7**
START TIME: **9:40** *END TIME:* **10:40**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**
LOCATION: **150th LN NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
5.5"		2.5 inches Bituminous, 3.0 inches of Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, dark brown.				
			1	14	5.3	
5.0						
			2	10	5.5	
			3	13	7.8	
10.0						
	SP	POORLY GRADED SAND, fine grained, brown.	4	13	13.7	
15.0		light grey	5	20	4.4	
20.0						
21.5			6	6	5.1	
		Boring complete to 21.5 feet. No water encountered during drilling. No water encountered to cave-in at 13' 8" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-8**
START TIME: **10:40** *END TIME:* **11:40**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**

LOCATION: **Tonto St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
6.0"		1.5 inches Bituminous, 4.5 inches of Aggregate				
	SP	POORLY GRADED SAND, fine grained, brown.				
4.0			1	21	4.3	
5.0	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, brown.				
			2	7	4.5	
9.0			3	10	7.2	
10.0	SP	POORLY GRADED SAND, fine grained, brown.				
			4	3	5.1	
15.0						
			5	9	3.9	
20.0		fine to medium grained, light grey.				
21.5			6	16	4.8	
		Boring complete to 21.5 feet. No water encountered during drilling. No water encountered to cave-in at 13' 9" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-9**
START TIME: **11:40** *END TIME:* **12:00**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**
LOCATION: **Tonto St NW- See Boring Location Plan** *ELEVATION:*

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
6.75"		1.75 inches Bituminous, 5.0 inches of Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, brown.				
			1	11	4.3	
5.0						
			2	6	5.3	
			3	2	7.4	
9.0						
	SP	POORLY GRADED SAND, fine grained, light greyish brown.				
10.0						
			4	8	2.7	
			5	17	3.7	
14.9						
		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 9' 9" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **23-192** **CITY OF RAMSEY**
JUNIPER WOODS 1-3
STREET RECONSTRUCTION
RAMSEY, MINNESOTA

DATE: **7/18/23** *BORING #:* **SB-10**
START TIME: **12:00** *END TIME:* **12:20**

METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/ NH**

LOCATION: **Tonto St NW- See Boring Location Plan**
ELEVATION:

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
5.0"		1.0 inches Bituminous, 4.0 inches of Aggregate				
	SP	POORLY GRADED SAND, fine grained, brown.				
		FILL				
			1	43	4.4	
4.0						
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, dark brown.				
5.0						
			2	28	5.3	
6.0						
	SP	POORLY GRADED SAND, fine grained, brown.				
			3	7	5.2	
10.0						
			4	7	11.1	
		light greyish brown.				
			5	5	6.9	
14.9						
		Boring complete to 14.9 feet. No water encountered during drilling. No water encountered to cave-in at 10' 1" after completion.				

Unified Soil Classification (USC) System (from ASTM D 2487)

Major Divisions			Group Symbol	Typical Names
Course-Grained Soils More than 50% retained on the 0.075 mm (No. 200) sieve	**Gravels** 50% or more of course fraction retained on the 4.75 mm (No. 4) sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands 50% or more of course fraction passes the 4.75 (No. 4) sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils More than 50% passes the 0.075 mm (No. 200) sieve	**Silts and Clays** Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock four, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly/sandy/silty/lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

Prefix: G = Gravel, S = Sand, M = Silt, C = Clay, O = Organic
Suffix: W = Well Graded, P = Poorly Graded, M = Silty, L = Clay, LL < 50%, H = Clay, LL > 50%