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

OCTOBER 7, 2024

PROJECT 24-327
REPORT OF GEOTECHNICAL EXPLORATION

For

CITY PROJECT #25-07
VARIOUS GRAVEL ROADS
RAMSEY, MINNESOTA

Prepared For:

CITY OF RAMSEY

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

October 7, 2024

Mr. Joe Feriancek
City of Ramsey
7550 Sunwood Drive NW
Ramsey, MN 55303

RE: 24-327 Report of Geotechnical Exploration
City Project #25-07
Various Gravel Roads
Ramsey, Minnesota

Dear Mr. Feriancek:

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 fill (SM, SP-SM) over native, sandy (SP, SP-SM) outwash soils. Some of the fill near the surface was dark but is not believed to be overly organic. Organic silt (OL) and peat (PT) was encountered in borings SB-1 through SB-3 on Xenolith Street to depths of 7.5 to 10.0 feet. No peat (PT) or other highly organic soils were encountered in any of the other borings. Some fine silty clayey sands (SC-SM) and clayey sand (SC) were encountered in borings SB-5and SB-6 on Carolyn Lane NW and in boring SB-9 in Garnet Street NW. Groundwater was observed in some of the borings at varying depths.

Mr. Feriancek, 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: October 7, 2024 License No.: 22037

TABLE OF CONTENTS

GEOTECHNICAL EXPLORATION
CITY OF RAMSEY
IMPROVEMENTS PROJECT 25-07
VARIOUS GRAVEL ROADS
RAMSEY, MINNESOTA
ITT PROJECT 24-327

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 numerous gravel roads throughout the City of Ramsey for the purpose of paving the existing roadways. The project has six different areas of roadways. Area A on the north side of the city includes Xenolith Street NW and Carolyn Lane NW. Area B on the north side of the city includes Garnet Street NW. Area C near the center of the city includes 157th Avenue NW. Area D on the east side of the city includes Potassium Street NW. Area E on the east side of the city includes 148th Lane NW. Area F on the southwest side of the city includes Beatty Avenue NW And Collins Drive NW. 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 investigate the subsurface soil and water conditions encountered at twenty-four (24) split-spoon soil boring locations. The borings were planned in the roadway surface to depths of ten (10) feet at each location.
2. To provide a report of our findings including a summary of our findings with aggregate 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 projects are located throughout the city of Ramsey. All the streets are in older residential areas. The sites are all relatively flat and level, with slopes of 2-6 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), most of the sites lie 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. The northernmost site lies within an end moraine of the Pine City Moraine Association. This is also associated with the Des Moines Lobe glaciation. The grey, calcareous drift is derived from parent material from Manitoba and eastern North Dakota.

According to the Soil Survey of Anoka County prepared by the Soil Conservation Service, most of the sites lie 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 these sites are sandy and have few limitations for development of local roads and streets. However, the middle portion of Potassium Street in Area D is mapped as mucky peat with severe limitations for local street construction.

The northernmost site lies within the Heyder- Kingsley- Hayden Soil Association, which consist of gently undulating to steep, well drained soils formed in loamy glacial till. They are generally fairly well suited for construction of local streets. However, the north half of Xenolith Street NW is mapped as mucky peat with severe limitations for local street construction.

B. Exploration Program

Twenty- four (24) split-spoon soil borings were conducted on this project. The borings were advanced to depths of 10 feet using a 3 ¼ inch I.D. hollow stem auger. Samples were obtained every 2 ½ feet 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. Some settlement of the bore holes may be expected. All the borings were conducted with a truck mounted rig.

Exploration Results:

All of the borings were conducted in existing gravel surfaced streets and encountered 5 to 12 inches of aggregate at the surface. The following table shows the depth of aggregate at each boring:

Boring	Street	Aggregate	Boring	Street	Aggregate
Area A			SB-13	157th Avenue	5.0 inches
SB-1	Xenolith Street	7.0 inches	SB-14	157th Avenue	3.0 inches
SB-2	Xenolith Street	12.0 inches	Area D		
SB-3	Xenolith Street	16.0 inches	SB-15	Potassium Street	12.0 inches
SB-4	Xenolith Street	11.0 inches	SB-16	Potassium Street	20.0 inches
SB-5	Xenolith Street	6.0 inches	SB-17	Potassium Street	6.0 inches
SB-6	Carolyn Lane	4.5 inches	Area E		
SB-7	Carolyn Lane	7.0 inches	SB-18	148th Lane	5.0 inches
Area B			SB-19	148th Lane	5.0 inches
SB-8	Garnet Street	4.5 inches	SB-20	148th Lane	6.0 inches
SB-9	Garnet Street	6.0 inches	Area F		
Area C			SB-21	Beatty Avenue	6.0 inches
SB-10	157th Avenue	7.0 inches	SB-22	Collins Drive	7.0 inches
SB-11	157th Avenue	4.0 inches	SB-23	Collins Drive	5.5 inches
SB-12	157th Avenue	3.0 inches	SB-24	Collins Drive	9.0 inches

Below the aggregate, boring SB-1 encountered fine grained, poorly graded sand with silt (SP-SM) fill to 5.0 feet, followed by organic silt (OL) to 7.5 feet, native, fine grained, clayey sand (SC) to 10.0 feet and then silty clayey sand (SC-SM) to termination at 11.5 feet. Below the aggregate, boring SB-2 encountered fine grained, poorly graded sand (SP) fill to 5.0 feet, followed by peat (PT) to 10.0 feet, and then native, clayey sand (SC) to termination at 11.5 feet. Below the aggregate, boring SB-3 encountered fine grained, poorly graded sand (SP) fill to 5.0 feet, followed by organic silt (OL) to 7.5 feet, native, clayey sand (SC) to 10.0 feet and then silty clayey sand (SC-SM) to termination at 11.5 feet.

Below the aggregate, boring SB-4 encountered fine grained, silty sand (SM) to 10.0 feet, followed by clayey sand (SC) to termination at 11.5 feet. Below the aggregate, boring SB-5 encountered fine grained, poorly graded sand with silt (SP-SM) to 5.0 feet, followed by silty clayey sand (SC-SM) to 7.5 feet, silty sand (SM) to 10.0 feet and then clayey sand (SC) to termination at 11.5 feet. Below the aggregate, boring SB-6 encountered fine grained, poorly graded sand with silt (SP-SM) to 5.0 feet, followed by clayey sand (SC) to 9.5 feet and then poorly graded sand (SP) to termination at 11.5 feet. Below the aggregate, boring SB-7 encountered fine grained, silty sand (SM) to 4.0 feet, followed by poorly graded sand (SP) to termination at 11.5 feet.

Below the aggregate, boring SB-8 encountered fine grained, silty sand (SM) to 10.0 feet, followed by poorly graded sand with silt (SP-SM) to termination at 11.5 feet. Below the aggregate, boring SB-9 encountered fine grained, silty clayey sand (SC-SM) to termination at 11.5 feet.

Below the aggregate, boring SB-10 encountered fine grained, poorly graded sand (SP) fill to 4.0 feet, followed by native, poorly graded sand (SP) to termination at 11.5 feet. Below the aggregate, borings SB-11, SB-12, SB-13, and SB-14 all encountered native, fine grained, poorly graded sand (SP) to termination at 11.5 feet.

Below the aggregate, borings SB-15, SB-16 and SB-17 all encountered fine grained, poorly graded sand (SP) to termination at 11.5 feet.

Below the aggregate, borings SB-18 and SB-19 both encountered native, poorly graded sand (SP) to termination at 11.5 feet. Below the aggregate, boring SB-20 encountered fine grained, poorly graded sand with silt (SP-SM) fill to 4.0 feet, followed by native, silty sand (SM) to 7.0 feet and then poorly graded sand (SP) to termination at 11.5 feet.

Below the aggregate, boring SB-21 encountered native, poorly graded sand (SP) to termination at 11.5 feet. Below the aggregate, boring SB-22 encountered fine grained, silty sand (SM) fill to 4.0 feet, followed by native, poorly graded sand (SP) to 10.0 feet and then fine silty sand (SM) to termination at 11.5 feet. Below the aggregate, boring SB-23 encountered native, poorly graded sand (SP) to termination at 11.5 feet. Below the aggregate, boring SB-24 encountered fine grained, poorly graded sand (SP) fill to 5.0 feet, followed by native, poorly graded sand with silt (SP-SM) to 9.0 feet and then poorly graded sand (SP) to termination at 11.5 feet.

Penetration Test Results:

The blow counts in the sandy soils (SM, SP-SM, SM, SC-SM, SC) ranged from 0 to 25, which are very low to moderate, indicating they are in a very loose to medium dense condition. The blow counts in the organic silt (OL) and peat (PT) on Xenolith Street ranged from 1 to 3, which are very low, indicating they are in a very soft 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 encountered in a few of the borings at the time of drilling. Groundwater was only encountered in three of the borings at the time of drilling. The following table shows the depth to water at each boring:

Boring	Water	Boring	Water	Boring	Water	Boring	Water
SB-1	None	SB-7	11’ 0”	SB-13	None	SB-19	9’ 0”
SB-2	None	SB-8	None	SB-14	None	SB-20	9’ 0”

SB-3	None	SB-9	None	SB-15	10’ 0”	SB-21	None
SB-4	None	SB-10	None	SB-16	4’ 0”	SB-22	None
SB-5	None	SB-11	None	SB-17	None	SB-23	None
SB-6	11’ 0”	SB-12	None	SB-18	None	SB-24	None

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 most of the sites due to the high permeability of the native sandy soils. However, in area A, the organic soils (OL, PT) and fine clayey sands (SC, SC-SM) likely did not allow the water to infiltrate into the holes. The water levels in that site are likely to match the level of the adjacent wetlands along the street.

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 observed. Mottled native soils are a historical indication of a temporarily or seasonally saturated soil condition. Grey soils were also 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.

Organic Content Tests- Organic content tests were performed on selected split spoon samples in accordance with ASTM method D2974; *Standard Test Method for Moisture, Ash and Organic matter of Peat and Other Organic of Soils*. Individual test results are shown on the boring logs adjacent to the sample that was tested.

C. Engineering Review

Discussion:

We understand the streets will be paved with a bituminous surface. We assume there will be little line or grade adjustments to the streets. We assume there will only be slight grading of the existing aggregate, and adding some aggregate needed to prepare the surface for paving.

The peat (PT) and organic silt (OL) encountered on Xenolith Street NW in Area A are not suitable for pavement subgrade and pavement support. They are very susceptible to settlement and movement. To reduce the amount of settlement and differential movement, we recommend using a geogrid under the aggregate to provide additional support for the pavement.

Based on our observation, it appears the roadway embankment through the wetland area on Xenolith Street NW was stable. Unless there is going to be a change in grade of more than 1 foot during construction, or if it is known that there is some issue in the embankment in this area, it is our opinion that the embankment should remain in place.

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

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.

Embankment/ Road Fill:

The on-site soils consisting of fine grained, poorly graded sand (SP), poorly graded sand with silt

(SP-SM) and silty sands (SM) are considered excellent material for use as roadway subgrade material. These soils are fairly 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.

No organic soils with organic content in excess of 3.0% by weight should be used as roadway embankment fill or as subgrade material. Some of the fill was dark brown to black. However, it is our opinion that most of the dark silty sand fill will be suitable for re-use.

The organic soils encountered on Xenolith Street in Area A were covered with at least 5 feet of granular, inorganic fill. That means it is below the depth that would be affected by traffic wheel loading. It is still likely to be affected by frost heave and some differential settlement. We see no need to remove this material unless it is exposed during construction.

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 or minus 2% 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

Areas A & B:

For the portion of Xenolith Street NW that runs through the wetland area, we recommend using a geogrid in the aggregate base to provide support for the pavement. We recommend placing a multi-axial geogrid withing the aggregate base layer. We recommend 6 inches of aggregate be placed above the geogrid and at least 2 inches of aggregate remain under the geo rid. The existing aggregate could be salvaged from the roadway to be re-used above the geogrid. With the geogrid reinforced aggregate base and granular material over the organic silt and peat, we recommend 3.5 inches of bituminous be placed over the aggregate.

The clayey sands (SC), silty clayey sands (SC-SM) and silty sands (SM) encountered on sites A and B are classified as A-2-4 and A-2-6 soils in accordance with the American Association of State Highway Transportation Officials (AASHTO) classification system. A-2-4 and A-2-6 soils are rated as fair 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 30 be assumed for the onsite soils.

Based on an assumed R-value of 30, we recommend the following bituminous pavement section for low volume, 9-ton, residential streets:

Thickness	Course/Description	G.E.
3.5”	MnDOT Superpave Bituminous	7.9”
8.0”	MnDOT 3138 Class 5 Aggregate Base	8.0”
11.5”	TOTAL	15.9”

In using the assumed R-value for bituminous pavement or concrete design, it is essential that the subgrade be constructed of uniform soils at a moisture content and density in accordance with MnDOT specification 2105 and capable of passing a test roll in accordance with MnDOT 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 replaced with

geotextile fabric and select granular material meeting MnDOT specification 3149. The top of the 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.

Areas C through F:

The silty sand (SM), poorly graded sand with silt (SP-SM) and poorly graded sand (SP) outwash soils on site this site are classified as A-1-b and A-3 soils in accordance with the American Association of State Highway Transportation Officials (AASHTO) classification system. A-1-b and 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.

Based on an assumed R-value of 70, we recommend the following bituminous pavement section for low volume, 9-ton, residential streets:

Thickness	Course/Description	G.E.
3.5”	MnDOT Superpave Bituminous	7.9”
6.0”	MnDOT 3138 Class 5 Aggregate Base	6.0”
9.5”	TOTAL	13.9”

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

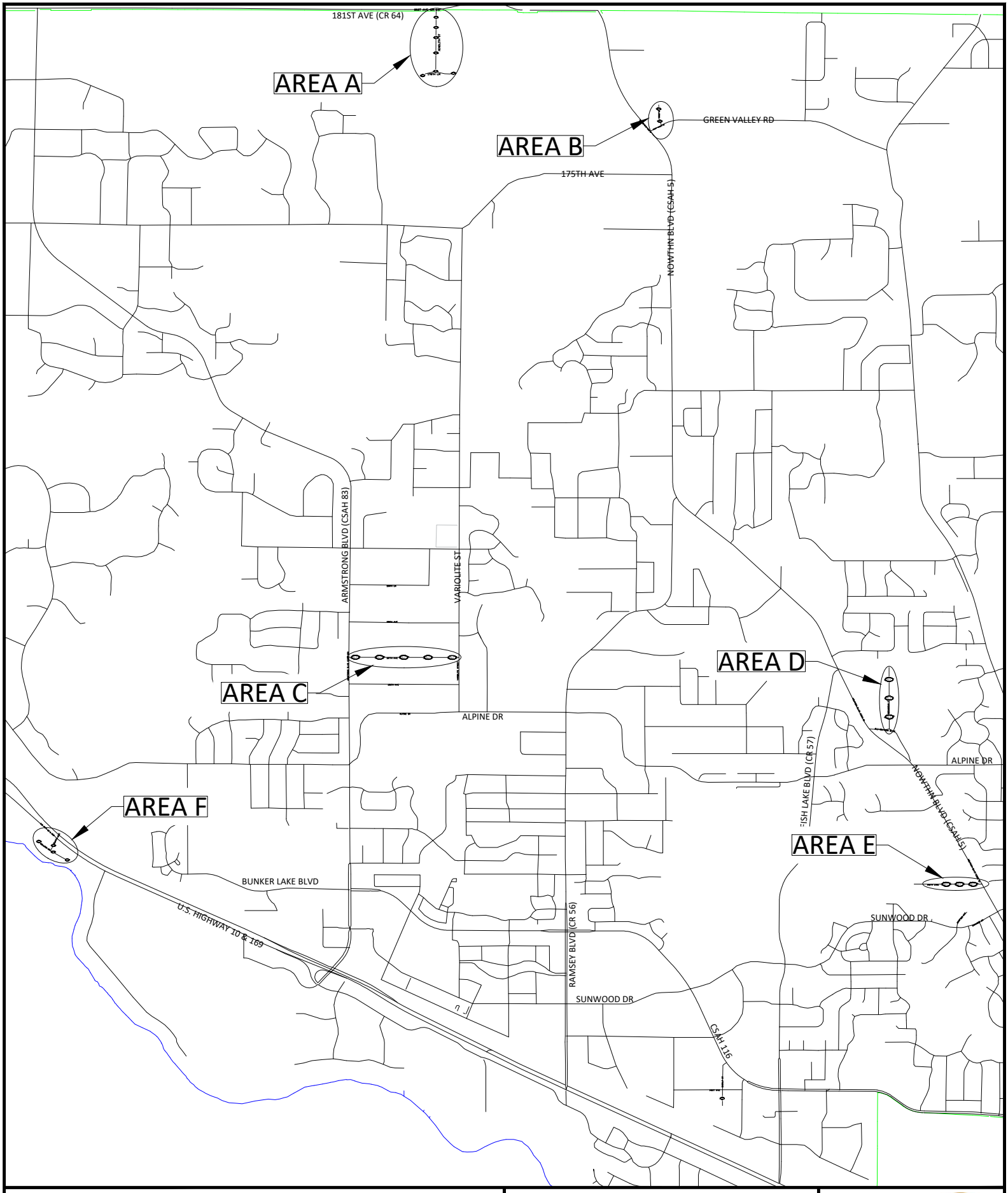
Our work was performed for geotechnical purposes only and not to document the presence or extent of any contamination on the site. We can note that our crew did not detect any obvious contamination by sight or smell during drilling operations. However, human senses are limited in terms of contamination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



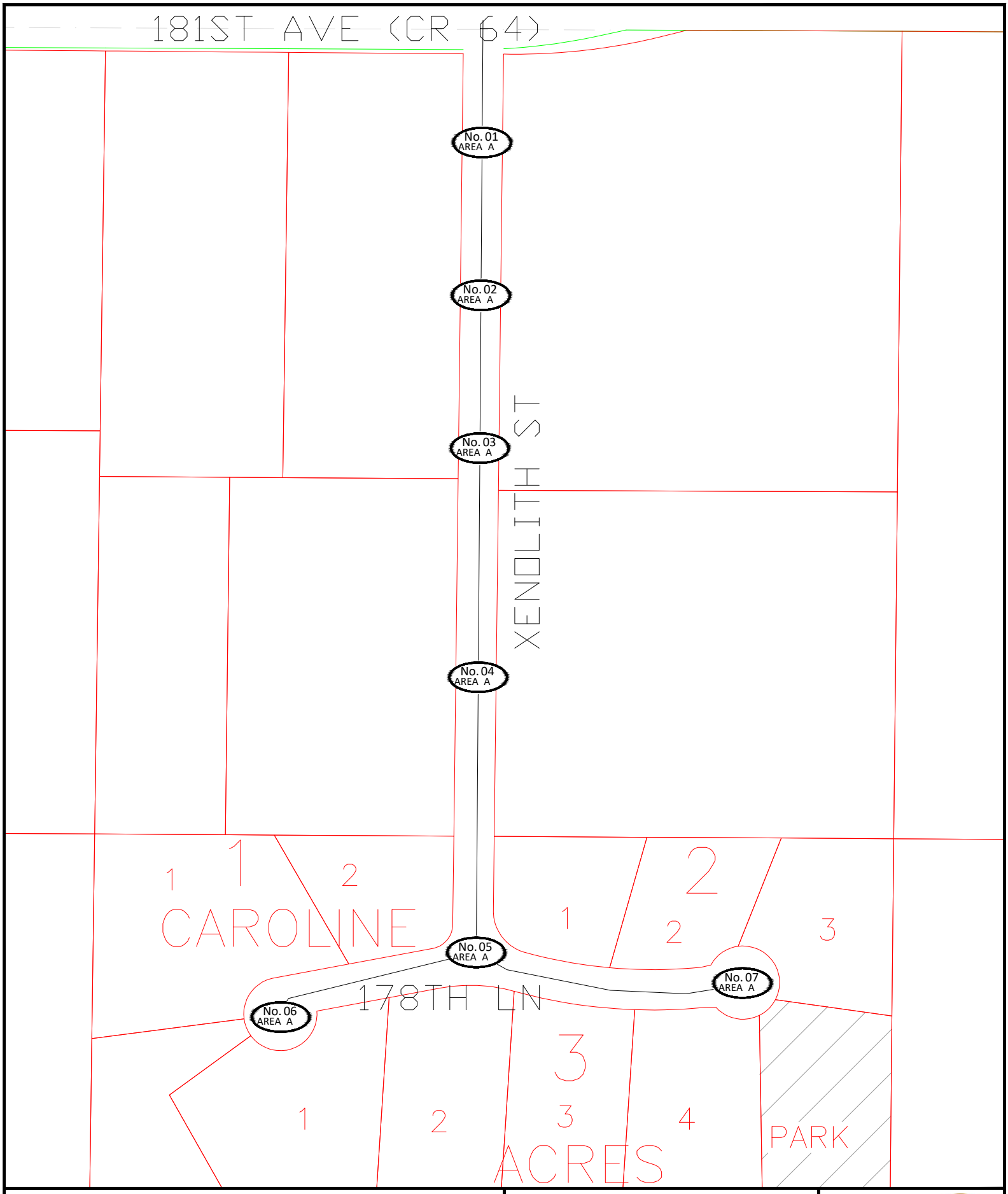
2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
OVERALL AREA MAP

0 3000 6000 9000

SCALE (FEET)

N

City of RAMSEY



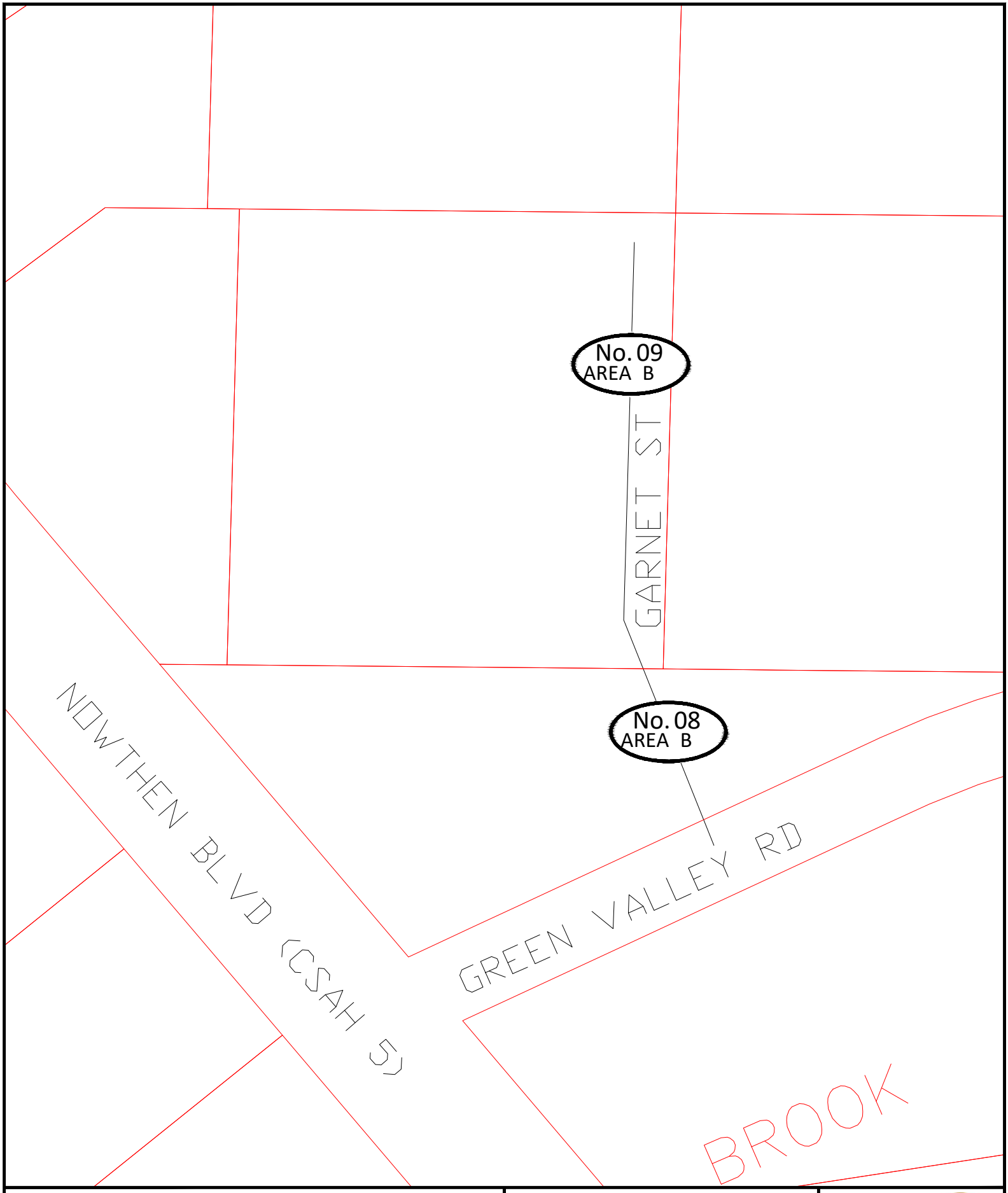
2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA A

0 250 500 750

SCALE (FEET)

N

City of RAMSEY

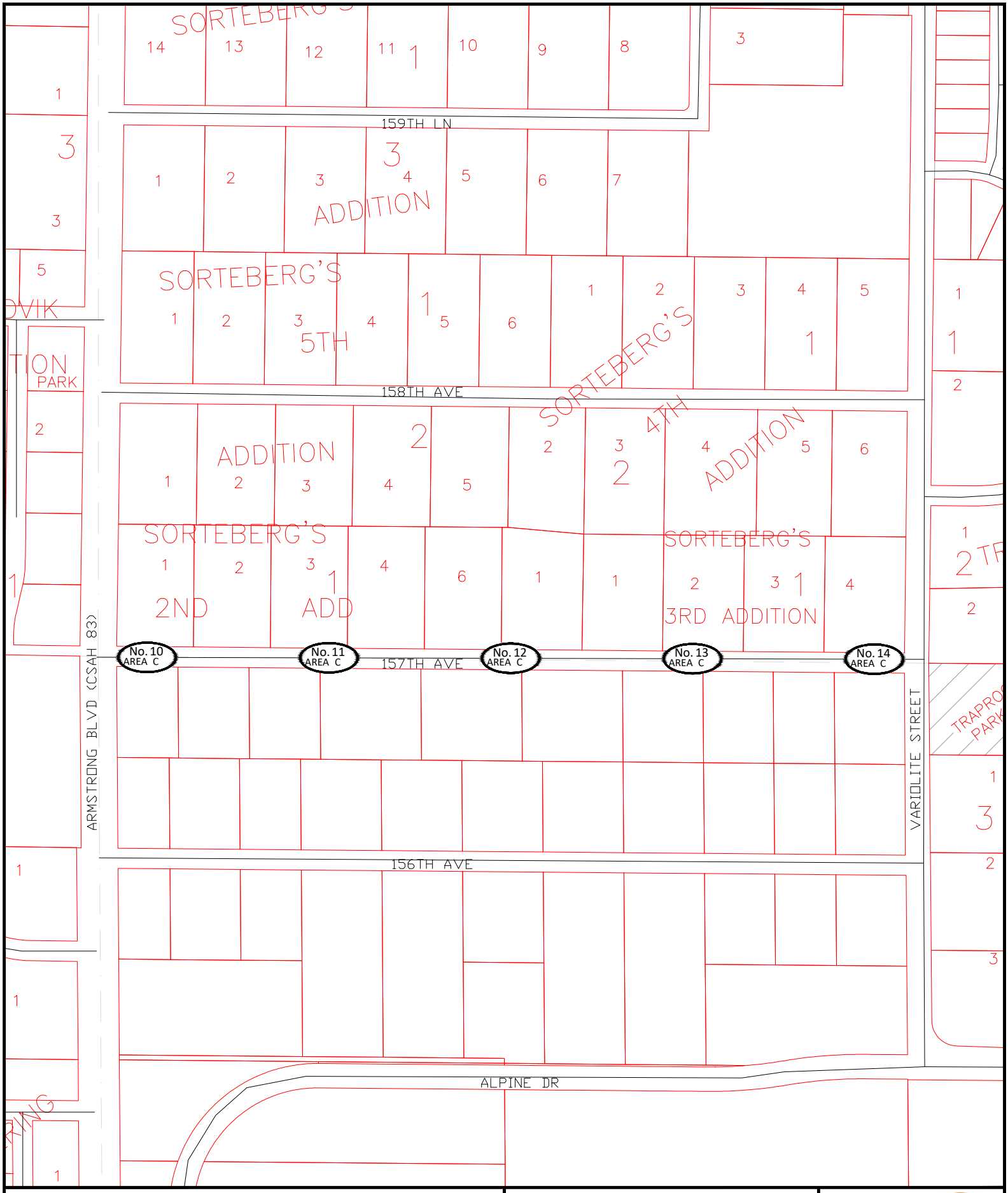


2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA B

0 100 200 300
SCALE (FEET)

N

City of RAMSEY

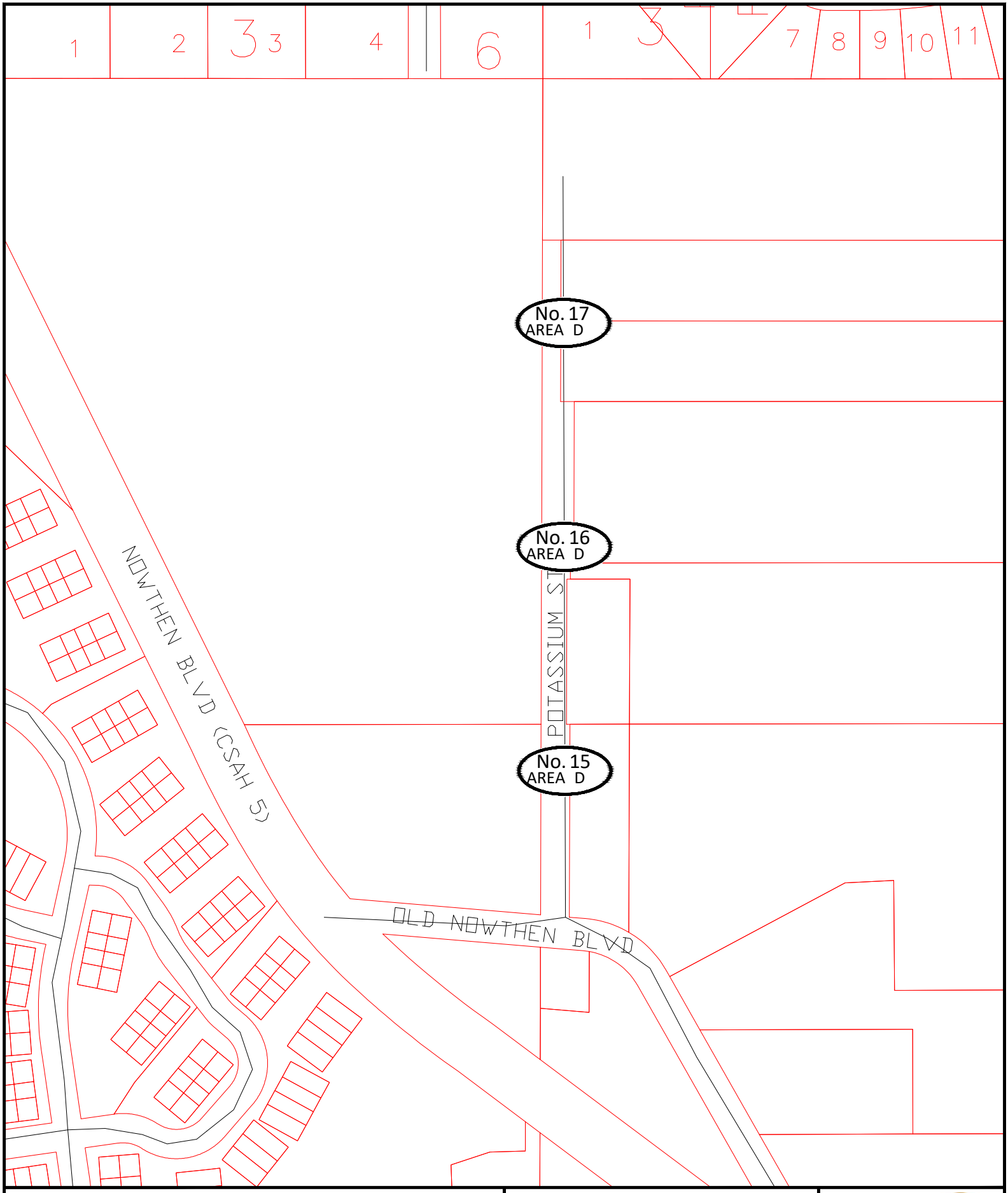


2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA C

0 400 800 12000
SCALE (FEET)

N

City of RAMSEY



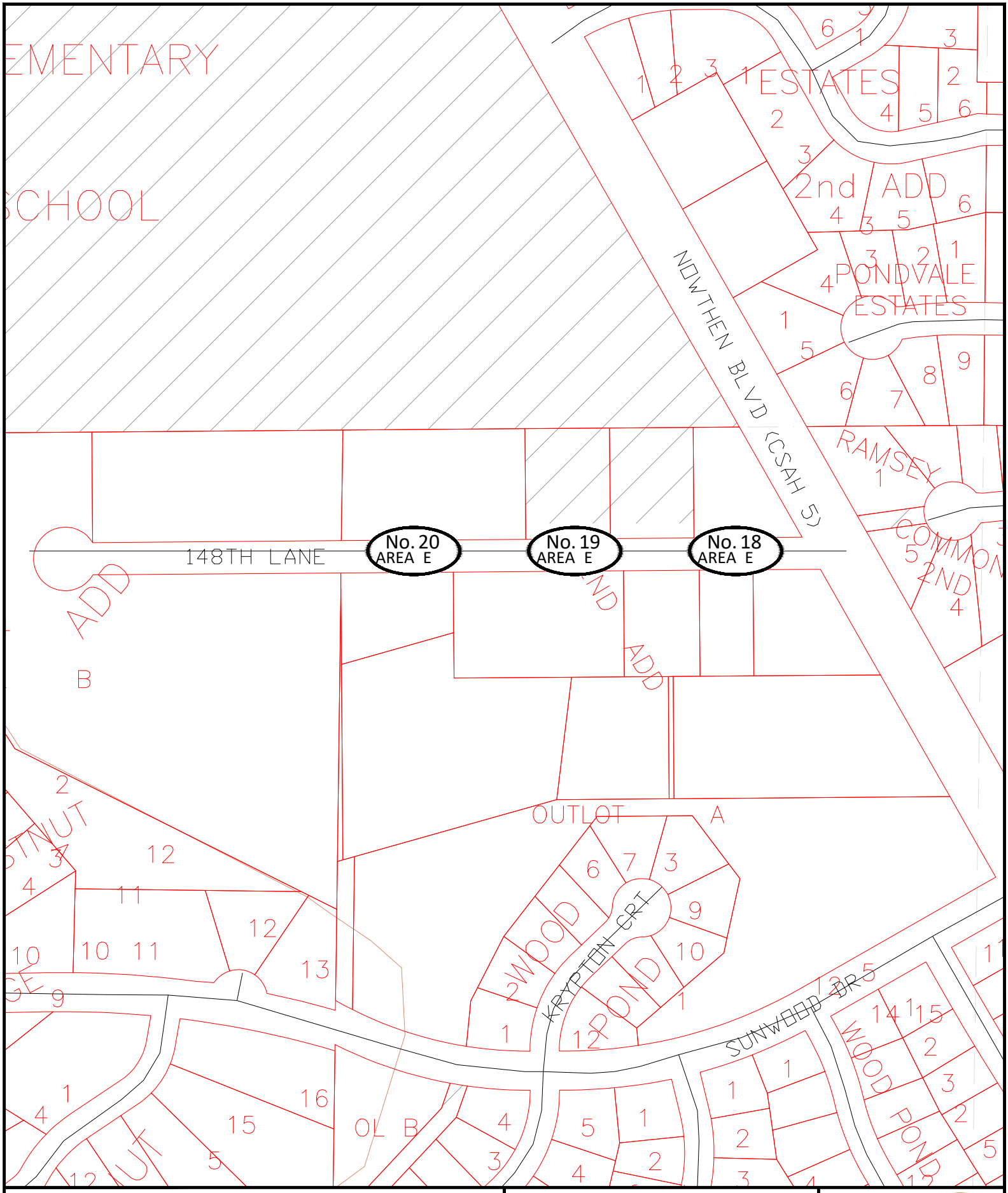
2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA D

0 250 500 750

SCALE (FEET)

N

City of RAMSEY

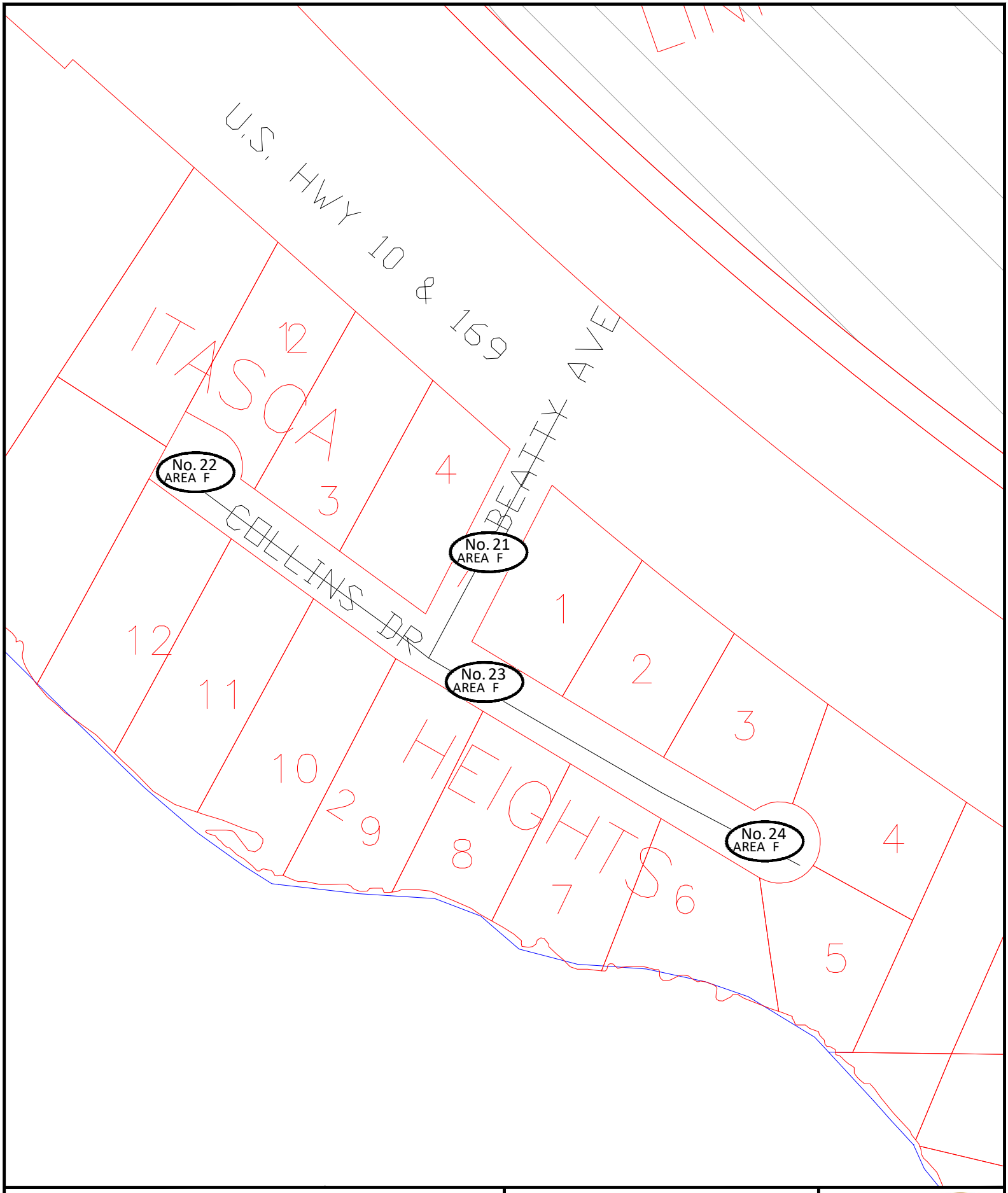


2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA E

0 250 500 750
SCALE (FEET)

N

City of RAMSEY



2024 GRAVEL ROADS
SOIL BORING LOCATION MAP
AREA F

0 150 300 450
SCALE (FEET)

N

City of RAMSEY

APPENDIX 2

SOIL BORING LOGS

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-1**
START TIME: **10:00** *END TIME:* **10:15**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Xenolith Street- NW See Boring Location Plan**
ELEVATION: **N/G**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
7.0"		**7.0 inches Aggregate**				
	SP-SM	**POORLY GRADED SAND w/ SILT, fine grained, dark brown.** **FILL**	**1**	**6**	4.4	
5.0						
	OL	**ORGANIC SILT, black.**	**2**	**3**	28.3	**Organic Content= 4.1%**
7.5						
	SC	**CLAYEY SAND, fine grained, grey.**	**3**	**2**	14.1	
10.0						
	SC-SM	**SILTY CLAYEY SAND, fine grained, w/ a trace of GRAVEL, grey.**	**4**	**14**	14.8	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' 6" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-2**
START TIME: **10:15** *END TIME:* **10:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Xenolith Street- NW See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
12.0"		**12.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
		FILL	**1**	**5**	5.0	
5.0						
	PT	**PEAT, black.**	**2**	**2**	205.1	
		sand in tip, blue, green	**3**	**1**	231.8	
10.0						
	SC	**CLAYEY SAND, fine to medium grained, grey, blue.**	**4**	**6**	15.4	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-3**
START TIME: **10:30** *END TIME:* **10:45**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Xenolith Street- NW See Boring Location Plan**
ELEVATION: **N/G**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
16.0"		**16.0 inches Aggregate**				
5.0	**SP**	**POORLY GRADED SAND, fine grained, brown.** **FILL**	**1**	**5**	4.6	
7.5	**OL**	**ORGANIC SILT, black.**	**2**	**3**	24.7	
10.0	**SC**	**CLAYEY SAND, fine grained, blue, green, dark grey.**	**3**	**w/h***	20.0	***Weight of Hammer**
11.5	**SC-SM**	**SILTY CLAYEY SAND w/ SILT, fine grained, grey.**	**4**	**5**	17.4	
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 8' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-4**
START TIME: **10:45** *END TIME:* **11:00**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Xenolith Street- NW See Boring Location Plan**
ELEVATION: **N/G**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
11.0"		**11.0 inches Aggregate**				
	SM	**SILTY SAND, fine grained, dark brown.**				
			1	**5**	14.6	
5.0		**brown.**				
			2	**4**	12.8	
			3	**6**	11.5	
10.0						
	SC	**CLAYEY SAND, fine grained, grey, mottled.**	**4**	**5**	21.4	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-5**
START TIME: **11:00** *END TIME:* **11:15**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Xenolith Street- NW See Boring Location Plan**
ELEVATION: **N/G**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
6.0"		**6.0 inches Aggregate**				
5.0	**SP-SM**	**POORLY GRADED SAND w/ SILT, fine grained, brown.**	**1**	**6**	6.1	
7.5	**SC-SM**	**SILTY CLAYEY SAND, fine grained, dark brown.**	**2**	**3**	15.1	
10.0	**SM**	**SILTY SAND, fine grained, brown.**	**3**	**7**	7.4	
11.5	**SC**	**CLAYEY SAND, fine, grained, grey, brown, mottled.**	**4**	**5**	16.2	
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-6**
START TIME: **11:15** *END TIME:* **11:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Carolyn Lane NW- See Boring Location Plan**
ELEVATION: **N/G**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
4.5"		4.5 inches Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, dark brown.	1	4	6.9	
5.0						
	SC	CLAYEY SAND, fine grained, reddish brown, mottled.	2	5	16.2	
			3	16	9.7	
9.5						
10.0	SP	POORLY GRADED SAND, fine to medium grained, brown.				
			4	8	11.0	V Water enountered at 11' 0" during drilling.
11.5						
		Boring complete to 11.5 feet. Water encountered at 11' 0" during drilling. No water measured to cave-in at 7' 6 " after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-7**
START TIME: **11:30** *END TIME:* **11:45**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Carolyn Lane NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
7.0"		**7.0 inches Aggregate**				
	SM	**SILTY SAND, fine grained, dark brown.**				
4.0			**1**	**12**	5.6	
5.0	**SP**	**POORLY GRADED SAND, fine to medium grained, w/ a trace of GRAVEL, brown.**	**2**	**13**	5.7	
		fine to medium grained, brown.	**3**	**9**	5.9	
10.0						
11.5			**4**	**7**	21.4	**V Water enountered at 11' 0" during drilling.**
		Boring complete to 11.5 feet. **Water encountered at 11' 0" during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-8**
START TIME: **12:15** *END TIME:* **12:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Garnet Street NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	W_n	*Notes*
4.5"		**4.5 inches Aggregate**				
	SM	**SILTY SAND, fine grained, w/ a trace of GRAVEL, brown.**				
		brown.	**1**	**7**	11.0	
5.0			**2**	**7**	12.9	
		reddish brown.	**3**	**20**	13.0	
10.0						
	SP-SM	**POORLY GRADED SAND w/ SILT, fine grained, w/ a trace of GRAVEL, reddish brown.**	**4**	**20**	8.1	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' 6" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-9**
START TIME: **12:30** *END TIME:* **12:45**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Garnet Street NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	W_n	*Notes*
6.0"		**6.0 inches Aggregate**				
	SC-SM	**SILTY CLAYEY SAND, fine grained, brown, mottled.**				
			1	**5**	11.9	
5.0						
			2	**10**	13.7	
		w/ a trace of GRAVEL, reddish brown.	**3**	**8**	14.9	
10.0						
			4	**14**	11.2	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-10**
START TIME: **3:00** *END TIME:* **3:15**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **157th Avenue- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.0"		**7.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, black.** **FILL**				
4.0			**1**	**7**	6.3	
5.0	**SP**	**POORLY GRADED SAND, fine grained, brown.**				
			2	**6**	3.0	
			3	**6**	3.7	
10.0		**fine to medium grained.**				
11.5			**4**	**5**	3.9	
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' 2" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-11**
START TIME: **3:15** *END TIME:* **3:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **157th Avenue- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
4.0"		**4.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine to medium grained, dark brown.**				
			1	**4**	5.4	
5.0		**fine grained, brown.**				
			2	**4**	4.1	
		dark brown				
			3	**4**	4.7	
10.0		**fine to medium grained, brown.**				
			4	**4**	4.2	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-12**
START TIME: **3:30** *END TIME:* **3:45**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **157th Avenue- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
3.0"		**3.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, dark brown to black.**				
			1	**7**	7.6	
5.0		**fine grained, brown.**				
			2	**11**	5.3	
			3	**6**	3.7	
10.0		**light brown.**				
			4	**5**	2.8	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-13**
START TIME: **3:45** *END TIME:* **4:00**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **157th Avenue- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
5.0"		**5.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, dark brown,**				
			1	**5**	3.5	
5.0		**brown.**				
			2	**7**	3.9	
			3	**10**	4.3	
10.0						
			4	**20**	7.8	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-14**
START TIME: **4:00** *END TIME:* **4:15**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **157th Avenue- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
3.0"		3.0 inches Aggregate				
	SP	POORLY GRADED SAND, fine grained, dark brown				
			1	6	7.8	
		brown.				
5.0						
			2	10	2.9	
			3	11	3.6	
10.0		w/ GRAVEL.				
			4	15	5.4	
11.5						
		Boring complete to 11.5 feet. No water encountered during drilling. No water measured to cave-in at 7' after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/11/24** *BORING #:* **SB-15**
START TIME: **4:15** *END TIME:* **4:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Potassium Street NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
12.0"		**12.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
			1	**4**	4.7	
5.0		**fine to medium grained, w/ a trace of GRAVEL.**				
			2	**4**	5.0	
		fine grained.				
			3	**4**	8.2	
					16.8	**V Water encountered at 10.0 feet during drilling.**
11.5		**medium to coarse grained.**	**4**	**4**		
		Boring complete to 11.5 feet. **Water encountered 10.0 feet during drilling.** **No water measured to cave-in at 6' 9" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-16**
START TIME: **7:45** *END TIME:* **8:00**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
LOCATION: **Potassium Street NW- See Boring Location Plan** *ELEVATION:* **N/G**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
		20.0 inches Aggregate				
20.0"						
	SP	**POORLY GRADED SAND, fine grained, dark brown.**				
			1	**6**	9.0	
						V Water measured at 4' 0" after completion.
5.0		**grey.**				
			2	**8**	23.3	
			3	**8**	29.8	
10.0						
		fine to medium grained.	**4**	**6**	25.6	
11.5						
		Boring complete to 11.5 feet. **Water encountered at 5' during drilling.** **Water measured at 4' 0" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-17**
START TIME: **8:15** *END TIME:* **8:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Potassium Street NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	W_n	*Notes*
6.0"		**6.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
			1	**4**	5.2	
5.0						
			2	**4**	7.2	
		fine to medium grained.				
			3	**8**	5.6	
10.0		**fine grained, light brown.**				
			4	**12**	9.2	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 7' 6" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-18**
START TIME: **8:50** *END TIME:* **9:05**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **148th Lane NW- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
5.0"		**5.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, brown.**				
			1	**7**	3.4	
5.0		**fine to medium grained, light brown.**				
			2	**11**	3.2	
			3	**15**	3.7	
10.0						
			4	**13**	3.7	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured to cave-in at 6' 9" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-19**
START TIME: **9:05** *END TIME:* **9:20**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **148th Lane NW- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
5.0"		**5.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, dark brown.**				
			1	**6**	1.9	
5.0		**fine to medium grained, brown.**				
			2	**3**	3.1	
			3	**5**	12.4	**V Water enountered at 9' 0" during drilling.**
10.0						
			4	**5**	20.5	
11.5						
		Boring complete to 11.5 feet. **Water encountered at 9' 0" during drilling.** **No water measured to cave-in at 6' 6" after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-20**
START TIME: **9:20** *END TIME:* **9:30**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **148th Lane NW- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
6.0"		6.0 inches Aggregate				
	SP-SM	POORLY GRADED SAND w/ SILT, fine grained, dark brown. FILL				
4.0			1	5	5.7	
5.0	SM	SILTY SAND, fine grained, dark brown.				
7.0			2	5	9.2	
	SP	POORLY GRADED SAND, fine grained, greyish brown.				
			3	15	18.4	V Water enountered at 9' 0" during drilling.
10.0		grey.				
11.5			4	4	24.3	
		Boring complete to 11.5 feet. Water encountered at 9' 0" during drilling. No water measured at cave-in at 6' 9" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-21**
START TIME: **1:20** *END TIME:* **1:35**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Beatty Avenue NW- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
6.0"		**6.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, dark brown.**				
			1	**5**	5.2	
5.0		**fine to medium grained, brown.**				
			2	**4**	7.0	
		fine grained.				
			3	**16**	3.3	
10.0		**fine to medium grained, w/ GRAVEL.**				
			4	**25**	4.2	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured at cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-22**
START TIME: **1:35** *END TIME:* **1:50**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Collins Drive NW- See Boring Location Plan**

Depth (Feet)	ASTM Symbol	Soil Description	Sample #	N Value	W_n	Notes
7.0"		7.0 inches Aggregate				
	SM	SILTY SAND, fine grained, dark brown to black. FILL	1	6	12.6	
4.0						
5.0	SP	POORLY GRADED SAND, fine grained, brown.	2	17	3.2	
			3	24	3.7	
10.0						
	SM	SILTY SAND, fine grained, brown.	4	23	8.2	
11.5						
		Boring complete to 11.5 feet. No water encountered during drilling. No water measured at cave-in at 6' 6" after completion.				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-23**
START TIME: **1:50** *END TIME:* **2:05**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Collins Drive NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	*W_n*	*Notes*
5.5"		**5.5 inches Aggregate**				
	SP	**POORY GRADED SAND, fine grained, dark brown, black.**				
			1	**6**	4.5	
5.0		**brown.**				
			2	**10**	3.3	
			3	**7**	3.1	
10.0						
			4	**8**	3.6	
11.5						
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured at cave-in at 7' after completion.**				

INDEPENDENT TESTING TECHNOLOGIES, INC. LOG OF SOIL BORING

PROJECT: **24-327** **CITY OF RAMSEY**
2024 GRAVEL ROADS
IP 25-07
RAMSEY, MINNESOTA

DATE: **9/12/24** *BORING #:* **SB-24**
START TIME: **2:05** *END TIME:* **2:20**
METHOD: **3 ¼" I.D. Hollow Stem Auger**
CREW: **CD/RS**
ELEVATION: **N/G**

LOCATION: **Collins Drive NW- See Boring Location Plan**

Depth (Feet)	*ASTM Symbol*	*Soil Description*	*Sample #*	*N Value*	W_n	*Notes*
9.0"		**9.0 inches Aggregate**				
	SP	**POORLY GRADED SAND, fine grained, dark brown.**				
		FILL	**1**	**4**	5.3	
5.0						
	SP-SM	**POORLY GRADED SAND w/ SILT, fine grained, brown.**	**2**	**5**	3.6	
9.0			**3**	**5**	4.8	
10.0	**SP**	**POORLY GRADED SAND, fine to medium grained, brown.**				
11.5			**4**	**5**	3.3	
		Boring complete to 11.5 feet. **No water encountered during drilling.** **No water measured at cave-in at 7' 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%