



FEASIBILITY REPORT

2024 / 2025 STREET RECONSTRUCTION
AND MUNICIPAL SEWER AND WATER
EXTENSION PROJECT PINE HAVEN

CITY OF LINO LAKES | ANOKA COUNTY | MINNESOTA

June 10, 2024

Prepared for:

City of Lino Lakes
600 Town Center Parkway
Lino Lakes, MN 55014

WSB PROJECT NO. 023620-000



June 10, 2024

Honorable Mayor and City Council
City of Lino Lakes
600 Town Center Parkway
Lino Lakes, MN 55014

Re: 2024 / 2025 Street Reconstruction and Municipal Sewer and Water Extension Project
Pine Haven
Feasibility Report
City of Lino Lakes, MN
WSB Project No. 023620-000

Dear Honorable Mayor and City Council Members:

The City of Lino Lakes is evaluating the extension of municipal sewer and water to the Pine Haven neighborhood which is located on: 81st Street, Danube Street, and Elbe Street. Transmitted herewith for your review is the Feasibility Study.

Please feel free to contact me with any questions at 651-982-2430 or dhankee@linolakes.us.

Sincerely,

WSB

A handwritten signature in black ink that reads "Diane Hankee". The signature is written in a cursive, flowing style.

Diane Hankee, PE
City Engineer

Attachments

cc: Veronica Kubicek, WSB

kkp



Table of Contents

Letter of Introduction

Table of Contents

Certification

1.	Executive Summary	1
2.	Introduction	2
2.1	Authorization	2
2.2	Scope	2
2.3	Data Available	2
3.	Existing Conditions	3
3.1.	Streets	3
3.2.	Drainage	3
3.3.	Utilities	3
3.3.1.	Sanitary Sewer	3
3.3.2.	Watermain	3
4.	Proposed Improvements	4
4.1	Streets	4
4.2	Drainage	4
4.3	Utilities	4
4.3.1	Sanitary Sewer	4
4.3.2	Water Service	5
5.	Financing	5
5.1	Opinion of Probable Cost	5
5.2	Funding	5
6.	Project Schedule	7
7.	Feasibility and Recommendation	7

Appendix A

Figures

- Project Location Map
- Pine Haven Proposed Sanitary Sewer and Watermain Extension
- Pine Haven Proposed Storm Sewer and Pond Location
- Pine Haven Street Typical Section



Appendix B

Pine Haven Opinion of Probable Cost

Appendix C

Preliminary Assessment Map

Preliminary Assessment Roll

Appendix D

Municipal Utility Unit Cost Estimates

Appendix E

Design Phase Geotechnical Evaluation (November 2023)



Certification Sheet

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly licensed professional engineer under the laws of the State of Minnesota.

Veronica Kubicek, PE

Date: June 10, 2024 Lic. No. 57270

Quality Control Review Completed By:

Diane Hanke, PE

Date: Date: June 10, 2024 Lic. No. 43338



1. Executive Summary

The City's 2024-2027 Street Reconstruction Plan incorporates multiple roadway improvements, some of which include the Pine Haven neighborhood. The Pine Haven neighborhood for the purpose of this study includes 81st Street, Danube Street, and Elbe Street. The street reconstruction and drainage improvements are planned to be funded through Street Reconstruction Bonds. There are no proposed assessments associated with the roadway and drainage improvements. The City's pavement management plan identifies these roadways to be in poor condition and recommends reconstruction. The estimated cost of the street and drainage improvements in the Pine Haven neighborhood is \$1,767,338. An exhibit illustrating the Pine Haven project location is shown in **Appendix A**.

Considering the age of the neighborhood, platted in 1976, and the need for street reconstruction, the City is evaluating the extension of municipal water and sanitary sewer to serve the area. Currently this neighborhood is served by onsite septic systems and private wells. Funding for sanitary sewer and water extension to serve the neighborhood would be through assessments to the benefitting properties, and Area & Unit Trunk Funds. The estimated cost of sanitary sewer and water system improvements is \$1,568,855.

The cost opinion includes a 10% construction contingency and 20% for indirect costs. The project is proposed to be constructed in either 2024 or 2025 pending permitting timelines. This project is feasible, necessary, and cost effective from an engineering standpoint and should be constructed as proposed herein.



2. Introduction

The City of Lino Lakes is completing this Feasibility Study for the extension of municipal sewer and water to the Pine Haven neighborhood which is located on 81st Street, Danube Street, and Elbe Street.

2.1 Authorization

On August 28, 2023, the City Council of Lino Lakes approved Resolution 23-89 authorizing the preparation of a feasibility study for the extension of sanitary sewer and water systems to the Pine Haven neighborhood which includes 81st Street, Danube Street, and Elbe Street.

2.2 Scope

The City of Lino Lakes plans to reconstruct 81st Street, Danube Street, and Elbe Street as part of a larger roadway improvement project, the project location map can be found in **Appendix A**. The most cost-effective time to consider extending municipal utilities is in coordination with roadway reconstruction. Thus, the City is evaluating the feasibility of extending municipal sanitary sewer and water systems to the Pine Haven neighborhood. This includes the three addresses located on the easterly side of Lake Drive: 8060, 8066, and 8074 in addition to those with 81st Street, Danube Street, and Elbe Street addresses, 30 properties in total.

2.3 Data Available

Information and materials used in preparation of this report include the following:

- City of Lino Lakes Record Drawings
- City of Lino Lakes Property files
- City of Lino Lakes Charter, updated January 13, 2014
- Design Phase Geotechnical Evaluations, dated November 4, 2023
- Rice Creek Watershed District Rules
- Minnesota Department of Water Resources Well Index
- Anoka County Property Data
- Field Observations of the Area and Discussions with City Staff
- Public Input and Participation



3. Existing Conditions

3.1. Streets

The roadway condition of 81st Street, Danube Street, and Elbe Street includes various severities of distress including delamination and potholes, minor alligator, block, transverse, and longitudinal cracking, along with a few localized drainage issues. The roadway is approximately 47 years old is generally 30 feet wide and has rolled bituminous curb that has diminished over time. Danube Street is a cul-du-sac that has a 46 foot wide radius, which is the City's standard. 81st Street, Danube Street, and Elbe Street are within a 60-foot wide right of way. The total length of roadway improvements for the streets in the Pine Haven Neighborhood included with this project is approximately 0.42 miles.

2024 Street Reconstruction Project Existing Conditions				
Street Segment	From	To	Length	Existing Width
81st Street	Lake Drive	Elbe Street	700'	30'
Danube Street	81st Street	Cul-de-Sac	500'	30'
Elbe Street	Highway 14	Dead End	965'	30'

3.2. Drainage

There are 2 main drainage areas in the Pine Haven neighborhood and the project encompasses 19 acres of land. Street runoff flows along the sides of the pavement and into the grass and low areas or is collected by the existing storm sewer drains at the southerly end of Danube Street or Elbe Street. There is an existing 20 foot wide drainage and utility easement between 8016 and 8020 Danube Street and 897 and 915 Main Street. Within the easement is the existing storm sewer system. The storm system conveys water from the southerly end of Danube Street and outlets /connects to storm sewer system in Main Street. Similarly the existing storm sewer system conveys water to from Elbe Street into the Main Street system. The Main Street system is Anoka's system.

3.3. Utilities

3.3.1. Sanitary Sewer

The properties along 81st Street, Danube Street, and Elbe Street are served by onsite septic systems. Some of the septic systems are drain fields while others are mound systems. There is an existing 15-inch diameter PVC sanitary sewer mainline that runs along the easterly side of Lake Drive, from the intersection of Main Street to approximately 600-feet northeast, with the as-built dated 2013. There are 2 of the 30 onsite septic systems that have been replaced within the last 10 years. The majority of septic systems appear to be installed at the same time the home was constructed. Septic systems installed around this time typically have a 35 to 40 year lifespan.

3.3.2. Watermain

The 81st Street, Danube Street, and Elbe Street properties are served by private wells. There is an existing 12-inch diameter DIP watermain that is parallel to the existing sanitary sewer trunk line and runs along the easterly side of Lake Drive, from the intersection of Main Street to approximately 600-feet northeast, with the as-built dated 2013. Existing wells are typically



between 60 to 272 feet deep. Wells were installed at the time these houses were built. Wells have an average life span of 50 years.

4. Proposed Improvements

4.1 Streets

The City will reconstruct 81st Street and Elbe Street back to their existing width of 30 feet wide (front of curb to front of curb) and install concrete curb and gutter. Danube will be reconstructed to 28 feet wide (back of curb to back of curb). Due to the nature of the existing rolled bituminous curb, the new concrete curb and gutter will change the perception of the road width. The road section will consist of 4 ½ inches of bituminous on top of 8 inches of class 5 aggregate base. The subgrade will be evaluated through the design process. The City may incorporate reclamation into the project. Surmountable curb and gutter is proposed for the entire Pine Haven neighborhood, and will be lowered at the driveways. A proposed typical section can be found in Appendix A.

The City has had discussions with Anoka County and the property owner of 8174 Lake Drive regarding the possible re-alignment of 81st Street and Diane Street to be one intersection. The City will continue to evaluate this option.

4.2 Drainage

The City has completed a preliminary stormwater management design that will replace and expand the existing drainage systems. The design is in conformance with the City's Stormwater Management Ordinance and Rice Creek Watershed District (RCWD) Rules. The area planned for a new stormwater management facility is within the 81st Street right of way as it extends undeveloped to the east. There is a second area planned for a stormwater management facility, east of property address 8010 Elbe Street. The City has been coordinating this option with the property owner to consider a drainage and utility easement.

The preliminary storm sewer design is proposed to consist of typically 12 inch to 15 inch diameter Reinforced Concrete Pipe (RCP). At the time of this report, the storm system is planned to convey water to the pond on the easterly end of 81st Street as well as to the east of property address 8010 Elbe Street, both of which will outlet to the easterly wetland. The preliminary storm pipe locations and pond outline can be seen in **Appendix A**. The City will be required to obtain a permit from Rice Creek Watershed District and the Minnesota Pollution Control Agency (MPCA).

4.3 Utilities

4.3.1 Sanitary Sewer

An 15-inch diameter PVC sanitary sewer will be extended northeast along Lake Drive and east along 81st Street. The sanitary sewer along Lake Drive and 81st Street is trunk sanitary sewer and will serve additional properties in the future. The installation of the sewer line along Lake Drive may require the reconstruction of the shoulder. This will continue to be coordinated with Anoka County, cost for this has not been included at this time.

An 8-inch diameter PVC sanitary sewer will be extended south along Danube Street and Elbe Street to serve the Pine Haven neighborhood, as shown in **Appendix A**. Four-inch diameter PVC services would be extended from the 8-inch PVC mainline sewer to the property lines.



4.3.2 Water Service

Twelve-inch diameter DIP watermain will be extended northeast along Lake Drive and east along 81st Street. The watermain along Lake Drive and 81st Street is trunk watermain and will serve additional properties in the future.

An 8-inch diameter DIP municipal water will be extended south along Danube Street and Elbe Street to serve the Pine Haven neighborhood, as shown in **Appendix A**. The City will terminate the watermain at the cul-de-sac for Danube Street and at the south end of Elbe Street. Fire hydrants will be installed per City specifications. One inch diameter copper services would be extended to the property lines.

5. Financing

5.1 Opinion of Probable Cost

A detailed opinion of probable cost is included in **Appendix B** of this report. The opinion of probable cost is based on projected construction costs for 2024 through 2025 and includes a 10% construction contingency and 20% indirect costs. The indirect costs include engineering, legal, and administrative costs associated with the project. The project costs are summarized as follows:

2024 / 2025 Street and Utility Improvement Project Opinion of Probable Cost	
Breakout	Probable Cost
Street and Storm	\$1,767,338
Sanitary Sewer	\$754,692
Watermain	\$814,163
Total Project	\$3,336,193

5.2 Funding

The street and storm water infrastructure improvements are proposed to be funded by the issuance of Street Reconstruction Bonds, repaid by a property tax levy. There are no proposed assessments associated with the roadway and drainage improvements.

Funding of the extension of municipal watermain and sanitary sewer improvements is proposed to be provided by the City's Area & Unit Trunk Fund and special assessments.

2024 / 2025 Street and Utility Improvement Project Funding Overview				
Breakout	Street Reconstruction Bond	Area & Unit Trunk Fund	Assessment	Total
Street and Storm	\$1,767,338			\$1,767,338
Sanitary Sewer		\$538,692	\$216,000	\$754,692
Watermain		\$550,163	\$264,000	\$814,163
Totals	\$1,767,338	\$1,088,855	\$480,000	\$3,336,193



In the table above, the total sewer and water infrastructure cost is \$1,568,855 of which \$510,365 is attributable to trunk oversizing. Generally, oversizing is calculated by the difference in cost between a regular main and an oversized main. There are other factors considered such as additional depth and difference in materials.

The remaining amount to be funded through special assessments is \$1,058,490. This equates to \$35,283 per unit/lot. The City consulted with an independent appraiser to conduct a special benefit analysis of the proposed sewer and water extensions. The analysis supported an assessment amount of \$16,000 per unit/lot. This would total \$480,000 from special assessments to benefiting properties. A Preliminary Assessment Role and corresponding map is include in **Appendix C**.

This would result in a funding gap of \$19,283 per unit/lot which totals \$578,490. The City could consider funding the gap through the Area & Unit Trunk Fund. The Area & Unit Trunk Fund would be reimbursed through a special project specific trunk connection fee.

All properties when connecting to municipal sewer and water services pay a standard trunk connection fee in the amount of \$7,429 per unit/lot (adjusted annually). The funding gap of \$19,283 per unit/lot minus the standard trunk connection fee in the amount of \$7,429 per unit/lot equals \$11,854 per unit/lot. A special project fee would be established to include the base fee plus 50% of the funding gap on a per lot basis. Based on this scenario property owners would pay an additional connection fee of \$5,927 upon hook up for a total connection fee of \$13,356. The City's Area & Unit Trunk Fund would fund the balance of the funding gap as outlined below:

2024 / 2025 Street and Utility Improvement Project Proposed Detailed Funding					
	Area & Unit Trunk Fund				Total
	City Funds		Property Owner Connection Fees		
	Oversizing	Additional Match Costs	Additional Match Connection	Standard Connection Fee	
Sanitary Sewer	\$278,982	\$79,410	\$79,410	\$100,890	\$538,692
Watermain	\$231,383	\$98,400	\$98,400	\$121,980	\$550,163
Total	\$510,365	\$177,810	\$177,810	\$222,870	\$1,088,855

Preliminary assessments are calculated on a per unit basis for benefitting parcels along the streets within the project area. Benefitting parcels would be assessed over a period of 15 years, collected with property taxes, at an interest rate set at 2% above the City's borrowing rate. Last year's interest rate was 5%. At a 5% rate over 15 years, the assessments would be \$1,542/year or \$129 per month.

The City also provides for the trunk connections fees to be specially assessed at the time of connection.

A compilation of connection cost and assessments per property is outlined in **Appendix D**.



6. Project Schedule

The proposed schedule for this improvement is as follows:

Task Number	Task Description	Completion Date
1	Accept Feasibility and Order Public Hearing	June 10, 2024
2	Public Hearing	July 22, 2024
3	60 days of no action of the City Council Ends	September 20, 2024
4	Authorize Preparation of the Plans and Specifications	October 14, 2024
5	Authorize the Ad for Bid	December 9, 2024
6	Award a Construction Contract	March / April 2025
7	Start Construction	Spring 2025
8	Complete Construction	Fall 2025

7. Feasibility and Recommendation

The 2024 / 2025 Street Reconstruction and Municipal Sewer and Water Extension Project Pine Haven includes roadway, drainage, sanitary sewer and water system improvements and appurtenant work. The total project costs are estimated to be \$3,336,193.

Based on our analysis and data presented, the proposed project is feasible, necessary, and cost effective from an engineering standpoint. We recommend reconstruction/construction of the proposed improvements as detailed in this report and as determined financially feasible by the City Council.



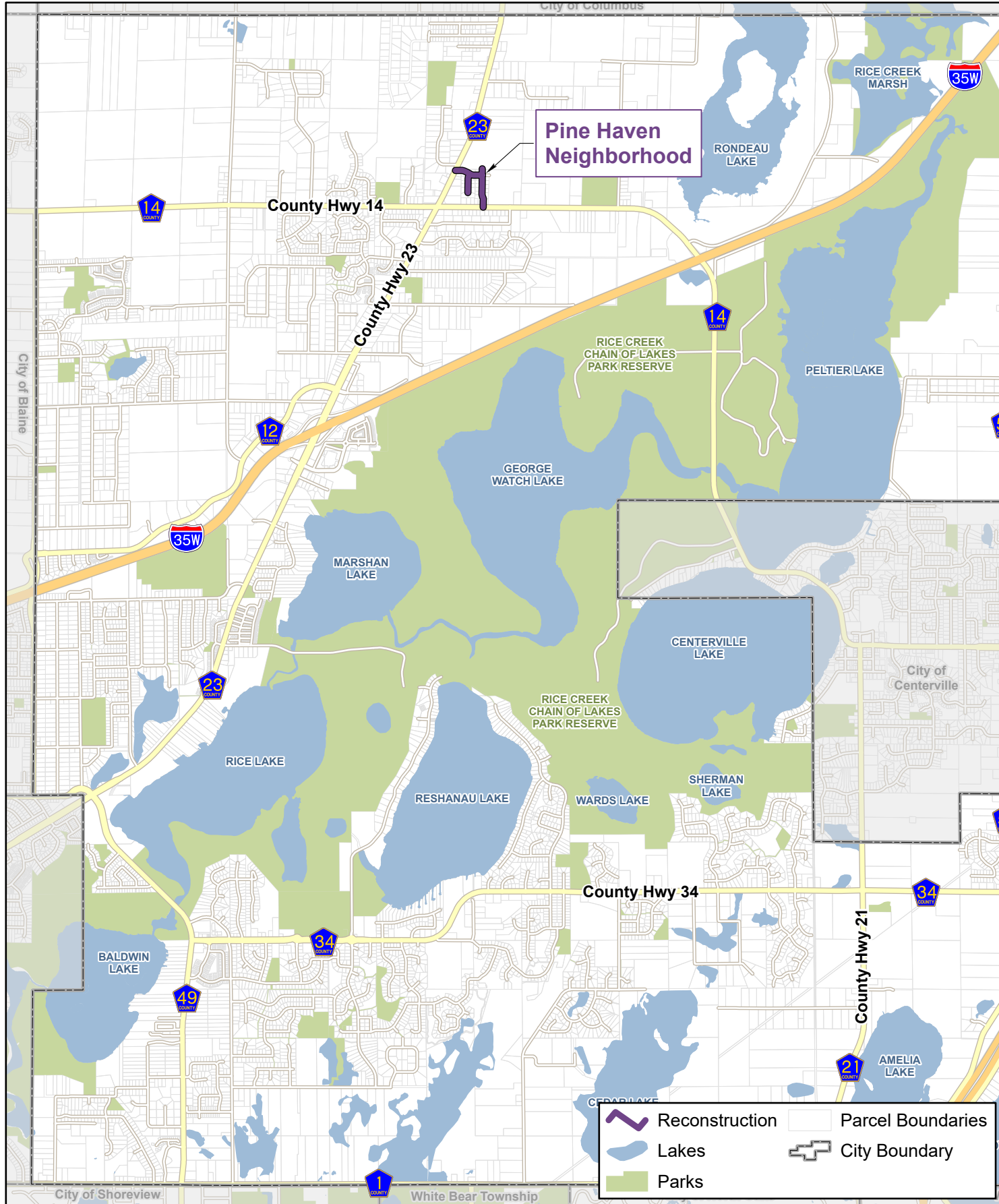
Appendix A

Pine Haven Project Location

Pine Haven Proposed Sanitary Sewer and Watermain Extension

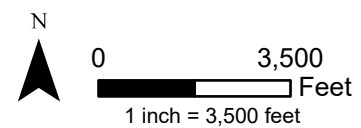
Pine Haven Proposed Storm Sewer and Pond Location

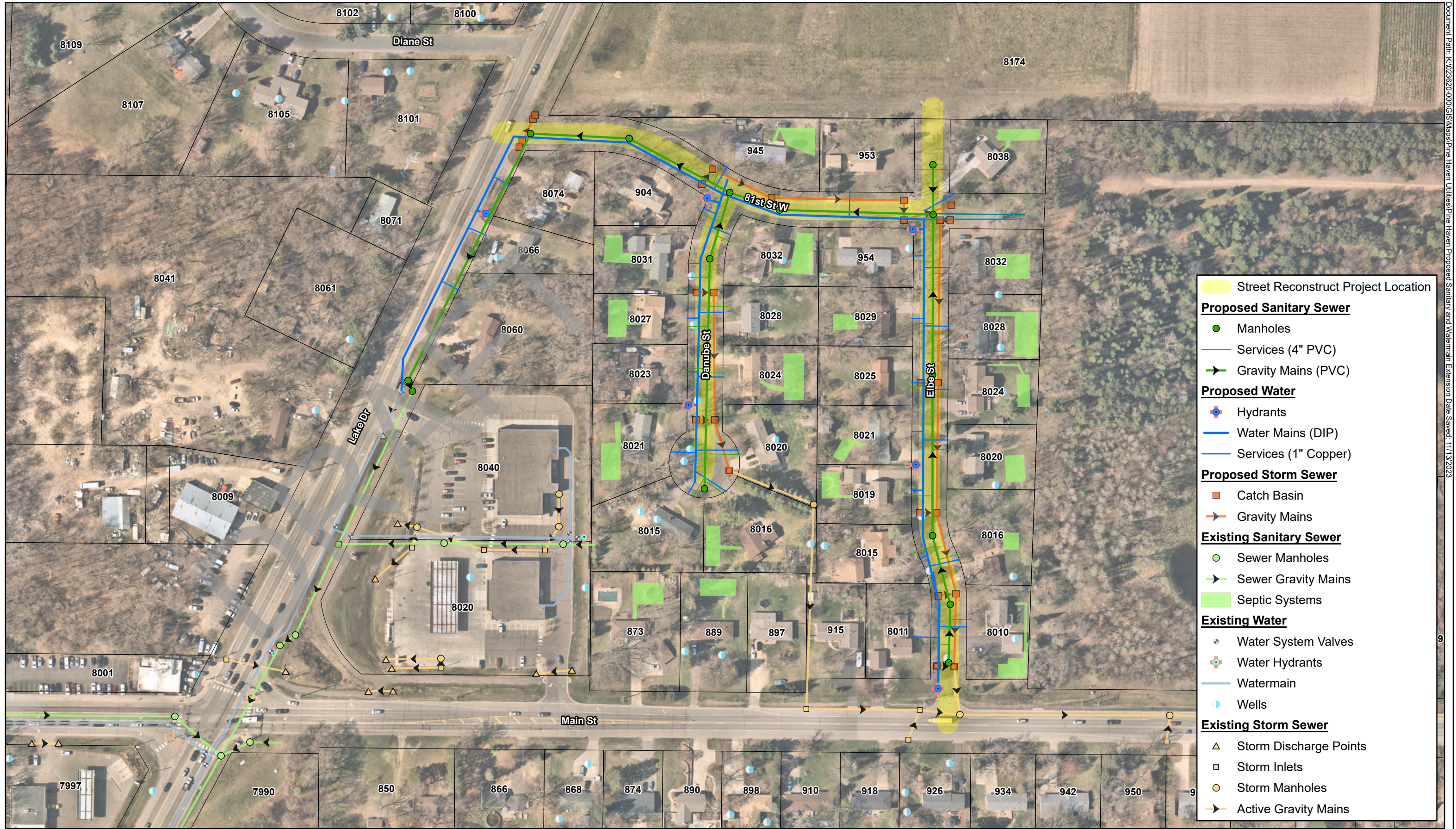
Pine Haven Street Typical Section



Project Location Map

City of Lino Lakes, Minnesota





Proposed Sanitary and Watermain Extension

Pine Haven Neighborhood
81st St, Danube St, Elbe St, Lino Lakes, MN



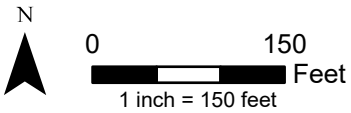
0 150
Feet
1 inch = 150 feet



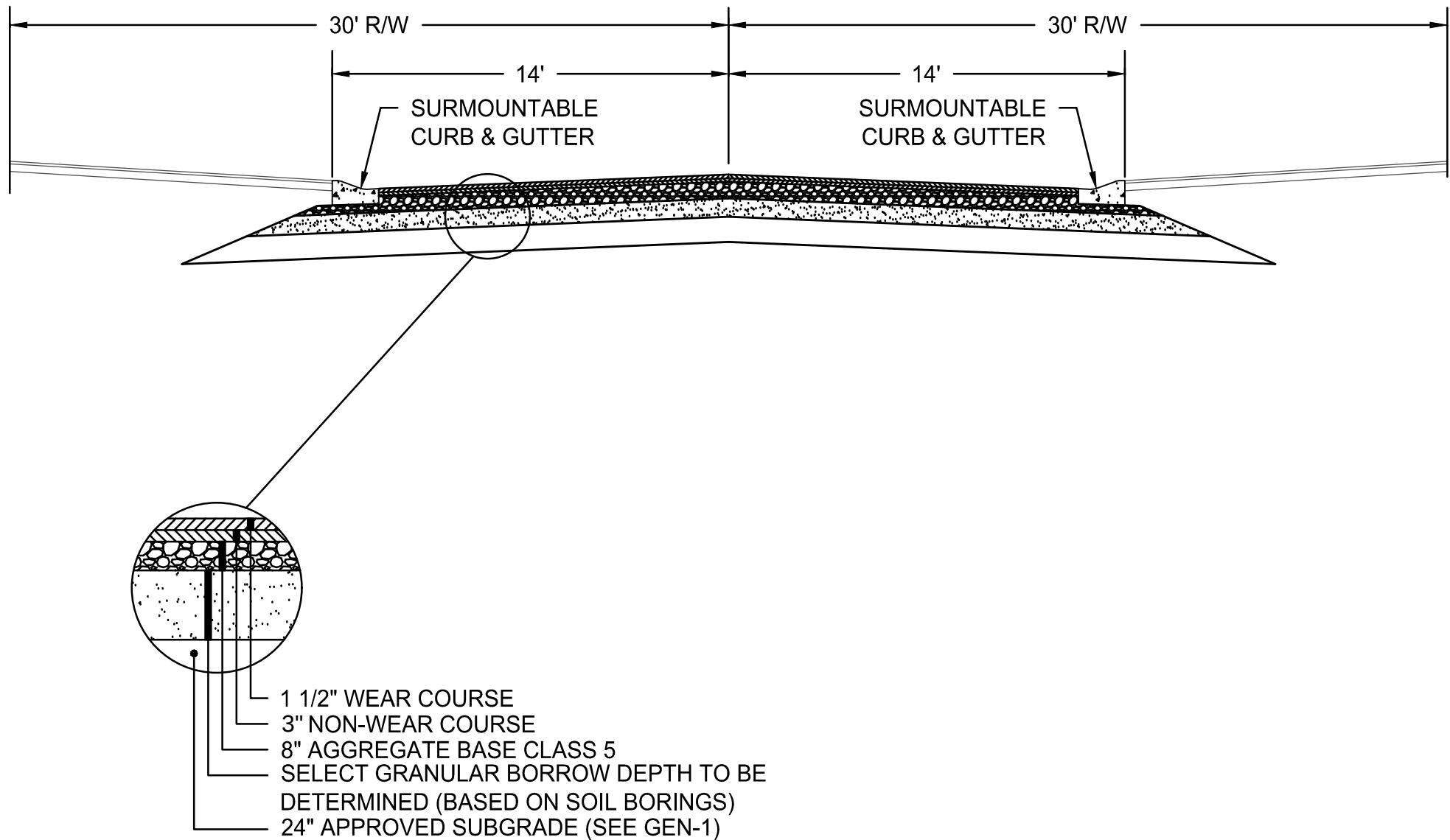


Proposed Storm Sewer Extension

Pine Haven Neighborhood
81st St, Danube St, Elbe St, Lino Lakes, MN



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WSB PROJECT NO.:
023620-000
NOVEMBER 2023

2024 STREET RECONSTRUCTION PROJECT
TYPICAL SECTION
CITY OF LINO LAKES

APPENDIX A



Appendix B

Pine Haven Opinion of Probable Cost

OPINION OF PROBABLE COST							Design By: EKM Checked By: VCK Date: 5/31/2024							
WSB Project: 2024 STREET IMPROVEMENT PROJECT Project Location: LINO LAKES, MN WSB Project No:							Design By: KJG Checked By: DLH Date: 5/31/2024		PAVEMENT MANAGEMENT FUND		TRUNK WATER FUND		TRUNK SEWER FUND	
							FUNDING SOURCE		FUNDING SOURCE		FUNDING SOURCE			
Item No.	MnDOT Specification No.	Description	Unit	Estimated Total Quantity	Estimated Unit Price	Estimated Total Cost	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST
A. SURFACE IMPROVEMENTS														
1	2021.501	MOBILIZATION	LS	1	\$ 63,757.00	\$ 63,757.00	1	\$ 63,757.00		\$ -		\$ -		\$ -
2	2101.501	CLEARING & GRUBBING	LS	1	\$ 25,000.00	\$ 25,000.00	1	\$ 25,000.00		\$ -		\$ -		\$ -
3	2104.502	REMOVE SIGN	EACH	10	\$ 150.00	\$ 1,500.00	10	\$ 1,500.00		\$ -		\$ -		\$ -
4	2104.502	REMOVE MAIL BOX SUPPORT	EACH	27	\$ 100.00	\$ 2,700.00	27	\$ 2,700.00		\$ -		\$ -		\$ -
5	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	L F	110	\$ 10.00	\$ 1,100.00	110	\$ 1,100.00		\$ -		\$ -		\$ -
6	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)	L F	492	\$ 8.00	\$ 3,936.00	492	\$ 3,936.00		\$ -		\$ -		\$ -
7	2104.503	REMOVE CURB & GUTTER	L F	220	\$ 12.00	\$ 2,640.00	220	\$ 2,640.00		\$ -		\$ -		\$ -
8	2104.503	REMOVE BITUMINOUS CURB	L F	3960	\$ 5.00	\$ 19,800.00	3960	\$ 19,800.00		\$ -		\$ -		\$ -
9	2104.503	SALVAGE FENCE	L F	100	\$ 150.00	\$ 15,000.00	100	\$ 15,000.00		\$ -		\$ -		\$ -
10	2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT	S Y	200	\$ 11.00	\$ 2,200.00	200	\$ 2,200.00		\$ -		\$ -		\$ -
11	2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	S Y	670	\$ 9.00	\$ 6,030.00	670	\$ 6,030.00		\$ -		\$ -		\$ -
12	2104.504	REMOVE BITUMINOUS PAVEMENT	S Y	7500	\$ 9.00	\$ 67,500.00	7500	\$ 67,500.00		\$ -		\$ -		\$ -
13	2104.601	SALVAGE AND REINSTALL LANDSCAPE STRUCTURES	LS	1	\$ 5,000.00	\$ 5,000.00	1	\$ 5,000.00		\$ -		\$ -		\$ -
14	2105.504	GEOTEXTILE FABRIC TYPE 5	S Y	9350	\$ 3.00	\$ 28,050.00	9350	\$ 28,050.00		\$ -		\$ -		\$ -
15	2105.601	DEWATERING	LS	1	\$ 10,000.00	\$ 10,000.00	1	\$ 10,000.00		\$ -		\$ -		\$ -
16	2105.601	SITE GRADING	LS	1	\$ 7,500.00	\$ 7,500.00	1	\$ 7,500.00		\$ -		\$ -		\$ -
17	2106.507	EXCAVATION - COMMON	C Y	2650	\$ 15.00	\$ 39,750.00	2650	\$ 39,750.00		\$ -		\$ -		\$ -
18	2106.507	EXCAVATION - SUBGRADE	C Y	5310	\$ 24.00	\$ 127,440.00	5310	\$ 127,440.00		\$ -		\$ -		\$ -
19	2106.507	EXCAVATION - CHANNEL AND POND	C Y	1500	\$ 45.00	\$ 67,500.00	1500	\$ 67,500.00		\$ -		\$ -		\$ -
20	2106.507	SELECT GRANULAR EMBANKMENT (CV)	C Y	5310	\$ 24.00	\$ 127,440.00	5310	\$ 127,440.00		\$ -		\$ -		\$ -
21	2106.507	COMMON EMBANKMENT (CV)	C Y	270	\$ 22.00	\$ 5,940.00	270	\$ 5,940.00		\$ -		\$ -		\$ -
22	2112.519	SUBGRADE PREPARATION	RDST	20	\$ 250.00	\$ 5,000.00	20	\$ 5,000.00		\$ -		\$ -		\$ -
23	2123.610	STREET SWEEPER (WITH PICKUP BROOM)	HOUR	75	\$ 150.00	\$ 11,250.00	75	\$ 11,250.00		\$ -		\$ -		\$ -
24	2130.523	WATER	MGAL	50	\$ 100.00	\$ 5,000.00	50	\$ 5,000.00		\$ -		\$ -		\$ -
25	2123.61	UTILITY CREW	HOUR	10	\$ 500.00	\$ 5,000.00	10	\$ 5,000.00		\$ -		\$ -		\$ -
26	2211.507	AGGREGATE BASE (CV) CLASS 5	C Y	1770	\$ 32.00	\$ 56,640.00	1770	\$ 56,640.00		\$ -		\$ -		\$ -
27	2331.603	JOINT ADHESIVE	L F	4460	\$ 1.00	\$ 4,460.00	4460	\$ 4,460.00		\$ -		\$ -		\$ -
28	2357.506	BITUMINOUS MATERIAL FOR TACK COAT	GAL	370	\$ 3.50	\$ 1,295.00	370	\$ 1,295.00		\$ -		\$ -		\$ -
29	2360.504	TYPE SP 9.5 WEAR CRS MIX(2.C)3.0" THICK	S Y	670	\$ 37.00	\$ 24,790.00	670	\$ 24,790.00		\$ -		\$ -		\$ -
30	2360.509	TYPE SP 9.5 WEARING COURSE MIX (2.C)	TON	640	\$ 82.00	\$ 52,480.00	640	\$ 52,480.00		\$ -		\$ -		\$ -
31	2360.509	TYPE SP 12.5 NON WEAR COURSE MIX (2.C)	TON	1270	\$ 85.00	\$ 107,950.00	1270	\$ 107,950.00		\$ -		\$ -		\$ -
32	2501.502	21" RC PIPE APRON	EACH	1	\$ 2,000.00	\$ 2,000.00	1	\$ 2,000.00		\$ -		\$ -		\$ -
33	2503.503	15" RC PIPE SEWER DES 3006 CL V	L F	1000	\$ 75.00	\$ 75,000.00	1000	\$ 75,000.00		\$ -		\$ -		\$ -
34	2503.503	18" RC PIPE SEWER DES 3006 CL V	L F	610	\$ 88.00	\$ 53,680.00	610	\$ 53,680.00		\$ -		\$ -		\$ -
35	2503.503	21" RC PIPE SEWER DES 3006 CL III	L F	120	\$ 92.00	\$ 11,040.00	120	\$ 11,040.00		\$ -		\$ -		\$ -
36	2504.602	IRRIGATION SYSTEM REPAIR	EACH	10	\$ 500.00	\$ 5,000.00	10	\$ 5,000.00		\$ -		\$ -		\$ -
37	2505.601	UTILITY COORDINATION	LS	1	\$ 2,500.00	\$ 2,500.00	1	\$ 2,500.00		\$ -		\$ -		\$ -
38	2506.502	CONST DRAINAGE STRUCTURE DESIGN SPECIAL	EACH	11	\$ 2,100.00	\$ 23,100.00	11	\$ 23,100.00		\$ -		\$ -		\$ -
39	2506.502	CONST DRAINAGE STRUCTURE DES 48-4020	EACH	11	\$ 2,100.00	\$ 23,100.00	11	\$ 23,100.00		\$ -		\$ -		\$ -
40	2506.502	ADJUST FRAME & RING CASTING	EACH	3	\$ 600.00	\$ 1,800.00	3	\$ 1,800.00		\$ -		\$ -		\$ -
41	2511.507	RANDOM RIPRAP CLASS III	C Y	10	\$ 80.00	\$ 800.00	10	\$ 800.00		\$ -		\$ -		\$ -
42	2531.503	CONCRETE CURB & GUTTER DESIGN B618	L F	4460	\$ 28.00	\$ 124,880.00	4460	\$ 124,880.00		\$ -		\$ -		\$ -
43	2531.504	6" CONCRETE DRIVEWAY PAVEMENT	S Y	200	\$ 90.00	\$ 18,000.00	200	\$ 18,000.00		\$ -		\$ -		\$ -
44	2540.602	MAIL BOX	EACH	27	\$ 100.00	\$ 2,700.00	27	\$ 2,700.00		\$ -		\$ -		\$ -
45	2540.602	MAIL BOX SUPPORT	EACH	27	\$ 150.00	\$ 4,050.00	27	\$ 4,050.00		\$ -		\$ -		\$ -
46	2540.602	TEMPORARY MAIL BOX	EACH	27	\$ 150.00	\$ 4,050.00	27	\$ 4,050.00		\$ -		\$ -		\$ -
47	2557.602	REPAIR DOG FENCE	EACH	10	\$ 500.00	\$ 5,000.00	10	\$ 5,000.00		\$ -		\$ -		\$ -
48	2557.603	INSTALL FENCE	L F	100	\$ 150.00	\$ 15,000.00	100	\$ 15,000.00		\$ -		\$ -		\$ -
49	2563.601	TRAFFIC CONTROL	LS	1	\$ 12,000.00	\$ 12,000.00	1	\$ 12,000.00		\$ -		\$ -		\$ -
50	2564.602	INSTALL SIGN	EACH	10	\$ 150.00	\$ 1,500.00	10	\$ 1,500.00		\$ -		\$ -		\$ -
51	2573.501	STABILIZED CONSTRUCTION EXIT	LS	1	\$ 1,500.00	\$ 1,500.00	1	\$ 1,500.00		\$ -		\$ -		\$ -
52	2573.502	STORM DRAIN INLET PROTECTION	EACH	3	\$ 150.00	\$ 450.00	3	\$ 450.00		\$ -		\$ -		\$ -
53	2573.503	SILT FENCE, TYPE MS	L F	1050	\$ 4.00	\$ 4,200.00	1050	\$ 4,200.00		\$ -		\$ -		\$ -
54	2573.503	SEDIMENT CONTROL LOG TYPE WOOD FIBER	L F	1050	\$ 3.00	\$ 3,150.00	1050	\$ 3,150.00		\$ -		\$ -		\$ -
55	2574.507	COMMON TOPSOIL BORROW	C Y	720	\$ 38.00	\$ 27,360.00	720	\$ 27,360.00		\$ -		\$ -		\$ -
56	2574.508	FERTILIZER TYPE 3	L B	160	\$ 4.00	\$ 640.00	160	\$ 640.00		\$ -		\$ -		\$ -
57	2574.508	FERTILIZER TYPE 4	L B	3	\$ 4.00	\$ 30.00	3	\$ 30.00		\$ -		\$ -		\$ -
58	2575.504	SODDING TYPE LAWN	S Y	3960	\$ 10.00	\$ 11,880.00	3960	\$ 11,880.00		\$ -		\$ -		\$ -
59	2575.504	ROLLED EROSION PREVENTION CATEGORY 25	S Y	130	\$ 3.00	\$ 390.00	130	\$ 390.00		\$ -		\$ -		\$ -
60	2575.505	SEEDING	ACRE	0.03	\$ 2,000.00	\$ 60.00	0.03	\$ 60.00		\$ -		\$ -		\$ -
61	2575.508	SEED MIXTURE 33-261	L B	1	\$ 25.00	\$ 25.00	1	\$ 25.00		\$ -		\$ -		\$ -
62	2575.508	HYDRAULIC MULCH MATRIX	L B	60	\$ 6.00	\$ 360.00	60	\$ 360.00		\$ -		\$ -		\$ -
CONSTRUCTION TOTAL							\$ 1,338,893.00	\$ 1,338,893.00	\$ -	\$ -		\$ -		\$ -
CONTINGENCY TOTAL (10%)							\$ 133,889.00	\$ 133,889.00	\$ -	\$ -		\$ -		\$ -
SUBTOTAL							\$ 1,472,782.00	\$ 1,472,782.00	\$ -	\$ -		\$ -		\$ -
INDIRECT COST TOTAL (20%)							\$ 294,556.00	\$ 294,556.00	\$ -	\$ -		\$ -		\$ -
TOTAL							\$ 1,767,338.00	\$ 1,767,338.00	\$ -	\$ -		\$ -		\$ -

							WATERMAIN ASSESSMENT		TRUNK WATER FUND		TRUNK SEWER FUND	
							FUNDING SOURCE		FUNDING SOURCE		FUNDING SOURCE	
Item No.	MnDOT Specification No.	Description	Unit	Estimated Total Quantity	Estimated Unit Price	Estimated Total Cost	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST
C. WATERMAIN IMPROVEMENTS												
75	2123.610	UTILITY CREW	HOURL	12	\$ 750.00	\$ 9,000.00		\$ -	12.0	\$ 9,000.00		\$ -
76	2104.502	REMOVE GATE VALVE	EACH	1	\$ 75.00	\$ 75.00		\$ -	1.0	\$ 75.00		\$ -
77	2104.502	REMOVE HYDRANT	EACH	1	\$ 125.00	\$ 125.00		\$ -	1.0	\$ 125.00		\$ -
78	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	1	\$ 2,500.00	\$ 2,500.00		\$ -	1.0	\$ 2,500.00		\$ -
79	2504.602	HYDRANT ASSEMBLY	EACH	13	\$ 10,000.00	\$ 130,000.00	6	\$ 60,000.00	7.0	\$ 70,000.00		\$ -
80	2504.602	1" CORPORATION STOP	EACH	30	\$ 250.00	\$ 7,500.00	30	\$ 7,500.00		\$ -		\$ -
81	2504.602	8" GATE VALVE & BOX	EACH	8	\$ 2,250.00	\$ 18,000.00	8	\$ 18,000.00		\$ -		\$ -
82	2504.602	12" GATE VALVE & BOX **	EACH	2	\$ 5,750.00	\$ 11,500.00		\$ -	2.0	\$ 11,500.00		\$ -
83	2504.602	1" CURB STOP & BOX	EACH	30	\$ 360.00	\$ 10,800.00	30	\$ 10,800.00		\$ -		\$ -
84	2504.603	1" TYPE K COPPER PIPE	L F	1020	\$ 50.00	\$ 51,000.00	1020	\$ 51,000.00		\$ -		\$ -
85	2504.603	8" WATERMAIN DUCTILE IRON CL 52	L F	2865	\$ 95.00	\$ 272,175.00	2865	\$ 272,175.00		\$ -		\$ -
86	2504.603	12" WATERMAIN DUCTILE IRON CL 52 **	L F	1515	\$ 50.00	\$ 75,750.00		\$ -	1515.0	\$ 75,750.00		\$ -
87	2504.603	ANODE BAGS	EACH	13	\$ 120.00	\$ 1,560.00	6	\$ 720.00	7.0	\$ 840.00		\$ -
88	2504.604	4" POLYSTYRENE INSULATION	S Y	25	\$ 50.00	\$ 1,250.00	15	\$ 750.00	10.0	\$ 500.00		\$ -
89	2504.608	DUCTILE IRON FITTINGS	LB	1278	\$ 20.00	\$ 25,560.00	1028	\$ 20,560.00	250.0	\$ 5,000.00		\$ -
CONSTRUCTION TOTAL \$								\$ 441,505.00		\$ 175,290.00		\$ -
CONTINGENCY TOTAL (10%) \$								\$ 44,151.00		\$ 17,529.00		\$ -
SUBTOTAL \$								\$ 485,656.00		\$ 192,819.00		\$ -
INDIRECT COST TOTAL (20%) \$								\$ 97,131.00		\$ 38,564.00		\$ -
TOTAL \$								\$ 582,787.00		\$ 231,383.00		\$ -

							SANITARY SEWER ASSESSMENT		TRUNK WATER FUND		TRUNK SEWER FUND	
							FUNDING SOURCE		FUNDING SOURCE		FUNDING SOURCE	
Item No.	MnDOT Specification No.	Description	Unit	Estimated Total Quantity	Estimated Unit Price	Estimated Total Cost	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST
B. SANITARY SEWER IMPROVEMENTS												
63	2106.601	DEWATERING	LS	1	\$ 45,000.00	\$ 45,000.00	0.3	\$ 13,500.00		\$ -	0.7	\$ 31,500.00
64	2123.610	UTILITY CREW	HOURL	12	\$ 850.00	\$ 10,200.00		\$ -		\$ -	12	\$ 10,200.00
65	2503.602	CONNECT TO EXISTING SANITARY SEWER	EACH	1	\$ 2,500.00	\$ 2,500.00		\$ -		\$ -	1	\$ 2,500.00
66	2503.602	CONNECT TO EXISTING MANHOLES (SAN)	EACH	1	\$ 1,250.00	\$ 1,250.00		\$ -		\$ -	1	\$ 1,250.00
67	2503.602	8"x4" PVC WYE	EACH	30	\$ 250.00	\$ 7,500.00	30	\$ 7,500.00		\$ -		\$ -
68	2503.602	15"x4" PVC WYE **	EACH	9	\$ 650.00	\$ 5,850.00		\$ -		\$ -	9	\$ 5,850.00
69	2503.603	8" PVC PIPE SEWER SDR 26	LF	2865	\$ 75.00	\$ 214,875.00	2865	\$ 214,875.00		\$ -		\$ -
70	2503.603	15" PVC PIPE SEWER SDR 26 **	LF	1515	\$ 95.00	\$ 143,925.00		\$ -		\$ -	1515	\$ 143,925.00
71	2503.603	4" PVC SANITARY SERVICE PIPE	L F	900	\$ 55.00	\$ 49,500.00	900	\$ 49,500.00		\$ -		\$ -
72	2506.602	CHIMNEY SEAL	EACH	13	\$ 275.00	\$ 3,575.00	10	\$ 2,750.00		\$ -	3	\$ 825.00
73	2506.602	CASTING ASSEMBLY (SANITARY SEWER)	EACH	13	\$ 850.00	\$ 11,050.00	10	\$ 8,500.00		\$ -	3	\$ 2,550.00
74	2506.603	CONSTRUCT 48" DIA SANITARY MANHOLE	L F	180	\$ 425.00	\$ 76,500.00	150	\$ 63,750.00		\$ -	30	\$ 12,750.00
CONSTRUCTION TOTAL \$								\$ 360,375.00		\$ -		\$ 211,350.00
CONTINGENCY TOTAL (10%) \$								\$ 36,038.00		\$ -		\$ 21,135.00
SUBTOTAL \$								\$ 396,413.00		\$ -		\$ 232,485.00
INDIRECT COST TOTAL (20%) \$								\$ 79,283.00		\$ -		\$ 46,497.00
TOTAL \$								\$ 475,696.00		\$ -		\$ 278,982.00
PINE HEAVEN PROJECT TOTAL COST \$												



Appendix C

Preliminary Assessment Map

Preliminary Assessment Roll



Preliminary Assessment Roll

WSB Project:
Project Location:
WSB Project No.:
Date:

2024 / 2025 STREET RECONSTRUCTION AND MUNICIPAL SEWER AND WATER EXTENSION PROJECT (PINE HAVEN) City of Lino Lakes 023620-000 6/10/2024
--

Residential per Unit
Cost
\$16,000.00

MapID	PIN	PROPERTY ADDRESS			OWNER	ASSESSMENT
1	043122330014	8060 LAKE DR	LINO LAKES	MN 55014	BOHJANEN-HAMMITT, CANDICE A	\$16,000.00
2	043122330015	8066 LAKE DR	LINO LAKES	MN 55014	MCKENZIE ANDREW W & KITTY A	\$16,000.00
3	043122330016	8074 LAKE DR	LINO LAKES	MN 55014	KOHEL TRUSTEE, MARY A	\$16,000.00
4	043122330025	904 81ST ST W	LINO LAKES	MN 55014	GENOSKY, JOHN JOSEPH	\$16,000.00
5	043122330024	8031 DANUBE ST	LINO LAKES	MN 55014	BARBER GERALD G & DIANE L	\$16,000.00
6	043122330023	8027 DANUBE ST	LINO LAKES	MN 55014	SCHMIDT, GARY DANIEL	\$16,000.00
7	043122330022	8023 DANUBE ST	LINO LAKES	MN 55014	YORK, DANIEL BRUCE	\$16,000.00
8	043122330021	8021 DANUBE ST	LINO LAKES	MN 55014	RODRIGUEZ JESSE	\$16,000.00
9	043122330020	8015 DANUBE ST	LINO LAKES	MN 55014	APMAN JEFFREY J & MICHELLE R	\$16,000.00
10	043122330019	8016 DANUBE ST	LINO LAKES	MN 55014	TESTIN TRUSTEE NEAL	\$16,000.00
11	043122340021	8020 DANUBE ST	LINO LAKES	MN 55014	SCHALLY, JANELLE C	\$16,000.00
12	043122340020	8024 DANUBE ST	LINO LAKES	MN 55014	AGWA OBANG O	\$16,000.00
13	043122340019	8028 DANUBE ST	LINO LAKES	MN 55014	MASTRIAN, LYNDSEE ANNA	\$16,000.00
14	043122340018	8032 DANUBE ST	LINO LAKES	MN 55014	MAMMENG A DEREK R	\$16,000.00
15	043122340017	954 81ST ST W	LINO LAKES	MN 55014	CARR TRUSTEE, JAMES	\$16,000.00
16	043122340016	8029 ELBE ST	LINO LAKES	MN 55014	MCCOY, JOHN E	\$16,000.00
17	043122340015	8025 ELBE ST	LINO LAKES	MN 55014	BARSKI NANCY L	\$16,000.00
18	043122340014	8021 ELBE ST	LINO LAKES	MN 55014	STAFKI ROBERT L & SHARON A	\$16,000.00
19	043122340013	8019 ELBE ST	LINO LAKES	MN 55014	METZGER DAVID A & BARRON AMY C	\$16,000.00
20	043122340012	8015 ELBE ST	LINO LAKES	MN 55014	BUSCH TRACI M	\$16,000.00
21	043122340010	8011 ELBE ST	LINO LAKES	MN 55014	MURPHY ROBERT	\$16,000.00
22	043122340004	8010 ELBE ST	LINO LAKES	MN 55014	THIGPEN RICKEY A & TAMARA L	\$16,000.00
23	043122340005	8016 ELBE ST	LINO LAKES	MN 55014	SCHULTZ CAROL M	\$16,000.00
24	043122340006	8020 ELBE ST	LINO LAKES	MN 55014	SCHMIDT ROBERT J & MARY P	\$16,000.00
25	043122340007	8024 ELBE ST	LINO LAKES	MN 55014	BERNFELD MICHAEL & CAROLYN	\$16,000.00
26	043122340008	8028 ELBE ST	LINO LAKES	MN 55014	FREDRICKSON, JERRINE	\$16,000.00
27	043122340009	8032 ELBE ST	LINO LAKES	MN 55014	HOOVESTOL CURTIS	\$16,000.00
28	043122340023	8038 ELBE ST	LINO LAKES	MN 55014	WHELAN, BRIAN	\$16,000.00
29	043122340022	953 81ST ST W	LINO LAKES	MN 55014	MOSER, STEVEN ROBERT	\$16,000.00
30	043122330026	945 81ST ST W	LINO LAKES	MN 55014	PEARSON, JULIE M	\$16,000.00
						\$480,000.00



APPENDIX D

Municipal Utility Unit Cost Estimates

Municipal utility extension would be funded by assessments to the benefitting properties and trunk utility funds. The proposed assessment amount is \$16,000 per unit/lot.

The City has established connection fees to pay for the trunk facilities on each utility. The trunk utility connection fees would be due at the time of connection. The 2024 connection fees for watermain and sanitary sewer are \$4,066 per unit/lot and \$3,363 per unit/lot respectively, which combined are \$7,429 per unit/lot. There would also be project specific additional trunk connection fees for watermain and sanitary sewer \$5,927 per unit/lot respectively.

A summary of the connection fees on a per unit basis:

Sanitary Sewer and Water Connection Fees per unit/lot	
Trunk sanitary sewer and SAC	\$3,363
Trunk watermain and WAC	\$4,06
Additional Trunk Connection Fee	\$5,927
MCES SAC	\$2,485
Total	\$15,841

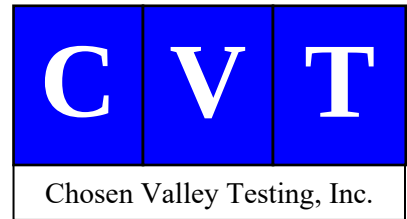
In addition to these costs, the individual property owners would need to hire a contractor to make the connection from the City's Right of Way to the house. The estimated cost of construction for installing both the sanitary sewer and watermain is \$10,000 per unit.

The City consulted with an independent appraiser to develop the proposed assessments. As part of the analysis, the appraiser determined a typical well replacement to cost typically \$15,000 - \$25,000 and a typical septic system replacement \$25,000 - \$30,000. The average overall full replacement well and septic is expected to cost \$40,000 - \$60,000 per unit.



APPENDIX E

Design Phase Geotechnical Evaluation (November 2023)



Design Phase Geotechnical Evaluation:

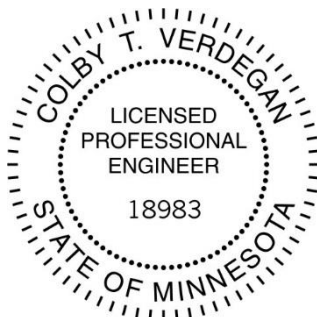
Proposed 81st Street to Elbe Street Infrastructure
Improvements
Lino Lakes, Minnesota

Prepared for:

City of Lino Lakes
c/o: Michael Grochala

November 4, 2023
CVT Project: 22538.23.MNS

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.

A handwritten signature in black ink that reads 'Colby T. Verdegan'.

Colby T. Verdegan, PE
Geotechnical Engineer
Registration Number 18983
Date: November 4, 2023

Chosen Valley Testing, Inc.

245 Roselawn Avenue East, Suite #29, St. Paul, MN 55117
Phone: 1-651-756-7384 Fax: 1-651-888-6121

City of Lino Lakes
c/o: Michael Grochala
600 Town Center Parkway
Lino Lakes, MN 55014
Email: Michael.Grochala@ci.lino-lakes.mn.us

November 4, 2023

cc. WSB
Veronica Abrams-Kubicek, PE
VKubicek@wsbeng.com

**Re: Design Phase Geotechnical Evaluation
Proposed 81st Street to Elbe Street Infrastructure Improvement
Lino Lakes, Minnesota
CVT Number: 22538.23.MNS**

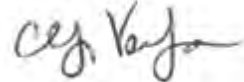
Dear Mr. Grochala,

As authorized, we have completed the geotechnical evaluation for the proposed infrastructure improvements in Lino Lakes, Minnesota. The attached report provides details of our findings and recommendations for the proposed project. CVT appreciates the opportunity to provide geotechnical services on this project. If you have any questions about our report, please feel free to contact us at (651) 756-7384.

Sincerely,
Chosen Valley Testing, Inc.



Hannah Fischer
Graduate Engineer



Colby T. Verdegan, PE
President/Chief Engineer

TABLE OF CONTENTS

A. INTRODUCTION	2
A.1. PURPOSE	2
A.2. SCOPE	2
A.3. BORING LOCATIONS AND ELEVATIONS.....	2
A.4. GEOLOGIC BACKGROUND	2
B. SUBSURFACE DATA	2
B.1. STRATA	3
B.2. PENETRATION TEST RESULTS	3
B.3. GROUNDWATER DATA	4
C. PROJECT DESIGN DATA	4
D. UTILITY RECOMMENDATIONS.....	4
D.1. GROUNDWATER/DE-WATERING	4
D.2. TRENCH SIDEWALLS	4
D.3. TRENCH BOTTOM STABILITY.....	5
D.4. FILL PLACEMENT AND COMPACTION	5
E. PAVEMENT RECOMMENDATIONS	5
E.1. STRIPPING AND GRADING	5
E.2. PRELIMINARY PAVEMENT DESIGN.....	5
F. CONSTRUCTION TESTING AND DOCUMENTATION	6
F.1. EXCAVATION	6
F.2. COMPACTION	6
F.3. COLD WEATHER	6
F.4. CONSTRUCTION PHASE TESTING AND DOCUMENTATION	6
G. LEVEL OF CARE.....	6
APPENDIX	7

BORING LOCATION SKETCH

LOG OF BORING # 1-4

LEGEND TO SOIL DESCRIPTION

**Design Phase Geotechnical Report
81st Street to Elbe Street Infrastructure Improvements
Lino Lakes, Minnesota**

CVT Project Number: 22538.23.MNS

Date: November 4, 2023

A. Introduction

The intent of this report is to present our findings and describe the means used to collect the data. The data was collected for a specific purpose and may not be suitable for other purposes. We should be consulted before attempting to use the data for other uses. A complete and thorough review of the entire document, including its assumptions and its appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This geotechnical report was prepared to assist planning for proposed infrastructure improvements of the subdivision located northeast of 81st Street to Elbe Street in Lino Lakes, Minnesota. Our services were authorized by Mr. Michael Grochala from The City of Lino Lakes.

A.2. Scope

To obtain data for analysis, a total of four (4) penetration test borings were performed. The borings were drilled to depths of about 9 ½ to 14.9 feet. Our engineering scope consisted of providing this report of our procedures, findings and geotechnical recommendations for construction and design of potential utility replacements and paved areas.

A.3. Boring Locations and Elevations

The preferred boring locations were indicated to Chosen Valley Testing (CVT) on a site plan provided by the city. The Boring Location Sketch in the Appendix shows the approximate locations as drilled on aerial imagery using Google Earth software. Ground surface elevations were estimated using MnTOPO software from the Minnesota DNR and are indicated on the Log of Boring sheets in the Appendix. The elevations should be considered approximate.

A.4. Geologic Background

A geotechnical report is based on subsurface data collected for the specific structure or problem. Available geologic data from the region can help interpretation of the data and is briefly summarized in this section.

Geologic maps indicate the soils in the area are dominated by lacustrine deposited of sands. Bedrock is commonly more than 200 feet below the surface and is not a consideration for this project.

B. Subsurface Data

The borings were performed using penetration test procedures (Method of Test D1586 of the American Society for Testing and Materials). This procedure allows for the extraction of intact soil specimen from deep in the ground. With this method, a hollow-stem auger is drilled to the desired sampling depth. A 2-inch OD sampling tube is then screwed onto the end of a sampling rod, inserted through the hole in the auger's tip,

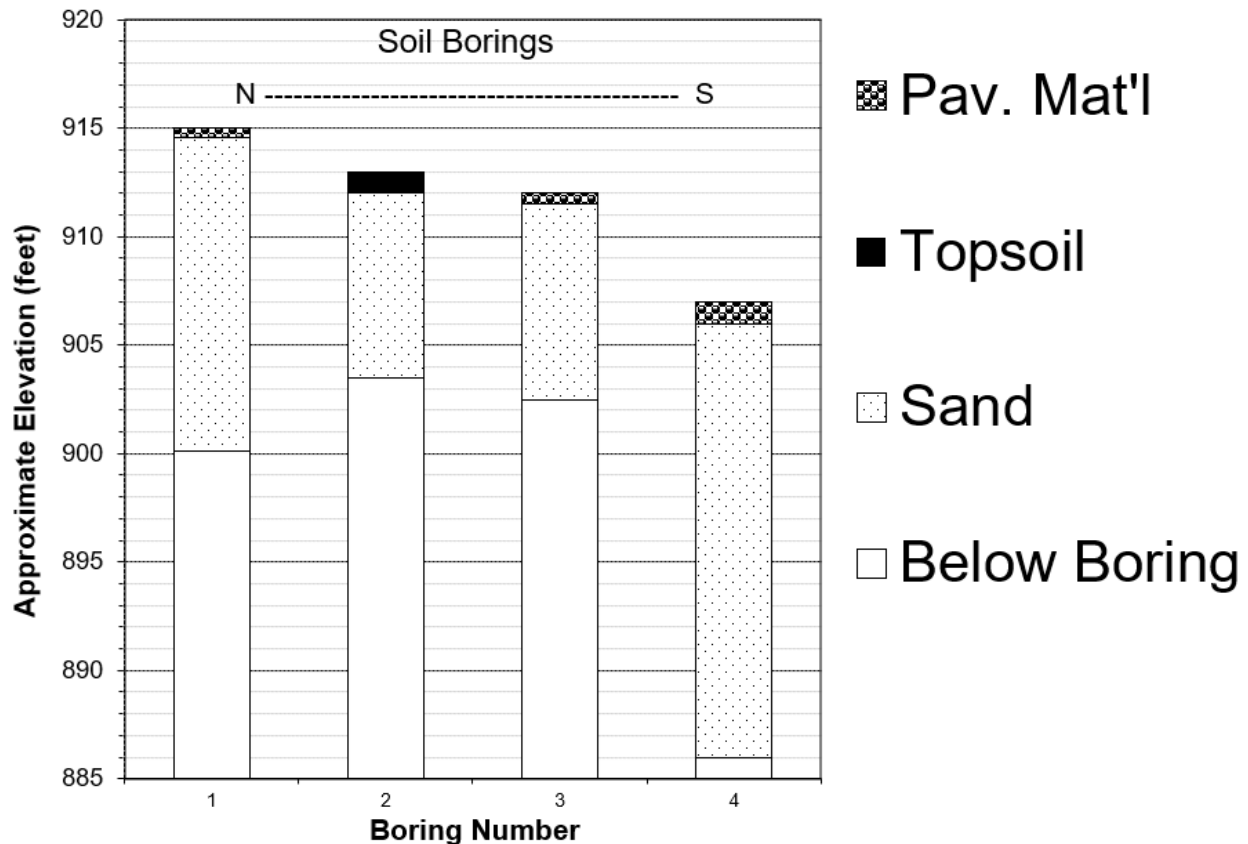
and then driven into the soil with a 140-pound hammer dropped repeatedly from a height of 30 inches above the sampling rod. The sampler is driven 18 inches into the soil unless the material is too hard. The samples are generally taken at 2½ to 5-foot intervals. The core of soil obtained was classified and logged by our drilling personnel at the site and a representative portion was then sealed and delivered to our laboratory for further review.

B.1. Strata

Three borings were drilled through existing roadways and encountered about 1 to 6 inches of asphalt over 4 to 6 inches of aggregate. The northeast boring was drilled in a green area for a possible roadway extension and met about 1 foot of topsoil at the surface.

Below the surface materials, the borings were dominated by clean sands natural sands (poorly graded sand and poorly graded sand with silt). All borings terminated in the sands.

For the reader's convenience, we have summarized the soil boring data in the following cross-section. The reader is referred to the boring logs in the Appendix for more detailed information.



B.2. Penetration Test Results

Penetration Test Results: The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The results tend to be more meaningful for natural mineral soils than for fill soils. In fill soils, density tests are more meaningful.

Penetration resistance values ("N" Value) of 4 to 10 blows per foot (BPF) were recorded in the sands

indicating they were very loose to loose but mostly loose.

A key to descriptors used to qualify the relative density of soil (such as *soft*, *stiff*, *loose*, and *dense*) can be found on the Legend to Soil Description in the Appendix.

B.3. Groundwater Data

During drilling, the drillers may note the presence of moisture on the sampler, in the cuttings, or in the borehole itself. These findings are reported on the Log of Boring sheets. Because water levels vary with weather, time of year, and other factors, the presence or lack of water during exploration is subject to interpretation and is not always conclusive.

Water was observed at a depth of 10 feet in the deepest boring, which was also the boring at the lowest ground surface elevation. This depth corresponds to the elevation of 897 feet on the datum used to locate the borings. Groundwater levels at the site are expected to fluctuate seasonally similar to levels in the nearby lake, as well as with local weather patterns.

C. Project Design Data

Each structure has a different loading configuration and intensity, different grades, and different structural and performance tolerances. Therefore, the geotechnical exploration will be construed differently from one structure to another. If the initial structure should change design, we should be engaged to review these conditions with respect to the prevailing soil conditions. Without the opportunity to review any such changes, the recommendations may no longer be valid or appropriate.

The project consists of complete reconstruction of pavements and the installation of watermain, storm sewer and sanitary sewer in the subdivision. CVT assumes the pipes will be installed at depths between 5 and 10 feet using open cut excavations or direction drilling.

We have assumed final grades will be at or close to the existing grades. The new pavement is expected to consist of asphalt over aggregate base.

D. Utility Recommendations

D.1. Groundwater/De-watering

As mentioned earlier, water was only observed in the boring with the lowest elevation, at a depth of 10 feet. If water is encountered during the excavation, well-points or dewatering wells will likely be required.

D.2. Trench Sidewalls

The contractor will be required to slope or shore the excavations as needed to meet OSHA requirements for safety. Most of the soils would be expected to classify as Type C soils as defined by OSHA. Trench boxes or other stabilization methods may be necessary if excavations encroach near existing utilities or structures.

D.3. Trench Bottom Stability

Depending upon location and depth, the utilities are expected to bear primarily on clean sands. These materials are considered suitable for support of pipes. If soft and unstable conditions are encountered, we recommend placing bedding of coarse sand or gravel at the base of the trenches to provide a more stable bottom for crews laying the pipes. Such conditions are not expected.

In order to reduce the potential for point loads on the pipes, we recommend removing any cobbles or boulders to a depth of at least 6 to 8 inches from around pipes and replacing those materials with clean sand or gravel that can more readily conform to the pipes. Again, cobbles and boulders were not observed during drilling.

D.4. Fill Placement and Compaction

The sands encountered are considered suitable for use as backfill above utilities and supporting the pavements. Soils placed as backfill below paved areas should be compacted to 100% of their maximum standard Proctor density (ASTM D 698) in the upper 3 feet, and to at least 95% below. In green areas, 90% compaction is normally adequate.

E. Pavement Recommendations

E.1. Stripping and Grading

We recommend removing the existing asphalt, aggregate base, and topsoil or other unsuitable soil from within 3 feet of the proposed pavement section subgrade before placing the new pavement material sections. It may be possible to reclaim and reuse the existing asphalt and aggregate for use as part of the new pavement's aggregate base, provided it meets MnDOT specifications.

After the removals, utility construction, and grading, the near-surface soils are expected to primarily consist of clean sands. We recommend scarifying and compacting all near-surface soils in order to even out any localized discontinuities in the subgrade materials and to provide a more gradational transition between differing materials. This action is intended to limit differential frost heave and provide more uniform pavement support.

Subgrades should be test rolled using a tandem axle truck. Any soft areas detected should be scarified, dried, and recompacted. If time constraints prohibit drying, soil corrections, extra aggregate base, breaker run, sand subbase, and/or geotextiles may be necessary for stabilization.

E.2. Preliminary Pavement Design

As mentioned earlier, subgrade soils are expected to consist primarily of clean sands. The effective Hveem-stabilometer R-values for dominant sands would be expected to range from 50 to 70. We recommend using a value of 50 for pavement design.

In the absence of traffic loading, we recommend a pavement section consisting of at least 3 inches of asphalt and 6 inches of aggregate base. As noted before, the existing pavements could possibly be milled

and then reused as base material provided the reclaimed material meets Mn/DOT Specification 3138 for Class 5 Aggregate Base.

F. Construction Testing and Documentation

F.1. Excavation

A variety of equipment is expected to be capable of performing earthwork and grading. An excavator or backhoe with a smooth-lipped bucket is recommended for completing any excavations. This is intended to limit disturbance to the supporting soils being left in place, while also producing a smooth working surface.

F.2. Compaction

Fill should be placed in lifts adjusted to the compactor being used and the material being compacted. We recommend limiting lifts to no more than 1 foot, assuming large, self-propelled or tow-behind compactors are used. Thinner lifts should be used for lighter compaction equipment.

F.3. Cold Weather

If the earthwork occurs during freezing temperatures, good winter construction practices should be used. No frozen fill should be used nor should structural filling take place on frozen ground.

F.4. Construction Phase Testing and Documentation

The bottom of all excavations, grading, and roadway subgrade should be evaluated and documented by geotechnical personnel after the unsuitable materials are removed and before placement of any fill or pavement. Samples of any fill materials and/or alternative gradations of materials proposed for use should be submitted for approval before use. The City may wish to have, or may be obligated to have tests performed regarding the other various paving components. Specification of such requirements is normally the responsibility of the City and their design consultant.

G. Level of Care

The services provided for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area, under similar budget and time constraints. This is our professional responsibility. No other warranty, expressed or implied, is made.

Appendix

Boring Location Sketch

Log of Boring # 1-4



Legend
○ Boring Locations

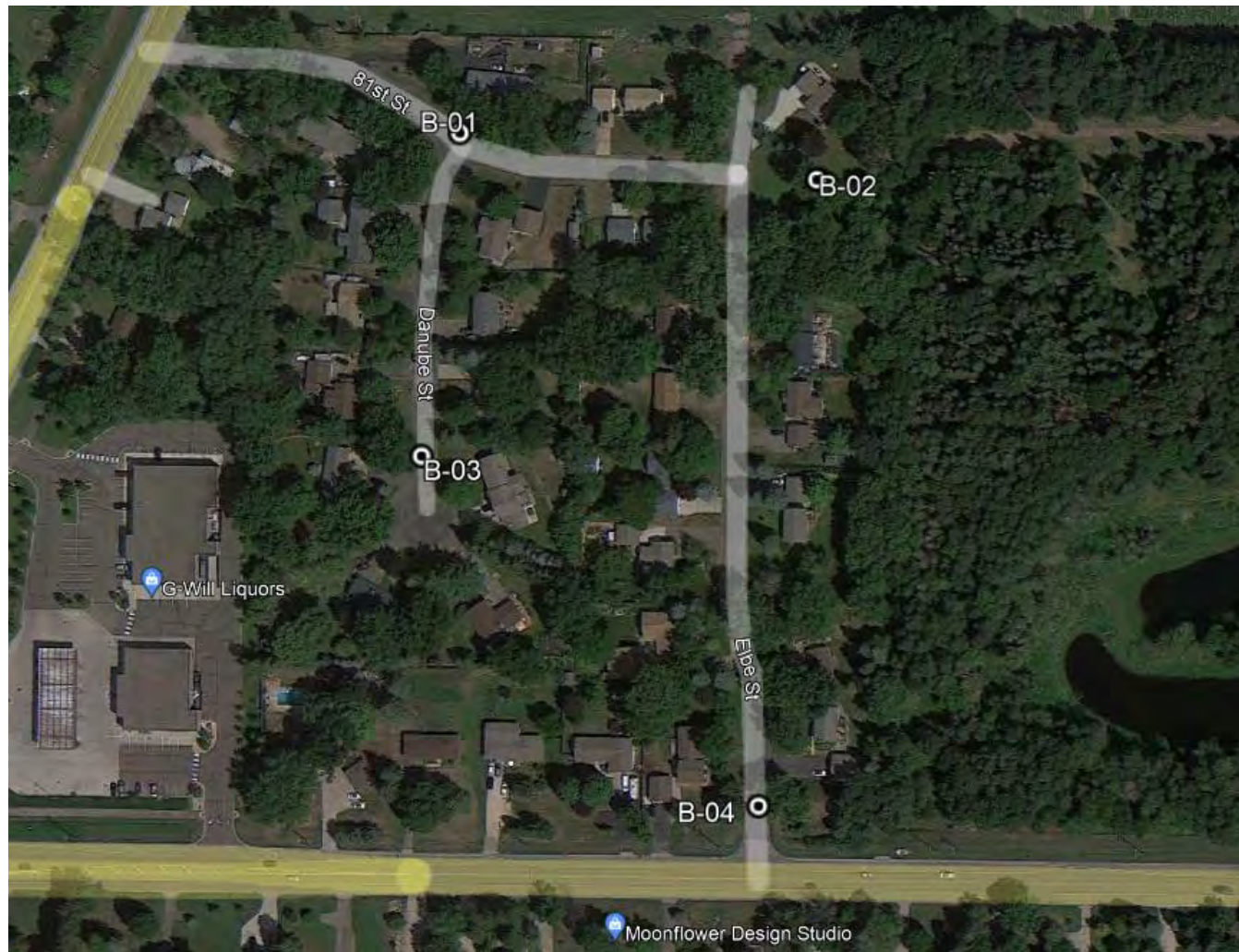
Boring Location Sketch

81st St. to Elbe Street Improvements

8032 Elbe St.

Lino Lakes, Minnesota

CVT Project 22538.23.MNT



LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 22538.23.MNT Design Phase Geotechnical Evaluation Lino Lakes 81st Street Improvements 8032 Elbe St. Lino Lakes, Minnesota				BORING: B-01		
				LOCATION: See attached sketch.		
				DATE: 10/3/2023	SCALE: 1" = 3'	
Elev. 915.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
914.9	0.1	SP SM	1 INCH BITUMINOUS			Elevations were estimated using MnDNR's program MNTPO and should be considered approximate. MC= 3.1%
914.6	0.4		4 INCHES AGGREGATE			
			POORLY GRADED SAND WITH SILT fine grained, brown, moist, loose. (Glacial Outwash)			
				9		
				8		MC= 6.9%
				9		MC= 14%
				5		MC= 7.3%
				8		MC= 5.1%
				6		
900.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			MC= 14.5%

CVT STANDARD 22538.23.MNT (LINO LAKES 81ST STREET).GPJ LOG A GNN06.GDT 10/24/23

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 22538.23.MNT Design Phase Geotechnical Evaluation Lino Lakes 81st Street Improvements 8032 Elbe St. Lino Lakes, Minnesota				BORING: B-02		
				LOCATION: See attached sketch.		
				DATE: 10/3/2023	SCALE: 1" = 3'	
Elev. 913.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
912.0	1.0	OL	TOPSOIL Silty Sand, fine grained, trace Roots, dark brown, moist.			
		SP SM	POORLY GRADED SAND WITH SILT fine grained, brown, moist, loose. (Glacial Outwash)			
				8		MC= 8.9%
				9		MC= 11.7%
				9		MC= 7.3%
				8		MC= 9%
903.5	9.5		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22538.23.MNT (LINO LAKES 81ST STREET).GPJ LOG A GNNN06.GDT 10/24/23

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 22538.23.MNT Design Phase Geotechnical Evaluation Lino Lakes 81st Street Improvements 8032 Elbe St. Lino Lakes, Minnesota				BORING: B-03		
				LOCATION: See attached sketch.		
				DATE: 10/3/2023	SCALE: 1" = 3'	
Elev. 912.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
911.8	0.2	SP SM	2 INCHES BITUMINOUS			
911.5	0.5		4 INCHES AGGREGATE			
			POORLY GRADED SAND WITH SILT fine grained, brown, moist, loose. (Glacial Outwash)			MC= 6.7%
				10		
				7		MC= 5.8%
						MC= 7.3%
				10		MC= 6.9%
				9		
902.5	9.5		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22538.23.MNT (LINO LAKES 81ST STREET), GPJ LOG A GNN06.GDT 10/24/23

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 22538.23.MNT Design Phase Geotechnical Evaluation Lino Lakes 81st Street Improvements 8032 Elbe St. Lino Lakes, Minnesota				BORING: B-04		
				LOCATION: See attached sketch.		
				DATE: 10/3/2023	SCALE: 1" = 3'	
Elev. 907.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
906.5	0.5		6 INCHES BITUMINOUS			
906.0	1.0		6 INCHES AGGREGATE			
		SP SM	POORLY GRADED SAND WITH SILT fine grained, brown, moist to 10 feet then water bearing, loose. (Glacial Outwash)			
				7		MC= 9.6%
				7		
				9		MC= 4.9%
				9	▽	MC= 26.4%
				4		MC= 24.6%
				5		MC= 25%
886.0	21.0			7		MC= 25.6%
			End of boring. Water was observed at 10 feet during drilling. Boring was sealed upon completion.			

CVT STANDARD 22538.23.MNT (LINO LAKES 81ST STREET).GPJ LOG A GNN06.GDT 10/24/23

UNIFIED SOIL CLASSIFICATION (ASTM D-2487/2488)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL	
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL	
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND	
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND	
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY	
			PI>4 AND PLOTS<"A" LINE	ML	SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY	
			PI PLOTS <"A" LINE	MH	ELASTIC SILT	
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT	
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	

Relative Proportions of Sand and Gravel	
TERM	PERCENT
Trace	< 15
With	15 - 29
Modifier	> 30
Relative Proportions of Fines	
TERM	PERCENT
Trace	< 5
With	5 - 12
Modifier	> 12
Grain Size Terminology	
TERM	SIZE
Boulder	< 12 in.
Cobble	3 in. - 12 in.
Gravel	#4 sieve to 3 in.
Sand	#200 sieve to #4 sieve
Silt or Clay	Passing #200 sieve

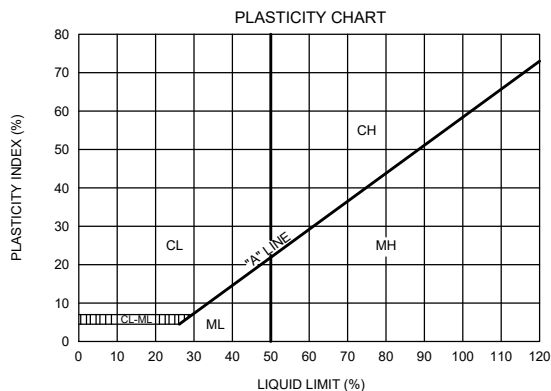
SAMPLE TYPES

- Hollow Stem
- Standard Penetration Test

TEST SYMBOLS

- | | |
|-----------------------------|--|
| MC - MOISTURE CONTENT | LL - LIQUID LIMIT |
| OC - ORGANIC CONTENT | PI - PLASTISITY INDEX |
| CN - CONSOLIDATION | SW - SWELL TEST |
| DD - DRY DENSITY | UU - Unconsolidated Undrained triaxial |
| PP - POCKET PENETROMETER | |
| RV - R-VALUE | |
| SA - SIEVE ANALYSIS | |
| P200 - % PASSING #200 SIEVE | |

- WATER LEVEL (WITH TIME OF MEASUREMENT)



PENETRATION RESISTANCE (RECORDED AS BLOWS / 0.5 FT)				
SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 1	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 3	0.25 - 0.50
MEDIUM DENSE	10 - 30	RATHER SOFT	4 - 5	0.50 - 1.0
DENSE	30 - 50	MEDIUM	6 - 8	
VERY DENSE	OVER 50	RATHER STIFF	9 - 12	1.0 - 2.0
		STIFF	13 - 16	
		VERY STIFF	17 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

Chosen Valley Testing

Job No. 16678.20.MNT

LEGEND TO SOIL DESCRIPTIONS

