Chosen Valley Testing

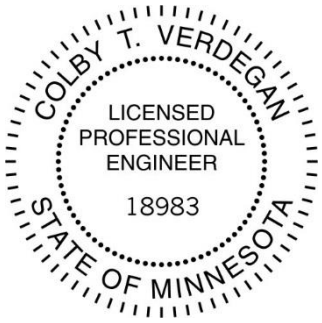
Design Phase Geotechnical Evaluation:

Proposed Bloomington Townhomes
11140 Bloomington Ferry Road
Bloomington, Minnesota

Prepared for:

Scott Carlston
Carlston Development

December 10, 2024
CVT Project: 24602.24.MNT



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.

Colby T. Verdegan, PE
Geotechnical Engineer
Registration Number 18983
Date: December 10, 2024

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing, 245 E. Roselawn Avenue, Suite 29, St. Paul, Minnesota 55117 (651) 756-7384 fax (651) 888-6121

Scott Carlston
Carlston Development
CarlstonDevelopment.com
Phone: 612-889-7898
Email: Scott5Carlston@gmail.com

December 10, 2024

Re: Design Phasea Geotechnical Evaluation
Proposed Bloomington Townhouses
11140 Bloomington Ferry Road
Bloomington, Minnesota
CVT Project 24602.24.MNT

Dear Mr. Carlston:

,

As authorized, we have completed the attached geotechnical evaluation report for the above development. This letter briefly summarizes the findings in the attached report.

Summary of Boring Results

All of the borings encountered topsoil at the surface. The topsoil appeared to be about 1 to 2 feet thick.

Below the topsoil, most of borings encountered "possible fill" to typical depths of about 4 to 6 feet. The southeastern boring for the north building and the nearby eastern roadway boring were the exceptions and terminated in the possible fill to the planned depths of about 15 feet.

The possible fill materials included consisted primarily of rather clean sands but included clay layers at two locations. It was termed "possible fill" because it was visually different than the more obvious natural soils at depth and was often dark but lacked characteristics specific to fill.

The dominant soils encountered at depth were rather clean sands which were often gravelly. The borings for the southern building met gravelly silty sands, and one boring terminated in a layer of gravel.

Free water was not observed in the borings. We would expect groundwater levels to fluctuate similarly to nearby lakes and rivers, along with local weather patterns.

Summary of Analysis and Recommendations

Based on the data, the general site stratigraphy consists of topsoil overlying primarily possible fill soils of varying depth, which is underlain by natural clean sands and silty sands. We recommend removing the topsoil from the building and roadway building areas. For planning purposes, we recommend assuming that the possible fill soils must also be removed from all building areas. If test pits before or during constructions

reveal that some or all of the possible fill soils are natural deposits, those materials can likely remain in place.

Remarks

We appreciate the opportunity to serve you. 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
Sr. Geotechnical/Materials Engineer

TABLE OF CONTENTS

Design Phase Geotechnical Evaluation
Proposed Bloomington Townhomes
11140 Bloomington Ferry Road
Bloomington, Minnesota

CVT Project Number: 24602.24.MNT
Date: December 10, 2024

A. Introduction

The intent of this report is to present our results to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services must often be completed before the design, assumptions are sometimes needed to prepare a proper evaluation and to analyze the data. A complete and thorough review of this entire document, including the assumptions and the appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This geotechnical report was prepared to aid in the design and construction of proposed townhouse development in Bloomington, Minnesota. Our services were authorized by Scott Carlston of Bloomington Ferry Bridge, LLC.

A.2. Scope

To provide data for analysis, a total of eleven (11) borings were drilled at the site to depths of about 15 feet. Our engineering scope consisted of providing this geotechnical report summarizing our procedures, findings, and geotechnical analyses and recommendations for the proposal development.

A.3. Boring Locations and Elevations

The boring locations were indicated to Chosen Valley Testing on a site plan provided by the client. The Boring Location Sketch in the Appendix shows the approximate boring locations as drilled and was made by superposing GPS coordinates for the borings and the plan onto a satellite view of the project area using Google Earth software.

Ground surface elevations at the borings were estimated using topographic contour lines on site plans provided by the client, dated October 31, 2024. The estimated elevations are indicated on the Log of Boring sheets in the Appendix and 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 suggest that the natural soils in the area are primarily terrace sands, gravelly sands and gravel. Bedrock is expected to be more than 100 feet below the surface and is not a consideration for this project.

B. Subsurface Data

Methods: 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 is classified and logged by the driller and a representative portion is then sealed in a jar and delivered to the soils engineer for review.

B.1. Stratification

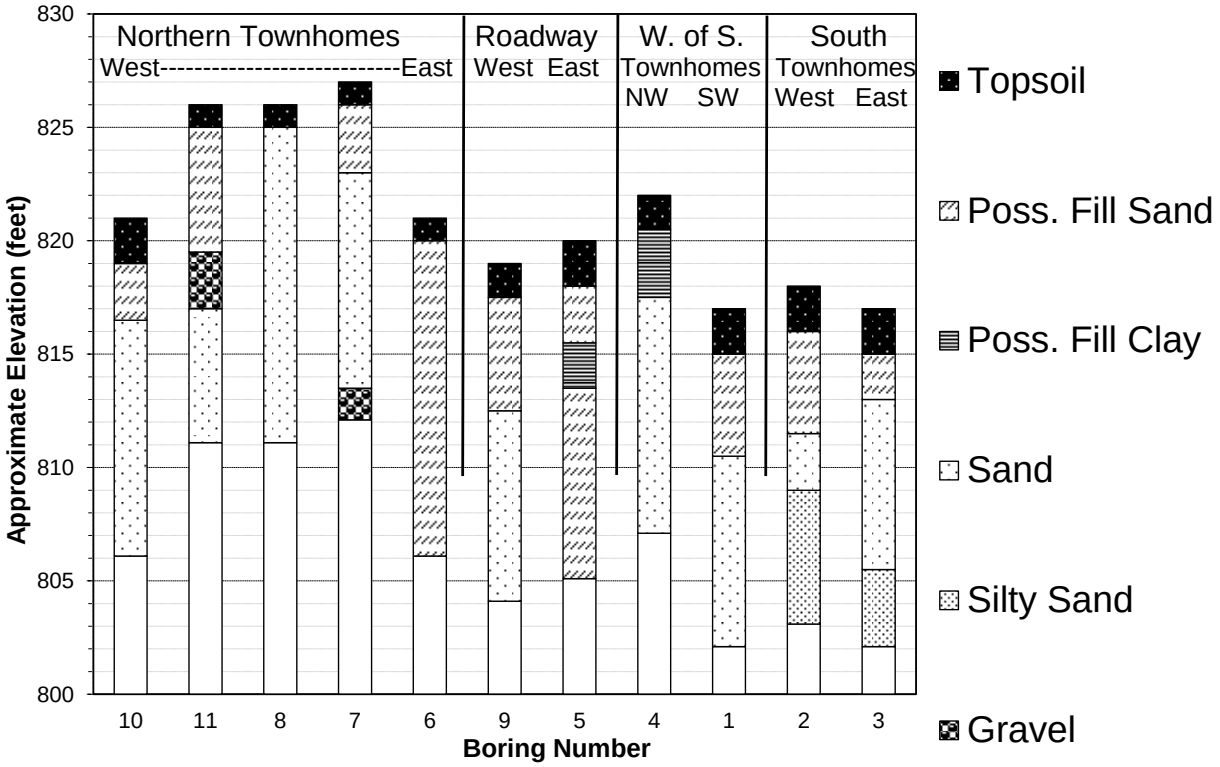
All of the borings encountered topsoil at the surface. The topsoil appeared to be about 1 to 2 feet thick.

Below the topsoil, most of borings encountered “possible fill” to typical depths of about 4 to 6 feet. The southeastern boring for the north building and the nearby eastern roadway boring were the exceptions and terminated in the possible fill to the planned depths of about 15 feet.

The possible fill materials included consisted primarily of rather clean sands but included clay layers at two locations. It was termed “possible fill” because it was visually different than the more obvious natural soils at depth and was often dark but lacked characteristics specific to fill.

The dominant soils encountered at depth were rather clean sands which were often gravelly. The borings for the southern building met gravelly silty sands, and one boring terminated in a layer of gravel.

For the reader’s convenience, the boring data has been summarized in the following cross sections. For more detailed information, please refer to the Log of Boring sheets in the Appendix.



B.2. Penetration Test Results

The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The number of blows to advance the sampler 1 foot is called the penetration resistance or "N"-value. The results tend to be more meaningful for natural mineral soils than for fill soils. In fill soils, compaction tests are more meaningful.

Penetration resistance values (N-values) in the natural soils ranged from 5 to 29 Blows per Foot (BPF) were recorded, indicating they were very loose to medium dense but mostly medium dense. The values in the possible fill ranged from 6 to 18 BPF.

A key to the 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 the drilling operation, the drillers may note the presence of moisture on the sampling instrument, in the cuttings, or within the boreholes. These observations are recorded on the boring logs. The water level may vary with weather, time of year and other factors and the presence or absence of water during the drilling is subject to interpretation and is not always conclusive.

Free water was not observed in the borings. We would expect groundwater levels to fluctuate similarly to nearby lakes and rivers, along with local weather patterns.

C. Design Information

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 construction of three separate townhouse structures along with associated roadways and utilities. The townhouses are assumed to be two-story structures without basements. Foundation loads are assumed to be on the order of 3,000 pounds per lineal foot or less and column loads were assumed to be about 50 kips or less.

Grading plans for the development were not provided. Based on the apparent elevations at the boring locations, cuts and fills for roads and buildings are expected to be less than 8 feet and perhaps only a couple feet in some areas.

A private drive will separate the northern and southern buildings. We assume that a storm pond will be needed, but none were indicated on the plan provided..

D. Analysis

Based on the data, the general site stratigraphy consists of topsoil overlying primarily possible fill soils of varying depth, which is underlain by natural clean sands and silty sands. We recommend removing the topsoil from the building and roadway building areas. For planning purposes, we recommend assuming that the possible fill soils must also be removed from all building areas. If test pits before or during constructions reveal that some or all of the possible fill soils are natural deposits, those materials can likely remain in place.

The remainder of this report provides more detailed geotechnical recommendations for the project.

E. Grading

E.1. Topsoil Stripping

We recommend stripping the topsoil from below all paved areas and future building areas. In paved areas which require 3 feet of fill or more to attain top-of-subgrade, it should be adequate to strip the vegetation and rootzone.

All fill should be removed from the building areas, along with any existing foundations, utilities, or other unsuitable soils. For planning purposes, we recommend assuming that the possible fill must also be removed from the building areas. The tabulation below shows the apparent depth of unsuitable soils in the building area borings.

Building	Boring Number	Approx. Ground Surface Elevation (feet)	Approx. Depth of Topsoil (feet)	Approx. Depth of Possible Fill (feet)	Apparent Bottom Elevation of Possible Fill (feet)
South Building	2	818	2	4 1/2	811 1/2
	3	817	2	2	813
North Buildings	6	821	1	14	806
	7	827	1	3	823
	8	826	1	0	825
	10	821	2	2 1/2	816 1/2
	11	826	1	5 1/2	819 1/2

E.2. Over-Sizing

The corrective excavations surface should be oversized at least 1-foot beyond the perimeter of the building or paved areas for each foot of fill needed below footing grade or pavements. This oversizing can be reduced by up to 50% if rather precise staking is present during grading. In that event, we suggest allowing a few extra feet as a nominal safety factor against stakes getting moved or against repositioning of buildings on site.

E.3. Filling and Compaction

All fill placed in building areas and paved areas should be compacted to at least 95% of the soil's maximum standard Proctor density (ASTM D 698). In the upper 3 feet of paved areas, we recommend compaction to 100% of its maximum standard Proctor density. In green areas, compaction to 90% is normally adequate.

We recommend using sands or gravels having less than 12% particles passing a #200 sieve as fill. The existing natural poorly graded sands and poorly graded sands with silt appear suitable for reuse as bulk engineered fill in and paved building areas. Most of the existing possible fill, excluding the clay soils, also appears suitable, but should be revaluated during grading.

F. Building Design

F.1. Foundation Depth

We recommend that foundations bear on soils at least 42 inches below the exposed ground surface for frost protection. Footings for unheated structures should ideally be placed 60 inches below the surface.

F.2. Bearing Capacity and Settlement

With the understood foundation loads and implementation of the earthwork recommendations, we are of the opinion that foundations may be designed to exert a bearing pressure of up to 4,000 psf. This capacity includes a safety factor of at least 3 against shear failure.

With the recommended soil corrections and anticipated foundation depths and loads, total settlement of footings is expected to be less than 1 inch. Differential settlement is expected to be ½ inch or less between footings that are similarly loaded.

F.3. Vapor Barrier and Drainage

If the slab receives coverings that are less permeable than concrete, a vapor barrier should be placed below the slab. Some contractors prefer to place this barrier below the sand, to limit the potential for curling.

F.4. Slab Design

The completed slab subgrade is expected to consist primarily of clean, compacted sands. We recommend using a modulus of subgrade reaction of up to 200 pounds per cubic inch for these conditions.

F.5. Lateral Loads

Lateral support values are provided for the design of below-grade walls. Backfill should be compacted to at least 95% of its maximum standard Proctor density (ASTM D 698). Lateral resistance will depend on the materials used. We recommend using clean sands, having less than 12% passing a #200 sieve, as fill against below-grade walls. The table below includes support values for the recommended clean sands. These values do not include a safety factor.

Poorly Graded Sands (SP) 95% standard Proctor density	
Internal Friction Angle (degrees)	34
Cohesion (psf)	0
Coefficient of Friction between Concrete and Soil	0.40
Moist Unit Weight (pcf)	120
At-Rest Coefficient (Ko)	0.44
Active Coefficient (Ka)	0.28
Passive Coefficient (Kp)	3.54

The actual loads exerted on the structure will depend on the movement or flexure of the structure. For sand fill, horizontal movement or flexure of about 0.2% of the height of soil retained may be sufficient to mobilize frictional forces from the at-rest state to the active state.

G. Utilities

G.1. Groundwater/De-watering

As mentioned, water was not observed in the borings. Based on this, dewatering is not expected to be needed for utility installations or other deep excavations.

G.2. General Support

Open cut installations are expected to encounter mostly clean sands. These materials appeared to be suitable for support of the pipes.

G.3. Backslopes

The contractors performing the work will need to slope or shore the excavations as needed to provide safe conditions for installation of utilities. The dominant soils would be expected to classify as Type C materials as defined by OSHA. A trench box or other stabilization methods should be anticipated for deep excavations where lateral disturbance must be minimized.

G.4. Filling and Compaction

Soils placed as backfill in building areas or more than 3 feet below pavements should be compacted to at least 95% of their standard Proctor density (ASTM D 698). In the upper 3 feet of paved areas, we recommend compaction to 100%. In green areas, 90% compaction is normally adequate. Oversize materials should be kept at least ½ to 1-foot away from utilities, to limit potential for point loads on the pipes. We suggest reserving the clean sand materials for use in the upper portion of trenches in the roadway areas, if feasible.

H. Pavements

Based on the borings, rather clean sands are expected to be the dominant soils present after grading. These soils would be expected to have an R-value of about 50.

In the absence of traffic information, we would suggest a pavement section consisting of at least 3 ½ inches of asphalt and 8 inches of aggregate base for the private roadway for the development. The above pavement sections assume that the subgrade has been sufficiently moistened and compacted to pass a test roll. Observation of the test roll should be documented by qualified personnel. The necessity of scarifying and compacting the subgrade would be determined by the test roll. The pavement section should be considered preliminary, subject to review by the project engineering consultant, and subject to their experience with pavement design and performance in the area of the project.

I. Stormwater Infiltration Recommendations

We assumed that a stormwater pond will be needed at the site. The following table presents the recommended infiltration rate per soil type from the MPCA Minnesota Storm Water Manual (updated from Version 2X). Please see the individual Log of Boring sheets in the Appendix for soil classification details at each location and depth.

Unified Soil Classification System, USCS	Infiltration Rate (inches/hour)
Poorly Graded Sand (SP)	0.8
Poorly Graded Sand with Silt (SP-SM)	0.8

Silty Sand	0.2 to 45

Our experience is the infiltration rates for sands are often faster than the assumed values and may exceed MPCA recommended limiting values. Conversely, values for silty sands tend to be slower than even the lower table value. Double-ring infiltrometer testing is strongly recommended to provide site specific infiltration values and would need to be performed at the bottom of the infiltration structures.

J. Construction Testing and Documentation

J.1. Excavation

Stripping can likely be performed with a variety of equipment. A backhoe with a smooth lipped bucket is recommended to limit disturbance of the natural bearing soils, and construction traffic should be limited across the silts in particular.

I.2. Cold Weather

If the excavation occurs during freezing temperatures, good winter construction practices should be used. Frozen fill should be thawed before placing and filling should not be placed on frozen ground. Slab areas should be completely thawed prior to placing concrete.

I.3. Construction Testing and Documentation

The bottom of the excavations should be evaluated and documented by qualified personnel to assess the soils at bearing depth. Any fill placed should be evaluated for conformance to the project gradation recommendations and should be tested for compaction. If filling proceeds during periods of freezing weather, full-time testing should be considered to help confirm that imported fill is thawed prior to and during compaction, and that all snow has been removed before placement of the fill.

Although our firm offers testing services relating to civil and structural components of the structure (such as concrete testing, reinforcement observations, etc.), specification of such services are beyond our work scope and the designer should be consulted as to such requirements.

J. 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 # 1-11

Legend to Soil Description

C V T

Chosen Valley Testing, Inc.

Legend

Boring Locations

N

Boring Location Sketch

Bloomington Townhouses
11140 Bloomington Ferry Road
Bloomington, Minnesota
CVT Project 24602.24.MNT

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-01** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
817.0	0.0	SP SM	**TOPSOIL**, Poorly Graded Sand With Silt, fine to medium grained, trace Roots, dark brown.			Elevations were estimated from topographic contour lines the site plan provided by the client and should be considered approximate.
815.0	2.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, brown, moist, loose. B-Horizon or Possible Fill	6		
				9		
810.5	6.5	SP	**POORLY GRADED SAND WITH SILT**, fine grained, light brown, trace Gravel, moist, loose to medium dense. Terrace Deposit	13		
808.0	9.0	SM SP	**SILTY SAND TO POORLY GRADED SAND WITH SILT**, fine to medium grained, brown, moist, medium dense. Terrace Deposit	15		
				12		
803.5	13.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, brown, moist, medium dense. Terrace Deposit	18		
802.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-02** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
818.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, fine to medium grained, trace Roots, dark brown.			
816.0	2.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, dark brown, moist, loose. B-Horizon or Possible Fill	7 10		
811.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to coarse grained, light brown, moist, loose. Terrace Deposit	8		
809.0	9.0	SM	**SILTY SAND WITH GRAVEL**, fine to medium grained, brown, moist, medium dense. Terrace Deposit	12 17 19		
803.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN. TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-03** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
817.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, fine to medium grained, trace Roots, dark brown.			
815.0	2.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, brown, moist, loose. B-Horizon or Possible FIll	8		
813.0	4.0	SP	**POORLY GRADED SAND**, fine grained, brown, moist, loose. Terrace Deposit	8		
				5		
				6		
805.5	11.5	SM	**SILTY SAND WITH GRAVEL**, fine to coarse grained, light brown, moist, medium dense. Terrace Deposit	13		
802.1	14.9			17		
			End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-04** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
822.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown to 1.5ft then brown, trace Roots in first 1.5ft.			
820.5	1.5	CL	**SANDY LEAN CLAY**, fine to medium grained, dark brown, wet, stiff. B-Horizon or Possible Fill	9		
817.5	4.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, brown, moist, loose. Terrace Deposit	9		
				13		
			Below 10 feet, trace Gravel.	27		
				25		
807.1	14.9			29		
			End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN. TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-05** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
820.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, fine to medium grained, trace Roots, dark brown.			
818.0	2.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, dark brown, moist, medium dense. B-Horizon or Possible Fill	11		
815.5	4.5	CL	**SANDY CLAY**, brown, trace Roots, wet, stiff. B-Horizon or Possible Fill	9		
813.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, brown, moist, medium dense. Possible Fill	11 10		
808.0	12.0	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to medium grained, brown to dark brown mix, moist, medium dense. Possible Fill	14 17		
805.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-06** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
821.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown, trace Roots.			
820.0	1.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, dark brown, moist, medium dense. Possible Fill	16 18		
814.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, brown, moist, loose to medium dense. Possible Fill	9 12		
809.5	11.5	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to medium grained, brown, moist, medium dense. Possible Fill	25 21		
806.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-07** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
827.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown for first foot then brown, trace Roots observed in first foot.			
826.0	1.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine grained, brown, moist, loose. Possible Fill or B-Horizon	9		
823.0	4.0	SP	**POORLY GRADED SAND**, fine grained, brown, moist, medium dense. Terrace Deposit	5		
				16		
818.0	9.0	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to medium grained, brown, moist, loose to medium dense. Terrace Deposit	17		
				10		
813.5	13.5	GP	**POORLY GRADED GRAVEL**, fine to medium grained, gray, moist, medium dense. (Terrace Deposit)	19		
812.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-08** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
826.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown for first foot then brown, trace Roots observed in first foot.			
825.0	1.0	SP	**POORLY GRADED SAND**, fine grained, brown, moist, loosely dense. Terrace Deposit	9		
				8		
819.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium dense, trace Gravel, light brown, moist, medium dense. Terrace Deposit	10		
				16		
814.5	11.5	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to medium dense, brown, moist, medium dense. Terrace Deposit	16		
				16		
811.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN, TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-09** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
819.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown for first 1.5ft then brown, trace Roots observed in first 1.5ft.			
817.5	1.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, at 5ft trace Gravel, brown, moist, medium dense. B-Horizon or Possible Fill	11 13		trace Gravel observed.
812.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, brown, moist, loose. Terrace Deposit	8 10 17 15		
804.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN. TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-10** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
821.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, fine to medium grained, trace Roots, dark brown.			
819.0	2.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, dark brown, moist, loose. B-Horizon or Possible Fill	8		
816.5	4.5	SP SM	**POORLY GRADED SAND WITH SILT AND GRAVEL**, fine to medium grained, brown, moist, loose to medium dense. Terrace Deposit	6 11		
812.0	9.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, brown, moist, loose to medium dense. Terrace Deposit	10 8 19		
806.1	14.9		End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN. TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 24602.24.MNT Design Phase Geotechnical Evaluation Proposed Bloomington Townhomes 11140 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-11** LOCATION: See sttsched sketch. DATE: 11/18/2024 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
826.0	0.0	SP SM	**TOP SOIL**, Poorly Graded Sand With Silt, dark brown for first foot then brown, trace Roots observed in first foot.			
825.0	1.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, dark brown, moist, loose. B-Horizon or Possible Fill	8		
				10		
819.5	6.5		**GRAVELY SAND**, fine to medium grained, brown, moist, loose. Terrace Deposit	7		
817.0	9.0	SP SM	**POORLY GRADED SAND WITH SILT**, fine to medium grained, trace Gravel, brown, moist. medium dense. Terrace Deposit	11		
				21		
811.1	14.9			24		
			End of boring. Water not observed during drilling. Boring sealed upon completion.			

CVT STANDARD 24602.24.MNT (BLOOMINGTON MN. TOWNHOMES).GPJ LOG A GNNN06.GDT 12/3/24

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

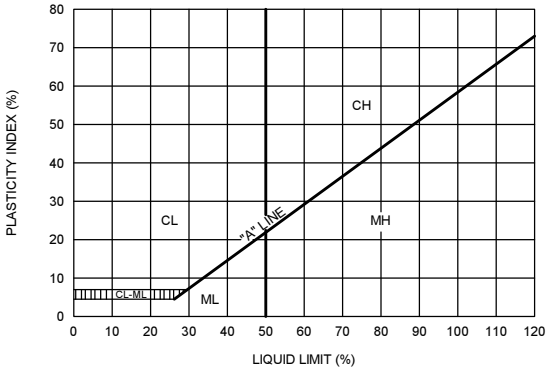
Standard Penetration Test

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

PLASTICITY CHART



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, Inc.

Job No. 14202.18.MNR

LEGEND TO SOIL DESCRIPTIONS

CVT

CVT 14202.18.MNR (PRESTON VETERAN'S HOME).GPJ 1/10/19

Chosen Valley Testing, Inc.

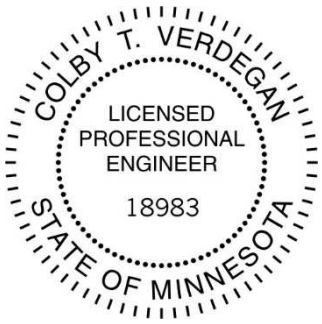
Design Phase Geotechnical Report:

Bloomington Townhouses
11208 Bloomington Ferry Road
Bloomington, Minnesota
CVT# 26634.25.MNT

Prepared for:

Pete Ice
Johnson and Ice Properties

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.

Colby T. Verdegan, PE
Geotechnical Engineer
Registration Number 18983
Date: January 25, 2026

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing, 245 Roselawn Ave. E., Suite #29, St. Paul, MN 55117 · (651) 756-7384 · stpaul@cvtesting.com

Pete Ice
8317 Pillsbury Ave S
Bloomington, MN 55420
Email: peteice@edinarealty.com

January 25, 2026

c/o: Ryan Johnson
Johnson and Ice Properties LLC
11700 Normandale Blvd
Bloomington, MN 55437
Email: rjohnson@core4technologies.com
Phone: (612) 802-6004

Re: Draft Design Phase Geotechnical Evaluation
Proposed Bloomington Townhouses
11208 Bloomington Ferry Road
Bloomington, Minnesota
CVT Project 26634.25.MNT

Dear Mr. Ice,

As authorized, we have completed the geotechnical evaluation for the proposed development in Bloomington, Minnesota. This letter briefly summarizes the findings in the attached report.

Summary of Boring Results

All of the borings encountered topsoil at the surface. The topsoil appeared to be about 2 feet thick.

Below the topsoil, the borings encountered fill to typical depths of about 4 to 6 ½ feet. The fill consisted of dark-colored primarily rather clean sands but included sandy lean clay and silty sand layers. Two of the rain garden borings also encountered "possible fill" below the fill at depths of 4 to 5 feet.

The possible fill materials included clean sand to sandy silt. It was termed "possible fill" because it was visually different than the more obvious natural soils at depth and was often dark but lacked characteristics specific to fill.

The dominant soils encountered at depth were rather clean sands. All the borings terminated in these materials at the planned depth.

Free water was not observed in the borings. We would expect groundwater levels to fluctuate similarly to nearby lakes and rivers, along with local weather patterns.

Summary of Analysis and Recommendations

Based on the data, the general site stratigraphy consists of topsoil overlying fill which is underlain by natural clean sands. The topsoil is not suitable for foundation support and should be removed from below

the building and pavements along with any existing foundations, utilities or other unsuitable natural materials. For planning purposes, we recommend assuming that the possible fill soils must also be removed from all building areas. We recommend using clean sands as engineered fill where needed. The sands on site are considered suitable for this purpose.

Based on the assumed loads and proper implementation of our grading recommendations, we are of the opinion that foundations may be designed to exert pressures of up to 3,000 pounds per square foot (psf). This allowable bearing capacity includes a safety factor of at least 3 against shear failure. Total settlement of footings is expected to be less than 1 inch, while differential settlement is expected to be on the order of ½ inch or less.

Remarks

CVT appreciates the opportunity to provide geotechnical services on this project. If there are any questions about our report, please feel free to contact us.

Sincerely,
Chosen Valley Testing, Inc.

Hannah Fischer
Graduate Engineer

Colby T. Verdegan, PE
Sr. Geotechnical/Materials Engineer

TABLE OF CONTENTS

Design Phase Geotechnical Evaluation
Proposed Bloomington Townhouses
11208 Bloomington Ferry Road
Bloomington, Minnesota

CVT Project Number: 26634.25.MNT
Date: January 25, 2026

A. Introduction

The intent of this report is to present our results to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services must often be completed before the design, assumptions are sometimes needed to prepare a proper evaluation and to analyze the data. A complete and thorough review of this entire document, including the assumptions and the appendices, should be undertaken immediately upon receipt.

A.1. Purpose

This geotechnical report was prepared to aid in the design and construction of proposed townhouse development in Bloomington, Minnesota. Our services were authorized by Pete Ice of Johnson and Ice Properties.

A.2. Scope

To provide data for analysis, a total of six (6) borings were drilled at the site to depths of about 15 feet. Our engineering scope consisted of providing this geotechnical report summarizing our procedures, findings, and geotechnical analyses and recommendations for the proposed development.

A.3. Boring Locations and Elevations

The boring locations were indicated to Chosen Valley Testing on a site plan provided by the client. The Boring Location Sketch in the Appendix shows the approximate boring locations as drilled and was made by superposing GPS coordinates for the borings and the plan onto a satellite view of the project area using Google Earth software.

Ground surface elevations at the borings were estimated using topographic contour lines on site plans provided by the client, dated December 3, 2025. The estimated elevations are indicated on the Log of Boring sheets in the Appendix and 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 suggest that the natural soils in the area are primarily terrace deposits consisting of sand and gravel. Bedrock is expected to be more than 100 feet below the surface and consists of dolostone of the Prairie Du Chien Group.

B. Subsurface Data

Methods: 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 is classified and logged by the driller and a representative portion is then sealed in a jar and delivered to the soils engineer for review.

B.1. Stratification

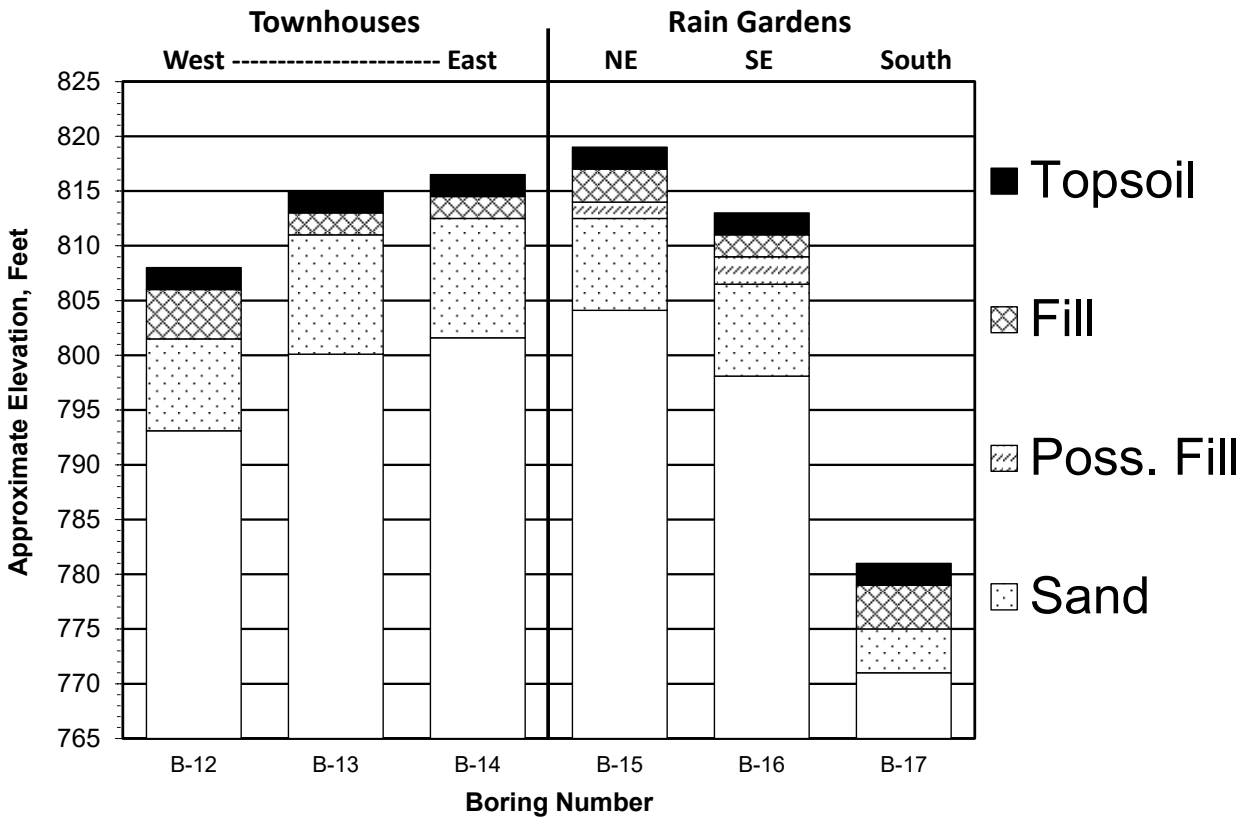
All of the borings encountered topsoil at the surface. The topsoil appeared to be about 2 feet thick.

Below the topsoil, the borings encountered fill to typical depths of about 4 to 6 ½ feet. The fill consisted of dark-colored primarily rather clean sands but included sandy lean clay and silty sand layers. Two of the rain garden borings also encountered “possible fill” below the fill at depths of 4 to 5 feet.

The possible fill materials included clean sand to sandy silt. It was termed “possible fill” because it was visually different than the more obvious natural soils at depth and was often dark but lacked characteristics specific to fill.

The dominant soils encountered at depth were rather clean sands. All the borings terminated in these materials at the planned depth.

For the reader’s convenience, the boring data has been summarized in the following cross sections. For more detailed information, please refer to the Log of Boring sheets in the Appendix.



B.2. Penetration Test Results

The number of blows needed for the hammer to advance the penetration test sampler is an indicator of soil characteristics. The number of blows to advance the sampler 1 foot is called the penetration resistance or "N"-value. The results tend to be more meaningful for natural mineral soils than for fill soils. In fill soils, compaction tests are more meaningful.

Penetration resistance values (N-values) in the fill and possible fill ranged from 9 to 18 Blows per Foot (BPF) were recorded. The values in the natural sands ranged from 8 to 19 BPF, indicating they were loose to medium dense, but mostly loose.

A key to the 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 the drilling operation, the drillers may note the presence of moisture on the sampling instrument, in the cuttings, or within the boreholes. These observations are recorded on the boring logs. The water level may vary with weather, time of year and other factors and the presence or absence of water during the drilling is subject to interpretation and is not always conclusive.

Free water was not observed in the borings. We would expect groundwater levels to fluctuate similarly to nearby lakes and rivers, along with local weather patterns.

C. Design Information

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 construction of five townhouse structures and three rain gardens along with associated roadways and utilities. The townhouses are assumed to be two-story structures without basements. Foundation loads are assumed to be on the order of 3,000 pounds per lineal foot or less and column loads were assumed to be about 50 kips or less.

Grading plans for the development were not provided.

D. Analysis

Based on the data, the general site stratigraphy consists of topsoil overlying fill which is underlain by natural clean sands. The topsoil is not suitable for foundation support and should be removed from below the building and pavements along with any existing foundations, utilities or other unsuitable natural materials. For planning purposes, we recommend assuming that the possible fill soils must also be removed from all building areas. We recommend using clean sands as engineered fill where needed. Most of the sands on site are considered suitable for this purpose.

Based on the assumed loads and proper implementation of our grading recommendations, we are of the opinion that foundations may be designed to exert pressures of up to 3,000 pounds per square foot (psf). This allowable bearing capacity includes a safety factor of at least 3 against shear failure. Total settlement of footings is expected to be less than 1 inch, while differential settlement is expected to be on the order of ½ inch or less.

The remainder of this report provides more detailed geotechnical recommendations for the project.

E. Building Earthwork Recommendations

E.1. Topsoil Stripping

The topsoil materials and fill soils should be removed from below the building along with any existing foundations, utilities or other unsuitable natural materials. For planning purposes, we recommend assuming that the possible fill must also be removed from the building areas. Based on the borings about 4 to 6 ½ feet of removals are expected in the building areas

E.2. Geotechnical Review

CVT should be retained to make a final review of the bearing conditions before placing fill or

foundations. Subject to the results of that review, additions or changes to the recommendations may be deemed warranted.

E.3. Oversizing

Any stripping or corrective excavations should be oversized at least 1 foot horizontally beyond the edge of the footings for each foot of fill needed below footing grade. This oversizing can be reduced by up to 50% if rather precise staking is present during grading.

E.4. Filling and Compaction

All materials below the building, in the oversized areas, and used as backfill for walls, should be compacted to a minimum of 95% of its maximum standard Proctor density (ASTM D698).

For ease in compaction, we recommend using clean sands or gravels having less than 12% particles passing a #200 sieve as structural fill. The existing natural poorly graded sands and poorly graded sands with silt appear suitable for reuse as bulk engineered fill in building areas. Most of the existing fill and possible fill, excluding the clay and silt soils, also appears suitable, but should be revaluated during grading.

We recommend using clean, free-draining sand or gravel, having less than 5% passing a #200 sieve in the upper 4 to 6 inches of the subgrade below slabs.

F. Building Design

F.1. Foundation Depth

For frost protection, foundations should be placed at least 42 inches below the exposed ground surface for heated structures. Interior foundations in heated areas may be placed directly below slabs. Footings for unheated structures should be placed at least 60 inches below the exposed ground surface.

F.2. Bearing Capacity and Settlement

Based on the assumed loads, assumed floor elevation, and proper implementation of our grading recommendations, we are of the opinion that foundations may be designed to exert pressures of up to 3,000 pounds per square foot (psf). This allowable bearing capacity includes a safety factor of at least 3 against shear failure.

With the recommended soil corrections and anticipated foundation depths and loads, total settlement of footings is expected to be less than 1 inch. Differential settlement is expected to be ½ inch or less between footings that are similarly loaded.

F.3. Vapor Barrier

If the slab receives coverings that are less permeable than concrete, a vapor barrier should be placed below the slab. Some contractors prefer to place this barrier below the sand, to limit the potential for

curling.

F.4. Slab Design

The completed slab subgrade is expected to consist primarily of clean glacial sands. We recommend using a modulus of subgrade reaction of up to 200 pounds per cubic inch for these conditions.

F.5. Lateral Loads

Lateral support values are provided for the design of below-grade walls. Backfill should be compacted to at least 95% of its maximum standard Proctor density (ASTM D 698). Lateral resistance will depend on the materials used. We recommend using clean sands, having less than 12% passing a #200 sieve, as fill against below-grade walls. The table below includes support values for the recommended clean sands. These values do not include a safety factor.

Poorly Graded Sands (SP) 95% standard Proctor density	
Internal Friction Angle (degrees)	34
Cohesion (psf)	0
Coefficient of Friction between Concrete and Soil	0.40
Moist Unit Weight (pcf)	120
At-Rest Coefficient (Ko)	0.44
Active Coefficient (Ka)	0.28
Passive Coefficient (Kp)	3.54

The actual loads exerted on the structure will depend on the movement or flexure of the structure. For sand fill, horizontal movement or flexure of about 0.2% of the height of soil retained may be sufficient to mobilize frictional forces from the at-rest state to the active state.

G. Utility Recommendations

G.1. Groundwater/De-watering

As mentioned, water was not observed in the borings. Based on this, dewatering is not expected to be needed for utility installations or other deep excavations.

G.2. General Support

Open cut installations are expected to encounter mostly clean sands. These materials appeared to be suitable for support of the pipes.

G.3. Backslopes

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. Due to the presence of existing roadways, utilities, and structures, trench boxes or other stabilization methods

may be necessary.

G.4. Fill Placement and Compaction

The sand fill and natural sands encountered appear to be suitable for use as backfill above utilities and supporting the pavements. The silt materials are less desirable and there used should be limited to depths at least 2 feet below the pavement section – similar to their existing orientation. 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.

H. Pavement Recommendations

H.1. Stripping and Grading

Pavement grades are assumed to be close to existing grades. We recommend stripping all topsoil from below the pavements areas. At the locations explored, topsoil thickness was about 2 feet.

H.2. Fill Placement and Compaction

Deep filling is not expected to be needed below most paved areas but may be needed for utilities or possibly near where pavement border areas where fill removals were needed below the building. Portions of the sand fill and natural soils can likely be used below the pavement but should be reviewed before use.

Fill placed in the upper 3 feet of the subgrade should be compacted to at least 100% of its maximum standard Proctor density. Below 3 feet, compaction to 95% is recommended.

The completed pavement subgrade should be able to pass a test roll with a fully loaded tandem-axle truck. Areas not passing the test roll should be reworked and stabilized with additional aggregate base or other means, as needed, to pass the test roll.

H.3. Pavement Design

The soils present at subgrade elevation are expected to consist primarily of clean to silty sands. We recommend using an R-value of no more than 70 for pavement design on such subgrades. In the absence of traffic information, we would suggest a pavement section consisting of at least 3 ½ inches of asphalt and 8 inches of aggregate base for the private roadway for the development.

The above sections should be considered preliminary, subject to review by the project civil engineering consultant, their experience with pavement design and performance in the area of the project, and subject to the evaluation of the actual soils encountered during construction in the proposed paved areas.

I. Stormwater Infiltration Recommendations

We assumed that a stormwater pond will be needed at the site. The following table presents the

recommended infiltration rate per soil type from the MPCA Minnesota Storm Water Manual (updated from Version 2X). Please see the individual Log of Boring sheets in the Appendix for soil classification details at each location and depth.

Unified Soil Classification System, USCS	Infiltration Rate (inches/hour)
Poorly Graded Sand (SP)	0.8
Poorly Graded Sand with Silt (SP-SM)	0.8
Silty Sand (SM)	0.2 to 0.45
Silt (ML)	0.2

Our experience is the infiltration rates for sands are often faster than the assumed values and may exceed MPCA recommended limiting values. Conversely, values for silty sands and silt tend to be slower than even the lower table value. Double-ring infiltrometer testing is strongly recommended to provide site specific infiltration values and would need to be performed at the bottom of the infiltration structures.

J. Construction Testing and Documentation

J.1. Excavation

Stripping can likely be performed with a variety of equipment. A backhoe with a smooth lipped bucket is recommended to limit disturbance of the natural bearing soils, and construction traffic should be limited across the silts in particular.

J.2. Sideslopes

The contractor will be required to slope or shore the excavations as needed to meet OSHA requirements for safety and to limit disturbance to surrounding structures. Most of the soils would be expected to classify as Type C soils.

J.3. Cold Weather

If the excavation occurs during freezing temperatures, good winter construction practices should be used. Frozen fill should be thawed before placing and filling should not be placed on frozen ground. Slab areas should be completely thawed prior to placing concrete.

J.4. Construction Testing and Documentation

The bottom of the excavations should be evaluated and documented by qualified personnel to assess the soils at bearing depth. Any fill placed should be evaluated for conformance to the project gradation recommendations and should be tested for compaction. If filling proceeds during periods of freezing weather, full-time testing should be considered to help confirm that imported fill is thawed prior to and during compaction, and that all snow has been removed before placement of the fill.

Although our firm offers testing services relating to civil and structural components of the structure (such as concrete testing, reinforcement observations, etc.), specification of such services is beyond our work

scope and the designer should be consulted as to such requirements.

K. 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 # 12-17

Legend to Soil Description

Chosen Valley Testing, Inc.

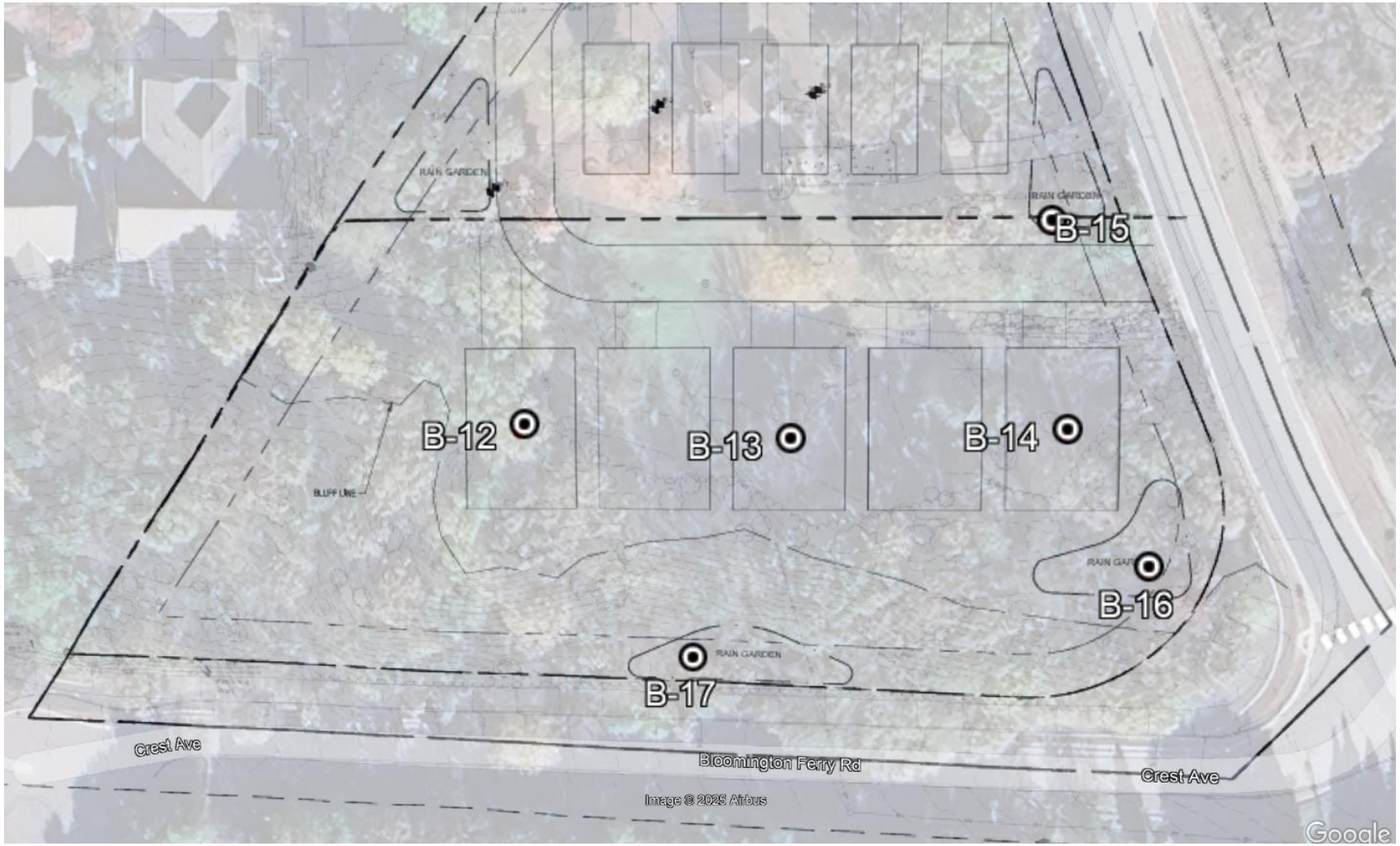
Legend

Boring Locations

Boring Location Sketch

Proposed Infiltration Improvements
11208 Bloomington Ferry Road
Bloomington, Minnesota
CVT Project: 26634.25.MNT

N



LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-12** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
808.0	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			Elevations were estimated using the Civil Site Group Site Plan dated December 3, 2025.
806.0	2.0	SP SM	**FILL**, Poorly Graded Sand with Silt, fine-to-medium grained, dark brown, moist.	12		
804.0	4.0	CL	**FILL**, Sandy Lean Clay, trace Roots, dark brown, wet.	18		MC=25%
801.5	6.5	SP SM	**POORLY GRADED SAND WITH SILT**, fine-to-medium grained, brown, moist, medium dense. (Glacial Outwash)	11		
799.0	9.0	SP	**POORLY GRADED SAND**, fine-to-medium grained, brown, moist, medium dense. (Glacial Outwash)	14		MC=4.5%
				10		
793.1	14.9			11		MC=6.6%
			End Boring Water was not observed. Boring was sealed upon completion.			

CVT STANDARD 26634.25.MNT (BLOOMINGTON FERRY ADDITION).GPJ LOG A GNNN06.GDT 1/5/26

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-13** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
815.0	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			
813.0	2.0	SP SM	**FILL**, Poorly Graded Sand with Silt, fine-to-medium grained, trace Woodchips, dark brown, moist.	9		
811.0	4.0	SP	**POORLY GRADED SAND**, fine-to-medium grained, trace Gravel, brown, moist, medium dense. (Glacial Outwash)	15		MC=4.4%
				13		
				10		MC=4.7%
				13		
800.1	14.9			12		MC=3.8%
			End Boring Water was not observed. Boring was sealed upon completion.			

CVT STANDARD 26634.25.MNT (BLOOMINGTON FERRY ADDITION).GPJ LOG A GNNN06.GDT 1/5/26

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-14** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
816.5	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			
814.5	2.0	SM	**FILL**, Silty Sand, fine grained, dark brown, moist.	14		
812.5	4.0	SP	**POORLY GRADED SAND**, fine-to-medium grained, trace Gravel, brown, moist, loose to medium dense. (Glacial Outwash)	9		MC=3.8%
				13		
			At 10 feet and below, trace Gravel.	11		MC=2.5%
				13		
801.6	14.9			10		MC=2.5%
			End Boring Water was not observed. Boring was sealed upon completion.			

CVT STANDARD 26634.25.MNT (BLOOMINGTON FERRY ADDITION).GPJ LOG A GNNN06.GDT 1/5/26

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-15** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
819.0	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			
817.0	2.0	SP SM	**FILL**, Poorly Graded Sand with Silt, fine-to-medium grained, dark brown, moist.	11		
814.0	5.0					MC=5.4%
812.5	6.5	ML	**SANDY SILT**, dark brown, moist, medium dense. (Possible Fill)	14		
807.5	11.5	SP	**POORLY GRADED SAND**, fine-to-medium grained, brown, moist, loose to medium dense. (Glacial Outwash)	8 14		MC=5.2%
804.1	14.9	SP SM	**POORLY GRADED SAND WITH SILT**, fine-to-medium grained, brown, moist, medium dense. (Glacial Outwash)	11 15		MC=4.8%
			End Boring Water was not observed. Boring was sealed upon completion.			

CVT STANDARD 26634.25.MNT (BLOOMINGTON FERRY ADDITION).GPJ LOG A GNNN06.GDT 1/5/26

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-16** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
813.0	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			
811.0	2.0	SP SM	**FILL**, Poorly Graded Sand with Silt, fine-to-medium grained, dark brown, moist.	9		
809.0	4.0	SP	**POORLY GRADED SAND**, fine-to-medium grained, dark brown, moist, medium dense. (B-Horizon/Possible Fill)	11		MC=2.7%
806.5	6.5	SP	**POORLY GRADED SAND**, fine-to-medium grained, trace Gravel, brown, moist, medium dense. (Glacial Outwash)	16		
				10		MC=2.1%
				14		
798.1	14.9			11		MC=2.9%
			End Boring Water was not observed. Boring was sealed upon completion.			

CVT STANDARD 26634.25.MNT (BLOOMINGTON FERRY ADDITION).GPJ LOG A GNNN06.GDT 1/5/26

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 26634.25.MNT Design Phase Geotechnical Evaluation Bloomington Townhouses 11208 Bloomington Ferry Road Bloomington, Minnesota	BORING: **B-17** LOCATION: See attached sketch. DATE: 12/22/2025 SCALE: 1" = 2'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
781.0	0.0	OL	**TOPSOIL**, Slightly Organic Poorly Graded Sand with Silt, trace Roots, dark brown, moist.			
779.0	2.0	SP	**FILL**, Poorly Graded Sand, fine grained, brown, moist.			
777.0	4.0	SP SM	**FILL**, Poorly Graded Sand with Silt, fine-to-medium grained, trace Roots, dark brown, moist.			MC=6.7%
775.0	6.0	SP	**POORLY GRADED SAND**, fine-to-medium grained, trace Gravel, brown, moist. (Glacial Outwash)			
771.0	10.0		End Boring Water was not observed. Boring was sealed upon completion.			MC=3.2%

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

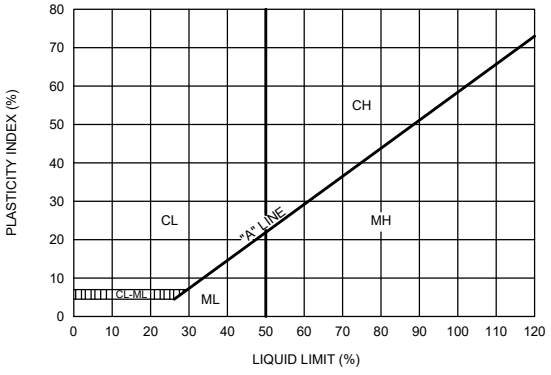
Standard Penetration Test

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

PLASTICITY CHART



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

CVT

Chosen Valley Testing, Inc.

CVT 16678.20.MNT (KAPPEL RESIDENCE ADDTITION).GPJ 5/28/20