C V T

Chosen Valley Testing

Design Phase Geotechnical Report:

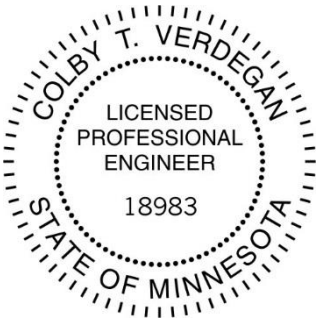
Proposed Breezy Point City Hall
Southeast Quadrant of Short St. and N. Birchwood Dr.
Breezy Point, Minnesota

Prepared for:

David Chanski, City Administrator
City of Breezy Point

c/o: Mika Angland, AIA
WIDSETH

December 21, 2023
CVT Project: 22842.23.MNS



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 21, 2023

Chosen Valley Testing, Inc.

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stcloud@chosenvalleytesting.com

David Chanski
City Administrator
City of Breezy Point
8319 County Road 11
Breezy Point, Minnesota 56472

December 21, 2023

Mike Angland, AIA
WIDSETH
7804 Industrial Park Road
Baxter, Minnesota 56425
Phone: 218-316-3608
Email: mike.anderson@widseth.com

Re: Design Phase Geotechnical Evaluation
Proposed City of Breezy Point City Hall
Southeast quadrant of Short St. and N. Birchwood Dr.
Breezy Point, Minnesota
CVT Project 22842.23.MNS

Dear Mr. Chanski,

As authorized, we have completed the geotechnical evaluation report for the proposed building in Breezy Point, Minnesota. This letter briefly summarizes the findings and analyses presented in the attached report.

Summary of Boring Results

At the surface, the northern 5 borings met about ½ to 1 foot of topsoil. The remaining two borings were drilled in a parking lot and met 2 inches of bituminous over 4 to 6 inches of aggregate base.

The natural soils were dominated by rather clean sands the borings terminated in these conditions at the planned 14.9-foot 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 borings, the soils across the site generally consist of pavement materials or topsoil over rather clean natural sands at depth. The pavement materials and topsoil are not suitable for support and should be removed from below all building areas, along with any deeper root zones, old foundations, utilities, or other

deleterious materials that may be discovered during construction.

The natural soils appear suitable for reuse. If imported fill is needed, we recommend obtaining clean sands or gravels, similar to the dominant natural sands below the surface.

It is recommended that Chosen Valley Testing be retained to evaluate the overall grading and excavating for conformance with our analyses and recommendations in this report. Subject to these observations, changes to the earthwork recommendations may be deemed warranted, but are not expected.

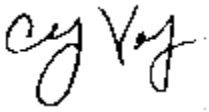
With the assumed foundation loads and implementation of the earthwork recommendations, we are of the opinion that foundations may be designed to exert bearing pressures up to 4,000 pounds per square foot (psf). Total post-construction settlements are then expected to be on the order of 1/2 inch or less.

Remarks

We appreciate the opportunity to serve you. Please refer to the attached report for more details of our findings and analyses. If you have 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

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Updated Design Phase Geotechnical Evaluation
City of Breezy Point City Hall
Southeast Quadrant of Short Street and North Birchwood Drive
Breezy Point, Minnesota

CVT Project Number: 22842.23.MNS
Date: December 21, 2023

A. Introduction

The intent of this report is to present our findings to the client in the same logical sequence that led us to arrive at the opinions and recommendations expressed. Since our services often must be completed before the design is finished, assumptions are often needed to prepare a proper scope and to analyze the data. 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 aid in the design and construction of the proposed City Hall Building for the City of Breezy Point, Minnesota. Our services were authorized by the City of Breezy Point's Administrator Mr. David Chanski.

A.2. Scope

A total of seven (7) borings were drilled to depths of about 14.9 feet. Our engineering scope consisted of providing this report summarizing our findings and geotechnical recommendations for the proposed facility.

A.3. Boring Locations and Elevations

The boring locations were indicated on a silt plan provided by the client. The Boring Location Sketch in the Appendix of this report shows the approximate boring locations as drilled and was made by superposing the boring layout and GPS coordinates for the borings onto aerial imagery using Google Earth software.

Ground surface elevations were estimated using the MnDNR's program MnTopo 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 indicate that the dominant soils in the area are commonly glacial outwash deposited sands, gravelly sands and gravel. Bedrock is commonly more than 150 feet below and is not a consideration for this project.

B. Subsurface Data

Procedures: 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 specimens

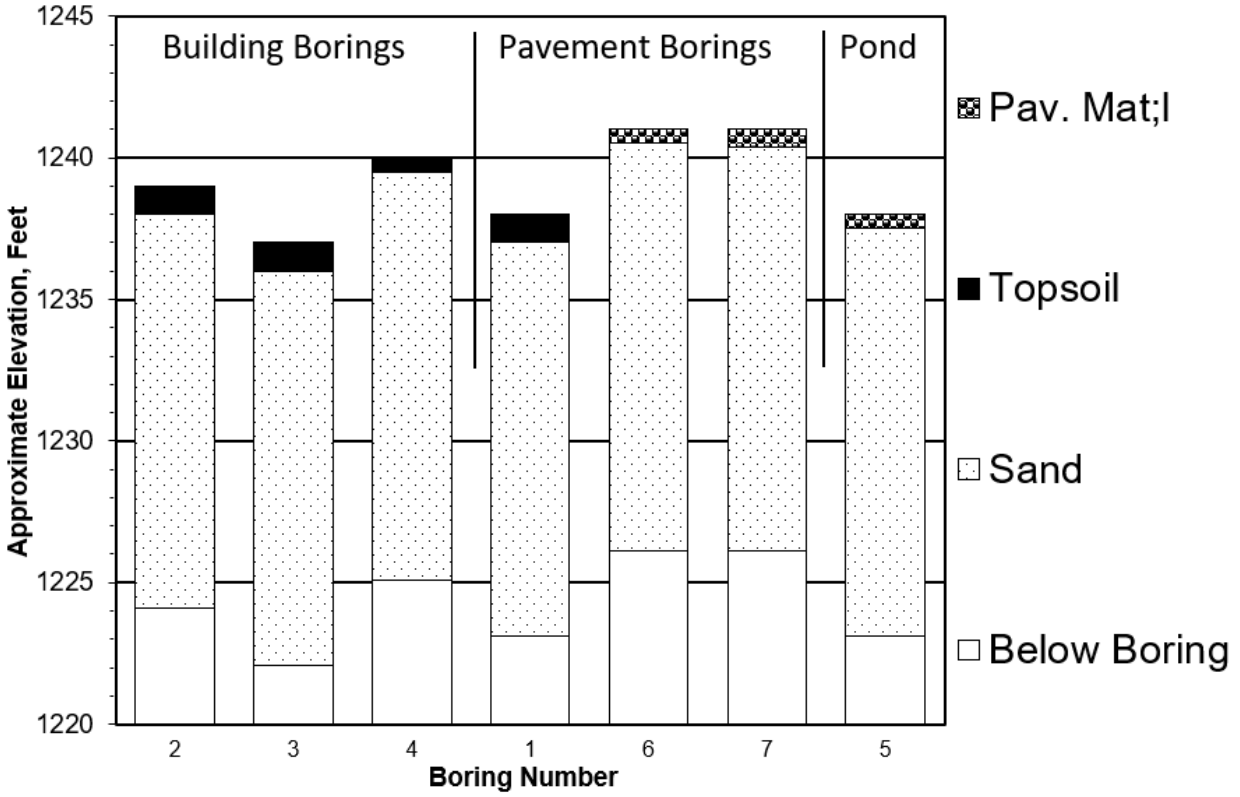
from deep in the ground. With this method, a hollow-stem auger is drilled to the desired sampling depth. A 2-inch OD sampling tube is then screwed onto the end of a sampling rod, inserted through the hole in the auger's tip, and then driven into the soil with a 140-pound hammer dropped repeatedly from 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 and delivered to the soils engineer for review.

B.1. Stratification

At the surface, the northern 5 borings met about ½ to 1 foot of topsoil. The remaining two borings were drilled in a parking lot and met 2 inches of bituminous over 4 to 6 inches of aggregate base.

The natural soils were dominated by rather clean sands and the borings terminated in these conditions at the planned 14.9-foot depth.

The soil boring data has been summarized in the cross-section following this paragraph. Please refer to the individual Log of Boring sheets in the Appendix for more detailed information.



B.2. Soil Strength/Penetration Test

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, compaction tests are more meaningful.

Penetration resistance values ("N" Values) in the natural sands ranged from 6 to 19 BPF (blows per foot), indicating they were loose to medium dense.

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 boring logs. 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.

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 Data

Because each structure has a different loading configuration and intensity, different grades, and different structural or performance tolerances, the results of a geotechnical exploration will mean different things for different facilities. If the facility changes, Chosen Valley Testing should be contacted to discuss possible implications of the changes. Without a chance to review such changes, the recommendations of the soils engineer may no longer be valid or appropriate.

The proposed building is planned to be a single-story, slab-on-grade facility. The structure is assumed to have primarily steel or wood framing. For purposes of this report, we assumed the maximum column loads would be around 50 kips per column or less, while the maximum strip footing loads were assumed to be on the order of 4 kips per linear foot or less.

Slab elevation is assumed to be near or slightly above existing grades. We have assumed that the paved areas will experience primarily auto traffic load but will receive some heavier truck traffic.

D. Analysis

Based on the borings, the soils across the site generally consist of pavement materials or topsoil over rather clean natural sands at depth. The pavement materials and topsoil are not suitable for support and should be removed from below all building areas, along with any deeper root zones, old foundations, utilities, or other deleterious materials that may be discovered during construction.

The natural soils appear suitable for reuse. If imported fill is needed, we recommend obtaining clean sands or gravels, similar to the dominant natural sands below the surface.

It is recommended that Chosen Valley Testing be retained to evaluate the overall grading and excavating for conformance with our analyses and recommendations in this report. Subject to these observations, changes to the earthwork recommendations may be deemed warranted, but are not expected.

With the assumed foundation loads and implementation of the earthwork recommendations, we are of the opinion that foundations may be designed to exert bearing pressures up to 4,000 pounds per square foot (psf). Total post-construction settlements are then expected to be on the order of 1/2 inch or less.

The remainder of the report provides further details of our recommendations for the buildings, along with recommendations for the paved areas and the pond.

E. Building Recommendations

E.1. Grading Recommendations

E.1.a. Removals: The pavement material and topsoil are not suitable for support and should be removed from all building areas, along with any fill, deeper root zones, old foundations, utilities, or other deleterious materials that may be discovered during construction. At the areas explored, about ½ to 1 foot of removal is needed.

E.1.b. Subgrade Evaluation and Additional Corrections: Chosen Valley Testing should be retained to evaluate the materials after the removals and to also evaluate the earthwork for conformance to our analyses and recommendations in this report. Subject to these observations, changes to the earthwork recommendations may be deemed warranted, but are not expected.

E.1.c. Oversizing: Any surface stripping or corrective excavations should be oversized at least 1-foot horizontally beyond the edge of foundations for each foot of fill needed below footing grade. This oversizing tcan be reduced by up to 50% if rather precise staking is present during grading, and the excavation limits can be rather precisely confirmed relative to the foundations. However, allowing some extra width provides a nominal safety factor against stakes getting moved or knocked down during grading. Extra oversizing also provides some protection for the owner, if the building position changes slightly after soil corrections are performed.

E.1.d. Filling and Compaction: As mentioned earlier, the natural soils appear to be mostly rather clean granular material and may plausibly be reused as bulk structural fill, subject to closer geotechnical review during construction. If imported fill is needed, we recommend using clean sands or gravels having less than 12% particles passing a #200 sieve where fill is needed below building areas.

All 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. All fill materials below the building, in the oversized areas, or used as backfill for walls should be compacted to a minimum of 95% of its maximum standard Proctor density (ASTM D 698).

E.2. Building Design

E.2.a. Foundation Depth: We recommend placing foundations at least 60 inches below the exposed ground surface for frost protection. Interior foundations in heated areas may be placed directly below slabs. Footings for unheated structures should be placed at least 72 inches below the exposed ground surface.

E.2.b. Bearing Capacity: Based on the assumed loads and implementation of the earthwork recommendations, we are of the opinion that foundations may be designed to exert pressures of up to 4,000 psf. This allowable bearing capacity includes a safety factor of at least 3 against shear failure.

E.2.c. Settlement: Based on the boring data and proper implementation of our recommendations, total settlement is expected to be ½ inch or less.

E.2.d. Vapor Barrier: If the slab will receive coverings that are less permeable than concrete, a vapor barrier should be placed below the slab. Some contractors prefer to place this barrier below a sand layer to limit the potential for curling. A layer of fine gravel is often used these days to meet current requirements for radon protection and would also address moisture considerations.

E.2.e. Slab Design: The completed slab subgrade is then expected to typically consist of natural sands or granular fill. We recommend using a modulus of subgrade reaction of no more than 200 pounds per cubic inch (pci) for these conditions.

F. Infiltration

The soils encountered consisted primarily of clean sands. 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)
Sands (SP to SP-SM)	0.8

In our experience, infiltration rates in the dominant poorly graded sands tend to be faster than the table values.

G. Paved Area Recommendations

G.1. Stripping and Grading

We recommend stripping all topsoil, root zone, and pavement materials from below any paved areas. At most locations, about ½ to 1 foot of removal is expected.

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. Compaction to 90% is usually sufficient in green areas. The near surface soils that are close to final grades should be scarified and surface compacted.

G.2. Pavement Design

After stripping and grading, the soils present at subgrade elevations are expected to consist of poorly graded

sands. These materials would be expected to have an R-value of 50 to 70.

Based on the traffic loading data, we recommend a bituminous pavement section consisting of at least 3 inches of bituminous and 6 inches of aggregate base. In truck traffic areas (heavy duty), we recommend a section consisting of at least 4 inches of bituminous pavement and 8 inches of aggregate base. If concrete pavement was to be used, we recommend that the concrete pavements to be a minimum of 5 inches thick and have a compressive strength of at least 4,000 psi. At apron areas, we recommend increasing the pavement to 8 inches.

The pavement sections should be considered preliminary and subject to review by the civil consultant, based on more specific traffic loading information.

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 geotechnical personnel. The necessity of scarifying and recompacting the subgrade would be determined by the test roll.

H. Construction Testing and Documentation

H.1. Earthwork

Earthwork can likely be performed with a variety of equipment. Deep excavations should use a backhoe.

H.2. Groundwater/Dewatering

Water was not encountered in the borings.

H.3. Cold Weather

If earthwork 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. Footing and slab areas should be completely thawed prior to placing concrete.

H.4. Construction Testing and Documentation

Grading and excavations should be evaluated and documented by qualified geotechnical personnel to assess the supporting materials. Any fill placed below building and paved areas 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.

I. 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 # 1-7

Legend to Soil Description

C V T

Chosen Valley Testing, Inc.

Legend

Boring Locations

Boring Location Sketch

City of Breezy Point City Hall

Southeast Quadrant of Short St. and N. Birchwood Dr.

Breezy Point, Minnesota

CVT Project: 22842.23.MNS

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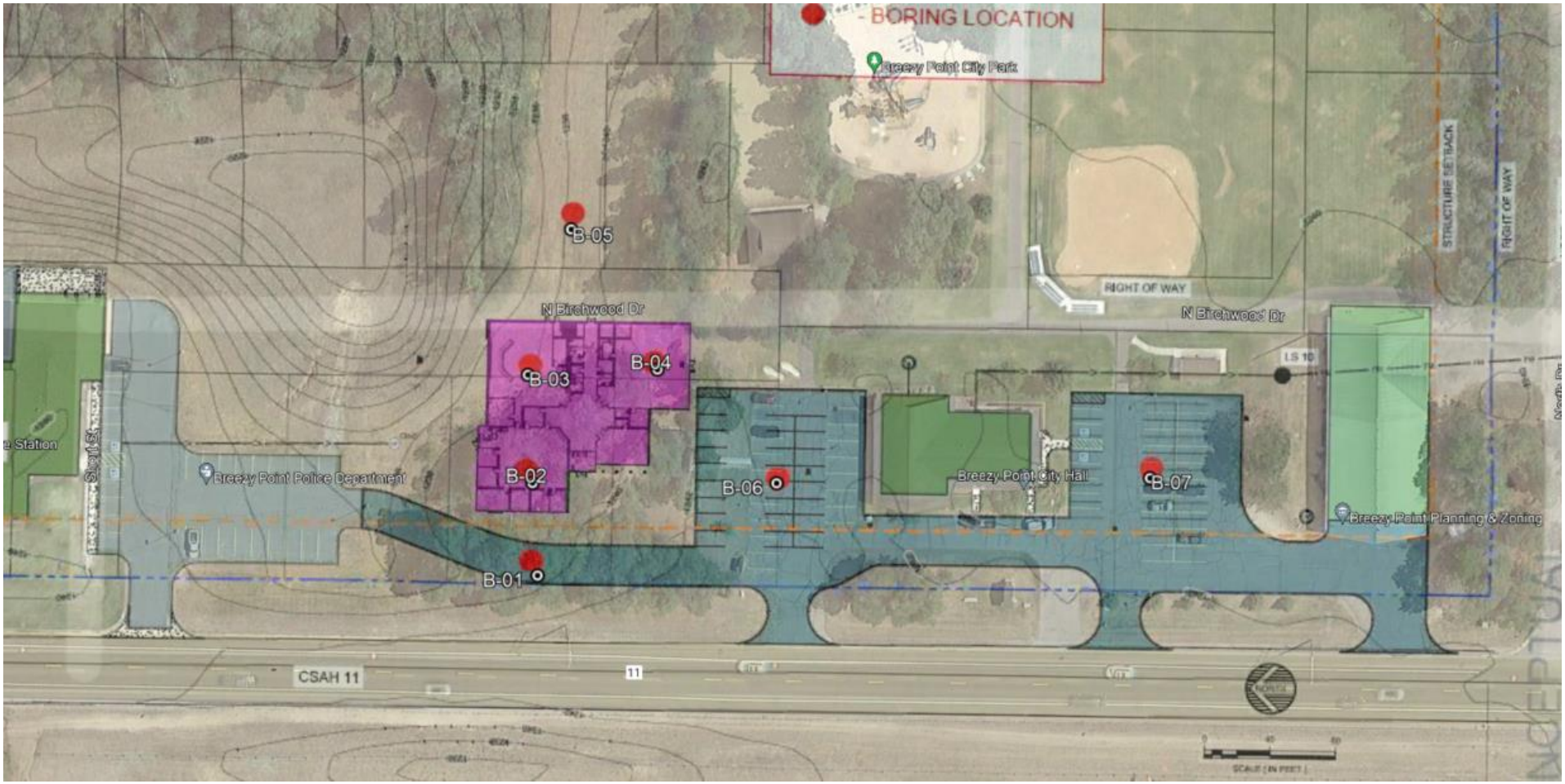


LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-01** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1238.0	0.0	OL	**TOPSOIL** Silty Sand, fine grained, trace Roots, dark brown, moist.			Elevations were estimated using MnDNR's program MnTopo and should be considered approximate.
1237.0	1.0	SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, dark brown, moist, loose. (Glacial Outwash)	8		
1234.5	3.5	SP	**POORLY GRADED SAND WITH SILT** fine-to-medium grained, trace Gravel, brown, moist, loose. (Glacial Outwash)	6 9 10 9 8		
1223.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-02** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1239.0	0.0	OL	**TOPSOIL** Silty Sand, fine grained, trace Roots, dark brown, moist.			
1238.0	1.0	SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose to medium dense. (Glacial Outwash)	8		
				8		
				9		
				11		
				8		
				8		
1224.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-03** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1237.0	0.0	OL	**TOPSOIL** Poorly Graded Sand with Silt, fine-to-medium grained, trace Roots, dark brown, moist.			
1236.0	1.0	SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose. (Glacial Outwash)	9		
				8		
				9		
				6		
				9		
				10		
1222.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-04** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1240.0	0.0					
1239.5	0.5	OL	**TOPSOIL** Silty Sand, fine grained, trace Roots, dark brown, moist.			
		SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose. (Glacial Outwash)	7		
				8		
				8		
				9		
				7		
				10		
1225.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-05** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1238.0	0.0					
1237.5	0.5	OL	**TOPSOIL** Poorly Graded Sand, fine-to-medium grained, trace Roots, brown, moist.			
		SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose to medium dense. (Glacial Outwash)	9		
				8		
				9		
				9		Minimal sample returned due to cobble or gravel obstruction.
				11		
				10		
1223.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-06** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1241.0	0.0					
1240.8	0.2		**2 INCHES BITUMINOUS**			
1240.5	0.5	SP	**4 INCHES AGGREGATE** **POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose to medium dense. (Glacial Outwash)	10		
				10		
				7		
				8		
				19		Minimal sample returned due to cobble or gravel obstruction.
				11		
1226.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

LOG OF BORING

CHOSEN VALLEY TESTING CVT

PROJECT: 22842.23.MNS Design Phase Geotechnical Evaluation Breezy Point City Hall 8319 County Road 11 Pequot Lakes, Minnesota	BORING: **B-07** LOCATION: See attached sketch. DATE: 11/30/2023 SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1241.0	0.0					
1240.8	0.2		**2 INCHES BITUMINOUS**			
1240.4	0.6		**6 INCHES AGGREGATE**			
		SP	**POORLY GRADED SAND** fine-to-medium grained, trace Gravel, brown, moist, loose. (Glacial Outwash)	10		
				8		
				7		
				7		
				8		
				6		
1226.1	14.9		End of boring. Water was not observed during drilling. Boring was sealed upon completion.			

CVT STANDARD 22842.23.MNS (PEQUOT LAKES BREEZY POINT CITY HALL).GPJ LOG A GNNN06.GDT 12/15/23

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

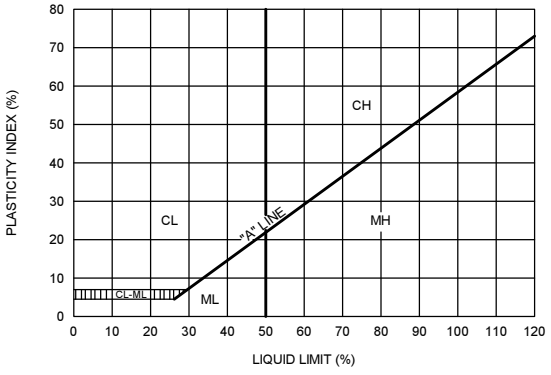
Standard Penetration Test

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

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