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Chosen Valley Testing

Design Phase Geotechnical Evaluation:

Proposed Apartment
Main Avenue SE (Parcel #642522078542)
Rochester, Minnesota

Prepared for:

Mr. Abdallah Yasin and Al Faisal Yasin

September 11, 2020
17097.20.MNR

Certification:

DEVIN M. EHLER LICENSED PROFESSIONAL ENGINEER 52649 STATE OF MINNESOTA	I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota. Devin M. Ehler, PE Geotechnical Engineer Registration Number 52649 Date: September 11, 2020

Chosen Valley Testing, Inc.

Geotechnical Engineering and Testing • 1410 7th St NW • Rochester, MN 55901 • Telephone (507) 281-0968 • Fax (507) 289-2523

Mr. Abdallah Yasin and Al Faisal Yasin
1013 Loren Drive
Cedar Falls, IA, 50613
Abdallahyasin98@yahoo.com

September 11, 2020

Re: Design Phase Geotechnical Evaluation
Proposed Apartment
Main Avenue SE (Parcel #642522078542)
Rochester, Minnesota
CVT Number: 17097.20.MNR

Dear Mr. Yasin,

As authorized, we have completed the geotechnical evaluation for the proposed apartment on Parcel #642522078542 located along Main Avenue SE in Rochester, Minnesota. The attached report provides details of our geotechnical recommendations for the proposed building. CVT appreciates the opportunity to provide geotechnical services on this project. If there are any questions or additional information needed, please contact us at (507) 281-0968.

Sincerely,
Chosen Valley Testing, Inc.

Devin M. Ehler, PE
Geotechnical Engineer

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A. Introduction

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

A.1. Purpose

This geotechnical report was prepared to aid in design and construction of the proposed apartment on Parcel #642522078542 located along Main Avenue SE in Rochester, Minnesota. Our services were authorized by Mr. Abdallah Yasin.

A.2. Scope

To provide data for analysis, a total of 5 penetration test borings were performed. The borings were drilled to depths of about 14 ½ feet. Our scope included geotechnical recommendations for foundations and slabs.

A.3. Boring Locations

The desired boring locations were indicated to Chosen Valley Testing (CVT) on a site map, provided by the Client. The Boring Location Sketch in the Appendix shows the approximate locations as drilled based on GPS coordinates recorded in the field using a handheld device, which are plotted onto aerial imagery using Google Earth Software.

Ground surface elevations at the borings were estimated using a laser level. The rim of the manhole with a concrete collar on the curve of Main Avenue SE, located northeast of the site, was used as a benchmark and was estimated to be near elevation 1058 feet from Minnesota Department of Natural Resources LiDAR topographic data.

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 of the area indicate that the dominant soils are glacial till deposited clay, silt, and sand mixtures. Bedrock is commonly within 50 feet of the surface and typically consists of Decorah Shale, Platteville Limestone, or Glenwood Shale.

B. Exploration Results

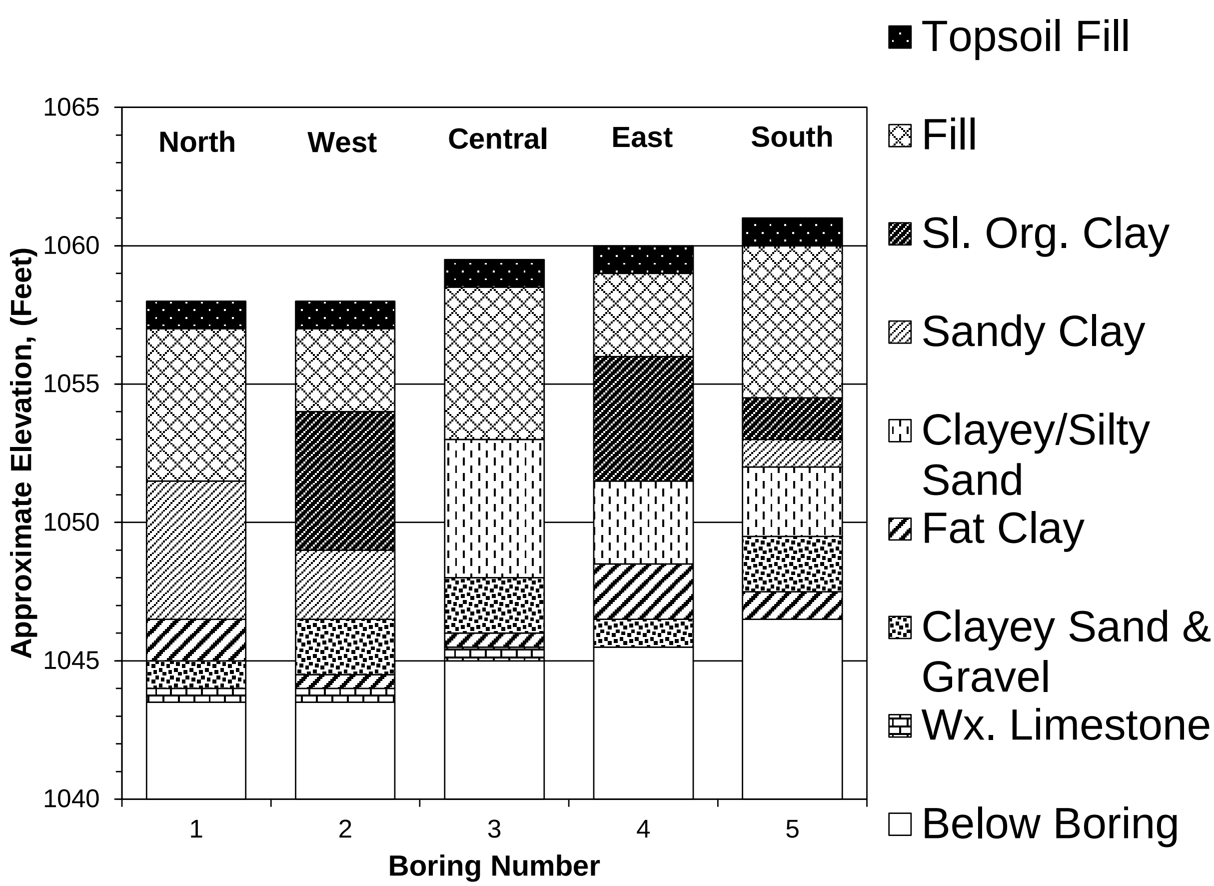
The majority of the borings were performed using penetration test procedures (Method of Test D1586 of the American Society for Testing and Materials). This procedure allows for the extraction of intact soil specimen from deep in the ground. With the penetration test, a hollow-stem auger is drilled to 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 borings encountered about 1-foot of mixed topsoil fill, followed by fat clay fill to depths of approximately 4 to 6 ½ feet. Slightly organic lean clay buried topsoil/possible fill followed in the west, east, and south boring (B-2, B-4, and B-5) to around 8 to 9 feet.

Beneath the fill and slightly organic lean clay, glacial sandy clay and clayey/silty sands followed to depths of about 11 ½ feet over residual clayey sand and gravel and weathered fat clay shale to approximately 14 to 14 ½ feet. Weathered limestone followed in the north, west, and central borings (B-1, B-2, and B-3) to termination depths around 14 ½ feet below the surface.

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



B.2. Penetration and Laboratory Test Data

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) of 7 to 17 blows per foot (BPF) were recorded in the fill and slightly organic clay materials, indicating they were variable.

The glacial sandy clay returned values of 10 to 11 BPF, indicating it was rather stiff. Resistance values of 8 to 17 BPF were recorded in the glacial clayey/silty sands, indicating they were loose to medium dense. The residual clayey sand and gravel returned values ranging from 13 to 31 BPF, indicating they were medium dense to dense. Values of 11 to 37 BPF were recorded in the weathered fat clay shale, indicating it was rather stiff to hard. The weathered limestone returned 50 hammer blows for 4 to 6 inches of sampler advancement, indicating it was very dense.

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.

Pocket penetrometer tests were performed to help estimate the compressive strength of the cohesive soils. The glacial sandy clay returned values of 1 ¾ to 3 tons per square foot (tsf), while the weathered fat clay shale returned values of 1 to 3 ½ tsf.

B.3. Ground Water Data

Methods: 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.

Water was observed in boring B-1 around 14 feet below the surface during our exploration. The depth corresponds near elevation 1044 feet. We would expect moisture to be capable of perching above low permeable clays and intact bedrock. Groundwater levels are expected to fluctuate seasonally with local weather patterns and similar to water levels in nearby creeks and rivers.

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.

It is understood that a three-story apartment building may potentially be constructed on site. Plans were very preliminary at the time of this report. The structure may be either slab-on-grade or have a basement with concrete foundations and the upper 3 levels assumed to be mainly wood and/or metal framing. If the apartment has a basement level, we assume the main floor will consist of hollow core concrete planks.

Structural loads were not provided. In order to facilitate our analyses, we assumed maximum wall loads will be on the order of 4,000 to 7,000 pounds per lineal foot and maximum column loads will be on the order of 150,000 to 275,000 pounds. We further assume the building will be constructed near existing grades with a main level floor elevation near 1061 feet and potential basement level floor elevation of 1052 feet.

D. Analysis

The existing fill and slightly organic clay materials are unsuitable for support and should be completely removed from the entire building area, along with any debris or otherwise deleterious materials that may be discovered during construction. The unsuitable materials were encountered to depths of approximately 6 ½ to 9 feet at the locations explored on site. With our assumed basement level elevation of 1052 feet, the majority of the unsuitable materials would be removed through standard excavation. Otherwise, for a slab-on-grade structure with frost-depth foundations, larger amounts of clean granular fill would need to be imported to replace the existing fill and organic materials.

Due to the expansive nature of the weathered fat clay shale found below the native glacial and residual soils, we recommend removing any fat clay from within 2 feet of the bottom of footings and slabs. This is only anticipated to be a concern if a basement is planned. With the boring data, an assumed basement level elevation of 1052 feet, and an assumed bottom of footing elevation of 1050 ½ feet, a 2-foot separate would just be achieved without needing soil corrections – barring any shallower fat clay possibly present between the borings. Native fat clay was found at the highest elevation around 1048 ½ feet in the eastern Boring B-4.

It is recommended that Chosen Valley Testing be retained to review subgrade soils in slab and footing excavations when they are better exposed during construction. Subject to the evaluation, additional soil corrections may be deemed warranted, but are not anticipated.

Based on our design assumptions, foundations are expected to bear on clean granular fill over glacial sandy clay and clayey/silty sands or directly on glacial soils with at least 2 feet of separation to underlying weathered fat clay shale. With the assumed foundation loads and implementation of the earthwork recommendations, we are of the opinion that foundations may be designed for an allowable bearing capacity of up to 3,000 pounds per square foot (psf). Total settlement of foundations are then expected to be on the order of 1 inch or less, and differential settlement between similarly loaded footings is expected to be on the order of ½ inch or less.

The remainder of this report provides further details of the building recommendations.

E. Building Recommendations

E.1. Earthwork Recommendations

E.1.a. Stripping and Excavation: As previously mentioned, the existing fill and slightly organic clay materials are unsuitable for support and should be completely removed from the entire building area, along with any debris or otherwise deleterious materials that may be discovered during construction. The unsuitable materials were encountered to depths of approximately 6 ½ to 9 feet at the locations explored on site. With our assumed basement level elevation of 1052 feet, the majority of the unsuitable materials would be removed through standard excavation. Otherwise, for a slab-on-grade structure with frost-depth foundations, larger amounts of clean granular fill would need to be imported to replace the existing fill and organic materials.

The following table presents the estimated depth and bottom elevation of unsuitable materials at the building boring locations, along with the top elevation of underlying weathered fat clay shale. The depths and elevations have been rounded to the nearest ½-foot.

Boring Locations	Approx. Ground Surface Elevation (Feet)	Approx. Depth of Unsuitable Materials (Feet)	Approx. Elevation to Bottom of Unsuitable Materials (Feet)	Top Elevation of Underlying Fat Clay Shale (Feet)
B-1	1058	6 ½	1051 ½	1046 ½
B-2	1058	9	1049	1044 ½
B-3	1059 ½	6 ½	1053	1046
B-4	1060	8 ½	1051 ½	1048 ½
B-5	1061	8	1053	1047 ½

E.1.b. Fat Clay Shale Consideration: Due to the expansive nature of the weathered fat clay shale found below the native glacial and residual soils, we recommend removing any fat clay from within 2 feet of the bottom of footings and slabs. This is only anticipated to be a concern if a basement is planned. With the boring data, an assumed basement level elevation of 1052 feet, and an assumed bottom of footing elevation of 1050 ½ feet, a 2-foot separate would just be achieved without needing soil corrections – barring any shallower fat clay possibly present between the borings. Native fat clay was found at the highest elevation around 1048 ½ feet in the eastern Boring B-4 as noted in the table above.

E.1.c. Geotechnical Evaluation and Testing: It is recommend that Chosen Valley Testing be retained to review subgrade soils in slab and footing excavations when they are better exposed during construction. Subject to the evaluation, additional soil corrections may be deemed warranted, but are not anticipated.

E.1.d. Oversizing: Any 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 over-sizing can 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.e. Filling and Compaction: For ease in compaction, we recommend importing clean sand or gravel having less than 12% particles passing a number 200 sieve as engineered fill. Aggregate base or similar materials could also be considered with geotechnical evaluation, but more stringent moisture control and effort to attain proper compaction are expected to be necessary with such materials.

We recommend placing a layer of clean free-draining sand having less than 5% particles passing the number 200 sieve as fill in the upper 4 to 6 inches directly below slabs.

All fill below building and oversizing areas 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: For frost protection, we recommend that exterior foundations for heated structures bear on soils at least 42 inches below the exposed ground surface. Interior footings for heated structures can be placed directly below slabs. Footings for unheated structures should be placed at least 60 inches below the surface.

E.2.b. Bearing Capacity and Settlement: With our design assumptions, 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 3,000 psf. This allowable bearing capacity includes a safety factor of at least 3 against shear failure.

Based on the information above, total settlement of foundations is expected to be on the order of 1 inch or less. Differential settlement between similarly sized footings is expected to be on the order of ½ inch or less.

E.2.c. Vapor Barrier and Drainage: 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.

E.2.d. Slab Design: The completed slab subgrade is expected to consist of at least 4 to 6 inches of clean free-draining sand over glacial sandy clay, clayey sand, and silty sand. We recommend using a modulus of subgrade reaction of no more than 75 pci for this stratification.

E.2.e. Lateral Earth Pressures: We recommend using clean free-draining sands or gravels having less than 10% particles passing a number 200 sieve as backfill against any below-grade basement walls. This fill material should be compacted to at least 95% of its maximum standard Proctor density (ASTM D 698). The top of the sand should be capped with clay topsoil or pavement. A draintile is recommended at the base of the wall backfill to prevent access pressure on below-grade walls from the collection of water.

The following table provides support values for the recommended clean sand backfill. 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	0.45
Moist Unit Weight (pcf)	120
Backslope behind wall (degrees)	0
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.

F. General Construction Recommendations

F.1. Earthwork

The earthwork can likely be performed with a variety of equipment, provided clayey/silty subgrades are not overly wet and soft. If such conditions prevail at the time of construction, standard vehicles with tires will likely have difficulty traversing the site. An excavator or backhoe with a smooth-lipped bucket is recommended for completing excavations. This is intended to limit disturbance to the native soils being left in place for support, while producing a smooth working surface.

F.2. Filling and Compacting

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

F.3. Cold Weather

If site grading is anticipated during cold weather, we recommend that good winter construction practices be observed. All snow and ice should be removed from cut and fill areas prior to additional grading. No fill or concrete should be placed on soils that are frozen or contain frozen material. Frozen soils should **not** be used as fill.

F.4. Construction Testing and Documentation

Grading and excavations should be evaluated and documented by geotechnical personnel, after the unsuitable soils are removed, and before the placement of any fill or concrete. Fill placed below building areas should be evaluated for conformance to the project gradation recommendations before its use and should be tested for compaction during construction. If the 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 building (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.

G. Level of Care

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

Appendix

Boring Location Sketch

Log of Boring # 1-5

Legend to Soil Description

Chosen Valley Testing, Inc.

Legend

Boring Locations

Benchmark

N

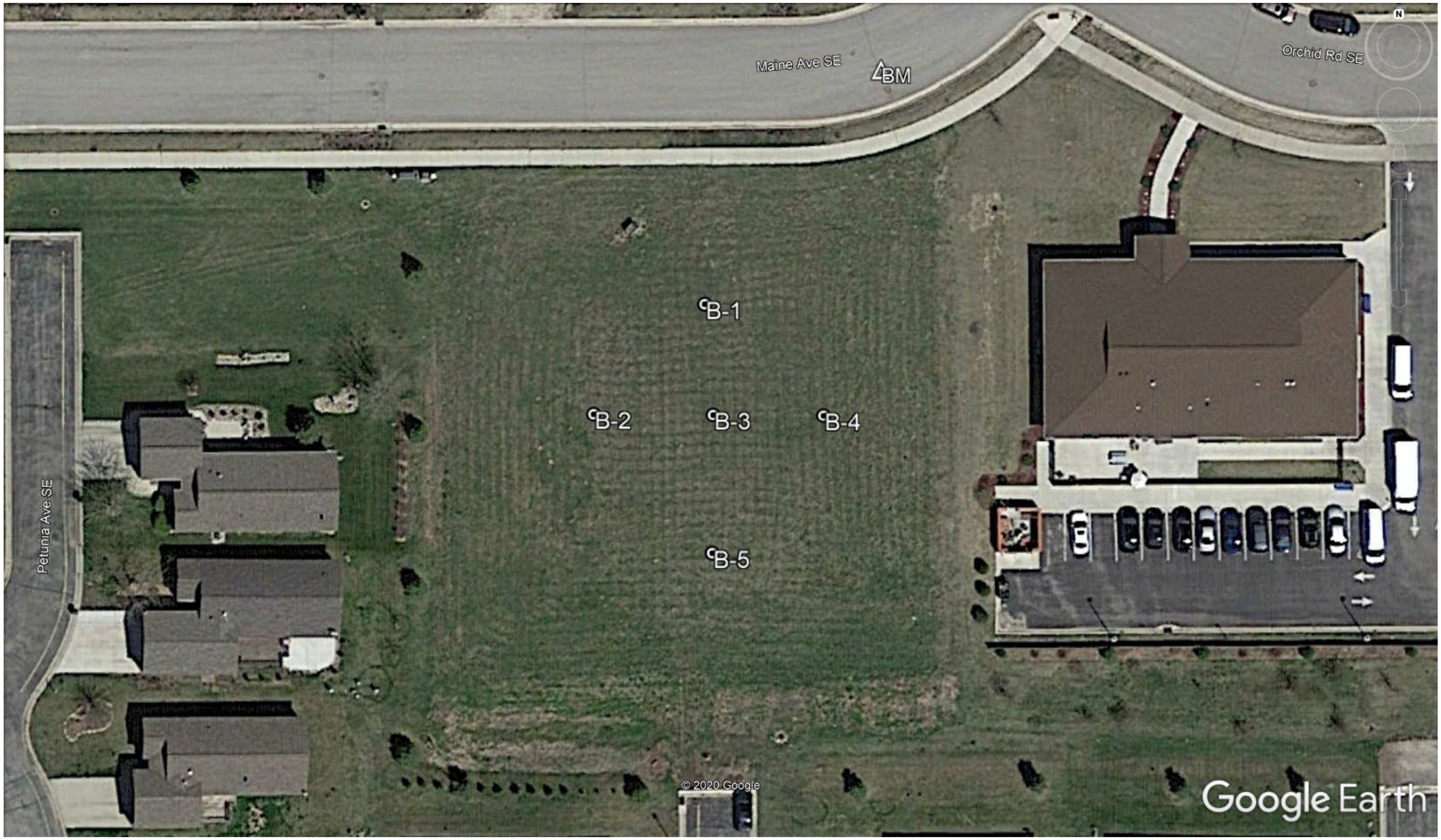
Boring Location Sketch

Proposed Apartment

Main Avenue SE (Parcel #642522078542)

Rochester, Minnesota

17097.20.MNR



LOG OF BORING

CHOSEN VALLEY TESTING **CVT**

PROJECT: 17097.20.MNR Design Phase Geotechnical Evaluation Proposed Apartment Maine Ave SE Rochester, Minnesota	BORING: **B-1** LOCATION: See attached sketch DATE: 8/28/2020 SCALE: 1" = 3'

Elev. 1058.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1057.0	1.0	CH OL	**TOPSOIL FILL** Slightly Organic Fat Clay, trace roots, black and greenish gray mix.			Benchmark: Rim of manhole with concrete collar on curve of Maine Ave SE, located NE of site, estimated elevation 1058 feet from LiDAR topographic data.
1051.5	6.5	CH	**FILL** Fat Clay, trace sand and gravel, greenish gray to greenish brown with some black mixing, wet.	12		MC = 23.9%
				13		
1046.5	11.5	CL	**SANDY LEAN CLAY** brown, wet, rather stiff. (Glacial Till)	10		PP = 1.75 tsf, MC = 16.6%
				11		PP = 2.0 tsf
1045.0	13.0	CH	**FAT CLAY** light greenish gray, wet, rather stiff. (Weathered Shale)	31		PP = 3.0 tsf, MC = 24.3%
1044.0	14.0	GC	**CLAYEY GRAVEL with SAND** light brown to tan, wet, medium dense. (Residual Limestone)	*		
1043.5	14.5		**WEATHERED LIMESTONE** tan, water bearing, very dense.		▽	* 9 / 50 = 6"

End of boring.
Water observed around 14 feet during drilling.
Boring sealed upon completion.

CVT STANDARD 17097.20.MNR (ROCHESTER MAINE AVE LOT).GPJ LOG A GNNN06.GDT 9/10/20

LOG OF BORING

CHOSEN VALLEY TESTING **CVT**

PROJECT: 17097.20.MNR Design Phase Geotechnical Evaluation Proposed Apartment Maine Ave SE Rochester, Minnesota	BORING: **B-2** LOCATION: See attached sketch DATE: 8/28/2020 SCALE: 1" = 3'

Elev. 1058.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1057.0	1.0	CH OL	**TOPSOIL FILL** Slightly Organic Fat Clay, trace roots, black and greenish gray mix.			Benchmark: Rim of manhole with concrete collar on curve of Maine Ave SE, located NE of site, estimated elevation 1058 feet from LiDAR topographic data.
1054.0	4.0	CH	**FILL** Fat Clay, trace gravel, greenish gray, greenish brown and black mix, wet.	12		PP = 22.6%
1049.0	9.0	CL OL	**Slightly Organic LEAN CLAY** trace roots, black, wet, medium to stiff. (Buried Topsoil / Possible Fill)	14 7		MC = 19.1% PP = 1.5 tsf, MC = 22.2%, OC = 5.0%
1046.5	11.5	CL SC	**SANDY LEAN CLAY to CLAYEY SAND** fine grained, brown, wet, rather stiff to medium dense. (Glacial Till)	10		PP = 2.25 tsf, MC = 14.0%
1044.5	13.5	SC	**CLAYEY SAND with GRAVEL** fine to medium grained, light brown, wet to very wet, medium dense. (Residuum)	13		MC = 14.7%
1044.0	14.0	CH	**FAT CLAY** greenish gray, wet, rather stiff. (Weathered Shale)	*		* 6 / 50 = 6"
1043.5	14.5		**WEATHERED LIMESTONE** tan, moist, very dense.			

End of boring.
No water observed during drilling.
Boring sealed upon completion.

CVT STANDARD 17097.20.MNR (ROCHESTER MAINE AVE LOT).GPJ LOG A GNNN06.GDT 9/10/20

LOG OF BORING

CHOSEN VALLEY TESTING **CVT**

PROJECT: 17097.20.MNR Design Phase Geotechnical Evaluation Proposed Apartment Maine Ave SE Rochester, Minnesota	BORING: **B-3** LOCATION: See attached sketch DATE: 8/28/2020 SCALE: 1" = 3'

Elev. 1059.5	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1058.5	1.0	CH OL	**TOPSOIL FILL** Slightly Organic Fat Clay, trace roots, black and greenish gray mix.			Benchmark: Rim of manhole with concrete collar on curve of Maine Ave SE, located NE of site, estimated elevation 1058 feet from LiDAR topographic data.
				14		MC = 28.5%
1053.0	6.5	CH	**FILL** Fat Clay, trace sand and gravel, brown, greenish gray, and gray mix, wet. Some black mixing around 5 feet. Cobble encountered around 5 feet.	17		MC = 25.4%
1050.5	9.0	SC	**CLAYEY SAND** fine grained, brown with dark brown mottling, wet, medium dense. (Glacial Till)	17		
1048.0	11.5	SM	**SILTY SAND** fine grained, brown, moist, medium dense. (Glacial Till)	12		
1046.0	13.5	GC	**CLAYEY GRAVEL with SAND** brown, wet, medium dense. (Residuum)	26		
1045.5	14.0	CH	**FAT CLAY** trace gravel, greenish brown to greenish gray, wet, very stiff. (Weathered Shale)	*		PP = 1.0 tsf, MC = 19.9% * 11 / 50 = 4"
1045.0	14.5		**WEATHERED LIMESTONE** light brown, moist, very dense.			
			End of boring. No water observed during drilling. Boring sealed upon completion.			

LOG OF BORING

CHOSEN VALLEY TESTING **CVT**

PROJECT: 17097.20.MNR Design Phase Geotechnical Evaluation Proposed Apartment Maine Ave SE Rochester, Minnesota	BORING: **B-4** LOCATION: See attached sketch DATE: 8/28/2020 SCALE: 1" = 3'

Elev. 1060.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1059.0	1.0	CH OL	**TOPSOIL FILL** Slightly Organic Fat Clay, trace roots, black and greenish gray mix.			Benchmark: Rim of manhole with concrete collar on curve of Maine Ave SE, located NE of site, estimated elevation 1058 feet from LiDAR topographic data.
1056.0	4.0	CH	**FILL** Fat Clay, greenish brown to greenish gray, wet.	9		MC = 27.2%
1051.5	8.5	CL OL	**Slightly Organic LEAN CLAY** trace roots, black, wet, medium to rather stiff. (Buried Topsoil / Possible Fill)	12 8		MC = 26.4% MC = 20.5%
1048.5	11.5	SC SM	**CLAYEY SAND to SILTY SAND** fine grained, brown, moist, loose. (Glacial Till)	8		
1046.5	13.5	CH	**FAT CLAY with SAND and GRAVEL** grayish brown, wet, rather stiff. (Residuum)	11		PP = 1.5 tsf, MC = 16.9%
1045.5	14.5	GC	**CLAYEY GRAVEL** brown, moist to wet, medium dense. (Residuum)	19		
			End of boring. No water observed during drilling. Boring sealed upon completion.			

CVT STANDARD 17097.20.MNR (ROCHESTER MAINE AVE LOT).GPJ LOG A GNNN06.GDT 9/10/20

LOG OF BORING

CHOSEN VALLEY TESTING **CVT**

PROJECT: 17097.20.MNR Design Phase Geotechnical Evaluation Proposed Apartment Maine Ave SE Rochester, Minnesota	BORING: **B-5** LOCATION: See attached sketch DATE: 8/28/2020 SCALE: 1" = 3'

Elev. 1061.0	Depth 0.0	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
1060.0	1.0	CH OL	**TOPSOIL FILL** Slightly Organic Fat Clay, trace roots, black and greenish gray mix.			Benchmark: Rim of manhole with concrete collar on curve of Maine Ave SE, located NE of site, estimated elevation 1058 feet from LiDAR topographic data.
1054.5	6.5	CH	**FILL** Fat Clay, greenish gray, brown, and black mix, wet.	9 15		MC = 27.5%
1053.0	8.0	CL OL	**Slightly Organic LEAN CLAY** trace roots, black, wet. (Buried Topsoil)	20		MC = 21.7%
1052.0	9.0	CL	**LEAN CLAY with SAND** brown, wet, very stiff. (Glacial Till)			PP = 3.0 tsf
1049.5	11.5	SC	**CLAYEY SAND** fine grained, trace gravel, brown, moist to wet, loose. (Glacial Till)	9		
1047.5	13.5	GC	**CLAYEY GRAVEL with SAND** orangish brown, wet, medium dense. (Residuum)	13		
1046.5	14.5	CH	**FAT CLAY** greenish brown to light greenish gray, wet, hard. (Weathered Shale)	37		PP = 3.5 tsf, MC = 22.7%
			End of boring. No water observed during drilling. Boring sealed upon completion.			

CVT STANDARD 17097.20.MNR (ROCHESTER MAINE AVE LOT).GPJ LOG A GNNN06.GDT 9/10/20

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

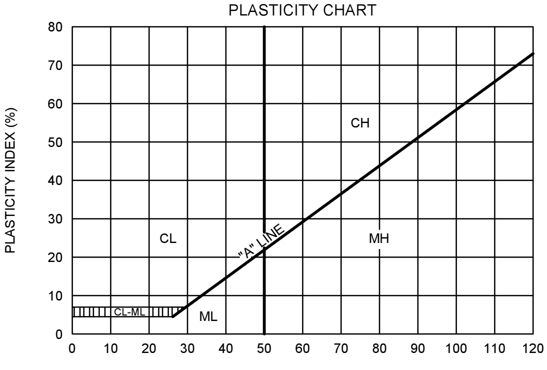
Relative Proportions of Fines

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

PLASTICITY CHART



SAMPLE TYPES

Hollow Stem

Standard Penetration Test

TEST SYMBOLS

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

▽ - WATER LEVEL (WITH TIME OF) MEASUREMENT

PENETRATION RESISTANCE
(RECORDED AS BLOWS / 0.5 FT)

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

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