

Design Phase Geotechnical Evaluation:

Park Place Apartment
Proposed ~~Golden Bluffs Senior Condominiums~~
SE Quadrant of Fairview Boulevard and Tyler Road S
Red Wing, Minnesota

Prepared for:

Mr. Andy Baartman
A1 Commercial Cleaning

September 6, 2018
12910.18.MNR

A circular professional seal for Devin M. Ehler, a Licensed Professional Engineer in the State of Minnesota. The seal features the name 'DEVIN M. EHLER' at the top, 'LICENSED PROFESSIONAL ENGINEER' in the center, and the registration number '52649' at the bottom. The words 'STATE OF MINNESOTA' are written around the inner edge of the seal.	<p>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.</p> <p><i>Devin Ehler</i> Devin M. Ehler, PE Geotechnical Engineer Registration Number 52649 Date: September 6, 2018</p>
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Chosen Valley Testing, Inc.

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Mr. Andy Baartman
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September 6, 2018

**Re: Design Phase Geotechnical Evaluation
Proposed Golden Bluffs Senior Condominiums
SE Quadrant of Fairview Boulevard and Tyler Road S
Red Wing, Minnesota
CVT Number: 12910.18.MNR**

Dear Mr. Baartman,

As authorized, we have completed the geotechnical evaluation for the proposed Golden Bluffs Senior Condominiums in Red Wing, Minnesota. The attached report provides details of our findings, recommendations, and analysis. CVT appreciates the opportunity to provide geotechnical services on this project. If you have any questions or need additional information, please contact us at (507) 281-0968.

Sincerely,
Chosen Valley Testing, Inc.



Devin M. Ehler, PE
Geotechnical Engineer

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**BORING LOCATION SKETCH
LOG OF BORING 1-10, 13-25
LEGEND TO SOIL DESCRIPTION**

**Design Phase Geotechnical Evaluation
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SE Quadrant of Fairview Boulevard and Tyler Road S
Red Wing, Minnesota**

CVT Project Number: 12910.18.MNR
Date: September 6, 2018

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 Golden Bluffs Senior Condominiums in Red Wing, Minnesota. Our services were authorized by Mr. Andrew Baartman of A1 Commercial Cleaning.

A.2. Scope

To provide data for analysis, a total of 25 penetration test borings were planned for depths of about 20 feet in the proposed building and pond areas, and to depths of approximately 10 feet in the paved areas. Borings B-11 and B-12 were eliminated due to steep slopes and thick vegetation. Borings B-2 and B-23 were performed manually with a hand auger due to similar access constraints. Our scope included geotechnical recommendations for the building, pavements, and pond.

A.3. Boring Locations and Elevations

The boring locations were selected by Chosen Valley Testing (CVT) based on access and a site layout, provided by the Client. The Boring Location Sketch in the Appendix shows the approximate locations as drilled according to GPS coordinates gathered in the field using a handheld device and the site plan overlaid onto aerial imagery using Google Earth software. These locations should be considered very approximate. Ground surface elevations at the borings were estimated to the nearest ½-foot from the GGG, Inc. Preliminary Grading Plan dated 12-18-2007.

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 colluvial (hillslope deposited) soil and rock mixtures. Bedrock is commonly within 50 feet of the surface and typically consists of dolostone, siltstone, sandstone, and some thin shale beds of the St. Lawrence and Franconia Formations.

B. Subsurface Data

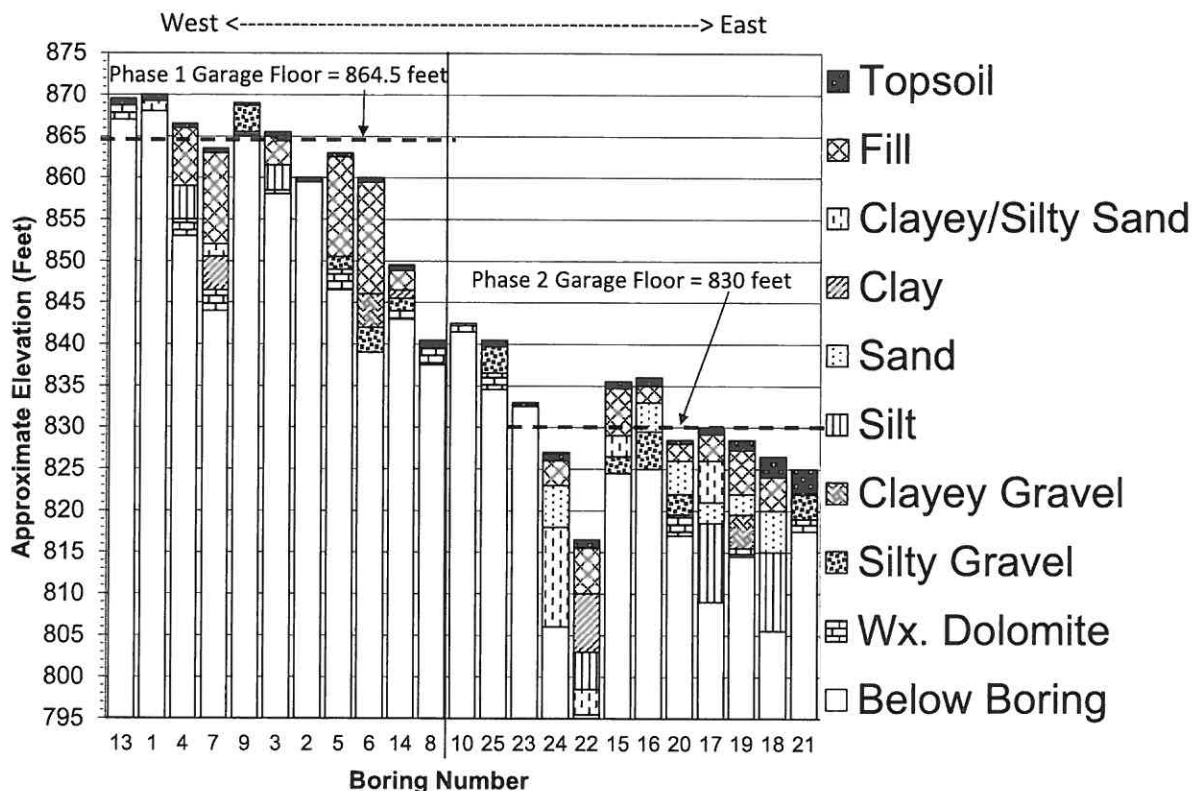
Procedures: The borings were performed using penetration test procedures (Method of Test D1586 of the American Society for Testing and Materials). This procedure allows for the extraction of intact soil specimen from deep in the ground. With this method, a hollow-stem auger is drilled to the desired sampling depth. A 2-inch OD sampling tube is then screwed onto the end of a sampling rod, inserted through the hole in the auger's tip, and then driven into the soil with a 140-pound hammer dropped repeatedly from a height of 30 inches above the sampling rod. The sampler is driven 18 inches into the soil, unless the material is too hard. The samples are generally taken at 2½ to 5-foot intervals. The core of soil obtained was classified and logged by the driller on site and a representative portion was then sealed and delivered to the geotechnical engineer for further review.

B.1. Stratification

At the surface, the borings encountered generally encountered about ½ to 1-foot of topsoil across the majority of the site, but a couple of borings found 2 ½ to 3 feet of topsoil at the eastern most locations explored. Clayey/silty fill materials were mainly found following the topsoil to depths of approximately 3 to 14 feet, with a couple of exceptions. Shallow bedrock was found within 1 to 5 feet of the surface in the northwest and central portions of the site

Beneath the fill materials, natural clays, silts, sands, and gravels were found with underlying shallow weathered dolomite at termination depths in the majority of the western borings done in the Phase 1 area of the project.

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 Test and Laboratory Test Results

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

Penetration resistance values ("N" Values) of 5 to 42 Blows Per Foot (BPF) were recorded in the fill materials, indicating they were highly variable.

The clays and silts returned values of from 7 to 16 BPF, indicating they were medium to stiff. Resistance values of 4 to 72 BPF were recorded in the clayey/silty sands, gravels, and clean sands, indicating they were very loose to very dense. In general the sands and gravels were mostly loose to medium dense. The weathered dolomite returned 38 BPF to 50 hammer blows for 2 inches of sampler advancement, indicating it was dense to very 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.

Water was not observed in any of the borings and none of the samples appeared to be overly wet. We would expect moisture to be capable of perching above less permeable clays and bedrock. Groundwater levels on site would be expected to fluctuate seasonally with local weather patterns and similar to levels in nearby creeks and rivers.

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.

Preliminary grading plans indicate that the project consists of constructing two, four-story condominium buildings with partially below grade parking garage levels. Structural loads were not provided. In order to facilitate analysis, we assumed maximum wall loads would be on the order of 13,000 pounds per lineal foot or less and maximum column loads are assumed to be on the order of 300,000 pounds. The garage floor of the Phase 1 building is proposed to be near elevation 864 ½ feet and the garage floor of the Phase 2 building is proposed to be near elevation 830 feet. This anticipated to require up to 25 feet of fill and 5 feet of cut in places to attain planned garage floor elevations.

Design traffic volumes were not provided for pavement design. It is understood that 66 parking spaces

are planned in the garage level of the Phase 1 building, along with 59 exterior parking spaces. For the phase 2 building, it is understood that 57 parking spaces are planned in the garage level, along with 51 exterior parking spaces. Based on this information, an average annual daily traffic (AADT) volume of 233 was used for pavement design. Asphalt is assumed to be the preferred exterior pavement type. Traffic is assumed to primarily consist of standard vehicles with occasional heavy trucks.

A pond is understood to be planned in the central portion of the site. The proposed bottom elevation of the pond is near 828 feet.

Chosen Valley Testing should be contacted for review of our analysis and recommendations when more final plans are available.

D. Analysis

In general, the borings encountered clayey/silty fill materials in the upper 3 to 14 feet overlying natural clays, silts, and sands. Very shallow bedrock was also found within 1 to 5 feet of the surface in the northwest and central portions of the site. Topsoil depths varied from about ½ to 1-foot thick across the majority of the site but was up to 2 ½ and 3 feet deep at the eastern most locations explored. The fill materials and topsoil are unsuitable for support and should be completely removed from the building areas, along with any deeper organic soils, debris, or otherwise deleterious materials that may be discovered during construction.

Due to the close proximity of some loose and rather compressible clays to anticipated foundations on the south end of the Phase 2 building (Boring B-17), we recommend removing these clays down to the underlying clean sand. The clays at this location were found within approximately 9 feet of the existing ground surface.

It is recommended that personnel from Chosen Valley Testing be retained to evaluate the suitability of the bearing soils and their consistency with our expectations during construction, based on the soil boring data and design assumptions. Especially in regards to evaluating soil corrections in the building areas. Subject to the results of the evaluations, additional soil corrections or changes to recommendations may be deemed warranted, but are not anticipated.

Based on the soil boring data, assumed structural loads, proposed floor elevations, and implementation of the earthwork recommendations, we are of the opinion that foundations may be sized to exert pressures up to 3,000 pounds per square foot (psf). Total post-construction settlement is then expected to be on the order of 1 inch or less and differential settlements between similarly loaded footings are anticipated to be on the order of ½ inch or less.

The remainder of this report provides further details of our recommendations for the building, pavement, and ponds.

E. Building Recommendations

E.1. Grading Recommendations

E.1.a. Removals: As previously mentioned, the fill materials and topsoil are unsuitable for support and should be completely removed from the building areas, along with any deeper organic soils, debris, or otherwise deleterious materials that may be discovered during construction.

Due to the close proximity of some loose and rather compressible clays to anticipated foundations on the south end of the Phase 2 building (Boring B-17), we recommend removing these clays down to the underlying clean sand.

The following table presents the apparent depths and bottom elevations of unsuitable materials at the building boring locations. The values below have been rounded to the nearest ½-foot.

Boring Number	Approx. Ground Elevation (Feet)	Apparent Depth of Unsuitable Materials (Feet)	Approx. Bottom Elevation of Unsuitable Materials (Feet)
B-1	870	1	869
B-2	860	*½	*859 ½
B-3	865 ½	4	861 ½
B-4	866 ½	7 ½	859
B-5	863	12 ½	850 ½
B-6	860	14	846
B-7	863 ½	11 ½	852
B-8	840 ½	1	839 ½
B-17	830	9	821
B-18	826 ½	6 ½	820
B-19	828 ½	6 ½	822
B-20	828 ½	2 ½	826
B-21	825	3	822
B-22	816 ½	6 ½	810
B-23	833	*½	*832 ½
B-24	827	4	823

***Depth and bottom elevation of refusal of manual hand auger exploration. Depth of unsuitable materials could possibly be deeper but oversized rock prevented further manual exploration. Steep slopes and thick vegetation prevented mechanical penetration test borings at these locations.**

E.1.b. Subgrade Evaluation: It is recommended that personnel from Chosen Valley Testing be retained to evaluate the suitability of the bearing soils and their consistency with our expectations during construction, based on the soil boring data and design assumptions. Especially in regards to evaluating soil corrections in the building area. Subject to the results of the evaluations, additional soil corrections or changes to recommendations may be deemed warranted, but are not anticipated.

E.1.c. Oversizing: Any 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 can be reduced by up to 50% if rather precise staking is present during grading. However, additional oversizing provides the Owner some protection against stakes getting knocked down, moved, or slight repositioning of the building after the soil corrections are performed.

E.1.d. Filling and Compaction: For ease of compaction, we recommend importing clean sands or gravels having less than 12% particles passing a number 200 sieve as engineered fill in the building areas. Aggregate base, limestone screenings, or other granular materials could also be considered for use as engineered fill, dependent upon geotechnical evaluation prior to construction.

Subgrades should be properly benched where filling is planned along slopes to prevent the formation of a failure plane for stability reasons.

Clean sand having less than 5% particles passing the number 200 sieve should be placed as fill in the upper 4 to 6 inches below slab areas.

All fill materials in the building area should be compacted to a minimum of 95% of its maximum standard Proctor density (ASTM D 698).

E.1.e. General Slope Considerations: According to preliminary grading plans, slopes as steep as 2H:1V (Horizontal:Vertical) are planned from the Phase 1 parking lot down to the pond and Phase 2 parking lot. We recommend flattening slopes to 3H:1V or flatter as typical soils are stable at such ratios and as a crude rule of thumb, allows safe mowing of lawn. If steeper slopes are desired or required for the grading plan, a stability analysis should be performed. This was outside of our work scope.

E.2. Building Design

E.2.a. Foundation Depth: We recommend placing foundations for heated structures at least 42 inches below the exposed ground surface for frost protection. Interior foundations in heated areas may be placed directly below slabs. Foundations for unheated structures should bear at least 60 inches below final grades.

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

E.2.c. Settlement: Total post-construction settlement is expected to be on the order of 1 inch or less based on the previously stated design data and recommended allowable bearing capacity. Differential settlements between similarly loaded footings are expected to be on the order of 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.

E.2.e. Slab Design: The completed slab subgrade is expected to consist of at least 4 to 6 inches of clean sand fill over a variety of materials ranging from silt, clay, and sands. We recommend using a modulus of subgrade reaction of no more than 100 pounds per cubic inch (pci) for this stratification.

E.2.f. Lateral Earth Pressures: We recommend using clean, free-draining sands or gravels having less than 10% fines, as fill against below-grade walls. The 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 clayey topsoil or pavement. A draitile is recommended at the base of the wall backfill to prevent access pressure on below-grade walls from the collection of water.

The table following this paragraph provides recommended 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	0.50
Moist Unit Weight (pcf)	120
Backslope behind wall (degrees)	0
At-Rest Coefficient (K _o)	0.44
Active Coefficient (K _a)	0.28
Passive Coefficient (K _p)	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. Pavement Recommendations

F.1. Stripping and Grading

We recommend stripping the existing topsoil from paved areas prior to any grading. Subgrades are then expected to generally consist of clay and silt with some sands, gravels, and weathered dolomite. These materials are considered generally suitable for pavement support. Subgrades should be deeply scarified to encourage uniformity and compacted as needed to pass a test roll. Clayey/silty subgrades should also be sloped to drain out from below pavements. New fill needed in paved areas should consist of a uniform soil type similar to the existing soils in the fill area.

Clayey/silty subgrade soils tend to be sensitive to moisture and traffic. If subgrades become unstable or if heavy traffic routes are planned for construction, a layer of 12 inches of breaker run or 18 inches of select sand subbase could be placed to help protect supporting soils and better carry construction traffic. In proposed pavement areas, it may be best to place breaker run or sand immediately after topsoil removal if subgrades are wet and soft so that rutting and instability can be prevented during construction.

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 at least 95% is recommended. Compaction to 90% is usually sufficient in green areas.

Regardless of densities, the completed pavement subgrade should be able to pass a proof roll test using a loaded tandem axle truck. Areas not passing the proof roll test should be reworked and stabilized as needed to pass the test roll or breaker run, sand subbase, extra aggregate base, and/or geosynthetic fabric should be incorporated into the pavement design.

F.2. Pavement Design

Pavement subgrades are expected to primarily consist of lean clay and silt with some sands, gravels, and weathered dolomite. The effective Hveem-stabilometer R-values typically range from about 10 to 50 for these types of materials. We recommend using an R-value of 12 for design.

In the absence of design traffic volumes, we have assumed a traffic volume of about 233 AADT consisting of mostly standard automobiles and approximately 4.4% heavy trucks. With the assumed traffic volume and using MnDOT's MnPAVE software, a flexible pavement section consisting of at least 3 ½ inches of asphalt over 8 inches of aggregate base is recommended.

This pavement section should be considered preliminary and subject to review by the civil consultant, based on more specific traffic volumes and their experience with pavement performance in the project area.

The above pavement section also assumes that the subgrade has been sufficiently scarified and compacted to pass a test roll. Observation of the test roll should be documented by qualified geotechnical personnel. The necessity of scarifying and recompaction of the subgrade would be determined by the test roll.

G. Pond Infiltration Recommendations

Infiltration rates were estimated for the various materials encountered in the Pond Boring B-25. This boring encountered soils ranging from slightly organic lean clay and silty gravels. The following table presents the recommended infiltration rates per soil type from the MPCA Minnesota Storm Water Manual (updated from Version 2X). Please see the individual Log of Boring sheet in the Appendix for soil classification details at each location and depth.

Unified Soil Classification System, USCS	Infiltration Rate (inches/hour)
Lean Clays (CL)	0.06
Silty Gravels (GM)	1.63

Double-ring infiltrometer testing could be performed to provide site specific infiltration values, but was not part of our initial work scope and would need to be performed at the bottom of the infiltration structure.

H. Construction Testing and Documentation

H.1. Earthwork

Topsoil stripping can likely be performed with a variety of equipment, provided clayey/silty subgrades are not overly wet or soft. Since some of the near surface samples on site were rather wet, we recommend using tracked equipment for topsoil stripping and grading. A backhoe with a smooth-lipped bucket is recommended for excavations to limit the disturbance to the supporting soils while also producing a smooth working surface.

H.2. Dewatering

As noted before, water was not observed in any of the borings during our exploration and none of the samples appeared to be overly wet or water bearing. We would expect moisture to be capable of perching and seeping above less permeable clay deposits and bedrock. Sump pumps are expected to be capable of removing any seepage or precipitation that may be pond in clay excavations. During very wet conditions, multiple numbers of sump pumps will likely be required.

H.3. Cold Weather

If earthwork occurs during freezing temperatures, good winter construction practices should be used. No frozen fill should be used nor should filling take place on frozen ground. Subgrades should be completely thawed prior to the placement of any concrete.

H.4. Construction Testing and Documentation

All subgrades and excavations should be evaluated and documented by qualified geotechnical personnel after the unsuitable soils are removed and prior to the placement of any fill, pavements, or concrete. Any

fill proposed for use in building and pavement areas should be evaluated for conformance to the project gradations prior to construction and compaction tests should be performed during construction to assure proper densities are achieved. 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 – 10, 13-25

Legend to Soil Description

Boring Location Sketch

Proposed Golden Bluffs Senior Condos
SE Quad. of Fairview Blvd. & Tyler Rd. S
Red Wing, Minnesota
12910.18.MNR



Legend

⊙ Boring Locations

C | V | T
Chosen Valley Testing, Inc.



LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-01		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
870.0	0.0					
869.2	0.8	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. Auger cuttings sampled.
868.0	2.0	SM	SILTY SAND fine grained, brown, moist. (Colluvium/Residuum)			
			Auger grinding around 1.5 feet Boring terminated due to auger refusal around 2 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD, 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A GNNN06.GDT, 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota	BORING: B-03	
	LOCATION: See attached sketch	
	DATE: 8/22/2018	SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
865.5	0.0					
865.0	0.5	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
		CL ML	FILL , Silty Clay, brown to black with grey mixing, moist.		10	
861.5	4.0	ML	SILT with SAND brown, moist, medium dense. (Colluvium)		16	
858.5	7.0	GM	WEATHERED DOLOMITE , Silty Gravel with Sand, tan, moist, very dense.		*	Auger grinding around 7 feet * 50 = 4" (Set)
858.0	7.5		Boring terminated due to auger refusal around 7.5 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ LOG A.GNND06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-06		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
860.0	0.0					
859.5	0.5	CL OL	Slightly Organic LEAN CLAY black. (Topsoil) FILL , Clay and Rock mix, black, dark brown, and light brown mix.			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
				11		
				15		
				19		
				11		
				10		
846.0	14.0	GC	CLAYEY GRAVEL grayish brown, wet, loose. (Colluvium)			
				7		
842.0	18.0	GM	SILTY GRAVEL light brown, moist, medium dense. (Residuum)			
				29		
839.0	21.0		End of boring. Boring sealed upon completion.			

CVT STANDARD, 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A.G.N.N.N.O.G.S.G.D.T. 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-07		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
863.5	0.0					
863.0	0.5	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
		ML	FILL Silt with Sand and Gravel, dark brown to light brown, moist, loose.	7		
859.5	4.0	SC SM	FILL Silty Clayey Sand with Gravel, brown with some black mixing, moist.	9		
			Trace roots around 10 feet.	6		
852.0	11.5	SC	CLAYEY SAND very fine grained, grey, moist, loose. (Colluvium)	7		
850.5	13.0	CL	LEAN CLAY with SAND brown to reddish brown, wet, medium to rather stiff. (Residium)	11		PP = 1.0 tsf
846.5	17.0	GM	WEATHERED DOLOMITE , Silty Gravel with Sand, tan, moist, dense.	48		Hard drilling around 17 feet Auger grinding around 17.5 feet
844.0	19.5		Boring terminated due to auger refusal around 18 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS). GPJ. LOG A. GNNND6. GDT. 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-08		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
840.5	0.0					
839.7	0.8	ML	Slightly Organic SANDY SILT trace roots, brown. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. * 33 / 50 = 2"
		GM	WEATHERED DOLOMITE , Silty Gravel with Sand, light brown, moist, very dense.			
837.5	3.0		Boring terminated due to auger refusal around 3 feet, presumably on bedrock. Boring sealed upon completion.	*		

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ LOG A.GNND06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota	BORING: B-09	
	LOCATION: See attached sketch	
	DATE: 8/22/2018	SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
869.0	0.0					
868.7	0.3	CL OL GM	Slightly Organic LEAN CLAY black. (Topsoil) SILTY GRAVEL with SAND trace silt and clay, light brown, moist, medium dense. (Residuum)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
865.5	3.5		WEATHERED DOLOMITE	19		Hard drilling around 2.5 feet
865.0	4.0		Boring terminated due to auger refusal around 4 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD, 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS), GPJ, LOG A, GNNN06.GDT, 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota	BORING: B-13 LOCATION: See attached sketch <hr/> DATE: 8/22/2018 SCALE: 1" = 3'
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Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
869.5	0.0					
868.8	0.7	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. Auger grinding around 1.5 feet
		GM	WEATHERED DOLOMITE tan.			
867.0	2.5		Boring terminated due to auger refusal around 2.5 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ LOG A.GN06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-14		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
849.5	0.0					
848.8	0.7	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
		ML CL	FILL Silt and Clay, dark brown, wet.			
846.5	3.0			10		
845.5	4.0	CL	LEAN CLAY with SAND reddish brown, wet, rather stiff. (Residuum)			
844.0	5.5	GP	POORLY GRADED GRAVEL with SILT light brown, moist, medium dense. (Residuum)	23		Auger grinding around 5.5 feet
843.0	6.5	GP	WEATHERED DOLOMITE tan, moist.			
			Boring terminated due to auger refusal around 6.5 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS), GP J, LOG A, GNNN06.GDT, 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota	BORING: B-15	
	LOCATION: See attached sketch	
	DATE: 8/22/2018	SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
835.5	0.0					
834.7	0.8	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
		SP SM	FILL , Sand with Silt and Gravel, trace cobbles, fine grained, brown, moist.	35		
				42		
829.0	6.5	SM	SILTY SAND with GRAVEL light brown, moist, medium dense. (Residuum)	13		
826.5	9.0	GM	SILTY GRAVEL with SAND light brown, moist, medium dense. (Residuum)	18		
824.5	11.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A.GNND06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota	BORING: B-16	
	LOCATION: See attached sketch	
	DATE: 8/22/2018	SCALE: 1" = 3'

Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
836.0	0.0	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
835.0	1.0	CL	FILL , black clay and brown sand mix, wet.			
833.0	3.0	SP SM	POORLY GRADED SAND with SILT fine grained, brown, moist, loose. (Alluvium)	9		
829.5	6.5	GM	SILTY GRAVEL with SAND light brown, moist, dense. (Residuum)	11 31		
825.0	11.0		End of boring. Boring sealed upon completion.	44		

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A.G.N.N.N.O.G.S.G.D.T. 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-17		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
830.0	0.0					
829.2	0.8	CL OL	Slightly Organic LEAN CLAY black. (Topsoil) FILL , black clay and sand mix, wet.			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
				9		
826.0	4.0	SC SM	CLAYEY SAND to SILTY SAND Alternating fine grained, brown, moist, loose. (Alluvium)			
				9		
				6		
821.0	9.0	SP SM	POORLY GRADED SAND with SILT trace seams of silt, fine grained, brown, moist, loose. (Alluvium)			
				5		
818.5	11.5	ML SM	SANDY SILT to SILTY SAND very fine grained, light grayish brown, moist to wet, medium dense. (Alluvium)			
				12		
				13		
809.0	21.0		Seam of silt around 20 feet.			PP = 2.5 tsf
				19		
			End of boring. Boring sealed upon completion.			

CVT STANDARD: 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A GNN06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-18		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
826.5	0.0	CL OL	Slightly Organic SANDY LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
824.0	2.5	SP	FILL , Poorly-Graded Sand, fine grained, trace clay and gravel, brown, moist.	10		
822.5	4.0	SM	FILL , Silty Sand to Sandy Silt, black and dark brown mix, moist.	15		
820.0	6.5	SP	POORLY GRADED SAND fine grained, trace gravel, light brown, moist, medium dense. (Alluvium)	16		
				19		
815.0	11.5	ML SM	SANDY SILT to SILTY SAND Alternating Seams very fine grained, light grayish brown, moist to wet, medium dense. (Alluvium)	13		
				14		
808.5	18.0	ML	SILT light grayish brown, wet, medium dense. (Alluvium)			
				13		
805.5	21.0		End of boring. Boring sealed upon completion.			

PP = 1.5 tsf

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS) GPJ LOG A.GNND06.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-19		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
828.5	0.0	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
827.3	1.2	SP SM	FILL , Poorly-Graded Sand with Silt, fine grained, brown, moist.	9		
824.5	4.0	GM	FILL , Silty Gravel with Sand, light brown, moist.	12		
822.0	6.5	SP SM	POORLY GRADED SAND with SILT fine grained, brown, moist, medium dense. (Alluvium)	14		
819.5	9.0	GC GM	CLAYEY SILTY GRAVEL brown to light brown, moist, medium dense. (Residuum)	20		
815.5	13.0	GM	WEATHERED DOLOMITE , Silty Gravel with Sand, light brown, moist, very dense.	*		
814.5	14.0		Boring terminated due to auger refusal around 14 feet, presumably on bedrock. Boring sealed upon completion.			

* 23 / 50 = 2"
Auger grinding around 13 feet

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ LOG A GNNND6.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-20		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
828.5	0.0					
828.0	0.5	CL OL	Slightly Organic LEAN CLAY black. (Topsoil) FILL , Cobbles and Gravel, trace clay, brown.			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. Auger grinding around 9 feet
826.0	2.5	SP	POORLY-GRADED SAND fine grained, brown, moist, medium dense. (Alluvium)	17		
					13	
822.0	6.5	GM	SILTY GRAVEL light brown, moist, medium dense. (Residuum)		19	
819.5	9.0	GM	WEATHERED DOLOMITE , Silty Gravel with Sand, light brown, moist, dense.		48	
817.0	11.5		Boring terminated due to auger refusal around 11.5 feet, presumably on bedrock. Boring sealed upon completion.			

CVT STANDARD, 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS), G.P.J. LOG A GNNND6.GDT 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-21		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
825.0	0.0	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
822.0	3.0	GM	SILTY GRAVEL with SAND trace cobbles and boulders, light brown, moist, medium dense to dense. (Residuum)	16		
819.0	6.0		WEATHERED DOLOMITE tan, moist, very dense.	31		
817.5	7.5		Boring terminated due to auger refusal around 7 feet, presumably on bedrock. Boring sealed upon completion.	*		Hard drilling around 6 feet * 50 = 4" (Set)

CVT STANDARD, 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS), GP J, LOG A, GNNND06.GDT, 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-22		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
816.5	0.0	CL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007.
815.5	1.0	OL				
		CL	FILL , Clay and Gravel mix, black, trace roots, dark brown, and light brown mix, wet.	7		
810.0	6.5	SC CL	CLAYEY SAND to SANDY LEAN CLAY fine grained, dark brown to brown, wet to very wet, very loose to loose. (Alluvium)	4	6	
803.0	13.5	ML SM	SILT to SILTY SAND Alternating fine grained, brown, moist to wet, loose. (Alluvium)	9		
798.5	18.0	SM	SILTY SAND with GRAVEL fine grained, brown moist, medium dense. (Residuum)	26		
795.5	21.0		End of boring. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).G.P.J. LOG A.G.N.N.N.06.GDT. 9/4/18

LOG OF BORING

CHOSEN VALLEY TESTING

CVT

PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-24		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
827.0	0.0	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. Auger grinding around 2 feet
826.0	1.0	SP SM	FILL Poorly Graded Sand with Silt and Gravel, trace clay and cobbles, brown and light brown mix, moist.	34		
823.0	4.0	SP	POORLY GRADED SAND fine grained, trace gravel, light brown, moist, medium dense. (Alluvium)	12		
				13		
818.0	9.0	SM	SILTY SAND fine grained, trace seams of silt, light grayish brown, moist, medium dense to very dense. (Alluvium / Residuum)	15		
				19		
				27		
806.0	21.0		Trace gravel around 20 feet.	72		
			End of boring. Boring sealed upon completion.			

CVT STANDARD 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ LOG A GNN06.GDT 9/4/18

LOG OF BORING
















CHOSEN VALLEY TESTING



PROJECT: 12910.18.MNR Design Phase Geotechnical Evaluation Proposed Golden Bluffs Senior Condos SE Quadrant of Fairview Blvd and Tyler Road S Red Wing, Minnesota				BORING: B-25		
				LOCATION: See attached sketch		
				DATE: 8/22/2018	SCALE: 1" = 3'	
Elev.	Depth	USCS Symbol	Description of Materials (ASTM D 2487/2488)	BPF	WL	Tests and Notes
840.5	0.0					
839.7	0.8	CL OL	Slightly Organic LEAN CLAY black. (Topsoil)			Ground surface elevation estimated to nearest 1/2-foot from GGG, Inc. Preliminary Grading Plan dated 12-18-2007. Auger grinding around 4 feet * 32 / 50 = 3"
		GM	SILTY GRAVEL with SAND trace cobbles and boulders, light brown, moist, dense. (Residuum)	47		
836.5	4.0	GM	WEATHERED DOLOMITE tan, moist, very dense.	*		
834.5	6.0		Boring terminated due to auger refusal around 6 feet, presumably on bedrock. Boring sealed upon completion.			




CVT STANDARD. 12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS). GPJ LOG A.GNNDG.GDT 9/4/18

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	
		GRAVELS WITH FINES >12% FINES	$Cu > 4$ AND $1 > Cc > 3$	GP	POORLY-GRADED GRAVEL	
		CLEAN SANDS <5% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
		SANDS AND FINES >12% FINES	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	
		SANDS AND FINES >12% FINES	$Cu > 6$ AND $1 > Cc > 3$	SP	POORLY-GRADED SAND	
		CLEAN SANDS <5% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND	
		SANDS AND FINES >12% FINES	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	
		ORGANIC	$Pi > 4$ AND PLOTS < "A" LINE	ML	SILT	
	SILTS AND CLAYS LIQUID LIMIT > 50	INORGANIC	LL (oven dried) / LL (not dried) < 0.75	OL	ORGANIC CLAY OR SILT	
		INORGANIC	PI PLOTS > "A" LINE	CH	FAT CLAY	
		INORGANIC	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

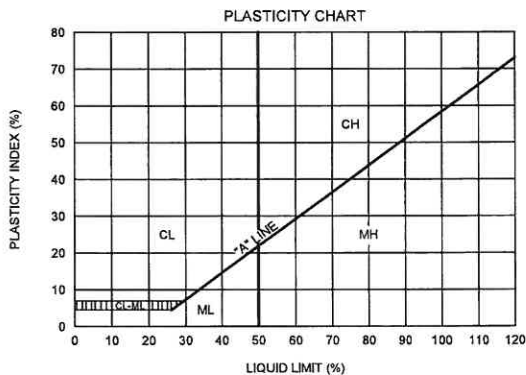
SAMPLE TYPES

-  Hollow Stem
-  Hand Augered
-  Standard Penetration Test

TEST SYMBOLS

- | | |
|-----------------------------|--|
| MC - MOISTURE CONTENT | LL - LIQUID LIMIT |
| OC - ORGANIC CONTENT | PI - PLASTICITY 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	1.0 - 2.0
VERY DENSE	OVER 50	RATHER STIFF	9 - 12	2.0 - 4.0
		STIFF	13 - 16	4.0 - 8.0
		VERY STIFF	17 - 30	8.0 - 16.0
		HARD	OVER 30	OVER 16.0

* 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).

CVT-12910.18.MNR (GOLDEN BLUFF SENIOR CONDOS).GPJ 8/29/18

Chosen Valley Testing, Inc.

Job No. 12910.18.MNR

LEGEND TO SOIL
DESCRIPTIONS

