October 1, 2019

Billy Texter
Texter Mountain Construction
PO Box 42
Oak Creek, Colorado 80467

Re: Geotechnical Subsurface Exploration
Proposed Twin Enviro Office Addition
20650 County Road 205
Routt County, Colorado
Western Slope Geotech Project # 19-1048

Dear Billy,

Western Slope Geotech, Inc. (WSG) has completed the geotechnical subsurface exploration you requested for the proposed Office Addition to the existing Twin Enviro Office building located 20650 County Road 205 in Routt County, Colorado. The results of our subsurface exploration, site observations, laboratory testing and pertinent geotechnical engineering recommendations are included with this report.

PURPOSE AND SCOPE OF WORK

The purpose of this exploration and associated reporting is to provide geotechnical design and construction recommendations for the proposed structure and other site improvements. WSG's scope of work included field exploration, site observations, laboratory testing and the preparation of this report summarizing the data obtained and outlining our recommendations for foundation design and construction and support of floor slabs and exterior flatwork. The conclusions and recommendations outlined in this report are based on our understanding of proposed construction, results of field exploration, laboratory testing and WSG's experience with subsurface conditions and similar construction in this area.

PROPOSED CONSTRUCTION

WSG understands proposed construction will be similar to the existing office building and generally consist of a single story wood framed addition to the west side of the existing office building. The building addition will be constructed with a structural floor system

over a crawl space that matches the existing building floor elevation. Based on site topography, site grading to develop finished grades around the structure would be minimal and could consist of fills up to 1-foot in height.

Foundation loads for the structure addition are expected to be relatively light, with continuous wall loads less than 3 kips per lineal foot and individual column loads less than 50 kips. If the assumed construction and loading conditions vary substantially from those assumed, WSG should be contacted to reevaluate the recommendations in this report.

SITE DESCRIPTION & OBSERVATIONS

The project site is located at the existing office building site of the Twin Landfill (solid waste landfill) and located at the south end of County Road 205 in Routt County, Colorado. The Twin Landfill site is known to be the site of a previous coal mining operation with both surface and underground mining operations. Locations of previous mining features is unknown.

The existing office building reportedly consists of a double-wide, single story modular residential structure on the order of 25 years in age. The existing structure appeared to be in fair to good condition and the client reports the owner has experienced satisfactory building performance. Differential foundation movement, settlement, subsidence or other soil-related distress have not been reported and are considered unknown by WSG.

The existing and proposed building sites are generally surrounded on all sides by gravel-surfaced parking and drive areas. The proposed building addition site is located along the west side of the existing office building and was partially occupied by an existing above ground propane tank. A small scale house located along the south side of the existing office building appears to have been an addition to the original modular construction. A truck scale borders the scale house addition to the south.

Site topography was fairly uniform and generally sloped gently down to the west on the order of 2 to 4 percent. Based on observations, it appeared that a maximum elevation difference of approximately 1 foot was likely over the proposed building addition site.

FIELD EXPLORATION AND SUBSURFACE CONDITIONS

WSG's field exploration program consisted of the excavation and observation of one (1) exploratory test pit located near the west side of the proposed building addition site. The

test pit was advanced to explore the subsurface profile and obtain material samples for laboratory testing, and the approximate test pit location is shown on Figure 1.

The subsurface conditions encountered in the test pit were variable and generally consisted of a layer of man-made gravel fill overlying apparent clay fill to the maximum depth explored, 9 feet below existing ground surface. A graphic log of the exploratory test pit and associated legend and notes are shown on Figure 2.

Pit run gravel fill was encountered at the ground surface in the test pit and extended to a depth of approximately 6 feet. The gravel fill was sandy, non-plastic, slightly silty, medium dense, fine to coarse grained, moist and light brown. A sample of the gravel fill classified as a GW soil in accordance with the Unified Soil Classification System (USCS).

Apparent lean clay fill was encountered beneath the gravel fill and extended to the maximum depth explored. The lean clay fill was slightly sandy to sandy with scattered gravel and organics, low plastic, medium stiff, moist and light to dark brown to black. A sample of the clay fill classified as a CL soil in accordance with the USCS.

A swell-consolidation test conducted on a sample of the lean clay fill indicates a low swell potential under wetting and constant (1,000 psf) loading conditions. Swell-consolidation test results are presented on Figure 3 and summarized according to risk category on Table A below. Laboratory test results are summarized on Table 1.

Table A

Slab Performance Risk Category	Representative Percent Swell (500 psf Surcharge)	Representative Percent Swell (1,000 psf Surcharge)	Test Results
			Clay Fill
Low	0 to <3	0 to <2	1
Moderate	3 to <5	2 to <4	0
High	5 to <8	4 to <6	0
Very High	>8	>6	0
Total			1

Groundwater seepage was not encountered in the test pit at the time of excavation. Groundwater levels will vary seasonally and over time based on weather conditions, site development, irrigation practices and other hydrologic conditions. Perched and/or trapped

groundwater conditions may also be encountered at times throughout the year. Perched water is commonly encountered in soils overlying less permeable soil layers and/or bedrock.

ANALYSIS AND RECOMMENDATIONS

General

Based on our assumptions regarding proposed construction and subsurface conditions encountered in the test pit, existing gravel fill is likely to be encountered at anticipated foundation grades. The depth and placement history of the fill materials are unknown, and therefore both gravel and clay materials are considered to be undocumented fill materials. In addition, the depth and condition of deeper underlying clay fill or other fill or natural materials is unknown. Additional geotechnical exploration and testing would be required to characterize material below approximately 9 feet below existing site grades. Due to undocumented fill conditions, a deep foundation system extending to natural undisturbed soils and/or bedrock would be recommended to minimize the potential for differential foundation movement and unsatisfactory structure performance.

Historical surface and underground mining activity are known to have occurred at the Twin Landfill site. The risk and movement associated with a mine subsidence event are unknown but should be recognized by the owner. Depending on amount or severity of subsidence, structural damage to overlying structures ranging from minor to severe could occur.

As an alternative and considering satisfactory performance of the existing office building structure, WSG believes the structure could be placed a spread footing foundation system placed on structural fill placed over the existing, undocumented clay fill materials. Based on swell-consolidation testing, lean clay fill will display a low swell potential under loading and wetting conditions.

WSG believes the structure foundations can be safely placed on structural fill provided certain design and construction considerations intended to reduce potential differential foundation movement are implemented.

Foundations

Based on WSG's understanding of proposed construction, WSG believes the proposed structure can be supported by continuous spread footing and isolated pad foundations bearing on structural fill and should be designed and constructed as outlined below:

1. WSG recommends foundation footings be placed on structural fill be designed using a maximum net allowable soil bearing pressure of 2,000 psf. As a precaution and to resist uplift forces from expansive clay soils, we recommend footings placed on natural lean clay be designed to maintain a minimum dead load pressure of 500 psf.
2. Foundations should be placed on a minimum of 3 feet of non-expansive, structural fill material approved by WSG. Structural fill should be underlain by a layer of geogrid and stabilization fabric to provide additional reinforcement and stability to the base of the excavation prior to fill placement. Structural fill should be uniformly placed and compacted in 9-inch loose lifts to at least 98 percent of the maximum standard Proctor density near optimum moisture content (ASTM D698). Structural fill should also extend beyond the edge of footings at a 1(H) to 1(V) or flatter slope.
3. Footings exposed to freezing or frost conditions should be designed with adequate soil cover to prevent freezing. A cover depth of 48 inches is recognized by the local building authority as the minimum value for frost protection.
4. WSG recommends continuous footings have a minimum width of 12 inches and isolated pad foundations have a minimum width of 24 inches in order to facilitate construction and reduce the potential for development of eccentrically loaded conditions.
5. Foundation walls and grade beams should be designed to span an unsupported distance of 10 feet or the distance between pads.
6. Foundation resistance to lateral loads can be developed by passive pressure against footings and walls and sliding resistance between footings and the underlying soils. WSG recommends passive pressures be computed using an equivalent fluid pressure value of 250 pcf and friction resistance be calculated using a coefficient of

friction of 0.30 times structural dead loads. The recommended passive equivalent fluid pressure value and coefficient of friction do not include a factor of safety.

7. WSG should be retained to observe foundation excavations to verify the subsurface conditions are consistent with those assumed. WSG should be retained to conduct testing and observation of structural fill to evaluate compliance with project specifications.

WSG estimates total and differential movement of foundations designed and constructed as outlined above, resulting from the assumed structural loads and associated with placement on documented structural fill will be 1-inch or less. Additional settlement associated with deeper existing fills or mine subsidence could occur and result in unsatisfactory structure performance.

Perimeter and Interior Drainage Systems

WSG recommends a perimeter drainage system be installed at all perimeter foundation areas. Properly constructed perimeter drainage systems enhance site drainage, help reduce the potential for development of hydrostatic pressures behind the below-grade walls and reduce the potential for water infiltration beneath footings and into underslab areas. WSG also recommends an interior drainage system be constructed within crawl space areas (if used) as a precaution to provide for collection and discharge of any water accumulation.

A perimeter drainage system should generally consist of a 4-inch diameter perforated PVC drainpipe covered by a minimum of twelve (12) inches of free-draining gravel and covered with filter fabric (Mirafi 140N or equivalent) to prevent intrusion of fines. The high point of the drainpipe should be placed at approximate footing grade around the perimeter foundation footings, constructed with a minimum 1% slope to a daylighted outfall. For buildings with at-grade floor slabs, minimum drainage system burial depths of 24-inches may be suitable. Care should be taken during drain installation to avoid disturbing those soils providing support to the footing bearing soils extending down at an approximate 1(H) to 1(V) slope from the bottom edges of the footings. Daylighted outfalls should be protected from small animal intrusion and backflow. WSG can provide perimeter and interior crawl space drainage system design and details upon request and after building plans are available.

Lateral Earth Pressures and Foundation Backfill

Lateral Earth Pressures: Foundation walls should be designed to resist lateral pressures associated with foundation backfill materials and existing site soils. Materials affecting lateral pressures are located within the area extending from the base of the foundation wall upward at an approximate 1(H) to 1(V) angle. Recommended lateral earth pressure design values to be used in foundation wall design are provided in Table B shown below. All values presented assume drained conditions (no hydrostatic loads) and sufficient wall deflection is achieved for activation of active earth pressure conditions.

Table B

Design Pressure Condition	Equivalent Fluid Pressure (pcf)
Active	55
At-Rest	65
Passive	250

Variables that affect active lateral earth pressures include but are not limited to the classification and swell potential of the backfill soils, backfill compaction and geometry, wetting of the backfill soils, surcharge loads and point loads developed in the backfill materials. The recommended equivalent fluid pressure values do not include a factor of safety or an allowance for hydrostatic loading. Use of expansive soil backfill, excessive compaction of the wall backfill, or surcharge loads placed adjacent to the foundation walls can add to the lateral earth pressures causing the equivalent fluid pressure values used in design to be exceeded.

Foundation Backfill: Backfill placed adjacent to below-grade walls should consist of LVC potential and relatively impervious soils free from organic matter, debris and other objectionable materials. The on-site gravel fill could be suitable for use as wall backfill but may require processing prior to placement. Imported LVC soils would also suitable for foundation backfill but should be approved by WSG prior to use. WSG recommends foundation backfill soils be uniformly placed in maximum 9-inch loose lifts, moisture conditioned to within +/-2 percent of optimum moisture content and compacted to at least

95 percent of the maximum standard Proctor dry density (ASTM D698) for imported LVC soils.

Foundation wall backfill operations should be conducted only after proper bracing and support is provided. Structural engineer approval is recommended. Excessive lateral stresses resulting in displacement, distress and damage to foundation walls can occur when insufficient bracing is in place or heavy mechanical compaction equipment is used. WSG recommends compaction of unbalanced foundation wall backfill soils be completed using light mechanical or hand compaction equipment.

Exterior Flatwork

WSG assumed existing gravel fill would be encountered beneath potential exterior flatwork areas. WSG recommends the exposed subgrade be scarified to a depth of 12-inches, moisture conditioned to within +/-2% of optimum moisture content and compacted to at least 95% of the maximum standard Proctor density. WSG recommends fill supporting flatwork consist of on-site gravel fill materials uniformly placed in 9-inch loose lifts, moisture conditioned and compacted to the values indicated above with a limited risk of post-construction movement. All fill materials should be approved by WSG prior to use.

Subgrade soils expected to receive exterior flatwork concrete should be evaluated closely evaluated immediately prior to concrete placement. If areas of disturbed, wet and softened, or dry subgrade soils are encountered at that time, reworking of those materials or removal/ replacement procedures may be required.

Drainage

Positive drainage is imperative for satisfactory long-term performance of structure foundations and associated site improvements. WSG recommends positive drainage be developed away from the structure during construction and maintained throughout the life of the site improvements. Twelve (12) inches of fall in the first 10 feet away from the building is recommended. Flatter slopes could be considered in hardscape areas. If some settlement of the backfill soils occurs adjacent to the structure, the original grade and associated positive drainage outlined above should be immediately restored.

Care should be taken in the planning of landscaping to avoid features which could result in the fluctuation of the moisture content of the foundation bearing and/or flatwork subgrade

soils. We recommend watering systems be placed a minimum of 5 feet away from the perimeter of the structure and be designed to discharge away from all site improvements. Gutter systems should be considered to help reduce the potential for water ponding adjacent to the residence, with the gutter downspouts, roof drains or scuppers extended to discharge a minimum of 5 feet away from structural, flatwork and pavement elements. Water which is allowed to pond adjacent to the site improvements can result in unsatisfactory performance of those improvements over time. The use of area drain inlets and subsurface piping is recommended to aid in rapid runoff of surface water from areas of concentrated drainage and/or limited surface runoff capability.

SITE GRADING

Based on site topography, WSG assumes unretained cuts and fills of up to 1-foot in height may be required for general site development. Based on assumed construction, WSG recommends the following:

1. Unretained cuts and fills should be constructed to a 2(H) to 1(V) or flatter slope configuration. Flatter slopes are often desirable to help facilitate revegetation efforts.
2. Fill materials supporting driveways or other settlement-sensitive landscaping features should consist of approved materials. All fills should be uniformly placed and compacted in 9-inch loose lifts to at least 95% of the maximum standard Proctor density within +/-2% of optimum moisture content (ASTM D698).
3. Proper drainage should be provided and maintained around all cuts, fills, buildings, and driveway surfaces. Special attention should be given to channeling or routing drainage around and away from site fills and retaining structures. Excessive or uncontrolled surface and subsurface drainage could lead to erosion and poor site fill performance and/or slope failure.
4. All disturbed areas should be protected from erosion by revegetation or other appropriate methods. Areas of concentrated drainage should be protected by use of rip rap or other appropriate methods.
5. Construction safety is the sole responsibility of the contractor. The contractor is responsible for determining the appropriate OSHA slope criteria for the soils conditions encountered and implementing it during construction. The contractor

shall be responsible for all means, methods, techniques, sequencing, and operations during construction. All excavation activities should meet minimum OSHA, state or local trenching and excavation safety standards.

GENERAL COMMENTS

This report was prepared based upon the data obtained from the completed site exploration, engineering analysis and WSG's experience with similar construction in this area. The subsurface conditions encountered during this investigation provide an indication of subsurface conditions at the test pit location only. Variations in subsurface conditions can occur in relatively short distances away. This report does not reflect any variations which may occur across the site or away from the test pit location. If variations in the subsurface conditions anticipated become evident, the geotechnical engineer should be notified immediately so that further evaluation can be completed and when warranted, alternative recommendations provided.

Existing, undocumented fill materials were encountered at the site. The depth, extent and condition of these materials is unknown. In addition, due to previous mining activity, there is an unknown risk of site subsidence associated with previous mining activity. The owner should recognize and fully accept the risks of structure damage should deep settlement or subsidence occur.

The scope of services for this project does not include either specifically or by implication any biological or environmental assessment of the site or identification or prevention of pollutants or hazardous materials or conditions. Other studies should be completed if concerns over the potential of such contamination or pollution exist.

WSG should be retained to review the plans and specifications so that comments can be made regarding the interpretation and implementation of our geotechnical recommendations in the design and specifications. WSG should also be retained to provide testing and observation services during construction to help evaluate compliance with project plans and specifications.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with the generally accepted standard of care for the profession. No warranties express or implied, are made. The conclusions and recommendations contained in this report should not be considered valid

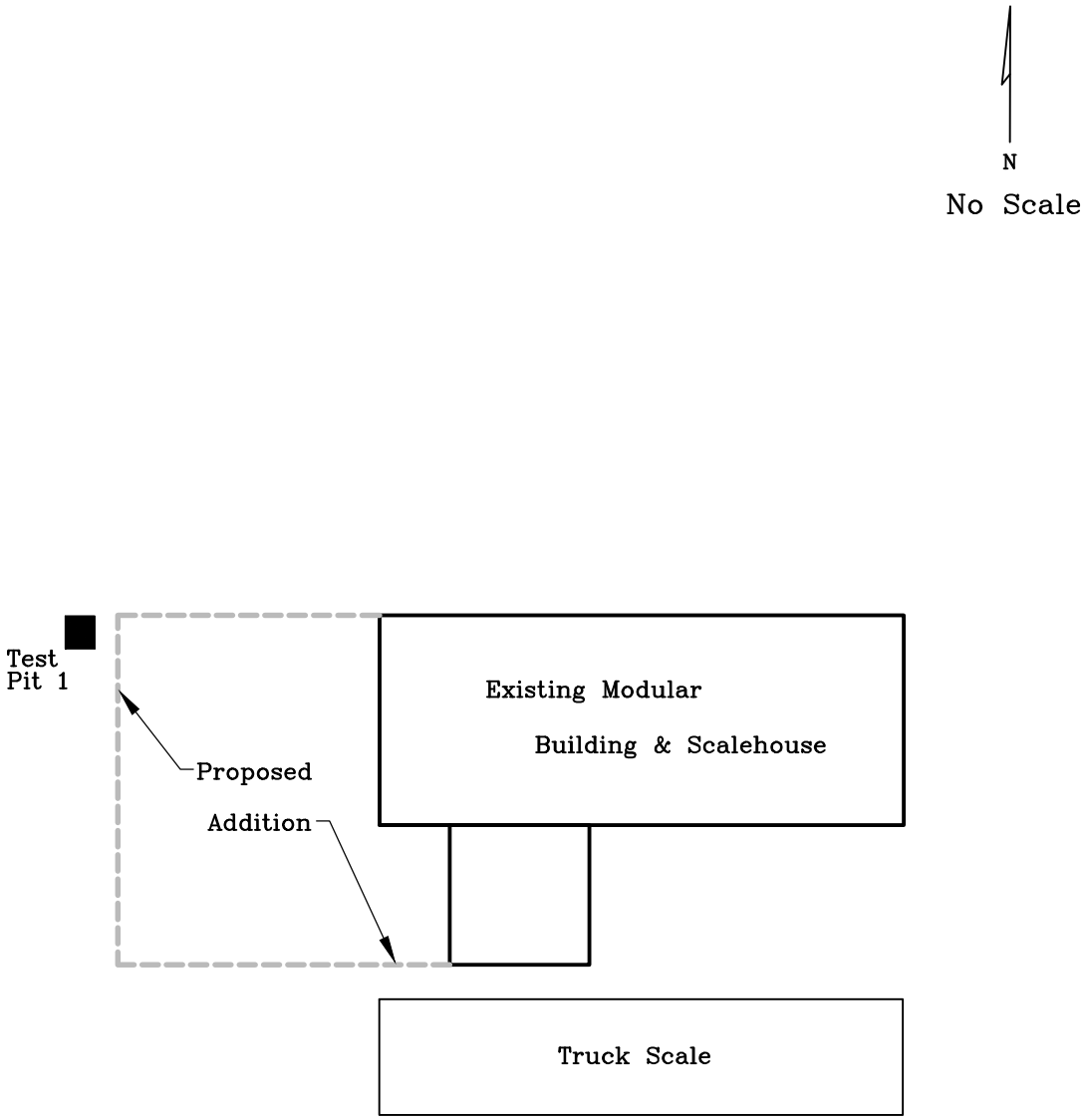
if any changes in the nature, design or location of the project as outlined in this report are planned, unless those changes are reviewed, and the conclusions of this report modified and verified in writing by the geotechnical engineer.

WSG appreciates the opportunity to be of service to you on this project. If you have any questions concerning the enclosed information or if we can be of further service to you in any way, please do not hesitate to contact us.

Very Truly Yours,
Western Slope Geotech, Inc.

Harold Schlicht, P.E.
Principal Engineer

Cc: Ryan Malone, SEAD



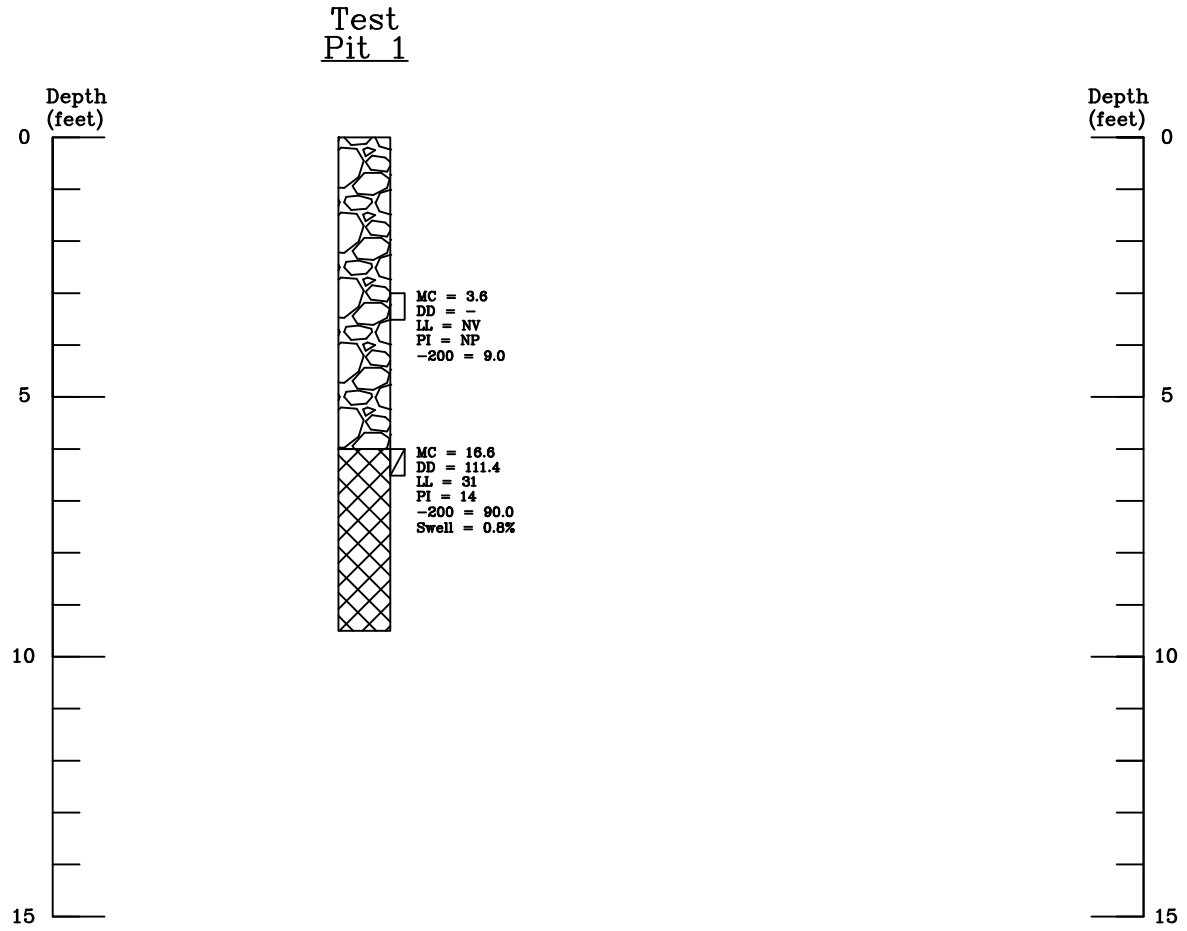
SITE PLAN/LOCATION OF TEST PIT

Project Name: Proposed Twin Enviro Office addition

Location: 20650 County Road 205, Routt County, CO

WESTERN SLOPE GEOTECH STEAMBOAT SPRINGS COLORADO

Project No.: 19-1048	Drawn/Checked:HS
Date: 9/25/19	Figure No.: 1



Legend:

FILL: Pit Run Gravel, sandy, non-plastic, slightly silty, medium dense, fine to coarse grained, moist and light brown.

FILL - LEAN CLAY: Slightly sandy to sandy, scattered gravel and organics, low plastic, medium stiff, moist and light to dark brown to black.

Hand Drive Sample - California Liner.

Small Disturbed bag sample.

MC = Natural Moisture Content (%)
DD = Natural Dry Density (pcf)
LL = Liquid Limit
PI = Plasticity Index
-200 = Percent Passing No. 200 Sieve
Swell = Percent Swell Under 500 or 1,000 psf surcharge

Notes:

1) Test pit was excavated on 9/11/19 with a Cat 330 trackhoe.

2) Location of test pit was determined by the client and by pacing from existing site features.

3) Test pit elevation was not determined and log is drawn to the depth explored.

4) Lines between materials types are approximate and transitions may be gradual.

5) Groundwater measurements were made at the time of excavation and levels may vary.

LOG, LEGEND & NOTES

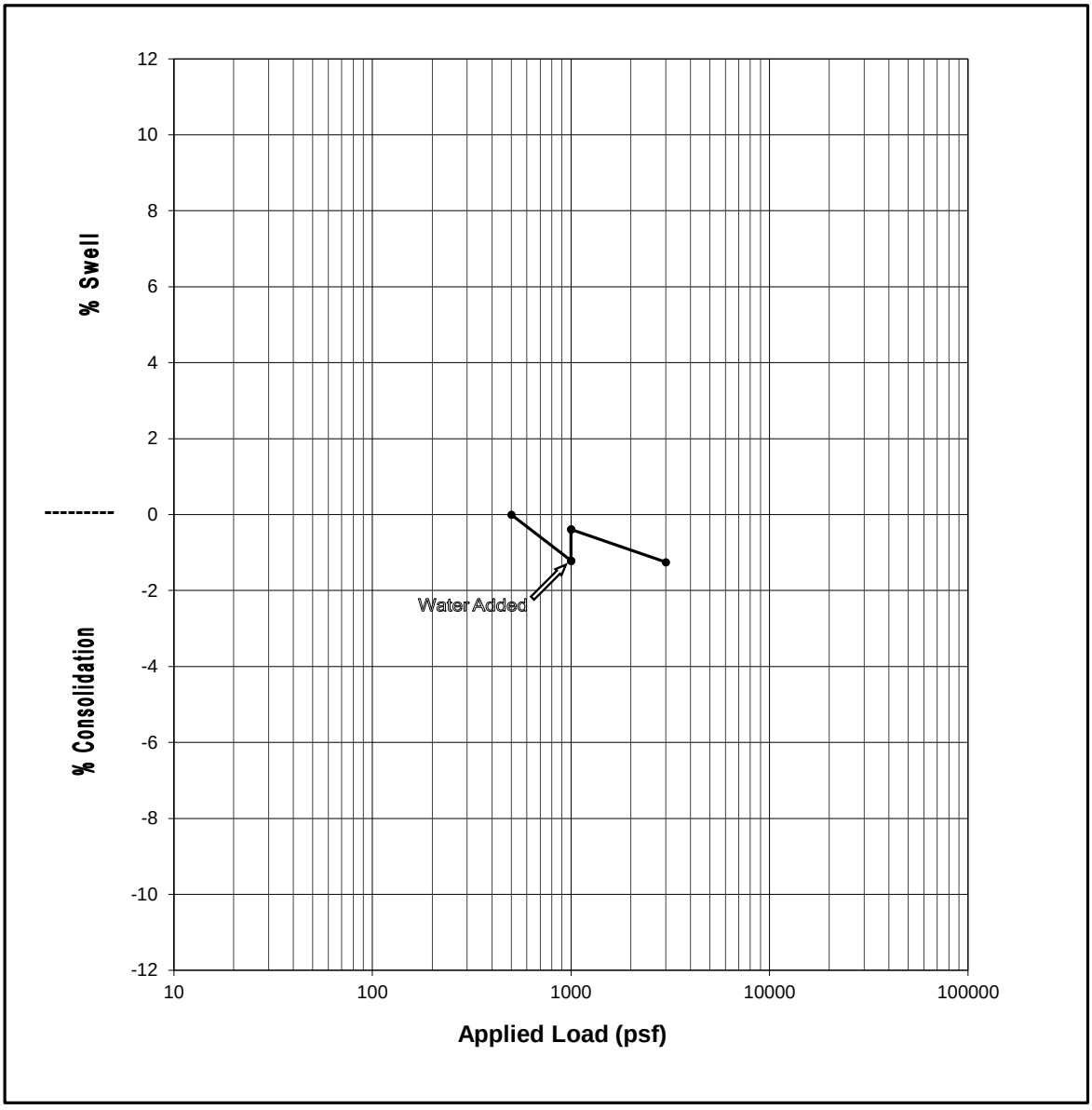
Project Name: Proposed Twin Enviro Office Addition

Location: 20650 County Road 205, Routt County, CO

WESTERN SLOPE GEOTECH STEAMBOAT SPRINGS COLORADO

Project No.: 19-1048	Drawn/Checked:HS/HS
Date: 9/25/19	Figure No. 2

SWELL/CONSOLIDATION TEST SUMMARY



Sample ID: TP-1 @ 6'			
Sample Description: Fill: Slightly Sandy Lean Clay (CL)			
Initial Moisture	16.6%	Liquid Limit	31
Final Moisture	17.9%	Plasticity Index	14
% Swell @ 1,000 psf	0.8%	% Passing #200	90.0%
Swell Pressure	2,000 psf	Dry Density	111.4 pcf

Project Name: Twin Enviro Office Addition	Project No.: 19-1048
Location: 20650 County Road 205, Routt County, CO	Date: 9/25/19
Drawn/Checked: HS/HS	Figure No. : 3

WESTERN SLOPE GEOTECH
STEAMBOAT SPRINGS COLORADO

WESTERN SLOPE GEOTECH STEAMBOAT SPRINGS COLORADO

Project No.: 19-1048

Table 1
Summary of Laboratory Test Results

Test Hole/ Pit	Depth (ft)	Natural Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits		Swell Test Data		Soil or Bedrock Type	USCS Classification	AASHTO Classification
				Gravel (%)	Sand (%)	Silt/ Clay (%)	LL (%)	PI (%)	Swell(+) Consol.(-)	Swell Pressure (psf)			
TP-1	6	16.6	111.4	0	10	90	31	14	0.8	2000	Fill: Slightly Sandy Lean Clay	CL	
TP-1	3-4	3.6	-	64	27	9	NV	NP			Fill: Sandy Gravel	GW	