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SOILS AND FOUNDATION INVESTIGATION
PROPOSED RESIDENCE
LOT 5, BLOCK 16
WHISPERING PINES RANCH SUB #8
101 MULE DEER COURT
SUMMIT COUNTY, COLORADO

Prepared For:

Liscott Custom Homes, LTD.
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Castle Rock, CO 80109

Attention: Rob Cowley

Project No. SU01733.000-120

August 7, 2019

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SCOPE

This report presents the results of our Soils and Foundation Investigation for the Proposed Residence on Lot 5, Block 16, Whispering Pines Ranch Sub #8 in Summit County, Colorado. We conducted this investigation to evaluate subsurface conditions at the site and provide geotechnical engineering recommendations for the proposed residence. Our report was prepared from data developed during our field exploration, engineering analysis, and experience. This report includes a description of the subsurface conditions observed in two exploratory pits and presents geotechnical engineering recommendations for design and construction of the residence foundations, floor systems, and details influenced by the subsoils. The scope was described in a Service Agreement (SU-19-0281) dated June 7, 2019.

Recommendations contained in this report were developed based on our understanding of the planned construction. Once building plans are completed, we should review to determine whether our recommendations and design criteria are appropriate. A summary of our conclusions is presented below.

SUMMARY OF CONCLUSIONS

1. Subsurface conditions observed in the exploratory pits consisted of about 4 inches of "topsoil" underlain by native clay soils and limestone bedrock. The maximum depth explored was 10 feet. No groundwater was observed in the pits at the time of excavation.

2. We anticipate that excavations for the new residence will result in natural clay soils or limestone bedrock being the predominant materials at anticipated foundation elevations. The residence can be constructed on footing foundations supported by the undisturbed, natural clay soils or limestone bedrock. Design and construction criteria are presented in the report. It is critical that we observe the excavation to check whether conditions are as anticipated, prior to placing footings.

3. Surface drainage should be designed to provide for rapid removal of surface water away from the residence.

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4. The design and construction criteria for foundations and floor systems in this report were compiled with the expectation that all other recommendations presented related to surface and subsurface drainage, landscaping irrigation, backfill compaction, etc. will be incorporated into the project and that the homeowner will maintain the structure, use prudent irrigation practices and maintain surface drainage. It is critical that all recommendations in this report are followed.

SITE CONDITIONS

The site is located at the end of Mule Deer Court in the Summit Cove neighborhood near Dillon, CO as shown on Figure 1. The property is bordered by private open space to the west, an existing single-family residence to the south, Mule Deer Court to the east, and a vacant residential lot to the north. The ground surface across the site slopes down to the north at approximately 6 percent. Vegetation consists of sage brush and grass.

PROPOSED CONSTRUCTION

Building plans for the residence have not yet been developed. We understand the residence will likely be a two-story structure over a full basement with an attached three-car garage. The basement and garage floors will likely be slab-on-grade. If a full basement is constructed, required excavations could be on the order of 10 to 12 feet for foundations. Foundation loads are expected to be about 1,000 to 3,000 pounds per linear foot of foundation wall, with maximum column loads of 40 kips or less. Once building plans have been developed, we should be contacted to re-evaluate our recommendations.

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SUBSURFACE CONDITIONS

Subsurface conditions were investigated by observing two exploratory pits excavated at the approximate locations shown on Figure 2. Subsurface conditions observed in the pits were logged by our geologist who obtained samples of the soils during excavation. Graphic logs of the soils observed in the pits are shown on Figure 3.

Subsurface conditions observed in the test pits consisted of about 4 inches of "topsoil" overlying 5 to 9 feet of clay in TP-2 and TP-1 respectively. The clay ranged from a gravelly lean clay to a lean clay with or without gravel. Within the clay, more gravel was encountered with depth. Beneath the clay layers in TP-2, we encountered limestone bedrock to the maximum depth explored of 10 feet below existing ground surface. The limestone excavates to a clayey gravel with angular cobbles and boulders up to 18 inches in diameter. Practical excavation refusal was encountered within the bedrock in TP-2 at a depth of 10 feet below the existing ground surface. No groundwater was observed in the pits at the time of excavation. The pits were backfilled after excavation operations were completed.

Samples obtained in the field were returned to our laboratory where field classifications were checked and samples were selected for pertinent testing. Swell consolidation testing conducted on a sample of the onsite clay soils, shown on Figures 4 and 5, indicates low expansion potential when wetted under a constant surcharge. Gradation test results of the clay soils and excavated limestone bedrock are presented on Figures 6 and 7. A bulk disturbed sample of the clay soils contained 15 percent gravel (retained on the No. 4 sieve), 5 percent sand, 80 percent silt and clay sized particles, and exhibited moderate plasticity. A bulk disturbed sample of the excavated limestone bedrock contained 78 percent gravel, 3 percent sand, 19 percent silt and clay sized particles, and exhibited low plasticity. Laboratory test results are summarized on Table I.

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GEOLOGY

We reviewed the following geologic mapping showing the site.

1. Geologic Map of the Frisco Quadrangle, Summit County, Colorado, (Map MF-2340) by Karl S. Kellogg, Paul J Bartos and Cindy L. Williams with the U.S. Geologic Survey, 2002.

The site is mapped as the Niobrara Formation from the Upper Cretaceous. Our field investigation and observations at the site support the mapping. We did not observe geologic constraints on this site that would inhibit the planned construction.

SITE EARTHWORK

We anticipate excavation of the soils can be accomplished using conventional, heavy duty excavating equipment. Hard bedrock will be exposed in some areas of the excavation. We expect the bedrock will be rippable, however, the use of a hydraulic hammer chisel (excavator attachment) or similar device may be required. Sides of excavations need to be sloped to meet local, state and federal safety regulations. We anticipate the clay soils will likely classify as Type B soils, unless groundwater is encountered, then should be considered Type C. Temporary slopes deeper than 4 feet that are not retained should be no steeper than 1.5 to 1 (horizontal to vertical) in Type C soils and 1 to 1 in Type B soils based on OSHA standards governing excavations. The bedrock may classify as "stable rock" in some areas. Stable rock may be vertical. However, if bedding planes dip into the excavation at a slope of 4H:1V or steeper, the bedrock should be classified as Type C. Some sloughing of the excavation face may occur as the soils dry out. Contractors are required to identify the soils encountered and ensure that applicable standards are met. Contractors are responsible for site safety and maintenance of the work site.

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No groundwater seepage was encountered in the exploratory pits at the time of excavation. Some seepage may occur during foundation excavation, particularly if it occurs during seasonal runoff. The footing areas should be protected from any seepage and precipitation through the use of shallow trenches and sumps. Excavations should be sloped to a gravity discharge or to a temporary sump where water can be removed by pumping, if necessary.

Structural Fill

We do not anticipate that structural fill will be needed below foundations. However, removal of over ripped bedrock sometimes requires placement of structural fill to re-establish subgrade elevation. If required, structural fill should consist of imported CDOT Class 4, 5 or 6 aggregate base course or similar soil. Structural fill should have no rocks larger than 6 inches. We can evaluate potential fill materials upon request. Lean-mix concrete (flowable fill) can also be used to fill voids.

Structural fill should be placed in thin loose lifts, moisture conditioned to within +/-2 percent of optimum moisture content, and compacted to at least 98 percent of ASTM D 698 maximum dry density. Moisture content and density of structural fill should be tested by a representative of our firm during placement.

FOUNDATIONS

The residence can be supported on footing foundations on the undisturbed, natural clay soils or limestone bedrock. Prior to concrete placement, the footing areas should be moistened and compacted to provide a flat and level subgrade. Loose and disturbed soils should be removed or compacted. Structural fill, if required, should be tested by our representative and meet the criteria in Structural Fill. Our representative should observe conditions exposed in the completed foundation excavation to confirm whether the exposed soils are as anticipated and suitable for support of the foundation.

1. Soils loosened during the forming process for the footings should be removed or compacted prior to placing concrete. Lean concrete may also be used to fill depressions resulting from the removal of over ripped bedrock.

2. Footings can be sized using a maximum allowable soil pressure of 3,000 psf. We expect settlement or heave of footings will be approximately 1 inch or less.

3. To resist lateral loads, a coefficient of friction of 0.35 can be used for concrete in contact with soil. Lateral loads can be resolved by evaluating passive resistance using a passive equivalent fluid density of 300 pcf for granular backfill that is compacted to the criteria in Foundation Wall Backfill and will not be removed. These values have not been factored; appropriate factors of safety should be applied in design. Deflection is necessary to develop passive pressures.

4. Continuous wall footings should have a minimum width of at least 16 inches. Foundations for isolated columns should have minimum dimensions of 24 inches by 24 inches. Larger sizes may be required, depending upon foundation loads.

5. Grade beams and foundation walls should be well reinforced, top and bottom, to span undisclosed loose or soft soil pockets and resist lateral earth pressures. We recommend reinforcement sufficient to span an unsupported distance of at least 10 feet. Reinforcement should be designed by the structural engineer.

6. The soils under exterior footings should be protected from freezing. We recommend the bottom of footings be constructed at a depth of at least 40 inches below finished exterior grade.

SLABS-ON-GRADE

We anticipate that a slab-on-grade lower level floor is desired. Based on our laboratory test data and experience, we judge slab-on-grade construction supported by the undisturbed, natural clay soils or limestone bedrock will have a low risk of damaging differential movement. Fill placed to attain subgrade elevations below floor slabs should be placed in accordance with the recommendations outlined in Structural Fill. We recommend the following precautions for slab-on-grade construction at this site. These precautions will not prevent movement from occurring; they tend to reduce damage if slab movement occurs.

1. Slabs should be separated from exterior walls and interior bearing members with slip joints which allow free vertical movement of the slabs.

2. Interior non-bearing partitions resting on floor slabs should be provided with a slip joint at the bottom of the wall so that, if the slab moves, the movement cannot be transmitted to the upper structure. This detail is also important for wallboards, stairways, and door frames. Slip joints which will allow at least 1 ½ inches of vertical movement are recommended.

3. Underslab plumbing should be pressure tested for leaks before the slabs are constructed. Plumbing and utilities which pass through slabs should be isolated from the slabs with sleeves and provided with flexible couplings.

4. Frequent control joints should be provided, in accordance with American Concrete Institute (ACI) recommendations, to reduce problems associated with shrinkage and curling.

5. We recommend a 4-inch layer of clean gravel be placed beneath the slabs to provide a flat, uniform subgrade. This material should consist of minus 2-inch aggregate with at least 50% retained on the No. 4 sieve and less than 2% passing the No. 200 sieve.

6. The 2012 International Residential Code (IRC R506) states that a 4-inch base course layer consisting of clean graded sand, gravel, crushed stone or crushed blast furnace slag shall be placed beneath below grade floors (unless the underlying soils are free-draining), along with a vapor retarder.

   IRC states that the vapor retarder can be omitted where approved by the building official. The merits of installation of a vapor retarder below floor slabs depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces, or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or gravel leveling course between the vapor retarder and the floor slab. Placement of concrete on the vapor retarder may increase the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 3.2.3 of the 2006 American Concrete Institute (ACI) Committee 302, "Guide for Concrete Floor and Slab Construction (ACI 302.R-96)".

FOUNDATION WALLS

Foundation walls which extend below-grade should be designed for lateral earth pressures where backfill is not present to about the same extent on both sides of the wall. Many factors affect the values of the design lateral earth pressure. These factors include, but are not limited to, the type, compaction, slope and drainage of the backfill, and the rigidity of the wall against rotation and deflection. For a very rigid wall where negligible or very little deflection will occur, an "at-rest" lateral earth pressure should be used in design. For walls that can deflect or rotate 0.5 to 1 percent of wall height (depending upon the backfill types), lower "active" lateral earth pressures are appropriate. Our experience indicates typical below-grade walls in residences deflect or rotate slightly under normal design loads, and that this deflection results in satisfactory wall performance. Thus, the earth pressures on the walls will likely be between the "active" and "at-rest" conditions.

If on-site clay soils are used as backfill and the backfill is not saturated, we recommend design of basement walls at this site using an equivalent fluid density of at least 65 pcf. If imported granular material, such as CDOT Class 4, 5, or 6 aggregate base course is used as backfill, this value can be reduced to 55 pcf. This value assumes deflection; some minor cracking of walls may occur. If very little wall deflection is desired, a higher design value is appropriate. The structural engineer should also consider site-specific grade restrictions, the effects of large openings on the behavior of the walls, and the need for lateral bracing during backfill.

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Retaining walls that are free to rotate and allow the active earth pressure condition to develop can be designed using an equivalent fluid density of at least 55 pcf for on-site clay soil backfill. If imported granular material, such as CDOT Class 4, 5, or 6 structural fill or similar material, is used as backfill, this value can be reduced to 45 pcf.

Foundation Wall Backfill

Proper placement and compaction of foundation backfill is important to reduce infiltration of surface water and settlement of backfill. Backfill which will support surface improvements (sidewalks, driveways, etc.) should be placed in thin loose lifts, moisture conditioned to within +/-2 percent of optimum moisture content, and compacted to at least 95 percent of ASTM D 698 maximum dry density. We recommend using imported granular soils (CDOT 4, 5, or 6 road base or similar soil) in pavement and walkway areas. Backfill in landscape areas should be compacted to at least 90 percent of ASTM D 698 maximum dry density. The natural clay soils can be used as backfill in landscape areas, provided they are free of rocks larger than 6 inches in diameter, organics, and debris. Clay backfill should be placed at a moisture content slightly above optimum to reduce expansion potential. The upper 2 feet of fill should be a relatively impervious material to limit infiltration. Thickness of lifts will likely need to be reduced if there are small confined areas of backfill, which limit the size and weight of compaction equipment. Some settlement of the backfill should be expected even if the material is placed and compacted properly. In our experience, settlement of properly compacted granular backfill could be on the order of 0.5 to 1 percent of backfill thickness. Backfill with on-site clay soils could have a slightly higher (1 to 2 percent) settlement or heave potential. Methods to reduce the risk of backfill settlement or heave include using a granular material and increasing the minimum compaction level. Moisture content and density of the backfill should be tested during placement by a representative of our firm.

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SUBSURFACE DRAINAGE

Water from snow melt, precipitation and surface irrigation of lawns and landscaping frequently flows through relatively permeable backfill placed adjacent to a residence, and collects on the surface of less permeable soils occurring at the bottom of foundation excavations. This process can cause wet or moist basement conditions after construction. To reduce the likelihood water pressure will develop outside foundation walls and the risk of accumulation of water at basement level, we recommend a foundation drain be installed. The drain should be installed along the entire basement perimeter. The foundation drain will not prevent moist conditions in the basement.

The drain should consist of a 4-inch diameter, perforated or slotted pipe encased in free-draining gravel, and a geocomposite drain board or clean gravel layer extending to within 2 feet of exterior grade, adjacent to the walls. The drain should lead to a positive gravity outlet or sump where water can be removed by pumping. Sump pumps and gravity outlet locations must be maintained by the homeowner. A typical foundation drain detail for basement construction is presented on Figure 8.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured the water-soluble sulfate concentration in a sample taken from the site at less than 0.01 percent. For this level of sulfate concentration, ACI 332-08 *Code Requirements for Residential Concrete* indicates there are no special requirements for sulfate resistance.

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Superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are likely relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete should have a total air content of 6 percent ± 1.5 percent.

SURFACE DRAINAGE

Surface drainage is critical to the performance of foundations, floor slabs and concrete flatwork. Recommendations in this report are based on effective drainage for the life of the structure and cannot be relied upon if effective drainage is not maintained. We recommend the following precautions be observed during construction and maintained at all times after construction is completed:

1. The ground surface surrounding the exterior of the building should be sloped to drain away from the building in all directions. We recommend providing a slope of at least 12 inches in the first 10 feet in landscape areas. There are instances where this slope cannot be achieved. A slope of 6 inches in the first 10 feet should be used as a minimum. We recommend a slope of at least 3 inches in the first 10 feet in paved areas. A swale should be provided around the uphill side of the building to divert surface runoff.

2. Backfill around the exterior of foundation walls should be placed as described in Foundation Wall Backfill. Increases in the moisture content of the backfill soils after placement often results in settlement. Settlement is most common adjacent to north facing walls. Re-establishing proper slopes (homeowner maintenance) away from the building may be necessary.

3. Landscaping should be carefully designed to minimize irrigation. Plants used near foundation walls should be limited to those with low moisture requirements; irrigated grass should not be located within 5 feet of the foundation. Lawn sprinklers should not discharge within 5 feet of the foundation and should be directed away from the building. Low-volume emitters can be used within 5 feet of the foundation.

4. Impervious plastic membranes should not be used to cover the ground surface immediately surrounding the building. These membranes tend to trap moisture and prevent normal evaporation from occurring. Geo-textile fabrics can be used to control weed growth and allow some evaporation to occur.

5. Roof downspouts and drains should discharge well beyond the limits of all backfill. Splash blocks and/or extensions should be provided at all downspouts so water discharges onto the ground beyond the backfill. We generally recommend against burial of downspout discharge. Where it is necessary to bury downspout discharge, solid, rigid pipe should be used and it should slope to an open gravity outlet. Buried downspout discharge pipes should be heated (with thermostat) during winter months to prevent freezing. Downspout extensions, splash blocks and buried outlets must be maintained by the homeowner.

CONSTRUCTION OBSERVATIONS

This report has been prepared for the exclusive use of Liscott Custom Homes, LLC. and the design/construction team to provide geotechnical design and construction criteria for the proposed project. The information, conclusions, and recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structure proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice evolve in the area of geotechnical engineering. The recommendations provided in this report are appropriate for about three years. If the proposed project is not constructed within about three years, we should be contacted to determine if we should update this report.

We recommend that CTL | Thompson, Inc. provide construction observation services to allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structure will perform satisfactorily. It is critical that all recommendations in this report are followed during construction. The homeowner must assume responsibility for maintaining the structure and use appropriate practices regarding drainage and landscaping. Improvements performed by the owner after construction, such as finishing a basement or construction of additions, retaining walls, decks, patios, landscaping and exterior flatwork, should be completed in accordance with recommendations in this report.

RADON

Radon is a gaseous, radioactive element that comes from the radioactive decay of uranium, which is commonly found in igneous rocks. The average indoor radon level in Summit County is approximately 9 pCi/L (http://county-radon.info/CO/Summit.html), which is above the recommended action level of 4 pCi/L as recommended by the Environmental Protection Agency. Testing for radon gas at the site is beyond the scope of this study. Due to the many factors that affect the radon levels in a specific building, accurate testing of radon levels is usually only possible after construction is complete. Typically, radon mitigation systems consist of ventilation systems installed beneath lower level slabs and crawlspaces. The infrastructure for such a mitigation system can normally be installed during construction at a relatively low cost, which is recommended. The residence should be tested for radon once construction is complete. If test results indicate mitigation is required, the installed system can then be used for mitigation. We are not experts in radon testing or mitigation. If the client is concerned about radon, then a professional in this special field of practice should be consulted.

LIMITATIONS

The exploratory pits were located to provide a reasonably accurate picture of subsurface conditions. Variations in the subsurface conditions not indicated by the pits will occur. A representative of our firm should observe placement of and test structural fill. We should observe the completed foundation excavation to confirm that the exposed soils are suitable for support of the footings. This investigation was conducted in a manner consistent with that level of care and skill ordinarily exercised by geotechnical engineers currently practicing under similar conditions. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report, please call.

CTL | THOMPSON, INC.

Reviewed by:

Brittany Niggeler
Staff Geologist

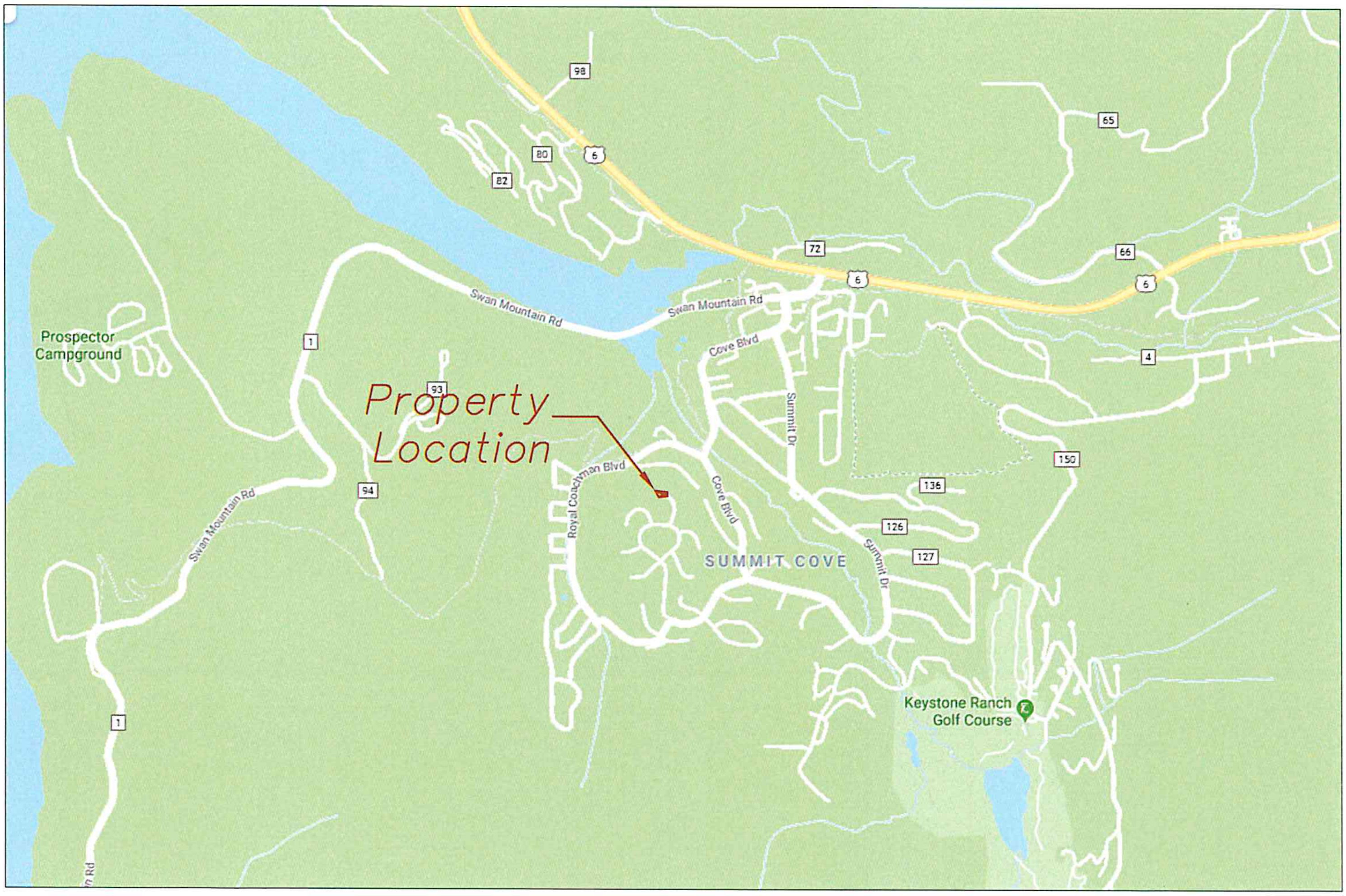
George W. Benecke III, P.E.
Division Manager, Summit County

BSN:GWB

cc: rob@liscott.com

N

Not to scale



VICINITY MAP

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Figure 1

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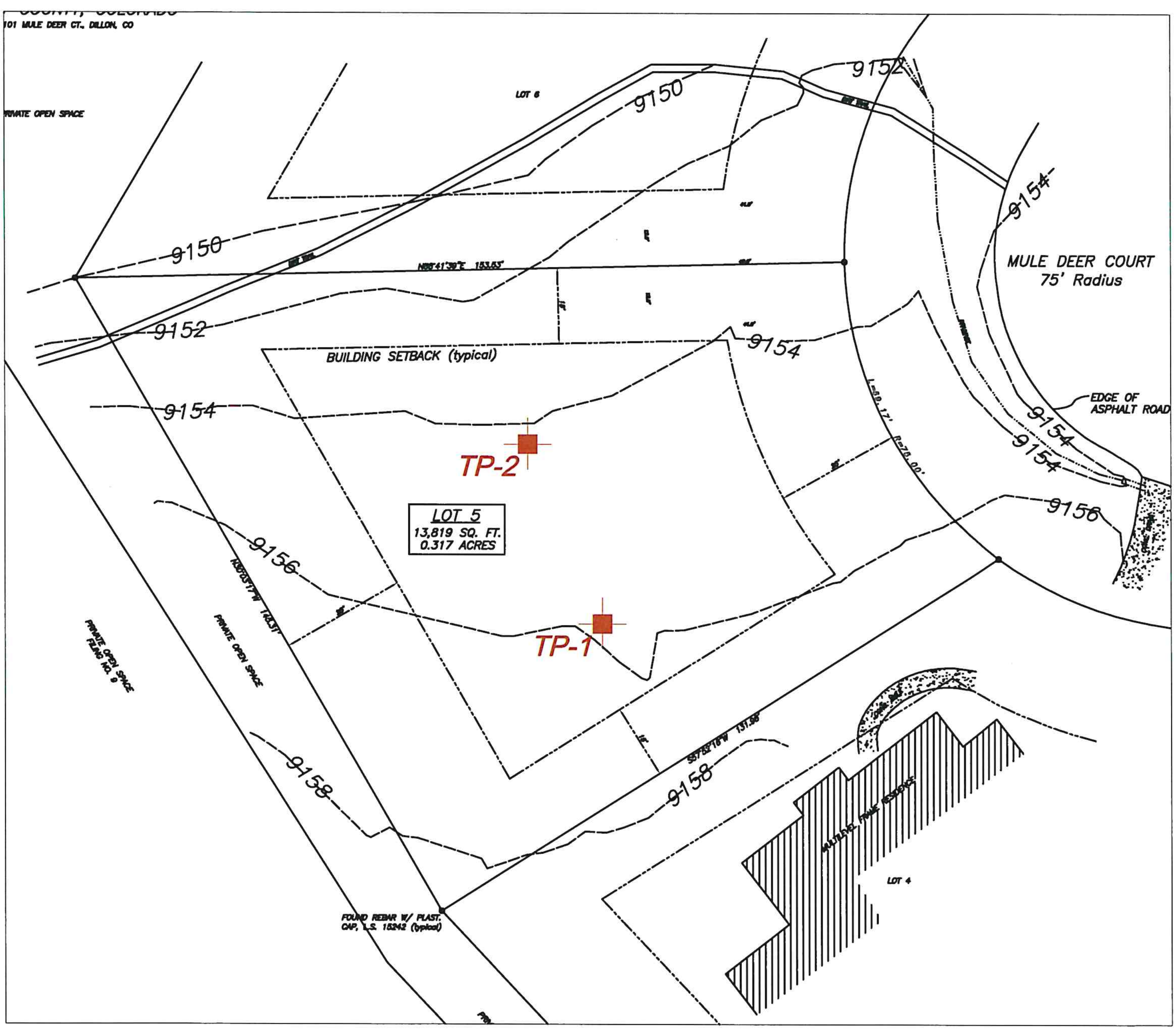
Scale: 1 inch = 30 feet



LOCATIONS OF EXPLORATORY PITS

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Figure 2

EXHIBIT 98

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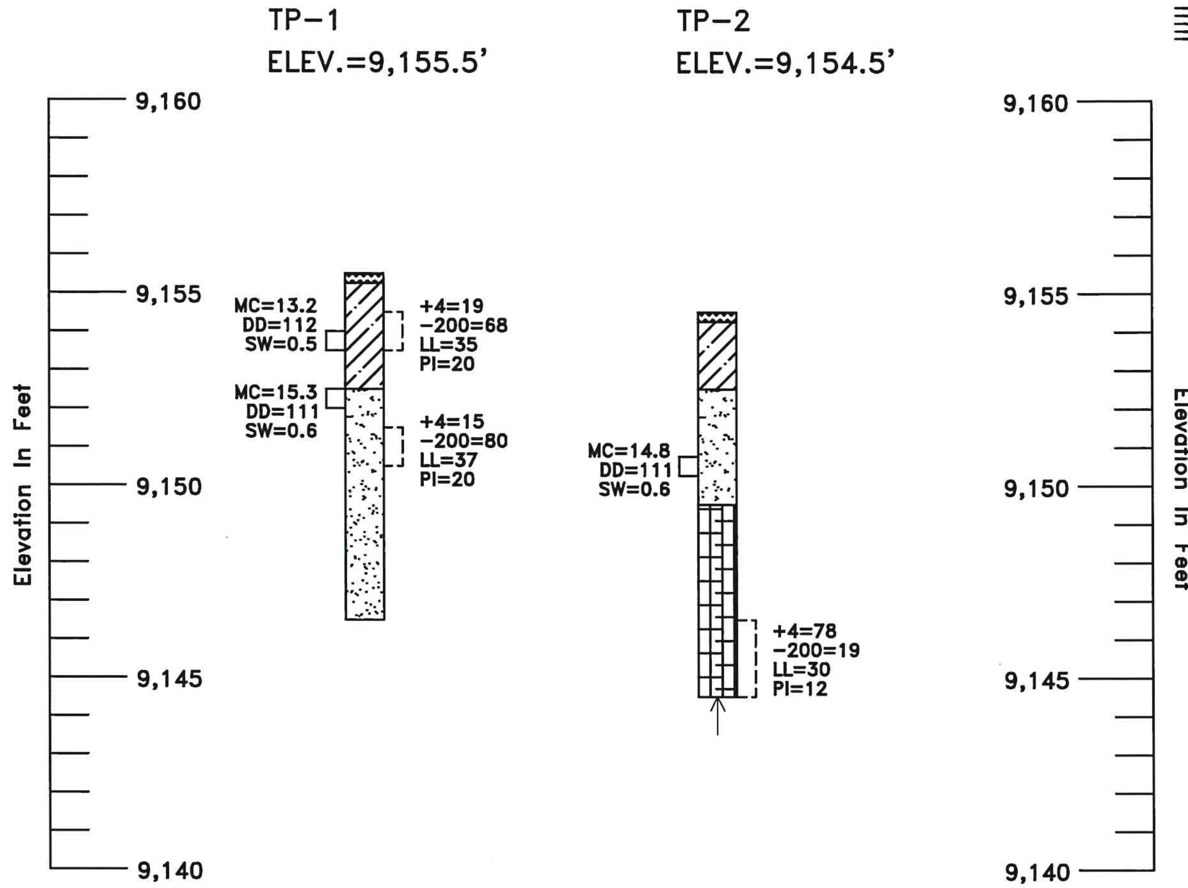

LEGEND:

TOPSOIL; clayey sand, with roots, slightly moist, dark brown.

CLAY; gravelly lean clay, with angular gravel and some cobbles, stiff, moist, black. (CL)

CLAY; ranges from a lean clay to a lean clay with gravel, more gravel with depth, with angular cobbles, very stiff, moist, light brown. (CL)

BEDROCK; Fort Hays Limestone member of the Niobrara formation, blocky-gray, effervescent limestone, excavates to a clayey gravel, very hard, slightly moist, light gray brown.

Relatively undisturbed hand-driven sample.

Disturbed bulk sample.

Practical excavation refusal encountered at depth indicated.

NOTES:

1. The pits were excavated with a track-mounted mini excavator on 06/19/19.
2. No groundwater was observed in the pits at the time of excavation. Groundwater levels can fluctuate. The pits were backfilled.
3. Pit locations as shown on Figure 2 were measured from site features and should be considered approximate.
4. Pit elevations are estimated from topography shown on Figure 2 and should be considered approximate. Relative elevations were checked by hand level.
5. These exploratory pits are subject to the explanations, limitations and conclusions contained in this report.

SUMMARY LOGS OF EXPLORATORY PITS

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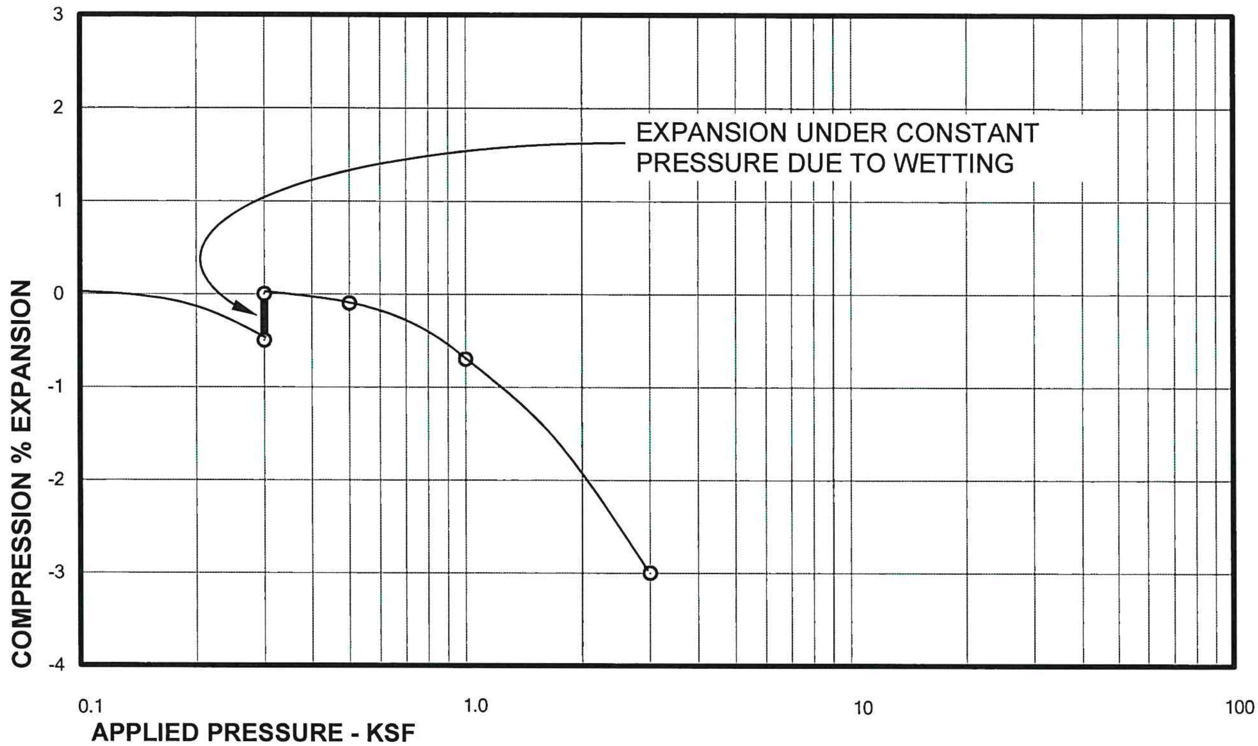
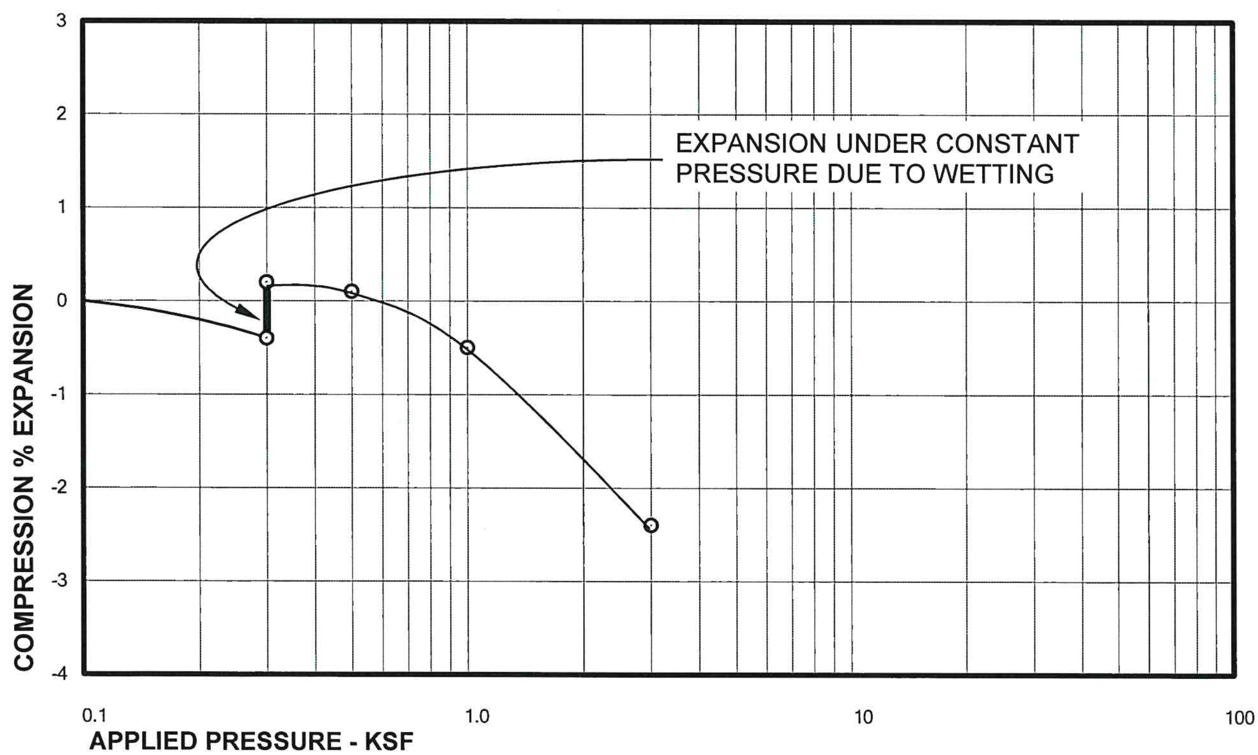
SMITH_000547 Figure 3



Sample of Gravelly Lean Clay (CL)
From TP-1 @ 1-2'

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 13.2 %



Sample of Lean Clay (CL)
From TP-1 @ 3'

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 15.3 %

Swell Consolidation Test Results

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Figure 4

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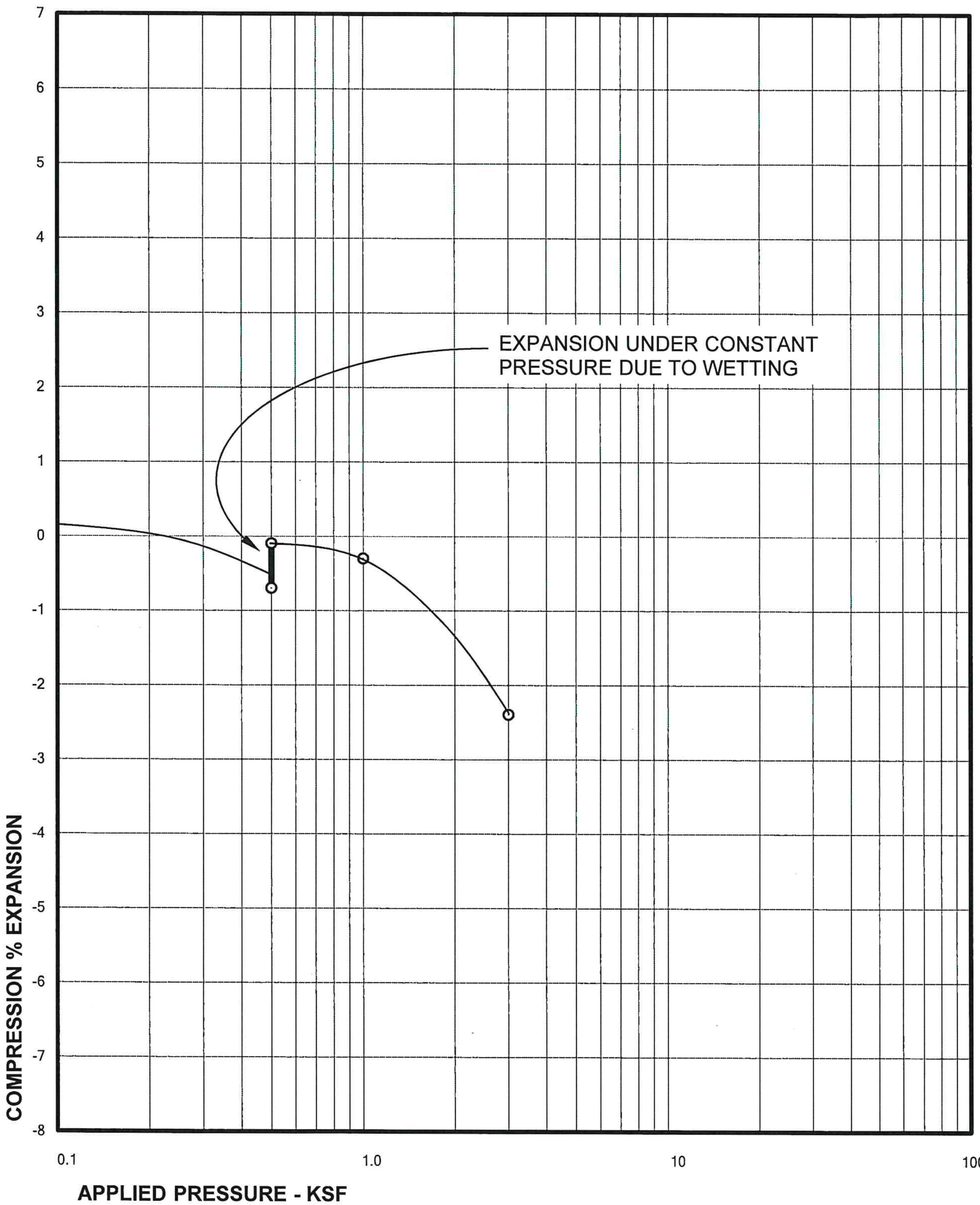

Sample of Lean Clay (CL)
From TP-2 @ 3'8"

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 14.8 %

Swell Consolidation Test Results

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Figure 5

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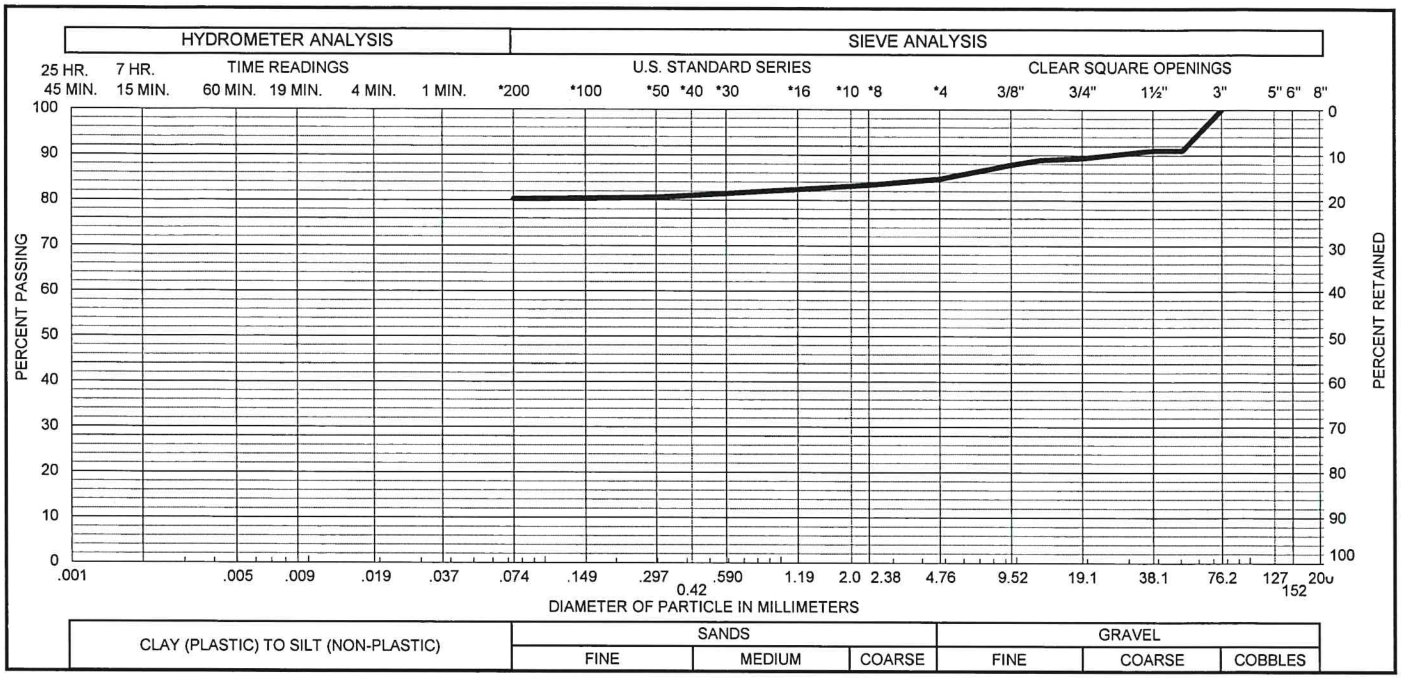


Sieve Size	% Passing
3 in.	100
2 in.	91
1.5 in.	91
3/4 in.	89
1/2 in.	89
3/8 in.	88
No. 4	85
No. 8	83
No. 16	82
No. 30	82
No. 50	81
No. 100	80
No. 200	80

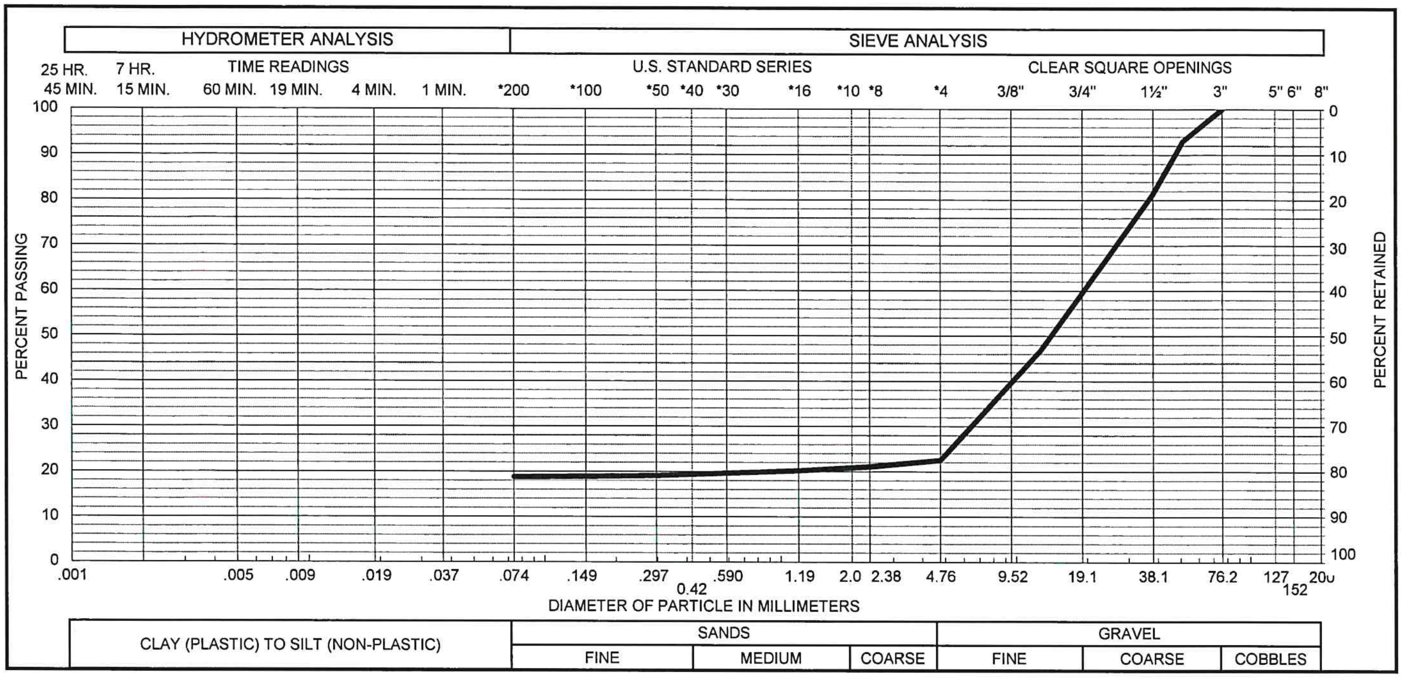
Curve No. 1

Sample of Lean Clay with Gravel (CL)

From TP-1 @ 4-5'

GRAVEL(USCS) 15 % SAND(USCS) 5 %
SILT & CLAY 80 % LIQUID LIMIT 37 %
PLASTICITY INDEX 20 %

Gradation Test Results



Sieve Size	% Passing
3 in.	100
2 in.	93
1.5 in.	81
3/4 in.	60
1/2 in.	47
3/8 in.	40
No. 4	23
No. 8	21
No. 16	20
No. 30	20
No. 50	19
No. 100	19
No. 200	19

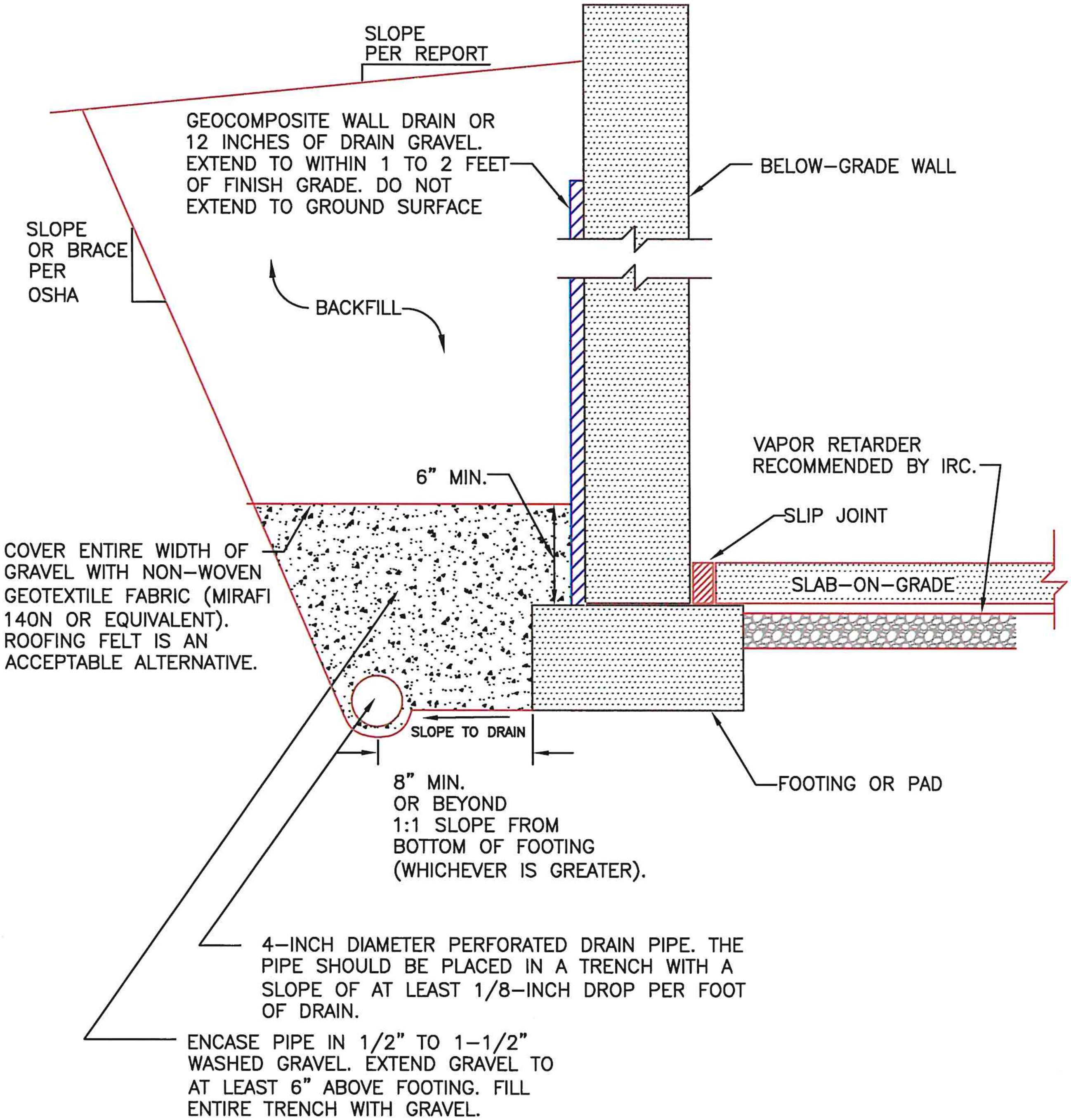
Curve No. 1

Sample of Clayey Gravel (GC)

From TP-2 @ 8-10'

GRAVEL(USCS) 78 % SAND(USCS) 3 %
SILT & CLAY 19 % LIQUID LIMIT 30 %
PLASTICITY INDEX 12 %

Gradation Test Results



NOTE:
THE BOTTOM OF THE DRAIN SHOULD BE AT OR BELOW BOTTOM OF FOOTING (AND 12 INCHES BELOW TOP OF ADJACENT SLAB OR CRAWLSPACE GRADE) AT THE HIGHEST POINT AND SLOPE DOWNWARD TO A POSITIVE GRAVITY OUTLET OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPING.

EXTERIOR FOUNDATION WALL DRAIN

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Figure 8

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TABLE I

SUMMARY OF LABORATORY TESTING
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EXPLORATORY PIT	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*			PERCENT GRAVEL (%)	SULFATE CONC. (%)	PASSING NO. 200 SIEVE (%)	DESCRIPTION
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)				
TP-1	1-2'	13.2	112	35	20	0.5	300	830	19	<0.01	68	Gravelly Lean Clay (CL)
TP-1	3'	15.3	111			0.6	300	910				Lean Clay (CL)
TP-1	4-5'			37	20				15		80	Lean Clay with Gravel (CL)
TP-2	3'8"	14.8	111			0.6	500	1,400				Lean Clay (CL)
TP-2	8-10'			30	12				78		19	Clayey Gravel (GC)

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SMITH_000553