ENTECH
ENGINEERING, INC.

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SUBSURFACE SOIL INVESTIGATION
GRAND ELK RANCH AND CLUB
GRANBY, COLORADO

Prepared for:

Cadillac Building Company
10095 East Pinewood Drive
Peyton, Colorado 80138

Attn: Bruce Benthagen

December 19, 2017

Respectfully Submitted,

ENTECH ENGINEERING, INC.

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COLORADO LICENSED
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35140
12/28/17
PROFESSIONAL ENGINEER

Reviewed by:

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Senior Engineer

DPS/nc

Encl.

Entech Job No. 171689
AAprojects/2017/171689 ssi

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1.0 INTRODUCTION

The project consists of the proposed construction of fifteen single family residential structures on fifteen lots. The sites are located in the Grand Elk Ranch and Club Subdivision as Lots D-20, E-25, E-59, E-86, and Lots L-2 through L-11, and L-13, in Granby, Colorado. More specifically the lots are located on Fairway Court, Mountain Sky Lane, Mountain Sky Drive, Wildhorse Drive, Wildhorse Court, and Wildhorse Circle. The approximate location of the project sites are shown on the Vicinity Location Map, Figure 1. The test boring locations are shown on Figures 2 and 3, the Test Boring Location Maps.

This report describes the subsurface investigation conducted for the planned structures and provides recommendations for foundation design and construction. The Subsurface Soil Investigation included the drilling of thirteen test borings, across the site, collecting samples of soil, and conducting a geotechnical evaluation of the investigation findings. All drilling and subsurface investigation activities were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.0.

2.0 PROJECT AND SITE DESCRIPTION

The project will consist of the construction of fifteen single-family residential structures with basements. The lots are located in the Grand Elk Ranch and Club Subdivision in Granby, Colorado. At the time of drilling, the lots for the proposed structures were vacant. Residential structures had been constructed on some nearby lots. The lots had been graded relatively flat with gently sloping grades. Vegetation consisted of field grasses and weeds. Streets were paved, with curb and gutter installed. Utilities were installed. Building loads are expected to be light to moderate. The lots are bordered with future and existing residential development with a golf course integrated into the development.

3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

Subsurface conditions at the planned building sites were explored by drilling thirteen test borings at the approximate locations shown on Figure 2. The borings were drilled to depths of 17 to 20 feet below the existing ground surface (bgs). The drilling was performed using a truck-mounted, continuous flight auger-drilling rig supplied and operated by Entech. Boring logs descriptive of the subsurface conditions encountered during drilling are presented in Appendix A. At the conclusion of drilling, and subsequent to drilling, observations for groundwater levels were made in each of the open boreholes.

Soil and bedrock samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D-1586) using 2-inch O.D. split-barrel and California samplers. Results of the Standard Penetration Test (SPT) are included on the boring logs in terms of N-values expressed in blows per foot (bpf). Soil and bedrock samples recovered from the borings were visually classified and recorded on the boring logs. The soil and bedrock classifications were later verified utilizing laboratory testing and grouped by soil type. The soil and bedrock type numbers are included on the boring logs. It should be understood that the soil and bedrock descriptions shown on the boring logs may vary between boring location and sample depth. It should also be noted that the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil and bedrock types and the actual stratigraphic transitions may be more gradual or variable with location.

Water content testing (ASTM D-2216) was performed on the samples recovered from the borings, and the results are shown on the boring logs. Grain-Size Analysis (ASTM D-422) and Atterberg Limits testing (ASTM D-4318) were performed on selected samples to assist in classifying the materials encountered in the borings. Volume change testing was performed on selected samples using the Swell/Consolidation Test (ASTM D-4546) and the FHA Swell Test in order to evaluate potential expansion characteristics of the soil and bedrock. Soluble sulfate testing was performed on select soil samples to evaluate the potential for below grade degradation of concrete due to sulfate attack. The Laboratory Testing Results are summarized on Table 1 and are presented in Appendix B.

4.0 SUBSURFACE CONDITIONS

Five soil types were encountered in the test borings drilled for the subsurface investigation, Type 1: sandy to very sandy clay fill (CL, CH), Type 2: native slightly silty to silty and clayey to very clayey sand (SM-SW, SM, SC), Type 3: native sandy clay (CL), Type 4: silty to clayey sandstone (SM, SC), and Type 5: sandy to very sandy claystone (CL, CH). Each soil type was classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

4.1 Soil and Bedrock

Soil Type 1 classified as a sandy to very sandy clay fill (CL,CH). The clay fill was encountered in seven of the test borings at the existing ground surface and extending to depths ranging from 1 to 8 feet below the ground surface (bgs). Standard Penetration Testing on the fill resulted in SPT N-values ranging from 9 to 29 bpf, indicating firm to stiff consistencies. Water content and grain size testing resulted in approximately 8 to 25 percent water content with approximately 57 to 85 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing resulted in liquid limits of 39 to 61 and plastic indexes of 24 to 43. FHA Swell Testing resulted in a swell pressure of 1640 psf, indicating moderate to high expansion potential. Swell/Consolidation Testing resulted in a volume change ot 2.8 percent, indicating moderate to high expansion potential. Sulfate testing resulted in 0.05 to 0.11 percent soluble sulfate be weight, indicating a negligible to moderate potential for below grade concrete degradation due to sulfate attack.

Soil Type 2 classified as a native slightly silty to silty and clayey to very clayey sand (SM-SW, SM, SC). The native sand was encountered in seven of the test borings at depths ranging from the existing ground surface to 6 feet and extending to depths ranging from 6 to 15 feet bgs. Standard Penetration testing on the sand resulted in SPT N-values ranging from 15 to greater than 50 bpf, indicating medium dense to very dense states. Higher blow counts were due to the presence of gravel and cobbles. Water content and grain size testing resulted in 1 to 23 percent water contents with approximately 10 to 46 percent of the soil size particles passing the No. 200 sieve. Atterberg limits testing resulted in the sand being non-plastic. FHA Swell Testing resulted in a swell pressure of 1280 psf, indicating moderate expansion potential. Sulfate testing resulted in 0.00 to less than 0.01 percent soluble sulfate by weight, indicating a negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 classified as a native sandy clay (CL). The clay was encountered in nine of the test borings at depths ranging from the existing ground surface to 14 feet bgs and extending to depths ranging from 3 to 19 feet bgs. Standard Penetration Testing on the clay resulted in SPT N-values of 6 to 42 bpf, indicating soft to very stiff consistencies. Water content and grain size testing resulted in water contents of 7 to 29 percent with approximately 71 to 78 percent of the soil size particles passing the No. 200 sieve. Atterberg limits testing resulted in a liquid limit of 37 and a plastic index of 22. FHA Swell testing resulted in a swell pressure of 800 psf, indicating low expansive potential. Swell/Consolidation testing resulted in volume changes of 0.3 to 2.2 percent, indicating low to moderate expansion potential. Sulfate testing resulted in 0.00 to less than 0.01 percent soluble sulfate be weight, indicating negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 4 classified as a silty to clayey sandstone (SM, SC). The sandstone was encountered in seven of the test borings at depths ranging from 1 to 19 feet bgs and extending to depths ranging from 4 feet to the termination of the borings (20 feet). Standard Penetration Testing conducted on the sandstone resulted in SPT N-values greater than 50 bpf, which indicates very dense states. Water content and grain size testing resulted in approximately 5 to 13 percent water content with approximately 23 to 27 percent of the soil size particles passing the No. 200 Sieve. Atterberg limits testing on the sandstone resulted in a liquid limit of 48 and a plastic index of 30.

Soil Type 5 classified as a sandy to very sandy claystone (CL, CH). The claystone was encountered in twelve of the test borings at depths ranging from 4 to 19 feet bgs and extending to depths ranging from 15 feet bgs to the termination of the borings (17 to 20 feet). Standard Penetration Testing conducted on the claystone resulted in SPT N-values of 26 bpf to greater than 50 bpf, which indicates stiff to hard consistencies. Water content and grain size testing resulted in approximately 8 to 27 percent water content with approximately 55 to 99 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits testing resulted in liquid limits of 28 to 73 and plastic indexes of 14 to 54. Swell/Consolidation Testing on the claystone resulted in volume changes of 0.5 to 2.0 percent. These results indicate the claystone exhibits low to moderate expansion potential. Sulfate testing resulted in 0.00 to less than 0.01 percent soluble sulfate by weight, indicating the claystone exhibits a negligible threat to below grade concrete degradation due to sulfate attack.

4.2 Groundwater

Depth to groundwater was measured in each of the borings at the conclusion of and subsequent to drilling. Groundwater was encountered in four of the test borings at depths ranging from 9 to 13.5 feet. Groundwater was not encountered in the other borings which were drilled to 17 to 20 feet. Groundwater is not expected to affect shallow foundations on the majority of the site. Groundwater may affect deeper excavations, particularly in the area of Lot L-7 (Test Boring No. 11). Foundations should be kept as high as possible to avoid groundwater. Unstable conditions should be expected where excavations approach the groundwater level. Stabilization using geo-grids or shot rock may be necessary. Drain systems may be required such as interceptor drains or underslab drains. It should be noted that groundwater levels could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas.

5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

The following discussion is based on the subsurface conditions encountered in the borings drilled on the fifteen lots planned for construction. If subsurface conditions different from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that the evaluation and recommendations presented can be reviewed and revised if necessary.

Subsurface soil conditions encountered in the test borings drilled for the planned structures generally consisted of sandy to very sandy clay fill, native silty to clayey sand and sandy clay with underlying sandstone, and claystone bedrock. Fill was encountered to depths ranging from 1 to 8 feet bgs in seven of the thirteen test borings drilled on the site. It is our understanding the fill on this site was periodically observed and tested by others. Records should be obtained to determine if the fill was placed in a controlled manner. Generally, the native clays and fill are expansive and will require overexcavation and replacement. Shallow bedrock was encountered in some of the test borings. SPT N-values measured in the fill and native sands generally indicated firm to stiff consistencies and medium dense to very dense states. Bedrock and weathered bedrock was encountered in all of the test borings at depths ranging from one to 19 feet bgs and extending to the termination of the test borings (17 to 20 feet). Bedrock and weathered bedrock was encountered at less than 10 feet in Test Boring Nos. 7, 8, 9, 12, and 13.

The medium dense to very dense sand, and very dense sandstone are considered to exhibit an adequate in-place density for support of the planned buildings using shallow foundations (i.e. spread footings). The majority of the foundations will be bearing on controlled non-expansive fill, native silty to clayey sand, sandstone, or imported structural fill. Loose zones, if encountered will require removal to 2 to 3 feet deep and recompaction. Any uncontrolled fill encountered beneath foundations will require complete removal and recompaction according to the "Structural Fill" paragraph. Expansive soil (claystone and clays) encountered at or within 3 to 4 feet of foundations will require removal and replacement with non-expansive structural fill compacted according to the "Structural fill" paragraph. Mitigation to provide for similar bearing capacities may be required on some lots. Shallow foundation systems are recommended on this site.

5.1 Footing Subgrade Improvement

The suitable native sand, non-expansive sandstone, structural fill, and recompacted granular soils will provide good support for foundations. Disturbed areas or loose soils will require moisture conditioning and recompaction. Loose soils, where encountered, should be moisture-conditioned and recompacted as structural fill. The depth of recompaction should be determined for each excavation as required. Expansive clay and claystone were encountered in the test borings. Expansive clay soils or claystone encountered at or near foundation or floor slabs grade, must be penetrated or removed and replaced with on-site sand or structural fill. The structural fill should be a non-expansive granular fill approved by Entech. An overexcavation depth of 3 to 4 feet is anticipated for the areas where expansive soils are encountered. The final depth of overexcavation will be determined at the time of the excavation observation.

Where expansive soils are removed, the overexcavation subgrade should be scarified, moisture-conditioned, and compacted to a minimum of 95 percent of its maximum Standard Proctor dry density (ASTM D-698) at a moisture content of 0 to +4 percent. On-site granular soils, as approved by Entech, may be used as structural fill. The granular structural fill should be placed in 6-inch lifts and be compacted to a minimum of 95 percent of its maximum Modified Proctor dry density (ASTM D-1557). The structural fill should be moisture-conditioned to within ± 2 percent of its optimum moisture content to aid in compaction. Density tests should be performed to verify compaction with the first density test performed at overexcavated subgrade and when each 12 to 18 inches of fill have been placed. Bearing capacities will be determined at the time of the individual excavation observation. An overexcavation drain may be required. An overexcavation drain detail is included in Figure 4.

The foundations should be supported by soils with a similar bearing capacity (i.e., entirely on sand, or entirely on suitable sandstone bedrock). If the majority of the foundation is supported by sandstone and a relatively small portion supported by sand, the sand may be overexcavated down to sandstone and replaced with structural fill compacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557. If the majority of the foundation is supported by sand, the sandstone should be overexcavated a minimum of 2 feet and replaced

with sand recompacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557.

Groundwater was encountered at depths that are not expected to affect shallow foundations on the majority of the sites. Groundwater encountered at 9 feet in Test Boring No. 11 may affect basement construction in that area. Fluctuations in groundwater levels can change due to seasonal variations and changes in land runoff characteristics. Groundwater, if approached or encountered near foundation grade, will likely create unstable subgrade conditions. Stabilization with shot rock and/or geogrid may be required. In addition, underslab drains and interceptor drains may be required. It is anticipated groundwater is at sufficient depth on the majority of the site as to not affect construction.

5.2 Shallow Foundations

Provided the above recommendations are followed, the proposed structures can be supported with shallow spread footing foundations placed on the site granular soils, approved controlled sand fill, sandstone, recompacted loose soils or structural fill. A maximum allowable bearing pressure of 2400 pounds per square foot (psf) is recommended for the for the sands. A maximum allowable bearing pressure of 2600 psf is anticipated for foundation members bearing on imported structural fill. A maximum allowable bearing pressure of 3500 psf is anticipated for foundation members bearing on undisturbed sandstone. For final design, continuous spread footings are recommended to have a minimum width of 16 inches, and individual column footings for main support beams should have minimum plan dimensions of 24 inches on each side in order to avoid punching failure into the supporting subgrade soils. Exterior footings should extend a minimum of 30 inches below the adjacent exterior site grade for frost protection.

Foundation walls should be designed to resist lateral pressures generated by the soils on this site. An equivalent hydrostatic fluid pressure (in the active state) of 45 pcf is recommended for the on-site sands and 55 pcf for the clay materials. Highly expansive clay soils are not recommended for backfill against the walls. It should be noted that these values apply to level backfill conditions. If sloping backfill conditions exist, pressures will increase substantially depending on the conditions adjacent to the walls. Surcharge loading should also be

considered in wall designs. Equivalent fluid pressures for sloping conditions should be determined on an individual basis.

Entech should observe overexcavated subgrades as well as the overall foundation excavation subgrade and evaluate if the exposed soil conditions are consistent with those described in this report. Entech should also provide recommendations for additional overexcavation depth, if required, and foundation drainage based on the excavation conditions observed at that time.

5.3 On-Grade Floor Slabs

On-grade floor slabs for the planned structures should be supported on compacted, native non-expansive soils, non-expansive granular fill or imported structural fill. If expansive soil is encountered at or within 4 feet of floor slab grade it should be removed a minimum of 4 feet and replaced with a non-expansive structural fill. The depth of overexcavation on each lot should be determined at the time of the excavation observation. On-site granular soils, as approved by Entech, may be used as structural fill. Loose soils, if encountered, should be removed and recompacted. Structural fill should be compacted to a minimum of 95 percent of its Maximum Modified Proctor Dry Density Test (ASTM D-1557). The fill should be moisture conditioned to ±2 percent of the optimum moisture content as determined to aid in compaction. All soil beneath the slab should be free of organics, debris and stone larger than 3 inches in diameter.

Grade supported floor slabs should be separated from other building structural components and utility penetrations to allow for possible future vertical movement. Interior partition walls should be constructed in such a manner so as not to transfer slab movement into the overlying floor(s) and/or roof members, should slab movement occur. Control joints in grade-supported slabs are recommended at 10 to 15 foot perpendicular spacings to control cracking. If slab movement cannot be tolerated, a structural floor system should be used.

5.4 Surface and Subsurface Drainage

Positive surface drainage is recommended around the building's perimeter to minimize infiltration of surface water into the supporting foundation soils. A minimum ground surface slope of 5 percent in the first 10 feet adjacent to exterior foundation walls is recommended for

unpaved areas. For paved areas and other impervious surfaces, a minimum slope of 2 percent is adequate. All roof drains and gutter downspouts should be extended to discharge well beyond the building's foundation backfill zone or be connected to a storm sewer system.

To help minimize infiltration of water into the foundation zone, vegetative plantings placed close to foundation walls should be limited to those species having low watering requirements and irrigated grass should not be located within 5 feet of the foundation. Similarly, sprinklers are not recommended to discharge water within 5 feet of foundations. Irrigation near foundations should be limited to the minimum amount sufficient to maintain vegetation. Application of more irrigation water than necessary can increase the potential for slab and foundation movement.

Perimeter drains are recommended for usable space below grade. Subsurface perimeter drains may also be recommended around the entire structure if an overexcavation is required. A typical perimeter drain detail is shown in Figure 5.

5.5 Concrete Degradation Due to Sulfate Attack

Sulfate Solubility testing was conducted on select samples recovered from the test borings to evaluate the potential for sulfate attack on concrete placed below grade. The test results indicated 0.00 percent to 0.11 percent soluble sulfate by weight (Table 1). The test results indicate the sulfate component of the in-place soils present a negligible to moderate exposure threat for concrete placed below the site grade.

Type II cement is recommended for concrete on the site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in the foundation excavation prior to the placement of concrete. If standing water is present in the foundation excavation, it should be removed by ditching to sumps and pumping the water away from the foundation area prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

5.6 Foundation Excavation Observation

Subgrade preparation for building foundations should be observed by Entech prior to construction of the footings and floor slabs in order to verify that (1) no anomalies are present, (2) materials of the proper bearing capacity have been encountered or placed, and (3) no soft spots, expansive or organic soil, or debris are present in the foundation area prior to concrete placement or backfilling. Entech should make final recommendations for over-excavation, if required, and foundation drainage at the time of excavation observation, if necessary.

5.7 Structural Fill

Compacted, non-expansive granular soil, free of organics, debris and cobbles greater than 3-inches in diameter, is recommended for structural fill beneath foundation components and floor slabs. All fill placed within the foundation area should be approved by Entech, and be compacted to a minimum of 95 percent of the soils maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of six inches or less. Fill should be placed at water contents conducive to achieving adequate compaction, usually within $\pm$2 percent of the optimum water content as determined by ASTM D-1557. The subgrade overexcavation should be scarified a minimum of 12 inches, moisture conditioned to 0 to +4 percent and be compacted to a minimum of 95 percent of its Standard Proctor Dry Density, ASTM D-698 for clay and 95 percent compaction, ±2 percent optimum moisture content, utilizing a Modified Proctor dry density, ASTM D-1557 for sand. Mechanical methods can be used for placement and compaction of fill; however, heavy equipment should be kept at a distance from foundation walls and below slab infrastructure to avoid overstressing. No water flooding techniques of any type should be used for compaction or placement of foundation or floor slab fill material. Entech should approve any imported fill to be used within the foundation area prior to delivery to the site.

5.8 Utility Trench Backfill

Fill placed in utility trenches should be compacted according to local specifications. Fill should be placed in horizontal lifts having a compacted thickness of six inches or less and at a water content conducive to adequate compaction, within ±2 percent of optimum water content. Mechanical methods should be used for fill placement; however, heavy equipment should be kept at a distance from foundation walls. No water flooding techniques of any type should be used for compaction or placement of utility trench fill.

Trench backfill placement should be performed in accordance with specifications of City of Granby or other authority, as appropriate. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

5.9 General Backfill

Any areas to receive fill outside the foundation limits should have all topsoil, organic material, and debris removed. Fill must be properly benched into existing slopes in order to be adequately compacted. The fill receiving surface should be scarified to a depth of 12-inches and moisture conditioned to ±2 percent of the optimum water content, and compacted to a minimum of 95 percent of the ASTM D-1557 maximum dry density before the addition of new fill. Fill should be placed in thin lifts not to exceed 6 inches in thickness after compaction while maintaining at least 95 percent of the ASTM D-1557 maximum dry density. Fill material should be free of vegetation and other unsuitable material and shall not contain rocks or fragments greater than 3-inches. Topsoil and strippings should be segregated from all other fill sources on the site. Fill placement and compaction beneath and around foundations, in utility trenches, beneath roadways or other structural features of the project should be observed and tested by Entech during construction.

5.10 Excavation Stability

Excavation sidewalls must be properly sloped, benched and/or otherwise supported in order to maintain stable conditions. All excavation openings and work completed therein shall conform to OSHA Standards as put forward in CFR 29, Part 1926.650-652, (Subpart P).

5.11 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the foundation subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to eliminate burial of snow, ice or frozen material within the planned construction area.

5.12 Construction Observations

It is recommended that Entech observe and document the following activities during construction of the building foundations.

- Excavated subgrades and subgrade preparation.
- Placement of foundation perimeter drains (if installed).
- Placement/compaction of fill material for the foundation components and floor slab.
- Placement/compaction of utility bedding and trench backfill.

6.0 CLOSURE

The subsurface investigation, geotechnical evaluation and recommendations presented in this report are intended for use by Cadillac Building Company with application to the fifteen planned single-family residential structures, located at the Grand Elk Ranch and Club Subdivision, in Granby, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests that it be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

TABLE

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB
JOB NO. 171689

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	7	2-3	14.6	102.4	61.3	39	24			2.8	CL	FILL, CLAY, SANDY
1	9	5			74.2	61	43	0.05			CH	FILL, CLAY, SANDY
1	10	5			84.7				1640		CL	FILL, CLAY, SANDY
1	13	2-3			56.5			0.11			CL	FILL, CLAY, VERY SANDY
2	1	10			9.5	NV	NP	0.00			SM-SW	SAND, SLIGHTLY SILTY
2	3	2-3			45.9						SC	SAND, VERY CLAYEY, SILTY
2	5	10			16.9				1280		SC	SAND, CLAYEY
2	10	10			34.5			<0.01			SC	SAND, CLAYEY
3	6	5			74.2			<0.01			CL	CLAY, SANDY
3	8	2-3			72.8				800		CL	CLAY, SANDY
3	11	5	16.1	108.3	77.8	37	22	0.00		0.3	CL	CLAY, SANDY
3	4	10	9.3	113.2						2.2	CL	CLAY, SANDY
3	11	15	27.2	95.5	70.5					0.4	CL	CLAY, SANDY
4	8	5			26.7						SM	SANDSTONE, SILTY
4	12	2-3			23.2	48	30				SC	SANDSTONE, CLAYEY
5	2	15			55.2	28	14	0.00			CL	CLAYSTONE, VERY SANDY
5	3	20			91.6	51	25				CH	CLAYSTONE, SANDY
5	5	20	23.2	103.1	89.5			<0.01		0.5	CL	CLAYSTONE, SANDY
5	7	10	20.0	106.2	98.6					2.0	CL	CLAYSTONE, SANDY
5	9	10			90.1	73	54				CH	CLAYSTONE, SANDY

FIGURES

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ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY LOCATION MAP
GRAND ELK RANCH & CLUB
GRANBY, CO
FOR: CADILLAC BUILDING COMPANY

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
TLC	12/7/17	KAH	KAH

JOB NO.: 171689
FIG. NO.: 1

TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

TEST BORING LOCATION MAP
GRAND ELK RANCH & CLUB
GRANBY, CO
FOR: CADILLAC BUILDING COMPANY

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
TLC	12/7/17	KAH	KAH

JOB NO.: 171689

FIG. NO.: 2

N

TB-10- APPROXIMATE TEST BORING LOCATION AND NUMBER

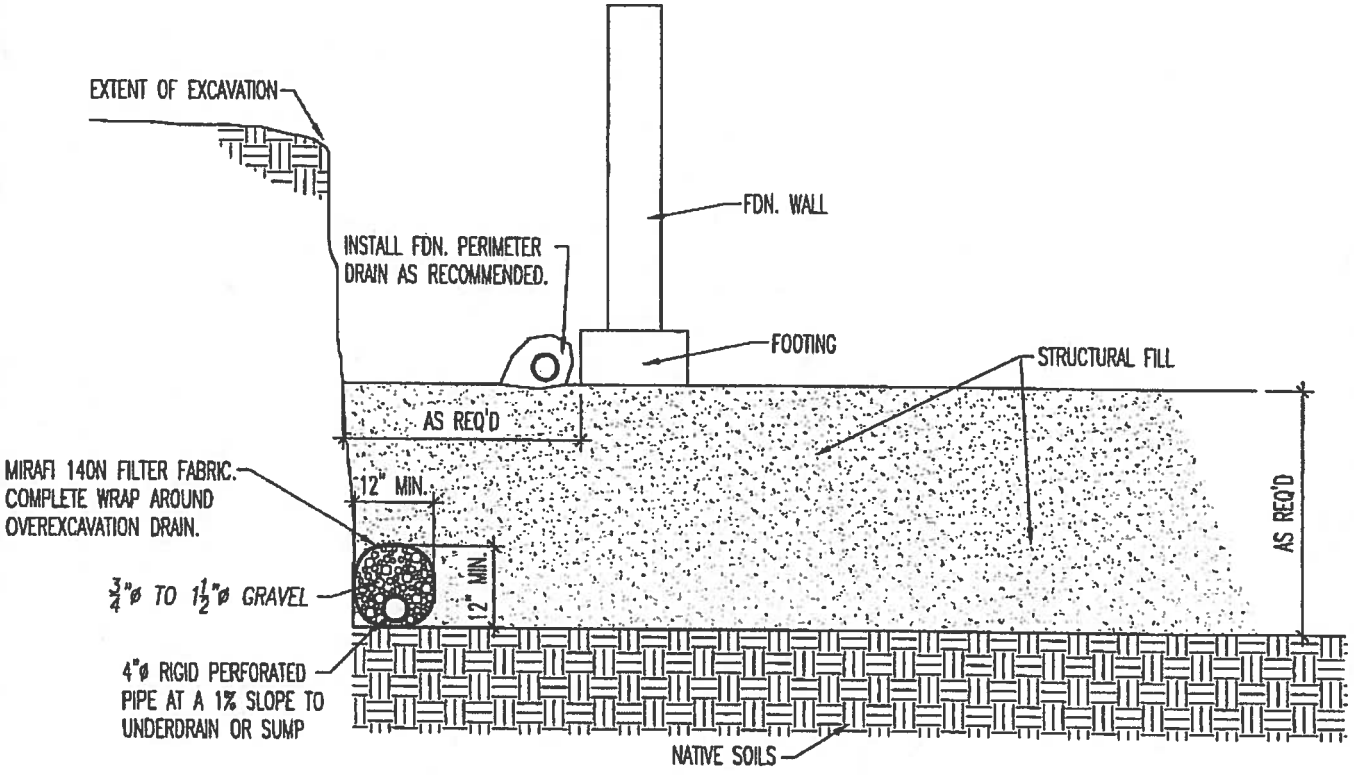
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

TEST BORING LOCATION MAP
GRAND ELK RANCH & CLUB
GRANBY, CO
FOR: CADILLAC BUILDING COMPANY

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
TLC	12/7/17	KAH	KAH

JOB NO.: 171689

FIG. NO.: 3



OVEREXCAVATION DRAIN DETAIL

N.T.S.

NOTE:

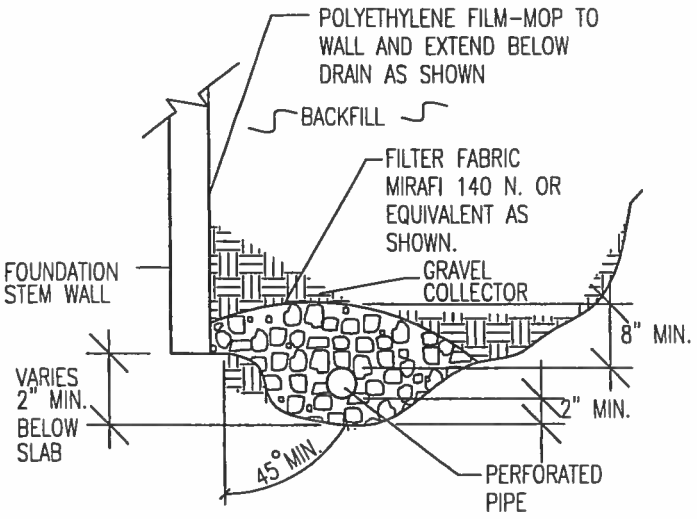
EXTEND DRAIN TO SUMP AS REQ'D.

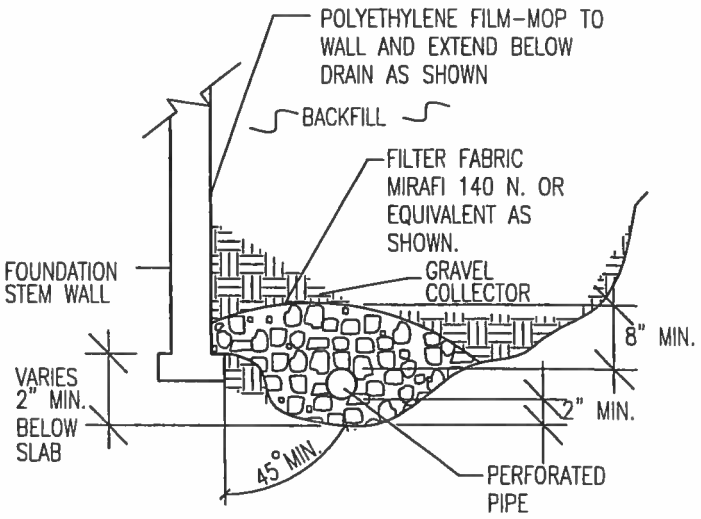
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

OVEREXCAVATION DRAIN DETAIL			
DRAWN:	DATE: 12/1/17	DESIGNED BY: D. STEGMAN	CHECKED: DS

JOB NO.:

FIG. NO.: 4





NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

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PERIMETER DRAIN DETAIL

DRAWN:	DATE: 12/7/17	DESIGNED: DS	CHECKED:

JOB NO.: 171689
FIG NO.: 5

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 11/7/2017
Job # 171689

REMARKS

LOT E-25

WATER @ 13.5', 11/7/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			26	14.6	3
5			18	8.2	2
10			36	1.0	2
15			16	25.5	3
20			50/8"	6.3	4

CLAY, SANDY, BROWN, STIFF, MOIST

SAND, GRAVELLY, SILTY TO SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE TO DENSE, DRY TO MOIST

CLAY, SANDY, BROWN, STIFF, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, GREEN BROWN, VERY DENSE, MOIST

TEST BORING NO. 2
DATE DRILLED 11/7/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS

LOT E-25

DRY TO 20', 11/7/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			18	11.7	3
5			50*/10"	6.5	2
10			50*/5"	4.1	2
15			50	17.0	5
20			50/10"	12.9	4

CLAY, SANDY, BROWN, STIFF, MOIST

SAND, GRAVELLY, SLIGHTLY SILTY WITH COBBLES, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST

CLAYSTONE, VERY SANDY, GREEN BROWN, HARD, MOIST

SANDSTONE, VERY CLAYEY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST

* - HIGH BLOW COUNTS DUE TO GRAVEL AND COBBLES

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/26/17

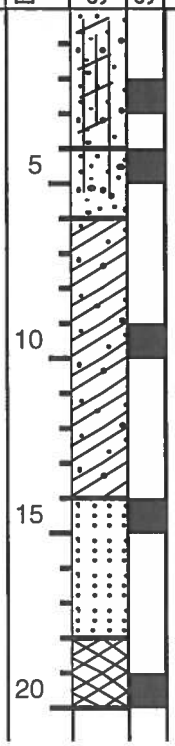
JOB NO.: 171689
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 11/7/2017
Job # 171689

REMARKS

LOT E-59

DRY TO 20',
11/8/17



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			15	6.7	2
5			32	8.4	2
10			14	19.8	3
15			50/11"	13.0	4
20			50/9"	21.0	5

SAND, VERY SILTY, CLAYEY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST

SAND, SILTY, GRAVELLY, FINE TO COARSE GRAINED, BROWN, DENSE, MOIST

CLAY, SANDY, BROWN, FIRM, MOIST

SANDSTONE, VERY CLAYEY, FINE GRAINED, GREEN BROWN, VERY DENSE, MOIST

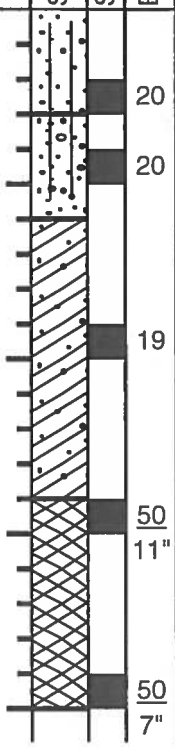
CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST

TEST BORING NO. 4
DATE DRILLED 11/7/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS

LOT E-59

DRY TO 20',
11/8/17



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			20	6.7	2
5			20	8.7	2
10			19	20.1	3
15			50/11"	19.5	5
20			50/7"	17.2	5

SAND, SILTY, FINE GRAINED, TAN, MEDIUM DENSE, MOIST

SAND, GRAVELLY, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST

CLAY, SANDY, BROWN, STIFF, MOIST

CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/20/17

JOB NO.: 171689

FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 11/7/2017
Job # 171689

REMARKS

LOT E-86

WATER @ 12.5', 11/8/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			18	7.5	2	SAND, SILTY TO CLAYEY, FINE TO COARSE GRAINED, GREEN BROWN, MEDIUM DENSE TO DENSE, MOIST
5			24	11.2	2	
10			34	10.1	2	
15			19	20.4	3	CLAY, SANDY, BLUE GRAY, STIFF, MOIST
20			50/8"	24.2	5	CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST

TEST BORING NO. 6
DATE DRILLED 11/7/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS

LOT E-86

WATER @ 12', 11/8/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			30	9.0	2	SAND, CLAYEY, FINE GRAINED, BROWN, DENSE, MOIST
5			42	10.6	3	CLAY, SANDY, BROWN, VERY STIFF, MOIST
10			37	9.6	2	SAND, GRAVELLY, CLAYEY, FINE TO COARSE GRAINED, BROWN, DENSE, MOIST
15			24	23.1	2	SAND, CLAYEY, FINE GRAINED, GREEN BROWN, MEDIUM DENSE, WET
20			50/9"	16.8	5	CLAYSTONE, SANDY, BLUE GRAY, HARD, MOIST

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		TBS	12/20/17

JOB NO.: 171689

FIG NO.: A- 3

TEST BORING NO. 7
DATE DRILLED 11/8/2017
Job # 171689

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
LOT D-20 DRY TO 20', 11/8/17						
FILL 0-4', CLAY, SANDY, BROWN, STIFF, MOIST				29	13.7	1
WEATHERED CLAYSTONE, SANDY, GREEN BROWN, VERY STIFF, MOIST	5			39	11.1	5
	10			31	21.5	5
	15			32	22.9	5
	20			35	21.8	5

TEST BORING NO. 8
DATE DRILLED 11/8/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
LOT D-20 DRY TO 20', 11/8/17						
FILL 0-2', CLAY, SANDY, BROWN						1
CLAY, SANDY, TAN, STIFF, MOIST				29	6.6	3
WEATHERED SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN, VERY DENSE, MOIST	5			50/10"	4.8	4
WEATHERED CLAYSTONE, SANDY, GREEN BROWN, STIFF, MOIST	10			28	24.5	5
	15			26	21.7	5
	20			27	27.2	5

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/20/17

JOB NO.: 171689
FIG NO.: A- 4

TEST BORING NO. 9
DATE DRILLED 11/7/2017
Job # 171689

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
LOT L-2 DRY TO 20', 11/8/17						
FILL 0-8', CLAY, VERY SANDY TO SANDY, GREEN BROWN, STIFF, MOIST				24	11.1	1
	5			21	16.5	1
CLAYSTONE, SANDY, TAN, HARD, MOIST	10			50/11"	15.5	5
	15			50/11"	17.1	5
SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, BROWN, VERY DENSE, MOIST	20			50/7"	9.1	4

TEST BORING NO. 10
DATE DRILLED 11/7/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
LOT L-4 DRY TO 19.5', 11/8/17						
FILL 0-6', CLAY, SANDY, BROWN, FIRM, MOIST				10	23.5	1
	5			9	25.1	1
SAND, CLAYEY, FINE TO COARSE GRAINED, GREEN BROWN, MEDIUM DENSE, MOIST	10			20	9.3	2
CLAYSTONE, SANDY, GREEN BROWN, HARD, MOIST	15			50/11"	11.8	5
SANDSTONE, SILTY, CLAYEY, FINE TO COARSE GRAINED, GREEN BROWN, VERY DENSE, MOIST	20			50/5"	8.7	4

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/12/17

JOB NO.: 171689
FIG NO.: A- 5

TEST BORING NO. 11
DATE DRILLED 11/8/2017
Job # 171689

REMARKS

LOT L-7

WATER @ 9', 11/8/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			15	13.4	1
5			14	17.7	3
10			6	29.2	3
15			15	25.4	3
20			37	22.3	5

FILL 0-3', CLAY, SANDY, BROWN, STIFF, MOIST

CLAY, SANDY, BROWN, STIFF TO SOFT, MOIST TO WET

WEATHERED CLAYSTONE, SANDY, GREEN BROWN, VERY STIFF, MOIST

TEST BORING NO. 12
DATE DRILLED 11/7/2017
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS

LOT L-9

DRY TO 20', 11/8/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
					1
			50	5.0	4
			6"		
5			28	15.9	5
10			50	20.6	5
			11"		
15			48	21.8	5
20			50	12.1	4
			11"		

FILL 0-1', CLAY, SANDY BROWN SANDSTONE, CLAYEY, FINE TO COARSE GRAINED, GREEN BROWN, VERY DENSE, MOIST

CLAYSTONE, SANDY, GREEN BROWN, STIFF TO HARD, MOIST

SANDSTONE, SILTY, CLAYEY, FINE TO MEDIUM GRAINED, GREEN, VERY DENSE, MOIST

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TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/22/17

JOB NO.: 171689
FIG NO.: A- 6

TEST BORING NO. 13
DATE DRILLED 11/8/2017
Job # 171689

TEST BORING NO.
DATE DRILLED
CLIENT CADILLAC BUILDING COMPANY
LOCATION GRAND ELK RANCH & CLUB

REMARKS

LOT L-11

DRY TO 17',
11/8/17

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	Description
			26	8.4	1	FILL 0-4', CLAY, VERY SANDY, TAN, STIFF, MOIST
5			25	24.8	3	CLAY, SANDY, TAN, STIFF, MOIST
10			50/4"	7.6	5	CLAYSTONE, VERY SILTY TO SANDY, GREEN BROWN, HARD, MOIST
15			50/11"	19.4	5	
			50/6"	14.4	5	REFUSAL AT 17'
20						

REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5					
10					
15					
20					

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TEST BORING LOG

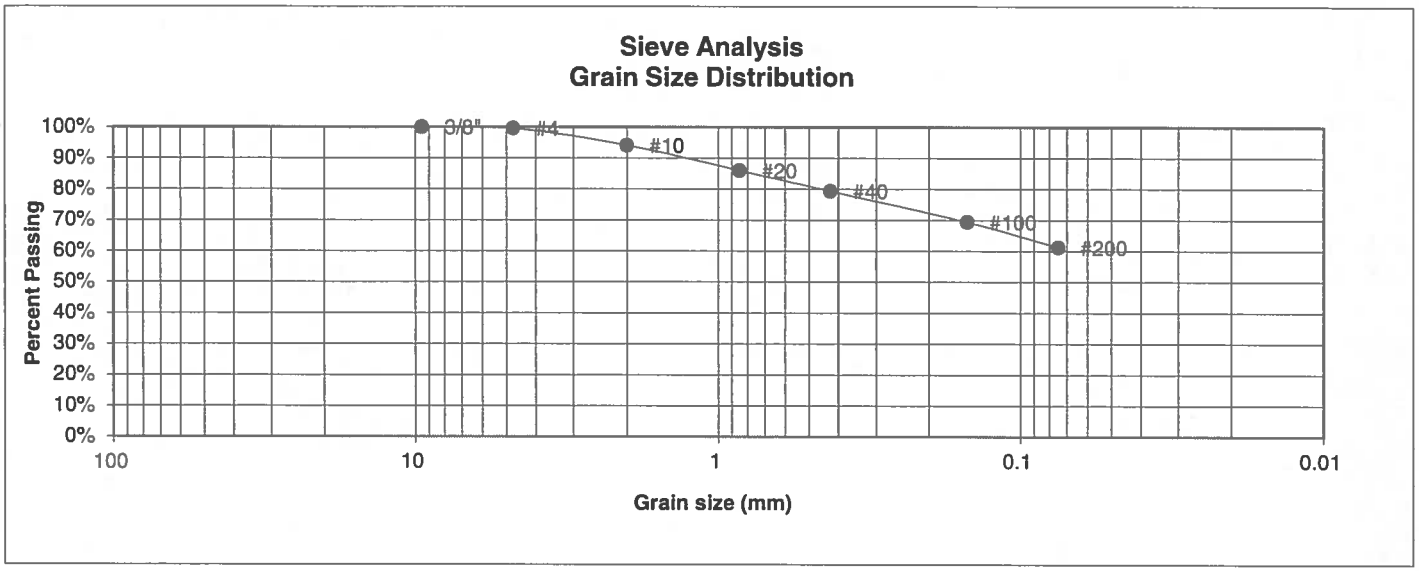
DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/22/17

JOB NO.: 171689

FIG NO.: A- 7

APPENDIX B: Laboratory Testing Results

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	1	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	7	JOB NO.	171689
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	94.1%
20	86.0%
40	79.4%
100	69.4%
200	61.3%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	39
Plastic Index	24

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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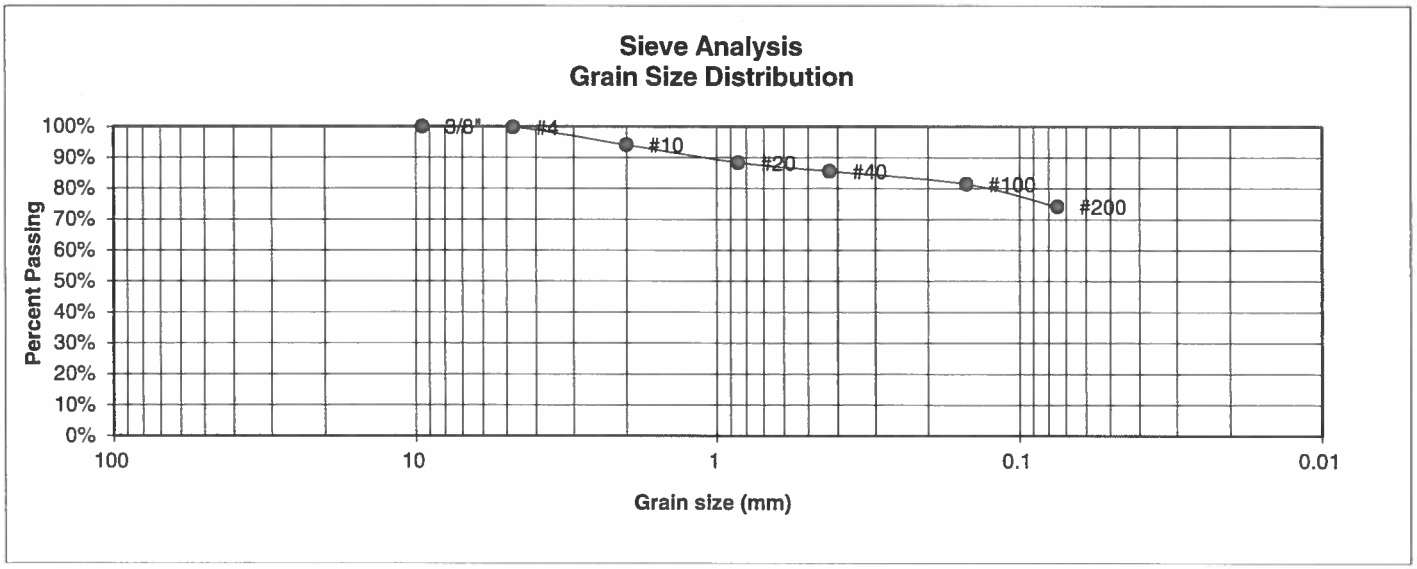
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-1

UNIFIED CLASSIFICATION	CH	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	1	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	9	JOB NO.	171689
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.8%
10	94.1%
20	88.3%
40	85.6%
100	81.4%
200	74.2%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	61
Plastic Index	43

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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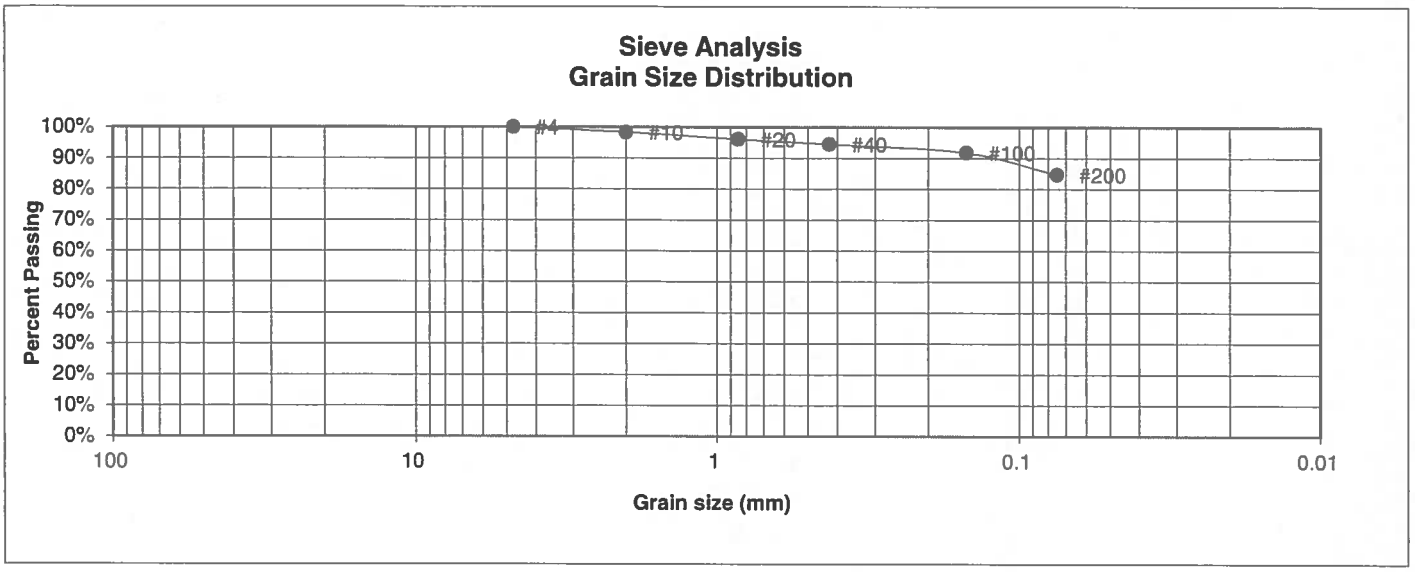
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
		DS	12/28/17

JOB NO.: 171689

FIG NO.: B-2

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	1	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	10	JOB NO.	171689
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.4%
20	96.1%
40	94.5%
100	91.8%
200	84.7%

Atterberg Limits

Plastic Limit	
Liquid Limit	
Plastic Index	

Swell

Moisture at start	11.4%
Moisture at finish	22.3%
Moisture increase	10.8%
Initial dry density (pcf)	100
Swell (psf)	1640

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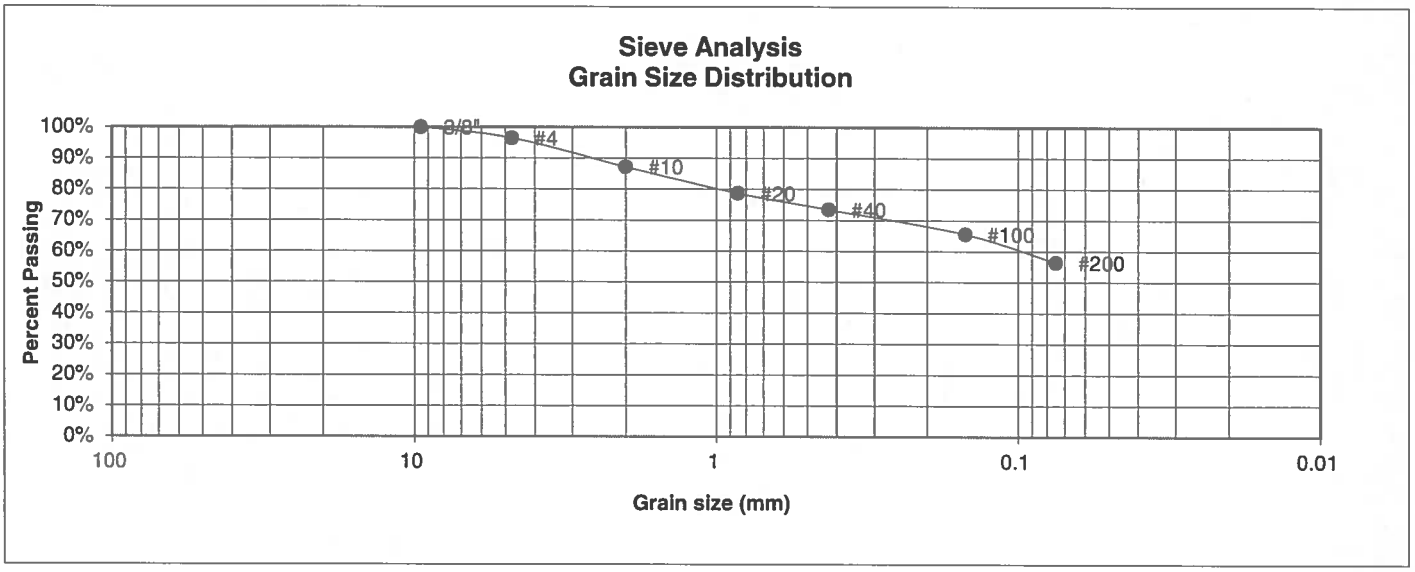
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-3

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	1	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	13	JOB NO.	171689
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	96.5%
10	87.2%
20	78.7%
40	73.4%
100	65.6%
200	56.5%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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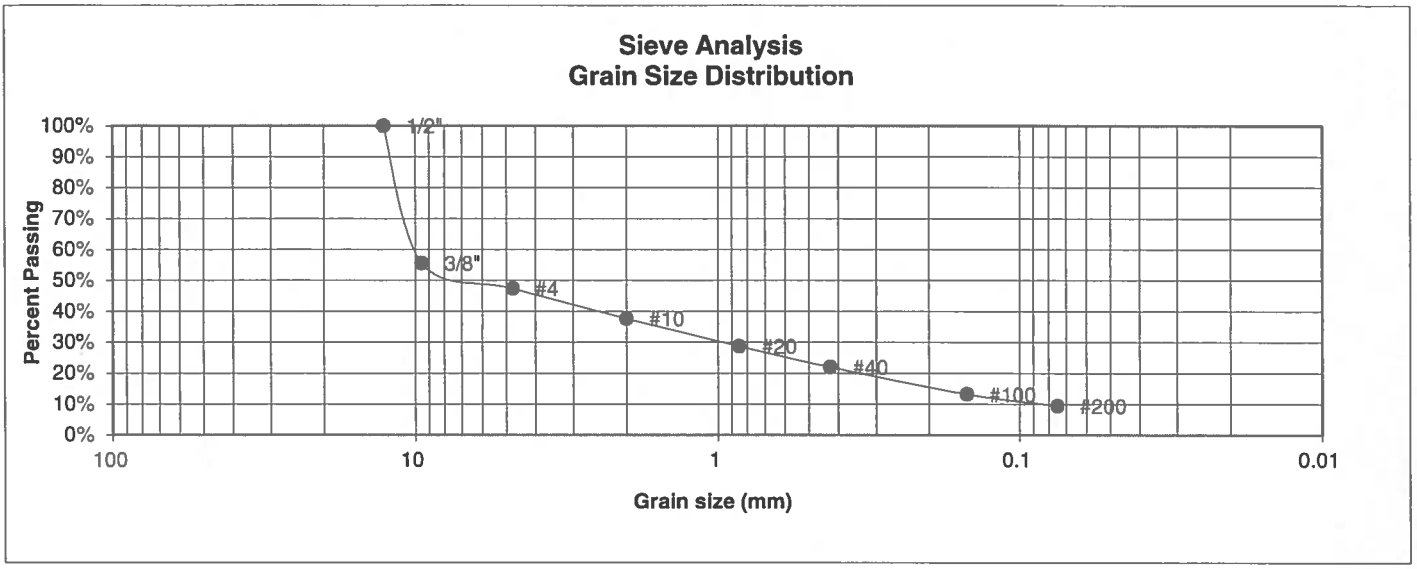
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-4

UNIFIED CLASSIFICATION	SM-SW	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	2	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	1	JOB NO.	171689
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	55.6%
4	47.4%
10	37.6%
20	28.7%
40	22.0%
100	13.2%
200	9.5%

Atterberg Limits

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell

Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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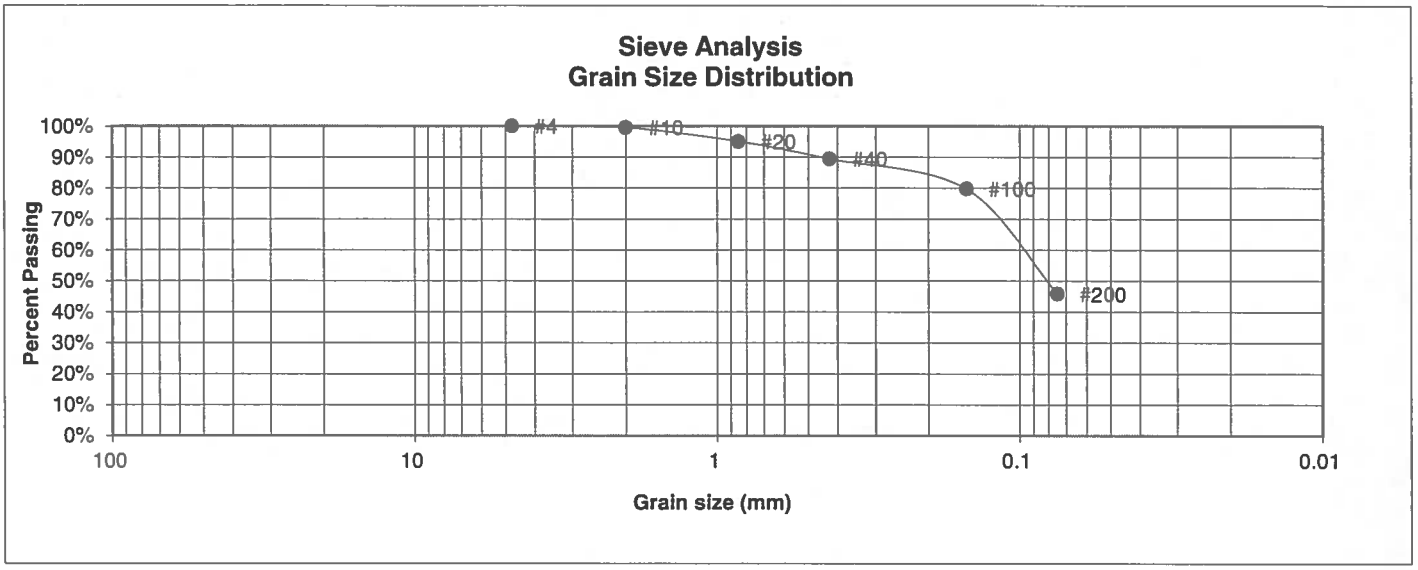
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-5

UNIFIED CLASSIFICATION	SC	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	2	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	3	JOB NO.	171689
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.6%
20	95.0%
40	89.4%
100	79.7%
200	45.9%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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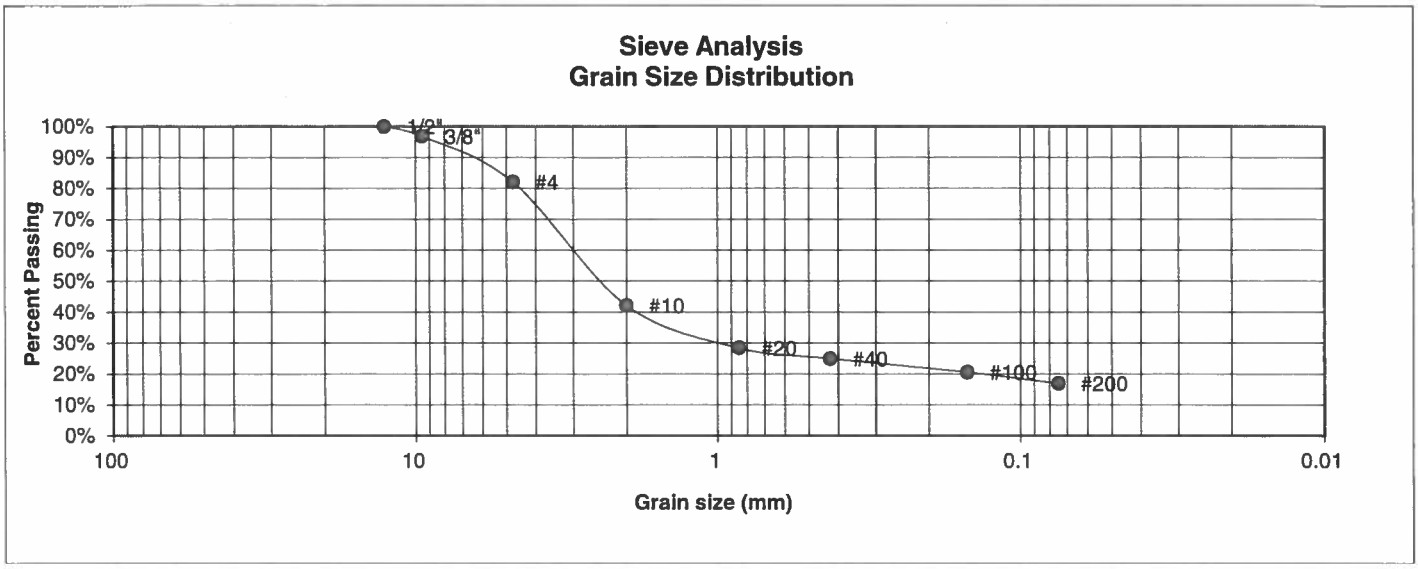
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 12/1/17

JOB NO.: 171689

FIG NO.: B-6

UNIFIED CLASSIFICATION	SC	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	2	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	5	JOB NO.	171689
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.9%
4	82.1%
10	42.1%
20	28.4%
40	24.9%
100	20.5%
200	16.9%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell

Moisture at start	12.1%
Moisture at finish	21.4%
Moisture increase	9.3%
Initial dry density (pcf)	103
Swell (psf)	1280

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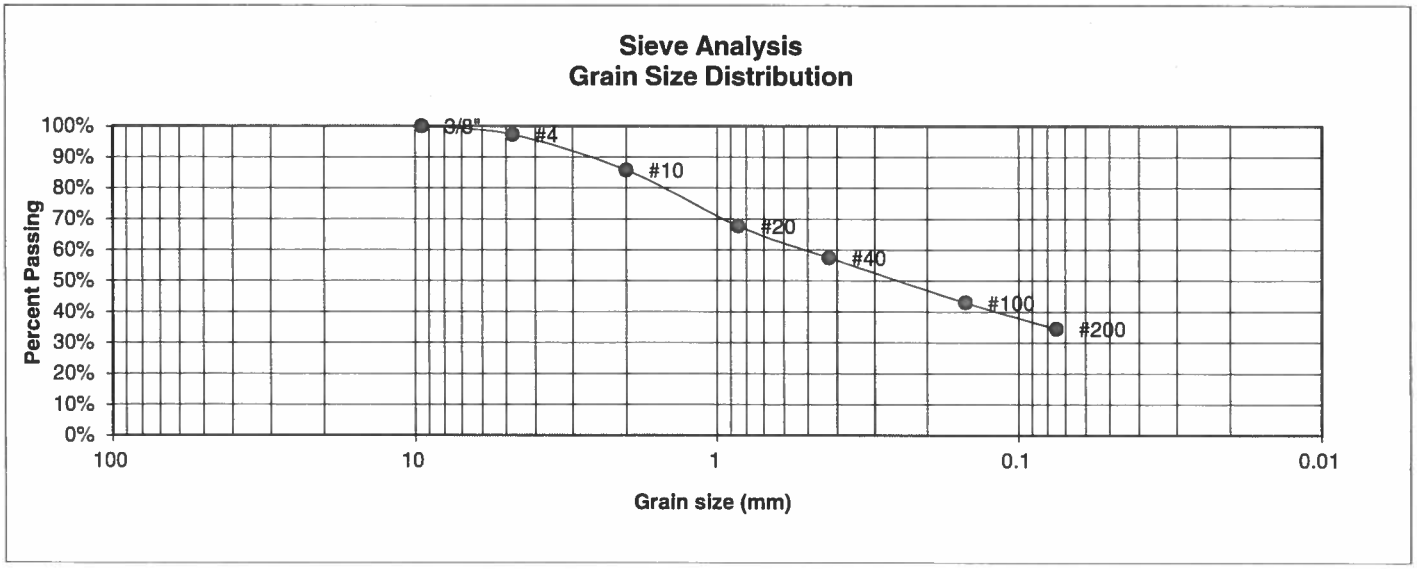
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-7

UNIFIED CLASSIFICATION	SC	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	2	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	10	JOB NO.	171689
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.3%
10	85.8%
20	67.7%
40	57.5%
100	43.0%
200	34.5%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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LABORATORY TEST RESULTS

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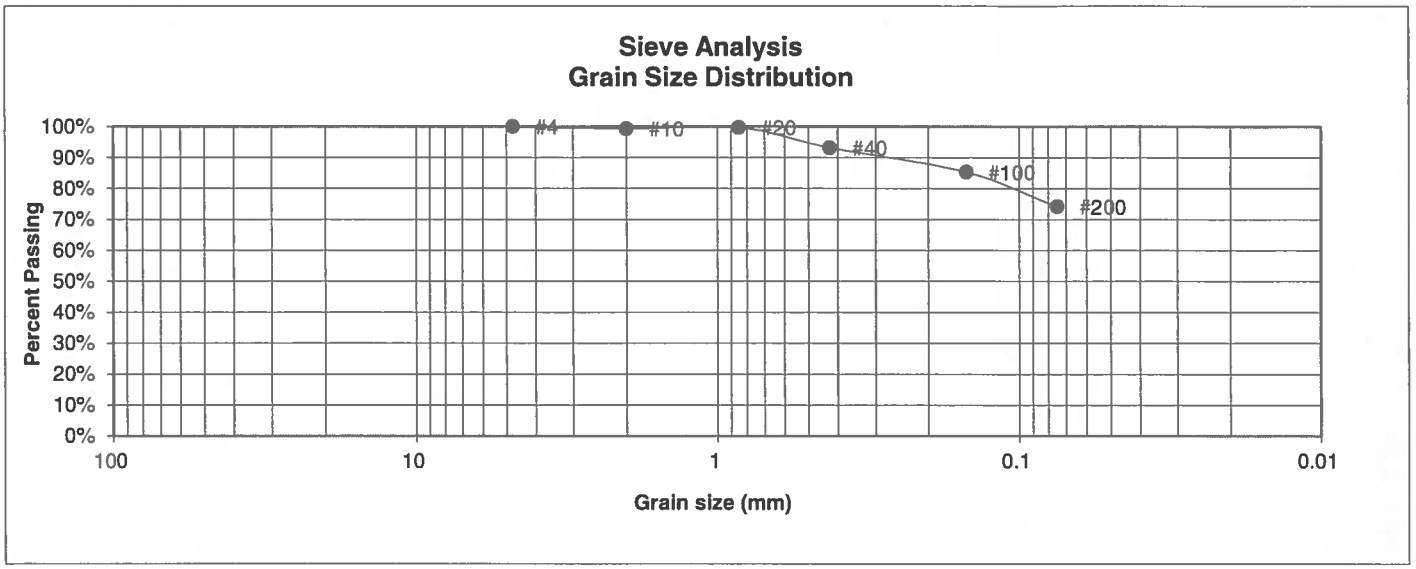
JOB NO.: 171689

FIG NO.: B-8

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	3	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	6	JOB NO.	171689
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.3%
20	99.7%
40	93.2%
100	85.3%
200	74.2%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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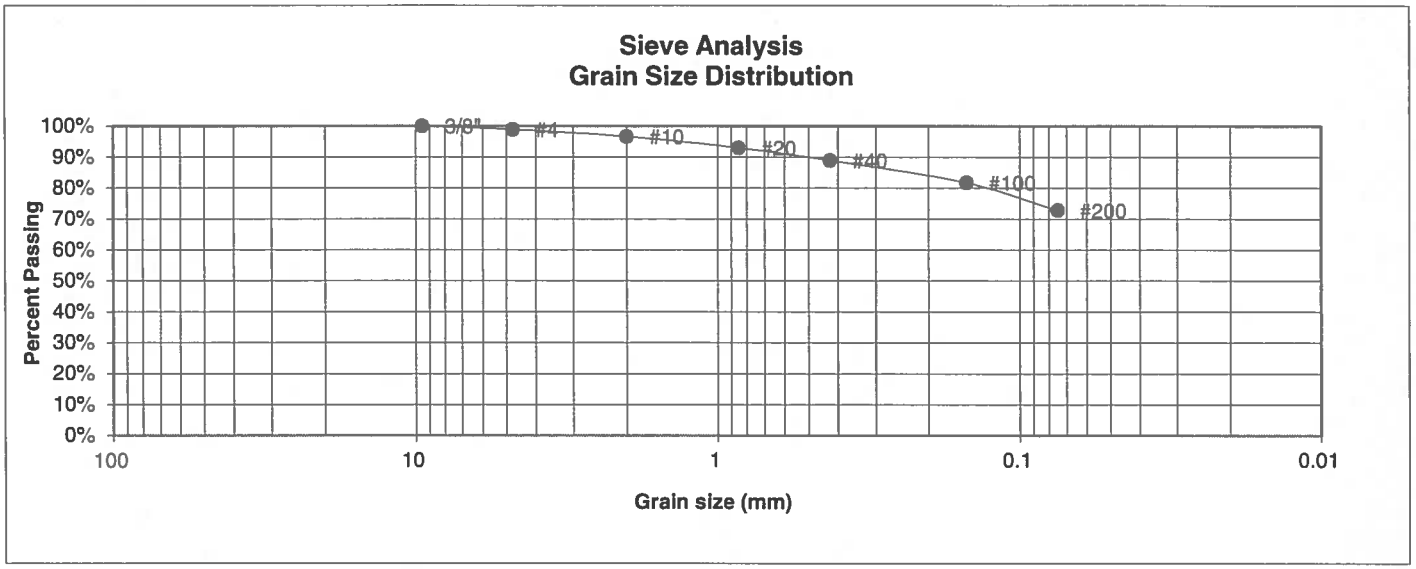
FIG NO.: B-9

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	3	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	8	JOB NO.	171689
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	98.9%
10	96.6%
20	93.0%
40	88.9%
100	81.7%
200	72.8%

Atterberg Limits

Plastic Limit

Liquid Limit

Plastic Index

Swell	
Moisture at start	10.3%
Moisture at finish	19.7%
Moisture increase	9.3%
Initial dry density (pcf)	105
Swell (psf)	800

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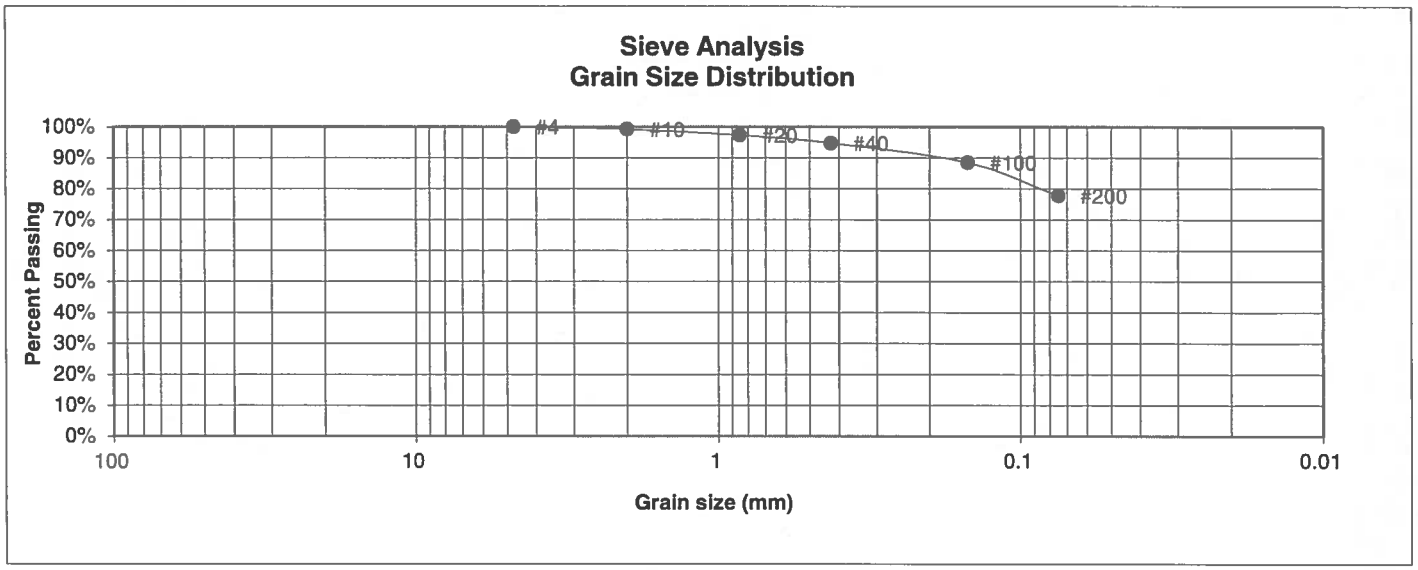
FIG NO.: B-10

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	3	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	11	JOB NO.	171689
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.2%
20	97.3%
40	94.7%
100	88.5%
200	77.8%

Atterberg Limits	
Plastic Limit	15
Liquid Limit	37
Plastic Index	22

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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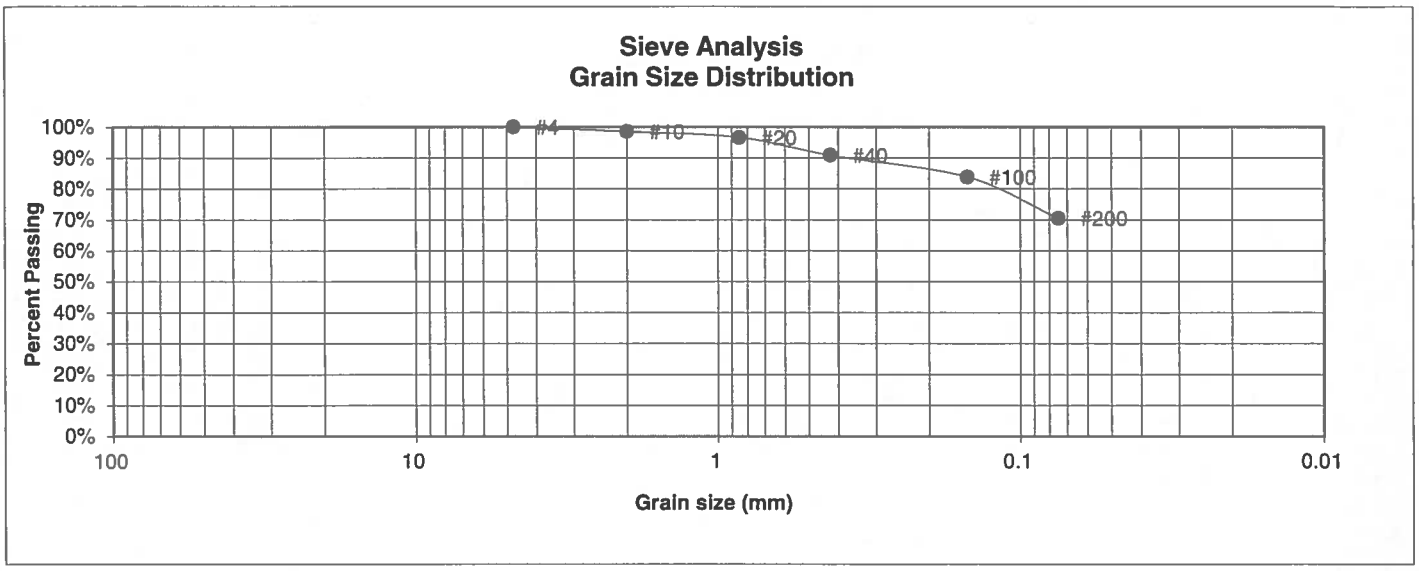
FIG NO.: B-11

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	3	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	11	JOB NO.	171689
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	98.5%
20	96.6%
40	90.8%
100	83.9%
200	70.5%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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LABORATORY TEST RESULTS

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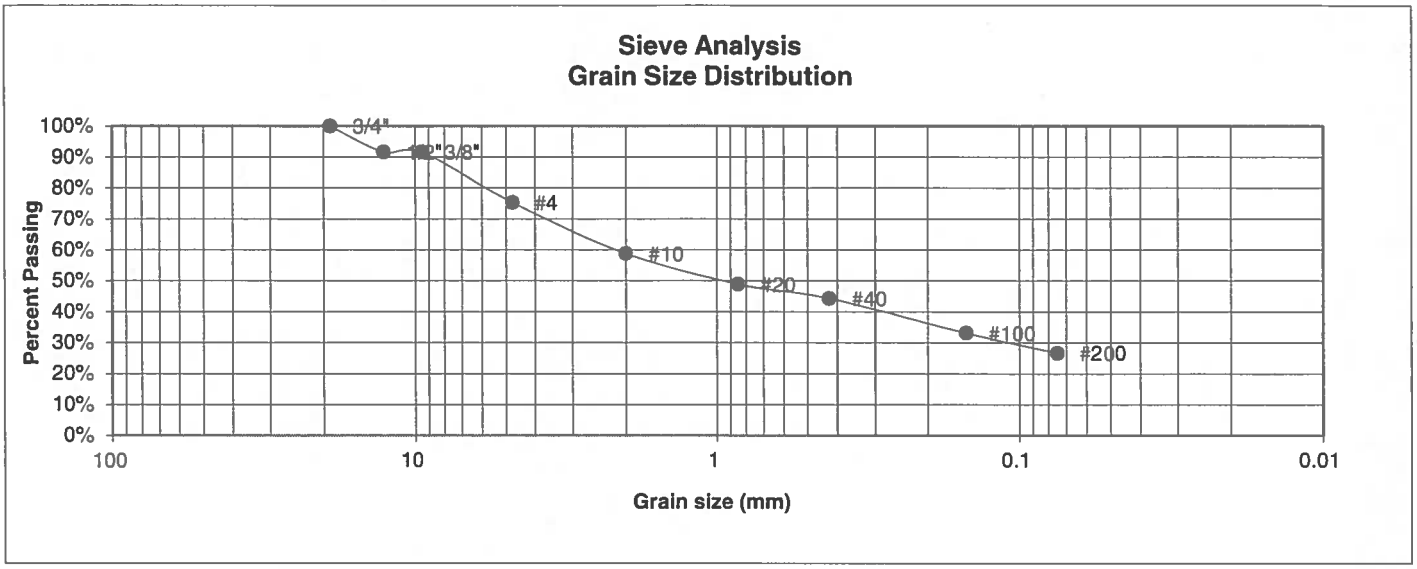
JOB NO.: 171689

FIG NO.: B-12

UNIFIED CLASSIFICATION	SM	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	4	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	8	JOB NO.	171689
DEPTH (FT)	5	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	100.0%
1/2"	91.6%
3/8"	91.6%
4	75.3%
10	58.8%
20	48.9%
40	44.3%
100	33.1%
200	26.7%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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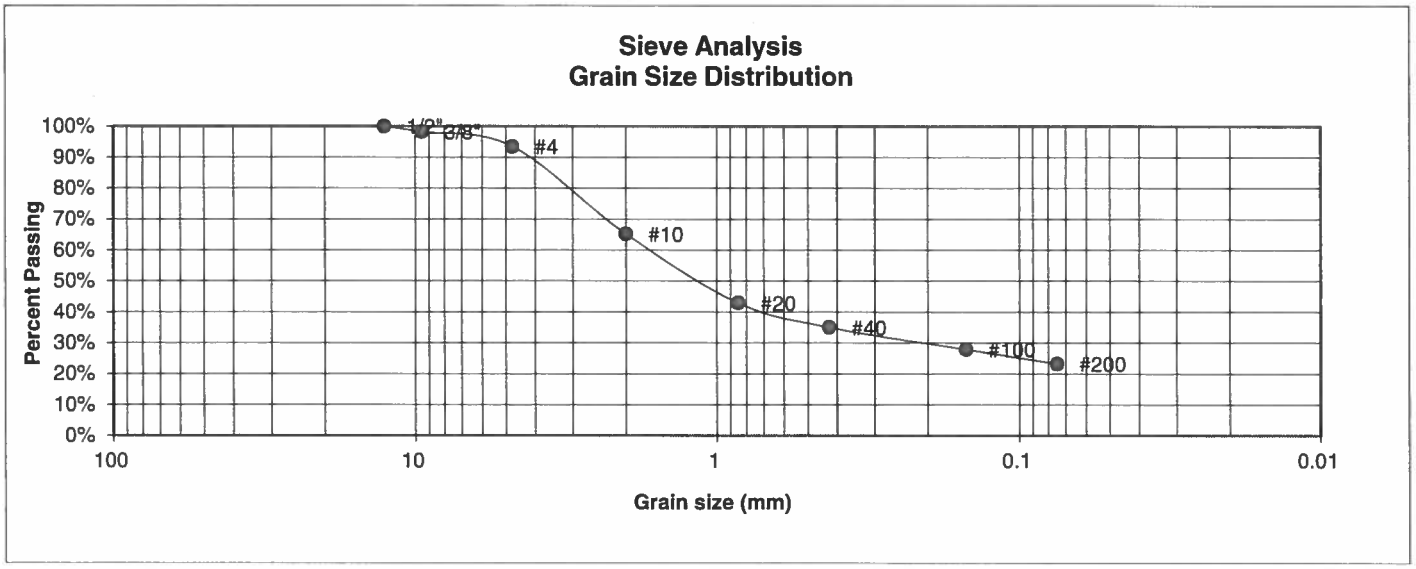
JOB NO.: 171689

FIG NO.: B-13

UNIFIED CLASSIFICATION	SC	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	4	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	12	JOB NO.	171689
DEPTH (FT)	2-3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	98.3%
4	93.5%
10	65.2%
20	42.9%
40	35.0%
100	27.9%
200	23.2%

Atterberg Limits	
Plastic Limit	18
Liquid Limit	48
Plastic Index	30

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

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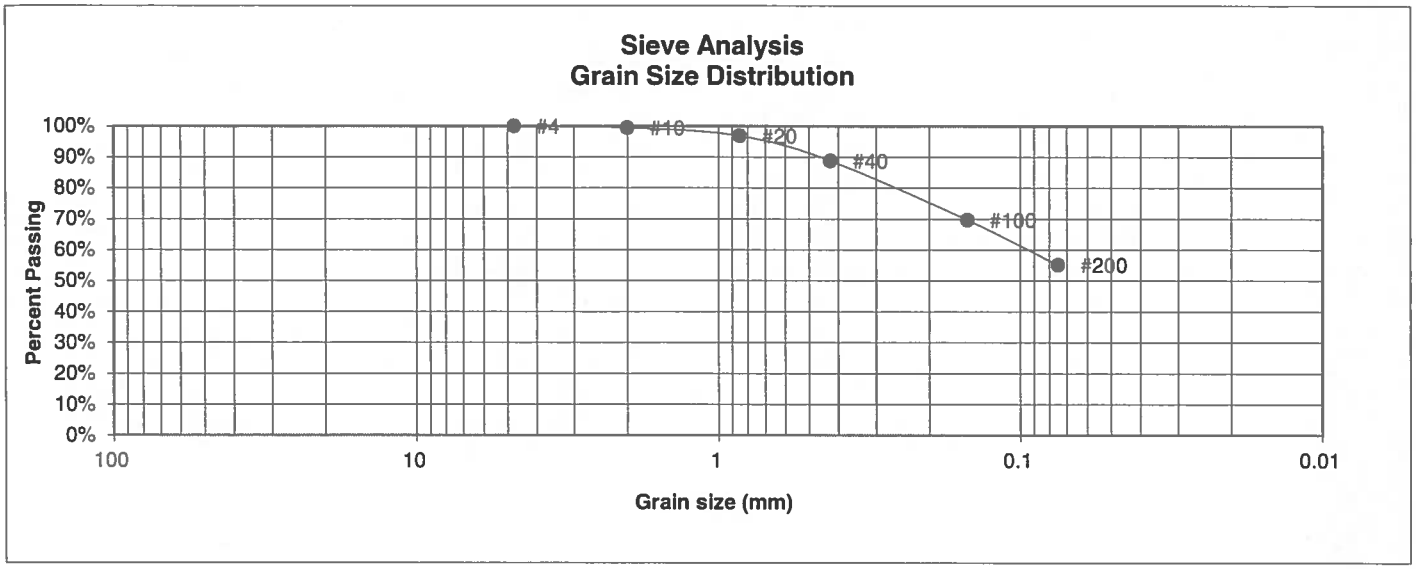
JOB NO.: 171689

FIG NO.: B-H

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	5	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	2	JOB NO.	171689
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.5%
20	96.9%
40	88.8%
100	69.7%
200	55.2%

Atterberg Limits	
Plastic Limit	14
Liquid Limit	28
Plastic Index	14

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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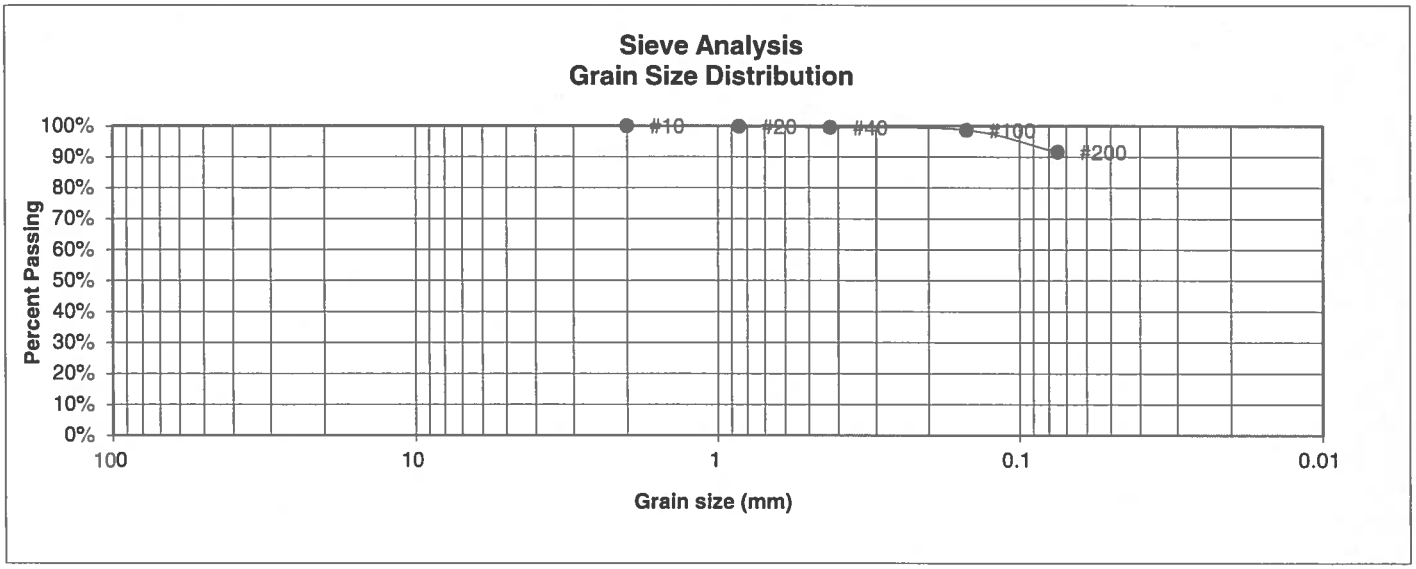
FIG NO.: B-15

UNIFIED CLASSIFICATION	CH	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	5	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	3	JOB NO.	171689
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	99.8%
40	99.5%
100	98.7%
200	91.6%

Atterberg Limits	
Plastic Limit	26
Liquid Limit	51
Plastic Index	25

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

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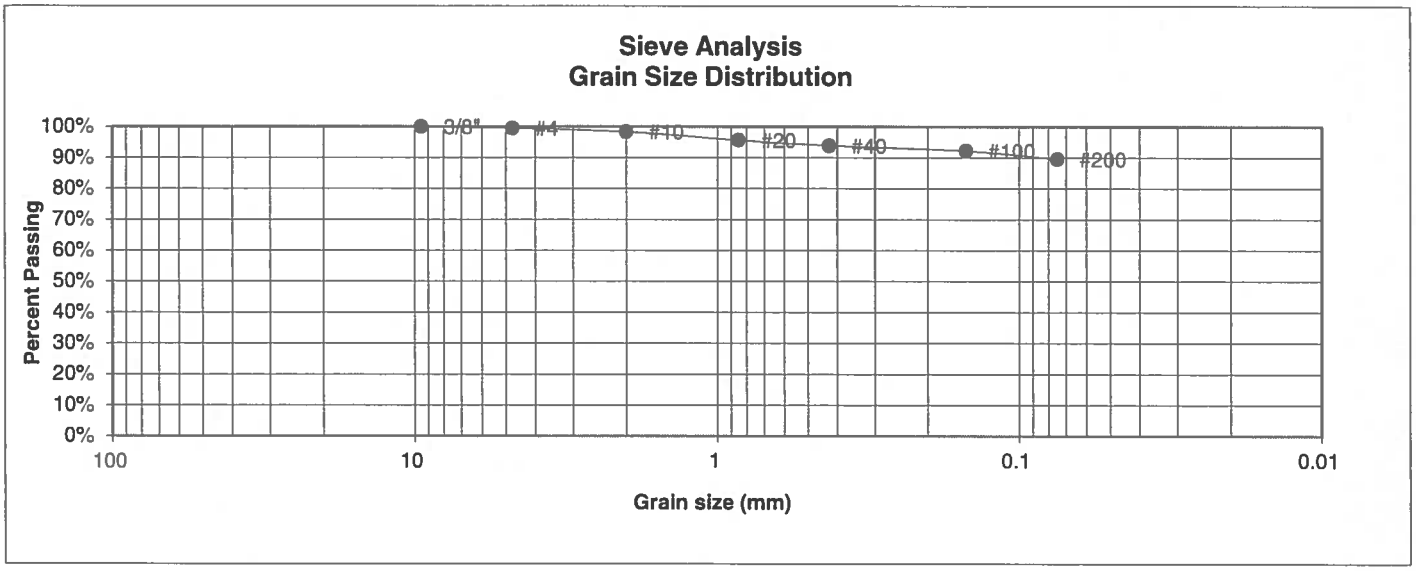
JOB NO.: 171689

FIG NO.: B-16

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	5	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	5	JOB NO.	171689
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.5%
10	98.3%
20	95.6%
40	93.9%
100	92.2%
200	89.5%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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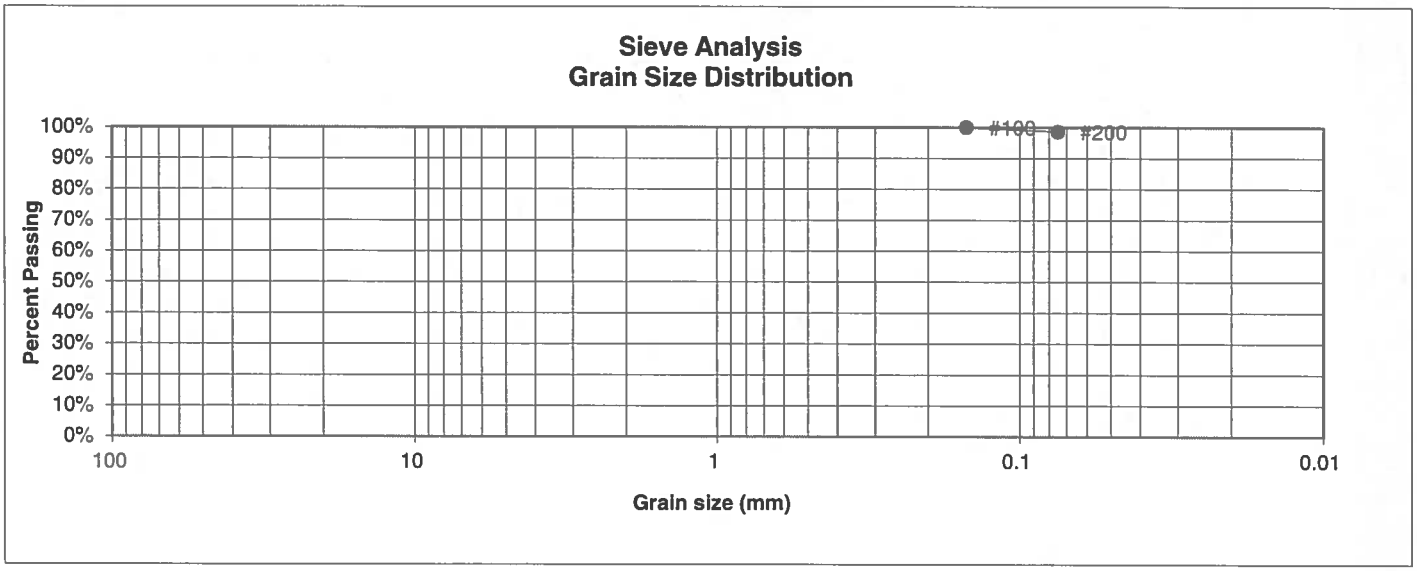
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE: 12/1/17

JOB NO.: 171689

FIG NO.: B-17

UNIFIED CLASSIFICATION	CL	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	5	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	7	JOB NO.	171689
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	
40	
100	100.0%
200	98.6%

Atterberg Limits
Plastic Limit
Liquid Limit
Plastic Index

Swell
Moisture at start
Moisture at finish
Moisture increase
Initial dry density (pcf)
Swell (psf)

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LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
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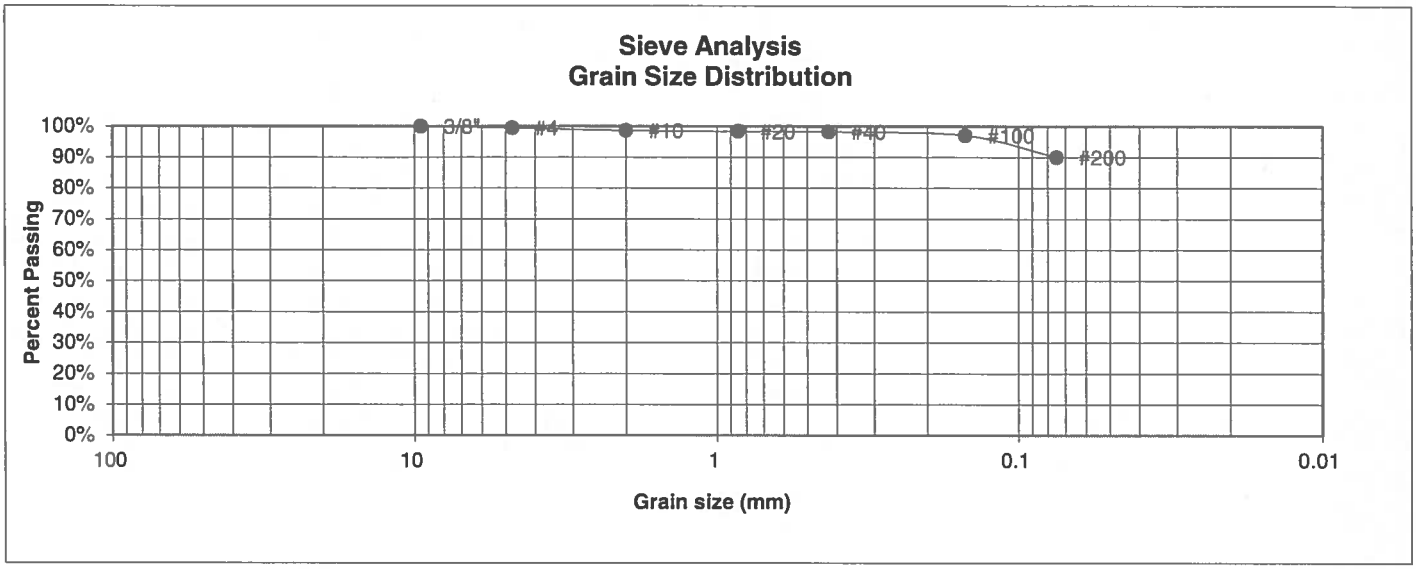
JOB NO.: 171689

FIG NO.: B-18

UNIFIED CLASSIFICATION	CH	CLIENT	CADILLAC BUILDING COMPANY
SOIL TYPE #	5	PROJECT	GRAND ELK RANCH & CLUB
TEST BORING #	9	JOB NO.	171689
DEPTH (FT)	10	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.5%
10	98.6%
20	98.4%
40	98.3%
100	97.1%
200	90.1%

Atterberg Limits	
Plastic Limit	19
Liquid Limit	73
Plastic Index	54

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	

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LABORATORY TEST RESULTS

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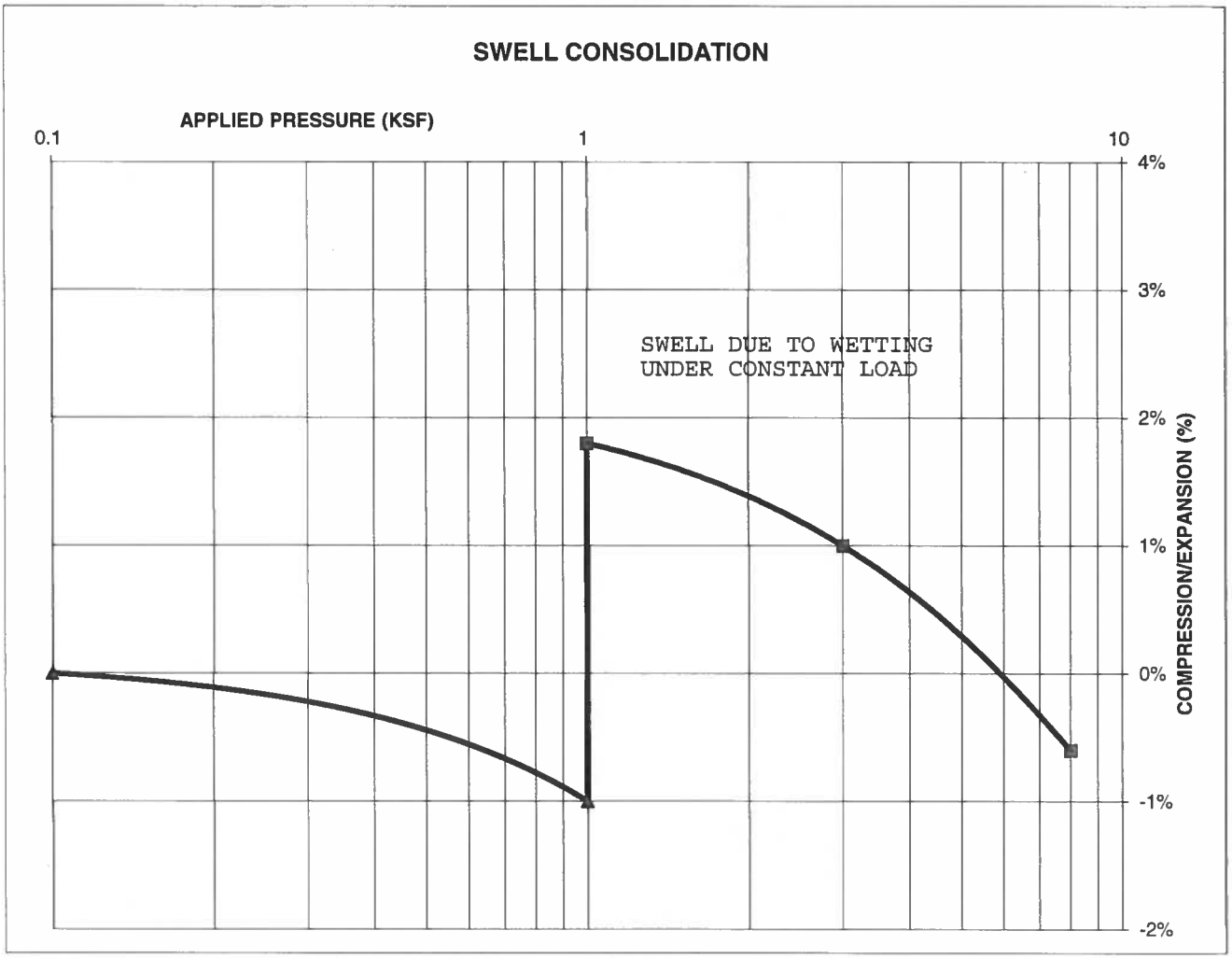
JOB NO.: 171689

FIG NO.: B-19

CONSOLIDATION TEST RESULTS

TEST BORING #	7	DEPTH(ft)	2-3
DESCRIPTION	CL	SOIL TYPE	1
NATURAL UNIT DRY WEIGHT (PCF)			102
NATURAL MOISTURE CONTENT			14.6%
SWELL/CONSOLIDATION (%)			2.8%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
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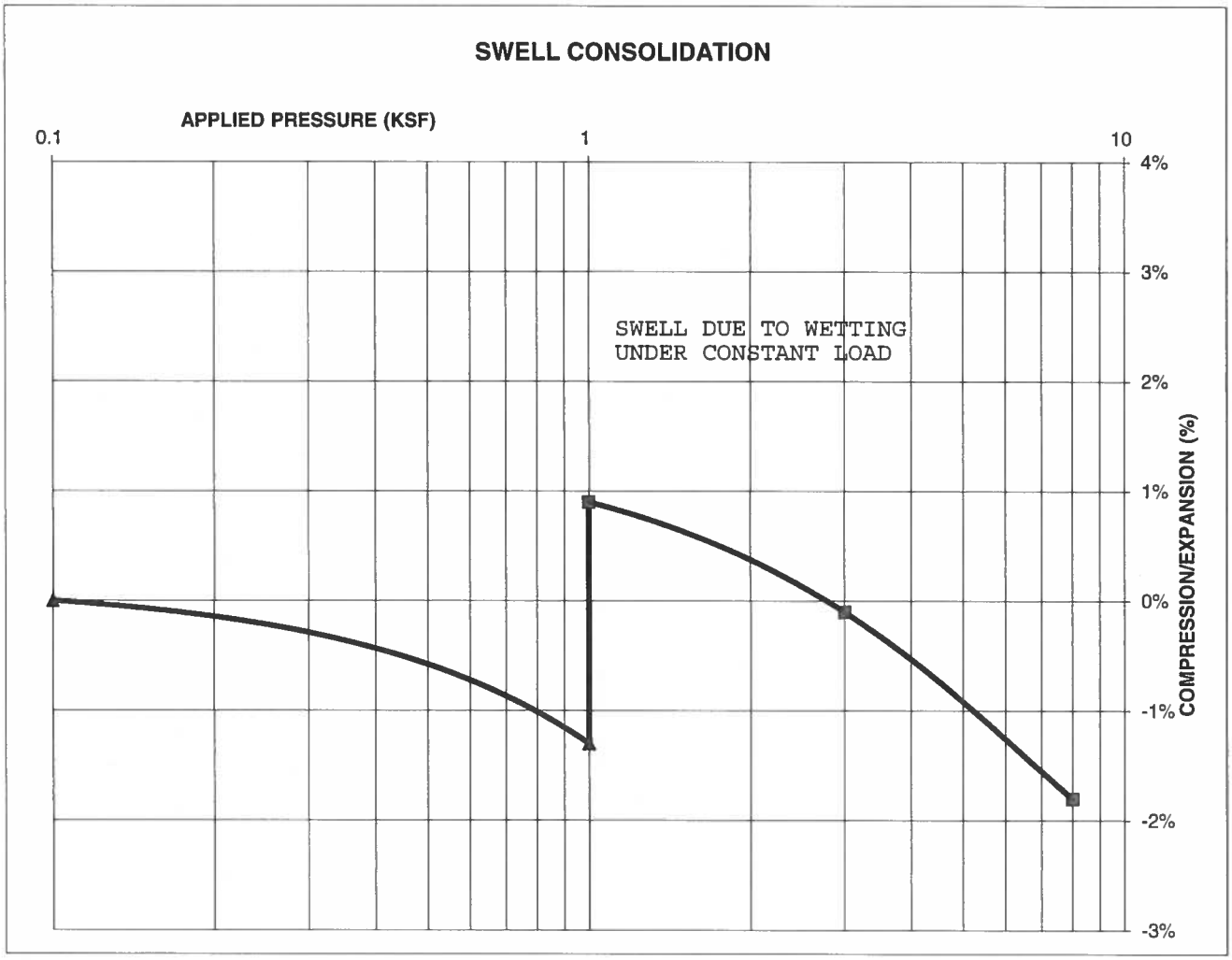
JOB NO.: 171689
FIG NO.: B-20

CONSOLIDATION TEST RESULTS

TEST BORING #	4	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			113
NATURAL MOISTURE CONTENT			9.3%
SWELL/CONSOLIDATION (%)			2.2%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

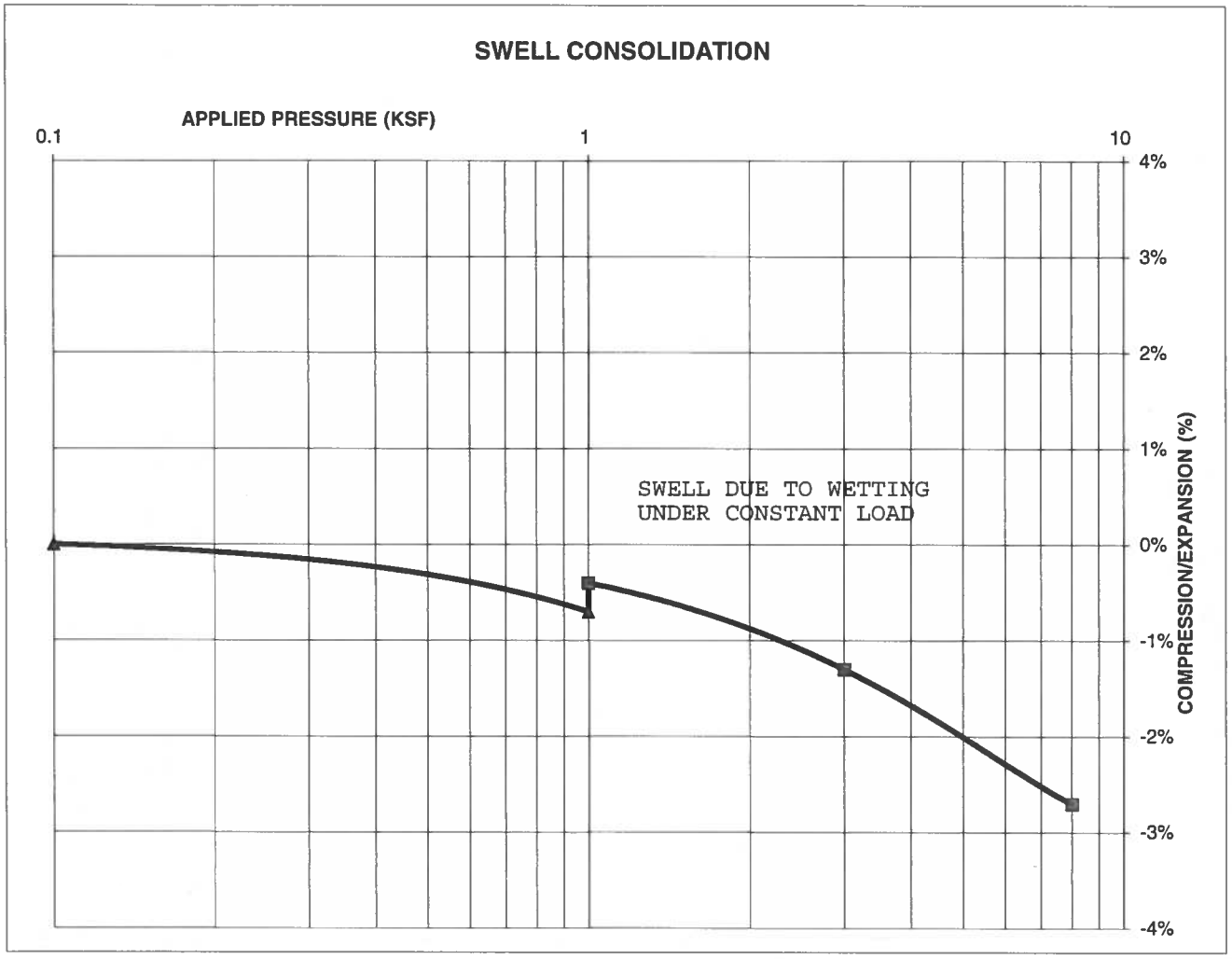
DRAWN:	DATE:	CHECKED:	DATE:
		CL	12/1/17

JOB NO.: 171689
FIG NO.: B-21

CONSOLIDATION TEST RESULTS

TEST BORING #	11	DEPTH(ft)	5
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			108
NATURAL MOISTURE CONTENT			16.1%
SWELL/CONSOLIDATION (%)			0.3%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
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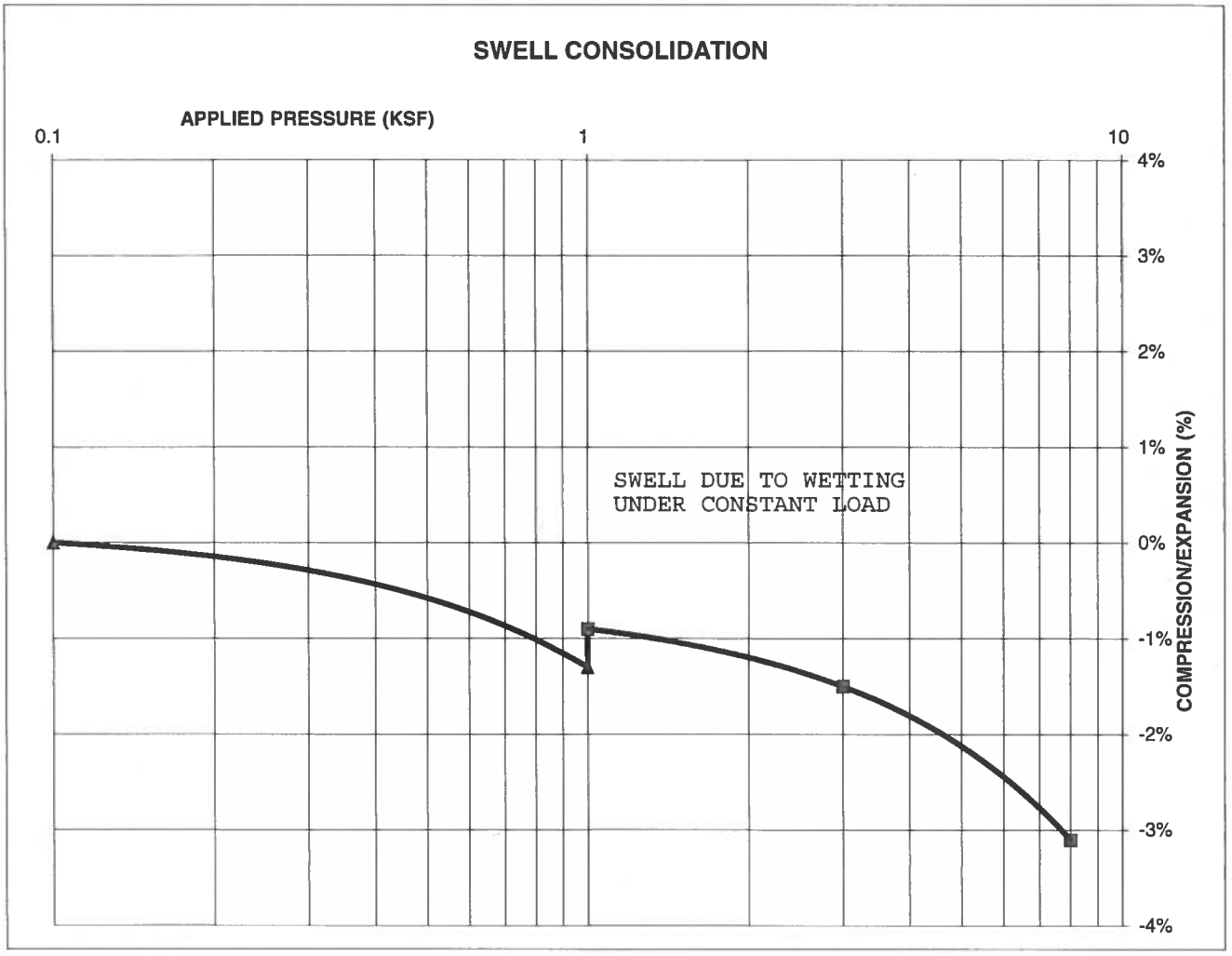
JOB NO.: 171689
FIG NO.: B-22

CONSOLIDATION TEST RESULTS

TEST BORING #	11	DEPTH(ft)	15
DESCRIPTION	CL	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			95
NATURAL MOISTURE CONTENT			27.2%
SWELL/CONSOLIDATION (%)			0.4%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
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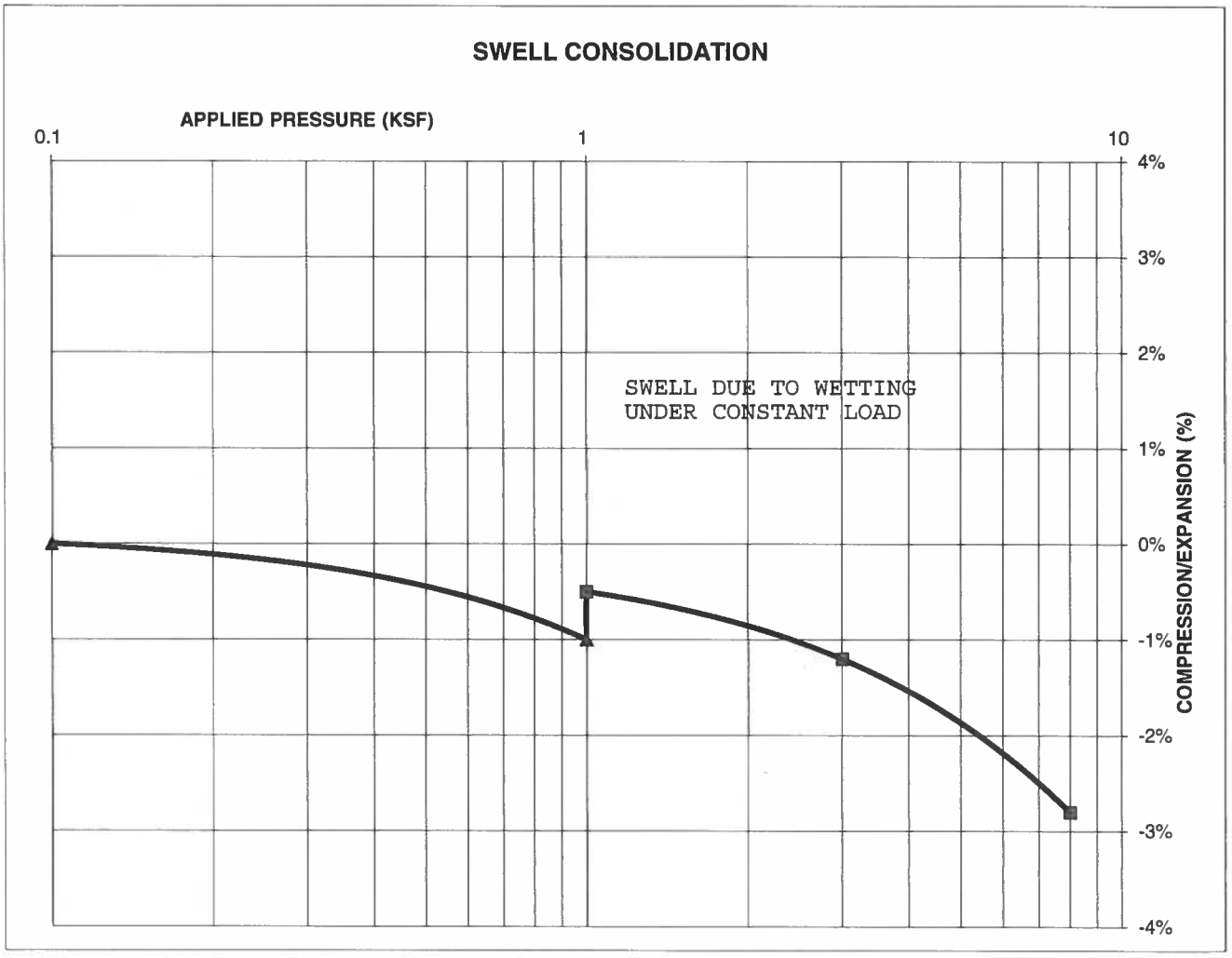
JOB NO.: 171689
FIG NO.: B-23

CONSOLIDATION TEST RESULTS

TEST BORING #	5	DEPTH(ft)	20
DESCRIPTION	CL	SOIL TYPE	5
NATURAL UNIT DRY WEIGHT (PCF)			103
NATURAL MOISTURE CONTENT			23.2%
SWELL/CONSOLIDATION (%)			0.5%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

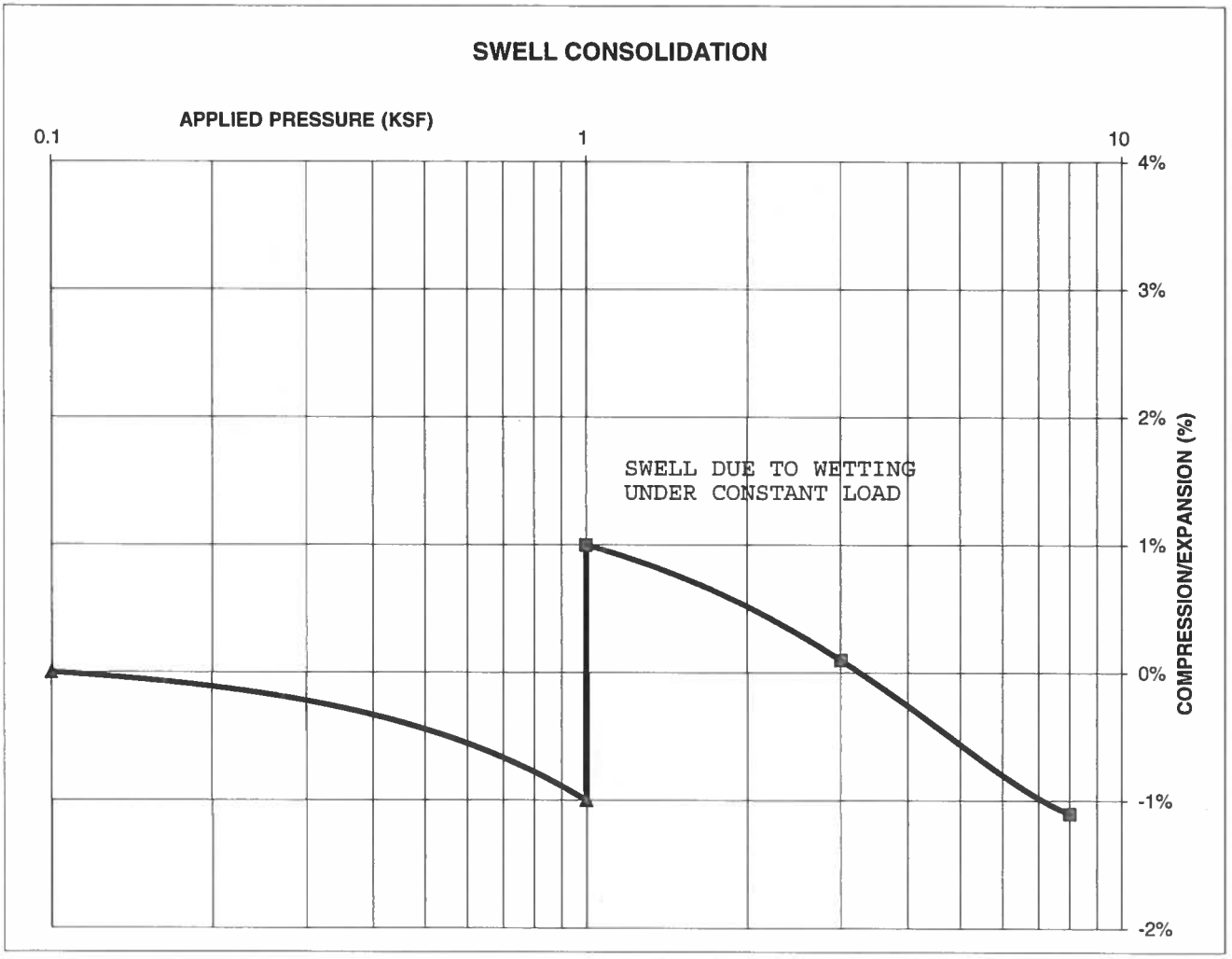
DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689
FIG NO.: B-24

CONSOLIDATION TEST RESULTS

TEST BORING #	7	DEPTH(ft)	10
DESCRIPTION	CL	SOIL TYPE	5
NATURAL UNIT DRY WEIGHT (PCF)			106
NATURAL MOISTURE CONTENT			20.0%
SWELL/CONSOLIDATION (%)			2.0%

JOB NO. 171689
CLIENT CADILLAC BUILDING COMPANY
PROJECT GRAND ELK RANCH & CLUB



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SWELL CONSOLIDATION
TEST RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689
FIG NO.: B-25

CLIENT	CADILLAC BUILDING COMPANY	JOB NO.	171689
PROJECT	GRAND ELK RANCH & CLUB	DATE	11/21/2017
LOCATION	GRAND ELK RANCH & CLUB	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-9	5	1	CH	0.05
TB-13	2-3	1	CL	0.11
TB-1	10	2	SM-SW	0.00
TB-11	5	3	CL	0.00
TB-6	5	3	CL	<0.01
TB-2	15	5	CL	0.00
TB-10	10	2	SC	<0.01
TB-5	20	5	CL	<0.01

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LABORATORY TEST
SULFATE RESULTS

DRAWN:	DATE:	CHECKED:	DATE:
			12/1/17

JOB NO.: 171689

FIG NO.: B-26