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Engineering

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3521 West Eisenhower Blvd. Loveland, Colorado 80537

July 29, 2010
Project No. JJRLLC-0C5D-07-709

JJR, LLC.
Mr. Hank Byma
110 Miller Avenue
Ann Arbor, MI 48104

Dear Mr. Byma,

The enclosed report presents the results of a preliminary geotechnical investigation on a 500 +/- acre parcel of land located in the NW 1/4, NE 1/4 & the SE 1/4 of Section 6 and the East ½ of Section 7, Township 16 South, Range 64 West of the 6th P.M., County of El Paso, Colorado. This report is intended to provide you and your design team with an understanding of the existing shallow subsoil characteristics and preliminary foundation and infrastructure design criteria.

If you have any questions or if we can be of further assistance, please contact our office as soon as possible. We will assume that by using this report, you and/or your representatives understand its contents and recommendations.

Sincerely,

LANDMARK ENGINEERING LTD.

Larry Miller
Geologist

LAM
Enclosure

The above has been reviewed and approved under the direct supervision of Rodney A. Harr, Colorado P.E. 26857.

PRELIMINARY
GEOTECHNICAL INVESTIGATION
PROPOSED COLORADO NATIONAL CEMETERY
FOR SEC. 6 & 7, T16S, R64W
EL PASO COUNTY, COLORADO

Prepared For:
JJR, LLC
Mr. Hank Byma
110 Miller Avenue
Ann Arbor, MI 48104

July 29, 2010
Project No. JJRLLC-0C5D-07-709

LANDMARK ENGINEERING LTD.
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TABLE OF CONTENTS

SCOPE

The following report represents the results of a preliminary geotechnical investigation on a 500 +/- acre parcel of land located in the NW 1/4, NE 1/4 & the SE 1/4 of Section 6 and the East ½ of Section 7, Township 16 South, Range 64 West of the 6th P.M., County of El Paso, Colorado. The investigation was performed for JJR, LLC. The purpose of this investigation was to obtain preliminary information and subsurface property data necessary for the analysis to determine the suitability of the parcel for the proposed Colorado National Cemetery Development for the Department of Veterans Affairs. The conclusions and recommendations presented in this report are based upon analysis of field and laboratory data obtained during this investigation. The scope of this investigation does not include a geologic hazard study of a flood analysis of the on-site drainage.

SITE DESCRIPTION

The proposed 500+/- acre site is located approximately 6 miles east of Fountain, Colorado on the south side of Squirrel Creek Road. The proposed development surrounds the M & M Equestrian Center located at 12285 Squirrel Creek Road, which is not a part of this investigation. The subject site is presently vacant ground vegetated in grasses, weeds, cacti, small brush and a few deciduous trees. The area exhibits rolling hill topography that is bisected by Williams Creek and East Branch Dry Creek. At the time of our investigation, these creeks were dry and not flowing. While these creeks were not flowing at the time of testing, they were not passable with the drill rig. Therefore, testing was not performed in those areas South of East Branch Dry Creek. Although tests were not performed in this area, it could be assumed that the soils encountered in these areas could be of a similar nature as those encountered in the areas North of East Branch Dry Creek..

Additionally, an existing cemetery site and steep grades were present along the Eastern edge of the site. Both of these limited the access to the area with the drill rig. However, there were enough other bore holes located around this area to make the assumption that the soils that would be encountered would be similar in nature to those encountered in the bore holes that were completed.

FIELD INVESTIGATION

The field investigation consisted of 30 soil test borings that were chosen and spaced in accessible areas throughout the parcel. The soil test borings were advanced with an Acker AD-II drill rig utilizing 4-inch diameter continuous flight augers. At your request, all borings were terminated at depths of 10 feet to 16 feet which met the requirement of the bore holes to be a minimum of at least 8 feet..

As the soil test boring operation advanced, an index of soils relative density and consistency was obtained by use of the standard penetration test, ASTM Standard Test D-1586. The penetration test results listed on the boring logs are the number of blows required to drive the 2-inch diameter split-spoon sampler 12 inches, or increments as shown, into undisturbed soil using a 140-pound hammer dropped 30 inches.

Undisturbed samples for use in the laboratory were taken in 3-inch O.D. thin wall Shelby samplers, hydraulically pushed into the soil and 2.5 inch O.D. California Samplers driven into the soil. Undisturbed and disturbed samples were sealed in the field and preserved at natural moisture content until tested in the laboratory.

Complete logs of all boring/excavation operations are shown on the attached plates and include visual classifications of each soil, location of subsurface changes, standard penetration test results, and subsurface water level measurements at the time of this investigation.

LABORATORY TESTING

Laboratory tests were performed to determine soil classifications, moisture contents, dry densities, unconfined compressive strengths, swelling and consolidation characteristics, and soluble sulfates.

SUBSURFACE CONDITIONS

Subsurface strata consisted of a mixture of overburden eolian and alluvial deposits of inter-layered clays and sands all underlain by a claystone bedrock of the Upper Unit of the Pierre Shale Formations of the Cretaceous Age. The upper 4 to 6 inches of soil at the surface contained organic root penetrations. A description of each follows.

Lean/Fat Clay - At the surface in all borings, except Boring No.'s 10,11,13,17,24 & 27, a dark brown to light brown lean to fat clay soil was encountered. These clays contain varying amounts of silt and sand. Based on field and laboratory data, the clays offers low to moderately low bearing capacities while exhibiting slight consolidation to high swell potentials when subjected to a wet surcharge. The higher swells were associated with the high plastic (CH) fat clays while the sandier low plastic (CL) lean clays possessed the low swell to consolidation values.

Sands - At the surface in Boring No.'s 10,11,13,17,24 & 27and at varying depths in most of the remaining borings, a light brown to brown, sand with varying amounts of silt, clay and fine gravel was found. Tests indicate this material offers low to moderately low bearing capacities while exhibiting slight swell to moderate consolidation potentials when wetted.

Claystone - Below the overburden material in soil test borings No.'1, a weathered to competent sandy claystone bedrock was encountered at a depth near 4.5 feet. Data collected and general knowledge of this formation suggests this stratum offers moderate to high bearing capacities while possessing moderate to high swell potentials.

Groundwater - At the time of drilling and 24 hours later, free groundwater was only encountered in soil Boring No. 25 at a depth near 14 feet. It was noted, however, that other borings (that were only advanced to depths of 10 feet) were moist to very moist but did not yield free groundwater at their termination depths. In any case, water levels on the site should be anticipated to fluctuate throughout the year and, therefore, current measurements may not be indicative of high groundwater levels. Groundwater levels may rise when the adjacent creeks are flowing. It would take a long-term groundwater monitoring program including the installation of piezometers to determine high water tables. Also, a perched water table could develop on top of the impervious clays or bedrock stratum during periods of high precipitation, snow melt or localized irrigation.

CORROSION PROTECTION

Tests performed on a representative number of samples, which will likely be in contact with concrete, resulted in soluble sulfate concentrations ranging from less than 150 to 8,000 parts per million (ppm). ACI rates these measured concentrations as being negligible to severe risk of concrete sulfate attack. For values between 150 ppm to 1,500 ppm, a Type II cement is required; for values in excess of 1,500 ppm but less than 10,000 ppm a Type V cement is required. Also, a water cement ratio of 0.45 and a 28 day compressive strength of 4,000 p.s.i. is recommended. Structural concrete should be designed in accordance with the provisions in the current ACI Design Manual.

Some of the exposed soils could be reactive when in contact with buried metals. Therefore, it is recommended that the buried metal be cathodically protected or separated from the soil with a poly mil wrapping or some other means as recommended by the design engineer. Final soils evaluations should be performed when depths and types of design elements are known and grading is determined. The soils at the depth of bury for the metals should be retested at that time.

FOUNDATION RECOMMENDATIONS

The selection of the foundation type for a given situation and structure is governed by 2 basic considerations. First, the foundation elements must be designed to be safe against shear failure in the underlying soils and/or bedrock; and second, differential settlement or other vertical movement of the foundation must be reduced to a reasonable level.

At your request we have provided preliminary design criteria for potential structures at the site. It should be noted that future site grading could cover shallower soil types or expose deeper soil types encountered in this investigation. Below we have provided general foundation design criteria for soil types encountered at various depths and locations. Since this is only preliminary information, structure specific geotechnical investigations along with additional borings are required to confirm subsurface conditions at foundation elevations and to determine specific design criteria. For deep foundations, additional borings advanced to depths exceeding the termination depths of the foundation elements will be required.

Continuous Spread Footing Foundations

Areas encompassing soils that swell or consolidate less than 2% at a 500 p.s.f surcharge:

Where foundations will bear through the organic topsoil and bear on the low expansive clays or low consolidating sand soils, while maintaining a vertical separation of at least 3 feet above the expansive clays, claystone bedrock or high groundwater table, the foundation could be a spread footing foundation designed for a maximum allowable bearing capacity in the range of 1,000 to 2,000 p.s.f. (dead load plus full live load) and with a minimum dead load requirement load in the range 0 to 750 p.s.f.

Areas encompassing soils that swell or consolidate more than 2% at a 500 p.s.f surcharge:

Due to the potential movement of the soils that swell or consolidation more than 2%, we do not recommend foundations bearing directly on these materials. A possible alternative would be to over-excavate these soils down to suitable material (or to depths and widths to be determined in the final geotechnical report) and to replaced with compacted, moisture-treated, non-expansive engineered fill. On-site, non expansive sand soils or imported structural fill could be used as fill. Depending on the type of soil used and the depth of the fill, foundations bearing on densely compacted engineered fill could utilize a continuous spread footing foundation designed for a maximum allowable bearing capacity in the range of 1,500 to 4,000 p.s.f. (dead load plus full live load) and with a minimum dead load requirement load in the range 0 to 500 p.s.f. The engineered fill shall be compacted as outlined in Appendix A of this report, and the imported structural fill (if used) shall conform to the following.

GRADATION (ASTM C 136)

(% Finer by Weight)

1"	*100%*
#4	*50 - 100%*
#200	*25% Max.*
Plasticity Index	*Non Plastic*

We estimate that properly engineered and constructed footings should experience total settlement on the order of 1 inch. Differential settlement should be on the order of ½ to 3/4 of the estimated total settlement. All footings should be placed a minimum of 30 inches below finished grade for frost protection. Foundation walls should be reinforced with rebar to span an unsupported length of 10 feet or as required by the Foundation Engineer. Splicing and placement should comply with ACI 318, or as required by the Foundation Engineer.

Drilled Pier (Caisson)

Areas encompassing soils that swell or consolidate more than 2% at a 500 p.s.f surcharge or where foundations bear near the claystone bedrock:

Another possible alternative, where expansive clay soils or consolidating sand soils are encountered, is to employ a deep foundation system bearing in the bedrock. Also, where foundation are anticipated to bear within 4 feet of the weathered claystone we recommend a drilled pier (caisson) and grade beam foundation be used. Again, a site specific geotechnical report including recommendations and borings that are advanced to depths exceeding the termination depths of the drilled piers will be required.

In drilling the piers the following design and construction details should be observed:

1. *Piers should be designed for the maximum end bearing pressure and side shear specified in the site specific final report;*

2. *All piers should be reinforced for their full length to resist tension. We recommend the use of at least a quantity of 2, Grade 60, No. 5 reinforcing bars for 12-inch diameter piers. For larger piers the area of reinforcing shall be equal to or greater than 0.5 percent of the gross cross-sectional area of the pier, or as required by the foundation engineer;*

3. *All piers should be carefully cleaned before placing concrete. Concrete and reinforcing steel should be placed in the caisson holes immediately after drilling and cleaning;*

7. *Most of the material at the site can be drilled with a normal heavy commercial sized pier drilling rig. However, dense layers of sandstone/claystone are very hard and problems may arise if the contractor attempts to drill the pier holes with a small drill rig;*

8. *Pier holes should be observed during construction by a competent Soils Engineer or technician to ensure that penetration is started at the proper depth and that no piers contain loose material. The client may determine the frequency and duration of this on-site observation, although Landmark recommends 100% observation to give the greatest opportunity to identify conditions and to match the encountered soils to the appropriate design criteria.*

FLOOR SLABS

Below, we have provided the following table provided by the Colorado Association of Geotechnical Engineers in their December 1996 report entitled, Guidelines for Slab Performance Risk Evaluation and Residential Basement Floor System Recommendations. This table can be used to evaluate potential slab risk with varying swell percentages. It should be noted that all of our swell tests were performed using a 500 p.s.f. surcharge.

RECOMMENDED REPRESENTATIVE SWELL POTENTIAL DESCRIPTIONS AND CORRESPONDING SLAB PERFORMANCE RISK CATEGORIES

Slab Performance Risk Category	***Representative Percent Swell (500 psf Surcharge)***	***Representative Percent Swell (1000 psf Surcharge)***
Low	*0 to <3*	*0 to <2*
Moderate	*3 to <5*	*2 to <4*
High	*5 to <8*	*4 to <6*
Very High	*≥8*	*≥6*

Note: The representative percent swell values presented are not necessarily measured values; rather, they are a judgement of the swell of the soil and bedrock profile likely to influence slab performance.

Based on our testing of the encountered materials, swell results fall within the low (sand soils) to moderate to very high (claystone bedrock, lean and fat clays) risk slab performance category. We, therefore, strongly advise that concrete slabs bearing on or near the expansive soils utilize a structural floor system with a void beneath it.

Due to the cost of structural floor systems, concrete slabs-on-grade may be an option for unfinished areas if the owner/contractor understands and accepts the risks involved. A possible alternative that has been used in the Colorado Front Range area consists of construction of slabs-on-grade supported by three feet or more of stable fill. It is our professional opinion that using three feet (3') or more of imported, non-expansive granular fill below floor slabs can reduce, but not eliminate, potential differential floor movement

(movement up to a few inches is still possible). The imported, non-expansive granular fill shall meet specifications as outlined above in the continuous spread footing section. Also, compaction efforts outlined in Appendix A along with a moisture content near optimum, should be used.

If slab on grade slabs are used they should be constructed to be "free-floating", isolated from all bearing members, utilities, and partitions so that the slab can move unimpaired without producing architectural or structural damage. Slabs should be underlain with a four-inch (4") layer of washed rock to help distribute floor loads, provide a capillary break, and provide a pathway for potential infiltrating water to be directed toward sump areas. If moisture sensitive floor coverings are used on interior slabs, consideration should be given to the use of barriers to minimize moisture rise through the slab. Positive drainage should be provided for the excavation subgrade to prevent pooling of water beneath the slab. The slabs should be reinforced with wire mesh, or equivalent. The slabs should be jointed to a depth of at least one-quarter (1/4) of the slab thickness in dimensions not to exceed fifteen feet (15') or 225 square feet and at areas of potential cracking. Exterior slabs exposed to de-icing chemicals or extreme weathering should be constructed using Type II cement with higher air contents and higher compressive strengths.

BASEMENTS

Based on current groundwater levels, basement construction is deemed feasible at the site. We do, however, require that all foundation elements, except piers, be placed a minimum of 3-feet above high groundwater levels. To ensure this separation, a groundwater monitoring system including the installation of piezometers is highly recommended. All below grade usable space shall be protected with a perimeter drain system.

LATERAL EARTH PRESSURES

The native soils and bedrock encountered at the site consist of lean clay (CL), fat clay (CH), silty sand (SM), clayey sand (SC), poorly graded sand with silt (SP-SM), and silty, clayey sand (SC-SM) type soils. The International Building Code does not recommend that the high plastic (CH) type soils be utilized as backfill material. Therefore, low expansive (but relatively impervious) soils should be imported for backfill adjacent to the foundation walls. Based on these soil types, applicable soil lateral loads can be found in Table

1610.1 of the 2006 International Building Code. The listed values assume the backfill will not become saturated and are, therefore, not applicable for submerged soils.

Backfill around the outside perimeter of structures should be moisture-treated and compacted to a minimum density of 90% of standard proctor density as determined by ASTM Standard Test D-698. A suggested specification for placement of backfills is included as Appendix A. The backfill should be free of frozen soil, large dried clods, and organic matter. Compaction of each lift adjacent to any foundation walls should be accomplished with hand operated tampers or other lightweight compactors. Over compaction may cause excessive lateral earth pressures which could result in wall movements.

SITE EXCAVATING, GRADING, LANDSCAPING & DRAINAGE

Excavations into the on-site materials will likely encounter fine-grained clays and sand type soils. The sands typically have a high erosion potential and may cave when subjected to high slope inclinations. It is our opinion that most soils can be excavated with scrappers, front-end loaders, or large backhoes. Where the claystone bedrock is found, larger equipment may be required. Groundwater seepage into excavations is not expected for shallow depths up to 8 feet below current site grades based on current groundwater levels. However, shallower groundwater levels may be found when adjacent creeks are flowing or after periods of high precipitation. The contractor is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the bottom and the sides of the excavation. All excavations should be sloped or shored in the interest of safety following local, and federal regulations including current OSHA excavation and trench safety standards.

Every precaution should be taken to prevent wetting of the foundation subsoils and the percolation of water in the backfill zone or other areas that may reach the foundation or slab elements. Water infiltrating near the foundation may result in architectural or structural damage due to consolidating or swelling of the subsoils and bedrock. The soil design criteria assumes that historic soil moisture content will be maintained. Fountains, waterfalls, ponds, running streams, and buried or non-working downspouts within 10 feet of the foundation all have potential to adversely affect soil moisture conditions and are, therefore, not allowed.

Finished grades should be sloped away from the structure on all sides to provide positive drainage, as required in the current building code. The building code requirements are minimum slopes, steeper grades

are permitted to ensure proper grading and drainage around the structure. The fall should be maintained throughout the life of the structure. Sprinkling systems should not be installed or direct water to within 10 feet of the structure. Downspouts with extensions are recommended and should be arranged to carry drainage from the roof at least 5 feet beyond the foundation walls and backfill zone. Should landscaping plants be located next to the structure, we recommend the installation of plants that require minimal watering.

PRELIMINARY PAVEMENT EVALUATION

Based on the encountered clay and sand soils and the claystone bedrock along with their physical properties, we have provided construction considerations for roadway infrastructure. It is our opinion that two items may have to be addressed when constructing streets within the development.

The first is the expansive nature of some of the native clay soils (especially the fat clays). These clay soils are subject to heave and shrink and, therefore, can cause premature cracking or differential movement of the street section. To reduce the effects of potential subgrade movement due to swelling soils the following soil mitigation techniques have been recommended (and often required) by municipalities within Colorado when existing subgrade soils swell more than 2% with a 150 p.s.f. surcharge (we measured swell values up to 8.9% with a 500 p.s.f. surcharge). Possible options to reduce potential roadway cracking or heaving could include:

Option A. *Over-excavation and soil replacement of approximately 2 feet with non-expansive material, or*

Option B. *Amending the upper foot of the native soils with Class C fly ash.*

The second concern is the close proximity of the claystone bedrock encountered in Boring No. 1. Typically, you would prefer a vertical separation of at least 2-3 feet between an expansive bedrock and the pavement section. Based on current grading and boring data this would only be an issue on the north side of the parcel encompassing Boring No. 1. However, overlot grading cut areas may reveal a shallow bedrock situation.

GENERAL INFORMATION

The data presented herein were collected to obtain preliminary information and subsurface property data necessary for the analysis to aid in determining the suitability of the parcel for the proposed Colorado National Cemetery Development for the Department of Veterans Affairs. Professional judgements on preliminary design alternatives and criteria are presented in this report. These are based on evaluation of technical information gathered and partly on our understanding of the characteristics of the proposed cemetery development. We do not guarantee the performance of the project in any respect, only that our engineering work and judgements rendered meet the standard of care of our profession. Due to the ever changing standards in the geotechnical field, the recommendations and design data presented in this report are only valid for a 2 year period. If the project has not commenced prior to this expiration date, Landmark Engineering Ltd requires that this report be re-issued utilizing current industry standards and practices.

The test holes drilled were spaced and chosen in accessible areas in order to obtain a reasonably accurate picture of subsurface conditions for preliminary design purposes. Variations from the conditions portrayed frequently occur. These variations are sometimes sufficient to necessitate modifications in our site evaluation and analysis.

We recommend that construction be continuously observed by a qualified soils technician, trained and experienced in the field to take advantage of all opportunities to recognize different conditions and minimize the risk of having some undetected condition which might affect the performance of the project.

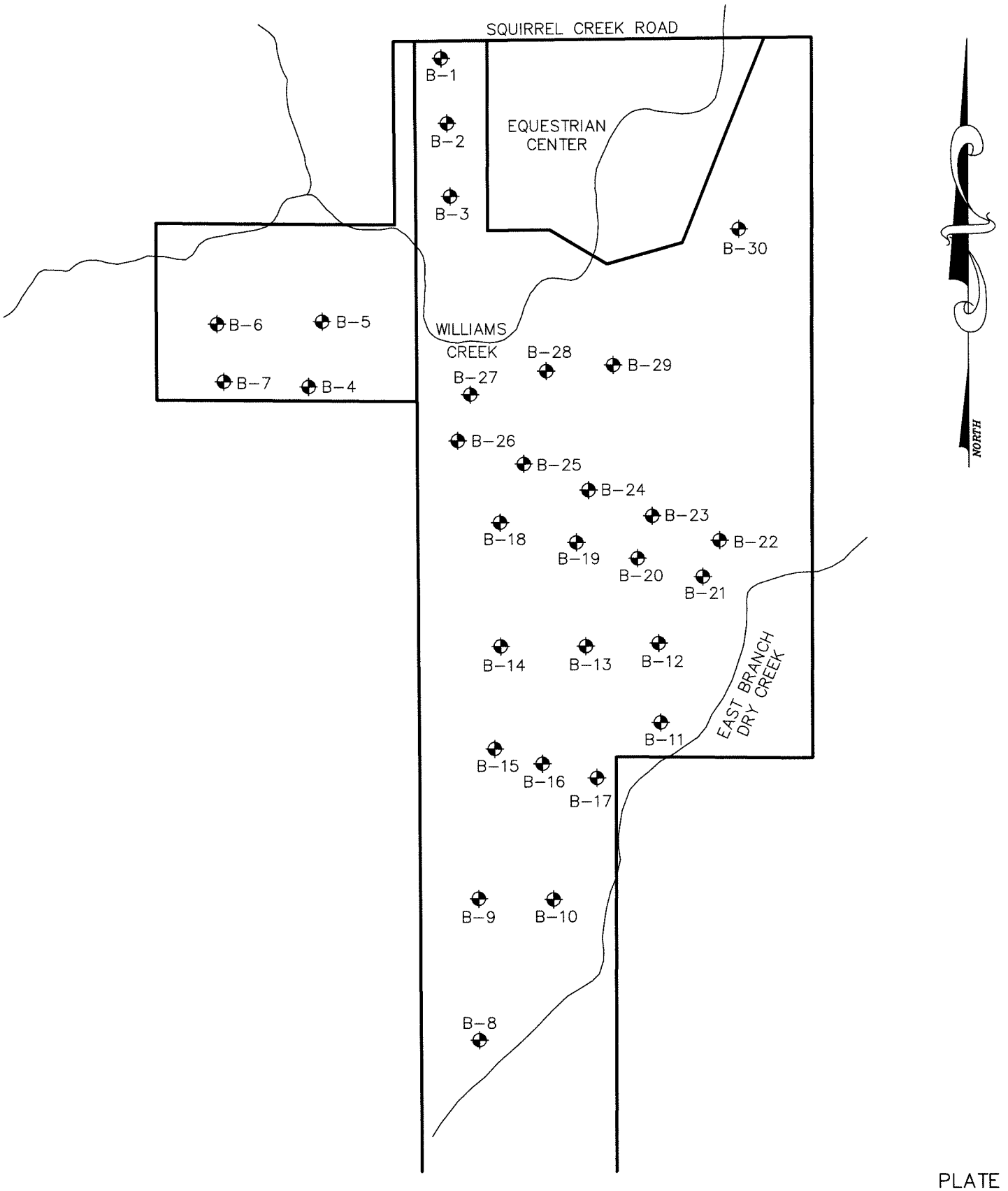

PLATE 1

Landmark Engineering

Engineers Planners Surveyors Architects Geotechnical

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CLIENT: JJR, LLC	
TITLE: SOILS BORING SITE PLAN	SCALE: 1"=1000'
DATE: JULY 28, 2010	JOB NO.: JJRLLC 0C5D07-709

F:\Projects\S.E. Colorado N.C\Survey\Borings Exhibit.dwg, 07/26/2010, -4:26pm, hernandezp

LEGEND OF SOIL AND ROCK SYMBOLS

FILL MATERIAL

GRAVELS (GW, GP, GM, GC)

SANDS (SW, SP, SM, SC)

SILTS (ML, MH)

CLAYS (CL, CH, OL, OH)

ORGANICS

WEATHERED BEDROCK

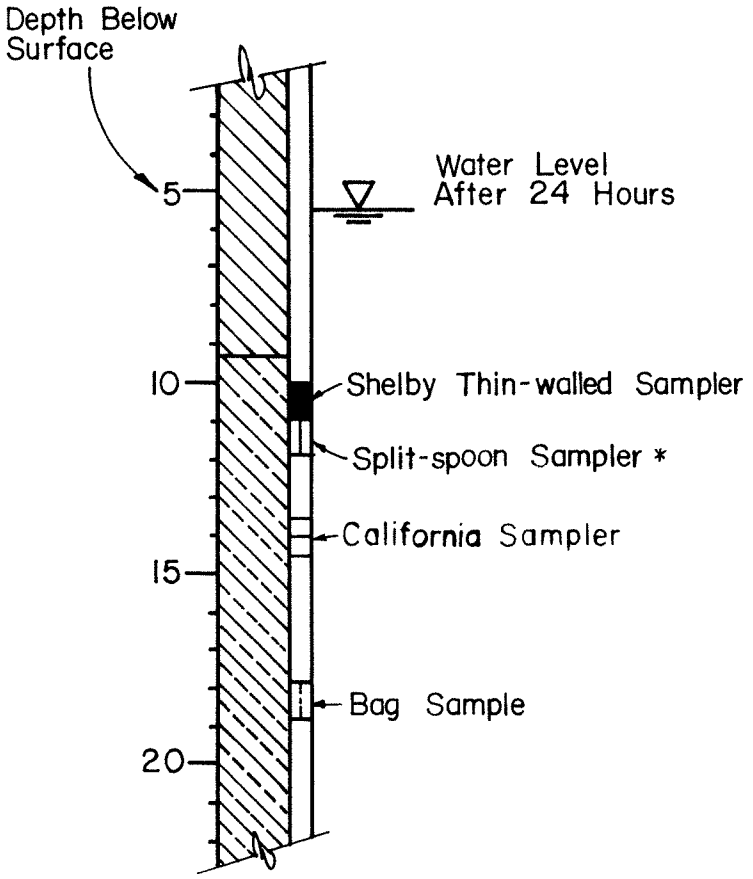
CLAYSTONE & SHALE

SILTSTONE

SANDSTONE

LIMESTONE

IGNEOUS / METAMORPHIC ROCKS



SYMBOLS COMBINED TO REPRESENT SOIL MIXTURES

Example:

SILTY CLAY

GRAVELLY CLAY

* Split-spoon sample utilizes a 140 lb. hammer dropping 30", Recording number of blows per 12" or partial increment. (ASTM D1586)

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PLATE NUMBER 2

LOG OF BORING

BORING NO. 1

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5633.0'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			17/12 29/12	sandy lean clay, stiff-very stiff, dry-damp, brown-lt. brown			6.6		
-5-				sandy claystone (lean clay with sand) very stiff-hard, tan-gray					soluble sulfates = 2,400 ppm
-10-			50/9	END BORE	CL		11.1	121.7	no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 3

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Loveland, Colorado 80537

LOG OF BORING

BORING NO. 2

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5613.0'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, stiff, dry-damp,					
			15/12	brown-lt. brown			4.9		
			10/12						
-5-									
				damp					
			11/12						
-10-			13/12	END BORE			6.8		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 4

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LOG OF BORING

BORING NO. 3

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5588.9'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, medium stiff, dry-damp, brown-lt. brown	CL		9.8	100.4	soluble sulfates = 1,200 ppm
			7/12				9.6		
-5-			7/12	damp-moist					
				lean clay, stiff, moist-very moist, brown			12.9		
-10-			9/12						
-15-			13/12	moist-very moist					soluble sulfates = 8,000 ppm
			21/12	END BORE			17.5		no water encountered
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 5

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Loveland, Colorado 80537

LOG OF BORING

BORING NO. 4

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5546.2'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, stiff, dry-damp,					
			13/12	brown-lt. brown			5.3		
			15/12						
-5-				damp-moist					
				lean clay with sand, stiff, damp-					
			15/12	slightly moist, light brown					
-10-			18/12	END BORE			7.3		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									

PLATE 6

Landmark Engineering

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Loveland, Colorado 80537

LOG OF BORING

BORING NO. 5

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5530.2'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay,very stiff, dry-damp, brown-lt. brown			14.2	111.7	
			23/12						
-5-			24/12	light brown					
			15/12						
-10-			18/12	END BORE	CL		7.5		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 7

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LOG OF BORING

BORING NO. 6

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5606.2'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				lean clay with sand, very stiff,					
			23/12	damp-slightiy moist, brown,			15.5		
-5-			27/12	calcareous					
				with gravels & redeposited claystone fragments					
-10-			30/12	END BORE			15.3		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 8

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BORING NO. 7

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5614.7'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			11/12	sandy lean clay, stiff, dry-damp, brown			7.0		
			11/12						
-5-				clayey sand, firm, damp-slightly moist, brown					
					SC		10.6	99.2	
			16/12				7.8		
-10-				lean clay with sand, stiff, moist, brown					
				very moist					
-15-			19/12	END BORE					no water encountered
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 9

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LOG OF BORING

BORING NO. 8

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5588.9'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, medium stiff-stiff,					
			8/12	dry-damp, brown-light brown			4.6		
			13/12						
-5-				damp					
			9/12	with sand & gravel lense					
-10-			13/12	END BORE			3.1		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 10

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LOG OF BORING

BORING NO. 9

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5607.9'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				lean clay with sand & gypsum, stiff-very stiff, damp-moist, brown			20.2	86.5	soluble sulfates = 2,000 ppm
			21/12						
-5-				fat clay, stiff-very stiff, slightly moist, brown-light brown, calcareous					
-10-			20/12	END BORE	CH				no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 11

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BORING NO. 10

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5595.3'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			5/12	clayey sand, loose, dry-damp, light brown			3.3		
			10/12						
-5-				damp-slightly moist					
			8/12	sandy lean clay, stiff, moist, dark brown					soluble sulfates = 1,200 ppm
-10-			9/12	END BORE			19.5		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 12

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BORING NO. 11

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5594.4'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				poorly graded sand with silt, loose, dry, brown	SP-SM		2.5	121.9	
			9/12						
-5-			9/12	lean clay with sand, medium stiff, damp-moist, dark brown-brown			5.7		
			8/12						
-10-			7/12	END BORE			17.3		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 13

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BORING NO. 12

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5600.3'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			21/12	sandy lean clay, very stiff, dry-damp, dark brown-brown			4.9		
-5-				medium stiff, damp-slightly moist					
			5/12						
-10-			7/12	END BORE			12.0		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 14

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BORING NO. 13

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5609.7'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			12/12	clayey sand, firm, dry-damp, brown-light brown			3.4		
-5-			11/12						
				silty sand, loose-firm, damp-slightly moist, brown	SM		4.2	101.6	
			5/12						
-10-			12/12	END BORE			4.1		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 15

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BORING NO. 14

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5605.7'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				sandy lean clay, stiff, dry-damp,					
			11/12	brown-light brown					
			11/12				6.5		soluble sulfates = 400 ppm
-5-									
				brown					
			11/12						
-10-			11/12	END BORE			6.5		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 16

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BORING NO. 15

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5608.0'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, stiff, dry-damp, brown-light brown, calcareous			6.5		
-5-			10/12						
			10/12						
				slightly moist-moist, brown with gray & iron staining			7.5		
-10-			11/12						
			16/12	END BORE	CL		9.6		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									

PLATE 17

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BORING NO. 16

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5599.7'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				sandy lean clay, medium stiff-stiff,					
			8/12	dry-damp, brown-light brown,					
			10/12	calcareous			6.5		
-5-									
			16/12	very stiff, dark brown			7.2		
-10-									
				poorly graded sand with silt, firm, damp, light brown					
-15-			21/12	END BORE			2.7		no water encountered
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 18

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BORING NO. 17

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5594.5'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				clayey sand, loose-firm, dry-damp, brown-light brown					
			10/12				4.2		
-5-			11/12						
				poorly graded sand with silt & fine gravels, firm, damp, light brown			6.9	86.0	
			8/12						
-10-			9/12	END BORE					no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 19

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LOG OF BORING

BORING NO. 18

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5596.5'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				fat clay with sand, very stiff, damp-slightly moist, dark brown	CH		16.4	103.3	
			24/12				13.7		
-5-				clayey sand, firm, damp-slightly moist, light brown-tan with iron staining					soluble sulfates less than 150 ppm
-10-			21/12	poorly graded sand with silt & fine gravels, firm, damp, light brown			5.4		no water encountered
				END BORE					
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 20

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LOG OF BORING

BORING NO. 19

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5596.8'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			16/12	lean clay with sand, very stiff, damp-slightly moist, brown, calcareous			11.9		
-5-				moist, dark brown-black					
			11/12	clayey sand, firm, very moist, light brown					
-10-			15/12	END BORE			15.5		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 21

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LOG OF BORING

BORING NO. 20

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5603.1'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			13/12	lean clay with sand, very stiff, damp-slightly moist, brown, calcareous			6.3	98.4	
-5-				clayey sand, firm, damp-moist, light brown					
			16/12						
-10-			18/12	END BORE			5.8		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 22

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BORING NO. 21

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5598.1'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			11/12	sandy lean clay, stiff, damp-slightly moist, brown, calcareous					
			15/12				7.7		
-5-				moist, dark brown-brown mottled					
			6/12						
-10-			7/12		CL		12.5		
				with sandy lenses					
				END BORE					
-15-			11/12				13.2		no water encountered
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 23

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BORING NO. 22

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5596.6'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				sandy lean clay, dry-damp, dark brown-brown					
			16/12				2.9		
			15/12						
-5-				clayey sand, trace gravel, loose, damp, light brown			8.0	102.7	
			8/12						
-10-			8/12	END BORE					no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 24

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BORING NO. 23

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5598.7'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				sandy lean clay, dry-damp, light brown-brown					
			9/12						
			11/12				5.6		
-5-				clayey sand, trace gravel, loose, damp, light brown-dark brown with silty sand lenses					
			20/12						
			20/12	END BORE			13.2		no water encountered
-10-									
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 25

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LOG OF BORING

BORING NO. 24

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5597.8'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			15/12	silty, clayey sand, firm-loose, loose, dry-damp, light brown			4.4		
-5-									
				loose-very loose, moist-very	SC-		20.0	99.0	
			4/12	moist, dark brown-light brown	SM				
-10-			4/12	END BORE			16.1		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 26

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LOG OF BORING

BORING NO. 25

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5598.8'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			16/12	sandy lean clay, stiff-very stiff, dry-damp, light brown			4.8		soluble sulfates = 300 ppm
-5-				clayey sand, firm-loose, dry-damp, brown-gray					
			13/12				9.1		
-10-			13/12		SC		11.3		
				poorly graded sand with silt & clay lenses, firm, moist-wet, brown		▽			water @ 14'
-15-			20/12	END BORE			17.8		
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 27

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LOG OF BORING

BORING NO. 26

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5598.1'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				sandy lean clay, stiff-very stiff, dry-damp, light brown, calcareous					
			13/12						
			17/12				12.6		
-5-				clayey sand, firm-loose, damp-slightly moist, brown					
			8/12						
-10-			12/12	END BORE			8.9		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 28

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LOG OF BORING

BORING NO. 27

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5599.0'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
0				clayey sand, firm, dry-damp, light brown			3.4	90.4	
-5-			11/12						
			13/12						
				sandy lean clay, stiff, damp-slightly moist, brown					
-10-			8/12						
			13/12	END BORE			13.4		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 29

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LOG OF BORING

BORING NO. 28

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5598.3'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				lean clay with sand, medium stiff, damp, brown					
			8/12				12.0		
			16/12	fat clay, very stiff, slightly moist-moist, brown					
-5-									soluble sulfates less than150 ppm
					CH		20.9	94.2	
-10-			25/12	END BORE			19.0		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									PLATE 30

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LOG OF BORING

BORING NO. 29

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5597.8'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
			18/12	lean clay with sand, very stiff, dry-damp, light brown			4.9		soluble sulfates = 300 ppm
-5-									
			20/12						
-10-			32/12	poorly graded sand with silt, firm, damp, brown			1.7		
				trace gravel					
-15-			27/12	with clay, slightly moist			6.2		no water encountered
				END BORE					
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 31

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LOG OF BORING

BORING NO. 30

CLIENT: **JJR, LLC**
PROJECT NO: **JJRLLC-0C5D-07-709**
PROJECT LOCATION: **S.E. Colorado VA Cemetery, Fountain, Colorado**
DATE DRILLED: **July 20, 2010 & July 21, 2010**
ELEVATION: **5625.0'**

DRILL RIG: **Acker AD-II**
ROD SIZE: **AW**
METHOD OF DRILLING: **4" S.S.**
DRILLER: **LAM**
ENGINEER/GEOLOGIST: **LAM/JO**
WEATHER: **sunny, windy, hot**

DEPTH (FT.)	SYMBOL	SAMPLE	SPT	DESCRIPTION	USC	WATER LEVEL	MOISTURE CONTENT	DRY DENSITY (PCF)	REMARKS
				lean clay with sand, stiff, dry-damp, dark brown					
			6/12		SC-SM		4.9	94.0	soluble sulfates = 300 ppm
-5-			6/12	silty, clayey sand, loose, dry-damp, light brown					
			20/12						
-10-			20/12	END BORE			4.6		no water encountered
-15-									
-20-									
-25-									
-30-									
-35-									
-40-									
									PLATE 32

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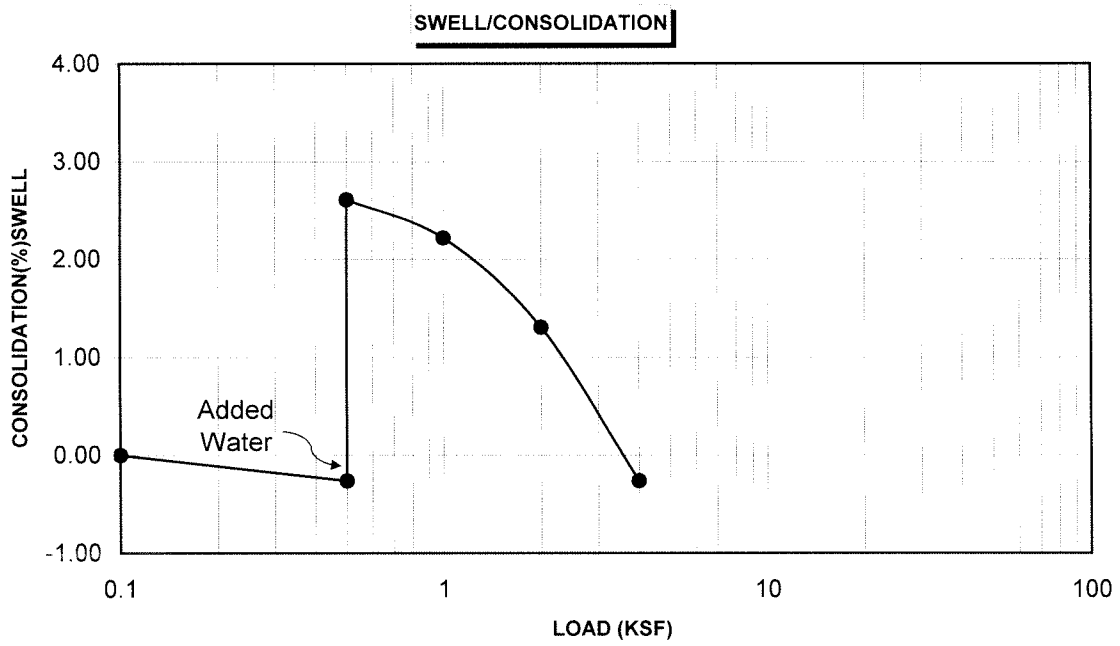
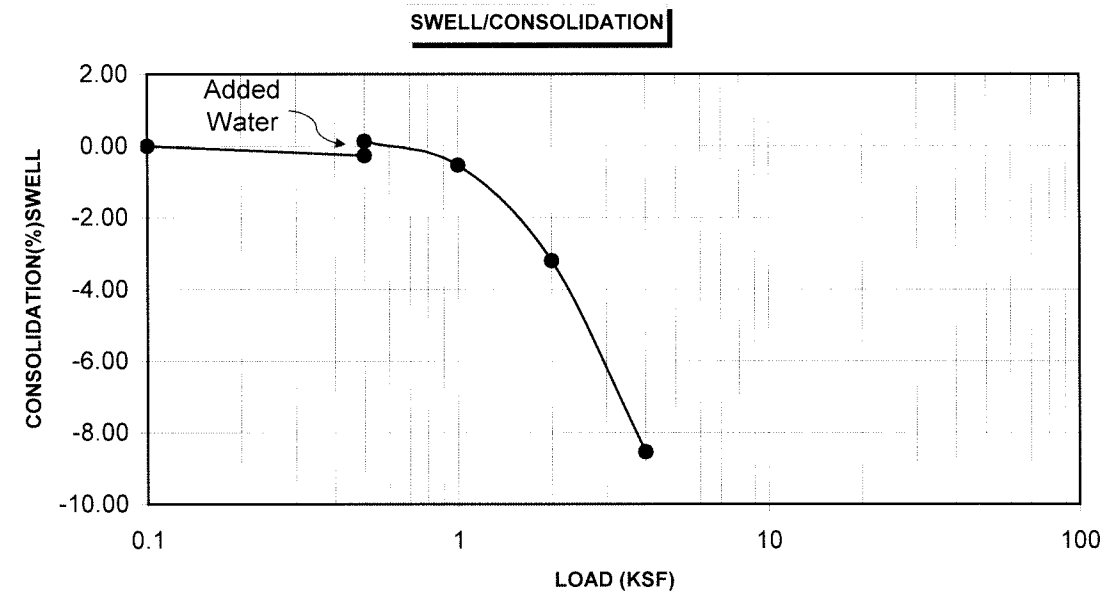
Test Hole No.:	1	Depth:	9 1/2 ft
Sample Description:	sandy claystone		
Moisture Content:	11.1 %	Dry Density:	121.7 lbs/ft^3
Swell:	2.9 %		



Test Hole No.:	3	Depth:	2 1/2 ft
Sample Description:	sandy lean clay		
Moisture Content:	9.8 %	Dry Density:	100.4 lbs/ft^3
Swell:	0.4 %		



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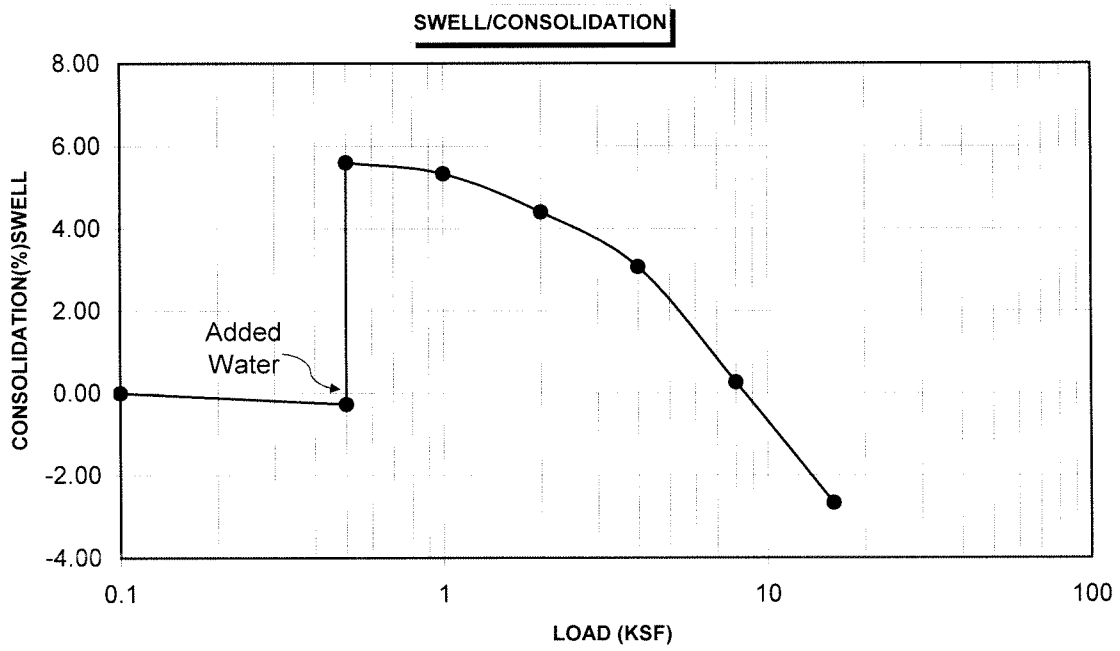
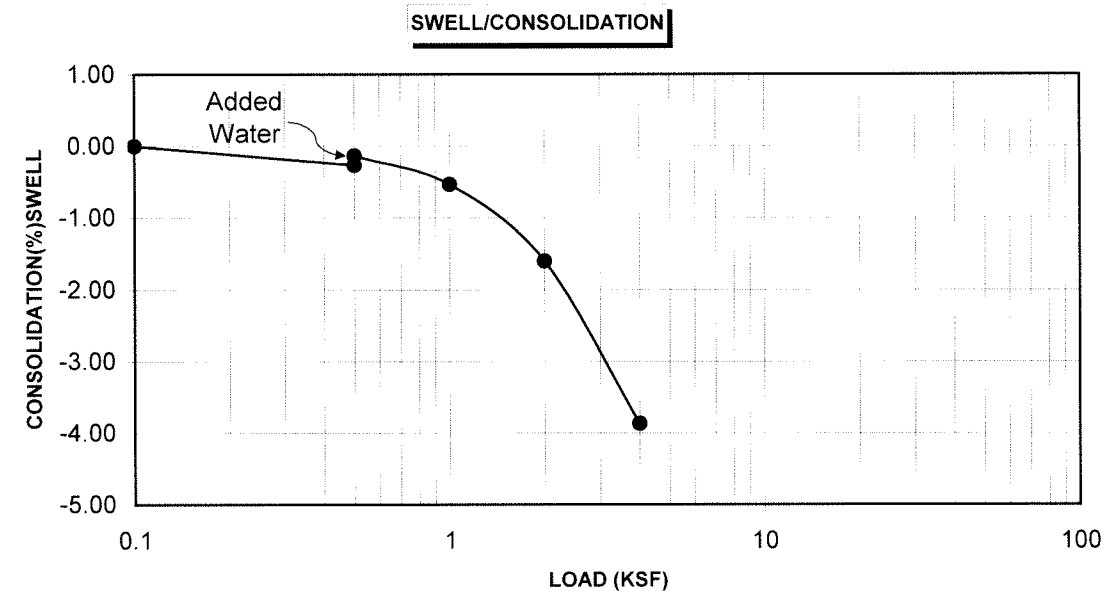
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
1

Test Hole No.:	5	Depth:	3 ft
Sample Description:	sandy lean clay		
Moisture Content:	14.2 %	Dry Density:	111.7 lbs/ft^3
Swell:	5.9 %		



Test Hole No.:	7	Depth:	7 1/2 ft
Sample Description:	clayey sand		
Moisture Content:	10.6 %	Dry Density:	99.2 lbs/ft^3
Swell:	0.1 %		



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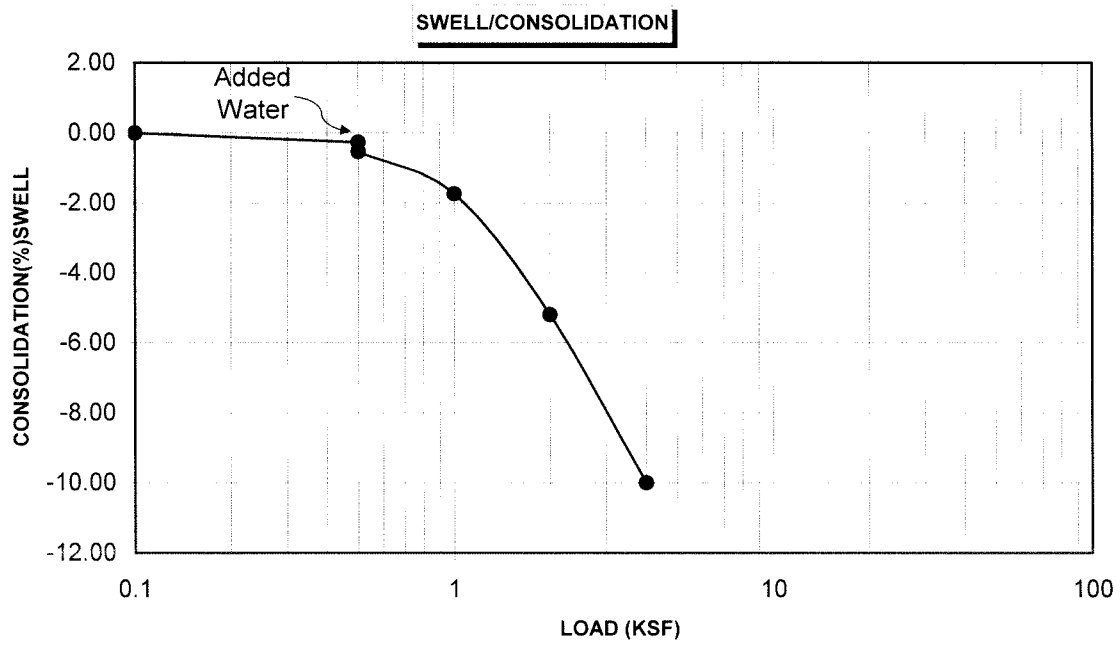
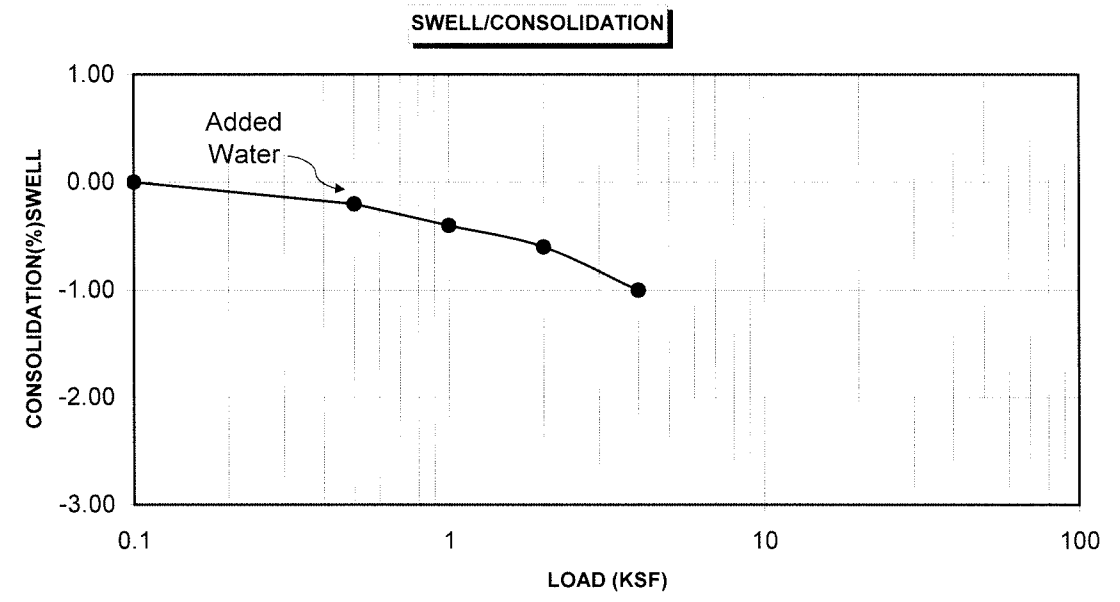
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
2

Test Hole No.:	9	Depth:	2 1/2 ft
Sample Description:	lean clay with sand & gypsum		
Moisture Content:	20.2 %	Dry Density:	86.5 lbs/ft^3
Swell:	--- %		



Test Hole No.:	11	Depth:	2 1/2 ft
Sample Description:	poorly graded sand with silt, trace gravel		
Moisture Content:	2.5 %	Dry Density:	121.9 lbs/ft^3
Swell:	--- %		



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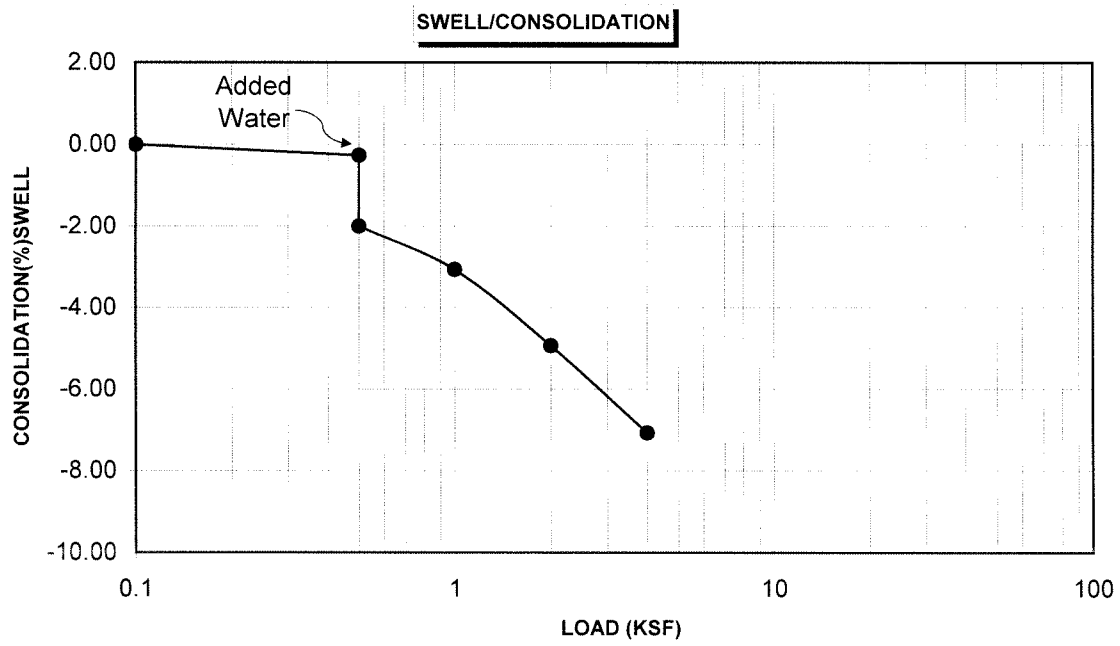
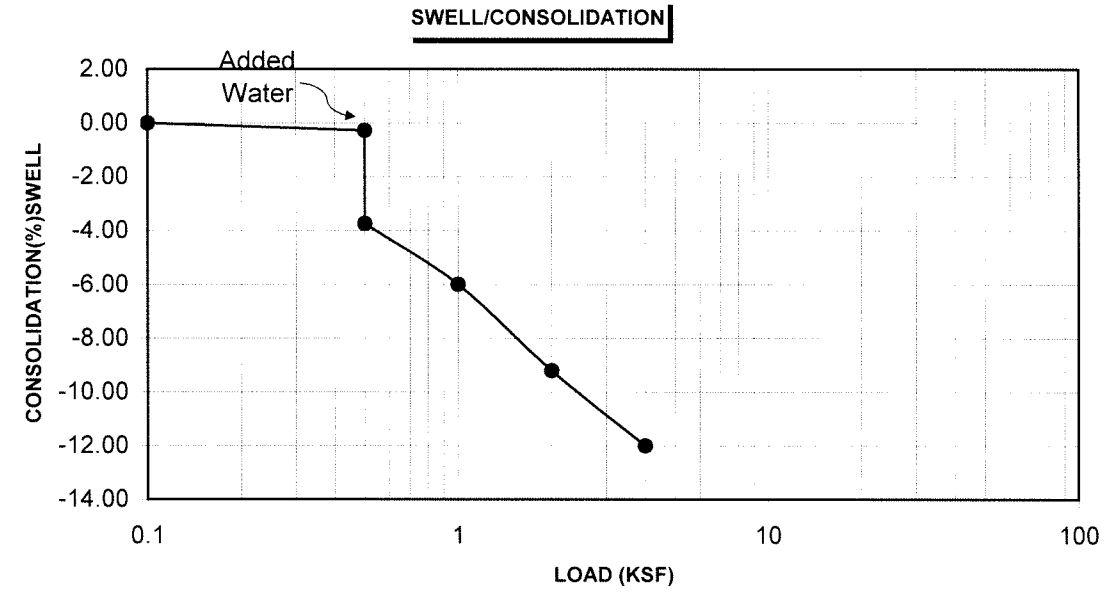
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
3

Test Hole No.:	13	Depth:	7 1/2 ft
Sample Description:	silty sand		
Moisture Content:	4.2 %	Dry Density:	101.6 lbs/ft^3
Swell:	--- %		



Test Hole No.:	17	Depth:	7 1/2 ft
Sample Description:	clayey sand		
Moisture Content:	6.9 %	Dry Density:	86.0 lbs/ft^3
Swell:	--- %		



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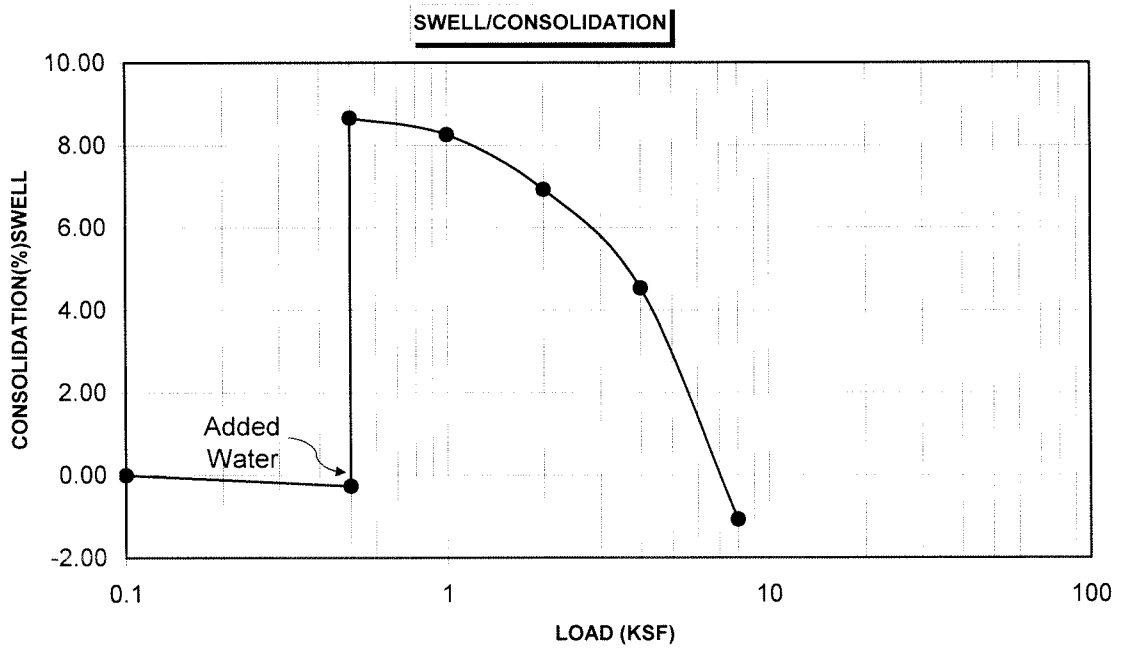
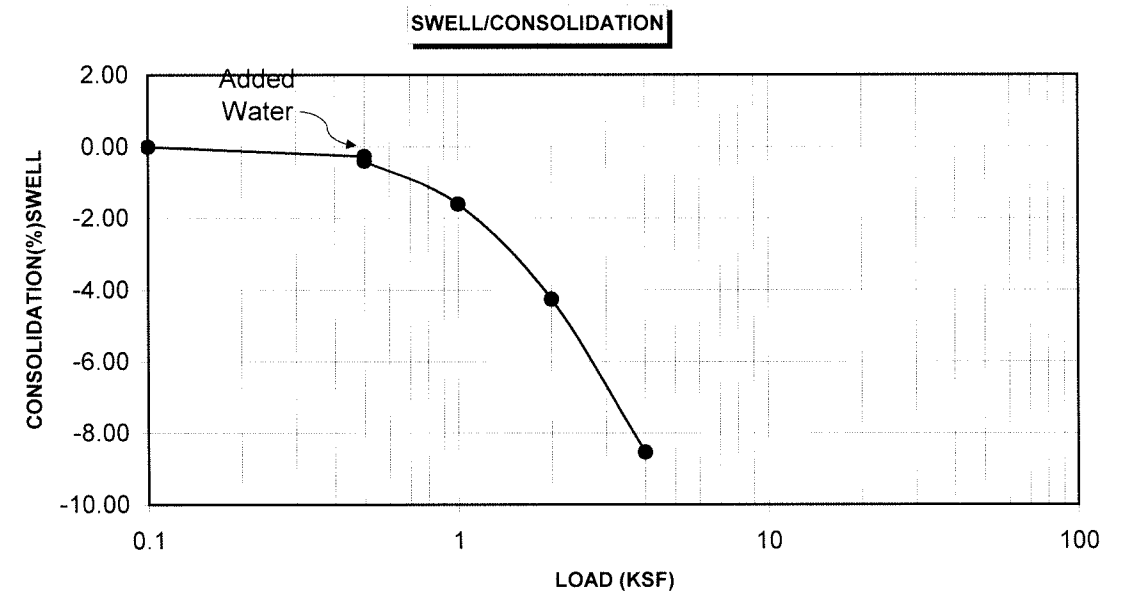
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
4

Test Hole No.:	18	Depth:	2 1/2 ft
Sample Description:	fat clay		
Moisture Content:	16.4 %	Dry Density:	103.3 lbs/ft^3
Swell:	8.9 %		



Test Hole No.:	20	Depth:	2 1/2 ft
Sample Description:	lean clay with sand		
Moisture Content:	6.3 %	Dry Density:	98.4 lbs/ft^3
Swell:	--- %		



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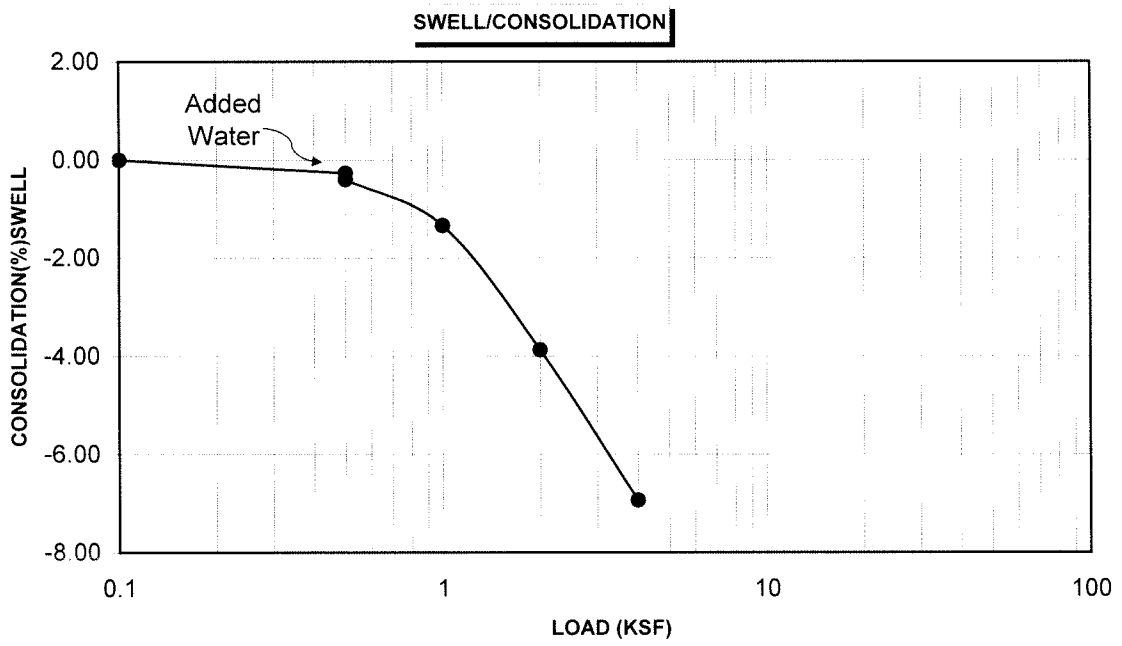
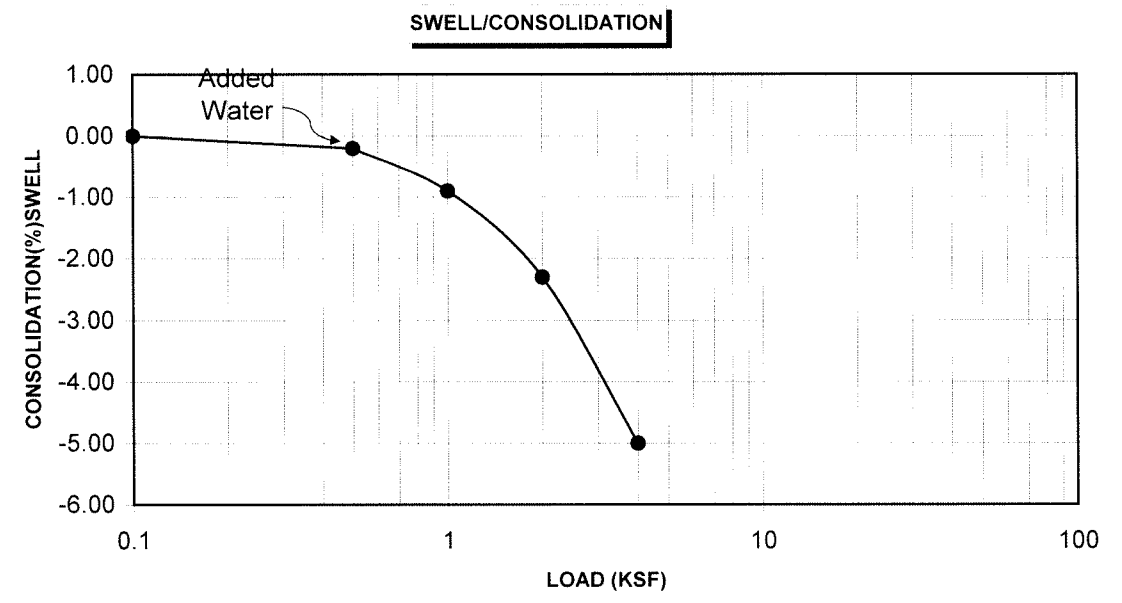
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
5

Test Hole No.:	22	Depth:	7 1/2 ft
Sample Description:	clayey sand, trace gravel		
Moisture Content:	8.0 %	Dry Density:	102.7 lbs/ft^3
Swell:	--- %		



Test Hole No.:	24	Depth:	7 1/2 ft
Sample Description:	sandy lean clay		
Moisture Content:	20.0 %	Dry Density:	99.0 lbs/ft^3
Swell:	--- %		



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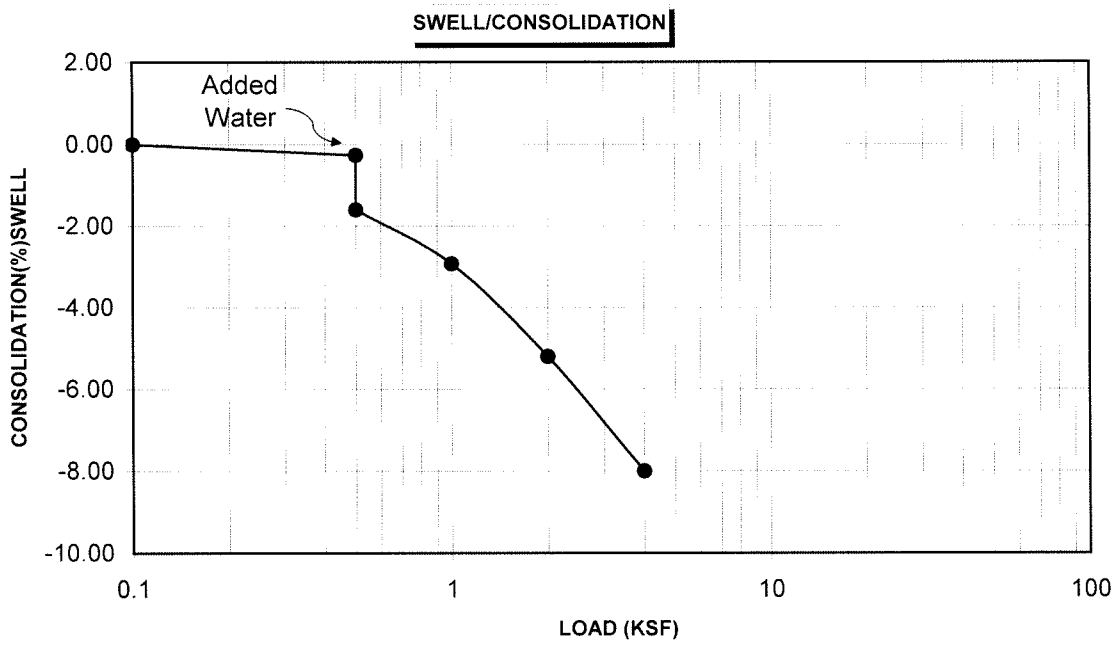
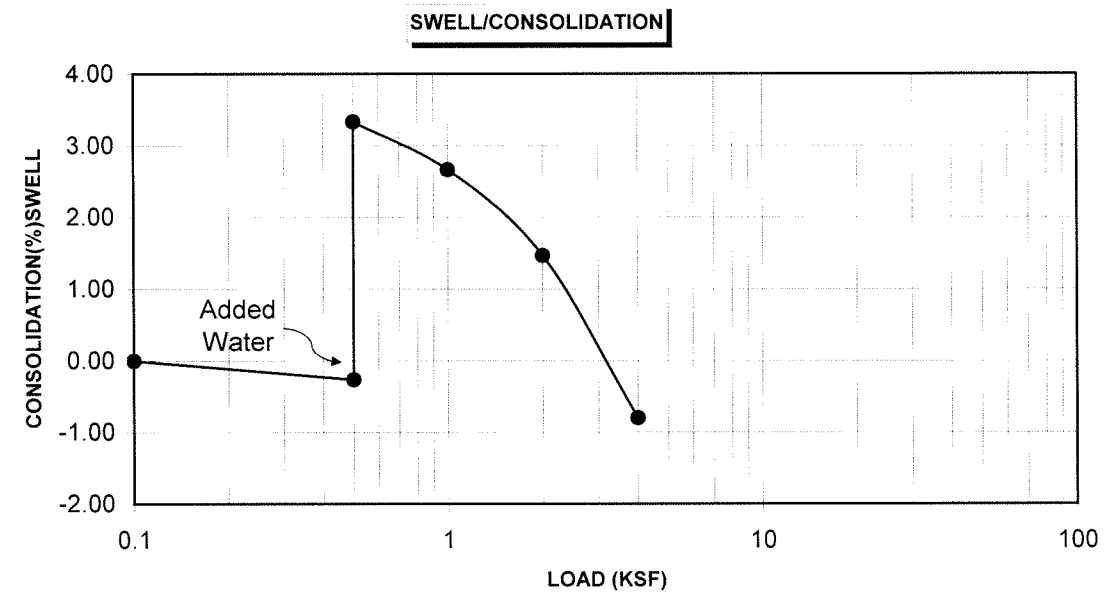
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
6

Test Hole No.:	27	Depth:	3 ft
Sample Description:	clayey sand		
Moisture Content:	3.4 %	Dry Density:	90.4 lbs/ft^3
Swell:	--- %		



Test Hole No.:	28	Depth:	7 1/2 ft
Sample Description:	fat clay		
Moisture Content:	20.9 %	Dry Density:	94.2 lbs/ft^3
Swell:	3.6 %		



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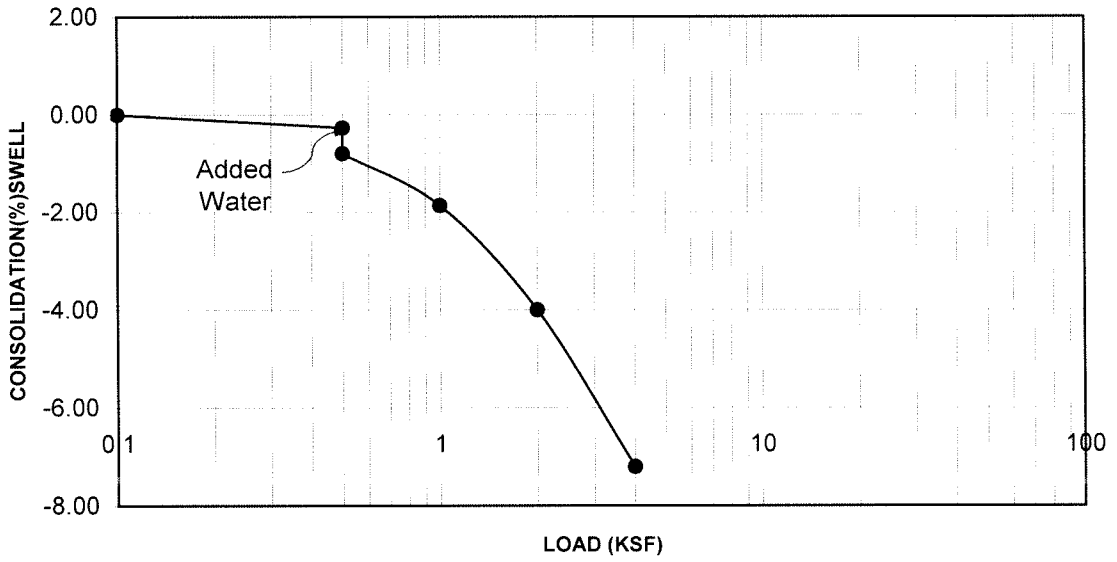
Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
7

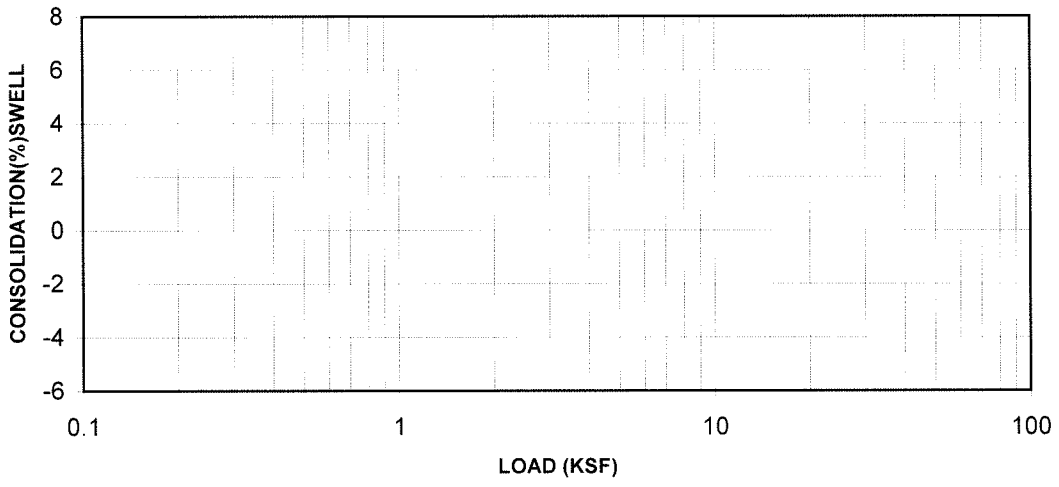
Test Hole No.:	30	Depth:	2 1/2 ft
Sample Description:	silty, clayey sand		
Moisture Content:	4.9 %	Dry Density:	94.0 lbs/ft^3
Swell:	--- %		

SWELL/CONSOLIDATION



Test Hole No.:		Depth:	ft
Sample Description:			
Moisture Content:	%	Dry Density:	lbs/ft^3
Swell:	% %		

SWELL/CONSOLIDATION



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Client:	JJR, LLC
Project No.:	JJRLLC-0C5D-07-709

DRAWING NO.:
8

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Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
184.67 Wet Wt. & Pan
173.57 Dry Wt. & Pan
77.18 Pan
11.10 Loss
96.39 Dry Weight
11.5 % Moisture

Material tan-gray, lean clay with sand Test No. 1
Classification (CL)
Pit Name
Area Rep Boring # 1 @ 9.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#10	0	0	100	
#40	0.9	0.9	99	
#200	19.4	20.1	79.9	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 38

PLASTIC LIMIT (PL) = 18

PLASTICITY INDEX (PI) = 20

TABLE 1

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Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
281.94 Wet Wt. & Pan
265.67 Dry Wt. & Pan
95.81 Pan
16.27 Loss
169.86 Dry Weight
9.6 % Moisture

Material brown-light brown sandy lean clay Test No. 2
Classification (CL)
Pit Name
Area Rep Boring # 3 @ 2.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
¾"	0	0	100	
#4	1.5	0.9	99	
#10	1.9	1.1	99	
#40	2.9	1.7	98	
#200	51.3	30.2	69.8	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 34

PLASTIC LIMIT (PL) = 16

PLASTICITY INDEX (PI) = 18

TABLE 2

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Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
277.17 Wet Wt. & Pan
264.45 Dry Wt. & Pan
94.49 Pan
12.72 Loss
169.96 Dry Weight
7.5 % Moisture

Material light brown sandy lean clay Test No. 3
Classification (CL)
Pit Name
Area Rep Boring # 5 @ 8.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
¾"	0	0	100	
#4	0.2	0.1	100	
#10	0.3	0.2	100	
#40	2.1	1.2	99	
#200	65.7	38.7	61.3	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 29

PLASTIC LIMIT (PL) = 18

PLASTICITY INDEX (PI) = 11

TABLE 3

Landmark
Loveland 970 667 6286
Toll Free 1 866 379 6252
Fax 970 667 6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
390.50 Wet Wt. & Pan
367.78 Dry Wt. & Pan
78.13 Pan
22.72 Loss
289.65 Dry Weight
7.8 % Moisture

Material brown clayey sand Test No. 4
Classification (SC)
Pit Name
Area Rep Boring # 7 @ 7.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#10	0	0	100	
#40	13.2	4.6	95	
#200	168.4	58.1	41.9	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 29

PLASTIC LIMIT (PL) = 16

PLASTICITY INDEX (PI) = 13

TABLE 4

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarklts.com
3521 West Eisenhower Blvd
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
_____ Wet Wt. & Pan
219.33 Dry Wt. & Pan
95.80 Pan
_____ Loss
123.53 Dry Weight
_____ % Moisture

Material brown fat clay with gypsum Test No. 5
Classification (CH)
Pit Name
Area Rep Boring # 9 @ 9' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#4	0	0	100	
#10	0.4	0.3	100	
#40	1.6	1.3	99	
#200	17.7	14.3	85.7	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 54

PLASTIC LIMIT (PL) = 19

PLASTICITY INDEX (PI) = 35

TABLE 5

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
410.80 Wet Wt. & Pan
393.75 Dry Wt. & Pan
93.96 Pan
17.05 Loss
299.79 Dry Weight
5.7 % Moisture

Material brown poorly graded sand with silt & trace gravel Test No. 6
Classification (SP-SM)
Pit Name
Area Rep Boring # 11 @ 2.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
¾"	0	0	100	
#4	42.0	14.0	86	
#10	92.5	30.9	69	
#40	200.1	66.8	33	
#200	276.0	92.1	7.9	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) =

PLASTIC LIMIT (PL) = 0

PLASTICITY INDEX (PI) = non plastic

TABLE 6

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarkllc.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
305.70 Wet Wt. & Pan
297.52 Dry Wt. & Pan
95.98 Pan
8.18 Loss
201.54 Dry Weight
4.1 % Moisture

Material brown-light brown silty sand Test No. 7
Classification (SM)
Pit Name
Area Rep Boring # 13 @ 7.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#4	0	0	100	
#10	0.3	0.2	100	
#40	12.6	6.2	94	
#200	135.3	67.1	32.9	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) =

PLASTIC LIMIT (PL) = 0

PLASTICITY INDEX (PI) = non plastic

TABLE 7

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
305.12 Wet Wt. & Pan
286.72 Dry Wt. & Pan
95.92 Pan
18.40 Loss
190.80 Dry Weight
9.6 % Moisture

Material brown sandy lean clay Test No. 8
Classification (CL)
Pit Name
Area Rep Boring # 15@ 9' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#10	0	0	100	
#40	4.1	2.1	98	
#200	74.3	38.9	61.1	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 29

PLASTIC LIMIT (PL) = 18

PLASTICITY INDEX (PI) = 11

TABLE 8

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
274.15 Wet Wt. & Pan
252.54 Dry Wt. & Pan
94.66 Pan
21.61 Loss
157.88 Dry Weight
13.7 % Moisture

Material fat clay with sand Test No. 9
Classification (CH)
Pit Name
Area Rep Boring # 18@ 2.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#4	0	0	100	
#10	0.2	0.1	100	
#40	1.7	1.1	99	
#200	27.4	17.3	82.7	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 60

PLASTIC LIMIT (PL) = 26

PLASTICITY INDEX (PI) = 34

TABLE 9

Landmark
Loveland 970 667 6286
Toll Free 1-866-379-6252
Fax 970 667 6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
273.32 Wet Wt. & Pan
251.51 Dry Wt. & Pan
77.05 Pan
21.81 Loss
174.46 Dry Weight
12.5 % Moisture

Material sandy lean clay Test No. 10
Classification (CL)
Pit Name
Area Rep Boring # 21@ 9' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#4	0	0	100	
#10	0.3	0.2	100	
#40	4.4	2.5	97	
#200	56.7	32.5	67.5	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 28

PLASTIC LIMIT (PL) = 19

PLASTICITY INDEX (PI) = 9

TABLE 10

Landmark
Loveland 970.667.6286
Toll Free 1.866.379.6252
Fax 970.667.6298
Web www.landmarkits.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
308.61 Wet Wt. & Pan
276.03 Dry Wt. & Pan
74.24 Pan
32.58 Loss
201.79 Dry Weight
16.1 % Moisture

Material silty, clayey sand Test No. 11
Classification (SC-SM)
Pit Name
Area Rep Boring # 24 @ 7.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
¾"	0	0	100	
#4	9.3	4.6	95	
#10	16.5	8.2	92	
#40	37.6	18.6	81	
#200	111.6	55.3	44.7	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 24

PLASTIC LIMIT (PL) = 18

PLASTICITY INDEX (PI) = 6

TABLE 11

Landmark

Loveland 970 667 6286
Toll Free 1-866 379-6252
Fax 970 667 6298
Web www.landmarkllc.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC

PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
401.10 Wet Wt. & Pan
369.82 Dry Wt. & Pan
93.71 Pan
31.28 Loss
276.11 Dry Weight
11.3 % Moisture

Material clayey sand Test No. 12
Classification (SC)
Pit Name
Area Rep Boring # 25 @ 9' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
¾"	0	0	100	
#4	13.0	4.7	95	
#10	50.8	18.4	82	
#40	155.0	56.1	44	
#200	205.4	74.4	25.6	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 29

PLASTIC LIMIT (PL) = 17

PLASTICITY INDEX (PI) = 12

TABLE 12

Landmark
Loveland 970-667-6286
Toll Free 1-866-379-6252
Fax 970-667-6398
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
275.90 Wet Wt. & Pan
247.25 Dry Wt. & Pan
96.22 Pan
28.65 Loss
151.03 Dry Weight
19.0 % Moisture

Material fat clay Test No. 13
Classification (CH)
Pit Name
Area Rep Boring # 28 @ 7.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#10	0	0	100	
#40	0.1	0.1	100	
#200	1.2	0.8	99.2	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 68

PLASTIC LIMIT (PL) = 30

PLASTICITY INDEX (PI) = 38

TABLE 13

Landmark
Loveland 970-667-6286
Toll Free 1-866-379-6252
Fax 970-667-6298
Web www.landmarkltd.com
3521 West Eisenhower Blvd.
Loveland, Colorado 80537

CLIENT: JJR, LLC PROJECT NO: JJRLLC-0C5D-07-709

MOISTURE PERCENT
316.92 Wet Wt. & Pan
308.87 Dry Wt. & Pan
94.51 Pan
8.05 Loss
214.36 Dry Weight
3.8 % Moisture

Material silty, clayey sand Test No. 14
Classification (SC-SM)
Pit Name
Area Rep Boring # 30 @ 2.5' Test By LAM
Sampled By LAM

GRADATION DATA
(ASTM C- 136)

Sieve Size	Grs.	Retained %	Passing %	Specs.
#4	0	0	100	
#10	0.05	0	100	
#40	11.7	5.5	94	
#200	112.3	52.4	47.6	

PLASTICITY INDEX
(ASTM C- 4318)

LIQUID LIMIT (LL) = 24

PLASTIC LIMIT (PL) = 20

PLASTICITY INDEX (PI) = 4

TABLE 14

FIGURE 1
SUMMARY OF TEST RESULTS

Project No.: JJRLLC-0C5D-07-709

Client: JJR, LLC

Test Hole No.	Depth (Ft.)	Soil I.D.	Field Moist. (%)	Dry Dens. (PCF)	Penet. (Blows/In.)	L.L.	P.I.	Swell % At 500 PSF	(PSF) Swell. Press.	Consol % At 500 PSF	% Passing 200 Sieve
1	9.5	Sandy claystone (CL)	11.1	121.7	50/9	38	20	2.9	3,500	-	79.9
3	2.5	Sandy lean clay (CL)	9.8	100.4	7/12	34	18	0.4	400	-	69.8
5	3	Sandy lean clay (CL)	14.2	111.7	23/12			5.9	8,500		
5	8.5	Sandy lean clay (CL)	7.5		18/12	29	11				61.3
7	7.5	Clayey sand (SC)	10.6	99.2	16/12	29	13	0.1	150	-	41.9
9	2.5	Lean clay with sand (CL)	20.2	86.5	21/12			-	-	0.3	
9	9	Fat clay (CH)			20/12	54	35				85.7
11	2.5	Poorly graded sand with silt(SP-SM)	2.5	121.9	9/12		N.P.	0		0	7.9
13	7.5	Silty sand (SM)	4.2	101.6	5/12		N.P.	-		1.8	32.9
15	9	Sandy lean clay (CL)	9.6		16/12	29	11				61.1
17	7.5	Clayey sand (SC)	6.9	86.0	8/12			-		1.7	
18	2.5	Fat clay with sand (CH)	16.4	103.3	24/12	60	34	8.9	6,500	-	82.7
20	2.5	Lean clay with sand (CL)	6.3	98.4	13/12			-		0.2	

FIGURE 2
SUMMARY OF TEST RESULTS

Project No.: JJRLLC-0C5D-07-709

Client: JJR, LLC

Test Hole No.	Depth (Ft.)	Soil I.D.	Field Moist. (%)	Dry Dens. (PCF)	Penet. (Blows/In.)	L.L.	P.I.	Swell % At 500 PSF	(PSF) Swell. Press.	Consol % At 500 PSF	% Passing 200 Sieve
21	9.5	Sandy lean clay (CL)	12.5		6/12	28	9				67.5
22	7.5	Clayey sand (SC)	8.0	102.7	8/12			-		0.2	
24	7.5	Silty, clayey sand (SC-SM)	20.0	99.0	4/12	24	6	-		-	44.7
25	9	Clayey sand (SC)	11.3		13/12	29	12				25.6
27	3	Clayey sand (SC)	3.4	90.4	11/12			-		1.6	
28	8.5	Fat clay (CH)	20.9	94.2	25/12	68	38	3.6	3,000	-	99.2
30	2.5	Silty, clayey sand (SC-SM)	4.9	94.0	6/12	24	4	-		0.8	47.6

APPENDIX A

Suggested Specifications for Placement of Compacted Earth Fills and/or Backfills.

GENERAL

A Soils Engineer shall be the owner's representative to supervise and control all compacted fill and/or compacted backfill placed on the project. The Soils Engineer shall approve all earth materials prior to their use, the methods of placing, and the degree of compaction obtained. A certificate of approval from the Soils Engineer will be required prior to the owner's final acceptance of the filling operations.

MATERIALS

The soils used for compacted fill beneath interior floor slabs and backfill around foundation walls shall be relatively impervious and non-swelling. Fill materials utilized for street subgrades shall have plasticities equal to or less than and/or R-values equal to or greater than those upon which the pavement recommendations were based. The materials used should not have any rocks or lumps greater than six inches (6") and shall be free of organics, trash, frozen ground or other deleterious matter. All materials used in either compacted fill or compacted backfill shall be subject to the approval of the Soils Engineer.

PREPARATION OF SUBGRADE

All topsoil and vegetation shall be removed to a depth satisfactory to the Soils Engineer before beginning preparation of the subgrade. The subgrade surface of the area to be filled shall be scarified to a minimum depth of six inches (6"), uniformly moistened or dried to within an acceptable moisture content range as determined by ASTM D 698, or as otherwise specified. The surface shall be free of ruts, ridges or other

uneven surfaces which would prevent uniform compaction. The subgrade shall then be compacted to 90% to 95% or greater of ASTM D 698 or as otherwise specified.

PLACING FILL

No sod, brush, frozen material or other deleterious or unsuitable material shall be placed in the fill. The select fill material shall be placed in uniform, level layers in a manner which will preclude the formation of lenses and will result in a uniformly compacted fill. The thickness of each compacted lift shall be six inches (6") or as specified, as determined by the capability of the compaction equipment. Each lift shall be compacted to the requirements described in Compaction Requirements of this Appendix or as specified otherwise.

MOISTURE CONTROL

The fill material in each layer, at the time of compaction, shall contain the amount of moisture required for optimum density; and the moisture shall be uniform throughout the fill. Expansive soils may need moisture above the optimum moisture content in order to pre-swell the soil as based on laboratory tests. The contractor may be required to add and thoroughly mix moisture to the backfill material. If, in the opinion of the Soils Engineer, the material proposed for use in the compacted fill is too wet to permit adequate compaction, it shall be dried in an acceptable manner prior to placement and compaction or a suitable imported fill material may be chosen.

COMPACTION METHODS

When an acceptable, uniform moisture content is obtained, each layer shall be compacted by a method acceptable to the Soils Engineer and as specified in the foregoing report as determined by the Standard Proctor Test (ASTM D 698). Compaction shall be performed by rolling with approved tamping rollers, three-wheel power rollers, or other approved equipment well suited to the soil being compacted. If a sheepsfoot roller is used, it shall be provided with cleaner bars so attached as to prevent the accumulation of material between the tamper feet.

COMPACTION REQUIREMENTS

The following compaction requirements are based on the Standard proctor (ASTM D 698).

Location	Compaction
Overlot Fills - Supporting Foundations, Exterior Slabs, Roadways, Driveways, Curb, Gutters, Drive-over Walks	*95% **
Overlot Fills - Backlots Where No Structures Will Be Located	*90%*
Utility Lines	
- *Under Roadways, Curb/Walk, etc.*	*95% **
- *Under Yards, Backlots, etc.*	*90%*
Interior Floor Slabs	*95% ± 2% ***

* *If expansive material is used for fill, moisture content should be -1% to +3% above optimum.*

** *If expansive material is used for fill, moisture content should be optimum to 4% above optimum.*

MOISTURE - DENSITY DETERMINATION

(PROCTOR)

Samples of representative fill materials to be placed shall be furnished by the contractor to the Soils Engineer at least 48 hours prior to compaction testing for determination of maximum density and optimum moisture for these materials. Tests for this determination will be made using methods conforming to requirements of ASTM D 698. Copies of the results of these tests will be furnished to the contractor. These test results shall be the basis of control for compaction effort.

DENSITY TESTS

The density and moisture content of each layer of compacted fill will be determined by the Soils Engineer in accordance with ASTM D 1556, D2167 or D2922, at frequencies required by municipal codes, city or county inspectors, or by the Soils Engineer. Any material found to not comply with the minimum specified density shall be recompacted and retested until the required density is obtained. The results of all density tests shall be furnished to both the owner and the contractor by the Soils Engineer.