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October 12, 2009

JDS-Hydro Consultants, Inc.
Attn: Ms. Gina Mangino
545 E. Pikes Peak Avenue, Suite 300
Colorado Springs, CO 80903

Subject: Proposed Operations Building, Widefield Water and Sanitation District, Willow Springs Road, Widefield, Colorado

Project No. 082-119.A

Dear Ms. Mangino:

As requested, this letter provides our opinion regarding the suitability of our geotechnical engineering report dated March 14, 2008, for the design of the proposed building in Widefield, Colorado.

We understand the proposed construction will generally be the same as what was addressed in our March 2008 report, including building location, type and proposed grading. The proposed building dimensions have changed slightly; the Phase I portion will have approximate plan dimensions of 45x45 feet, and Phase II will have approximate plan dimensions of 25x46 feet. The building will have a slab-on-grade floor, with an approximate floor elevation of 5,643 feet.

Based on our understanding of the proposed construction, it is our opinion the recommendations contained in our March 14, 2008, report remain applicable for the proposed construction. A representative of Kumar & Associates should observe all foundation excavations prior to fill and concrete placement to confirm the recommendations provided.

If there are any questions or we may be of further assistance, do not hesitate to contact our office.

Sincerely,

KUMAR & ASSOCIATES, INC.
Duane P. Craft, P.E.

DPC:lm
Rev. by: CAJ

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GEOTECHNICAL ENGINEERING STUDY
PROPOSED OPERATIONS BUILDING
WIDEFIELD WATER AND SANITATION DISTRICT
RICE LANE NEAR WILLOW SPRINGS ROAD
WIDEFIELD, COLORADO

Prepared By:
Duane P. Craft, P.E.

Reviewed By:

Bruce E. Berends, P.E.

Prepared for:

JDS-HYDRO CONSULTANTS, INC.
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Attn: Ms. Gina Mangino

Project No. 082-119

March 14, 2008

TABLE OF CONTENTS

SUMMARY

1. The subsoils encountered on the site consisted of approximately 3 to 5 feet silty to clayey sand fill, underlain by native silty sand and/or clayey sand with occasional sandy lean clay.

2. Ground water was not encountered in the borings at the time of drilling or when the borings were checked seven days later.

3. We recommend the proposed building be founded on spread footings bearing on the native soils and/or new structural fill. Footings should be designed for an allowable soil bearing pressure of 2,000 psf.

PURPOSE AND SCOPE OF STUDY

This report presents the results of a geotechnical engineering study for the proposed Widefield Water and Sanitation District (WWSD) operations building, to be located in Widefield, Colorado. The project site is shown on Figure 1. This study was conducted in accordance with the scope of work in our proposal dated February 25, 2008, to develop recommendations for foundations and floor slabs.

This report has been prepared to summarize the data obtained during this study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction of the proposed building are included in the report.

PROPOSED CONSTRUCTION

We understand the proposed construction consists of a single-story building that will have an approximately 2,500 square-foot footprint. The building will be constructed in two phases: the first phase will have plan dimensions of approximately 31x43 feet, and the second phase will be added to the south side of the first phase and will be approximately 24x48 feet. The building will be steel-framed, and will have a slab-on-grade floor. Foundation loads for the building are assumed to be light to moderate and typical of the proposed type of construction. We understand site grading will be minimal, with construction occurring near the existing grade.

If loadings, locations or conditions are significantly different from those described above or depicted in this report, we should be notified to reevaluate the recommendations contained herein.

SITE CONDITIONS

The location of the proposed construction consists of vacant land, bound by the WWSD wastewater treatment facility property to the south, west and north, and a trucking storage yard to the east. Rice Lane, a two-lane asphalt paved road, leads into the site from the north and ends before reaching the proposed building location. The site was nearly level with a slight slope to the southwest; there was less than 1 foot of elevation difference within the proposed building footprint. The site was generally devoid of vegetation.

SUBSURFACE CONDITIONS

Information on subsurface conditions was obtained by drilling two exploratory borings at the approximate locations shown on Figure 1. The logs of the borings are shown on Figure 2, and the legend and notes for the logs are presented on Figure 3. The results of laboratory testing performed on selected soil samples from the borings are presented on Figures 2, 4 and 5, and are summarized on Table I. The laboratory testing was conducted in general accordance with applicable ASTM standards.

Existing fill consisting silty and clayey sand was encountered in Boring 1 to an approximate depth of 5 feet and in Boring 2 to an approximate depth of 3 feet. Our study did not define the exact lateral or vertical extent of the fill. Sampler penetration blow counts suggest the fill is relatively compact.

Native silty sand and clayey sand with occasional sandy lean clay layers were encountered below the fill in each of the borings, and extended to the 15- to 20-foot depths explored. Sampler penetration blow counts indicate the silty sands are medium dense to dense and the clayey sands are very stiff. Swell-consolidation test results presented on Figure 5 indicate the tested sample of sandy lean clay was nonexpansive when wetted under a constant 1-ksf surcharge.

Ground water was not encountered in the borings at the time of drilling or when the borings were checked seven days later.

FOUNDATION RECOMMENDATIONS

Considering the subsurface conditions encountered in the exploratory borings and the nature of the proposed construction, we recommend the proposed building be founded on spread footings bearing on the native soils and/or new structural fill. The condition of placement of the existing fill is unknown; therefore, it should be assumed unsuitable for support of foundations.

The design and construction criteria presented below should be observed for spread footing foundations systems. The construction details should be considered when preparing project documents.

1. Footings placed on the undisturbed native soils and/or properly compacted fill should be designed for an allowable soil bearing pressure of 2,000 psf.

2. Any existing fill or loose materials encountered below the proposed foundation bearing elevations should be removed and the footings extended down to adequate natural bearing material. As an alternate, these materials may be removed and replaced with nonexpansive structural fill material.

3. The on-site silty sand and clayey sand soils, free of debris and deleterious substances, may be used as structural fill. Imported material for use as structural fill should be a minus 2-inch material with a maximum 30% passing the No. 200 sieve, a maximum liquid limit of 30 and a maximum plasticity index of 10. Fill beneath footings should be compacted to 98% of the maximum standard Proctor density (ASTM D 698), within two percent of the optimum moisture content. New fill should extend down from the edges of the footings at a minimum 1 horizontal to 1 vertical projection.

4. We estimate total settlement for footings designed and constructed as discussed in this section will not exceed approximately 1 inch. The settlement between the Phase I and Phase II construction will be differential; plan details should provide for this differential movement.

5. Spread footings placed on granular soils should have a minimum width of 16 inches for continuous footings and 24 inches for isolated pads.

6. Exterior footings and footings beneath unheated areas should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 30 inches below the exterior grade is typically used in this area.

7. Continuous foundation walls should be reinforced top and bottom to span an unsupported length of at least 10 feet.

8. Granular foundation soils should be compacted with a smooth vibratory compactor prior to placement of concrete.

10. A representative of the geotechnical engineer should observe all footing excavations prior to fill and concrete placement.

SEISMIC DESIGN CRITERIA

The Colorado Front Range is located in an area of low seismic activity. Based on the subsurface conditions encountered and our experience in the area, the soil profile was assumed to generally consist of granular overburden soils underlain by claystone bedrock. The weighted average of the estimated shear wave velocities for this subsurface profile indicates an IBC design Site Class C.

FLOOR SLABS

The native on-site soils are suitable to support lightly to moderately loaded slab-on-grade construction. The existing fill should not be relied on for support of floor slabs. Any fill

encountered below the proposed floor slab elevation should be removed and replaced with nonexpansive structural fill.

Fill placed beneath slabs on grade should be nonexpansive structural fill material approved by the geotechnical engineer. Specifications for structural fill and a discussion regarding the suitability of reusing the on-site soils are presented in the "Foundation Recommendations" section of the report. Fill should be compacted to a minimum 95% of the maximum standard Proctor density, within two percent of the optimum moisture content.

To reduce the effects of some differential movement, floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement. Floor slab control joints should be used to reduce damage due to shrinkage cracking. The appropriate joint spacing is dependant on slab thickness, concrete aggregate size and slump, and should be consistent with recognized guidelines such as those of the Portland Cement Association (PCA) and American Concrete Institute (ACI). The joint spacing and any requirements for slab reinforcement should be established by the designer based on experience and the intended slab use.

If moisture-sensitive floor coverings will be used, mitigation of moisture penetration into the slabs such as by use of a vapor barrier, may be required. If an impervious vapor barrier membrane is used, special precautions will be required to reduce potential differential curing problems which could cause the slabs to warp. Section 302.1R of the ACI Manual of Concrete Practice addresses this topic.

WATER SOLUBLE SULFATES

Based on our experience, soils similar to those encountered at this site generally do not contain sufficient concentrations of water soluble sulfates to cause sulfate attack on concrete exposed to these materials. Therefore, we believe special sulfate resistant cement will not be required for concrete exposed to the on-site soils.

SURFACE DRAINAGE

Providing proper surface drainage, both during construction and after the construction has been completed, is very important for acceptable performance of the building. The following recommendations should be used as guidelines and changes should be made only after consultation with the geotechnical engineer.

1. Excessive wetting or drying of the foundation and slab subgrades should be avoided during construction.

2. Exterior backfill should be adjusted to near optimum moisture content and compacted to at least 95% of the standard Proctor maximum dry density.

3. Care should be taken when compacting around the foundation walls and underground structures to avoid damage to the structure.

4. The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 6 inches in the first 10 feet in unpaved areas. Site drainage beyond the 10-foot zone should be designed to promote runoff and reduce water infiltration. A minimum slope of 3 inches in the first 10 feet is recommended in the paved areas.

5. Ponding of water should not be allowed on backfill material or within 20 feet of the foundation walls, whichever is greater.

6. Roof downspouts and drains should discharge well beyond the limits of all backfill.

7. Excessive landscape irrigation should be avoided within 10 feet of the foundation walls.

DESIGN AND CONSTRUCTION SUPPORT SERVICES

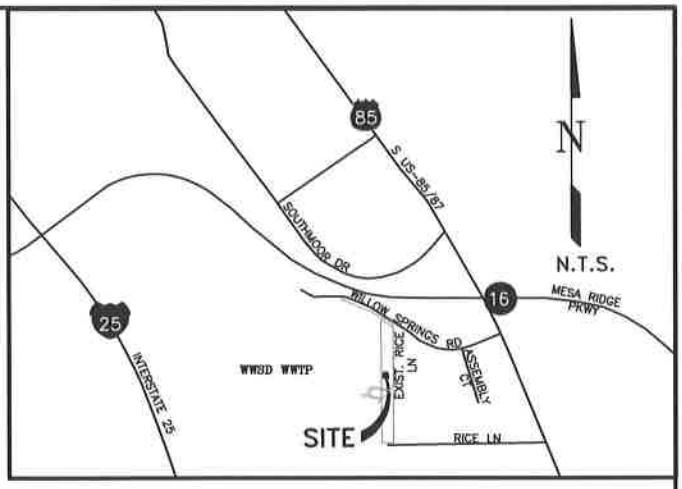
Kumar & Associates, Inc., should be retained to review the project plans and specifications for conformance with the recommendations provided in this report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project and, if necessary, perform additional studies to accommodate any changes in the proposed construction.

We recommend that Kumar & Associates, Inc., be retained to provide observation and testing services to document that the requirements of the plans and specifications are being followed during construction, and to identify possible variations in subsurface conditions from those encountered in this study.

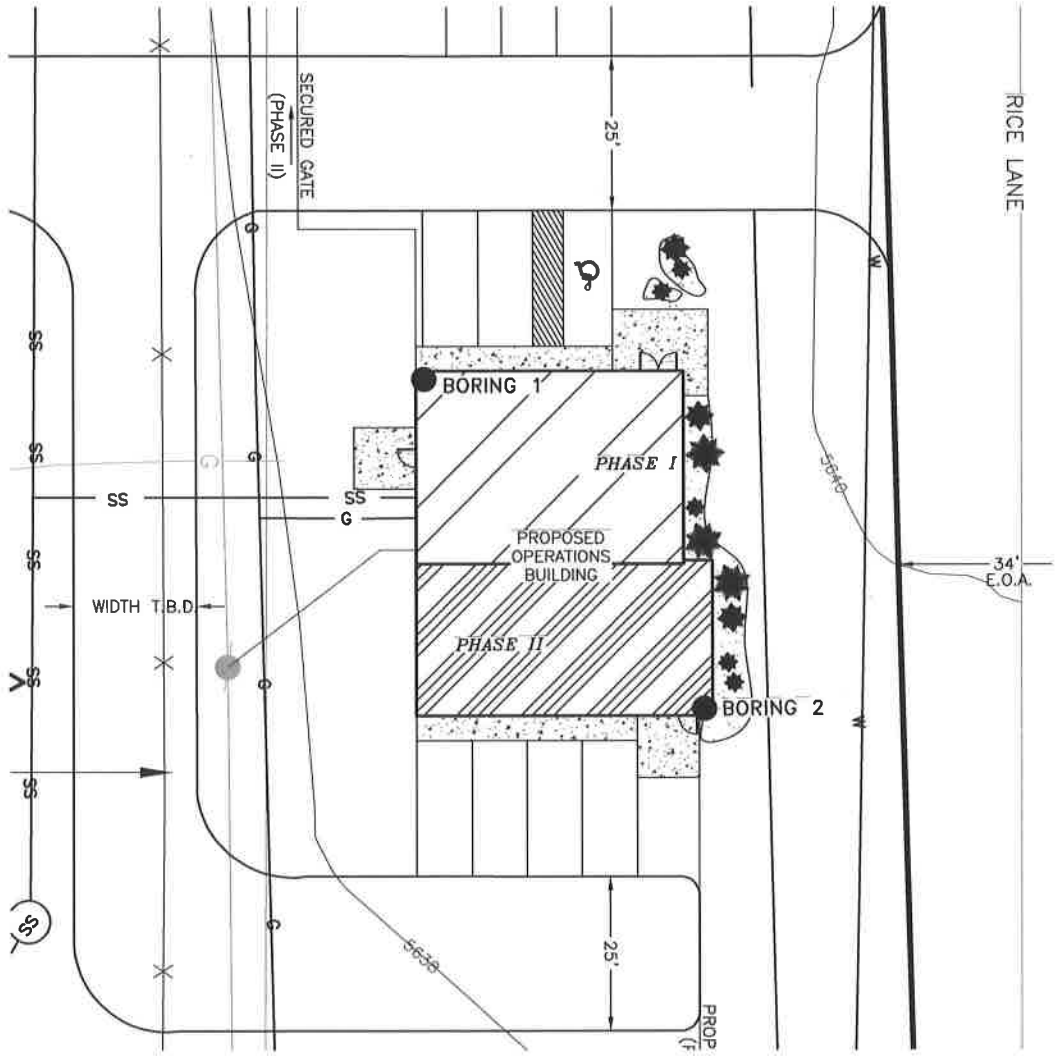
LIMITATIONS

This study has been conducted in accordance with generally accepted geotechnical engineering practices in this area for exclusive use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory boring at the location indicated on Figure 1, and the proposed type of construction. This report may not reflect subsurface variations that occur, and the nature and extent of variations across the site may not become evident until site grading and excavations are performed. If during construction, fill, soil, bedrock or water conditions appear to be different from those described herein, Kumar & Associates, Inc. should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. Kumar & Associates, Inc. is not responsible for liability associated with interpretation of subsurface data by others.

DPC:db



VICINITY MAP



082-119	Kumar & Associates	LOCATION OF EXPLORATORY BORINGS	Fig. 1

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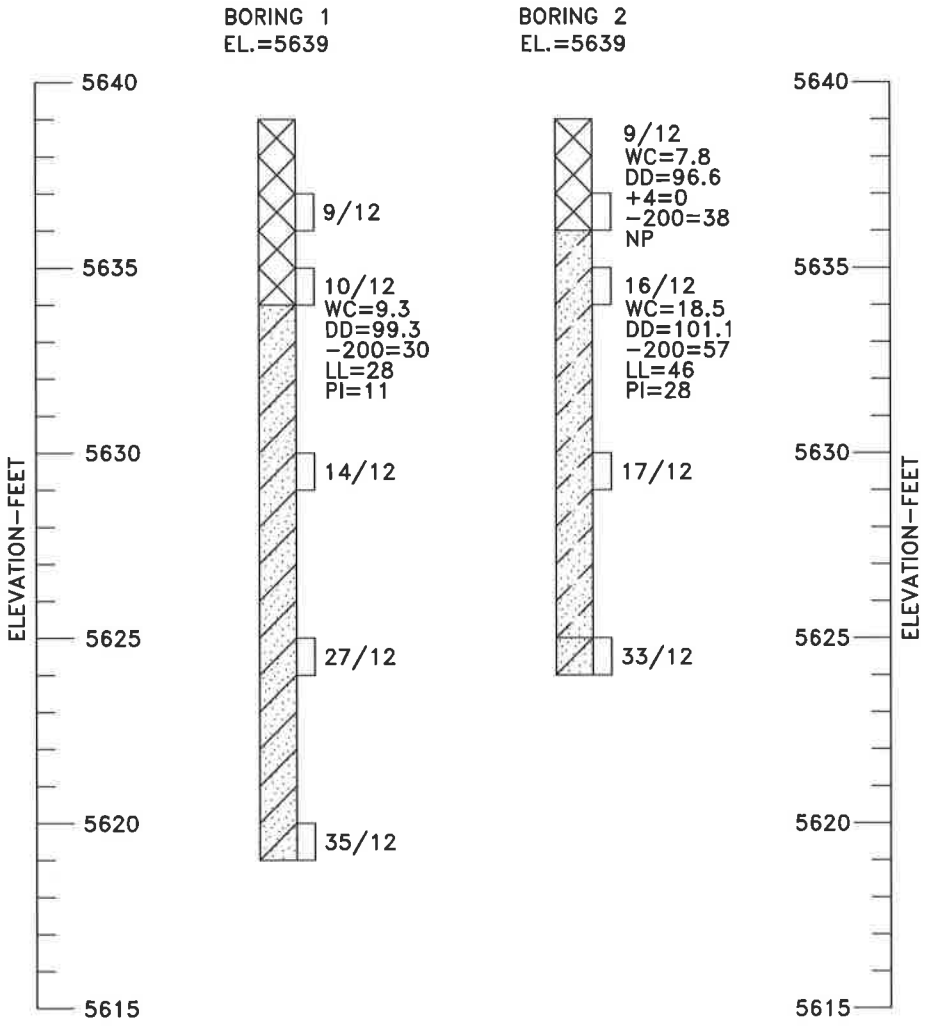


082-119	Kumar & Associates	LOGS OF EXPLORATORY BORINGS	Fig. 2

LEGEND

FILL: SILTY SAND AND CLAYEY SAND, MOIST, LIGHT BROWN TO BROWN.

CLAYEY SAND (SC), WITH OCCASIONAL SANDY LEAN CLAY LAYERS (CL), VERY STIFF, MOIST, LIGHT BROWN.

SILTY SAND (SM), MEDIUM DENSE TO DENSE, MOIST, LIGHT BROWN.

DRIVE SAMPLE, 2-INCH I.D. CALIFORNIA LINER SAMPLER.

9/12 DRIVE SAMPLE BLOW COUNT. INDICATES THAT 9 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE THE SAMPLER 12 INCHES.

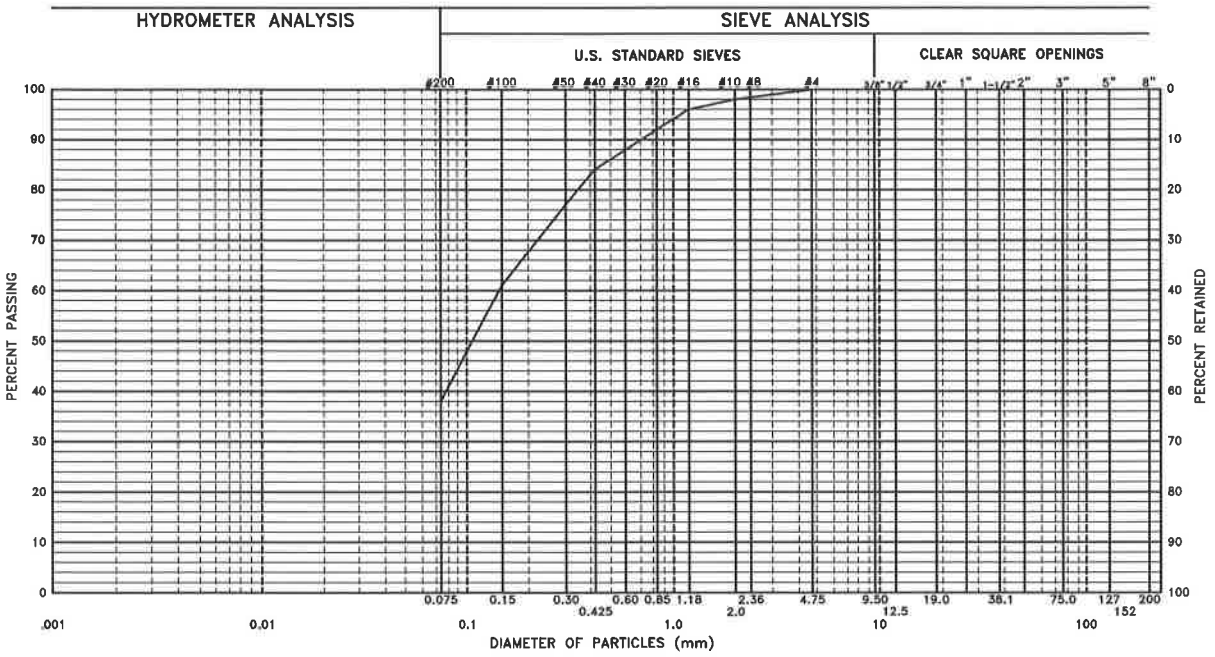
LABORATORY TEST RESULTS

WC = WATER CONTENT (%) (ASTM D 2216);
DD = DRY DENSITY (pcf) (ASTM D 2216);
+4 = PERCENTAGE RETAINED ON NO. 4 SIEVE (ASTM D 422);
-200 = PERCENTAGE PASSING NO. 200 SIEVE (ASTM D 1140);
LL = LIQUID LIMIT (ASTM D 4318);
PI = PLASTICITY INDEX (ASTM D 4318);
NP = NONPLASTIC (ASTM D 4318).

NOTES

1. THE EXPLORATORY BORINGS WERE DRILLED ON MARCH 6, 2008, WITH A 4-INCH DIAMETER CONTINUOUS FLIGHT POWER AUGER.
2. THE BUILDING CORNERS WERE MARKED BY OTHERS PRIOR TO DRILLING. THE BORING LOCATIONS CORRESPOND WITH TWO OF THE PREMARKED CORNERS.
3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE OBTAINED BY INTERPOLATION BETWEEN CONTOURS ON THE PLAN PROVIDED AND SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
4. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.
5. GROUND WATER WAS NOT ENCOUNTERED IN THE BORINGS AT THE TIME OF DRILLING, OR WHEN CHECKED SEVEN DAYS LATER. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.

082-119	Kumar & Associates	LEGEND AND NOTES	Fig. 3



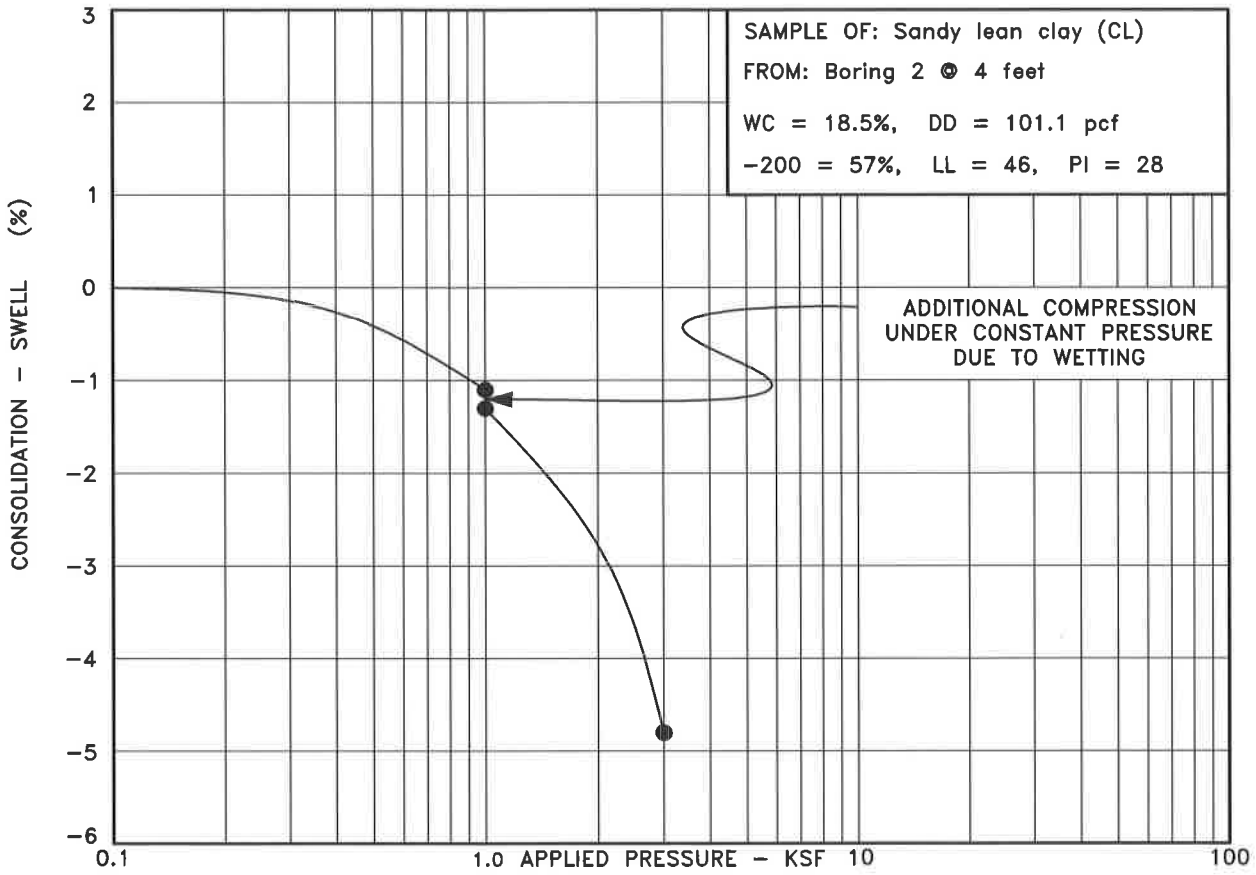
SILT AND CLAY	SAND			GRAVEL		COBBLES
	FINE	MEDIUM	COARSE	FINE	COARSE	

GRAVEL: 0 %
SAND: 62 %
SILT AND CLAY: 38 %

LIQUID LIMIT: –
PLASTICITY INDEX: NP

SAMPLE OF: Fill: Silty sand (SM)
FROM: Boring 2 @ 2 feet

082–119	Kumar & Associates	GRADATION TEST RESULTS	Fig. 4



082-119	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 5

Kumar & Associates, Inc.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

Project No.: 082-119
Project Name: Operations Building, Widefield Water and Sanitation District, Widefield, Colorado
Date Sampled: 3/6/08
Date Received: 3/6/08

SAMPLE LOCATION		DATE TESTED	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		SOIL OR BEDROCK TYPE (Unified Soil Classification)
BORING	DEPTH (ft)				GRAVEL (%)	SAND (%)		LIQUID LIMIT	PLASTICITY INDEX	
1	4	3/7/08	9.3	99.3			30	28	11	Fill: Clayey sand (SC)
2	2	3/7/08	7.8	96.6	0	62	38		NP	Fill: Silty sand (SM)
	4	3/7/08	18.5	101.1			57	46	28	Sandy lean clay (CL)