

January 12, 2012

**Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, Colorado 80920**

Attention: Mr. Ray Perez, P.E.

**Subject: Temporary Parking and Pedestrian Walkway
University of Colorado – Colorado Springs
East of Nevada Avenue
North and West of Four Diamonds Sports Complex
Colorado Springs, Colorado
CTL|T Project No. CS17888-125**

As requested, we conducted a subgrade investigation for the construction of a temporary aggregate surface parking lot and pedestrian walkway on the campus of the University of Colorado at Colorado Springs in Colorado Springs, Colorado. This letter summarizes our aggregate base course sections and recommendations for construction of the parking lot and walkway.

INVESTIGATION

The near surface subgrade soils were evaluated by drilling two test holes to a depth of 10 feet below the existing grade on December 29, 2011. Figure 1 shows the approximate location of the test holes. Bulk samples of the subgrade soils were obtained from the surface to about 4 feet with penetration resistance testing performed at depths of 4 and 9 feet. The samples were returned to the laboratory where index property testing (gradation and Atterberg Limits) of the bulk samples were performed. The near surface soils encountered in both test holes consisted of sandy to very sandy clays over either clayey sandstone bedrock or clayey sands. Graphical log of the test holes are shown in Fig. 2. The near surface bulk samples which influence the aggregate base course section classify under the AASHTO system as A-6 and A-7-6. Our experience with these types of soils indicates Hveem stabilometer values ("R" values) rarely exceed 5, which was considered in our recommendations for aggregate design thickness. Laboratory data is presented in Fig. 3 and summarized on Table 1.

DESIGN

We understand the parking lot is to have an expected usage life span of approximately 5 years and will service passenger vehicle traffic only. The pedestrian walkway will be limited to maintenance vehicle traffic only (pick-up trucks). We understand an aggregate base course pavement section is desired for both the parking lot and the walkway. Aggregate base course sections should consist of 6 inches of



aggregate base course placed directly on a prepared subgrade for the parking lot and 4 inches of aggregate base course material placed directly on a prepared subgrade for the pedestrian walkway. These aggregate base course sections will require periodic maintenance consisting of re-grading to original design slopes for the removal of water from the surface and may include placement of additional aggregate base course to level depressions and ruts. An alternative section for the parking lot would be an additional 2 inches of aggregate base course for a total section thickness of 8 inches. This thicker section may reduce the amount of maintenance required over the projected life span of the parking lot and the likelihood of additional materials being required for maintenance.

The aggregate base course should consist of material meeting Colorado Department of Transportation (CDOT) Class 5 or 6 specifications. Recycled concrete meeting these specifications would be an acceptable alternative. The existing subgrade should have organic matter and topsoil stripped prior grading. Grading should be such that water is rapidly removed for the pavement surface. Fill materials should consist of on-site soils that are moisture conditioned to within 2 percent of optimum moisture and compacted to at least 95 percent of maximum standard proctor (ASTM D 698 or AASHTO T 99). Natural soils in areas of cut should be scarified to a depth of at least 12 inches; moisture conditioned to within 2 percent of optimum moisture and compacted to at least 95 percent of maximum standard proctor prior to the placement of the aggregate base course. The aggregate base course pavement should be placed in thin lifts, and moisture conditioned to within 2 percent of optimum moisture and compacted to at least 95 percent of maximum modified proctor (ASTM D 1557 or AASHTO T 180).

ROADWAY CONSTRUCTION

Our recommendations consider construction of the aggregate base course surface is completed in accordance with the City of Colorado Springs standard specifications. The specifications contain requirements for the quality of materials and the construction practices used. Recommendations directed towards subgrade and aggregate base course compaction and proofrolling are of particular importance.

LIMITATIONS

The recommended sections presented were developed based upon the subgrade soils encountered and anticipated traffic loads. If traffic loads are not as discussed or traffic types and volume are not as indicated, we should be contacted to review the data presented in this letter.

Should you have any questions regarding the information contained in this letter, the design of the streets, or the project from a geotechnical point-of-view, please call.



Very truly yours,
CTL|THOMPSON, INC.

A handwritten signature in blue ink, appearing to read 'David Groenendale'.

David Groenendale
BSCET

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Michael Lemons'.

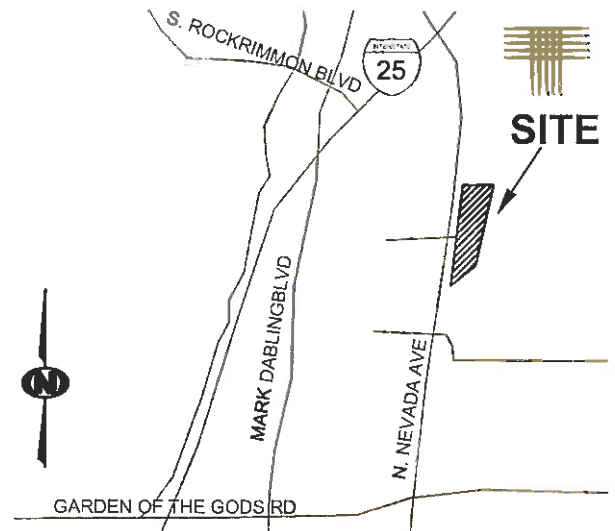
Michael Lemons, P.E. 1/12/12
Associate Engineer



DG:MNL
(3 copies sent)

LEGEND:

- TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.
- APPROXIMATE LOCATION OF EXISTING BUILDING.
- APPROXIMATE LOCATION OF PROPOSED PARKING LOT AND WALKWAY.

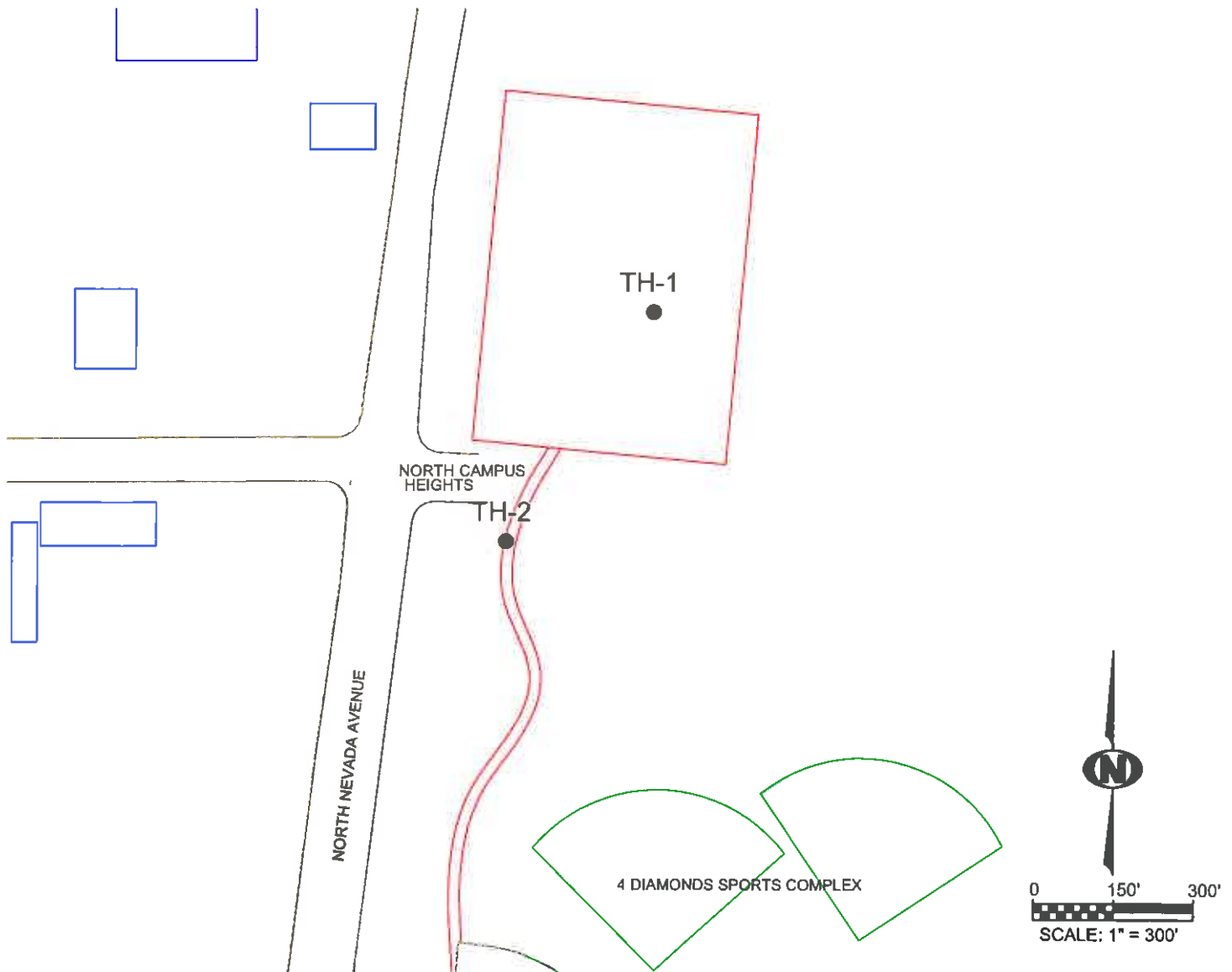


VICINITY MAP

(NO SCALE)

NOTE:

BASE DRAWING WAS PROVIDED BY GOOGLE EARTH
(DATED 10/22/2011).



**Location of
Exploratory
Borings**

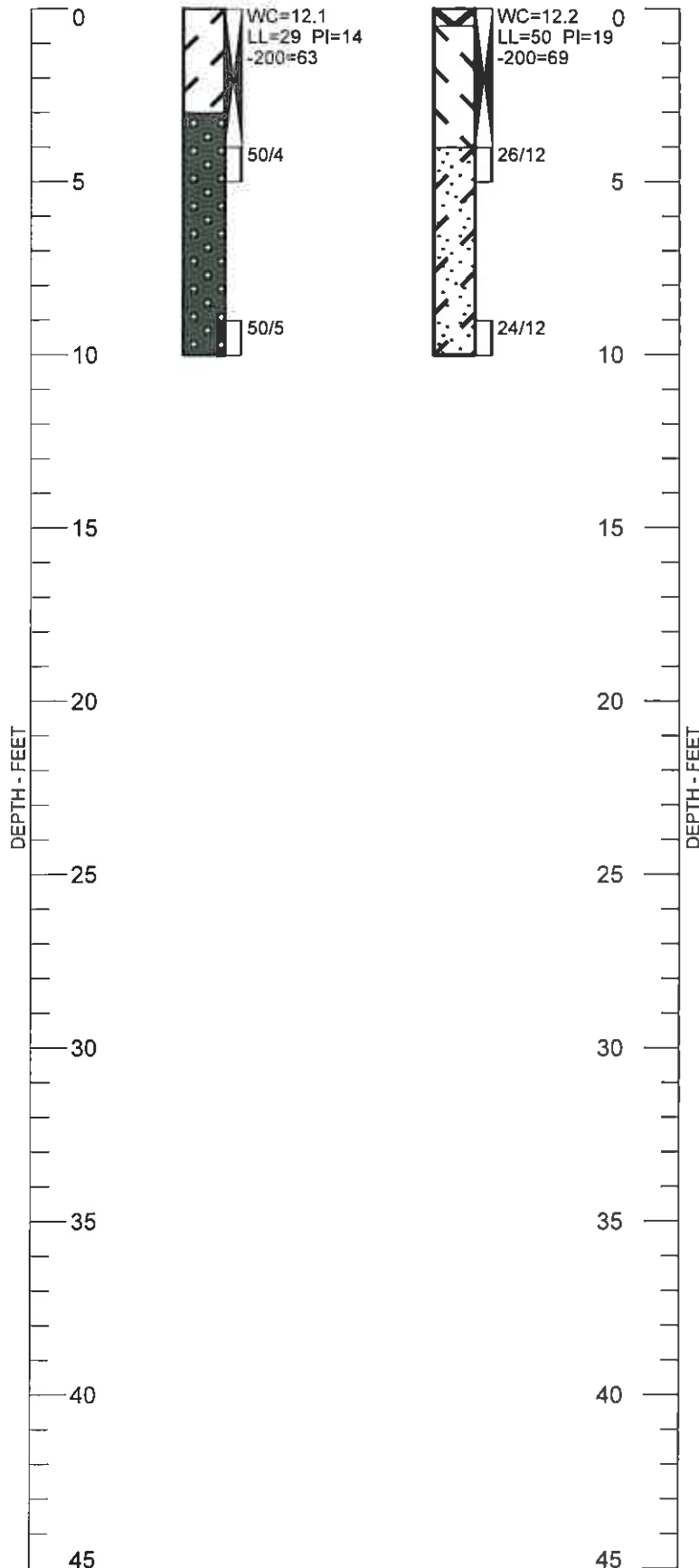
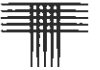
MATRIX DESIGN GROUP, INC.
TEMPORARY PARKING AND PEDESTRIAN WALKWAY
CTLJT PROJECT NO. CS17888-125

\\Csp-2k3r2-dc-01\\engineering\\CS17500-17999\\CS17888.000\\125\\2. Reports\\CS17888-125_CAD_FIG.dwg

FIG. 1

TH - 1

TH - 2

**LEGEND:**

FILL. SAND, CLAYEY, MOIST, BROWN.



CLAY, VERY SANDY, MOIST, LIGHT BROWN. (CL)



CLAY, SANDY, MOIST, DARK BROWN. (CH)



SAND, CLAYEY, MEDIUM DENSE, SLIGHTLY MOIST, DARK BROWN. (SC)



BEDROCK. SANDSTONE, CLAYEY, VERY HARD, SLIGHTLY MOIST, LIGHT BROWN.



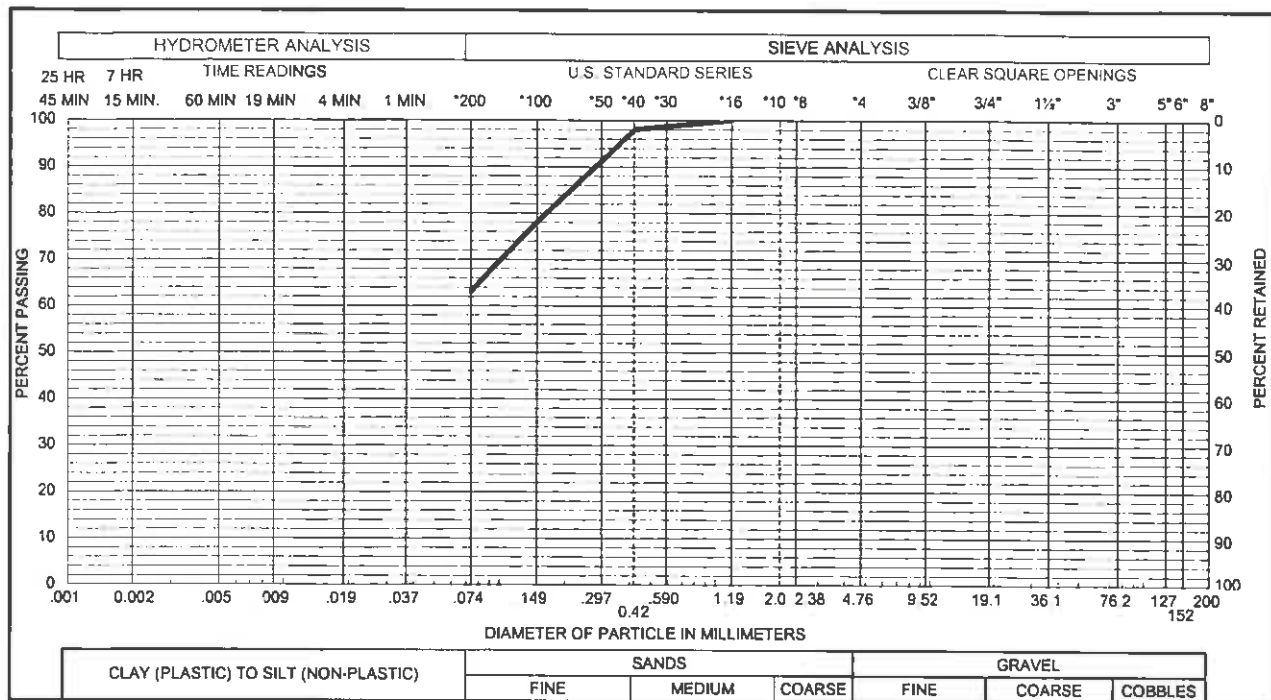
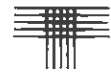
DRIVE SAMPLE. THE SYMBOL INDICATES BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.



INDICATES BULK SAMPLE OBTAINED FROM AUGER CUTTINGS.

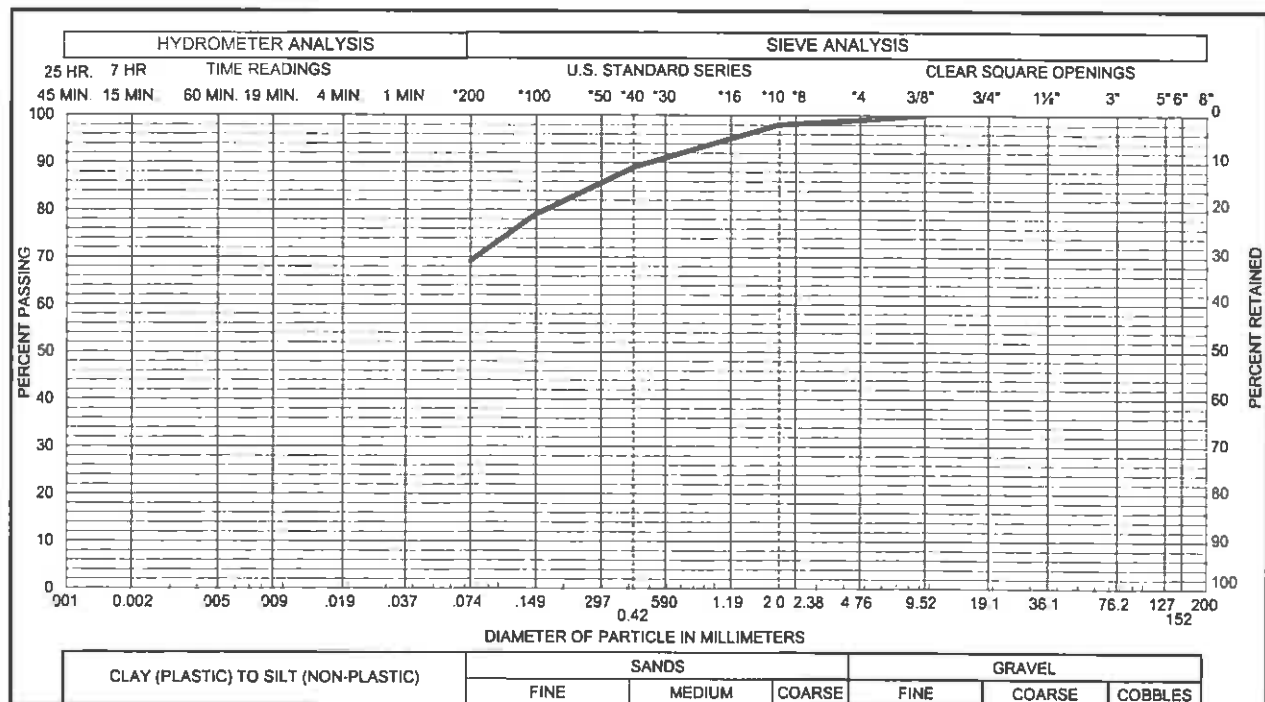
NOTES:

1. THE BORINGS WERE DRILLED DECEMBER 29, 2011 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. GROUND WATER WAS NOT ENCOUNTERED IN THE EXPLORATORY BORINGS DURING THIS INVESTIGATION.
4. WC - INDICATES MOISTURE CONTENT. (%)
 LL - INDICATES LIQUID LIMIT. (%)
 (NV : NO VALUE)
 PI - INDICATES PLASTICITY INDEX. (%)
 (NP : NON-PLASTIC)
 -200 - INDICATES PASSING NO. 200 SIEVE. (%)



Sample of CLAY, VERY SANDY (CL)
From TH - 1 AT 0-4 FEET

GRAVEL 0 % SAND 37 %
SILT & CLAY 63 % LIQUID LIMIT 29 %
PLASTICITY INDEX 15 %



Sample of CLAY, SANDY (CH)
From TH - 2 AT 0-4 FEET

GRAVEL 1 % SAND 30 %
SILT & CLAY 69 % LIQUID LIMIT 50 %
PLASTICITY INDEX 31 %

