CTL | THOMPSON INCORPORATED

SOILS AND FOUNDATION INVESTIGATION
PICNIC SHELTER
LEGACY PARK
FORT COLLINS, COLORADO

Prepared For:

The City of Fort Collins
Parks Department
413 South Bryan Avenue
Fort Collins, Colorado 80521

Attention: Ms. Eileen Scholl

CTL|T Project No. FC03844-125-B

July 15, 2006

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SCOPE

This report presents the results of our soils and foundation investigation for the proposed new picnic shelter at Legacy Park in Fort Collins, Colorado (Figure 1). The purpose of this investigation was to evaluate the subsurface conditions and provide foundation recommendations for the proposed shelter.

This report was prepared from data developed during our field exploration, laboratory testing, engineering analysis and experience with similar conditions. This report contains our opinions, conclusions and recommendations for geotechnical criteria for design and construction of foundations, a slab-on-grade floor, and drainage precautions for the proposed picnic shelter. A summary of our conclusions and recommendations follows.

SUMMARY OF CONCLUSIONS

1. The borings penetrated 12 feet of sandy gravel. Ground water was not encountered during drilling.

2. In our opinion, the shelters can be founded with a thickened edge slab on the natural soils or engineered fill.

3. Surface drainage should be designed, constructed and maintained to provide rapid runoff of surface water away from the proposed picnic shelter. Conservative irrigation practices should be followed to avoid excessive wetting.

SITE CONDITIONS

Legacy Park is located along the Cache la Poudre River on Woodlawn Drive, northwest of the intersection of Vine Drive and North College Avenue in northeast Fort Collins, Colorado. The existing picnic shelter is to be demolished and replaced with the new shelter. The building site is relatively flat. Ground cover in the area consisted of natural weed, grass and trees.

PROPOSED CONSTRUCTION

The site included in this investigation is planned for a picnic shelter. We understand that the picnic shelter will be a steel framed canopy over a thickened edge slab-on-grade foundation. Foundation loads are expected to be column loads with very low deadload. If final designs are different from our assumptions, we should be advised so we can review our criteria.

INVESTIGATION

The field investigation for the proposed picnic shelter included drilling one exploratory boring. The boring was drilled to a depth of 12 feet using a truck-mounted drill with 4-inch diameter, continuous-flight augers. Drilling was observed by our field representative who logged and sampled the soils. The location of the boring is shown on Figure 1 and graphic log of the boring is shown on Figure 2.

Bulk soil samples obtained during drilling were returned to our laboratory and visually examined by the engineering geologist for this project. Laboratory testing included natural moisture content and gradation. The results of the laboratory tests are presented on Figure 3 and summarized in Table 1.

SUBSURFACE CONDITIONS

Our borings penetrated 12 feet of medium dense to very dense, sandy gravels. Ground water was not encountered during drilling.

UTILITIES

We do not anticipate any utility installations requiring more than a shallow trench excavation. If utility trenches greater than 3 feet deep are required for this project, our office should be contacted to provide appropriate recommendations. For the typical shallow trench excavations, sides will need to be sloped or braced. We believe the soils penetrated by our borings are Type C as described in the

Occupational Safety and Health Administration (OSHA) standards governing excavations published by the Department of Labor. The publication indicates a minimum slope of 1-1/2:1 (horizontal:vertical) for Type C soils above ground water level. Soils removed from an excavation should not be stockpiled at the edge of the excavation. We recommend the excavated soils be placed a distance from the edge of the top of the excavation equal to at least the depth of the excavation. OSHA regulations require bracing and/or slopes for excavations greater than 20 feet tall to be designed by a Registered Professional Engineer.

Utility trenches should be backfilled using materials and criteria discussed in the FOUNDATION section of this report.

FOUNDATION

The existing shelter foundations, floor, buried piping should be removed from under the new building. The excavations resulting from removal of the existing shelter should be backfilled with densely compacted, engineered fill.

We believe the proposed picnic shelter foundation can consist of a thickened edge slab foundation bearing on the natural, undisturbed soil or well-compacted fill. Any excavations made during the removal of the existing shelter should be filled and well compacted. We recommend the following geotechnical criteria for the design of footings. We would be pleased to send geotechnical design criteria for the other alternatives considered if required.

1. Foundations should bear on the undisturbed natural soil or densely compacted engineered fill and be designed for a maximum soil bearing pressure of 2,000 psf. Where soils are loosened during excavation or in the footing forming process, or if any loose or soft soils are encountered at the footing level, the soils should be removed or compacted. Engineered fill should be constructed with the onsite sand or similar offsite sand. Imported fill soils should be non-expansive, placed in 8-inch maximum loose lifts at 2 percent below optimum moisture to 1 percent above optimum moisture content and be compacted to at least 95 percent of maximum dry density (ASTM D698).

2. Thickened edges should have a minimum width of 12 inches. Foundations for isolated columns should have minimum dimensions of 16 inches by 16 inches. Larger sizes may be required depending upon the loads and structural system used. The structural engineer should consider uplift resistance when sizing the footings.

3. If the owner deems the risk of frost heave to be unacceptable, the soil below exterior footings should be protected from freezing. Normally, 3 feet of cover over footings is assumed in the area for protection from freezing.

4. The completed foundation excavation should be observed by a representative of our firm prior to placing the forms to verify the subsurface conditions are those we anticipated from our borings and that demolition activities did not adversely alter the subsurface conditions. Engineered fill and backfill should be tested for compaction. Each one-foot lift of compacted fill should be tested and approved prior to placement of the footing forms. The owner's representative should notify the testing agency at least 3 days in advance to prepare moisture/density relationship tests (ASTM D698) and schedule compaction testing.

CONCRETE SLAB-ON-GRADE FLOORS AND EXTERIOR FLATWORK

The onsite soils or similar non-expansive (maximum liquid limit of 30 and maximum plasticity index of 15) offsite soils free of organic matter and other deleterious materials can be used to construct the engineered fill under the floor.

We suggest the following recommendations for the slab-on-grade construction:

1. Utilities that pass through the slab should be isolated from the slab.

2. A 4-inch thick layer of free-draining, reasonably well-graded sand and gravel or gravel can be provided under the slab to prevent capillary rise.

3. Frequent control joints should be provided in the slab to reduce problems associated with shrinkage. The American Concrete Institute (ACI) recommendations should be followed.

4. Exterior concrete flatwork should be separated from any nearby buildings. The slab should be reinforced. Movement of exterior slabs should not be transmitted to any nearby foundations. Frequent control joints should be provided according to the recommendations of the ACI.

SURFACE DRAINAGE

Wetting of foundation soils always may cause some degree of volume change in soils and should be prevented during and after construction. The risk of wetting the foundation soils can be reduced by planned and maintained surface grading. We recommend the following precautions be observed during construction, and that they be maintained at all times after completion of the addition:

1. The ground surface surrounding the exterior of the structure should be sloped to drain away from the structure in all directions.

2. Backfill around foundations should be on-site soils placed in thin lifts, moisture conditioned to 2 percent below to 2 percent above optimum moisture content and compacted to at least 90 percent of maximum dry density (ASTM D 698). All backfill that supports pavement or sidewalks should be compacted to at least 95 percent of maximum dry density (ASTM D 698).

3. Roof downspouts and drains should discharge well beyond the limits of all backfill. We recommend providing splash blocks at all downspout locations. Concrete swales can be used to convey concentrated water flows through paved areas to drains and gutters.

LIMITATIONS

One boring was drilled during this investigation to obtain a reasonably accurate picture of foundation soil conditions. Variations in the subsurface conditions not indicated by our boring are possible. A representative of our firm should observe the foundation excavations where spread footings are recommended to confirm the exposed materials are as anticipated from our borings.

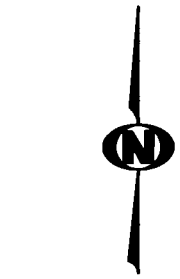
We believe this investigation was conducted with that level of skill and care ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report or in the analysis of the influence of subsoil conditions on design of the structures, please call.

CTL | THOMPSON, INC.

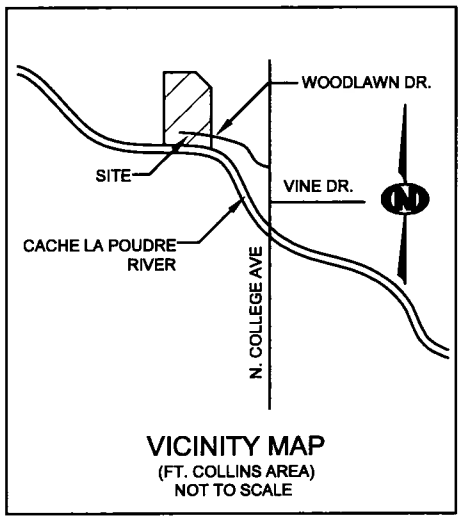
Reviewed By:

Robin Dornfest. PG
Project Engineering Geologist

R.B. "Chip" Leadbetter, III, PE
Project Engineer



APPROX. SCALE: 1"= 100'



VICINITY MAP
(FT. COLLINS AREA)
NOT TO SCALE

LEGACY PARK

TH-1

WOODLAWN DR.

CACHE LA POUDRE RIVER

LEGEND:

TH-1 ● INDICATES APPROXIMATE LOCATION OF EXPLORATORY BORING.

Locations of Exploratory Borings

CITY OF FORT COLLINS
SHELTER AT LEGACY PARK
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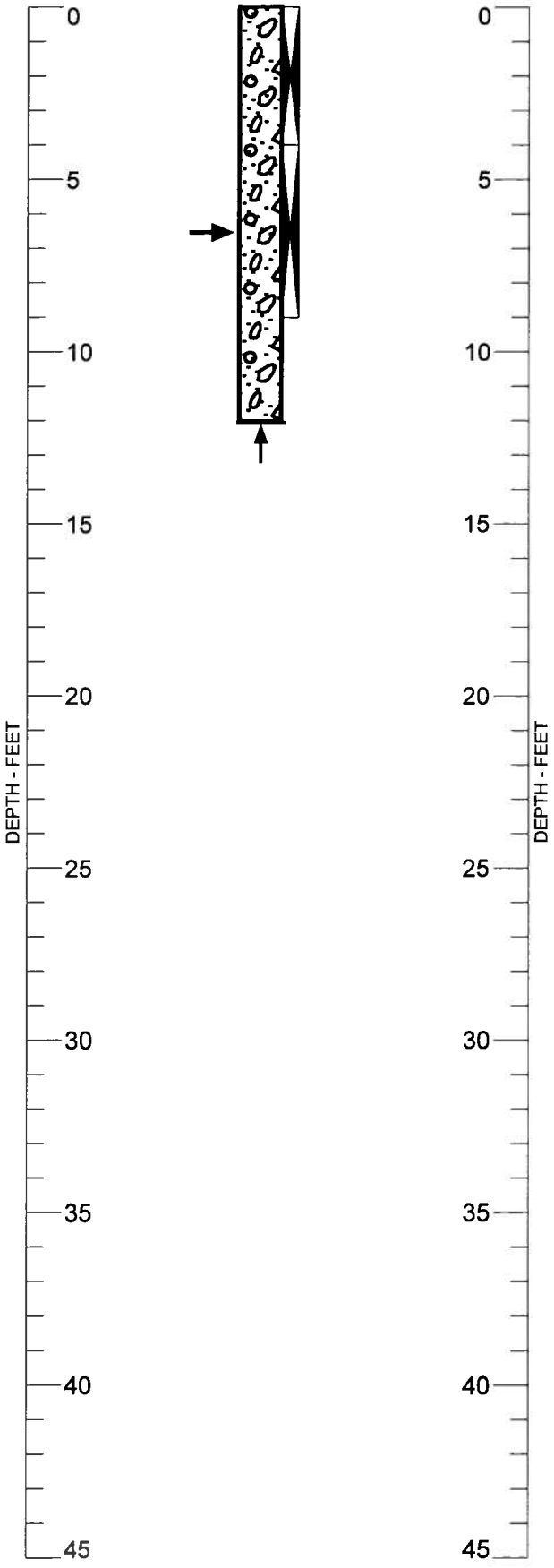
FIGURE 1

TH-1



LEGEND:

GRAVEL, SANDY, WITH COBBLES, SLIGHTLY MOIST TO MOIST, DARK BROWN, GREY (GP-GM, GW-GM)

BULK SAMPLE FROM AUGER CUTTINGS.

PRACTICAL DRILL REFUSAL.

INDICATES DEPTH WHERE HOLE CAVED.

NOTES:

1. THE BORINGS WERE DRILLED ON JULY 5 AND JULY 7, 2006 USING 4-INCH DIAMETER CONTINUOUS-FLIGHT AUGER AND A TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS IN THIS REPORT.

CITY OF FORT COLLINS
SHELTER AT LEGACY PARK
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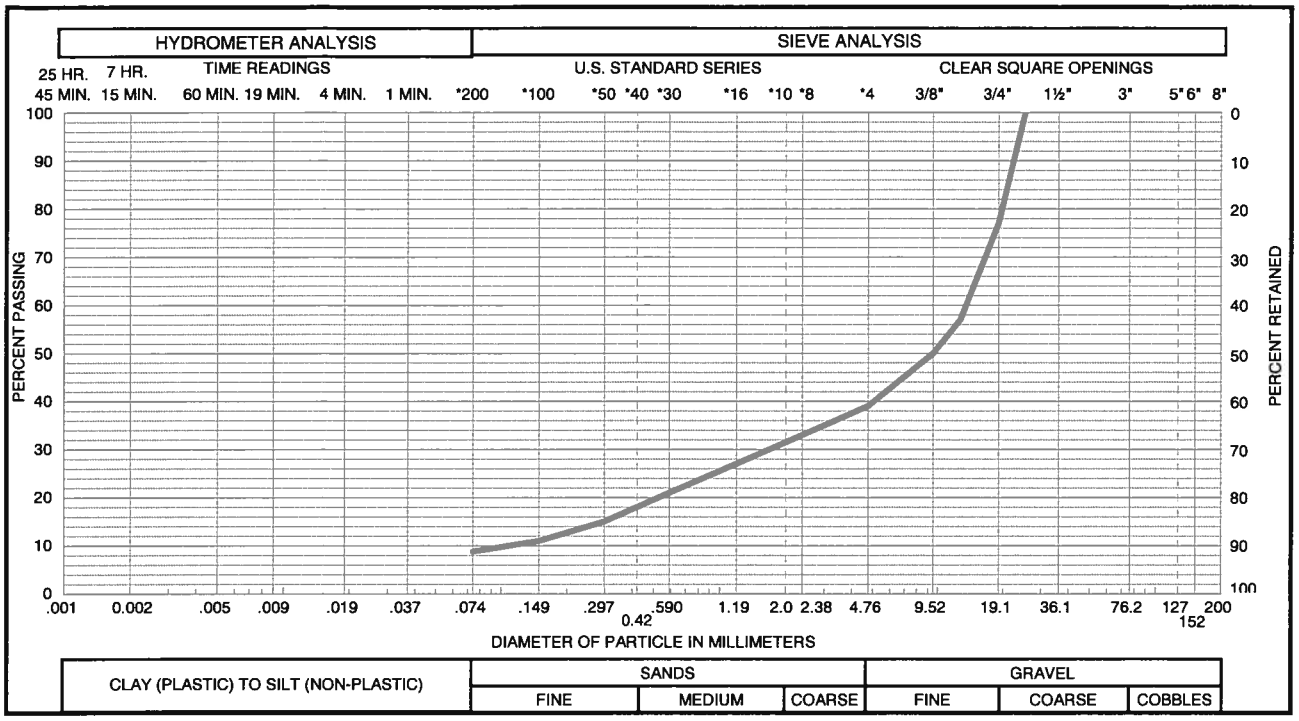
Summary Log of Exploratory Boring

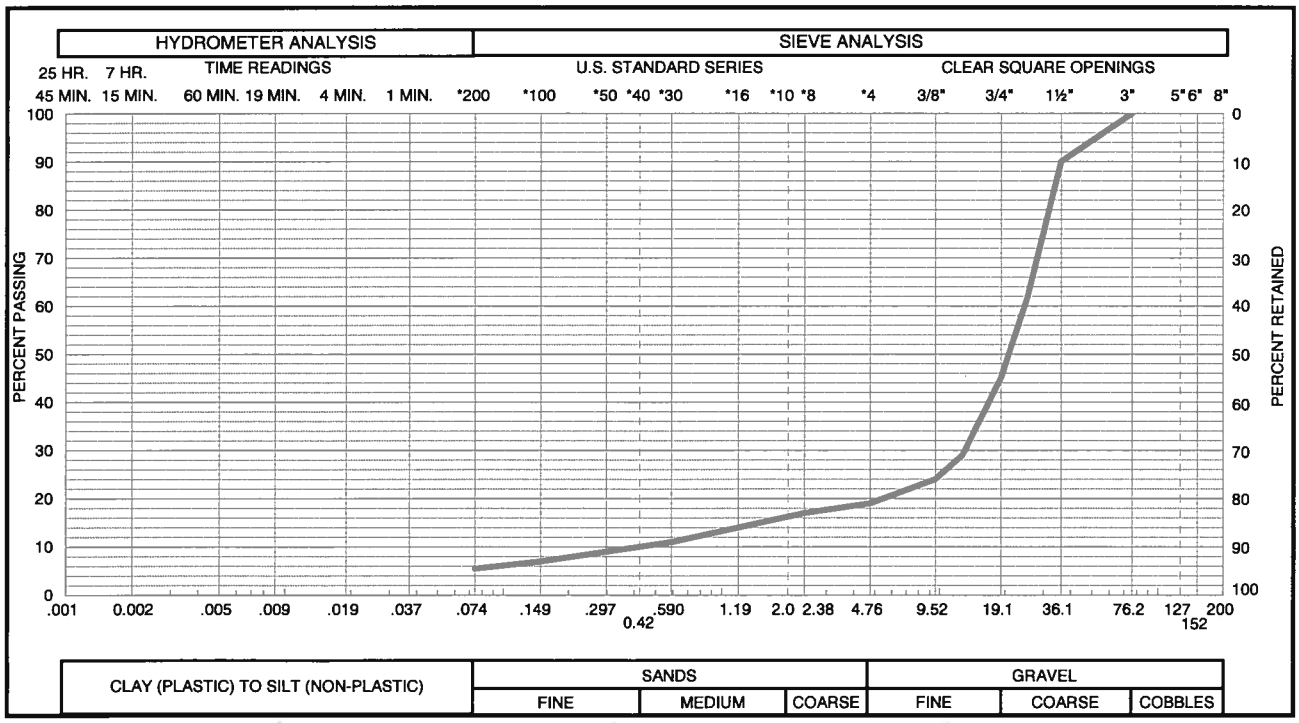
FIGURE 2

ONE LOG BY DEPTH WITH LEGEND FC03844-125.GPJ CTLMAIN.GDT 7/12/06



Sample of WELL GRADED GRAVEL, SILTY (GW-GM)
From TH - 1 AT 0-4 FEET

GRAVEL 61 % SAND 30 %
SILT & CLAY 9 % LIQUID LIMIT - %
PLASTICITY INDEX - %



Sample of GRAVEL, SILTY (GP-GM)
From TH - 1 AT 4-9 FEET

GRAVEL 81 % SAND 13 %
SILT & CLAY 6 % LIQUID LIMIT - %
PLASTICITY INDEX - %

Gradation Test Results

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FIGURE 3

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

LOT	BLOCK	DEPTH (FEET)	NATURAL MOISTURE (%)	NATURAL DRY DENSITY (PCF)	SWELL TEST DATA			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	SOLUBLE SULFATES (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
					SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)				
TH	1	0-4	6.8									9	WELL GRADED GRAVEL, SILTY (GW-GM)
TH	1	4-9	3.5									6	GRAVEL, CLEAN TO SILTY (GP-GM)