

PRELIMINARY SOIL AND GEOLOGICAL REPORT
FOR THE
BLACK FOREST GLIDER PARK SUBDIVISION
ELBERT COUNTY, COLORADO

PREPARED FOR:
MR. BEN KELLY
2570 E. SAN MIGUEL
COLORADO SPRINGS, COLORADO 80909

January 19, 1986

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SITE CONDITIONS

The site consists of approximately 320 acres of unirrigated farm land, the primary crops being wheat and oats. The native vegetation consists of blue stem, bluegrass, gramma grass, and buffalo grass. The site slopes gently to the north with a central ridge which bifurcates the property causing sloping to the east and west. There is only one well defined drainage which flows on the west half of the property. This drainage is singularly not impressive in either slope or definition. There are a few sandstone rock outcroppings which are shown on the accompanying topographic map. These outcrops appear to be the result of weathering action. The surrounding land is similar in nature supporting dryland farming and grazing. The slopes on this site vary from 1% to 10 %, with the steeper slopes being adjacent to sandstone bedrock outcrops.

SUBSURFACE SOIL CONDITIONS

The subsurface soil conditions for this site were explored using a backhoe and digging 22 test pits as shown on the attached topographic map. The logs for these exploratory holes are shown on pages 8 and 9. The exploratory holes were dug in December of 1986 with a 2 to 4 inch snow cover, which probably explained why only 1 to 2 inches of frost were encountered.

The soils on this site are fairly well developed and consist

typically of 1 to 3 feet of humus and sandy clay topsoil overlaying a sandy clay soil which ranged from between 3 to 15 feet in thickness. This sandy clay tended to be calcareous in places. The swell potential for this material is slight to moderate. Well graded sand was encountered below the sandy clay in TP-4 at a depth of 6 feet. The sandy clay varied from very sandy to slightly sandy in lenses throughout the entire site.

Sandstone bedrock was encountered in 12 of the 22 test pits at a depth of between 4 to 10 feet. The bedrock varied in hardness from partially cemented to very hard. All of the sandstone bedrock found is rippable. This sandstone bedrock appears on the surface in a few places which are noted on the accompanying topo map on page 7.

No free ground water was found in any of the test pits. During the spring and wet seasons water may be found on top of the bedrock, however since the bedrock surface tends to have fairly steep slopes this should not cause any particular problems. Individual sewage disposal systems must be designed to remain 4 feet above any seasonal ground water.

PROPOSED CONSTRUCTION

This site is to be a residential subdivision with limited commercial, therefore the type construction anticipated should

not require any special foundation applications. Due to the fact that some swell potential was noted (see swell consolidation test results pages 11 through 13) it is highly recommended that each structure obtain a soil report and foundation design to minimize any potential foundation problems.

FOUNDATION RECOMMENDATIONS

Based on the field and laboratory findings it is our belief that standard spread footing and stem wall type construction can be utilized on the majority of the sites. In areas where swelling soils are present one of the following foundation systems may be used if the severity of the swell warrants:

- (1) Wall on Grade - This system consists of a stem wall founded on undisturbed natural soil with a bearing pressure of between 1.1 and 1.5 times the dead load plus the live load. It is very important that the swell pressure be offset to the dead load pressure of the structural system. In addition care should be taken not to back fill the wall until it can be braced at the bottom to prevent lateral movement.
- (2) Interrupted Pad - This system consist of a series of pads which are designed to increase the foundation load in order to prevent vertical movement if the soil swells. The wall spanning

between these pads should have a minimum of 4 inch void between the bottom of the wall and the soil to allow for this expansion.

- (3) Drilled Piers - Drilled piers should be designed to be drilled in to the sandstone bedrock. Piers should be designed for an allowable end bearing pressure of 35,000 psf. Piers should also be designed for a minimum dead load pressure of 20,000 psf based on pier end area only.

The foundation systems listed above represent standard type construction and should pose no special problems. It is also recommended that if basements are to be used adequate foundation drains should be installed in order to lessen the possibility of leaks. The foundation walls should be water proofed in addition to the installation of a drain system to prevent moisture from entering the basement. Backfill should be placed so as to promote positive drainage away from the structure. Good design practices should be used as well as strict adherence to local codes.

FLOOR SLABS

Floor slabs should not create any problems if they are installed in accordance with good design and construction practices. They should be placed on undisturbed soil or granular fill containing non expansive material compacted to 95 % standard Proctor density.

In addition, the slabs should be provided with release and expansion joints to allow for free movement.

SOIL PERCOLATION

Percolation test were run at six locations on the site in order to determine the suitability of the soil for the installation of individual sewage disposal systems. The results of these tests are presented below:

HOLE NO.	PERC RATE (MIN./INCH)
1	28.6
2	25.2
3	18.7
4	26.9
5	35.5
6	15.6

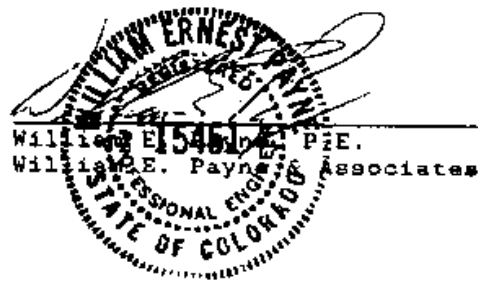
AVERAGE = 25.08 MIN./INCH

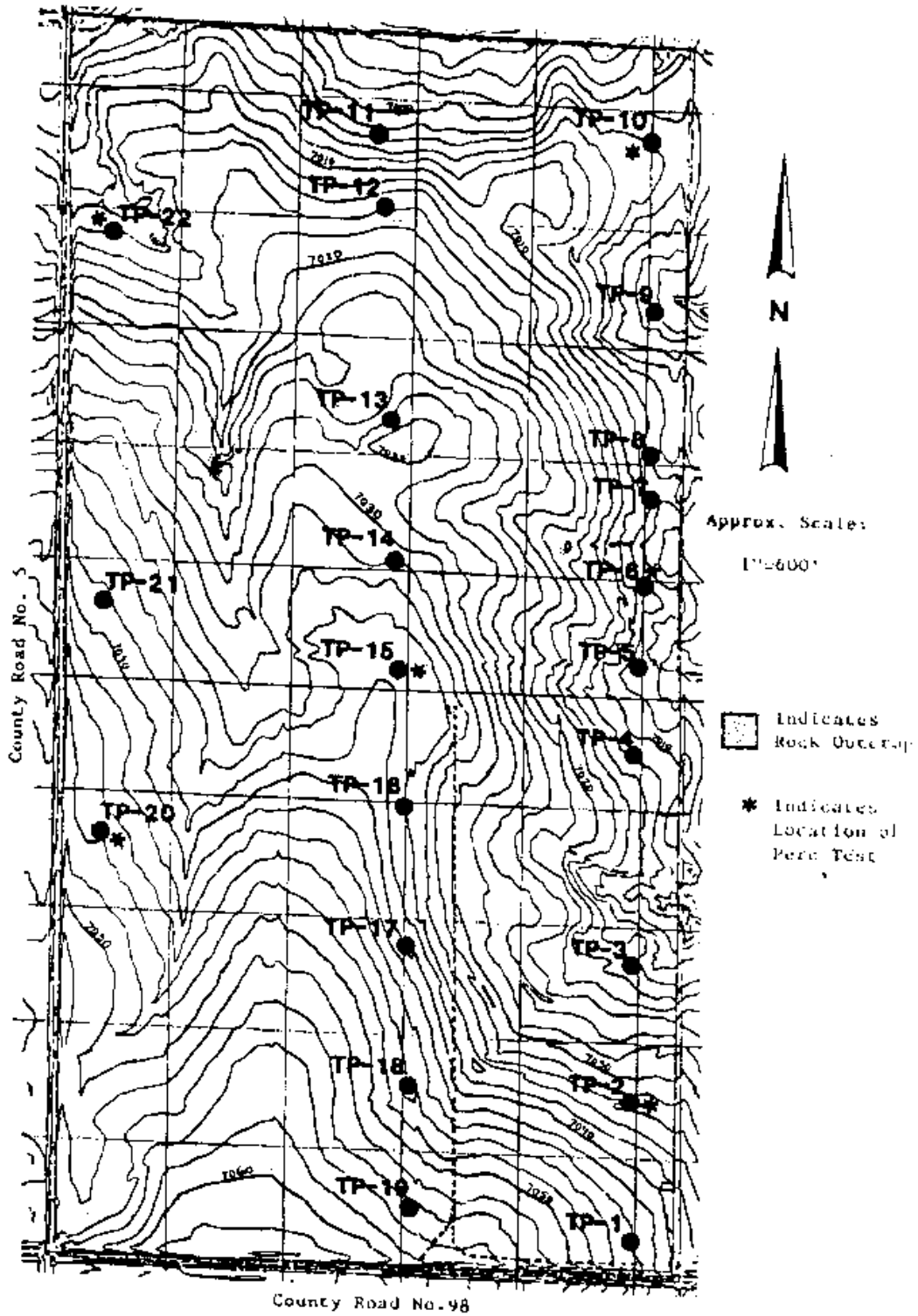
The above percolation rates are well within the 5 to 60 minute/inch allowable range. The soil in this area appear to be well suited to the installation of individual sewage disposal systems. Installation of systems should be discouraged in areas where the sandstone bedrock is near the surface. Each lot has been designed so that a suitable area exists for an installation.

however should it become necessary to locate a system in the area of shallow bedrock, our tests indicate that the sandstone is rippable and if necessary a mounded system could be designed.

CONCLUSIONS

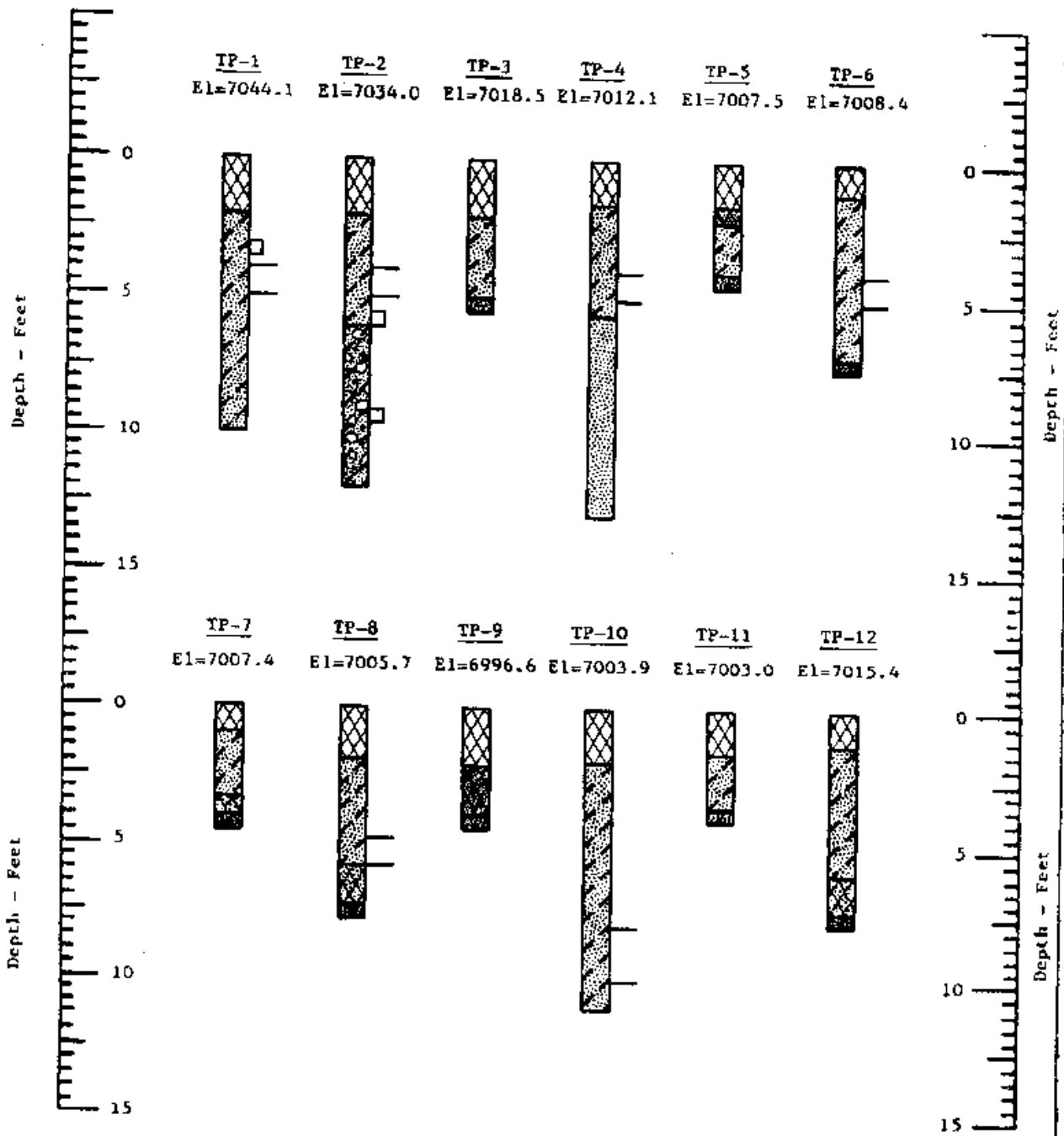
In conclusion the results of the soil tests presented in this report indicate that there are no soil conditions which should adversely effect proposed construction on this property. The results of the swell consolidation test presented on pages 11 ,12 and 13 indicate moderate swell potential for the sandy clay material, however this should not present a design problem. The soil profiles presented on pages 8 and 9 indicate approximate soil horizons and some variation may occur, therefore it recommended that an open hole inspection be performed at each building site to verify soil conditions. If any marked variation from the soil profile and/or conditions are noted during construction additional soil tests should be performed.





LOCATION OF TEST PITS

BORINGS

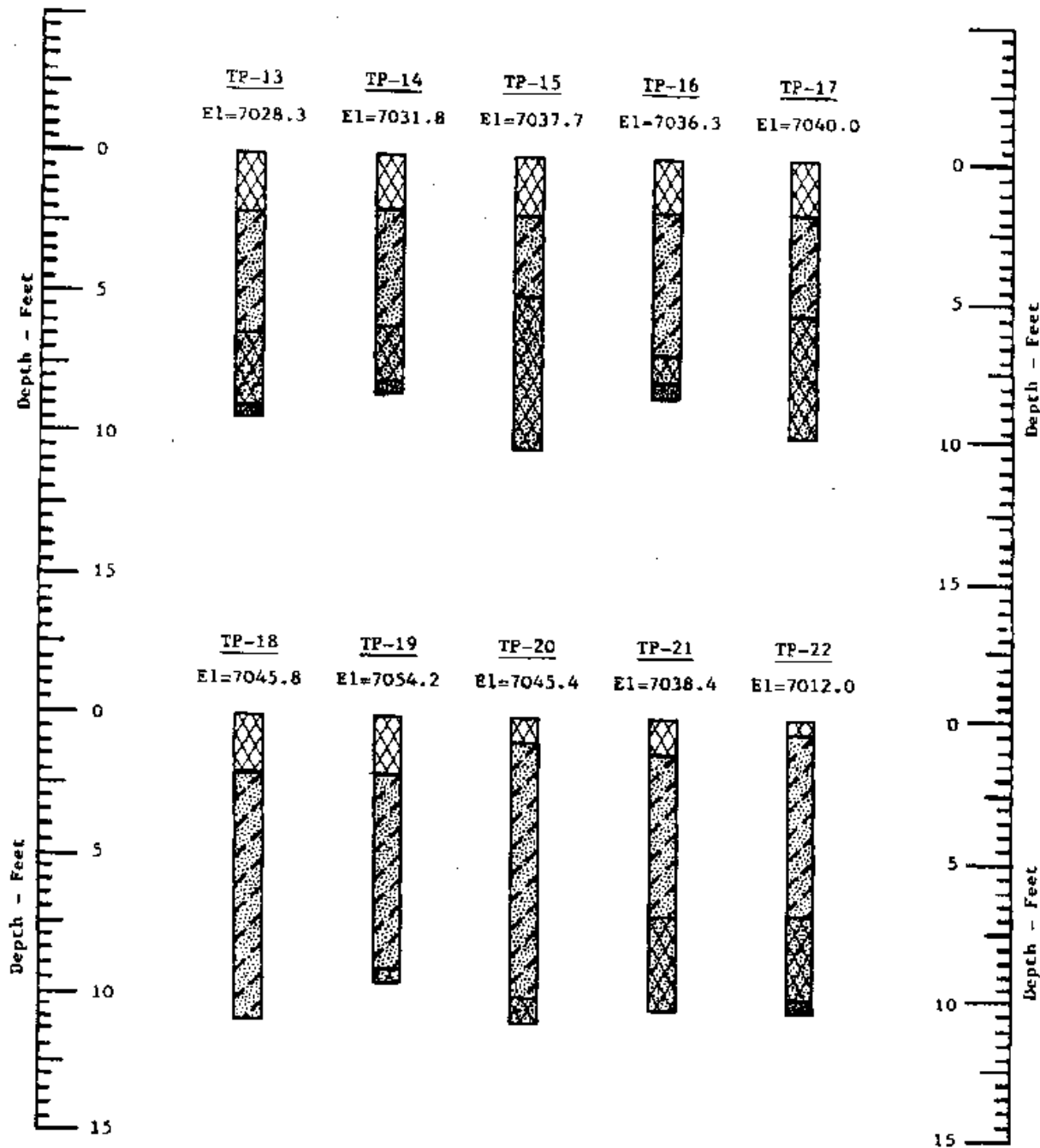


William E. Payne & Associates

Post Office Box 2842
 Englewood, Colorado 80420

Figure 2

BORINGS



William E. Payne & Associates

Post Office Box 2642
Evergreen, Colorado 80439

Figure 3

LEGEND:



Topsoil, Sandy Clay & Humus, Dark brown to brown, Moist.



(CL) Clay, Dark brown to black, Slightly moist to moist, Soft, Medium to high plasticity.



(SW) Sand, Well Graded, Light brown, Slightly moist, Loose to slightly firm, Contains some silica.



(SC) Sandy Clay, Redish brown to brown, Slightly moist to moist, Slightly firm, Calcareous areas.

Calcium carbonate



(SP-SC) Sandy Sandy Clay, Light tan, Slightly moist, Firm to hard, Calcareous areas.



(SC-GC) Slightly Gravely Sandy Clay, Greenish gray to tan, Slightly moist, Calcareous areas.



Sandstone Bedrock, Tan to light tan, Very hard to hard, Dense to medium dense.



Indicates undisturbed hand drive sample was obtained using a 2 inch O.D. sampling tube.



Indicates disturbed bulk sample was obtained at depth shown.

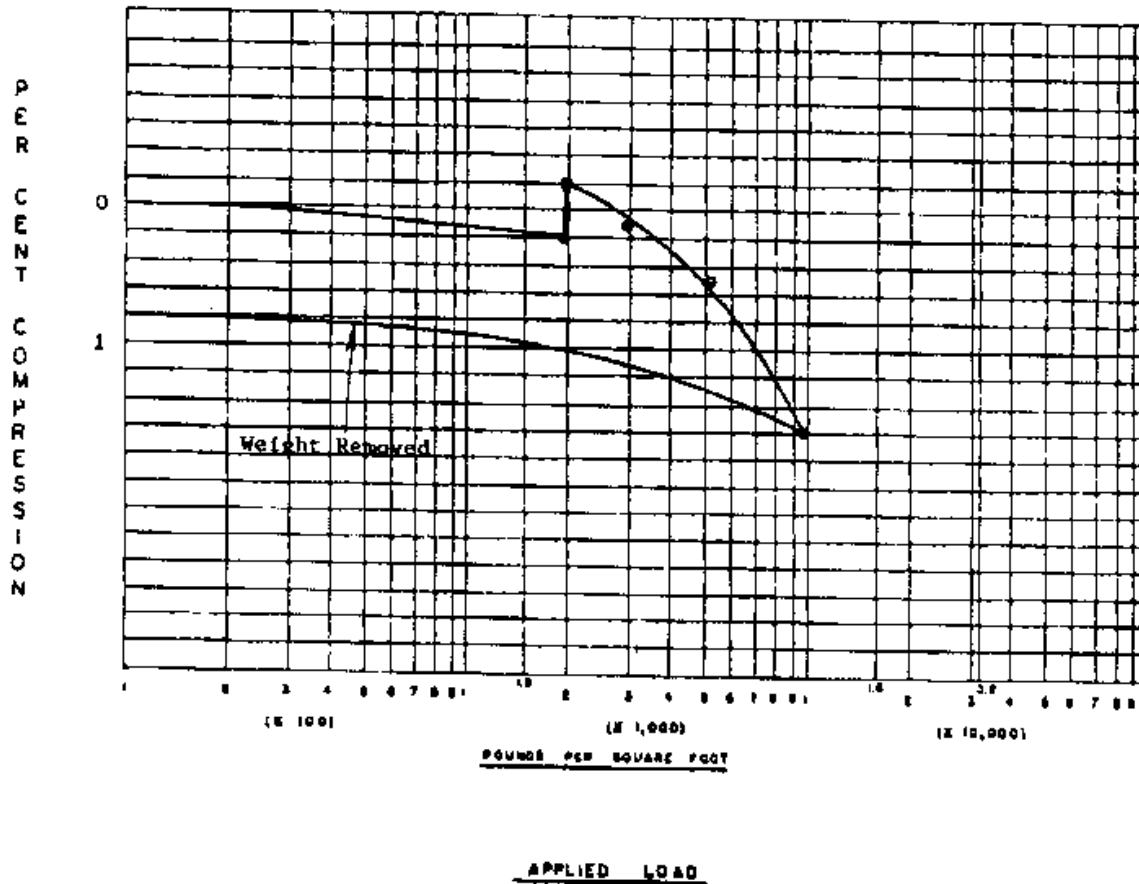
NOTES:

- 1) Test pits were dug on December 15, 1986 using a backhoe.
- 2) Elevations of test pits were obtained by interpolation between contours on an aerial photo taken in November, 1986.
- 3) Test pit locations and elevations should be considered accurate only to the degree implied by the method used.
- 4) The lines between materials shown on the logs represent the approximate boundaries between material types, and the transition may be gradual.
- 5) No water was encountered in any of the test pits.

WILLIAM E. PAYNE & ASSOCIATES

1301 N. Speer Boulevard
Denver, Colorado 80204
(303) 623-4110

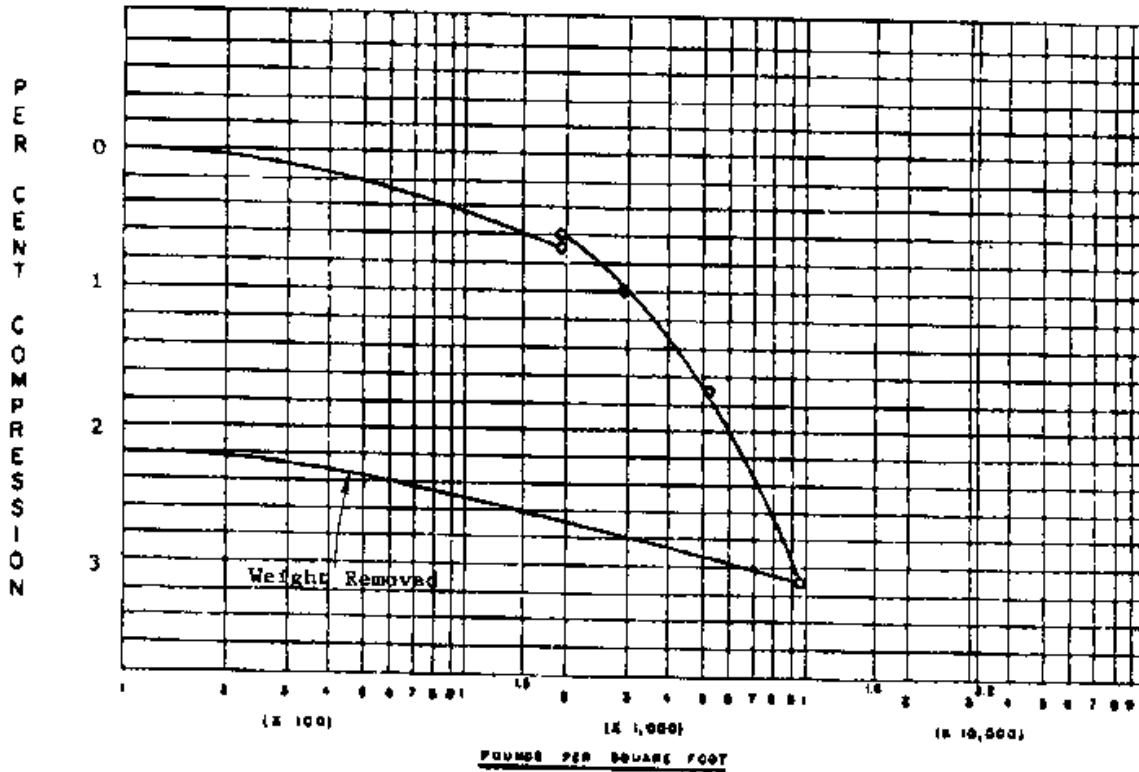
CONSOLIDATION TEST



Test hole No. <u>2</u>	Sample Depth <u>66"</u>
Soil Classification <u>Sandy Clay</u>	
In situ Density (lb./ft. ³) <u>113.1</u>	Initial Moisture % <u>26.8</u>
Dry Density (lb./ft. ³) <u>89.2</u>	
% Swell <u>0.2</u>	% Consolidation <u>1.6</u>

Figure 6

CONSOLIDATION TEST



APPLIED LOAD

Test hole No. 2 Sample Depth 108"
 Soil Classification Slightly Gravelly Sandy Clay
 In situ Density (lb./ft.³) 107.2 Initial Moisture % 33.7
 Dry Density (lb./ft.³) 80.2
 % Swell 0.0 % Consolidation 3.1

Figure 7