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**SOIL, GEOLOGY, GEOLOGIC HAZARD,  
AND WASTEWATER STUDY  
MOUNTAINS TO VIEW ESTATES  
11150 NORTH ELLICOTT HIGHWAY  
EL PASO COUNTY, COLORADO**

Prepared for

**Avalar Real Estate**  
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Attn: Craig McConnell

April 16, 2018

Respectfully Submitted,

ENTECH ENGINEERING, INC.

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LLL/rm

Encl.

Entech Job No. 180343  
A\Projects\2018\180343 countysoil/geo/wastewater

Reviewed by:



**TABLE OF CONTENTS**

1.0 SUMMARY..... 1  
2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION.....2  
3.0 SCOPE OF THE REPORT .....2  
4.0 FIELD INVESTIGATION .....3  
5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY.....3  
    5.1 General Geology.....3  
    5.2 Soil Conservation Survey.....4  
    5.3 Site Stratigraphy.....4  
    5.4 Soil Conditions .....5  
    5.5 Groundwater .....5  
6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS.....6  
    6.1 Relevance of Geologic Conditions to Land Use Planning.....9  
7.0 ECONOMIC MINERAL RESOURCES..... 10  
8.0 EROSION CONTROL ..... 12  
9.0 CLOSURE..... 13  
BIBLIOGRAPHY..... 14

**TABLES**

*Table 1: Summary of Tactile Test Pit Results*

**FIGURES**

- Figure 1: Vicinity Map*
- Figure 2: USGS Map*
- Figure 3: Development Plan/Test Boring Location Map*
- Figure 4: Soil Survey Map*
- Figure 5: Falcon Northwest Quadrangle Geology Map*
- Figure 6: Geology Map/Engineering Geology*
- Figure 7: Floodplain Map*
- Figure 8: Perimeter Drain Detail*
- Figure 9: Septic Suitability Map*

- APPENDIX A: Site Photographs*
- APPENDIX B: Test Boring Logs and Profile Hole Logs*
- APPENDIX C: Laboratory Test Results*
- APPENDIX D: Geoquest, LLC Soils Report, Job No. 18-0058*
- APPENDIX E: Soil Survey Descriptions*
- APPENDIX F: El Paso County Health Department Septic Records*

## **1.0 SUMMARY**

### ***Project Location***

The project lies in a portion of the SE¼ of the NE¼ of Section 24, Township 12 South, Range 63 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 5½ miles southeast of Peyton, Colorado. More specifically the site is located southwest of Scott Road and North Ellicott Highway.

### ***Project Description***

Total acreage involved in the project is approximately forty acres. The proposed site development consists of three rural residential lots. The development will utilize individual water wells and on-site wastewater treatment systems. The existing house is located on Lot 1 will remain.

### ***Scope of Report***

This report presents the results of our geologic evaluation and treatment of engineering geologic hazard study.

### ***Land Use and Engineering Geology***

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some constraints on development and land use. These include artificial fill, hydrocompaction, loose or collapsible soils, floodplain, and potentially seasonally shallow groundwater areas. Based on the proposed development plan, the floodplain areas have been designated as a no build area. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

## 2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the SE¼ of the NE¼ of Section 24, Township 12 South, Range 63 West of the 6<sup>th</sup> Principal Meridian in El Paso County, Colorado. The site is located approximately 5½ miles southeast of Peyton, Colorado. More specifically the site is located southwest of Scott Road and North Ellicott Highway. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gently sloping to the southeast. The drainages on site flow in a southeasterly direction through the central portion of the site. Water was not observed in the drainages on-site at the time of this investigation. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses, weeds, cacti, and yuccas, and scattered trees along the southern portion of the site. Site photographs, taken March 10, 2018, are included in Appendix A.

Total acreage involved in the proposed development is approximately forty acres. Three single-family rural residential lots are proposed. The proposed lots will be approximately 13 acres. The area will be serviced individual water wells and on-site wastewater treatment systems. The proposed Development Plan is presented in Figure 3.

## 3.0 SCOPE OF THE REPORT

The scope of the report will include the following:

- A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.
- The site will be evaluated for on-site wastewater treatment systems in accordance with El Paso Land Development Code.

## 4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on March 10, 2018.

Two tactile test pits for On-site Wastewater Treatment Systems (OWTS) were excavated on the site to determine general soil and bedrock characteristics. The locations of the test pits are indicated on the Site Plan/Test Boring Location Map, Figure 4. The Test Pit Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis. Results of the laboratory testing are included in Appendix C.

A Soils Report which included two test borings on the southern lot (Lot 3) by Geoquest, LLC (Reference 1, Appendix D) was also used in evaluating the site.

## 5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

### 5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately 26 miles to the west is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within the southeastern edge of a large structural feature known as the Denver Basin. Bedrock in the area tends to be very gently dipping in a northwesterly direction (Reference 2). The rocks in the area of the site are sedimentary in nature and typically Upper Cretaceous in age. The bedrock underlying the

site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of alluvial and eolian soils of Quaternary Age. The alluvial soils were deposited by water on-site and as stream terrace deposits along the drainages on-site. The site's stratigraphy will be discussed in more detail in Section 5.3.

### 5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has mapped four soil types on the site (Figure 4). In general, the soils classify as loamy sand and sandy loam. The soils are described as follows:

<u>Type</u>	<u>Description</u>
8	Blakeland Loamy Sand, 1 to 9% slopes
10	Blendon Sandy Loam, 0 to 3% slopes
28	Ellicott Loamy Coarse Sand, 0 to 5% slopes
96	Truckton Sandy Loam, 0 to 3% slopes

Complete descriptions of each soil type are presented in Appendix E. The soils have generally been described to have moderately rapid to rapid permeability. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have moderate to high erosion hazards (Reference 4).

### 5.3 Site Stratigraphy

The Pueblo 1°x2° Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 5). The Geology Map prepared for the site is presented in Figure 6. Four mappable units were identified on this site which are described as follows:

- Qal**      **Recent Alluvium of Holocene Age:** These are recent deposits that have been deposited along the drainages on-site.
- Qaf**      **Artificial Fill of Holocene Age:** These are man-made fill deposits associated with the small earthen dam that is located in the southeastern portion of Lot 2.

- Qp Piney Creek Alluvium of Holocene Age:** This material is a water-deposited alluvium, typically classified as a silt to well-graded sand, brown to dark brown in color and of moderate density. The Piney Creek Alluvium can sometimes be very highly stratified containing layers of very silty and clayey soil.
- Qes Eolian Sand of Quaternary Age:** These deposits are fine to medium grained soils deposited on the site by action of the prevailing winds from the west and northwest. They typically occur as large dune deposits or narrow ridges. These soil types are typically tan to brown in color and tend to have very uniform or well-sorted gradation. These materials tend to have a relatively high permeability and low density.

The soils listed above were mapped from site-specific mapping, and the *Geologic Map of the Pueblo 1° x 2° Quadrangle South-Central Colorado* distributed by the US Geological Survey in 1976 (Reference 5). The Test Pits and Test Holes (Geoquest) were also used in evaluating the site and are included in Appendices B and D. The Geology Map prepared for the site is presented in Figure 6.

#### **5.4 Soil Conditions**

The soils encountered in the Test Holes and Test Pits can be grouped into one general soil types. The soils were classified using the Unified Soil Classification System (USCS). The test pit soils were classified using the USDA Textural Soil Classification.

Soil Type 1 silty sand (SM), encountered in both of test holes and test pits at the existing ground surface and extending to depths ranging from 8 feet to 15 feet bgs. These soils were encountered at loose to medium dense states and at moist conditions. Samples tested had 10 to 18 percent passing the No. 200 Sieve.

The Test Pit Logs are presented in Appendix B. Laboratory Test Results are presented in Appendix C. A Summary of Tactile Test Pit Results is presented in Table 1. Test Hole Logs and Laboratory Test Results from the Soils Report performed by Geoquest, LLC (Reference 1) are included in Appendix D.

### **5.5 Groundwater**

Groundwater was not encountered in the test pits or test holes. Areas of potential seasonal shallow groundwater have been mapped along the drainages on-site. These areas are discussed in the following section. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time.

It should be noted that in the sandy materials on site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

## **6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS**

As mentioned previously, detailed mapping has been performed on this site to produce an Engineering Geology Map Figure 6. This map shows the location of various geologic conditions of which the developers should be cognizant during the planning, design and construction stages of the project. These hazards and the recommended mitigation techniques are as follows:

### **Artificial Fill**

These are man-made fill deposits associated with erosion berms and the earthen dam on-site.

**Mitigation:** The earthen dam will be avoided by the development, and the small erosion berms can easily be removed or penetrated by foundations. Should any uncontrolled fill be encountered beneath foundations, removal and recompaction at 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 will be required.



Hydrocompaction

Areas in which hydrocompaction have been identified are acceptable as building sites. In areas identified for this hazard classification, however, we anticipate a potential for settlement movements upon saturation of these surficial soils. The low density, uniform grain sized, windblown sand deposits are particularly susceptible to this type of phenomenon. Additionally, loose or collapsible soils may be encountered on this site.

Mitigation: The potential for settlement movement is directly related to saturation of the soils below the foundation areas. Therefore, good surface and subsurface drainage is extremely critical in these areas in order to minimize the potential for saturation of these soils. The ground surface around all permanent structures should be positively sloped away from the structure to all points, and water must not be allowed to stand or pond anywhere on the site. We recommend that the ground surface within 10 feet of the structures be sloped away with a minimum gradient of five percent. If this is not possible on the upslope side of the structures, then a well-defined swale should be created to intercept the surface water and carry it quickly and safely around and away from the structures. Roof drains should be made to discharge well away from the structures and into areas of positive drainage. Where several structures are involved, the overall drainage design should be such that water directed away from one structure is not directed against an adjacent building. Planting and watering in the immediate vicinity of the structures, as well as general lawn irrigation, should be minimized.

Loose or Collapsible Soils

Some of the sandy soils encountered on site exhibit low density and may be subject to settlement under a load. The potential for loose or collapsible soils exists anywhere in areas mapped as Eolian Sand (Qes) and may also exist in areas mapped as Piney Creek Alluvium (Qp).

Mitigation: Should loose collapsible soils be encountered beneath foundations, removal and recompaction of the upper 2 feet with thorough moisture conditioning at 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 will be necessary. Specific recommendations should be made after additional investigation of each building site.

Groundwater and Floodplain Areas

Areas within the drainages on-site have been identified as areas of potentially seasonally high groundwater areas. Water was not flowing in the any of the drainages at the time of this investigation. Areas of the site are mapped within a floodplain zone according to the FEMA Map No. 08041CO575F, Figure 7 (Reference 6). These areas are located within the no-build area and will be avoided by development. Finished floor levels must be a minimum of on foot above floodplain levels. Specific floodplain locations and drainage studies are beyond the scope of this report.

Potentially Seasonal Shallow Groundwater Area

In these areas, we would anticipate the potential for periodically high subsurface moisture conditions, frost heave potential and highly organic soils. The majority of these areas lie within defined drainages which can likely be avoided by the proposed development.

Mitigation: Foundations must have a minimum 30-inch depth for frost protection. In areas where high subsurface moisture conditions are anticipated periodically, subsurface perimeter drains are recommended to help prevent the intrusion of water into areas below grade. Typical drain details are presented in Figure 8. Any grading in these areas should be done to direct surface flow around construction to avoid areas of ponded water. Structures should not block drainages. All organic material should be completely removed prior to any fill placement.

## 6.1 RELEVANCE OF GEOLOGIC CONDITIONS TO LAND USE PLANNING

The proposed development will be three single family rural residential lots. It is our opinion that the existing geologic and engineering geologic conditions will impose some constraints on the proposed development and construction. The most significant issues affecting development will be those associated with the artificial fill, hydrocompaction, loose or collapsible soils, floodplain, and potentially seasonally shallow groundwater areas on site that can be properly mitigated or avoided. Other hazards on site may be satisfactorily mitigated through proper engineering design and construction practices.

The upper materials are typically at loose to medium dense states. The medium dense granular soils encountered in the upper soil profiles of the test holes and test pits should provide good support for foundations. Loose soils, if encountered at foundation depth will require mitigation. Foundations anticipated for the site are standard spread footings possibly in conjunction with overexcavation in areas of loose soils. Excavation is anticipated to be moderately easy with rubber-tired equipment for the site sand materials. Expansive layers may also be encountered in the soil on this site. Areas of expansive soils encountered on site are sporadic; therefore, none have been indicated on the maps. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of potentially seasonal shallow groundwater, and an earthen dam exist on this site. Due to lot size, it is anticipated these areas can be avoided by development. All surface drainage should be directed around proposed structures.

A floodplain exists in the western portion of the site. This area is designated as a no-build area and will be avoided by development. Finished floors must be a minimum of one foot above the floodplain level. Specific floodplain locations and drainage studies are beyond the scope of this report.

In summary, development of the site can be achieved if the items mentioned above are mitigated. These items can be mitigated through proper design and construction or through avoidance. Investigation on each lot is recommended prior to construction.

## 7.0 ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 7), the area is not mapped with any aggregate deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 8), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 9), the area of the site has been mapped as "Good" for industrial minerals. However, considering the silty nature of much of these materials and abundance of similar materials through the region and the close proximity to developed land, they would be considered to have little significance as an economic resource.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 9), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as "Poor" for coal resources. No active or inactive mines have been mapped in the area of the site. No metallic mineral resources have been mapped on-site (Reference 9).

The site has been mapped as "Fair" for oil and gas resources (Reference 9). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

## 8.0 ON-SITE WASTEWATER TREATMENT

The site was evaluated for On-site Wastewater Treatment Systems (OWTS) for the proposed lots in accordance with El Paso Land Development Code. Two (2) tactile test pits were performed on the site. Tactile test pits were located in anticipated locations of proposed on-site wastewater treatment system (OWTS) for the development. The approximate locations of the test pits are indicated on Figure 3 and 6, and on the Septic Suitability Map, Figure 9. The locations were chosen to determine a general understanding of the soil and bedrock conditions across the site. The results of the tactile test pits are presented in Table 1. An existing mobile home and septic system are located on Lot 1 and will remain. Septic records for Lot 1 are presented in Appendix F. An infiltrator system installed in 2002 is presently located on the site.

The Natural Resource Conservation Service (Reference 3), previously the Soil Conservation Service (Reference 4) has been mapped with four soil descriptions. The Soil Survey Map (Reference 3) is presented in Figure 4, and the Soil Survey Descriptions are presented in Appendix E. The soils are described as having moderately rapid to rapid percolation rates.

Soils encountered in the tactile test pits consisted of sandy loam to loamy sand. The limiting layers encountered in the test pits are the sandy loam, which corresponds to an LTAR value of 0.50 gallons per day per square foot. The conditions encountered in test pits are suitable for a conventional OWTS. Signs of seasonal shallow groundwater or bedrock were not observed in the test pits, which were excavated to 8 feet.

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems and that contamination of surface and subsurface water resources should not occur provided the OWTS sites are evaluated and installed according to El Paso County Guidelines and properly maintained. A Septic Suitability Map is presented in Figure 9. Absorption fields must be located a minimum of 100 feet from any well, including those on adjacent properties. Absorption fields must also be located a minimum of 50 feet from any ponded areas and 25 feet from dry gulches. It should be noted that additional testing will be required for the individual lots prior to construction on each lot.

## 9.0 EROSION CONTROL

The soil types observed on the site are mildly to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils become increasingly less susceptible to water erosion. For the typical soils observed on-site, allowable velocities on unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

## 10.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. The majority of these conditions can be mitigated through proper engineering design and construction practices. The proposed development and use is consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Individual investigations for building sites will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report. Reporting such discrepancies to Entech Engineering, Inc. soon after they are discovered would be greatly appreciated and could possibly help avoid construction and development problems.

This report has been prepared for Avalor Real Estate for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

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**TABLE**

**Table 1: Summary of Percolation Test and Tactile Test Pit Results**

<b>Test Pit No.</b>	<b>USDA Soil Type Limiting Layer</b>	<b>LTAR Value</b>	<b>Depth to Bedrock (ft.)</b>	<b>Depth to Seasonally Occurring Groundwater (ft.)</b>
1	2A	0.50	N/A	N/A
2	2A	0.50	N/A	N/A

## FIGURES

Dave Dillman  
Performance Horses

Scott Rd

Scott Rd

Scott Rd

Scott Rd

E Range Blvd

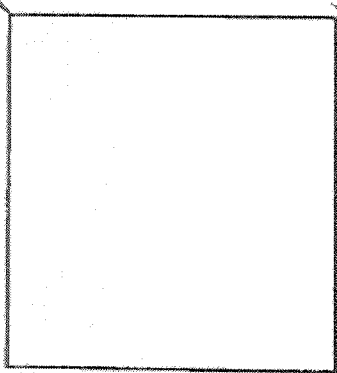
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N Ellicott Hwy

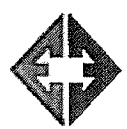
SITE



NCAF Maintenance



N



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VICINITY MAP  
MOUNTAINS TO VIEW ESTATES  
11150 NORTH ELlicOTT HIGHWAY  
EL PASO COUNTY, CO.  
FOR: AVALAR REAL ESTATE

DRAWN:  
LLL

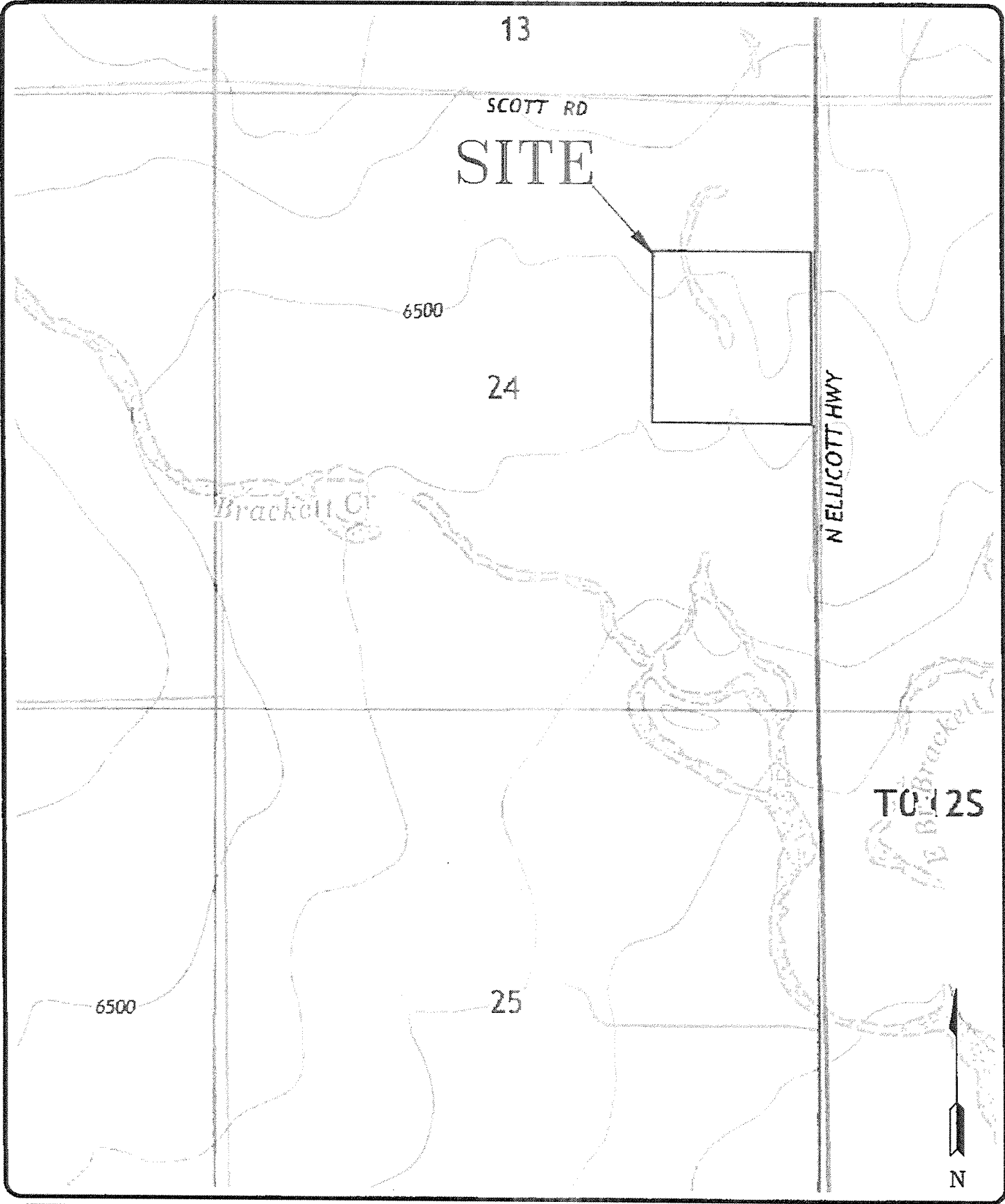

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180343

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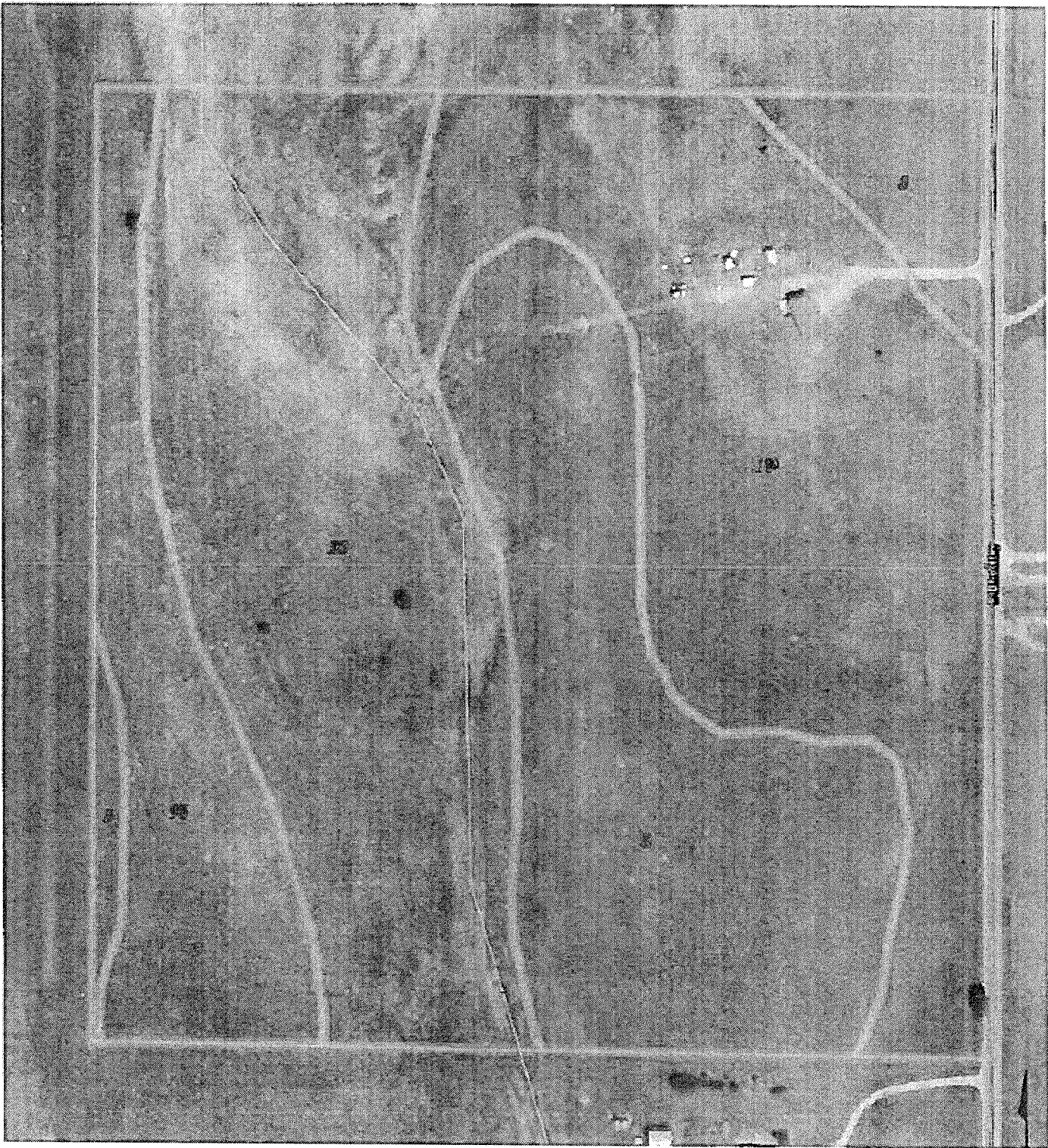
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505 ELKTON DRIVE  
 COLORADO SPRINGS, CO 80907 (719) 531-2599

**USGS MAP**  
**MOUNTAINS TO VIEW ESTATES**  
 11150 NORTH ELLICOTT HIGHWAY  
 EL PASO COUNTY, CO.  
 FOR: AVALAR REAL ESTATE

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**JOB NO.:**  
180343

**FIG NO.:**  
2



Landmark



**ENTECH**  
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 303 ELKTON DRIVE  
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**SOIL SURVEY MAP**  
**MOUNTAINS TO VIEW ESTATES**  
 11150 NORTH ELICOTT HIGHWAY  
 EL PASO COUNTY, CO.  
 FOR: AVALAR REAL ESTATE

JOB NO:  
**180343**

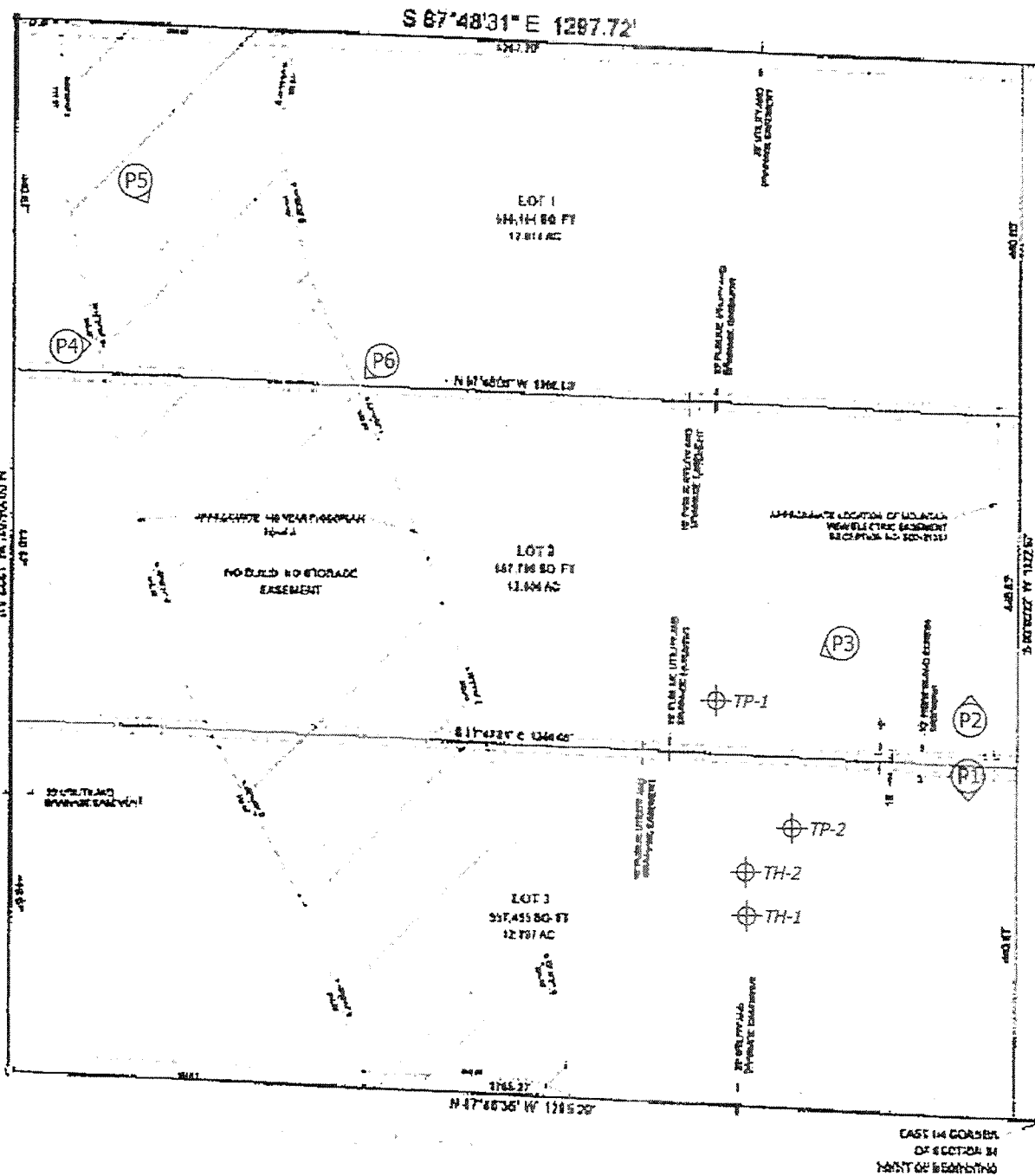
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**3/23/18**

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DATE:



- APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER
- APPROXIMATE TEST PIT LOCATION AND NUMBER
- APPROXIMATE TEST HOLE LOCATION AND NUMBER (GEOQUEST, LLC)



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**SITE CONCEPT PLAN**  
**MOUNTAINS TO VIEW ESTATES**  
11150 NORTH ELICOTT HIGHWAY  
EL PASO COUNTY, CO.  
FOR: AVALAR REAL ESTATE

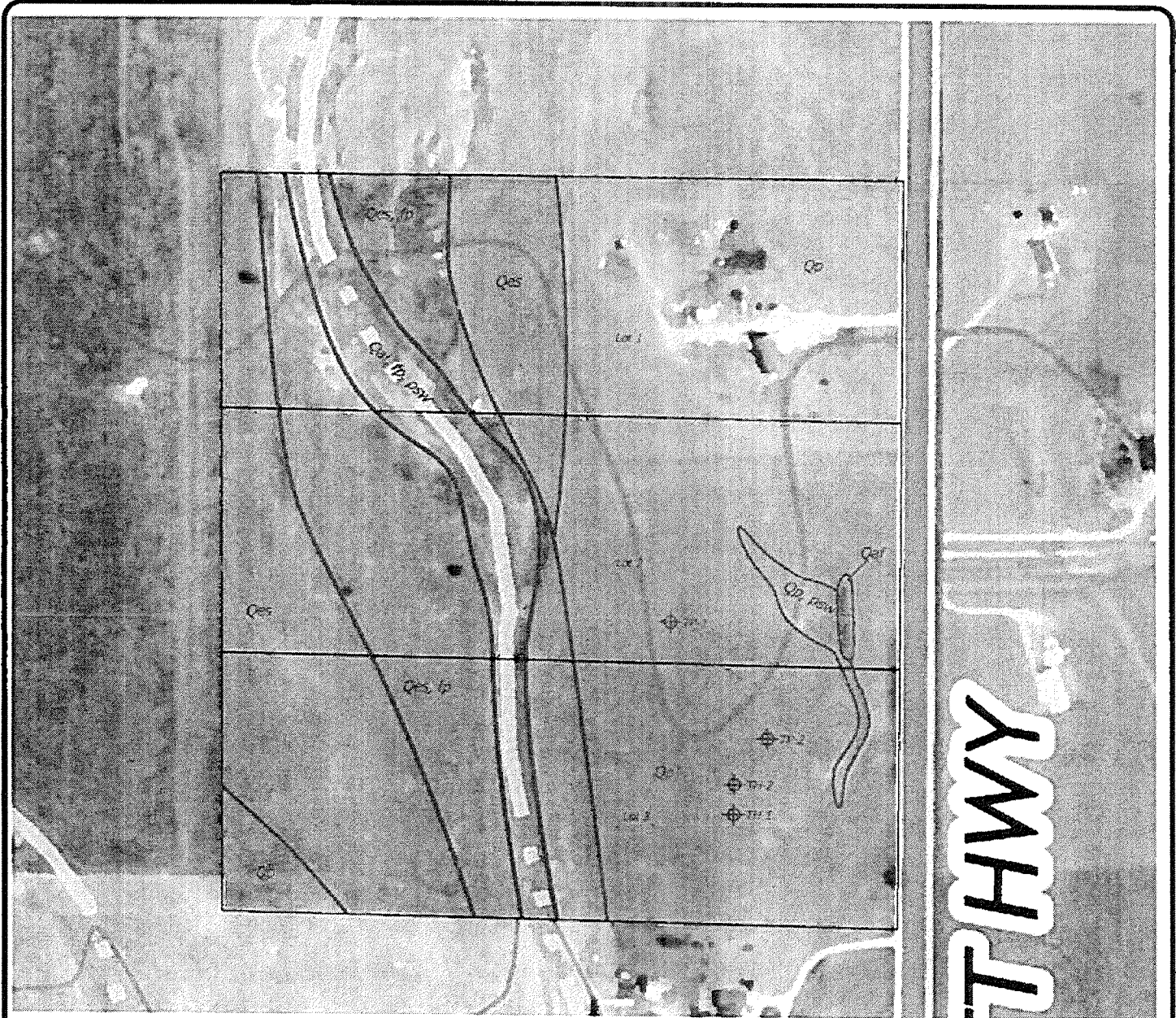
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**180343**

FIG NO.:  
**3**








**LEGEND:**

- Qal* - Recent Alluvium of Holocene Age:  
recent water deposited materials
- Qaf* - Artificial Fill of Holocene Age:  
recent man-made fill deposits
- Qp* - Piney Creek Alluvium of Quaternary Age:  
water deposited sands, and clays
- Qes* - Eolian Sand of Quaternary Age:  
wind blown sand deposits
  
- fp* - floodplain
- psw* - potential seasonal shallow water
- ⊕ - Test Pit/ Test Hole

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505 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-2779

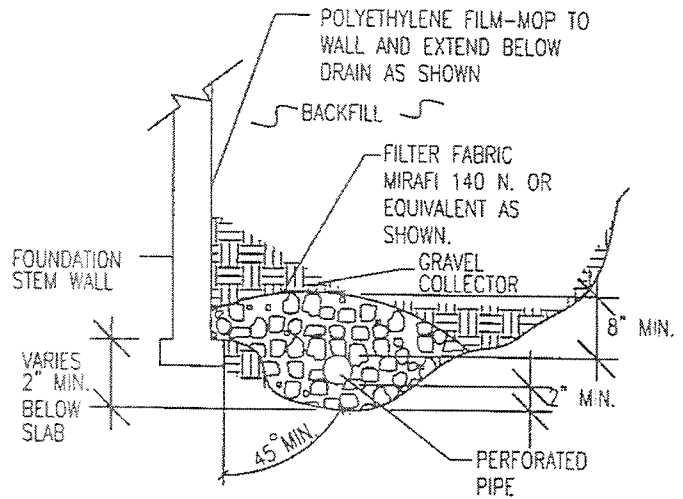
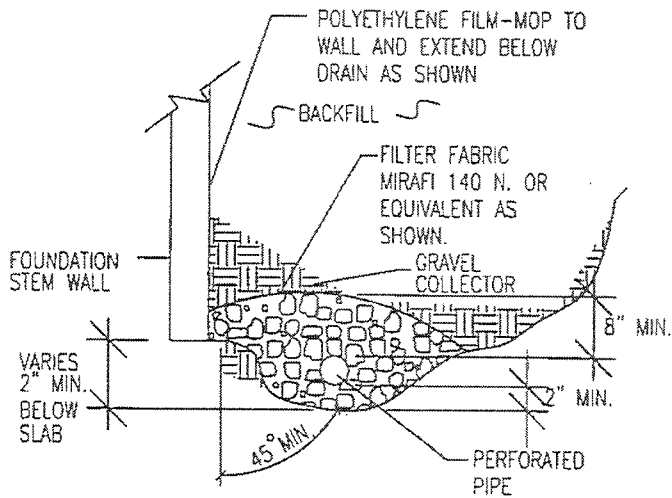
**GEOLOGY/ENGINEERING GEOLOGY MAP**  
MOUNTAINS TO VIEW ESTATES  
11150 NORTH ELLICOTT HIGHWAY  
EL PASO COUNTY, CO.  
FOR: AVALAR REAL ESTATE

DRAWN: LLL	DATE: 4/5/18	CHECKED:	DATE:
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JOB NO.:  
**180343**

FIG NO.:  
**6**





NOTES:

-GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS-85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

-PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4-INCH DIAMETER IS MOST OFTEN USED.

-ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON-PERFORATED PIPE.

-FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

-MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

-DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUTFALL IS NOT AVAILABLE.



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505 ELKTON DRIVE  
COLORADO SPRINGS, CO. 80907 (719) 531-5599

*PERIMETER DRAIN DETAIL*

DRAWN:

DATE:

DESIGNED:

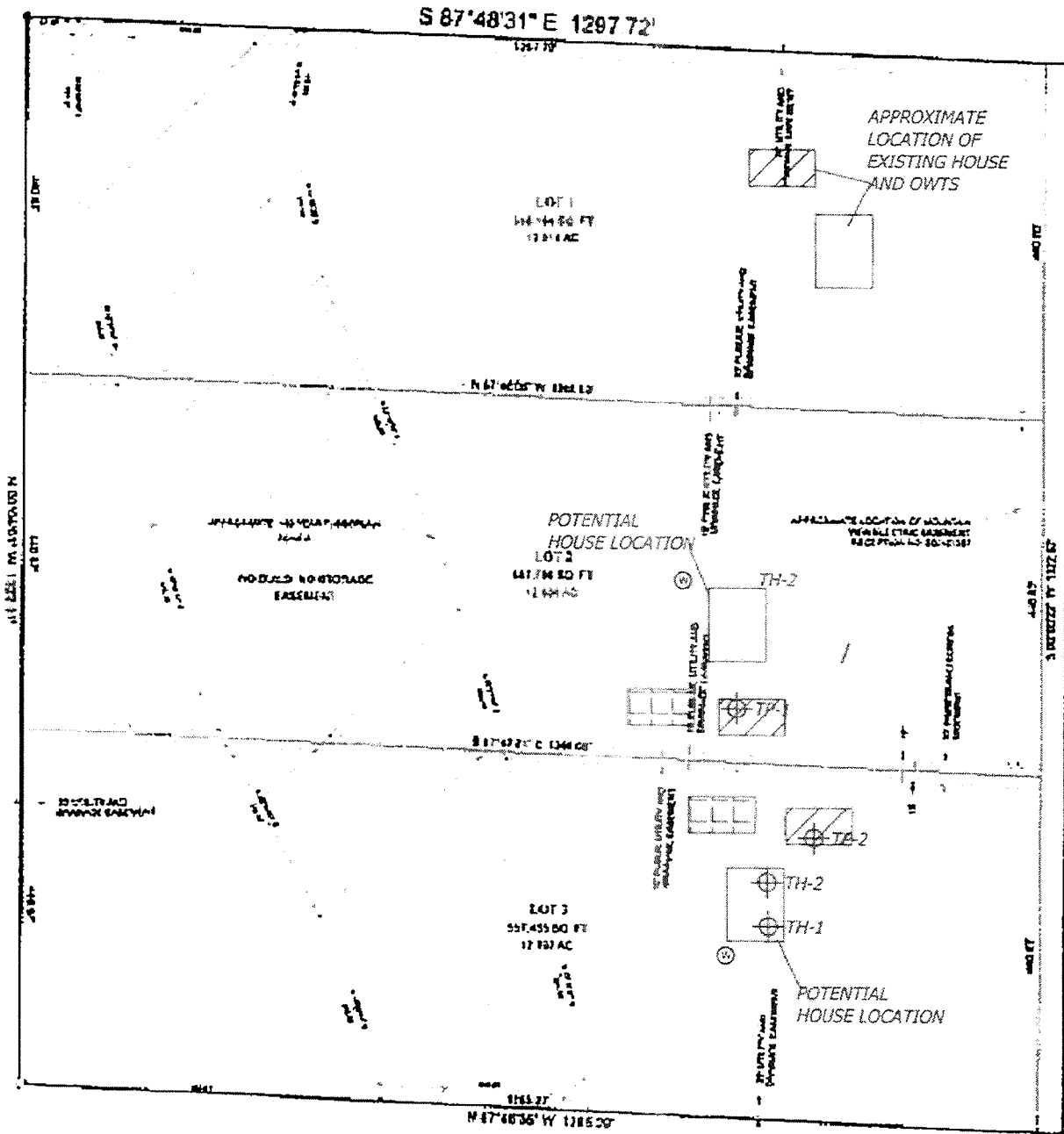
CHECKED:




JOB NO.:

180343

FIG NO.:

8



-  POTENTIAL OWTS LOCATION
-  POTENTIAL ALTERNATE OWTS LOCATION
-  -POTENTIAL WATER WELL LOCATION

\*OWTS MUST BE KEPT A MINIMUM OF 100' FROM ANY WATER WELL  
 \*OWTS LOCATIONS ARE NOT FINAL  
 \*LOT SPECIFIC INVESTIGATION WILL BE REQUIRED PRIOR TO CONSTRUCTION

EAST 1/4 CORNER  
 OF SECT 24 IN  
 T8N R10E



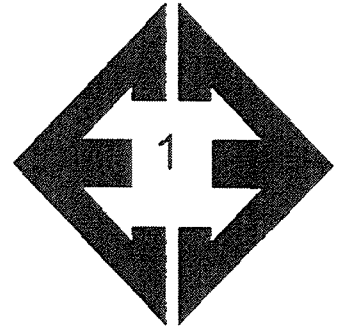
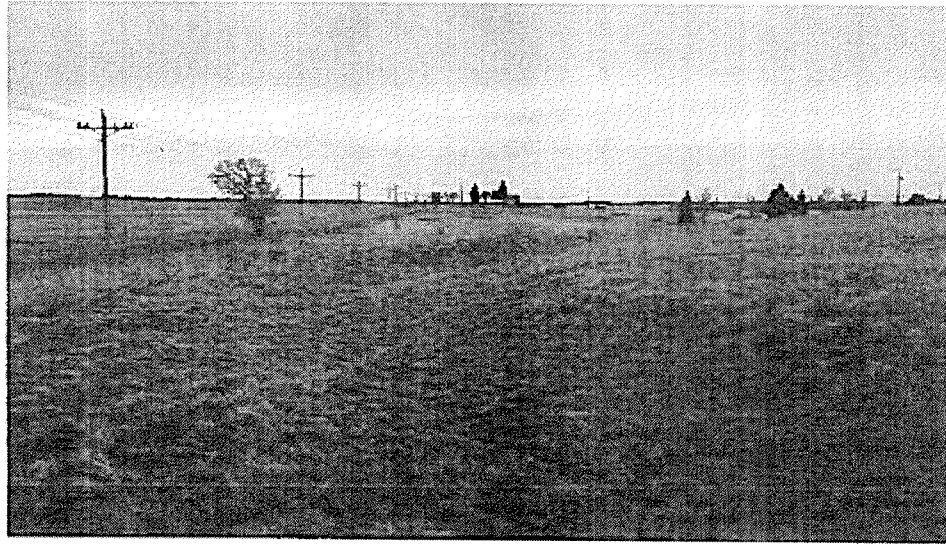
**ENTECH**  
 ENGINEERING, INC.  
 505 ELKTON DRIVE  
 COLORADO SPRINGS, CO. 80907 (719) 531-5299

OWTS SUITABILITY MAP  
 MOUNTAINS TO VIEW ESTATES  
 11150 NORTH ELICOTT HIGHWAY  
 EL PASO COUNTY, CO.  
 FOR: AVALAR REAL ESTATE

DRAWN: LLL	DATE: 4/5/18	CHECKED:	DATE:
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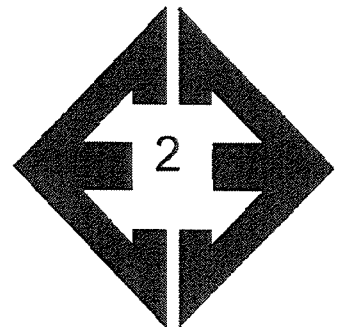
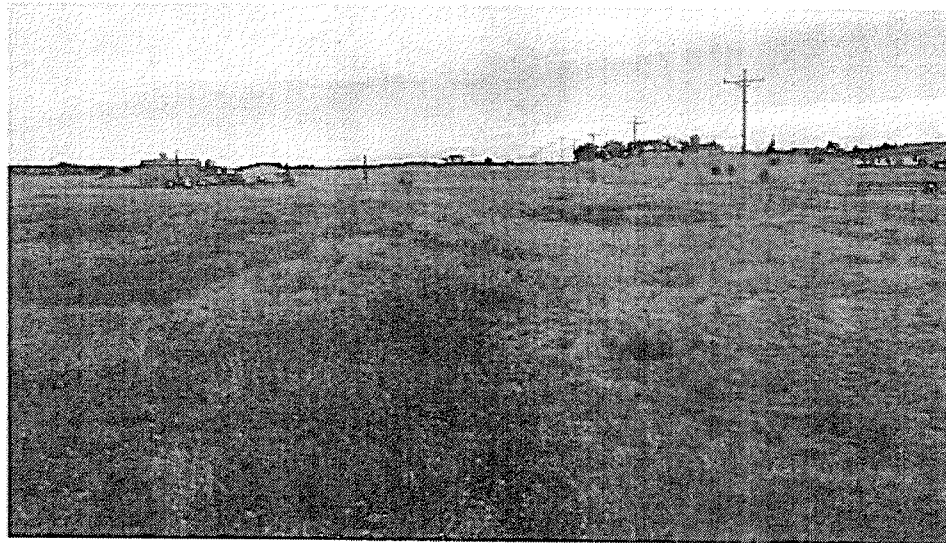
JOB NO.:  
**180343**  
 FIG NO.:  
 9

## **APPENDIX A: Site Photographs**



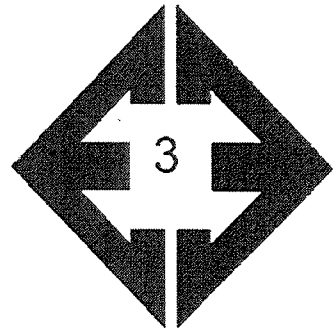
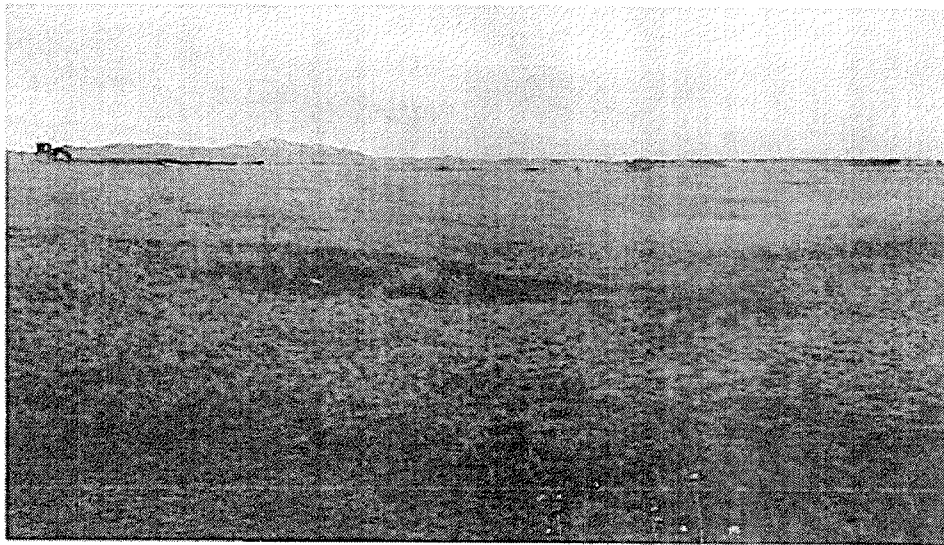
Looking south from the eastern portion of the site.

March 10, 2018



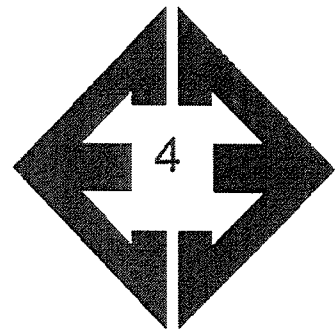
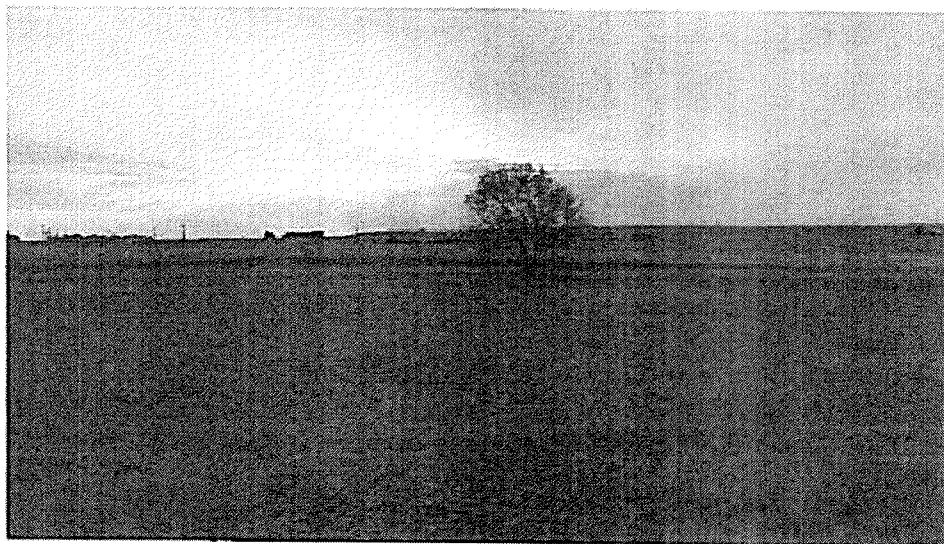
Looking north from the eastern portion of the site.

March 10, 2018



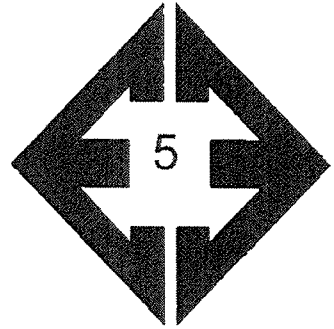
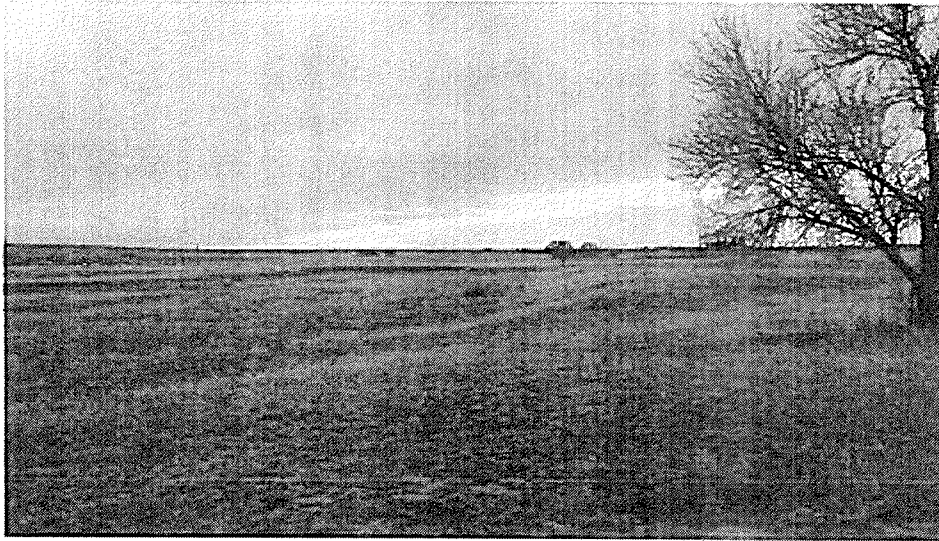
Looking west from the eastern portion of the site.

March 10, 2018



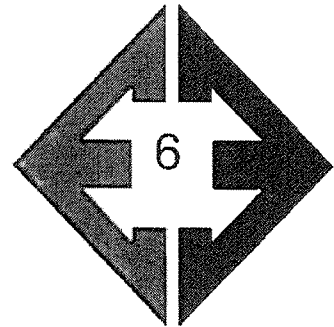
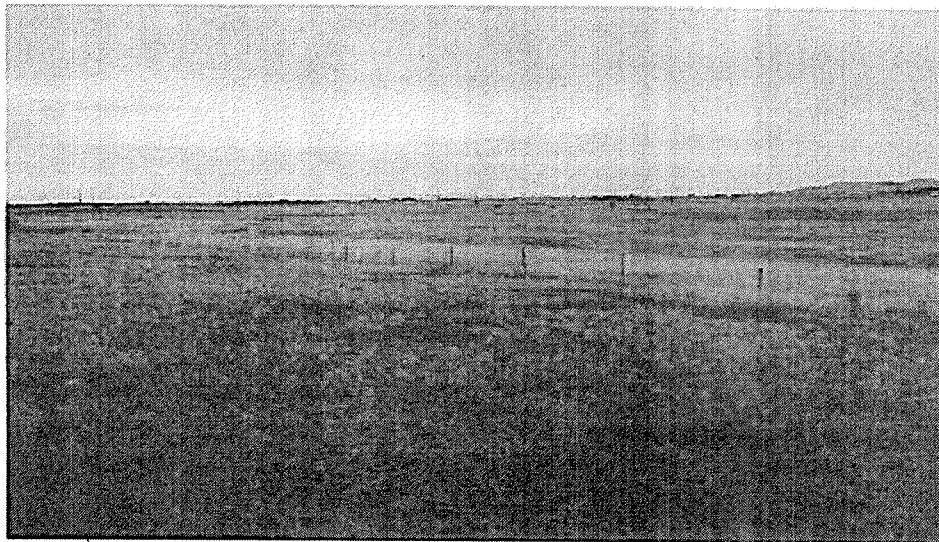
Looking east from the northwestern portion of the site.

March 10, 2018



Looking southeast  
from the northwestern  
portion of the site.

March 10, 2018



Looking southeast  
from the central  
portion of the site.

March 10, 2018



## **APPENDIX B: Test Pit Logs**

TEST PIT NO. 1  
 DATE EXCAVATED 3/10/2018  
 Job # 180343

TEST PIT NO. 2  
 DATE EXCAVATED 3/10/2018  
 CLIENT AVALAR REAL ESTATE  
 LOCATION 11150 N. ELLICOTT HWY

REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type	REMARKS	Depth (ft)	Symbol	Samples	Soil Structure Shape	Soil Structure Grade	USDA Soil Type
topsoil, sandy loam, brown	1	[Symbol]					topsoil, sandy loam, brown	1	[Symbol]				
sandy loam, fine to medium grained, light brown	2	[Symbol]		gr	w	2A	sandy loam, fine to medium grained, light brown	2	[Symbol]		gr	w	2A
	3	[Symbol]						3	[Symbol]				
loamy sand, fine to coarse grained, tan	4	[Symbol]						4	[Symbol]				
	5	[Symbol]		sg		1	loamy sand, fine to coarse grained, tan	5	[Symbol]		sg		1
	6	[Symbol]						6	[Symbol]				
	7	[Symbol]						7	[Symbol]				
	8	[Symbol]						8	[Symbol]				
	9	[Symbol]						9	[Symbol]				
	10	[Symbol]						10	[Symbol]				

Soil Structure Shape

granular - gr  
 platy - pl  
 blocky - bl  
 prismatic - pr  
 single grain - sg  
 massive - ma

Soil Structure Grade

weak - w  
 moderate - m  
 strong - s  
 loose - l



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST PIT LOG

DRAWN:

DATE:

CHECKED:

DATE:

LLL

4/5/18

JOB NO.:

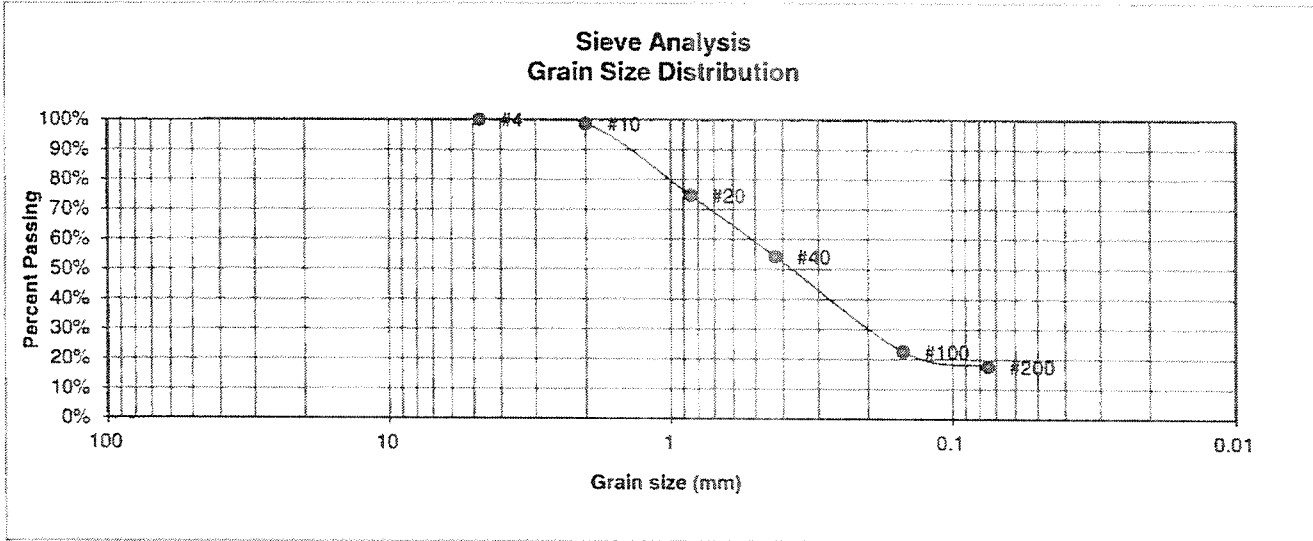
180343

FIG NO.:

B-1

## **APPENDIX C: Laboratory Test Results**

BORING NO.	TP-1	<u>UNIFIED CLASSIFICATION</u>	SM	<u>TEST BY</u>	BL
DEPTH(ft)	2-3	<u>AASHTO CLASSIFICATION</u>		<u>JOB NO.</u>	180343
CLIENT	AVALAR REAL ESTATE				
PROJECT	11150 N. ELLICOTT				



<u>U.S. Sieve #</u>	<u>Percent Finer</u>	<u>Atterberg Limits</u>
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4	100.0%	<u>Swell</u>
10	98.7%	Moisture at start
20	74.7%	Moisture at finish
40	54.3%	Moisture increase
100	22.6%	Initial dry density (pcf)
200	17.8%	Swell (psf)



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN

DATE

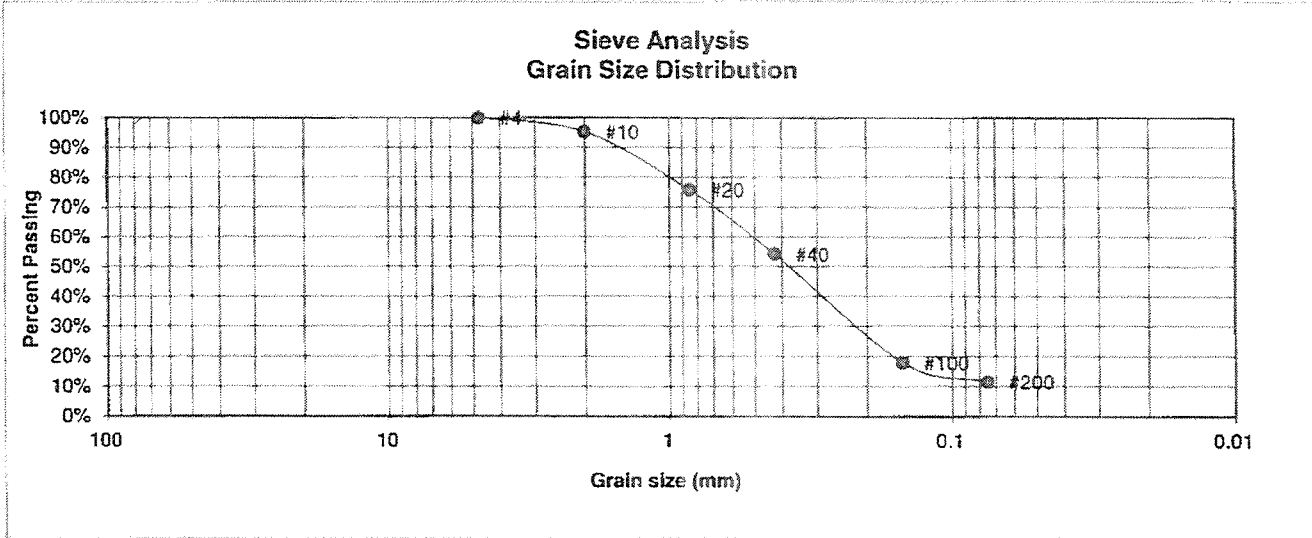
CHECKED:  
LLL

DATE  
3/19/18

JOB NO.:  
180343

FIG NO.:  
2-1

BORING NO.	TP-1	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	5-6	AASHTO CLASSIFICATION		JOB NO.	180343
CLIENT	AVALAR REAL ESTATE				
PROJECT	11150 N. ELLICOTT				



U.S. Sieve #	Percent Finer	Atterberg Limits
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		
4	100.0%	<u>Swell</u>
10	95.3%	Moisture at start
20	75.9%	Moisture at finish
40	54.2%	Moisture increase
100	18.0%	Initial dry density (pcf)
200	11.6%	Swell (psf)



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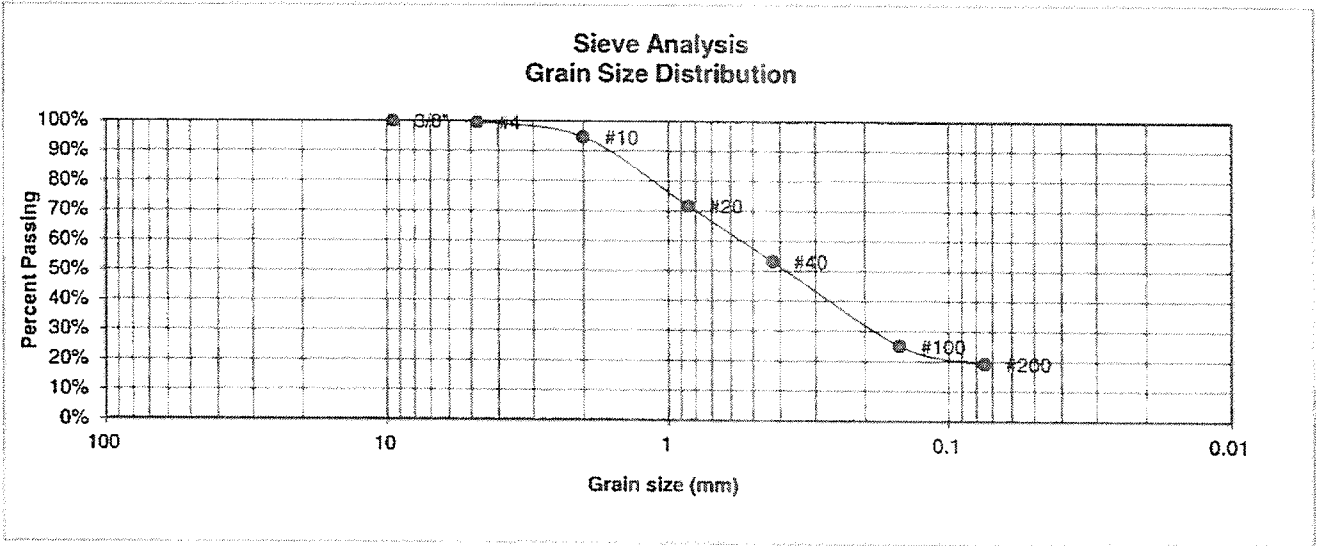
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE	CHECKED LLL	DATE 3/19/18
--------	------	----------------	-----------------

JOB NO:  
180343

FIG NO:  
C-2

BORING NO.	TP-2	UNIFIED CLASSIFICATION	SM	TEST BY	BL
DEPTH(ft)	2-3	AASHTO CLASSIFICATION		JOB NO.	180343
CLIENT	AVALAR REAL ESTATE				
PROJECT	11150 N. ELLICOTT				



<u>U.S. Sieve #</u>	<u>Percent Finer</u>	<u>Atterberg Limits</u>
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"	100.0%	
4	99.6%	<u>Swell</u>
10	94.6%	Moisture at start
20	71.7%	Moisture at finish
40	53.2%	Moisture increase
100	25.2%	Initial dry density (pcf)
200	19.3%	Swell (psf)

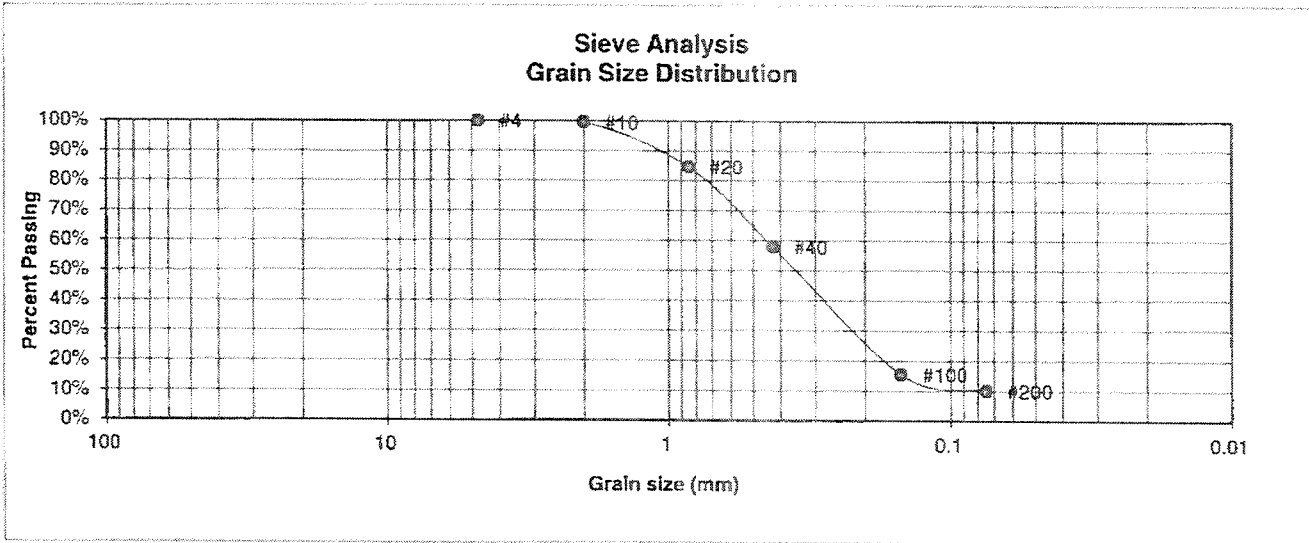


LABORATORY TEST RESULTS			
DRAWN:	DATE:	CHECKED:	DATE:
		LL	3/19/18

JOB NO  
180343

F-G NO:  
C-3

BORING NO.	TP-2	UNIFIED CLASSIFICATION	SM-SW	TEST BY	BL
DEPTH(ft)	5-6	AASHTO CLASSIFICATION		JOB NO.	180343
CLIENT	AVALAR REAL ESTATE				
PROJECT	11150 N. ELLICOTT				



<u>U.S. Sieve #</u>	<u>Percent Finer</u>	<u>Atterberg Limits</u>
3"		Plastic Limit
1 1/2"		Liquid Limit
3/4"		Plastic Index
1/2"		
3/8"		<u>Swell</u>
4	100.0%	Moisture at start
10	99.5%	Moisture at finish
20	84.7%	Moisture increase
40	58.0%	Initial dry density (pcf)
100	15.7%	Swell (psf)
200	10.1%	



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN:	DATE	CHECKED LLL	DATE 3/17/18
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JOB NO.  
180343

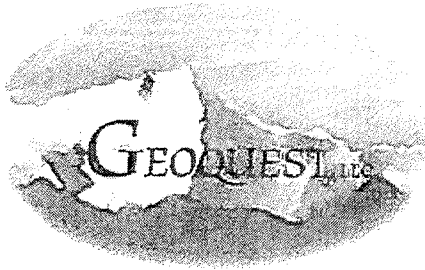
FIG NO.

C-4

**APPENDIX D: Geoquest, LLC, Soils Report,**

**February 13, 2018, Job No. 18-0058**





6825 Silver Ponds Heights #101  
Colorado Springs, CO 80908  
(719) 481-4560

---

SOILS REPORT  
FOR  
APEX CONSTRUCTION

JOB #18-0058

11150 North Ellicott Highway,  
El Paso County,  
Colorado

Respectfully submitted,

  
Charles E. Milligan, P.E.  
Civil Engineer



## TABLE OF CONTENTS

INTRODUCTION	1
CONCLUSIONS	1
GENERAL	1
FIELD AND LABORATORY INVESTIGATION	1
TOPOGRAPHY	2
WEATHER	2
DESIGN AND CONSTRUCTION CONSIDERATIONS	2 - 3
RECOMMENDATION REMARKS	3
COLD TEMPERATURE CONSIDERATIONS	3
SURFACE DRAINAGE	4
SUBSURFACE DRAINAGE	4
REINFORCING	4
FOOTING DESIGN	4
CONSTRUCTION DETAILS	4
MINIMUM MATERIALS SPECIFICATIONS	5
OPEN HOLE OBSERVATION	5
LOGS	6
SITE MAP	7
SIEVE ANALYSIS RESULTS	8
PERIMETER DRAIN SKETCH	9
LIMITATIONS	10

## INTRODUCTION

The owners must be made aware of the contents of this report. If there are any questions or concerns regarding the information in this report please contact us. This is to ensure that the recommendations and requirements of the report, especially regarding the surface drainage, are acknowledged and followed. This report is prepared for Apex Construction on 11150 North Ellicott Highway, El Paso County, Colorado. It is my understanding that a single-family residence is planned for this site. The site is currently vacant.

## CONCLUSIONS

A satisfactory foundation for this structure is a properly designed shallow foundation system consisting of foundation components resting directly on undisturbed materials. Foundation components resting directly on undisturbed materials shall be designed for a loading of not greater than 1,000 pounds per square foot. Any design by any engineer is subject to revision based on the results of the open hole observation. The compressibility of this material is low. This bearing capacity is calculated with a safety factor of three. The type of foundation configuration used depends on the building loads applied. The depth of foundation elements shall be determined by the foundation engineer, but should be at least as deep as the minimum depth required by the governing building authority. The laboratory testing revealed that the on-site soil is silty sand (U.S.C. Classification Symbol SM). The unit weight of equivalent fluid soil pressure of this material is 40 (SM) pounds per cubic foot. The owners shall be made aware that movement will occur if surface or subsurface water is allowed to collect around the foundation wall.

## GENERAL

The investigation was made to reveal important characteristics of the soils and of the site influencing the foundation design. Also evaluated during the investigation were subsurface conditions that affect the depth of the foundation and subsequent loading design, such as ground water levels, soil types, and other factors which affect the bearing capacity of the soils. Design loadings are based on soils characteristics and represent the maximum permissible loads for these conditions.

## FIELD AND LABORATORY INVESTIGATION

Two exploratory holes were drilled on January 22, 2018, at the location shown on the enclosed site map. The location of these test holes were determined by Apex Construction. The test holes was drilled with a 4-inch diameter auger. At intervals anticipated to be the foundation depths, and as determined by the soils conditions, the drill tools were removed and samples were taken by the use of a 2-inch split barrel sampler connected to a 140-pound drop-hammer. This hammer is dropped 30 inches to drive the penetration sampler into the soil (ASTM D-1586). The depths and descriptions of the materials encountered in each test boring at which the samples were taken are shown on the enclosed log sheets. All samples were classified both in the field and in the laboratory to evaluate the physical and mechanical properties of the materials encountered.

## TOPOGRAPHY

The topography of this site is that of an incline sloping down towards the southeast at 3%.

## WEATHER

The weather at the time of the soil examination consisted of clear skies with cold temperatures.

## DESIGN AND CONSTRUCTION CONSIDERATIONS

Residential basement slabs-on-grade may move and crack. Vertical slab movement of one to three inches is considered normal for soils of low to moderate expansion potential and for compacted structural fill after removal of highly expansive soils. In some cases, vertical movement may exceed this range. If movement and associated damage to basement floors and finish cannot be tolerated, a structural floor system should be installed. If compaction is not performed, settlement may occur causing cracking of foundation walls and floors. Soil located beneath concrete walls shall be compacted to at least 95% Modified Proctor density. Soil located beneath concrete floors shall be compacted to at least 85% Modified Proctor density. Special care is to be taken to re-compact the material above utility lines to a minimum of 85% Modified Proctor density. During construction, conditions that could cause settlement shall be eliminated. Interior non-bearing partition walls shall be constructed such that they do not transmit floor slab movement to the roof or overlying floor. The gap or void (1.5" min.) installed in these non-bearing partitions may require re-construction over the life of the structure to re-establish the gap or void to allow for vertical slab movement. Stairwells, doorways and sheeted walls should be designed for this movement. The following are general recommendations of on-grade slabs:

1. Slabs shall be placed on well-compacted, non-expansive materials, and all soft spots shall be thoroughly excavated and replaced with non-expansive fill materials as stated above.
2. Separate the slab from all foundation walls, load bearing members, and utility lines.
3. At intervals not to exceed 12 feet in each direction, provide control joints to reduce problems with shrinkage and curling as recommended by the American Concrete Institute (ACI). Moisten the ground beneath the slab prior to placement of concrete.
4. All concrete placed must be cured properly as recommended by the American Concrete Institute (ACI). Separate load bearing members from slabs, as discussed above. Care must be exercised to prevent excess moisture from entering the soil under the structure, both during and after construction.

#### DESIGN AND CONSTRUCTION CONSIDERATIONS (CONTINUED)

5. Due to the exposure of exterior concrete to variations in moisture fluctuations, heaving and cracking of exterior slabs-on-grade should be expected. Placement of at least 3 feet of non-expansive fill beneath the slabs can help to reduce the impact of differential movement and cracking but may not eliminate movement.
6. The soil has been analyzed for its expansion and/or consolidation potential. Basement slabs, garage slabs, and all concrete floor slabs, however, exert a very low dead-load pressure on the soil. Since this soil contains at least a small amount of expansion potential, slabs will crack and heave or settle if excess water is allowed to penetrate the sub-grade. For example, column openings to pads below the placed slab, if exposed to precipitation during construction, will conduct water to the sub-grade, possibly causing it to expand. Also, if the slab is placed with concrete too wet, expansion may occur. We recommend 3,000 psi concrete placed at a maximum slump of 4 inches.

#### RECOMMENDATION REMARKS

The recommendations provided in this report are based upon the observed soil parameters, anticipated foundation loads, and accepted engineering procedures. The recommendations are intended to minimize differential movement resulting from the heaving of expansive soil or from the settlement induced by the application of loads. It must be recognized that the foundation will undergo some movement on all soil types. In addition, concrete floor slabs will move vertically, therefore, adherence to those recommendations which isolate floor slabs from columns, walls, partitions or other structural components is extremely important, if damage to the superstructure is to be minimized. Any subsequent owners should be apprised of the soil conditions and advised to maintain good practice in the future with regard to surface and subsurface drainage and partition framing, drywall and finish work above floor slabs.

Geoquest, LLC does not assure that the contractor and/or homeowner will comply with the recommendations provided in this report. Geoquest, LLC provides recommendations and requirements only and does not supervise, direct or control the implementation of such.

#### COLD TEMPERATURE CONSIDERATIONS

1. Concrete shall not be placed upon frozen soil.
2. Concrete shall be protected from freezing until it has been allowed to cure for at least 7 days after placement in forms.
3. Snow or other frozen water shall not be allowed in the forms during placement of concrete.

#### COLD TEMPERATURES CONSIDERATIONS (CONTINUED)

4. Concrete shall be cured in forms for at least 72 hours.
5. The site shall be kept well drained at all times.

#### SURFACE DRAINAGE

After construction of foundation walls, the backfill material shall be well compacted to 80% Modified Proctor density, to prevent future settlement. Any areas that settle after construction shall be filled to eliminate ponding of water adjacent to the foundation walls. The finished grade shall have a positive slope away from the structure with an initial slope of 6" in the first 10'. If a 10' zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum of 5' from the foundation and sloped parallel with the wall at a 2% grade to intercept the surface water and carry it around and away from the structure. Homeowners shall maintain the surface grading and drainage installed by the builder to prevent water directed in the wrong direction. All downspouts shall have splash blocks that will remove runoff to outside the foundation area and carried across backfill zones. No irrigation devices shall be placed within 7' of the foundation. Shrubs and plants requiring minimal watering shall be established in this area. Irrigated grass shall not be located within 5' of the foundation. Sprinklers shall not discharge water within 5' of the foundation. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of floor slab and foundation movement.

#### SUBSURFACE DRAINAGE

The necessity for perimeter drains will be determined at the time of the Open Hole Observation.

#### REINFORCING

The concrete foundation walls shall be properly reinforced as per the specific design for this foundation by a Professional Engineer. Exact requirements are a function of the design of the structure. Questions concerning the specific design requirements shall be referred to the design engineer.

#### FOOTING DESIGN

The design for footings for this structure is determined by applying the dead load and full live load to the foundation walls.

#### CONSTRUCTION DETAILS

It is necessary with any soils investigation to assume that the materials from the test holes are representative of the materials in the area. On occasion variations in the subsurface materials do occur, therefore, should such variations become apparent during construction, the owner is advised to contact this office for a determination as to whether these variations will affect the design of the structure's foundation. If clay layers are observed during the excavation for the dwelling, this office should be contacted to determine whether the layers will adversely affect the design.

#### MINIMUM MATERIALS SPECIFICATIONS

1. Minimum materials specifications of the concrete, reinforcing, etc., shall be determined by the Professional Engineer.
2. Compact beneath foundation walls a minimum of 95% Modified Proctor density to prevent settlement.
3. Compact all back-fill material located around the perimeter of the foundation to a minimum of 80% Modified Proctor density.
4. Concrete shall be vibrated or rodded in forms to avoid segregation and cold joints.
5. The site shall be kept well drained at all times.

#### OPEN HOLE OBSERVATION (added cost)

If anyone other than Geoquest performs the Open Hole Observation, that person/company assumes liability for the soils, and any possible changes to the foundation design.

The owner, or a representative of the construction company shall contact Geoquest, LLC. a minimum of 24 hours prior to excavating for the foundation. An Open Hole Observation must be performed on each individual structure prior to the placement of concrete, and preferably prior to the placement of forms in the excavated area. The failure to request or obtain an Open Hole Observation prior to the placement of foundation components may result in this Soils Report being declared null and void. This is to ensure that soft areas, anomalies, etc., are not present in the foundation region. At the time of the open hole observation the foundation type recommendations, maximum allowable bearing capacity may be revised according to soil conditions found at that time. If revisions are made to the Soils Report Due to the soil conditions of the excavation, the Foundation Design Engineer must be notified of all revisions.



# DRILL LOGS

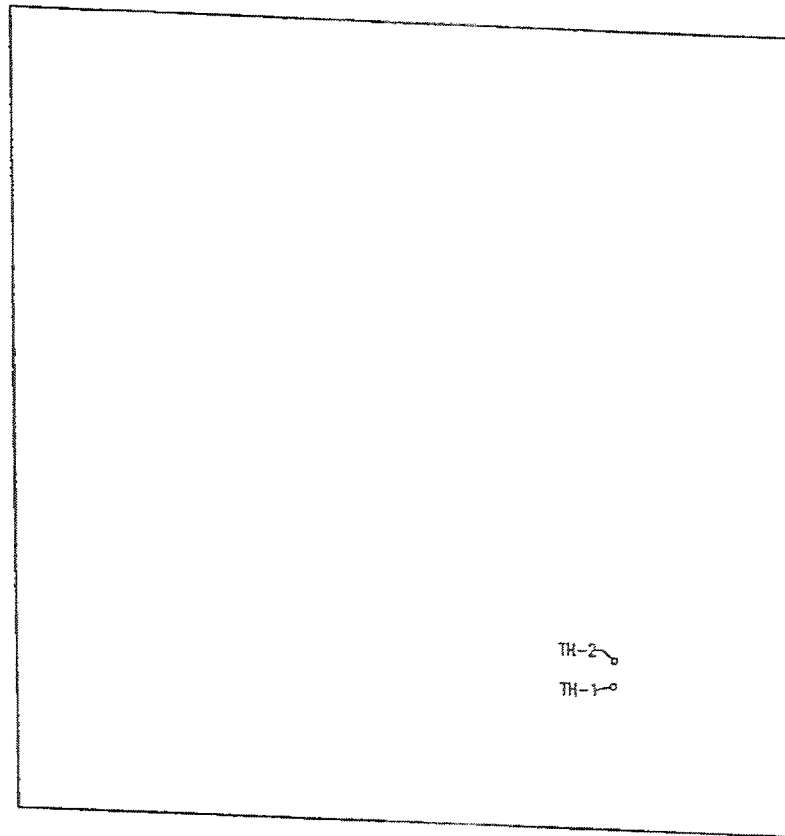
JOB #: 18-0058	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-1						
DATE: 1/22/2018						
0"-6" Topsoil	0-6	X X X				
6"-15' Sand (SM)	6-15					
Fine-coarse grained Low-moderate density Low-moderate moisture content Low clay content Low plasticity Brown color	2					
	4			10	3.8	
	6					
	8					
	10					
	12			15		
	14			12"	6.4	SM
	16					
	18					
	20					

JOB #: 18-0058	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-2						
DATE: 1/22/2018						
0"-6" Topsoil	0-6	X X X				
6"-15' Sand (SM)	6-15					
Fine-coarse grained Low-moderate density Low-moderate moisture content Low clay content Low plasticity Brown color	2					
	4			10	6.6	SM
	6					
	8					
	10					
	12			15		
	14			12"	4.9	
	16					
	18					
	20					



GEOQUEST LLC  
SITE MAP

11150 N Ellicott Hwy  
El Paso County,  
Colorado,  
Job #18-0058



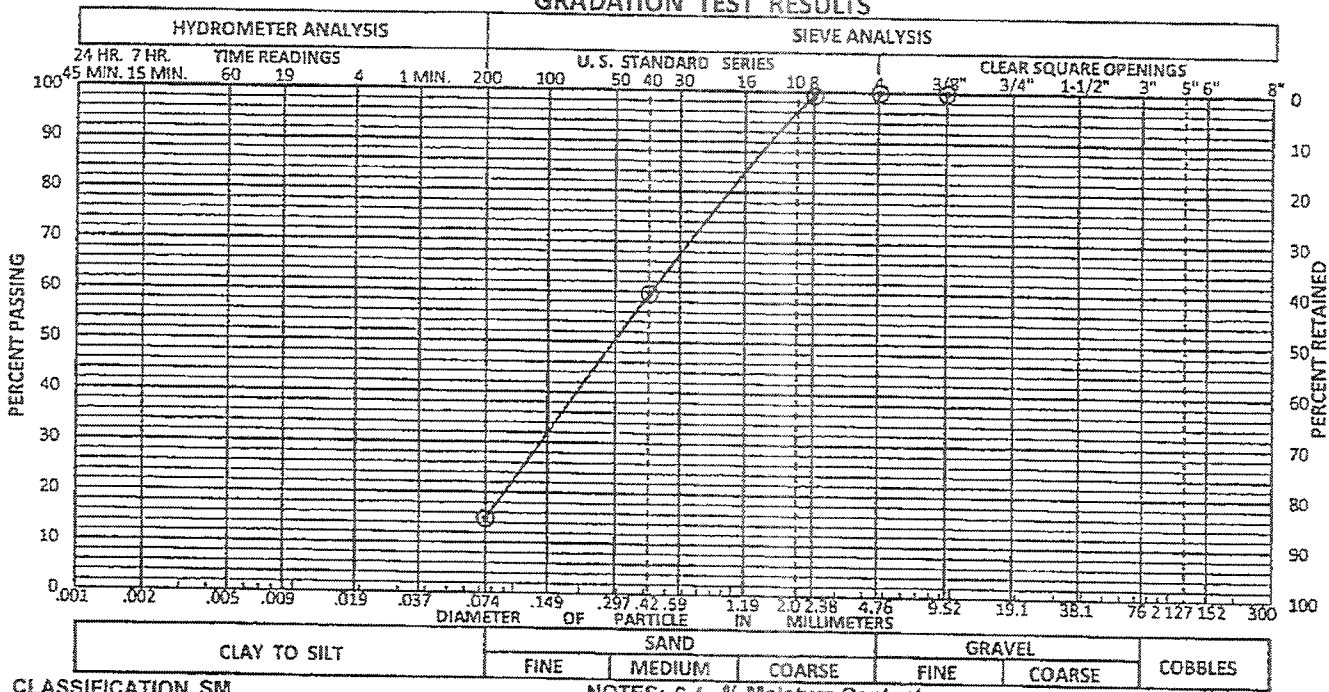
N Ellicott Hwy

TH-2  
TH-1



0 100 200 300  
GRAPHIC SCALE IN FEET  
SCALE: 1" = 300'

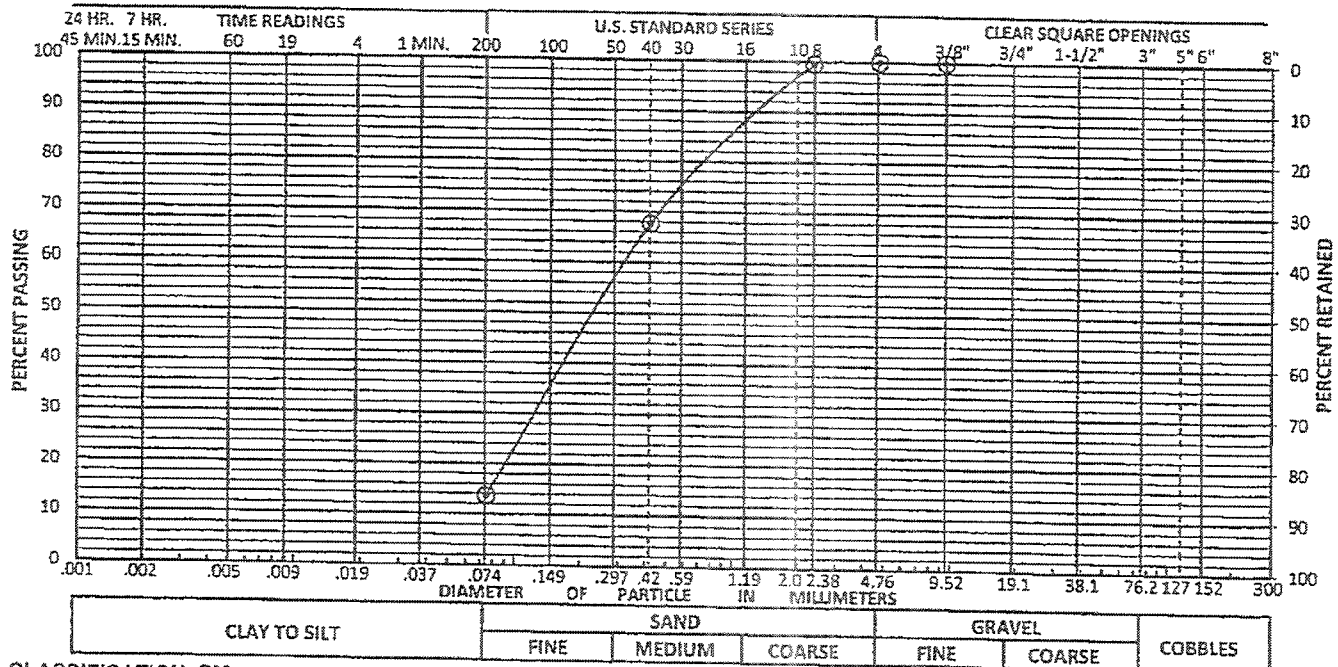
**GEOQUEST LLC  
GRADATION TEST RESULTS**



CLASSIFICATION SM  
 GRAVEL 0.0 %  
 SAND 85.2 %  
 FINES 14.8 %

NOTES: 6.4 % Moisture Content

SAMPLE # 1 HOLE # TH-1 DEPTH 12 FEET



CLASSIFICATION SM  
 GRAVEL 0.0 %  
 SAND 86.4 %  
 FINES 13.5 %

NOTES: 6.6 % Moisture Content

SAMPLE # 1 HOLE # TH-2 DEPTH 4 FEET

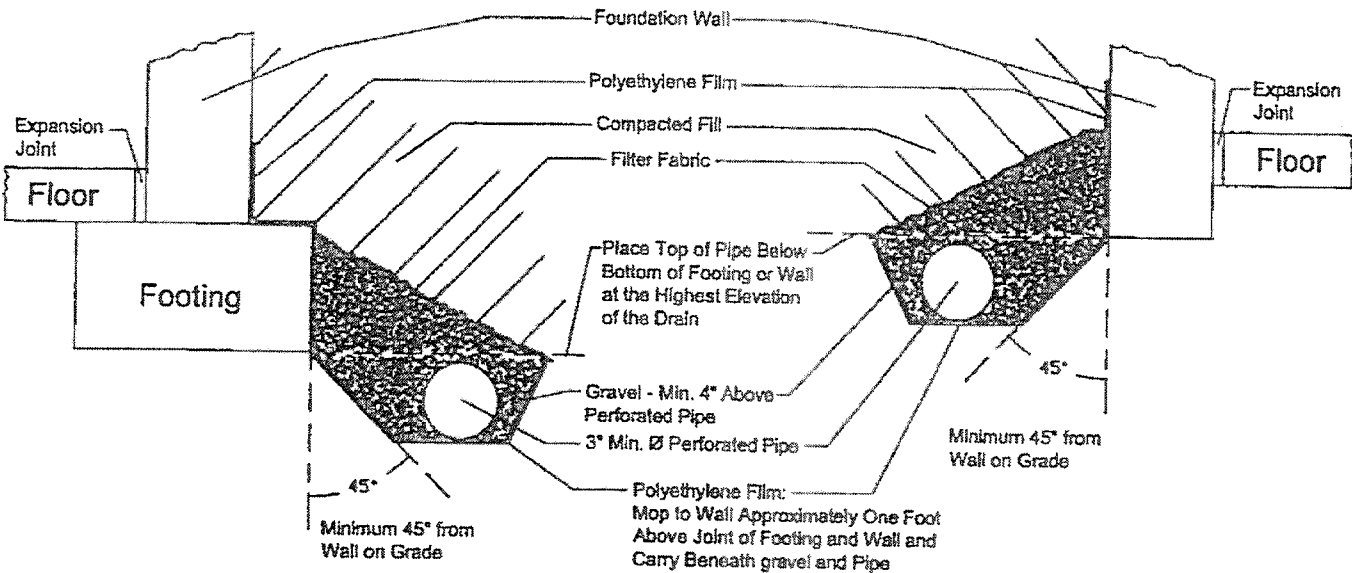
Job #: 18-0058 By: MJ 1/22/2018



## EXTERIOR DRAIN DETAIL

### SPREAD FOOTING TYPE

### WALL ON GRADE TYPE



1. Gravel to be Not More Than 1-1/2" and Not Less Than 1/2" Diameter.
2. Perforated Pipe Diameter Varies With Expected Seepage. 3"Ø and 4"Ø are Most Common. ABS and PVC are Most Common Materials for Pipe.
3. Pipe to be Laid out in a Minimum Slope of 1" in 10'.
4. Gravity Outfall is Desired if Possible. Portion of Pipe in Area Not Drained Shall be Non-Perforated. Daylight Must be Maintained Clear of Debris in Order to Function Properly.
5. If Gravity Outfall is Not Possible, Provide a Sump With Operational Pump. Pump May Not Connect to Any Sanitary or Storm Sewer.
6. Soil Backfill Should be Compacted to at Least 80% of the Modified Proctor Density in the Upper Three Feet of Fill.
7. Filter Fabric to be Mirafi 140s or Approved Equivalent. Roofing Felt and Sheet Plastic are Not Acceptable.
8. Drain Pipe Shall be Laid Below Protected Area, as Shown in The Detail Above.
9. Mop Polyethylene Film to Wall Approximately One Foot Above Joint of Footing and Wall and Carry Beneath Gravel and Pipe.
10. The Polyethylene Film Shall be Continued to the Edge of the Excavation.

## LIMITATIONS

This report is issued based on the understanding that the owner or his representative will bring the information, data, and recommendations contained in this report to the attention of the project engineer and architect, in order that they may be incorporated into the plans for the structure. It is also the owner's responsibility to ensure that all contractors and sub-contractors carry out these recommendations during the construction phase.

This report was prepared in accordance with generally accepted professional geotechnical/engineering methods. However, Geoquest, LLC makes no other warranty, express or implied, as to the findings, data, specifications, or professional advice rendered hereunder.

This report is considered valid as of the present date. The owner acknowledges, however, that changes in the conditions of the property might occur with the passage of time, such as those caused by natural effects or man-made changes, both on this land and on abutting properties. Further, changes in acceptable tolerances or standards might arise as the result of new legislative actions, new engineering advances, or the broadening of geotechnical knowledge. Thus certain developments beyond our control may invalidate this report, in whole or in part.

This report and its recommendations do not apply to any other site than the one described herein and are predicated on the assumption that the soil conditions do not deviate from those described. In the event that any variations or undesirable conditions should be detected during the construction phase or if the proposed construction varies from that planned as of this report date, the owner shall immediately notify Geoquest, LLC in order that supplemental recommendations can be provided, if so required.

## **APPENDIX E: Soil Survey Descriptions**

## El Paso County Area, Colorado

### 8—Blakeland loamy sand, 1 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369v  
*Elevation:* 4,600 to 5,800 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 46 to 48 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Blakeland and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Blakeland

##### Setting

*Landform:* Flats, hills  
*Landform position (three-dimensional):* Side slope, talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

##### Typical profile

*A - 0 to 11 inches:* loamy sand  
*AC - 11 to 27 inches:* loamy sand  
*C - 27 to 60 inches:* sand

##### Properties and qualities

*Slope:* 1 to 9 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Somewhat excessively drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 5 percent  
*Available water storage in profile:* Low (about 4.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e  
*Land capability classification (nonirrigated):* 6e  
*Hydrologic Soil Group:* A  
*Ecological site:* Sandy Foothill (R049BY210CO)  
*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 10—Blendon sandy loam, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 3671  
*Elevation:* 6,000 to 6,800 feet  
*Mean annual precipitation:* 14 to 16 inches  
*Mean annual air temperature:* 46 to 48 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Blendon and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Blendon

##### Setting

*Landform:* Alluvial fans, terraces  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Sandy alluvium derived from arkose

##### Typical profile

*A - 0 to 10 inches:* sandy loam  
*Bw - 10 to 36 inches:* sandy loam  
*C - 36 to 60 inches:* gravelly sandy loam

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Low  
*Capacity of the most limiting layer to transmit water (Ksat):*  
Moderately high to high (0.60 to 2.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 2 percent  
*Available water storage in profile:* Moderate (about 6.2 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* B  
*Ecological site:* Sandy Foothill (R049BY210CO)  
*Hydric soil rating:* No



**Minor Components**

**Other soils**

*Percent of map unit:*  
*Hydric soil rating:* No

**Pleasant**

*Percent of map unit:*  
*Landform:* Depressions  
*Hydric soil rating:* Yes

**Data Source Information**

Soil Survey Area: El Paso County Area, Colorado  
Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 28—Ellicott loamy coarse sand, 0 to 5 percent slopes

#### Map Unit Setting

*National map unit symbol:* 3680  
*Elevation:* 5,500 to 6,500 feet  
*Mean annual precipitation:* 13 to 15 inches  
*Mean annual air temperature:* 47 to 50 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Ellicott and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Ellicott

##### Setting

*Landform:* Flood plains, stream terraces  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Sandy alluvium

##### Typical profile

*A - 0 to 4 inches:* loamy coarse sand  
*C - 4 to 60 inches:* stratified coarse sand to sandy loam

##### Properties and qualities

*Slope:* 0 to 5 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Somewhat excessively drained  
*Runoff class:* Very low  
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* Frequent  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 4.1 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7w  
*Hydrologic Soil Group:* A  
*Ecological site:* Sandy Bottomland LRU's A & B (R069XY031CO)  
*Other vegetative classification:* SANDY BOTTOMLAND (069AY031CO)  
*Hydric soil rating:* No

### Minor Components

#### Fluvaquentic haplaquoll

*Percent of map unit:*

*Landform:* Swales

*Hydric soil rating:* Yes

#### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

## El Paso County Area, Colorado

### 96—Truckton sandy loam, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 36bf  
*Elevation:* 6,000 to 7,000 feet  
*Mean annual precipitation:* 14 to 15 inches  
*Mean annual air temperature:* 46 to 50 degrees F  
*Frost-free period:* 125 to 145 days  
*Farmland classification:* Prime farmland if irrigated and the product of  
I (soil erodibility) x C (climate factor) does not exceed 60

#### Map Unit Composition

*Truckton and similar soils:* 85 percent  
*Estimates are based on observations, descriptions, and transects of  
the mapunit.*

#### Description of Truckton

##### Setting

*Landform:* Flats  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Linear  
*Across-slope shape:* Linear  
*Parent material:* Arkosic alluvium derived from sedimentary rock  
and/or arkosic residuum weathered from sedimentary rock

##### Typical profile

*A - 0 to 8 inches:* sandy loam  
*Bt - 8 to 24 inches:* sandy loam  
*C - 24 to 60 inches:* coarse sandy loam

##### Properties and qualities

*Slope:* 0 to 3 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Very low  
*Capacity of the most limiting layer to transmit water (Ksat):* High  
(1.98 to 6.00 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Available water storage in profile:* Low (about 5.7 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 2e  
*Land capability classification (nonirrigated):* 3e  
*Hydrologic Soil Group:* A  
*Ecological site:* Sandy Foothill (R049BY210CO)  
*Hydric soil rating:* No

### Minor Components

#### Other soils

*Percent of map unit:*

*Hydric soil rating:* No

#### Pleasant

*Percent of map unit:*

*Landform:* Depressions

*Hydric soil rating:* Yes

### Data Source Information

Soil Survey Area: El Paso County Area, Colorado

Survey Area Data: Version 15, Oct 10, 2017

**APPENDIX F: El Paso County Health Department Septic Records**

# 3200000143

EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT  
INDIVIDUAL SEWAGE DISPOSAL SYSTEM INSPECTION FORM

Permit # 4379  
Date 8/22/02

*P* *MS*

APPROVED: YES  NO  (Repair/Addition) ENVIRONMENTALIST D. Firley

Address 11150 Elliott Hwy Owner Alycia Boing

Legal Description S1/4 of NE 1/4 Sec. 24 T12, R 03W of the 6th P.M.  
Residence  # of bedrooms 7; Commercial ; System Installer KWANI

SEPTIC TANK:  
Commercial ; Noncommercial  L     , W     , WD       
Construction Material precast concrete, capacity 2250 gallons.

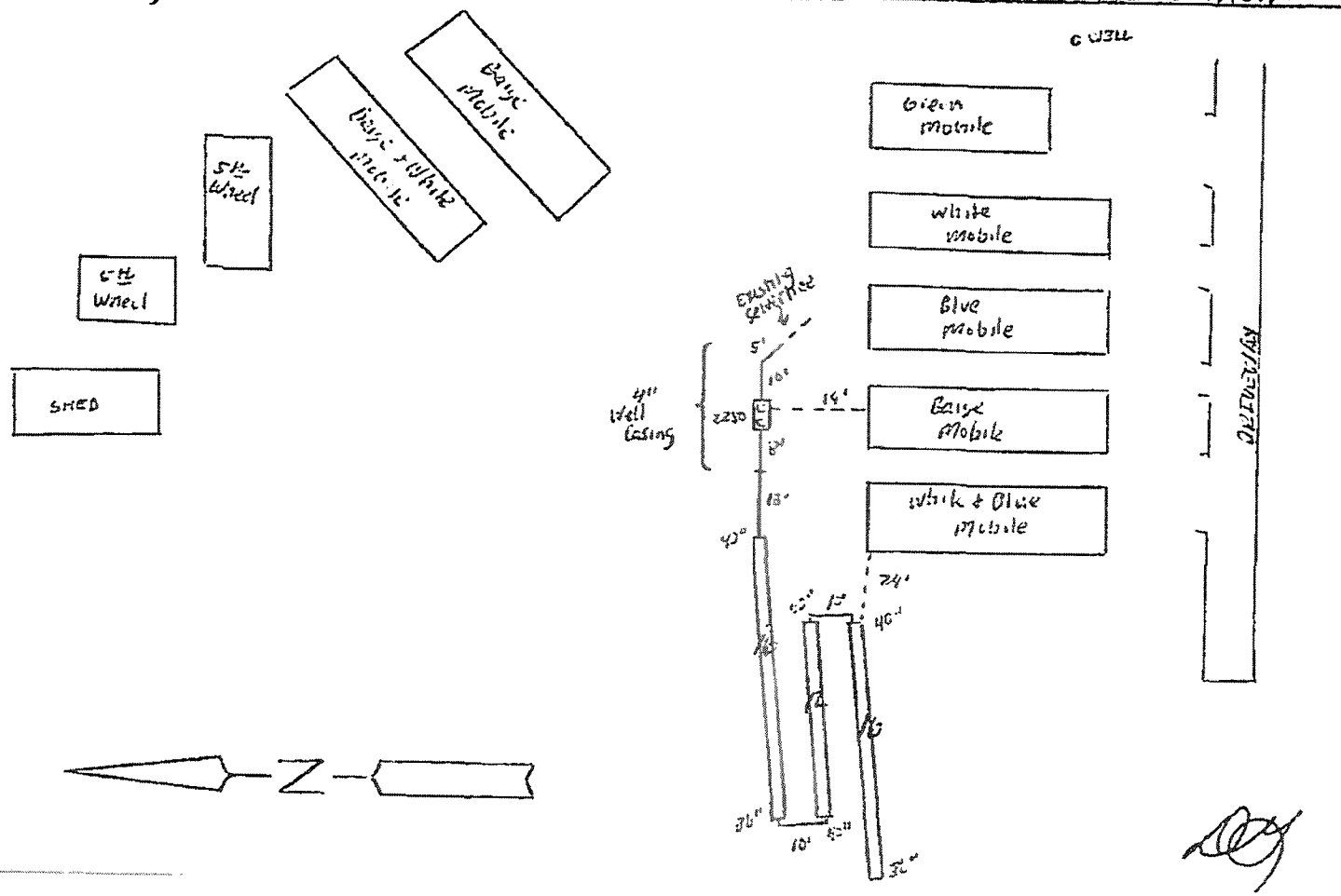
DISPOSAL FIELD:  
Rock Systems:  
Trench: depth     , width     , total length     , sq. feet       
Bed: depth     , length     , width     , sq. feet       
Rock type     , depth     , under PVC     , over PVC       
Seepage Pits: # of pits     , total # of rings     , working depth(s)       
size of pit(s) L X W     , lining material     , total sq. feet     

Rockless Systems:  
Chamber: Type infiltrator, number of chambers 44, bed     , trench   
sq. ft./section 15.5, reduction allowed 40%, sq. ft. required 1127  
total sq. ft. installed 1126, depth of installation 30"-40"  
Engineer Design Y or  N, Designing Engineer     

Approval letter provided? Y or N  
Well 50 feet from tank  or N 100 feet from leach field  or N  
Well installed at time of septic system inspection  or N Public Water       
\*Approval will be revoked if in the future the well is found to be within 50 feet of the septic tank and/or 100 feet of the disposal field.

NOTES: pipe = 4" SDR 35, 4" well casing specified on drawing

\* Existing leach field was abandoned. New leach field installed in same location



DAVE F

EL PASO COUNTY  
DEPARTMENT OF HEALTH AND ENVIRONMENT  
301 S Union Blvd, Colorado Springs, Colorado 719-575-8636

INDIVIDUAL SEWAGE DISPOSAL SYSTEM PERMIT

OWNER NAME: *Have permit re-typed*  
ALYSLA BOING  
ADDRESS: 11150 ELLICOTT HWY  
CITY, STATE, ZIP: A CALHAN CO 80808  
INSTALLED BY: *Add corrected in computer 8-26-02*

PERMIT NUMBER: ON0004379  
DATE PERMITTED: 08/05/2002  
PHONE NUMBER: 7193472265

This permit is issued in accordance with 25-10-107 Colorado Revised Statutes. PERMIT EXPIRES upon completion-installation of sewage-disposal system or at the end of twelve (12) months from date of issue- whichever occurs first-(unless work is in progress). If both a building and an ISDS permit are issued for the same property and construction has not commenced prior to the expiration date of the building permit, the ISDS permit shall expire at the same time as the building permit. This permit is revokable if all stated requirements are not met.  
Sewage disposal system to be installed by an El Paso County Licensed System Contractor or the property owner.

THIS PERMIT DOES NOT DENOTE APPROVAL OF ZONING AND ACREAGE REQUIREMENTS.

*John Lowe*

DIRECTOR, EL PASO COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT

PERMIT EXPIRATION DATE:  
Expires twelve months from date of issue

*Karen for Christensen*  
ENVIRONMENTALIST / PHONE NUMBER\*

\* NOTE: FOR INSPECTIONS CALL 575-8699 BEFORE 8:30 A.M. OF THE DAY TO BE INSPECTED.  
(WEEKENDS & HOLIDAYS EXCLUDED)  
LEAVE THE ENTIRE SEWAGE DISPOSAL SYSTEM UNCOVERED FOR FINAL INSPECTION.

WATER SOURCE: WELL *g take-out*  
MINIMUM SEPTIC TANK SIZE: ~~1500~~ GALLONS MINIMUM ABSORPTION AREA REQUIRED \_\_\_\_\_ SQ FT

PLANNING DEPARTMENT  ENUMERATION  FLOOD PLAIN  WASTEWATER

COMMENTS:  
NO MORE THAN 2 MOBILE HOMES MAY BE CONNECTED TO ONE SEPTIC SYSTEM. OWNER MAY ADD DESIRED SQUARE FOOTAGE DIRECTLY TO EXISTING LEACH FIELD. IF EXISTING LEACH FIELD IS ABANDONED OR IF A DIVERTER VALVE IS INSTALLED, THE MINIMUM SQUARE FOOTAGE OF ABSORPTION AREA MUST BE INSTALLED. FOR A 4 BEDROOM, A MINIMUM SEPTIC TANK CAPACITY OF 1500 GALLONS AND 644 SQUARE FEET OF ABSORPTION AREA IS REQUIRED. FOR A 7 BEDROOM, A MINIMUM OF 2250 GALLON SEPTIC TANK CAPACITY AND 1127 SQUARE FEET OF ABSORPTION AREA IS REQUIRED.

The Health Office shall assume no responsibility in case of failure or inadequacy of a sewage-disposal system, beyond consulting in good faith with the property owner or representative. Free access to the property shall be authorized at reasonable time for the purpose of making such inspections as are necessary to determine compliance with requirements of this law.

FOR ADMINISTRATIVE USE ONLY

Permit Ready: *8/12/02* Called Mailed  
Final Inspection Requested: BY: *Jeff Kuman Phelan* Date Called In: *8/21/02 2:51 PM*  
Phone # *693-3770* Septic Site will be ready: *now*



Inspector

JANET

013

Record I.D.

1379

EL PASO COUNTY ENVIRONMENTAL HEALTH SERVICES

301 South Union Boulevard • Colorado Springs, CO • 80910-3123 • (719) 578-3126 • Fax: (719) 578-3188

APPLICATION FOR AN ON-SITE TREATMENT SYSTEM:

NEW CONSTRUCTION MINOR REPAIR MAJOR REPAIR/ADD P.E. DESIGN

Owner Alycia J Boing PA @ John Giegerich Cell phone 205-0962 Daytime Phone 347-2265

Address of Property 1150 Ellicott Hwy City & Zip Calhan 80808

Legal Description SW 1/4 of NE 1/4 sec. 24, T12 R16 Range 63W 6th PM

Owner's MAILING Address 1150 Ellicott Hwy City, State & Zip Calhan CO 80808

Lot Size 40 ACR Tax Schedule # 3200000143 Mark 337-6882

Septic Contractor Kunal Daytime Phone # 683-3720

Type of Building: Frame Modular Mobile Commercial Manufactured Other

Water Supply: Well or Spring Cistern Public Inside City Limits: No Yes-City

MAIL PERMIT OR PICK UP PERMIT THERE IS AN ADDITIONAL RESIDENCE ON THIS PROPERTY

MAXIMUM POTENTIAL BEDROOMS 4

Percolation Test Attached Y N Garbage Disposal Y N Basement Y N Clothes Washer Y N

I have supplied a plot plan as described on the back of this form. I acknowledge the completeness of the application is conditional upon such further mandatory and additional tests and reports as may be required by the Department to be made and furnished by an applicant for purposes of evaluating the application, and issuance of the permit is subject to such terms and conditions as deemed necessary to ensure compliance with rules and regulations adopted pursuant to C.R.S. 25-10-107 et. seq. I hereby certify all represented to be true and correct to the best of my knowledge and belief, and are designed to be relied on by the El Paso County Department of Health and Environment in evaluating the same for purposes of issuing the permit applied for herein. I further understand any falsification or misrepresentation may result in the denial of the application or revocation of any permit granted based upon said application and in legal action for perjury as provided by law.

OWNER'S SIGNATURE Alycia J Boing PA Date 8-1-02

DEPARTMENT OF HEALTH USE ONLY

See Below Minimum Absorption Area Existing 1250 gallon Minimum Tank Capacity 2 Aug. 2002 Date of Site Inspection

REMARKS Owner wants to size for future 7 bedrooms. 5 mobile homes 3 are lived in, does not have plumbing. Leach field was dry, pool of septic wastewater on top of septic tank.

EHS INSPECTOR Janet Chastain DATE 08/02/02 APPROVED DENIED

FEE AS OF 8/1/00: NEW CONSTRUCTION \$315. + County Surcharge of \$30. = \$345.00 MAJOR REPAIR/ADDITION \$150 MINOR REPAIR/ADDITION \$75 DATE TO PLANNING / WASTEWATER: DATE TO FLOODPLAIN:

- 1) We require an original of your PERCOLATION (PERC) TEST with an original professional engineer's (PE) stamp and signature as well as a plot of the percolation test holes.
- 2) **PROPERTY NUMBER MUST BE POSTED AND CLEARLY VISIBLE FROM ROAD. PERC TEST CLEARLY MARKED.**
- 3) A **PLOT PLAN** (to scale) on an 8 1/2 x 11 sheet of paper. The plot plan must include:
 

1) a north arrow	buildings (proposed or existing)	7) driveway (proposed or existing and name of adjoining street)
2) property boundaries	proposed septic system site	
3) property adjacent property well(s)	date septic system site	Subsoil drain
- 4) Initial any **PLAN.** that apply to your property and INCLUDE them on your **PLOT PLAN.**

<input checked="" type="checkbox"/> Well	adjacent property well(s)	<input type="checkbox"/> Subsoil drain
<input type="checkbox"/> Cistern	Water line	
- 5) Initial any **PLOT PLAN.** within 100 feet of your proposed septic system and INCLUDE on your **PLOT PLAN.**

<input type="checkbox"/> Lake(s)
<input type="checkbox"/> Stream(s)
<input type="checkbox"/> Natural drainage course(s)

EL PASO COUNTY HEALTH  
 ENVIRONMENTAL QUALITY  
 (719) 575-8336  
 DATE 08.01.02 THU  
 MON-ADD # 3165  
 TSDS 150 \$150.00  
 SUBTOTAL \$150.00  
 TOTAL \$150.00  
 CHECK \$150.00  
 BRENDA NO. 000019

6) GIVE COMPLETE DIRECTIONS TO THE PROPERTY FROM A MAIN HIGHWAY

Highway 24 To Ellicott Hwy South 3 miles  
~~2nd~~ 2nd right south of Scott Rd.

