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GEOTECHNICAL STUDY
HIGLEY SUBDIVISION (CEDAR COVE ESTATES)
6500 SOUTH & BYBEE DRIVE
OGDEN, UTAH

PREPARED FOR:

MAGIC VALLEY CONSTRUCTION, L.L.C.
336 SOUTH 1000 WEST
KAYSVILLE, UT 84037

ETE JOB NO.: 00E-069

APRIL 19, 2000

TABLE OF CONTENTS
ETE JOB NUMBER: 00E-030

1.0 INTRODUCTION

We have completed a geotechnical investigation for the proposed Higley Property located in a part of the NE ¼ of Section 26 and NW ¼ Quarter of Section 25, T.5N., R.1.W. in Weber County, Utah. The main access road in the development will connect the existing 6500 South Street and the existing Bybee Drive in Uintah, Utah, as shown on the Vicinity Map, Figure 1.

Geologic evaluations have been conducted on this site and in this vicinity in the past. Mr. Bruce Kaliser, an engineering geologist, conducted a geologic study of the site and presented his findings in a report (Kaliser 1997)[1] dated September 15, 1997. This report was reviewed by the UGS and a response letter (UGS 1998)[2] dated April 3, 1998 was sent to the Weber County Planning Commission. Mr. Kaliser then conducted additional investigation in conjunction with our study and results are presented in a letter (Kaliser 2000)[3] dated March 29, 2000. The UGS letter[2] has asked for slope stability analysis on the steeper slopes at the site, which have been included in this study.

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1 Kaliser, Bruce N., Letter to Ed Higley concerning engineering Geology on Higley Subdivision, Uintah, Utah, September 15, 1997.

2 Giraud, Richard E., Utah Geological Survey, Review of "Engineering-Geology report for Higley Subdivision, Uintah, Utah, 4-3-98.

3 Kaliser, Bruce N., Response to UGS letter on Review of "Engineering-Geology for Higley Subdivision, Uintah, Utah, March 29, 2000.

This study was made to assist in evaluating the subsurface conditions and engineering characteristics of the foundation soils and in developing our opinions and recommendations concerning appropriate foundation types, floor slabs and pavements. This report presents the results of our geotechnical investigation including field exploration, laboratory testing, engineering analysis, and our opinions and recommendations. Data from the study is summarized on Figures 3 through 16 and in Table 1.

2.0 CONCLUSIONS

(1) Based on the test pits excavated for this investigation the area is covered with a layer of organic topsoil of varying thickness ranging from 4 to 24 inches thick. Below the topsoil we encountered poorly graded sands with silt (SP-SM) to poorly graded gravels with silt and sand(GP-GM). The sands and gravels were in a medium dense to dense state. Groundwater was not encountered in our test pits and no seeps or wet areas were found on the surface.

(2) Lightly loaded spread footings founded on the undisturbed native sand and gravel soils should provide adequate support for the proposed structures. A maximum allowable bearing capacity of 2000 psf should be used for footing designs.

(3) Proper drainage control is important to the performance of the structures and pavements at this site.

3.0 PROPOSED CONSTRUCTION

We understand the site will be developed with one to two story single family residences with basements. For analysis purposes, it was assumed that wall loads of the residential structures would be on the order of 3 to 4 klf. For pavement design, we assumed a Daily Traffic Number (equivalent 18k axle loading) of 5 which is typical for single family residential developments. If structural loads or traffic conditions are different than those assumed, we should be notified and allowed to reevaluate our recommendations.

4.0 SITE CONDITIONS

At the time of our investigation the site was an undeveloped and covered with grasses, weeds and oak brush. Several areas have been defoliated by off-road vehicle use. The site is split into an east and west bowl by a ridge. The south side of the site slopes down to the south at grades of about 3 to 5 percent. The north and east side of the site rises rapidly to a ridge with a vertical relief of about 80 to 150 feet. Grades on the slope range from 25 to 75 percent. A small stream from Broad Canyon runs through the east side of the property. A railroad grade abuts the south property boundary. Residential homes have been, or are being, constructed to the north and west. To the east is the Wasatch range. The existing homes in the area generally appear to be performing satisfactorily from a foundation viewpoint, based solely on limited exterior visual inspection.

5.0 FIELD INVESTIGATION

The field investigation consisted of excavating 9 test pits to a depths ranging from 10 to 18 feet below present site grades at the approximate locations shown on Figure 2. The soils exposed in the test pits were continuously logged by an engineer from our office. Pits on the slopes were also observed by Bruce Kaliser, an engineering geologist. Disturbed samples were obtained and returned to our laboratory for testing.

6.0 LABORATORY TESTING

The samples obtained during the field investigation were sealed and returned to our laboratory where each sample was inspected to confirm field classifications and representative samples were selected for laboratory testing. Laboratory tests included natural moisture determinations, grain size distribution analyses and direct shear strength tests. The results of these tests are shown on Figures 3 through 11 and in Table 1, attached.

Samples will be retained in our laboratory for 30 days following the date of this report at which time they will be disposed of unless a written request for additional holding time is received prior to the disposal date.

7.0 SUBSURFACE CONDITIONS

Based on the test pits excavated for this investigation the area is covered with a layer of organic topsoil with variable thickness ranging from 4 to 24 inches. Below the topsoil we encountered poorly graded sands with silt (SP-SM) and poorly graded gravels with silt and sand (GP-GM) extending beyond the maximum depth explored of 18 feet. The sands and gravels were in a medium dense to dense state. Groundwater was not encountered in our test pits and no seeps or wet areas were found on the surface. Graphical representations of the soils encountered at the site are shown on Figures 3 through 11, Test Pit Logs. Figure 12 is a key to the symbols used on the logs.

A spring was found to the north of the northeast corner of the property in the adjacent subdivision. This spring was addressed by Chen-Northern Inc. (Chen 1989)[4]. If springs are observed on this development during construction we should be notified and allowed to evaluate the situaton.

8.0 SITE GRADING

Topsoil, man-made fill (although none was found in the test pits), and soils loosened by construction activities should be removed (stripped) from the building pads prior to foundation excavation and placement of site grading fills. Following stripping and the excavations required to achieve design grades, the subgrade should be proofrolled to a firm, non-yielding surface. Soft areas detected during the proof-rolling operation, should be removed and replaced with structural fill.

All fill placed below buildings, pavements and concrete flatwork should be structural fill. All other fills should be considered as backfill. Structural fill should consist of native sands and gravels or imported

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4 Chen-Northern Inc., letter from David Marble to Mark Babbit of Great Basin Engineering on "Cut Slope Observation, Spring Creek Subdivision Phase III, Project No. 5-618-89" dated October 12, 1989.

material. Imported material should consist of well-graded sandy gravels with a maximum particle size of 3 inches and 5 to 15 percent fines (materials passing the No. 200 sieve). The liquid limit of fines should not exceed 35 and the plasticity index should be below 15. All fill soils should be free from topsoils, highly organic, or other deleterious materials. Structural fill should be placed in maximum 8-inch thick loose lifts at a moisture content within 2 percent of optimum and compacted to at least 95 percent of maximum density (ASTM D 1557) under buildings and 90 percent under pavements and concrete flatwork.

The soils at the site should stand temporarily at slopes of 1:1 unless wet areas or seeps are encountered. Permanent slopes should be no steeper than 2:1 (horizontal:vertical). The soils at this site will erode easily; therefore, disturbed areas on slopes steeper than 25 percent should be graded with topsoil and planted. Slopes steeper than 35 percent will require erosion blankets. The areas will have to be maintained until the vegetative cover is established. Saturation of the slopes could cause localized unstable areas; therefore, we recommend that slope re-vegetation consist of native plants that do not require irrigation.

The native soils may be used as backfill in utility trenches and against the outside foundation walls. Backfill should be placed in lift heights suitable to the compaction equipment used and compacted to at least 90 percent density (ASTM D 1557). Trenches over 4 feet deep should be shored prior to allowing personnel to enter and all OSHA safety requirements should be followed.

9.0 SEISMIC CONSIDERATIONS

Based on the geologic reports for the site (Kaliser 1997)[1] and (Kaliser 2000)[3], a surface rupture associated with the Wasatch fault has been identified within the development and non-build setback distances estabilished. The proposed structures should be kept outside the setback designation and be designed in accordance with "Zone 3" requirements of the Uniform Building Code. We recommend the soil profile type "S_D" be used in design considerations.

The expected maximum ground acceleration from a large earthquake at this site with a 10 percent probability of exceedance in 50 years is 0.20g [5].

Liquefaction is a phenomenon where soils lose their intergranular strength due to an increase of pore pressures during a dynamic event such as an earthquake. According to the Utah Geologic Survey [6], this site is in a broad area classified as having a very low potential for liquefaction. Our test pits in this area tend to support this designation.

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5 Frankel, A. et al, National Seismic-Hazard Maps: Documentation June 1996, U.S. Department of the Interior, U.S. Geologic Survey, Open File Report 96-532.

6 Utah Geological Survey, "Selected Critical Facilities and Geologic Hazards, Weber County, Utah", 1994

10.0 FOUNDATIONS

The sand soils found at this site are capable of supporting the planned light residential structures if the recommendations contained in this report are followed. The recommendations presented below should be utilized during design and construction of this project:

(1) Spread footings founded on undisturbed native soils should be designed for a maximum allowable soil bearing pressure of 2000 psf. A one-third increase is allowed for short term transient loads such as wind and seismic events. Footings should be uniformly loaded.

(2) Continuous footings should have minimum widths of 24 inches.

(3) Exterior footings should be placed below frost depth which is determined by local building codes. Generally 30 inches is adequate in this area. Interior footings not subject to frost should extend at least 18 inches below the lowest adjacent final grade.

(4) Footings should be set so that there is at least a 20 foot horizontal distance from the edge of the footing to the face of any slope.

(5) Foundation walls on continuous footings should be well reinforced both top and bottom. We suggest a minimum amount of steel equivalent to that required for a simply supported span of 12 feet.

(6) The bottom of footing excavations should be compacted with 4 passes of a hand thumper or other approved compactor to densify soils loosened during excavation and to identify soft spots. If soft areas are encountered they should be removed and replaced as discussed in section 8.0.

If footings are designed and constructed in accordance with the recommendations presented above, the risk of total settlement exceeding 1 inch and differential settlement exceeding 0.5 inches for a 25-foot span will be low. Additional settlement should be expected during a strong seismic event.

11.0 BELOW GRADE WALLS

The basement walls should be designed to resist the lateral loads imposed by the soils retained behind the walls. The lateral earth pressures on the walls and the distribution of those pressures depends upon the types of wall, hydrostatic pressures, in-situ soils, backfill, and tolerable wall movements. Walls of this type are usually designed with triangular stress distributions known as equivalent fluid pressure. The lateral earth pressures for basements should be based on "at rest" conditions, which assume little or no wall movement. Basement walls backfilled with the native soils should be designed assuming an ultimate at rest lateral earth pressure coefficient of 0.45 and a moist unit weight of 125 pcf (equivalent fluid weight of 56 pcf). These values assume level backfill and that water will not accumulate behind walls. If the ground surface is sloping within 10 feet of the basement wall then the lateral earth pressures used in design should be increased. If this situation occurs please contact us and we will provide lateral load criteria specifically designed for that wall. We did not encounter groundwater in the test pits excavated at this site; however, if groundwater or groundwater seeps are encountered or impermeable soil layers are found during basement excavation, then we recommend those walls be drained. This may be accomplished by placing a free draining gravel against the wall with a geotextile filter fabric placed between the gravel and native soils to prevent infiltration of fines into the drain. Backfill should be placed in accordance with the requirements of structural fill discussed above. Lateral pressures approximately 30 percent higher will occur during backfill placement and bracing may be called for until the backfilling operation is completed.

12.0 FLOOR SLABS

Prior to floor slab construction, native soils below the slabs should be proof rolled to identify soft areas which should be removed and replaced as discussed in Section 8.0. A minimum 4-inch thick layer of free-draining gravel should be placed immediately below the floor slabs to help distribute floor loads, break the rise of capillary water, and aid in the concrete curing process. As a basis for designing slab thickness, the native sand and gravel soils may be considered to possess a subgrade modulus of 250 psi/in. To help control normal shrinkage and stress cracking, the floor slabs should have adequate reinforcement for the anticipated floor loads with the reinforcement continuous through interior floor joints and placed at the center of the slab section and have frequent crack control joints.

13.0 SURFACE DRAINAGE

Wetting of the foundation soils will likely cause some degree of volume change within the soil and should be prevented both during and after construction. We recommend that the following precautions be taken at this site:

1. The ground surface should be graded to drain away from the structure in all directions. We recommend a minimum fall of 8 inches in the first 10 feet.

2. Roof runoff should be collected in rain gutters with down spouts designed to discharge well outside of the backfill limits.

3. Sprinkler heads, if planned, should be aimed away and kept at least 12 inches from foundation walls.

4. Provide adequate compaction of structural fill, i.e. a minimum of 95% of ASTM D 1557 under buildings and 90% under concrete flatwork. Water consolidation methods should not be used.

5. Other precautions which may become evident during design and construction should be taken.

14.0 SLOPE STABILITY

The geologic studies conducted by Bruce Kaliser (Kaliser 1997)[1] and (Kaliser 2000)[3] did not reveal any features which would indicate active landslides in the development. However, the Weber County Landslide Inventory Map (Lowe)[7] shows an old landslide area to the north of the site (LS 305) and a portion of the site is within a possible slide zone designated by LS 289. We have conducted an evaluation of the stability of the two steepest existing slopes on the south side of the site using the XSTABLE computer program and the modified Bishop's method of slices. The configuration of the slope used in our analysis was measured from topographic maps prepared by Reeve and Associates Engineers[8]. Based on a direct shear analysis of the native sands an angle of internal friction of 33.5 degrees and no cohesion was used in the analysis.

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7 Lowe, Mike, "Landslide Inventory Map - Ogden Quadrangle", Weber County Planning Commission, Ogden, Utah.

8 Reeve and Associates, Inc., "Preliminary Design - Higley Subdivision" revision 3 dated February 16, 1998.

The slopes were analyzed under both static and pseudo static conditions. The pseudo static analysis is used to evaluate the slope during a seismic event. As stated in Section 9.0, the expected maximum ground accelerations from a large earthquake at this site with a 10 percent probability of exceedance in 50 years is 0.20g. The pseudo static analysis is based on sustained acceleration which is commonly assumed between 50 and 75 percent of the peak acceleration value. We used an acceleration value of 0.15g in our analysis.

Typical engineering practice in this area assumes that stable slopes have safety factors against failure of 1.5 or greater for static conditions and 1.0 or greater for pseudo static conditions. Our analysis indicates that the slopes in there current condition have minimum safety factors of 1.47 to 1.56 under static conditions and 1.10 to 1.14 under pseudo static conditions. Figures 13 through 16 show the results of our slope stability analysis with the 10 most critical failure surfaces for the global stability.

Vegetation on the slopes which require frequent watering should not be allowed since saturation of the native soils could result in localized slumps.

15.0 PAVEMENTS

We understand that a flexible pavement is desired for the access roads in this development. We recommend a pavement section for the residential streets consisting of 3 inches of asphaltic concrete over 8 inches of aggregate base. The design recommendations were based on AASHTO design methods and the following assumptions:

(1) the subgrade is proof rolled to a firm, non-yielding condition (proof rolling should be observed by the geotechnical engineer);

(2) asphaltic concrete and aggregate base will meet UDOT specification requirements;

(3) all fill below the road grades will meet the material and placement Requirements of structural fill as defined in Section 8.0;

(4) aggregate base will be compacted to at least 95 percent of maximum dry density (ASTM D 1557).

(5) asphaltic concrete will be compacted to at least 95 percent of the laboratory Marshal mix design density;

(6) traffic loads are approximated by the traffic assumptions set forth in Section 3.0 of this report; and

(7) a pavement design life of 20 years.

16.0 GENERAL CONDITIONS

The exploratory data presented in this report were collected to provide geotechnical design recommendations for this project. The test pits may not be indicative of subsurface conditions between test pits or outside the study area and thus have limited value in depicting subsurface conditions for contractor bidding. Variations from the conditions portrayed in the test pits often occur which are sometimes sufficient to require modifications in the design. If during construction, conditions are found to be different than those presented in this report, please advise us so that the appropriate modifications can be made. An experienced geotechnical engineer or technician should observe earthwork operations and conduct testing as required to confirm proper structural fill materials and placement procedures.

The geotechnical study as presented in this report was conducted within the limits prescribed by our client, with the usual thoroughness and competence of the engineering profession in the area. No other warranty or representation, either expressed or implied, is intended in our proposals, contracts or reports.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please call.

Respectfully;
EARTHTEC ENGINEERING, P.C.

REGISTERED PROFESSIONAL ENGINEER
168431
ROBERT E
BARTON
5-1-00
STATE OF UTAH

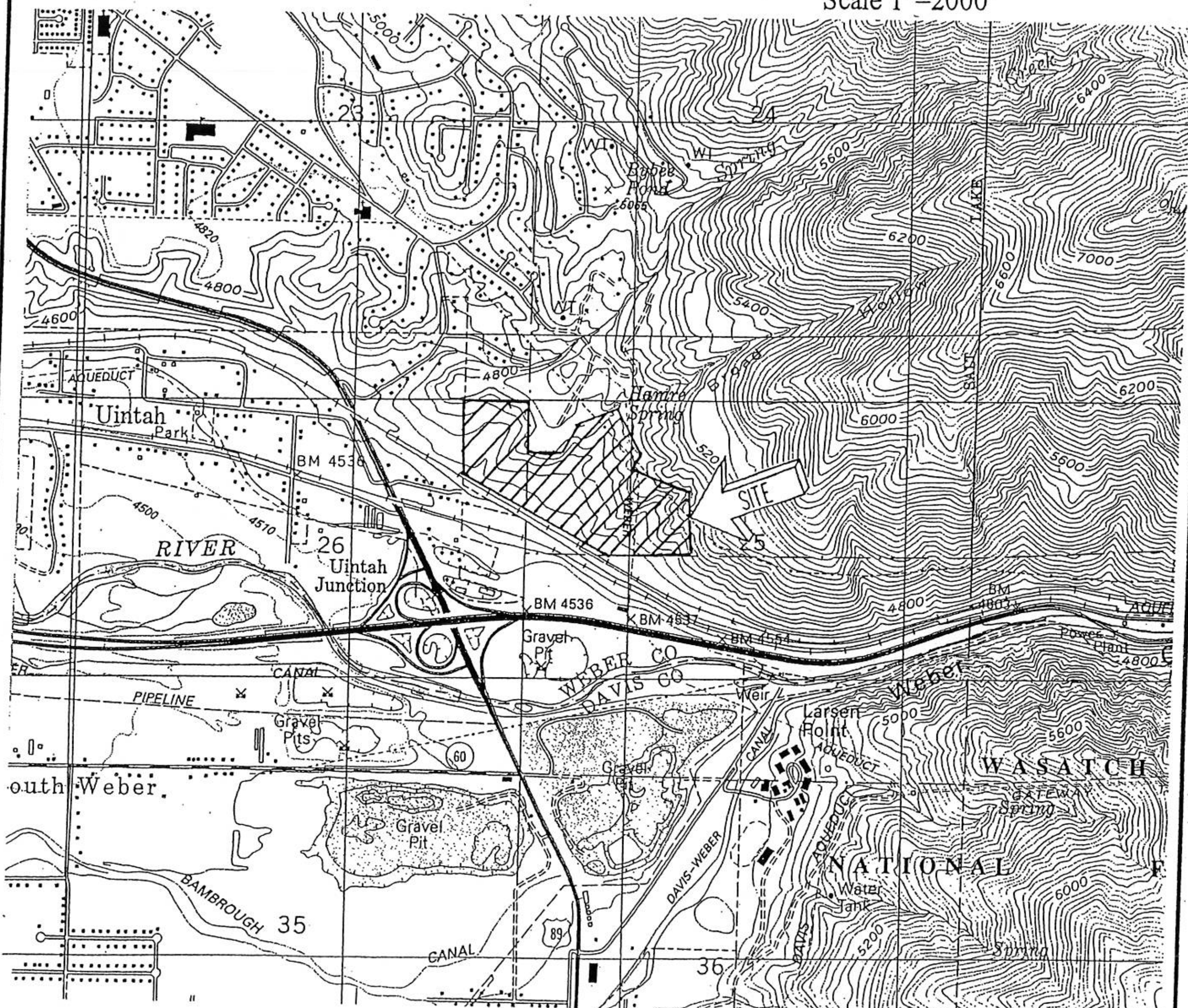
Robert E. Barton, P.E.
Project Geotechnical Engineer

3 copies sent

EARTHTEC ENGINEERING

North

Scale 1"=2000'



BASE MAP TAKEN FROM
USGS 7.5' "OGDEN"
QUADRANGLE

VICINITY MAP

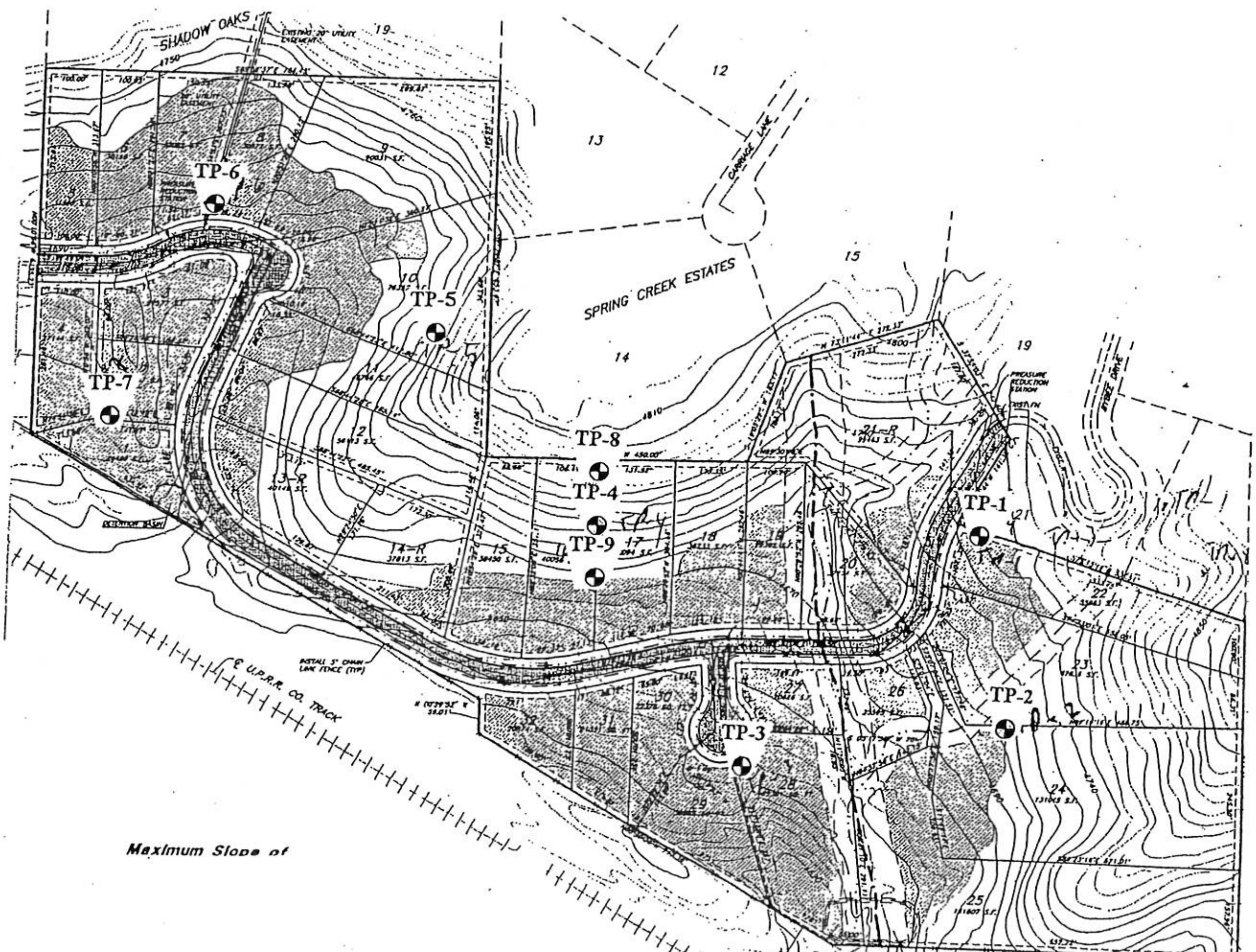
ETE JOB NO. 00E-069

FIGURE 1

EARTHTEC ENGINEERING

North

NOT TO
SCALE



Base map provided by
Reeve & Associates Engineering

SITE PLAN SHOWING LOCATION OF TEST HOLES

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FIGURE 2

TEST PIT LOG

PIT NO.: TP-1

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS: Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown									
3, 6, 9		GP-GM	Poorly Graded Gravel with silt and sand - with cobbles, with heavy tree roots to 4 feet, dense, moist, brown									
12, 15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-2

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown									
3		SP-SM	Poorly Graded Sand with silt and gravel, - with cobbles, dense, moist, brown									
6				■		4.7			38	54	8	
9												
12												
15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-3

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown									
3, 6, 9		GP-GM	Poorly Graded Gravel with silt and sand - with cobbles, dense, moist, brown									
12, 15												

Notes:

Tests Key:
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DRILL HOLE LOG

BORING NO.: TP-4

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
DRILLER: Magic Valley Construction
DRILL RIG: Trackhoe
DEPTH TO WATER> INITIAL ⊽ : None ft. **AT COMPLETION** ⊽ :

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Blow Count	TEST RESULTS: PL ├──┤ LL; Water Con.- ●; Blows - ▨; 10 20 30 40 50	Dry Dens. pcf	Water Cont. %	Gravel %	Sand %	Fines %	Torvane Cohesion (psf)	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown										
		SP-SM	Poorly Graded Sand with silt - medium dense, moist, brown										
3				▮		●	95.9	5.6					Direct Shear = 33.5 degrees
6													
9													
12													
15													

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

DRILL HOLE LOG

BORING NO.: TP-5

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
DRILLER: Magic Valley Construction
DRILL RIG: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

DEPTH TO WATER > INITIAL ∇ : None ft. **AT COMPLETION** ▼ :

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Blow Count	TEST RESULTS: PL ├─┤ LL, Water Con. - ●, Blows - ▨ (10 20 30 40 50)	Dry Dens. pcf	Water Cont. %	Gravel %	Sand %	Fines %	Torvane Cohesion (psf)	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown										
		SP	Poorly Graded Sand - medium dense, moist, brown										
3													
				▮		●	98.1	4.7	0	96	4		
6													
9													
12													
15													

Notes:

Tests Key:
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C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-6

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown									
3, 6, 9		SP-SM	Poorly Graded Sand with silt - medium dense, moist, brown									
12, 15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-7

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Mark Christensen

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
0–11		SP-SM	Poorly Graded Sand with silt - medium dense, moist, brown									
~3.5				Sample		8.3			0	89	11	
12												
15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-8

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Bruce N. Kaliser

Depth (Ft.)	Graphic Log	USCS	Description	Samples	TEST RESULTS Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		SP-SM	Poorly Graded Sand with silt and gravel - with cobbles, moist, brown									
3, 6, 9, 12		SP-SM	Poorly Graded Sand with silt - medium dense, moist, brown									
15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

TEST PIT LOG

PIT NO.: TP-9

PROJECT: Higley Subdivision
CLIENT: Magic Velley Construction LLC
LOCATION: See Figure 2
OPERATOR: Magic Valley Construction
EQUIPMENT: Trackhoe

PROJECT NO.: 00E-069
DATE: 3/24/00
ELEVATION: NM
LOGGED BY: Bruce N. Kaliser

Depth (Ft.)	Graphic Log	USCS	Description	Samples	Dry Dens. pcf	Water Cont. %	PL	LL	Gravel %	Sand %	Fines %	Other Tests
		OL	Topsoil - silty gravel with sand, organic, moist, dark brown									
3			Poorly Graded Sand with silt - medium dense, moist, brown									
6												
9												
		SP-SM										
12												
15												

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
G = Gradation
DS = Direct Shear
SO = Solubility
UC = Unconf. Compress. Strength

PROJECT NO. 00E-069 | EARTHTEC ENGINEERING, P.C. | FIGURE NO.: 11

KEY TO SYMBOLS

Symbol Description

Strata symbols

Low plasticity organic silts

Poorly graded gravel with silt

Poorly graded sand

Poorly graded sand with silt

Soil Samplers

Bulk/Grab sample

Notes:

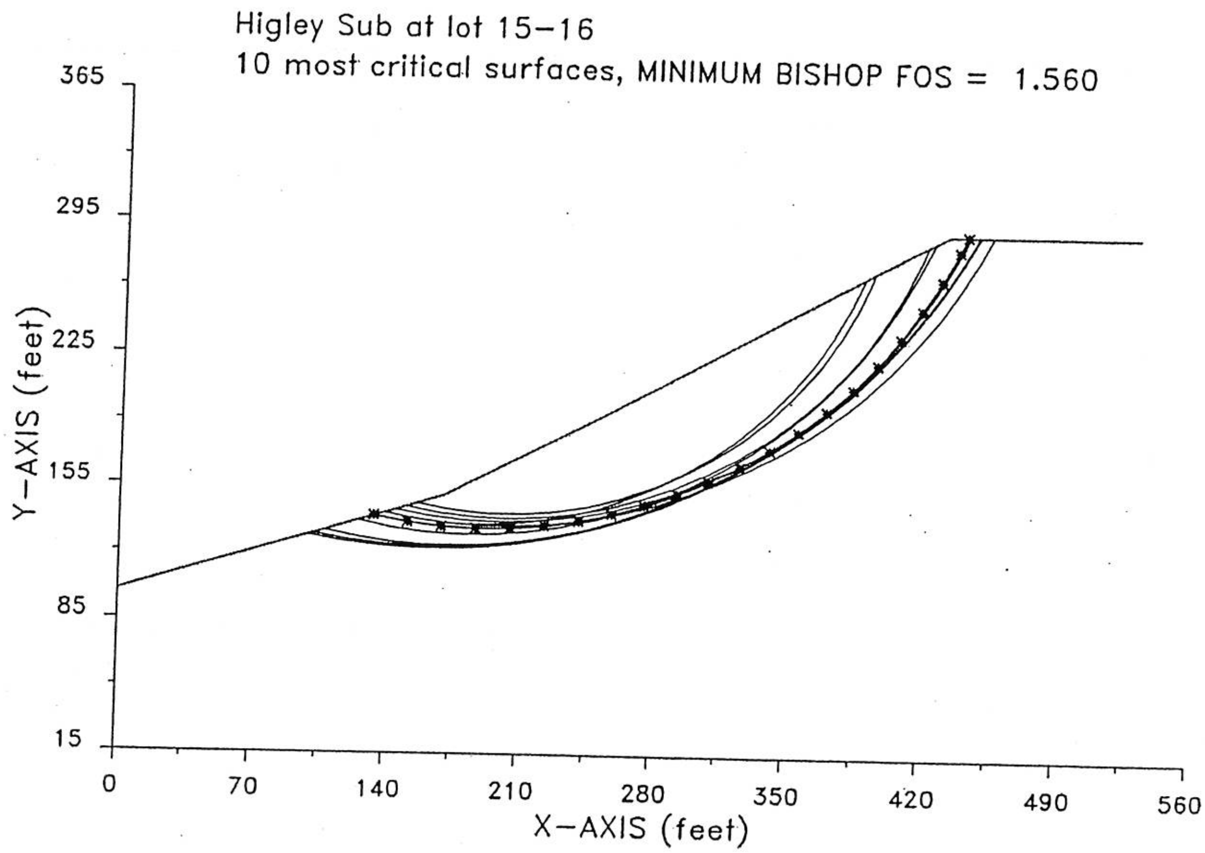
1. Exploratory test pits were excavated on 3/24/00 using a trackhoe.
2. Free water was not encountered at the time this investigation.
3. Test pit locations were estimated from existing features based on the schematic plan provided by Reeve & Associates Engineering.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs.

FIGURE NO.: 12

EARTHTEC ENGINEERING

Soil Layer	*Soil Type*	*Moist Unit Wt. (pcf)*	*Sat. Unit Wt. (pcf)*	*Cohesion (psf)*	*Friction Angle (degrees)*
1	*Sand*	*102*	*115*	*0*	*33.5*

HIGLEY15 4-12-** 15:28



GLOBAL STABILITY ANALYSIS - SLOPE AT LOT 15/16

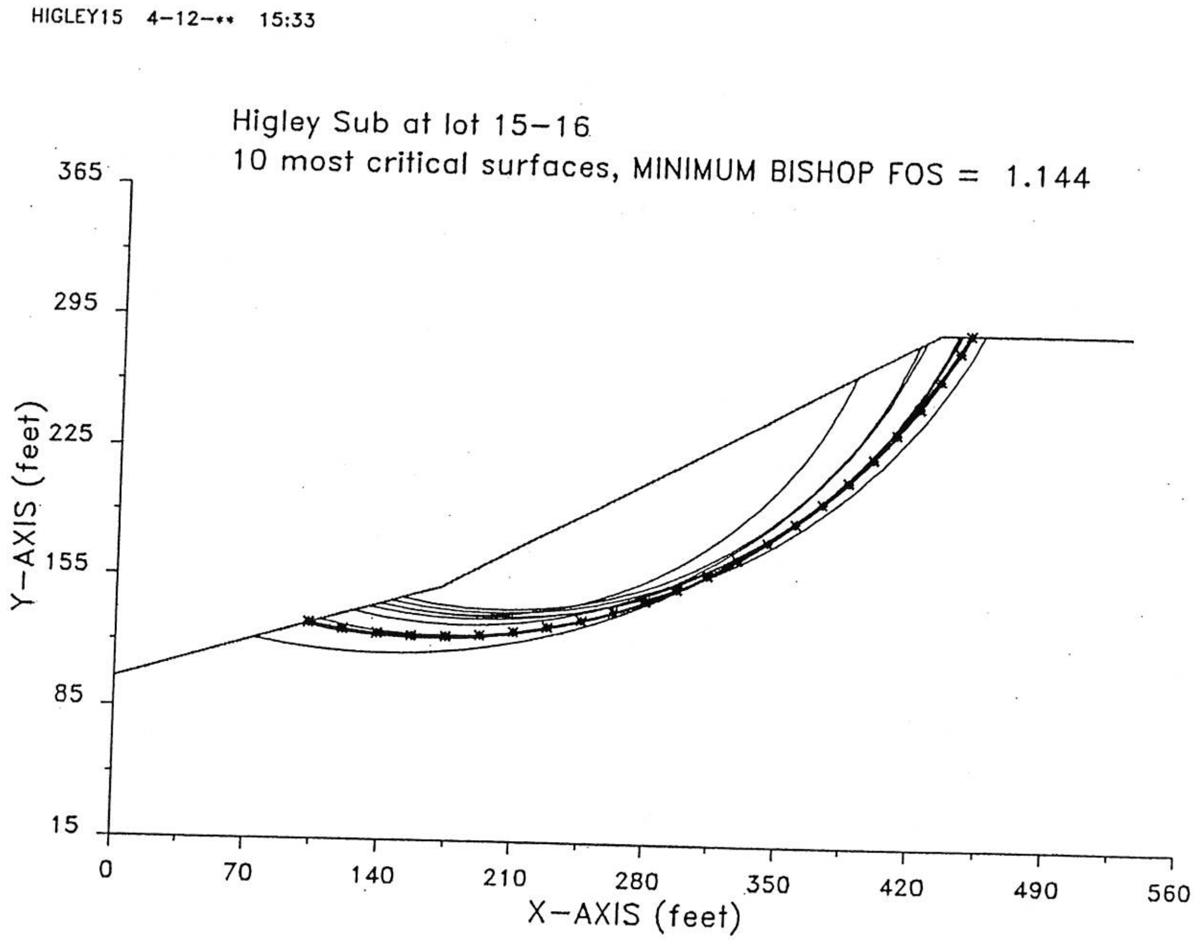
ETE JOB NO. 00E-069

FIGURE 13

EARTHTEC ENGINEERING

Soil Layer	*Soil Type*	*Moist Unit Wt. (pcf)*	*Sat. Unit Wt. (pcf)*	*Cohesion (psf)*	*Friction Angle (degrees)*
1	*Sand*	*102*	*115*	*0*	*33.5*

Horizontal Acceleration of 0.15 G



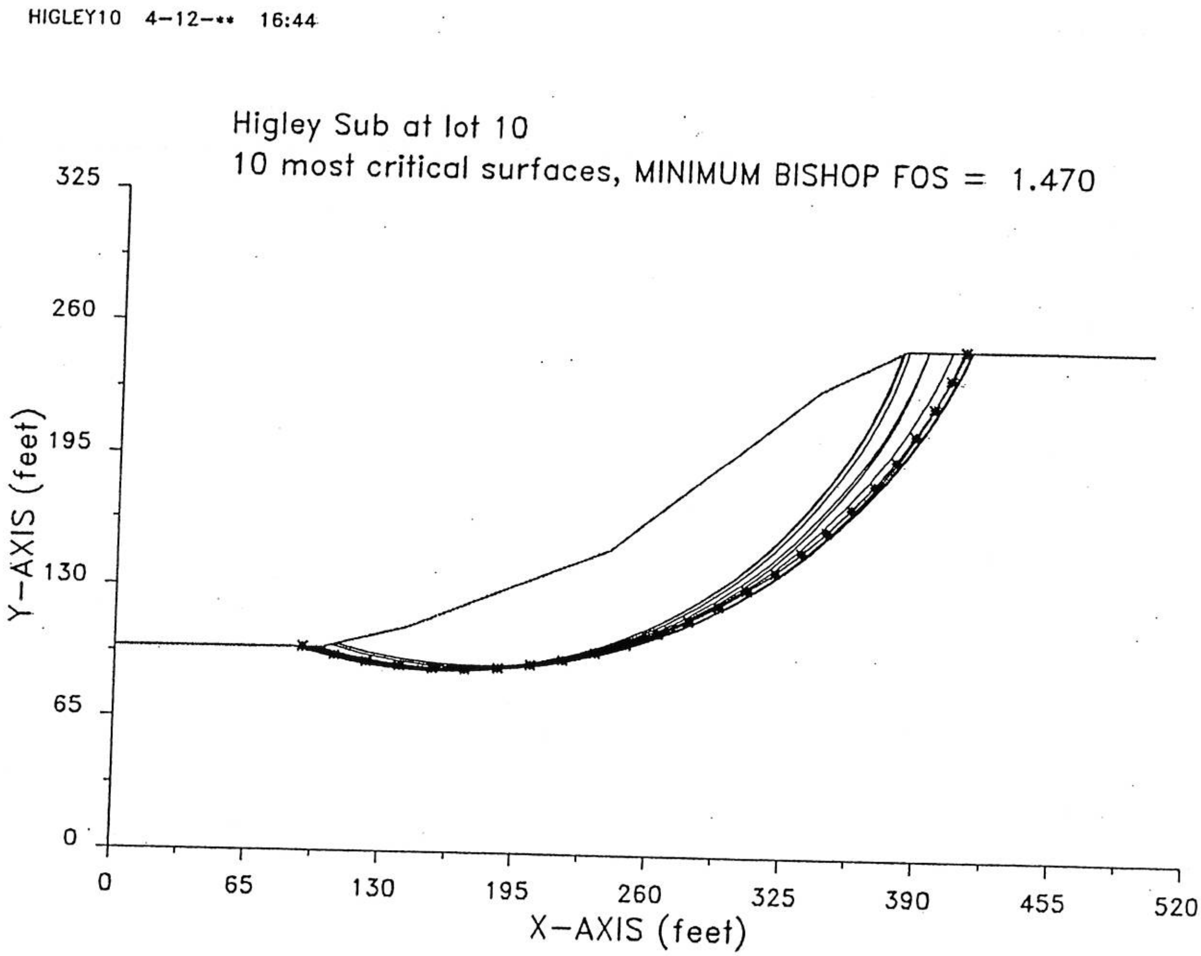
GLOBAL STABILITY ANALYSIS - SLOPE AT LOT 15/16 (PSEUDO STATIC)

ETE JOB NO. 00E-069

FIGURE 14

EARTHTEC ENGINEERING

Soil Layer	*Soil Type*	*Moist Unit Wt. (pcf)*	*Sat. Unit Wt. (pcf)*	*Cohesion (psf)*	*Friction Angle (degrees)*
1	*Sand*	*102*	*115*	*0*	*33.5*



GLOBAL STABILITY ANALYSIS - SLOPE AT LOT 10

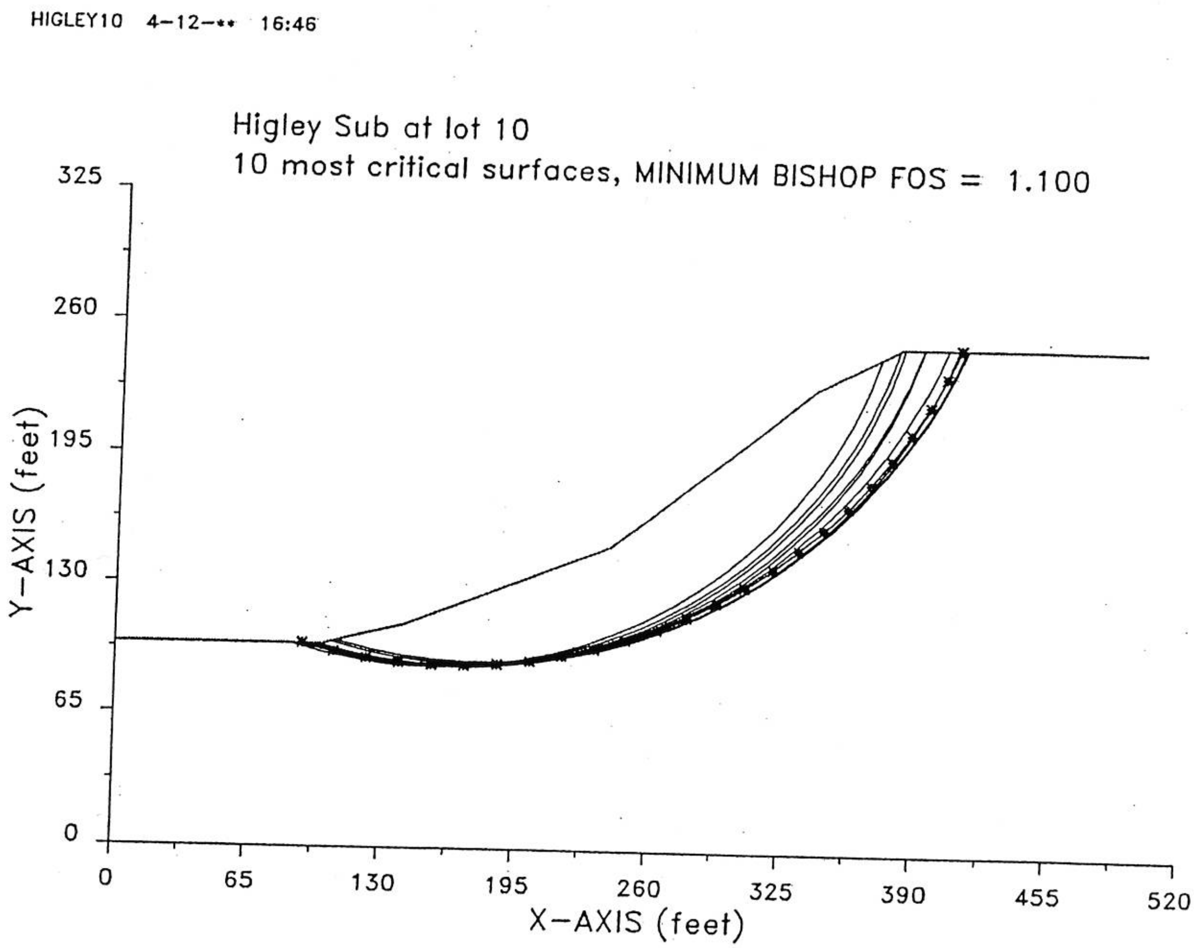
ETE JOB NO. 00E-069

FIGURE 15

EARTHTEC ENGINEERING

Soil Layer	Soil Type	Moist Unit Wt. (pcf)	Sat. Unit Wt. (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	Sand	102	115	0	33.5

Horizontal Acceleration of 0.15 G



GLOBAL STABILITY ANALYSIS - SLOPE AT LOT 10 (PSEUDO STATIC)

ETE JOB NO. 00E-069

FIGURE 16

TABLE 1
SUMMARY OF LABORATORY DATA

TEST HOLE	DEPTH (FT)	DENSITY (PCF)	MOISTURE (%)	(%) GRADATION			DIRECT SHEAR (DEGREES)	COHESION (PSF)	SOIL TYPE
				GRAVEL	SAND	SILT/CLAY			
TP-2	5		4.7	38.3	53.7	8.0			Poorly Graded Sand with silt and gravel (SP-SM)
TP-4	2	95.9	5.6				33.5	0	Poorly Graded Sand (SP)
TP-5	4	98.1	4.7	0.0	96.4	3.6			Poorly Graded Sand (SP)
TP-7	3		8.3	0.0	89.2	10.8			Poorly Graded Sand with silt (SP-SM)

Higley Subdivision

ETE Job #: 00E-069

Notice to all Lot owners of ___CEDAR COVE ESTATES__________ in order for a building permit to be issued, the excavation for the foundation shall be examined by a professional Geotechnical Engineer for evidence of faulting, landslides, as well as other geological problems, and if found to exist, the dwelling location shall be relocated outside of the identified Geological Area. All zoning setbacks shall be maintained in any relocation, or a variance approved by the Board of Adjustment.

A signed copy of the inspection report of the excavation shall be submitted as a required document for obtaining a building permit. This copy shall be signed by a Geotechnicial Engineer.

I ______________________ Certify that I am a professional Geotechnical Engineer, and that I inspected the excavation on Lot _____ of____. I further certify that no geological hazards were found in any areas that were excavated.

DATED this ____________________ Day of_______________________, 20__.

____

Geotechnical Engineer