Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED HANNOY RESIDENCE

3563 PINEVIEW COURT

EDEN, UTAH

PREPARED FOR:

BIG CANYON HOMES, INC.
1925 SW HOYTSVILLE ROAD
WANSHIP, UTAH 84017

ATTENTION: PAUL BERMAN

PROJECT NO. 1160176B **MAY 3, 2016**

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EXECUTIVE SUMMARY

1. The subsurface soil encountered in Boring B-1 consists of approximately 4 feet of fill overlying clay. The clay extends to a depth of approximately 10½ feet and is underlain by clayey gravel extending the full depth of the boring, approximately 15 feet where practical auger refusal was encountered. The test pits encountered approximately ½ foot of topsoil overlying clayey gravel extending the full depth investigated, approximately 26 feet.

2. No subsurface water was encountered to the maximum depth investigated.

3. The proposed residence may be supported on spread footings bearing on the undisturbed natural gravel or on structural fill extending down to the undisturbed natural gravel and may be designed for a net allowable bearing pressure of 3,500 pounds per square foot.

4. Geotechnical information related to foundations, subgrade preparation and materials is included in the report.

SCOPE

This report presents the results of a geotechnical investigation for a proposed Hannoy residence to be constructed at 3563 Pineview Court in Eden, Utah. The report presents the subsurface conditions encountered, laboratory test results and recommendations for foundations. The study was conducted in general accordance with our proposal dated March 14, 2016. A geologic-hazard study is being prepared in conjunction with this study and was reported May 2, 2016 under Project No. 1160176A.

Field exploration was conducted to obtain information on the subsurface conditions. Samples obtained from the field investigation were tested in the laboratory to determine physical and engineering characteristics of the on-site soil. Information obtained from the field and laboratory was used to define conditions at the site for our engineering analysis and to develop recommendations for the proposed foundations.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

At the time of our field study, there were no permanent structures or pavement on the site. The site consists of an undeveloped residential lot. It appears that some fill has been placed along the north edge of the site. This fill is approximately 4 feet thick at the boring location.

The ground surface at the site slopes gently to moderately down toward the south and southwest with slopes of approximately 6 horizontal to 1 vertical and flatter throughout most of the proposed building area and slopes on the order of 3 horizontal to 1 vertical and flatter south of the proposed building area.

Vegetation at the site consists of grass and brush.

There is a residential house west of the site and Pineveiw Court to the north. There are undeveloped lots to the south and east.

FIELD STUDY

The field study was conducted on April 13, 2016. One boring was drilled and two test pits excavated at the approximate locations indicated on Figure 1. The boring and test pits were logged by a geologist from AGEC. Logs of the subsurface conditions encountered in the boring and test pits are presented on Figure 2.

The test pits were backfilled without significant compaction. The backfill in the test pits should be removed and replaced with properly compacted fill where it will support proposed buildings, floor slabs or other settlement-sensitive improvements.

SUBSURFACE CONDITIONS

The subsurface soil encountered in Boring B-1 consists of approximately 4 feet of fill overlying clay. The clay extends to a depth of approximately 10½ feet and is underlain by clayey gravel extending the full depth of the boring, approximately 15 feet where practical auger refusal was encountered. The test pits encountered approximately ½ foot of topsoil overlying clayey gravel extending the full depth investigated, approximately 26 feet.

A description of the soil encountered in the boring and test pits follows:

> Fill - The fill consists of sandy lean clay with gravel and occasional cobbles. It is moist and dark brown.

Topsoil - The topsoil consists of clayey gravel with sand, cobbles and occasional boulders up to approximately 3 feet in size. It is very moist, dark brown and contains roots and organics.

Lean Clay - The clay contains occasional gravel. It is stiff to very stiff, moist and brown.

Laboratory tests performed on a sample of the clay indicate it has a natural moisture content of 23 percent and a natural dry density of 100 pounds per cubic foot (pcf). Results a consolidation test performed on a sample of the clay indicate it will compress a small amount with the addition of light to moderate loads. Results of the consolidation test are presented on Figure 3.

Clayey Gravel with Sand - The gravel contains cobbles and boulders up to approximately 3 feet in size. It is dense to very dense, moist to very moist and brown with iron oxide staining.

Results of a gradation test performed on a sample of the gravel are presented on Figure 4.

Results of the laboratory tests are included on the boring and test pit logs and Table I.

SUBSURFACE WATER

No subsurface water was encountered to the maximum depth investigated, approximately 26 feet.

PROPOSED CONSTRUCTION

A single-family residence is planned for the site. The building will be a single-story structure with a basement. We have assumed building loads to consist of wall loads up to 3 kips per lineal foot and column loads up to 50 kips.

Grading for the site will be relatively minor with most rockeries planned to be 5 feet or less in height. The tallest rockery is planned for the northeast corner of the site along the driveway where a two-tier rockery is planned to be up to approximately 10 feet in height. We understand that rockery design is to be provided by others.

If the proposed construction or building loads are significantly different from those described above, we should be notified so that we can reevaluate the recommendations given.

SLOPE STABILITY EVALUATION

A slope stability evaluation was performed using the program SLIDE 7.0 by Rocscience. The strength selected for the clayey gravel is based on Stark and Eid (1997) for the clay component assuming a fully-softened condition and a friction angle of 39 degrees for the gravel component. The strength contributed to the clay is assumed to be 15 percent with 85 percent attributed to the gravel. The soil profile was considered to consist entirely of clayey gravel using these strengths. The slope profile was developed from the contours presented on Figure 1 in conjunction with elevation contours obtained from the Lidar data. The results of the stability analysis indicate a safety factor of 2.3 under static conditions and 1.4 under seismic conditions. The seismic condition was evaluated using a pseudostatic analysis from the same computer program and is based on a peak ground acceleration for a seismic event with a 2 percent probability of occurrence in 50 years.

Based on this study, both static and pseudostatic slope stability safety factors are at or above the required safety factors of 1.5 and 1.0, respectively. Printouts of the stability analyses are included in the appendix.

No subsurface water was encountered to the maximum depth investigated and a perched water table is not expected to form since the building will be connected to a sewer. A long-term perched-water condition could cause stability concerns for the undeveloped slope but not the house. Site grading should be planned to promote surface runoff away from the house and sumps should not be constructed in the slope below the proposed building area.

RECOMMENDATIONS

A. Site Grading

1. Subgrade Preparation

   Prior to placing grading fill or base course, the topsoil, organic material, unsuitable fill and other deleterious materials should be removed. The north portion of the property appears to have been raised with fill and this fill is not considered suitable for support of buildings, slabs or other settlement-sensitive features and should be removed from below such structures and features.

2. Cut and Fill Slopes

   Temporary unretained excavation slopes may be constructed at 1 horizontal to 1 vertical or flatter. Permanent, unretained cut and fill slopes up to 15 feet in height may be constructed at slopes of 3 horizontal to 1 vertical or flatter. Slopes greater than 15 feet in height will require a stability analysis.

Good surface drainage should be provided upslope of cut and fill slopes to direct surface runoff away from the face of the slopes. The slopes should be protected from erosion by revegetation or other methods.

3. Excavation

We anticipate that excavation at the site can be accomplished with heavy-duty excavation equipment. Significant difficulty can be expected for confined excavations where boulders are encountered. Care should be taken not to disturb the natural soil to remain in the proposed building area.

4. Materials

Listed below are materials recommended for imported structural fill:

Fill to Support	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

Fill placed below areas of the proposed building should consist of granular soil as indicated above. The on-site sand and gravel is generally expected to meet these criteria if the oversized particles are removed.

5. Compaction

Compaction of materials placed at the site should equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D 1557.

Fill To Support	Compaction
Foundations	≥ 95%
Concrete Slabs	≥ 90%
Landscaping	≥ 85%
Retaining Wall Backfill	85 - 90%

The moisture of the soil should be adjusted to within 2 percent of optimum to facilitate compaction.

Fill placed for the project should be frequently tested for compaction. Fill should be placed in thin enough lifts to allow for proper compaction.

6. Drainage

The ground surface surrounding the proposed building should be sloped away from the residence in all directions. Roof down spouts and drains should discharge beyond the limits of backfill.

B. Foundations

1. Bearing Material

The proposed residence may be supported on spread footings bearing on the undisturbed natural gravel or on compacted structural fill that extends down to the natural undisturbed gravel. Structural fill placed below footings should extend out away from the edge of footings at least a distance equal to the depth of fill below footings.

The topsoil, organics, unsuitable fill, debris and other deleterious materials should be removed from below proposed foundation areas.

2. Bearing Pressure

Spread footings bearing on the undisturbed, natural gravel or on compacted structural fill may be designed for a net allowable bearing pressure of 3,500 pounds per square foot.

3. Settlement

We estimate that total and differential settlement will be less than ½ inch for footings designed as indicated above.

4. Temporary Loading Conditions

The allowable bearing pressure may be increased by one-half for temporary loading conditions such as wind or seismic loads.

5. Minimum Footing Width and Embedment

Spread footings should have a minimum width of 1½ feet and a minimum depth of embedment of 10 inches.

6. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 36 inches below grade for frost protection.

7. Foundation Base

The base of foundation excavations should be cleared of loose or deleterious material prior to structural fill or concrete placement. The subgrade should not be scarified prior to structural fill placement.

8. Construction Observation

A representative of the geotechnical engineer should observe footing excavations prior to structural fill or concrete placement.

C. Concrete Slab-on-Grade

1. Slab Support

Concrete slabs may be supported on the undisturbed natural soil or on compacted structural fill that extends down to the undisturbed natural soil.

Topsoil, unsuitable fill, organics, debris and other deleterious materials should be removed from below proposed slabs.

2. Underslab Sand and/or Gravel

Consideration may be given to placing a 4-inch layer of free-draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) below slabs to promote even curing of the slab concrete.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for footings placed on natural soil or on compacted structural fill is controlled by sliding resistance between the footing and foundation soils. A friction value of 0.45 may be used in design for ultimate lateral resistance.

2. Subgrade Walls and Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. The values listed below assume a horizontal surface adjacent the top and bottom of the wall.

Soil Type	Active	At-Rest	Passive
Clay & Silt	50 pcf	65 pcf	250 pcf
Sand & Gravel	40 pcf	55 pcf	300 pcf

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weight should be increased by 22 pcf and 7 pcf for active and at-rest conditions, respectively, and decreased by 22 pcf for the passive condition. This assumes a peak horizontal ground acceleration of 0.35g for a seismic event having a 2 percent probability of exceedance in a 50-year period (IBC, 2012).

4. Safety Factors

The values recommended above for active and passive conditions assume mobilization of the soil to achieve the soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Seismicity, Faulting and Liquefaction

1. Seismicity

Listed below is a summary of the site parameters for the 2012 International Building Code.

a.	Site Class	C
b.	Short Period Spectral Response Acceleration, S_S	0.89g
c.	One Second Period Spectral Response Acceleration, S_1	0.30g

2. Faulting

There are no mapped active faults extending through the site. The closest mapped fault considered to be active is the Wasatch fault located approximately 6.7 miles west of the site (Black and others, 2003).

3. Liquefaction

Based on the subsurface conditions encountered at the site, published literature and our understanding of the geologic conditions in the area, liquefaction is not considered a hazard at this site.

F. Water Soluble Sulfates

One sample of the natural soil was tested in the laboratory for water soluble sulfate content. Results of the test indicate there is less than 0.1 percent water soluble sulfate in the sample tested. Based on the results of the test and published literature, the natural soil possesses negligible sulfate attack potential on concrete. No special cement type is required for concrete placed in contact with the natural soil. Other conditions may dictate the type of cement to be used in concrete for the project.

G. Subsurface Drain

We recommend that a subsurface drain be provided for the below-grade floor portion of the residence. The subsurface drain system should consist of at least the following items:

a. The subsurface drain system should consist of a perforated pipe installed in a gravel filled trench around the perimeter of the subgrade floor portion of the residence. A geosynthetic drain could be used as an alternative. The drain should extend up the foundation walls high enough (to within approximately 3 feet of the ground surface) to intercept potential subsurface water.

b. At least 6 inches of free-draining gravel should be placed below the floor slab of the residence. The gravel should connect the perimeter drainage pipe.

c. The flow line of the pipe should be placed at least 14 inches below the finished floor level and should slope to a sump or outlet where water can be removed by pumping or by gravity flow.

d. If placing the gravel and drain pipe requires excavation below the bearing level of the footing, the excavation for the drain pipe and gravel should have a slope no steeper than 1:1 (horizontal to vertical) so as not to disturb the soil below the building.

e. A filter fabric should be placed between the natural soil and the drain gravel. This will help reduce the potential for fine grained material filling in the void spaces of the gravel.

f. Consideration may be given to installing cleanouts to allow access into the perimeter drain should cleaning of the pipe be required in the future.

H. Preconstruction Meeting

A preconstruction meeting should be held with representatives of the owner, project architect, geotechnical engineer, general contractor, earthwork contractor and other members of the design team to review construction plans, specifications, methods and schedule.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the boring drilled and test pits excavated at the approximate locations indicated on the site plan and the data obtained from laboratory testing. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the proposed construction, subsurface conditions or groundwater level is found to be significantly different from what is described above, we should be notified to reevaluate the recommendations given.

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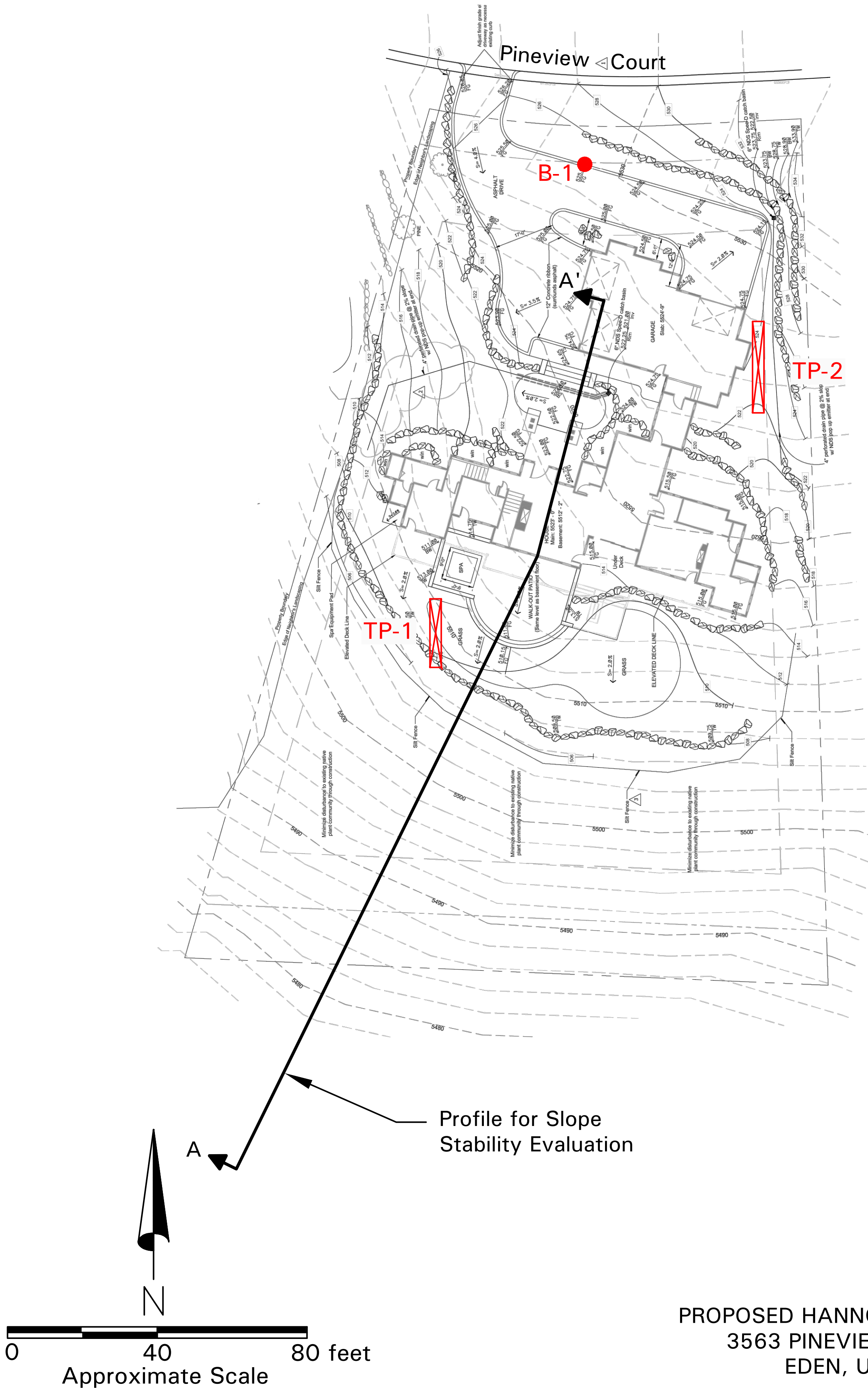
REFERENCES

Black, B.D., Hecker, S., Hylland, M.D., Christenson, G.E., and McDonald, G.N., 2003; Quaternary fault and fold database and map of Utah; Utah Geological Survey Map 193DM.

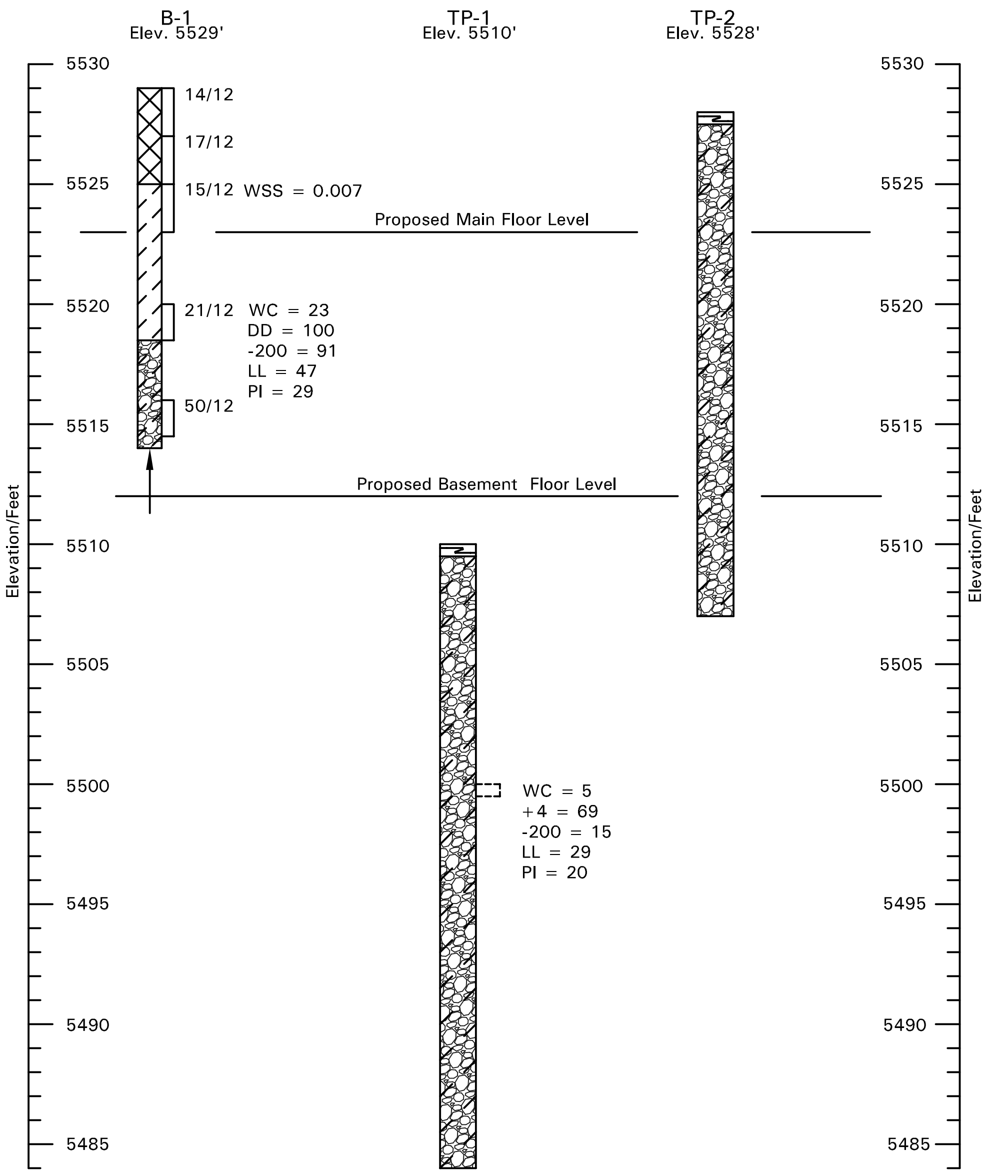
International Building Codes, 2012; International Code Council, Inc., Falls Church, Virginia.

Stark, T.D. and Eid, H.T., 1997; Slope stability analyses in stiff fissured clays, J. of Geotechnical and Geoenvironmental Engineering, Vol. 123, No. 4, April 1997.



PROPOSED HANNOY RESIDENCE
3563 PINEVIEW COURT
EDEN, UTAH

1160176B	AGEC	Test Pit and Boring Locations	Figure 1



LEGEND:

Fill; sandy lean clay with gravel, occasional cobbles, moist, dark brown.

Topsoil; clayey gravel with sand, cobbles, occasional boulders up to approximately 3 feet in size, very moist, dark brown, roots, organics.

Lean Clay (CL); occasional gravel, stiff to very stiff, moist, brown.

Clayey Gravel with Sand (GC); cobbles, boulders up to approximately 3 feet in size, dense to very dense, moist to very moist, brown, iron oxide staining.

10/12 California Drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound automatic hammer falling 30 inches were required to drive the sampler 12 inches.

Indicates disturbed sample taken.

Indicates practical auger refusal.

NOTES:

1. The boring was drilled on April 13, 2016 with 8-inch diameter hollowstem auger. Test pits were excavated on April 13, 2016 using a tracked excavator.
2. The locations of the boring and test pits were measured approximately by pacing from features shown on the site plan provided.
3. The elevations of the boring and test pits were determined by interpolating between contours shown on the plan provided.
4. The boring and test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between materials shown on the logs represent the approximate boundaries between material types and the transitions may be gradual.
6. No free water was encountered in the boring and test pits at the time of the field work.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   +4 = Percent Retained on the No. 4 Sieve;
   -200 = Percent Passing the No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%);
   WSS = Water Soluble Sulfates (%).

Approximate Vertical Scale 1" = 8'

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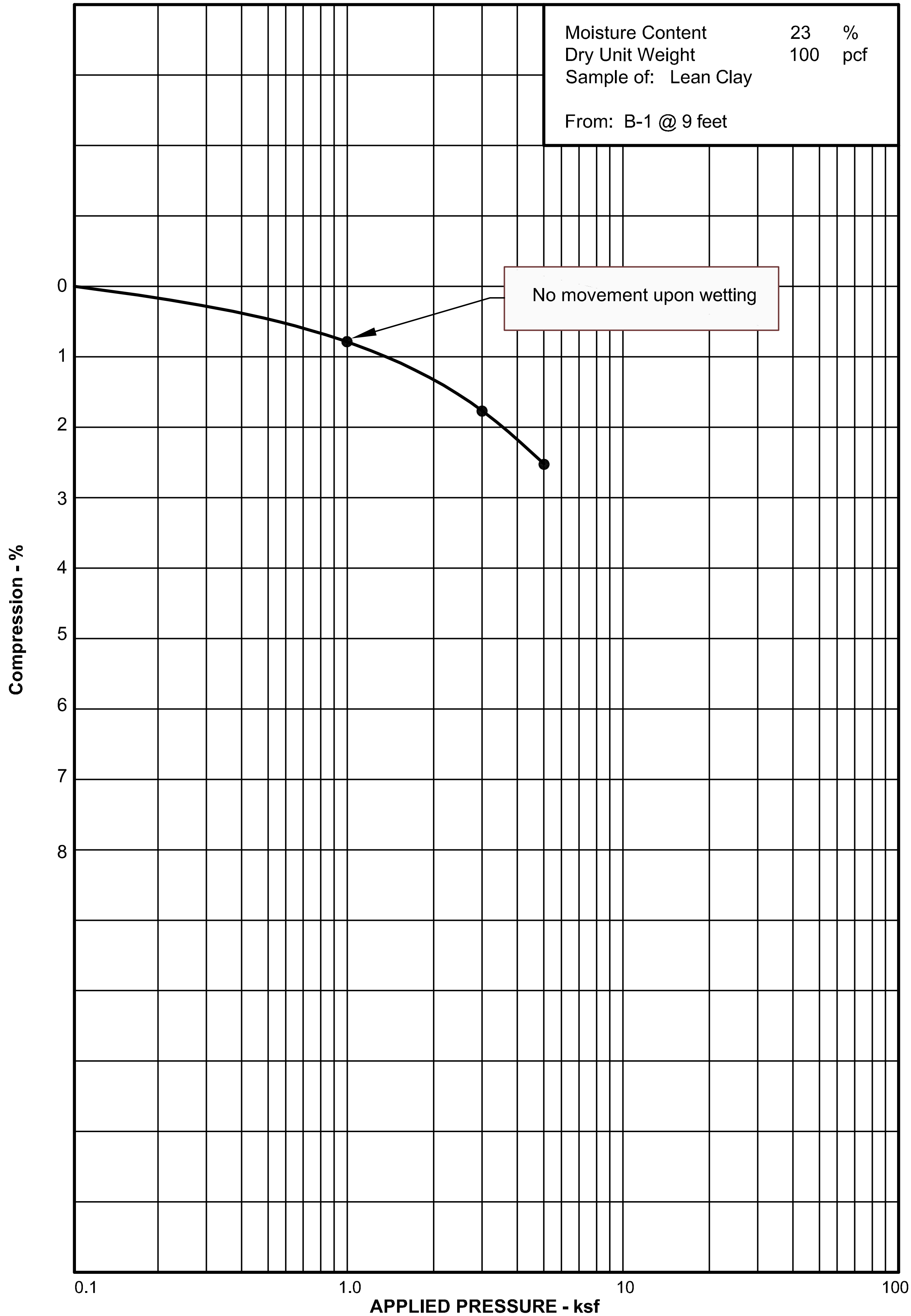
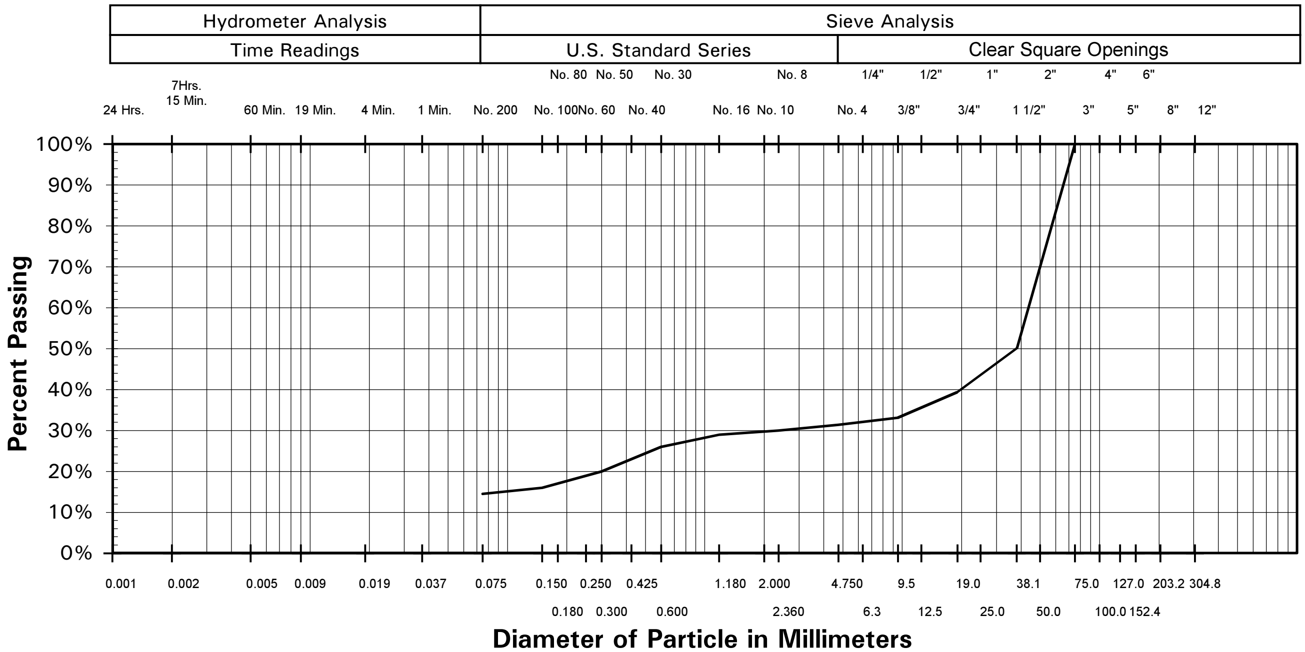


Project No. 1160176B

CONSOLIDATION TEST RESULTS

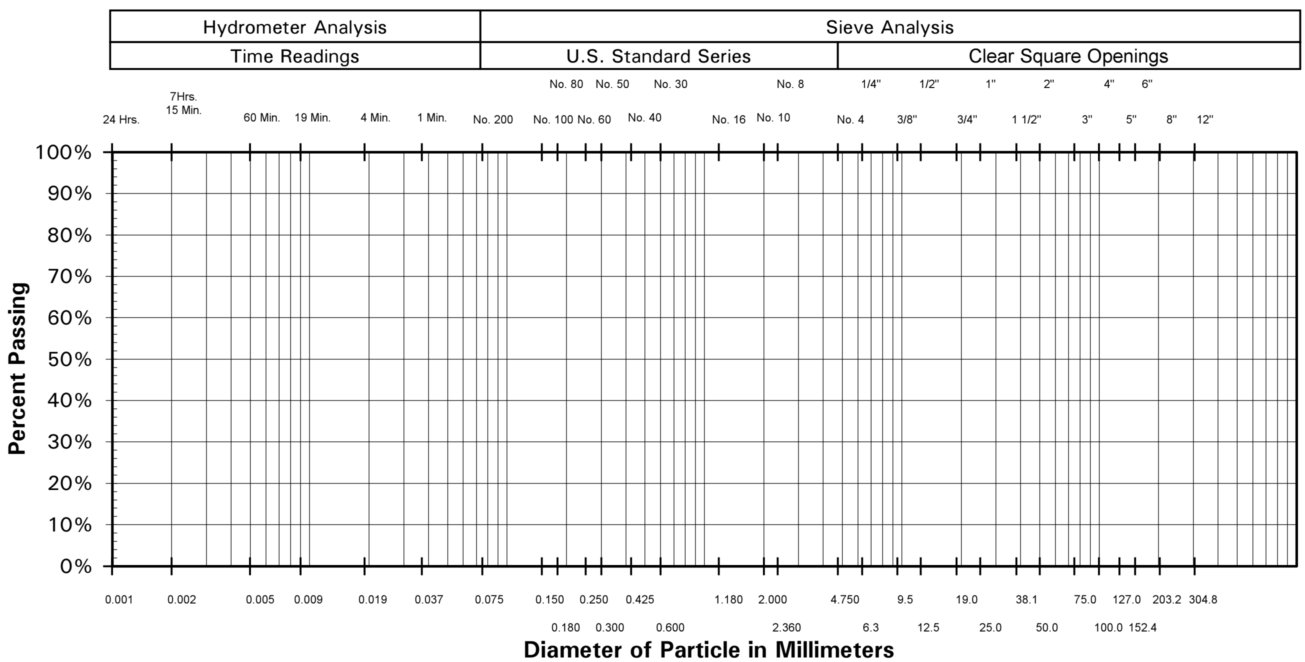
Figure 3

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel	69%	Liquid Limit	-
Sand	16%	Plasticity Index	-
Silt and Clay	15%	Sample Location	TP-1 at 10 feet
Sample Description	Clayey Gravel with Sand		



Clay to Silt	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

Gravel		Liquid Limit	-
Sand		Plasticity Index	-
Silt and Clay		Sample Location	
Sample Description			

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I

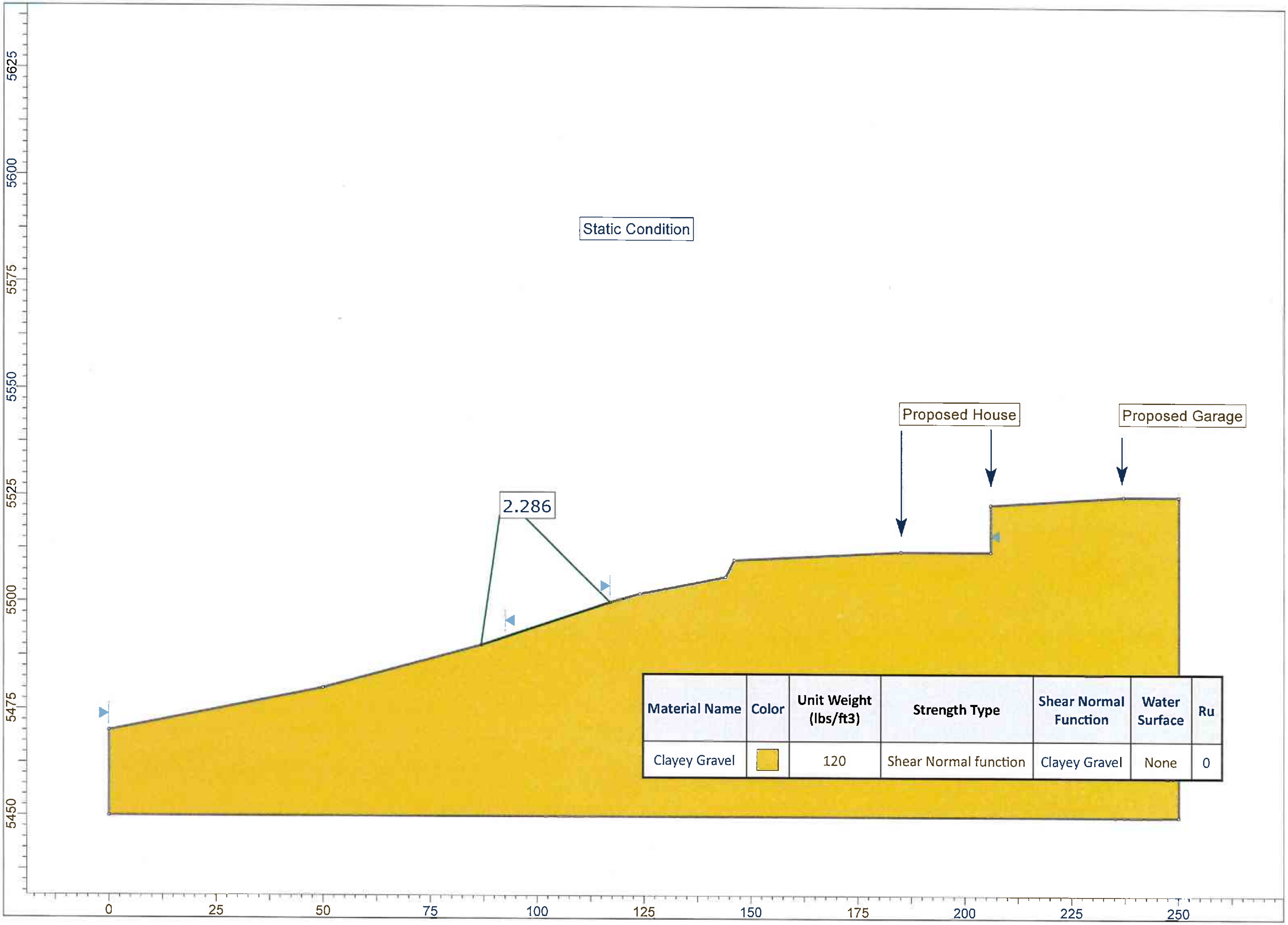
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1160176B

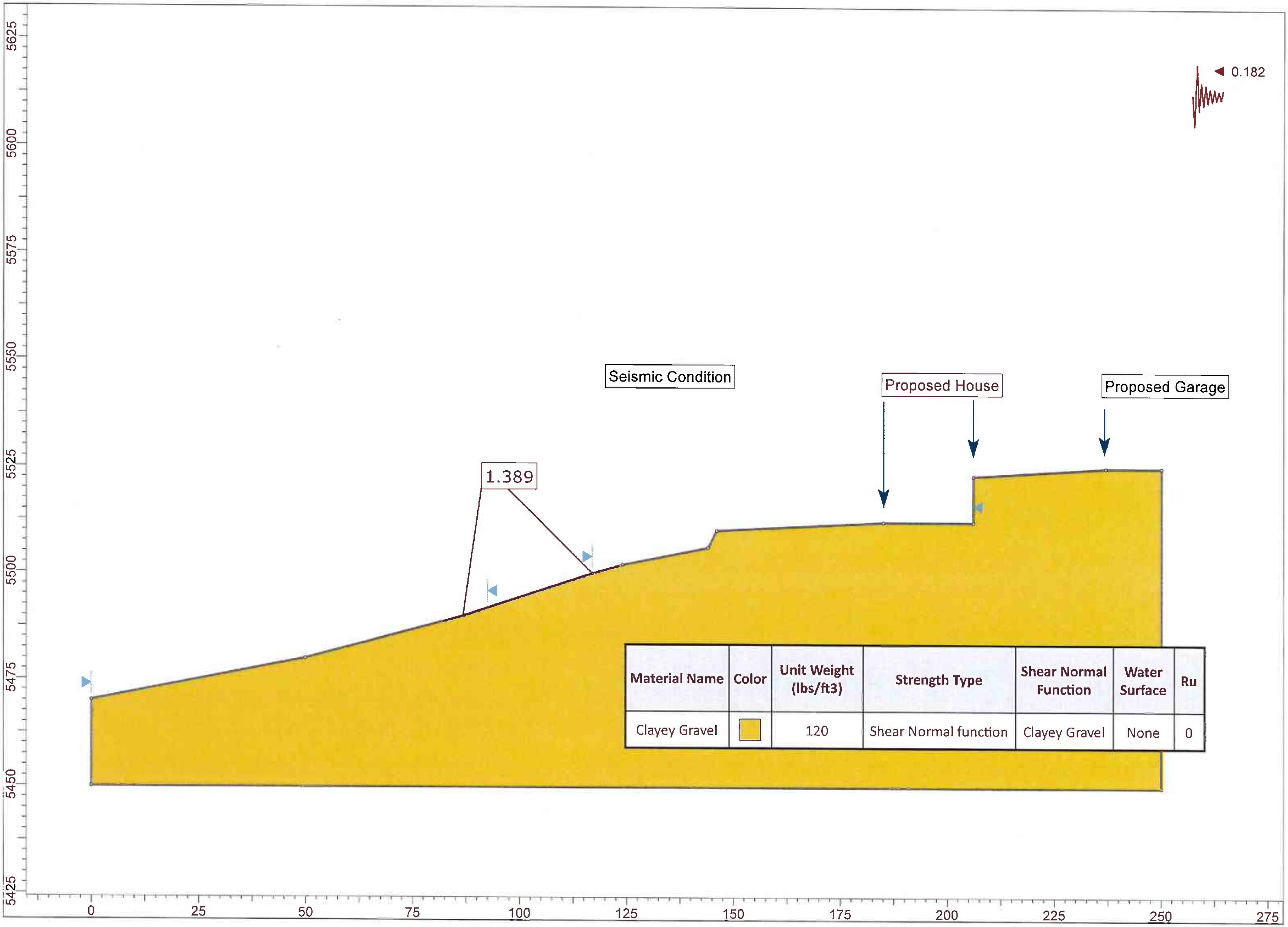
SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
BORING/ TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1	4									0.007	Lean Clay
	9	23	100			91	47	29			Lean Clay
TP-1	10	5		69	16	15	29	20			Clayey Gravel with Sand

APPENDIX

SLOPE STABILITY PRINTOUTS



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Shear Normal Function	Water Surface	Ru
Clayey Gravel		120	Shear Normal function	Clayey Gravel	None	0



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Shear Normal Function	Water Surface	Ru
Clayey Gravel		120	Shear Normal function	Clayey Gravel	None	0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name:	1160176 Seismic Condition
Slide Modeler Version:	7.014
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	5/2/2016, 10:42:47 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Failure Direction:	Right to Left
Data Output:	Standard
Maximum Material Properties:	20
Maximum Support Properties:	20

Analysis Options

Slices Type:	Vertical

Analysis Methods Used

Spencer

Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Auto Refine Search
Divisions along slope:	10
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Number of vertices per surface:	12
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Loading

Seismic Load Coefficient (Horizontal): 0.182

Material Properties

Property	Clayey Gravel
Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft3]	120
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: Clayey Gravel

Normal (psf)	Shear (psf)
0	0
1050	800
2000	1540
4000	3085
8350	6375

Global Minimums

Method: spencer

FS	1.388850
Axis Location:	91.825, 5525.199
Left Slip Surface Endpoint:	86.773, 5489.939
Right Slip Surface Endpoint:	117.002, 5500.001
Resisting Moment:	3293.89 lb-ft
Driving Moment:	2371.66 lb-ft
Resisting Horizontal Force:	97.8572 lb
Driving Horizontal Force:	70.4591 lb
Total Slice Area:	1.26602 ft2
Surface Horizontal Width:	30.2298 ft
Surface Average Height:	0.0418798 ft

Global Minimum Coordinates

Method: spencer

X	Y
86.7726	5489.94
87.419	5490.11
88.4014	5490.44
89.3839	5490.76
90.312	5491.07
91.2402	5491.37
92.1683	5491.68
93.0964	5491.99
94.3228	5492.39
95.5491	5492.8
96.2066	5493.02
96.8835	5493.24
97.5604	5493.47
98.5661	5493.8
99.5718	5494.14
100.845	5494.56
102.119	5494.98
102.763	5495.2
103.406	5495.41
104.693	5495.84
105.649	5496.17
106.605	5496.49
107.561	5496.81
108.517	5497.13
109.489	5497.45
110.462	5497.78
111.434	5498.11
112.406	5498.43
113.235	5498.72
114.064	5499
114.893	5499.28
115.722	5499.56
117.002	5500

Valid / Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 1666
Number of Invalid Surfaces: 2836

Error Codes:

Error Code -105 reported for 38 surfaces
Error Code -111 reported for 37 surfaces
Error Code -113 reported for 2761 surfaces

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-111 = safety factor equation did not converge
-113 = Surface intersects outside slope limits.

Slice Data

Global Minimum Query (spencer) - Safety Factor: 1.38885

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]
1	0.646406	0.664783	15.1221	Clayey Gravel	-1.11022e-016	37.304	0.508383	0.706068	0.926714	0	0.926714
2	0.491235	1.62417	18.2021	Clayey Gravel	0	37.304	1.54018	2.13908	2.80754	0	2.80754
3	0.491235	1.75474	18.2021	Clayey Gravel	-4.44089e-016	37.304	1.664	2.31104	3.03324	0	3.03324
4	0.982469	3.90117	18.2021	Clayey Gravel	0	37.304	1.84971	2.56897	3.37177	0	3.37177
5	0.464066	2.00445	18.2816	Clayey Gravel	0	37.304	2.00904	2.79025	3.6622	0	3.6622
6	0.464066	2.08126	18.2816	Clayey Gravel	-4.44089e-016	37.304	2.08602	2.89717	3.80254	0	3.80254
7	0.464066	2.15806	18.2816	Clayey Gravel	-4.44089e-016	37.304	2.163	3.00408	3.94286	0	3.94286
8	0.464066	2.23487	18.2816	Clayey Gravel	0	37.304	2.23998	3.111	4.08318	0	4.08318
9	0.464066	2.31168	18.2816	Clayey Gravel	-4.44089e-016	37.304	2.31697	3.21792	4.22352	0	4.22352
10	0.464066	2.38849	18.2816	Clayey Gravel	-8.88178e-016	37.304	2.39395	3.32484	4.36385	0	4.36385
11	0.464066	2.46529	18.2816	Clayey Gravel	-4.44089e-016	37.304	2.47093	3.43175	4.50417	0	4.50417
12	0.464066	2.5421	18.2816	Clayey Gravel	-4.44089e-016	37.304	2.54791	3.53867	4.64451	0	4.64451
13	0.613163	3.45163	18.3388	Clayey Gravel	-4.44089e-016	37.304	2.61545	3.63247	4.76762	0	4.76762
14	0.613163	3.53573	18.3388	Clayey Gravel	-4.44089e-016	37.304	2.67918	3.72098	4.88379	0	4.88379
15	0.613163	3.61983	18.3388	Clayey Gravel	0	37.304	2.7429	3.80948	4.99995	0	4.99995
16	0.613163	3.70392	18.3388	Clayey Gravel	0	37.304	2.80663	3.89799	5.11612	0	5.11612
17	0.657558	4.05209	18.3656	Clayey Gravel	-4.44089e-016	37.304	2.86169	3.97446	5.21649	0	5.21649
18	0.676893	4.22726	18.3972	Clayey Gravel	-8.88178e-016	37.304	2.89838	4.02541	5.28335	0	5.28335
19	0.676893	4.26745	18.3972	Clayey Gravel	-8.88178e-016	37.304	2.92594	4.06369	5.33358	0	5.33358
20	0.502836	3.19918	18.3869	Clayey Gravel	0	37.304	2.95334	4.10175	5.38356	0	5.38356
21	0.502836	3.22745	18.3869	Clayey Gravel	0	37.304	2.97944	4.138	5.43111	0	5.43111
22	0.502836	3.25572	18.3869	Clayey Gravel	0	37.304	3.00554	4.17424	5.47869	0	5.47869
23	0.502836	3.28399	18.3869	Clayey Gravel	-8.88178e-016	37.304	3.03164	4.21049	5.52626	0	5.52626
24	0.636832	4.18032	18.4279	Clayey Gravel	0	37.304	3.04473	4.22867	5.55013	0	5.55013
25	0.636832	4.18695	18.4279	Clayey Gravel	-8.88178e-016	37.304	3.04955	4.23537	5.55892	0	5.55892
26	0.636832	4.19358	18.4279	Clayey Gravel	0	37.304	3.05438	4.24208	5.56773	0	5.56773
27	0.636832	4.2002	18.4279	Clayey Gravel	0	37.304	3.05921	4.24878	5.57653	0	5.57653
28	0.643539	4.22747	18.4771	Clayey Gravel	0	37.304	3.04413	4.22784	5.54905	0	5.54905
29	0.643539	4.18683	18.4771	Clayey Gravel	0	37.304	3.01487	4.1872	5.4957	0	5.4957
30	0.643539	4.14619	18.4771	Clayey Gravel	-8.88178e-016	37.304	2.9856	4.14655	5.44235	0	5.44235
31	0.643539	4.10555	18.4771	Clayey Gravel	0	37.304	2.95634	4.10591	5.38901	0	5.38901
32	0.47796	3.00998	18.5257	Clayey Gravel	-8.88178e-016	37.304	2.91561	4.04934	5.31476	0	5.31476
33	0.47796	2.96171	18.5257	Clayey Gravel	-4.44089e-016	37.304	2.86885	3.9844	5.22952	0	5.22952
34	0.47796	2.91343	18.5257	Clayey Gravel	-4.44089e-016	37.304	2.82208	3.91945	5.14427	0	5.14427
35	0.47796	2.86516	18.5257	Clayey Gravel	0	37.304	2.77532	3.85451	5.05905	0	5.05905
36	0.47796	2.81688	18.5257	Clayey Gravel	0	37.304	2.72856	3.78956	4.9738	0	4.9738
37	0.47796	2.7686	18.5257	Clayey Gravel	0	37.304	2.6818	3.72462	4.88856	0	4.88856
38	0.47796	2.72033	18.5257	Clayey Gravel	-4.44089e-016	37.304	2.63504	3.65967	4.80332	0	4.80332
39	0.47796	2.67205	18.5257	Clayey Gravel	0	37.304	2.58828	3.59473	4.71807	0	4.71807
40	0.486176	2.64912	18.5959	Clayey Gravel	-4.44089e-016	37.304	2.51934	3.49899	4.59244	0	4.59244
41	0.486176	2.56051	18.5959	Clayey Gravel	0	37.304	2.43507	3.38195	4.43882	0	4.43882
42	0.972352	4.8552	18.5959	Clayey Gravel	0	37.304	2.30867	3.2064	4.2084	0	4.2084
43	0.972352	4.50075	18.5959	Clayey Gravel	0	37.304	2.14013	2.97232	3.90117	0	3.90117
44	0.486176	2.11746	18.5959	Clayey Gravel	0	37.304	2.01372	2.79676	3.67076	0	3.67076
45	0.486176	2.02885	18.5959	Clayey Gravel	0	37.304	1.92946	2.67973	3.51714	0	3.51714
46	0.828803	3.15522	18.7196	Clayey Gravel	0	37.304	1.75605	2.43889	3.20105	0	3.20105
47	0.828803	2.69939	18.7196	Clayey Gravel	0	37.304	1.50236	2.08655	2.73861	0	2.73861
48	0.828803	2.24357	18.7196	Clayey Gravel	-4.44089e-016	37.304	1.24867	1.73422	2.27615	0	2.27615
49	0.828803	1.78775	18.7196	Clayey Gravel	0	37.304	0.994981	1.38188	1.81371	0	1.81371
50	1.28081	1.21389	19.0595	Clayey Gravel	-1.11022e-016	37.304	0.434372	0.603277	0.791798	0	0.791798

Interslice Data

Global Minimum Query (spencer) - Safety Factor: 1.38885

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	86.7726	5489.94	0	0	0
2	87.419	5490.11	0.045752	0.0230554	26.7445
3	87.9102	5490.27	0.0532396	0.0268286	26.7445
4	88.4014	5490.44	0.061329	0.030905	26.7445
5	89.3839	5490.76	0.0793137	0.0399679	26.7445
6	89.848	5490.91	0.0853778	0.0430237	26.7445
7	90.312	5491.07	0.0916743	0.0461967	26.7445
8	90.7761	5491.22	0.0982032	0.0494867	26.7445
9	91.2402	5491.37	0.104964	0.0528938	26.7446
10	91.7042	5491.53	0.111958	0.056418	26.7445
11	92.1683	5491.68	0.119184	0.0600593	26.7445
12	92.6324	5491.83	0.126642	0.0638177	26.7445
13	93.0964	5491.99	0.134333	0.0676932	26.7445
14	93.7096	5492.19	0.140842	0.0709731	26.7444
15	94.3228	5492.39	0.147509	0.0743329	26.7445
16	94.9359	5492.6	0.154335	0.0777725	26.7445
17	95.5491	5492.8	0.161319	0.0812921	26.7445
18	96.2066	5493.02	0.166801	0.0840544	26.7445
19	96.8835	5493.24	0.169856	0.0855943	26.7446
20	97.5604	5493.47	0.172941	0.0871488	26.7445
21	98.0633	5493.63	0.175912	0.088646	26.7446
22	98.5661	5493.8	0.17891	0.0901565	26.7445
23	99.0689	5493.97	0.181933	0.0916801	26.7446
24	99.5718	5494.14	0.184983	0.0932171	26.7446
25	100.209	5494.35	0.185458	0.0934561	26.7445
26	100.845	5494.56	0.185933	0.0936955	26.7445
27	101.482	5494.77	0.186408	0.0939352	26.7446
28	102.119	5494.98	0.186885	0.0941754	26.7445
29	102.763	5495.2	0.183239	0.0923381	26.7445
30	103.406	5495.41	0.179628	0.0905186	26.7446
31	104.05	5495.63	0.176053	0.0887166	26.7444
32	104.693	5495.84	0.172512	0.0869324	26.7445
33	105.171	5496.01	0.167017	0.0841634	26.7445
34	105.649	5496.17	0.16161	0.0814389	26.7446
35	106.127	5496.33	0.156292	0.0787587	26.7445
36	106.605	5496.49	0.151061	0.0761229	26.7445
37	107.083	5496.65	0.145919	0.0735316	26.7445
38	107.561	5496.81	0.140865	0.0709847	26.7445
39	108.039	5496.97	0.135898	0.0684822	26.7446
40	108.517	5497.13	0.131021	0.0660241	26.7444
41	109.003	5497.29	0.122506	0.0617333	26.7445
42	109.489	5497.45	0.114276	0.057586	26.7445
43	110.462	5497.78	0.0986703	0.0497221	26.7445
44	111.434	5498.11	0.084204	0.0424322	26.7445
45	111.92	5498.27	0.0773981	0.0390026	26.7445
46	112.406	5498.43	0.070877	0.0357165	26.7446
47	113.235	5498.72	0.0530306	0.0267232	26.7445
48	114.064	5499	0.0377623	0.0190293	26.7446
49	114.893	5499.28	0.0250723	0.0126345	26.7446
50	115.722	5499.56	0.0149605	0.00753893	26.7446
51	117.002	5500	0	0	0

List Of Coordinates

External Boundary

X	Y
0	5450
250	5450
250	5525
237	5525
206	5523
206	5512
185	5512
146	5510
144	5506
124	5502
117	5500
87	5490
50	5480
0	5470