APPENDIX E

Preliminary Geotechnical Report and Percolation Feasibility Study

AZ GEO TECHNICS, INC.

Geotechnical and Environmental Consultants

38713 9th Street East
Palmdale, Ca. 93550
Phone: (661) 273-3123 Fax: (661) 273-4245

PRELIMINARY GEOTECHNICAL REPORT
FOR PROPOSED SUBDIVISION

PROJECT NUMBER

GT-3503-S

SITE LOCATION

BETWEEN TRIUMPH AND TANNAHILL AVENUE
IN THE CITY OF SANTA CLARITA,
COUNTY OF LOS ANGELES,
STATE OF CALIFORNIA.

LEGAL DESCRIPTION

APN: 2841-018-035

DATE

November 11, 2017

PREPARED FOR

Bill Rex

A Z Geo Technics, Inc.

Geotechnical, Environmental and General Building Services

NOVEMBER 11, 2017

BILL REX
REXHALL COMPANY
45640 23RD STREET WEST
LANCASTER, CA 93536

SUBJECT: PRELIMINARY SOILS REPORT FOR A SITE LOCATED IN BETWEEN TRIUMPH AND TANNAHILL AVENUE @ THE NORTHWEST CORNER OF RADCLAY STREET, IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.
APN: 2841-018-035 ("Site")

Dear Mr. Rex:

Pursuant to your authorization, AZ Geo Technics, Inc., referred to herein as **"Consultant"**, has visited the Site and performed a preliminary soils evaluation for **Bill Rex**, referred to herein as **"Client"**. The findings and recommendations contained in this "Report" are based upon four (4) specific exploratory borings/trenches and observations as noted within our described limitations. The materials immediately adjacent to or beneath those observed may have different characteristics and no representations are made as to the quality or extent of materials not observed.

Client, and/or Clients' contractor(s)/agents, are the responsible parties for the implementation of all recommendations during the life of the project. To the best of Consultants' knowledge, the evaluation covered in this limited study is in accordance with applicable recommendations. Any variances not approved in writing by Consultant would nullify this Report for any use. No other warranties are expressed or implied. Please note, this Report is valid for only one (1) year from the date hereof, subject to Consultants' review and approval prior to further use.

If you have any questions regarding this Report, please contact our office at your convenience. We appreciate this opportunity to be of service and will be available for future developments at your convenience.

Respectfully submitted for,

AZ GEO TECHNICS, INC.

REGISTERED PROFESSIONAL ENGINEER
NORIK BEDASSIAN
C 53083
Exp. 6/30/18
CIVIL
STATE OF CALIFORNIA

Norik Bedassian, P.E.
NB:jr/GT-3503

SCOPE

The scope of this limited evaluation consisted of the following geotechnical steps:

A. Review of literature, reports, and maps made available by Client pertinent to the Site.

B. Preliminary Site reconnaissance and subsurface exploration.

C. Laboratory analysis of selected representative bulk and relatively undisturbed samples.

D. Preparation of this Report presenting our findings, conclusions, and recommendations.

PROPOSED DEVELOPMENT

The proposed development is reported to be a subdivision of four lot. "Client" prepared the Tentative Tract Map. The Site are intended for a one or two-story single-family residential dwelling***(s)***. This study was performed for the proposed building pad areas, associated driveways, and on-Site utility construction only. Though no building plans were made available to Consultant at the time of the preparation of this Report, this type of structure is typically wood framed with continuous and/or isolated pad footings. Structural loads are anticipated to be light to moderate. Should something other than what is represented here be utilized during construction, Consultant should be notified immediately to review the proposed changes and modify this Report if necessary.

BACKGROUND OF SUBJECT SITE

The Site is currently vacant.

SITE DESCRIPTION

The Site is located in the City of Santa Clarita, County of Los Angeles, State of California. The Site is bounded on the north by number of residence, on the south by vacant lot, on the east by number of residence, and on the west by number of residence. The Site is approximately twenty (20) acres in size, rectangular in shape, and mostly accessible. The Site terrain is relatively flat to fooling hills.

The surface is sparsely covered with native vegetation / weeds / oak trees. Signs / No signs of watercourses or rock outcroppings were observed on the Site.

FIELD SUB-SURFACE INVESTIGATION AND LABORATORY TESTING RESULTS

Subsurface evaluation consisted of four (4) exploratory trenches, excavated to a maximum depth of fifteen (15) feet in order to determine the condition of the near-surface natural material. The trenches were logged and reviewed. Representative bulk and undisturbed samples were collected for laboratory testing. Bulk (disturbed) samples of the near surface soil were observed from the cuttings developed during excavation operations. The subsurface conditions shown on the Trench Logs apply only at the specific locations and to the dates indicated. It is not warranted to be a representative of subsurface conditions at any other locations and times.

Expansive Soils

The potential expansion characteristics of the near-surface soils are classified as low expansive in accordance with CBC Standards No. 1805A.8, Expansion Index Test. General guidelines for the proposed construction are based on soil expansion. Upon completion of rough pad grades, evaluation of foundation bearing materials should be made in accordance with CBC Standards No. 1805A.8.1. Specific recommendations for construction should be made after evaluation of foundation bearing materials.

Artificial Fill

No artificial fill or structural fill was encountered during the excavation operations.

Surface Erosion Potential

No evidence of significant erosion was observed on the Site. By nature, on-Site soil is cohesive and must be considered to be susceptible to surface erosion. The velocity of the concentration of drainage must be reduced by Rip Rap, juding, and landscaping the area to prevent possible erosion.

SHRINKAGE AND SUBSIDENCE

It is estimated that there will be a minimum of teen percent (10%) shrinkage approximately six (6) inches below surficial soil at an average density of ninety three percent (93%) compaction relative to the maximum dry density, due to the reworking of the surface soils (excluding rocks and organics). Natural ground subsidence is estimated to be as much as one-half (½) of an inch, depending significantly on the methods and the compaction equipment used. Some additional losses are anticipated due to the preparation and removal of surface and sub-surface obstructions, such as trees and rock outcroppings.

SETTLEMENT

It is estimated that after grading, in accordance with our recommendations/supervision, the settlement of the foundation system is expected to occur on initial load application. A maximum of one-half (½) of an inch settlement is anticipated, but differential settlement is anticipated not to exceed one-fourth (¼) of an inch within a thirty (30) foot span.

ON-SITE SEWAGE DISPOSAL

It is Consultants' opinion that the proposed private on-Site sewage disposal system, via leach line at the Site (which has been tested) will not have any adverse effect as to the stability of the Site.

DRAINAGE

All pads drainage should be sheet flow and transferred to an appropriate non-erosive drainage device. The drainage will not be allowed to pond on the pad.

SUBSURFACE CONDITIONS

Based on our findings from the Site observation and exploratory ***trenches***, the on-Site earth materials generally consist of older alluvium (Oal). These materials are typically moderately dense to dense sands, silts and clays in varying degrees of combinations. Please refer to the ***Trench*** Logs for a brief description of the on-Site earth materials encountered during the ***excavation*** operations.

Top Soil	Light Brown Silty Sand
Near Surface Materials	Light Brown Silty Sand with gravel
Subsurface At Depth Explored	Light Brown Silty Sand/gravel/cobbles
Depth To Groundwater	None encountered
Depth To Bedrock	None encountered

FOUNDATION RECOMMENDATIONS

Foundations may be conventional spread or continuous wall footings, provided they are as follows:

- ▶Minimum continuous footings widths: Twelve (12) inches (one-story)
  Fifteen (15) inches (two-story)
  Eighteen (18) inches (three-story)
- ▶Minimum column footing width: Two (2) Feet

Minimum footing depths (in inches) below lowest adjacent final grade are as follows:

Expansion Index	Expansion Classification	One Story Structure	One Story structure	Two Story Structure	Two Story Structure	Three Story Structure	Three Story Structure
		Perimeter or Bearing Walls	Interior or Non-Bearing	Perimeter or Bearing Walls	Interior or Non-Bearing	Perimeter or Bearing Walls	Interior or Non-Bearing
0 – 20	Very Low	12	12	18	18	24	18
21 – 50	Low	12	12	18	18	24	18
51 – 90	Medium	15	12	20	18	24	18
91 - 130	High	18	12	24	18	30	18

Foundation reinforcement in addition to minimum structural requirements for dead, live and seismic loads:

Expansion Classification	Expansion Index	No. 4 ReBars Top and Bottom
Very Low	0 to 20	Two (2)
Low	21 to 50	Two (2)
Medium	51 to 90	Two (2)
High	91 to 130	Two (2)

SLABS-ON-GRADE

The concrete for slabs-on grade should conform to the requirements contained in the CBC Standard No. 1805A.8.2 and the City of Santa Clarita Amendments. The concrete slab thickness *minimums* do not preclude more stringent requirements of which may be imposed by the architect, structural engineer, or building official. These *minimums* are as follows:

Expansion Classification	Expansion Index	Minimum Slab Thickness
Very Low	0 to 20	Four (4) inches
Low	21 to 50	Four (4) inches
Medium	51 to 90	Five (5) inches
High	91 to 130	Six (6) inches

Slab Reinforcement

The concrete slab reinforcement *minimums* do not preclude more stringent requirements of which may be imposed by the architect, structural engineer, or building official. These *minimums* are as follows:

Expansion Classification	Expansion Index	Slab Reinforcement
Very Low	0 to 20	No. 3 Rebar @ 24" on center, each way
Low	21 to 50	No. 3 Rebar @ 18" on center, each way
Medium	51 to 90	No. 4 Rebar @ 18" on center, each way
High	91 to 130	No. 4 Rebar @ 14" on center, each way

Moisture Vapor Barrier

Where moisture sensitive materials are to be placed on the slab, the slab should be underlain by a moisture vapor barrier (polyethylene plastic vapor barrier). Moisture barriers should have a minimum thickness of ten (10) mil. and should be protected by a two (2) inch thick layer of sand (above and below) in order to reduce the possibility of punctures and to aid in obtaining a satisfactory concrete cure. The moisture barrier must be properly lapped and/or sealed, as well as sealed around all plumbing structures and other openings. The slab areas should be presaturated to near optimum moisture content of the sub-grade material to a minimum depth of six (6) inches prior to placing sand and moisture barrier.

BEARING

Soil Bearing

For the proposed construction, foundations should be designed for an allowable bearing value not to exceed two thousand (2000) pounds per square foot (psf) on compacted material. This value is for dead loads plus the adjusted live load, which may be increased by one-third (⅓) for short term seismic and wind effects.

LATERAL LOADS

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footing bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of three hundred fifty (350) pounds per square foot (psf) per foot of depth. Base friction may be computed as four-hundreds (0.40) times the normal dead load. Base friction and passive earth pressure may be combined directly.

RETAINING WALLS

Retaining Wall Foundation Soils

Retaining walls should be founded on clean, non-deleterious natural or compacted competent material. Consultants' representative should observe soil materials exposed at the bottom of the proposed retaining wall footings. If these materials visually appear to be potentially expansive (e.g. clays and elastic silts), the expansion index testing should be performed in order to confirm the expansion characteristics of the material and Consultant should then make the appropriate recommendations.

Retaining Wall Design Parameters

Based upon a review of the current plans, retaining walls may be designed for a maximum height of **five (5)** feet.

The allowable net bearing pressure for retaining wall footings, at least one (1) foot wide and one (1) foot deep below the lowest adjacent grade which should be founded on competent natural soils or on at least two (2) feet of compacted fill to a minimum of ninety percent (90%) relative compaction, is **two-thousand (2000)** psf.

If retaining walls are constructed to retain on-Site compacted fill materials, they should be designed to resist lateral pressures equal to those exerted by an equivalent fluid having a density of not less than that shown in the following table.

Based upon analyses, the following Lateral Earth Pressures may be used in the design of any proposed retaining walls or similar structures:

	Driving Earth Pressure*	**Resisting Earth Pressure***
Well Drained Level Soil	30 pcf	350 psf
Well Drained 2:1 Backfill Soil	40 pcf	

* Equivalent fluid pressure (psf) per foot of soil height.

SEISMIC COEFFICIENTS

Based on the California Building Code (CBC 2013), the site is located at Region 1. Due to the proposed structure's occupancy category and the severity of the design earthquake ground motion at the site, the proposed structure will be assigned to a Seismic Design Category. Under the Earthquake Design Regulations of Chapter 16, Section 1613 of the CBC 2013, the following coefficients and factors apply to lateral – force design for structures at the site:

Site Classification CBC 2013 Section 1613.5.2	
Latitude	34.394199 N
Longitude	118.420536 W
Ss =	20783
Fa =	1.00
S1 =	0.973
Fv =	1.50
Site Class	D
FaSs = S_{MS} =	2.783
FvS1 = S_{M1} =	1.460
⅔ S_{MS} = S_{DS} =	1.856
⅔ S_{M1} = S_{D1} =	0.973

PGA=1.029

HYDRO-CONSOLIDAITON

The disturbed and loose soil is underlain by sediments, which are subject to hydro-consolidation. This is a phenomenon by which metastable soils undergo rapid consolidation upon introduction of sufficient quantity of water or an increase in ambient loading. These soils are generally of low density and low moisture content.

The soils encountered beneath the Site were very dense below a depth of five (5) feet. Samples obtained below this depth had in-place dry densities of approximately (109.1) pounds per cubic foot (pcf). The moisture contents were found to be within percent (100%) of optimum moisture.

In addition to the density data, the result of a consolidation test performed on a selected sample is included in this Report.

Based upon available data, it is our opinion that hydro-consolidation of on-Site soils do not present any unusual risk for this Site provided that the recommendations contained in this Report are followed.

Over-excavating the building area, Site processing, control of landscape irrigation, and minimal changes from existing grades will further lessen the possibility of hydro-consolidation.

SUMMARY AND CONCLUSIONS

General Conclusions

The following conclusions are presented based upon the results of our findings and analysis of field and laboratory data at the time and locations as shown. No representation is made to any other areas or consistency of the conditions. Environmental testing was not a part of the report.

1. Proposed construction is feasible from a geotechnical point of view provided the soil recommendations presented in this Report have been implemented during construction.
2. The area of the proposed Site is underlain by massive Silty Sand with gravel. The soils are dense, and moist.
3. On-Site soils are primarily fine to coarse granular with an anticipated expansion potential.
4. No groundwater or evidence of seepage was encountered within the trenches.
5. Any change of plans must be approved by Consultant prior to construction.
6. At the time of further review and/or during construction, additional recommendations or changes may be provided depending on the future findings of the proposed development.

Liquefaction Potential

The primary factors influencing liquefaction potential include groundwater, soil type, and intensity of ground shaking. Liquefaction potential is greatest in saturated, loose, and poorly graded sand.

Based on our investigation, the sub-surface material is classified as a dense mixture of sand, clay, silts, and groundwater at a depth of below fifty (50) feet.

Therefore, considering the above characteristics, the potential for soil liquefaction and other secondary seismic hazards such as lurch cracks and seismically induced settlement are considered to be minor at the Site.

CITY OF SANTA CLARITA BUILDING ORDINANCE 02-08, SECTION 18, 02,03

It is the opinion of this firm that the proposed development will be safe against any geotechnical hazards from landslides, settlement, or slippage, and the proposed work will not adversely affect adjacent property in compliance with the City of Santa Clarita Building Code, provided our recommendations are followed.

RECOMMENDATIONS

General Site Grading

All Grading shall be performed in accordance with the General Earthwork and Grading Specifications (Enclosed) *except* as modified in the text of this Report.

The geotechnical exploration trench backfill is uncompacted and is unsuitable for support of structures. If any structure or other improvements (including paved access roads) are located over or immediately adjacent to the uncompacted fill, it is recommended that the backfill be over-excavated and replaced with engineered compacted fill.

Construction should allow for all plumbing and utility services to be connected with flexible connections and/or provided with convenient shut-offs. Structures should be designed in accordance with at least minimum code standards for Seismic Zone 4 as described in the City of Santa Clarita Amendments to 2013 California Building Code.

Diversion and reduction of the concentrated run-off(s) should be provided to minimize erosion of the on-Site slopes and improvements.

If Grading plans are required, all recommendations must be shown on the Grading plans prior to our review, approval, and signature; otherwise all recommendations should be addressed on the Plot Plan.

Any Site Grading should be in conformity with existing building codes
contains specific considerations for grading and forms a part of this Report.

Field review of the Site Grading by Consultant, if requested as recommended, will be an additional expense and will be billed at current fee schedule rates in effect at the time of the Site Grading.

Building Area Preparation

The minimum upper four (4) feet of soils across the Site are considered unsuitable to support any structure due to possible hydro-consolidation potential. These soils should be mitigated in structural areas by a minimum over excavation of the upper four (4) feet below original grade. The resultant ground surface should be scarified an additional six (6) inches and moisture conditioned to optimum moisture and compacted to a minimum of ninety percent (90%) relative compaction prior to fill placement. All lateral over-excavation shall be extended to the equivalent of the depth of over-excavation beyond the building footprint, but not be less than five (5) feet (under any circumstances). If the building pad is to be created by cut and fill transitional, the cut area must be over-excavated thirty-six (36) inches below the bottom of the footing.

The Site should be cleared of surface and sub-surface obstructions including any existing debris, pavement, existing foundations, existing utilities, vegetation, residual top soils, and other deleterious materials. Removed materials and debris should be disposed of off-Site. All cavities created by the removal of buried obstructions should be backfilled with suitable compacted materials. Vertical temporary excavations greater than five (5) feet in height will require sloping or shoring in accordance with the requirements of OSHA.

The non-structural area shall be over-excavated to a minimum depth of twelve (12) inches from the natural grade or finish grade, whichever is lowest, and re-compacted to a minimum of ninety percent (90%) relative to maximum dry density.

Preparation Of Paving Areas

All surfaces to receive concrete or asphaltic concrete paving should be over-excavated and scarified to a minimum depth of twenty-four (24) inches, or mitigated to the Consultants' satisfaction based on exposed conditions. The scarified bottom should be moisture conditioned and re-compacted to a minimum relative compaction of ninety percent (90%) prior to placing any additional fill.

Regarding preliminary pavement sections, no "R" Value tests were conducted on samples of the proposed parking area sub-grade soils. During Site Grading, sample(s) should be tested, secured from the exposed pavement sub-grade areas, and evaluated for review or revision of the following preliminary pavement sections. Based upon "R" Value estimated, the following sections may be used for developing preliminary earth quantities and paving cost estimates:

Asphalt Concrete Pavement Sections:

Traffic Index 4.0 (Automobile and Light Truck Parking Areas): 3.0" Asphalt Concrete on 4.0" Crushed Aggregate Base or equivalent.
Traffic Index 5.0 (Automobile and Light Truck Drive Lanes): 4.0" Asphalt Concrete on 4.0" Crushed Aggregate Base or equivalent.

Asphalt concrete pavement section recommendations are based on the assumption that the pavement section is placed on a minimum twelve (12) inch thick layer of compacted sub-grade as recommended in this Report. Aggregate base material should be properly moisture conditioned and compacted to at least ninety five percent (95%) of the maximum dry density as determined by ASTM D - 1557 test procedures using mechanical compaction equipment. Pavement sections should be verified with the jurisdictional authority prior to the time of construction.

Electrically insulate each buried steel pipeline from dissimilar metals, cement-mortar coated and concrete encased steel, also electrically insulate above ground steel pipe using dielectric fittings to prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection.

Apply cathodic protection to steel piping as per NACE International RP – 0169 - 92. As an alternative for steel waterlines to a dielectric coating and cathodic protection, apply a mortar coating as per AWWA Standard C - 205.

Other Protective Measures

Electrically insulate (isolate) below-grade ferrous metals by means of dielectric fittings in exposed metal structures breaking grade.

All steel and wire concrete reinforcement of structures and foundations in contact with Site soils should have at least five tenths (0.5) of an inch greater cover than required by the ACI code and a water-cement ratio of five tenths (0.5) or less.

GEOTECHNICAL OBSERVATION AND TESTING SERVICES

Consultant should provide continuous observation and testing during Grading of the subject Site. It is the responsibility of Client to notify Consultant of the date of the pre-grade meeting as well as notifying the inspector of record. The recommendations provided in this report are based on preliminary design information and sub-surface conditions disclosed by widely spaced trenches. The outlined sub-surface conditions should be verified in the field during construction. Consultant should prepare a final as-grade soil report and maps summarizing all conditions encountered and any field modification to the recommendations provided herein. The primary aspects of geotechnical observation and testing may include the following on an as needed basis:

- Observation of all removal and over excavation.
- Observation and material testing during fill placement.
- Geologic mapping of cut slopes (if recommended).
- Observation of footing excavations.
- After pre-saturation of the slab areas, but prior to placement of sand and visqueen.
- During utility trench excavation backfilling and compaction.
- Prior to construction of pavement, parking, and driveway areas to perform R-Value tests (if needed).
- During compaction of sub-grade and aggregate base.
- When any unusual conditions are encountered.

It is the responsibility of Client to ensure the above testing/observations are satisfied and that Consultant is given forty-eight (48) hours prior notice. Any grading performed at the subject Site that does not conform to the recommendations in this Report is the sole liability of Client.

LIMITATIONS

This Report is issued with the understanding that it is the responsibility of the Client to ensure that the information and recommendations contained herein are called to the attention of all parties concerned, including but not limited to future owners, agents, designers and contractors, as well as that the necessary steps are taken to ensure that such recommendations are carried out under any and all circumstances/conditions.

Conclusions and recommendations presented in this Report are based on soil conditions as encountered at the test locations and may not necessarily represent areas between and beyond the ***trenches and / or borings***. No representation is made to the quality or chemical characteristic of on-Site soil. This Report is not transferable without written consent of Consultant. This Report shall not be used for any appraisal purposes or cost evaluation.

If conditions other than those noted in this Report are encountered, Consultant should be notified immediately so that supplementary recommendations can be provided.

Consultant will be available to make a final review of the project plan and specifications and to assist in assuring correct interpretation of this Report's recommendations for use in applicable sections.

A representative of Consultant should inspect all Grading operations, including Site clearing and stripping. The presence of Consultants' field representative will be for the purpose of providing observation and field testing, and will not include any supervising or directing of the actual work of the Contractor (its employees or agents). Neither the presence of Consultants' field representative nor the observations and testing by Consultant shall excuse the Contractor in any way for defects discovered in Contractors' work.

It is understood that Consultant will not be responsible for job or Site safety on this project, which will be the responsibility of Client and Client's contractor.

Again, it is imperative that all recommendations provided herewith to be adhered to throughout the life of the project. No changes or variations shall be allowed without written approval of Consultant.

The conclusions and recommendations presented in this Report are based upon preliminary field and laboratory observation described herein and information available at this time within the limits prescribed by Client. It is possible that conditions between sampling locations may vary. Should conditions be encountered in the field that appear different than those described in this Report, Consultant should be contacted immediately in order to evaluate their effect and prepare additional recommendations.

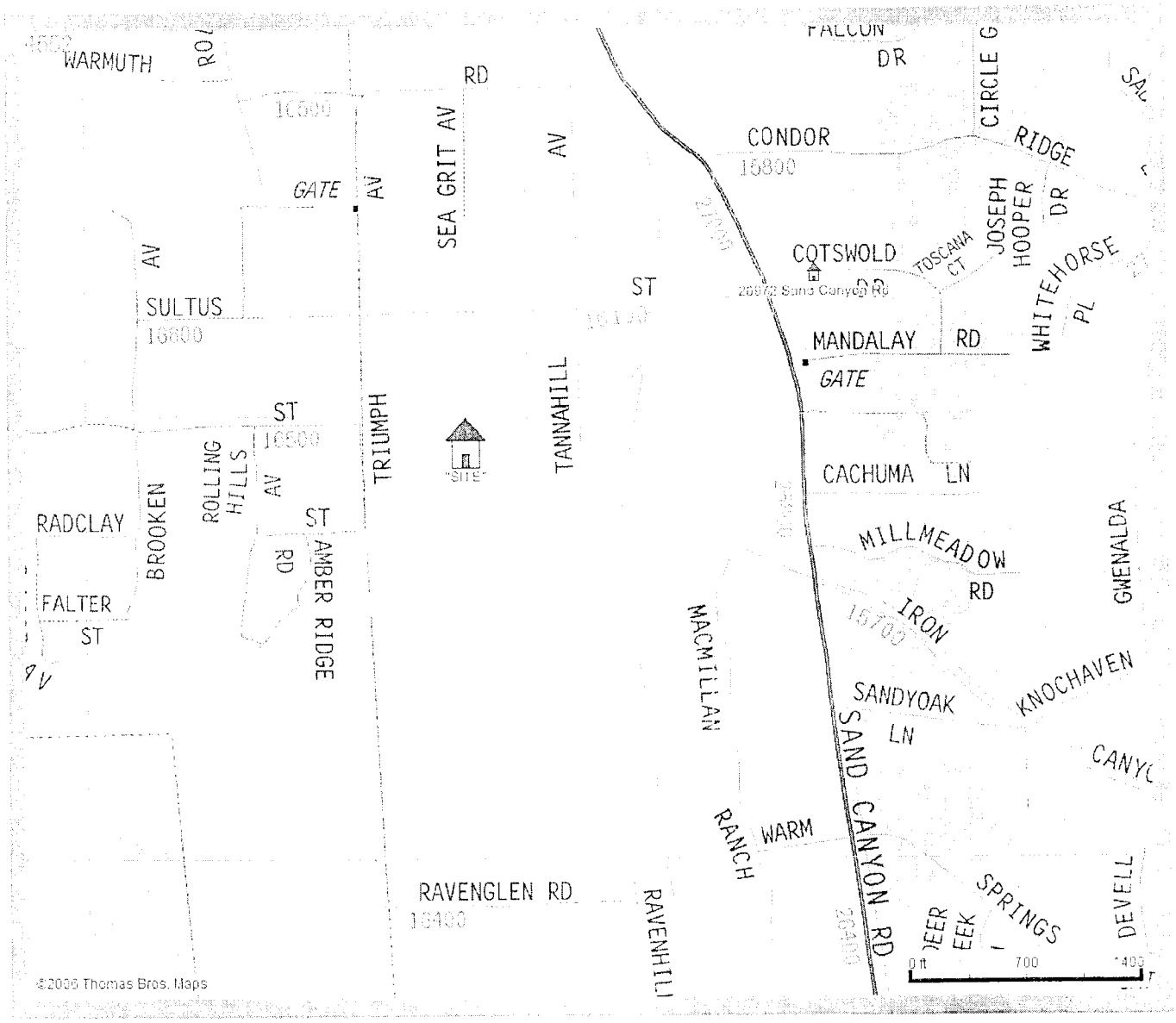
This Report concludes Consultants' services under the scope of services and Consultant makes no other representations or any other warranties, expressed or implied.

If this Report or portions hereof are provided to contractors or included in specifications, it should be understood by all parties that they are provided for preliminary information only, and should be used as such. The Report and its contents resulting from this evaluation are not intended or represented to be suitable for reuse on extensions or modifications of the project, or for use on any other project. Furthermore, this Report is issued to **Client Name** and is not transferable; any further use of this Report beyond one year of the date of this Report will require written consent by Consultant. Consultant must negotiate any additional work clarification or investigations and services. Any variance from Consultants' prescribed requirements would nullify this Report, and Client indemnifies Consultant and its representatives of all liability and obligation. The amount paid for this Report is the total liability of Consultant and its representatives toward all parties and any claimant.

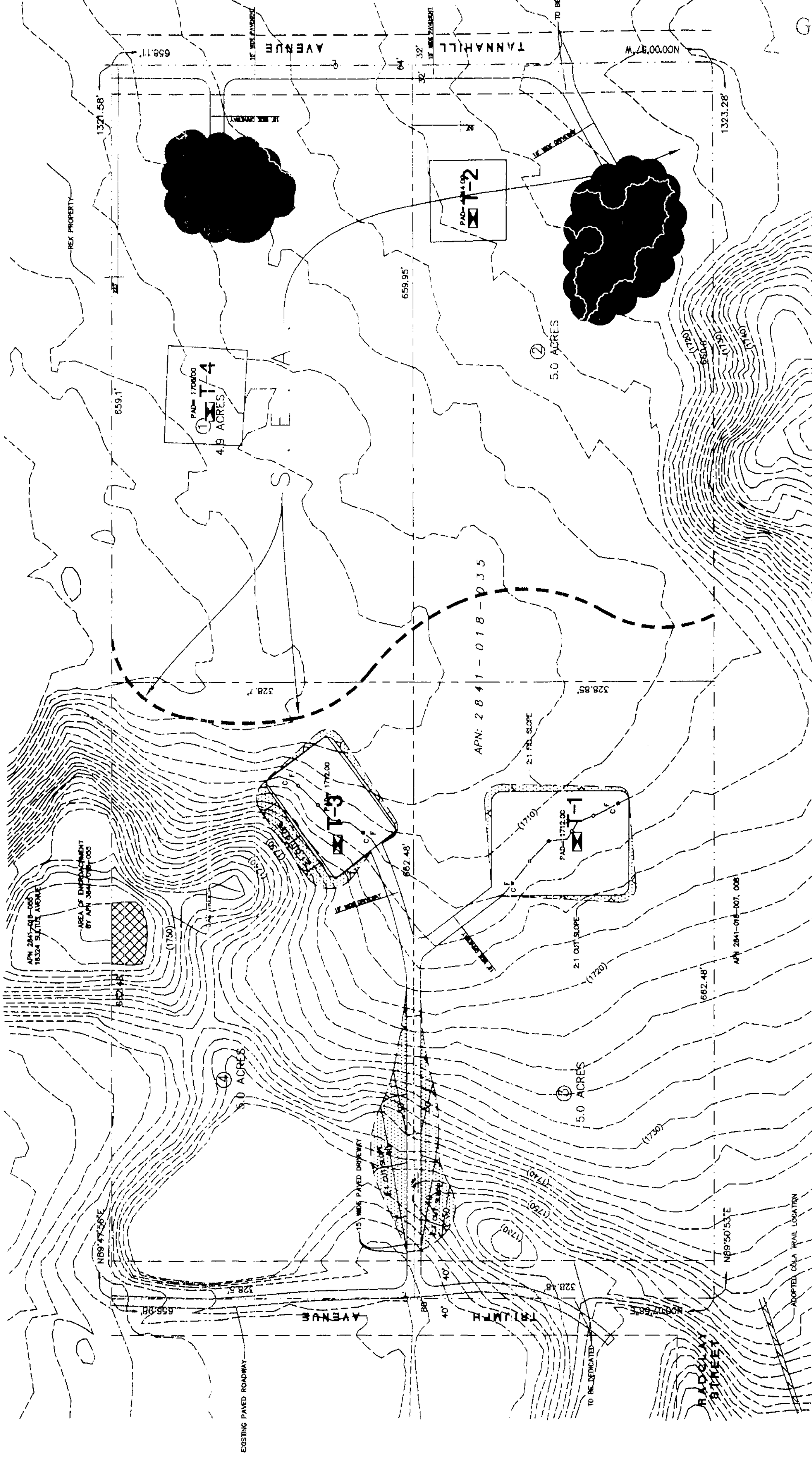
This Report does not cover any environmental, geologic, or flood hazards. If any such hazards exist, a geology report will be required.

ENCLOSURES

VICINITY MAP



PLOT PLAN


TANNAHILL AVENUE
TRIUMPH AVENUE
RADCLAY STREET
APN: 2841-018-035
5.0 ACRES
4.9 ACRES
T-1
T-2
T-3
T-4
REX PROPERTY
TO BE DEDICATED
EXISTING PAVED ROADWAY
2:1 FILL SLOPE
2:1 CUT SLOPE

TRENCH LOGS

TRENCH LOG SUMMARY

Date: 9/6/2017	Project Number: GT-3503	Logged By: JR
Client: Bill Rex	Location: Tannahill Avenue, Santa Clarita	Trench No: T-1

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	Blow Count	USCS	Description
0						Top Soil/ Silty Sand with trace Gravel/ Dry/ Fine to Medium/ Slightly Dense
1						
2	⊗				SM/	Dark Brown to Brown/ Silty Sand to Gravelly Sand/
3	A		7.7%		GW	Fine to Coarse/ Slightly Moist/ Moderately Dense
4	2	93.6	16.5 %	13/19	SM	Dark Brown to Brown/ Poorly Graded Silty Sand/ Fine to Coarse/ Moist/ Moderately Dense
5						
6	⊗				SM	Same As Above – with Gravel and Trace Cobbles
7						
8	⊗				SM	Same As Above
9						Same As Above -- Dense
10						
11						
12						
13						
14						
15						End of Trench @ -15'
						No Groundwater
						No Bedrock

O = Ring Sample □ = Bulk Sample ⊗ = No Recovery

TRENCH LOG SUMMARY

Date: 9/6/2017	Project Number: GT-3503	Logged By: JR
Client: Bill Rex	Location: Tannahill Avenue. Santa Clarita	Trench No:T-2

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	Blow Count	USCS	Description
0					SM	Light Brown/ Fine to Coarse/ Silty Sand to Sandy
1						Silt with roots/ Rootlets and Gravel/ Dry/ Dense
2						
3						
4					SP	Light Brown/ Fine to Coarse/ Gravelly Silty Sand
5						with Trace Roots/ Slightly Moist/ Moderate Dense to
						Dense
6						
7					GW	Brown to Light Greyish Brown/ Fine to Coarse/
						Gravelly Sand to Silty Sand with Gravel Cobbles
8						And Trace Boulders/ Slightly moist/ Dense
9						
10					SM	Same as above
11						
12						
13						Same as above
14						
15						End of Trench @ -15'
						No Groundwater
						No Bedrock

O = Ring Sample □ = Bulk Sample ⊗ = No Recovery

TRENCH LOG SUMMARY

Date: 9/6/2017	Project Number: GT-3503	Logged By: JR
Client: Bill Rex	Location: Tannahill Avenue, Santa Clarita	Trench No:T-3

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	Blow Count	USCS	Description
0						Light Brown/ Fine to Coarse/ Silty Sand with
1					SM	Gravel/ Dry to Very Slightly Moist/ Moderately
2						Dense
3					SM	Light Brown/ Fine to Coarse/ Silty Sand with
4						Gravel/ Dry to Very Slightly Moist/ Moderately
						Dense
5					SM/	Very Light Brown/ Fine to Coarse/ Gravelly Sand
						with Cobbles/ Slightly Moist/ Dense
6					GW	
7						
8						Brown to light Greyish Brown/ Fine to Coarse/
						Gravelly Sand with Cobbles and Trace Boulders/
						Slightly Moist/ Dense
9						
10						
11						Same as above
12					SM	
13						Same as above
14						
15						End of Trench @ -15'
						No Groundwater
						No Bedrock

O = Ring Sample □ = Bulk Sample ⊗ = No Recovery

TRENCH LOG SUMMARY

Date: 9/6/2017	Project Number: GT-3503	Logged By: JR
Client: Bill Rex	Location: Tannahill Avenue, Santa Clarita	Trench No:T-4

Depth	Sample Number	Dry Density (pcf)	Percent Moist.	B ow Count	USCS	Description
0					SM	Brown/ Fine to Coarse/ Silty Sand to Sandy
1						Silt with roots/ Rootlets and Gravel/ Dry/ Dense
2						
3						
4					SP	Brown/ Fine to Coarse/ Gravelly Silty Sand
5						with Trace Roots/ Slightly Moist/ Moderate Dense to
						Dense
6						
7					GW	Brown to Light Greyish Brown/ Fine to Coarse/
						Gravelly Sand to Silty Sand with Gravel Cobbles
8						And Trace Boulders/ Slightly moist/ Dense
9						
10					SM	Same as above
11						
12						
13						Same as above
14						
15						End of Trench @ -15'
						No Groundwater
						No Bedrock

O = Ring Sample □ = Bulk Sample ⊗ = No Recovery

LABORATORY TESTING

PLATE: M-1
J.O.: GT-3503
DATE: 11/15/2017

Maximum Dry Density & Optimum Moisture Curve

Sample Identification	Sample Description	Maximum Dry Density (PCF)	Optimum Moisture (%)
A	S lty Sand w/ Gravel	133.2	7.9

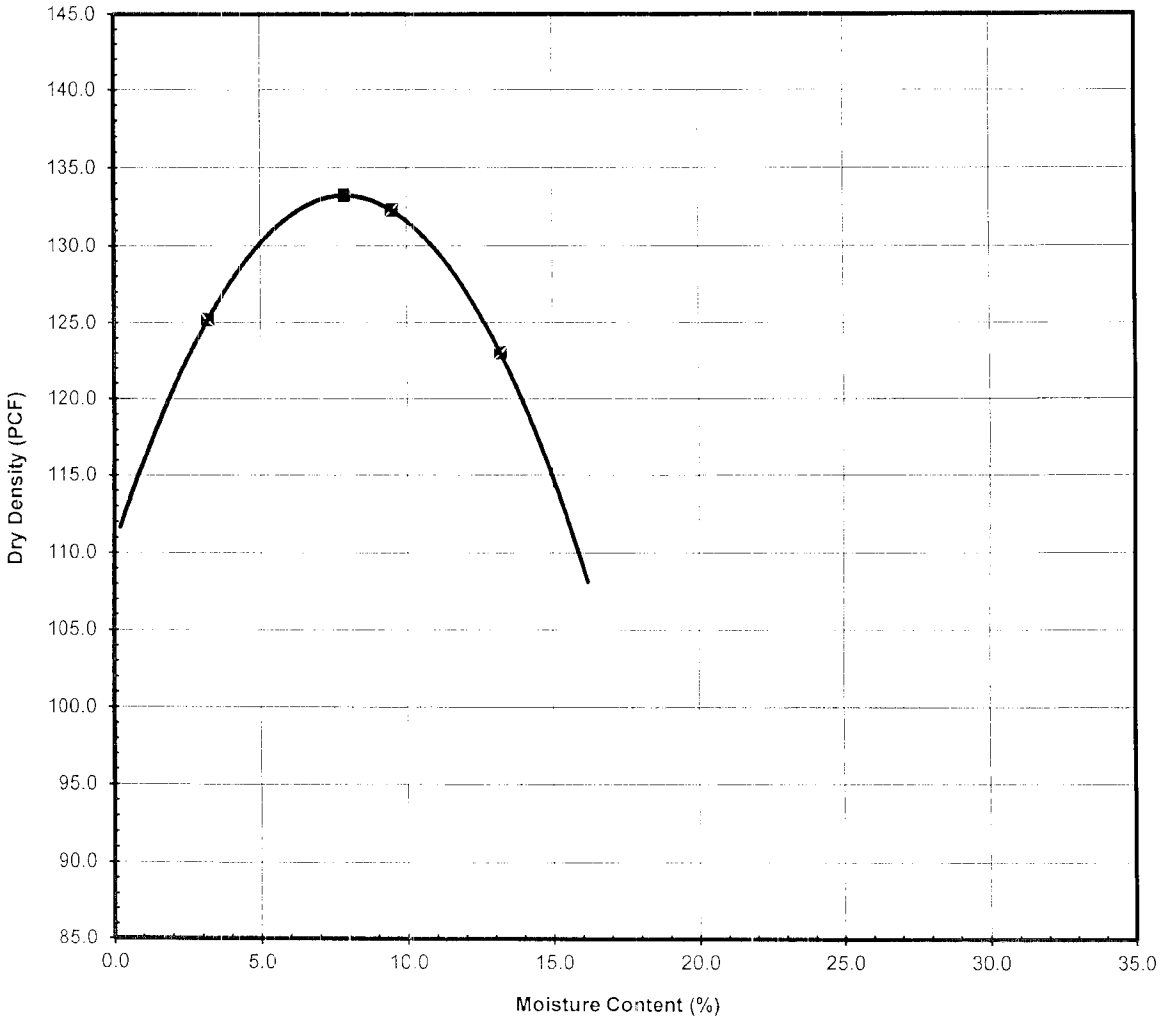


PLATE: S-1
J.O.: GT-3503
DATE: 11/20/2017

Direct Shear Test Diagram

Sample Identification	Sample Description	Sample Test State	Test Type
T-1 @ 4' #2	Silty Sand w/ trace Gravel	Saturated	Ultimate
Wi=16.5%	Wf=21.4%	Ws=96.3 pcf	
	Phi (Degrees)	25.1	
	Cohesion (PSF)	199.3	

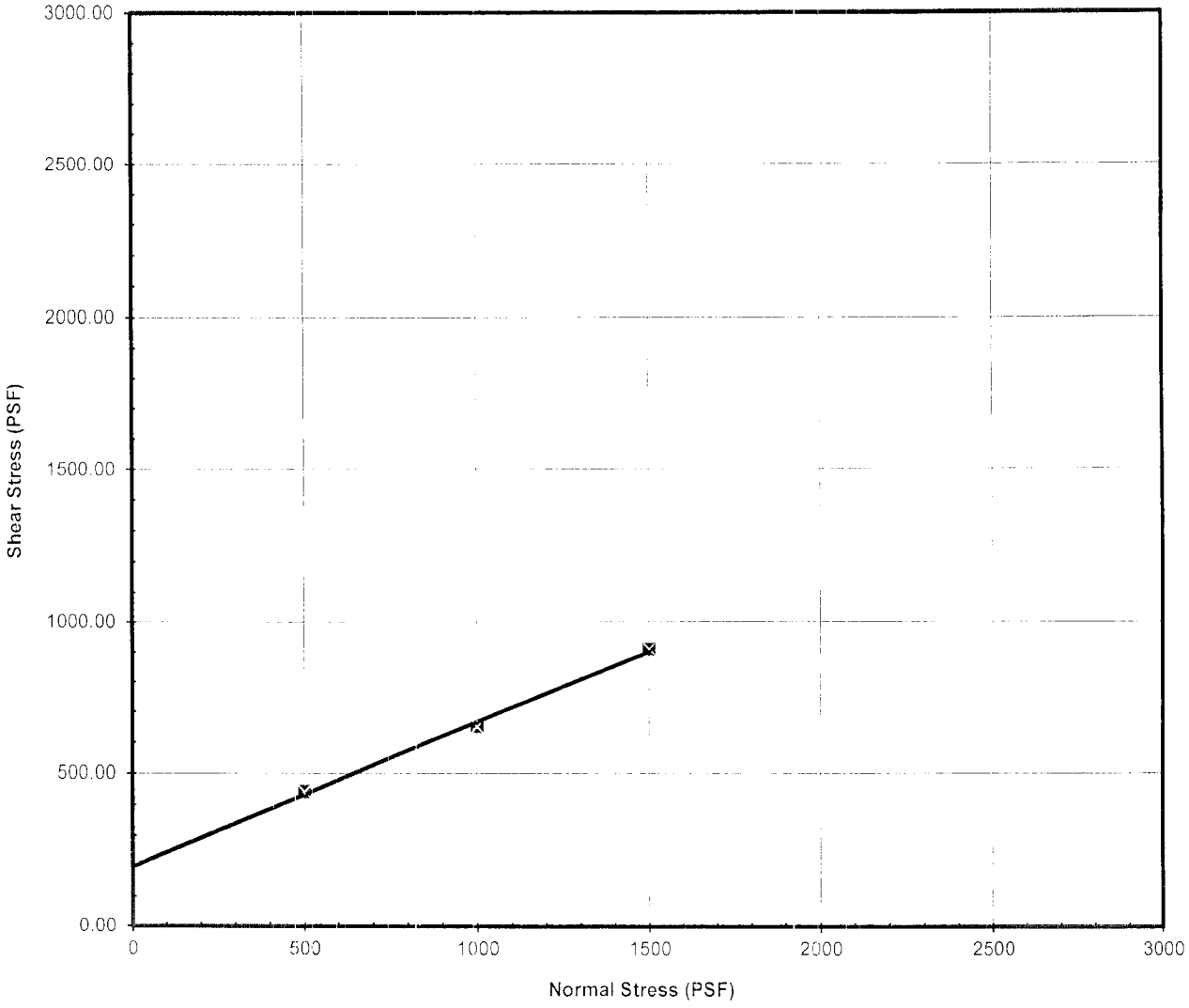
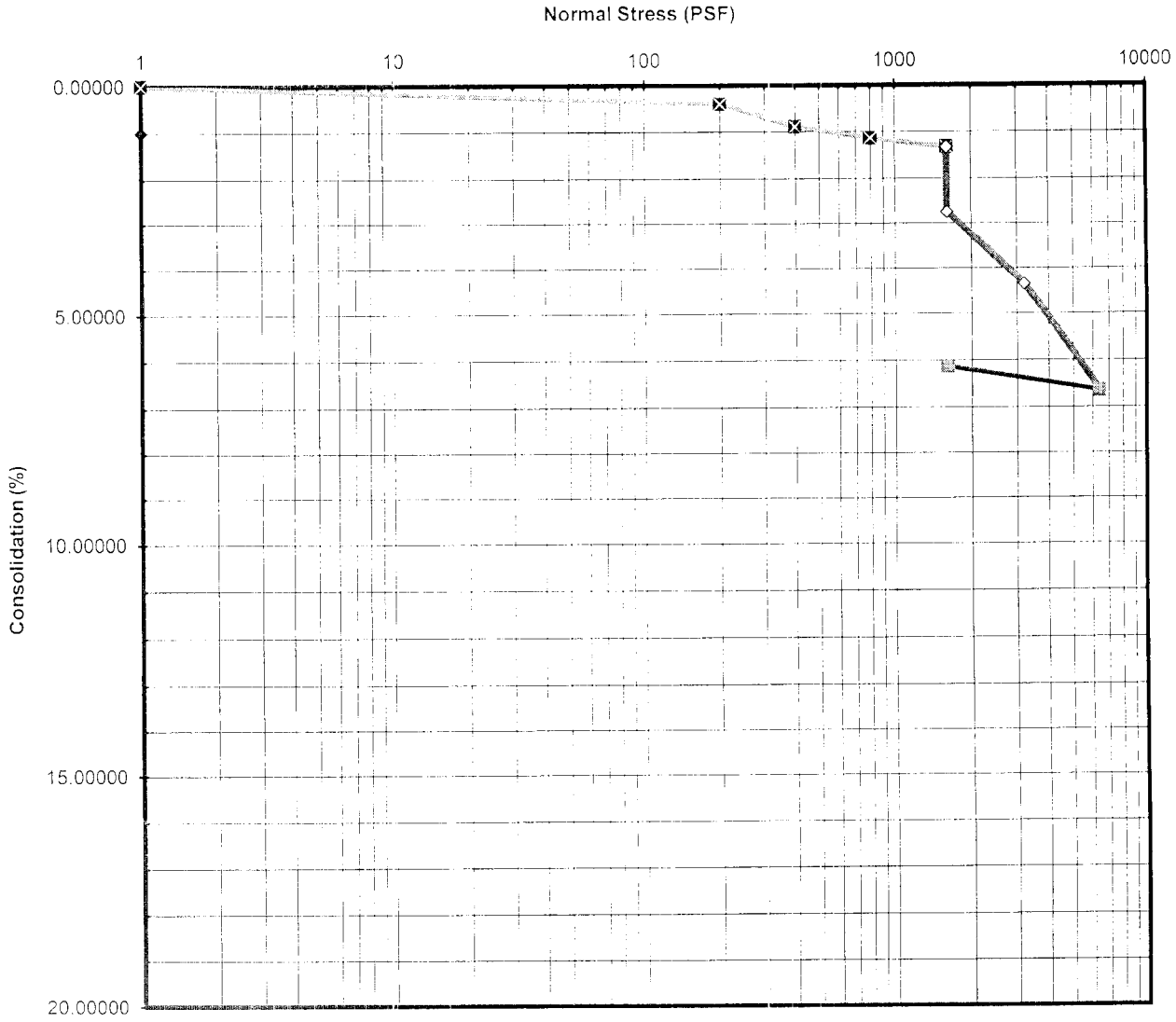


PLATE: HC-1
J.O.: GT-3503
DATE: 11/14/2017

Consolidation Pressure Curve

Sample Identification	Sample Description
T-1 @ -4' #2	Silty Sand w/ trace Clay & Gravel
Wi=16.5% Wf=24.6%	Ws=93 6 pcf



DESCRIPTION OF LABORATORY TESTING

Undisturbed Samples

Undisturbed samples for additional testing in our laboratory are obtained per Modified California Sampler D3550-01, by driving a sampling spoon into the material. A split barrel type spoon sampler was used, having an inside diameter of two and five tenths (2.5) inches, with a tapered cutting tip at the lower end and a ball valve at the upper end. The barrel is lined with thin brass rings, each one (1) inch in length. The spoon penetrated into the soil below the depth of the ***boring or trench*** at approximately twelve (12) inches to eighteen (18) inches. The central portion of the sample is retained for testing. All samples in the natural field condition are placed in airtight containers and transported to the laboratory. Bulk samples, representative of the surface and near-surface materials, are obtained.

Classification

Typical materials were subjected to mechanical grain-size analysis by wet sieving from U.S. Standard brass screens (ASTM D - 422). Hydrometer analyses were performed where appreciable quantities of fines were encountered. The data was evaluated in determining the classification of the materials. The grain-size distribution curves are presented in the test data and the Unified Soil Classification is presented in both the test data and the ***Trench and / or Boring Logs***.

Moisture and Density Test

Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test trenches. The results of these tests are presented in the ***Boring / Trench Logs***. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Expansion Index Test

The Expansion Index Test, ASTM D4829-03, evaluated the expansion potential of selected materials. Specimens are molded under a given compactive energy approximately to the optimum moisture content and approximately fifty percent (50%) saturation or approximately ninety percent (90%) relative compaction.

The prepared one (1) inch thick by four (4) inches in diameter specimens are loaded to an equivalent one hundred forty-four (144) psf surcharge and are inundated with tap water until a volumetric equilibrium is reached.

Consolidation

Compression tests are performed on undisturbed and/or remolded samples in a two and five tenths (2.5) inches diameter, and one (1) inch high brass ring. Consolidometers, like the direct shear machine, are designed to receive the specimens in the rings in field condition. Porous stones, placed at the top and bottom of each specimen, permit the free flow of water from the sample during the test. Settlement accompanying each increment of load is measured by a dial indicator reading to one ten thousandths (0.0001) of an inch. To simulate possible adverse field conditions, moisture was added to an axial load of fifteen hundred (1,500) lbs./sq.ft. and Test Method: ASTM D – 2435 - 2004 was followed.

Standard Penetration Test

Standard Penetration Testing is performed in the trench per ASTM D – 1586 - 99 by driving a split spoon sampler ahead of the ***trench or boring*** at selected levels. The number of hammer blows required to drive the sampler twelve (12) inches with a one hundred forty (140) lb. Hammer dropped thirty (30) inches is identified as the Standard Penetration Resistance (SPT). Many correlations have been made between SPT values and soil properties. Empirical correlations also permit the blows of different energy or sampler sizes, such as ring samples, to be converted to SPT values.

Direct Shear

Direct shear tests were performed on selected undisturbed and/or remolded samples, which were soaked for a minimum of twenty-four (24) hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately one (1) hour prior to application of shearing force. The samples were tested under various normal loads, a different specimen being used for each normal load.

The samples were sheared in a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of five hundredths (0.05) of an inch per minute. After a travel of three tenths (0.300) of an inch of the direct shear machine, the motor was stopped and the sample was allowed to "relax" for approximately fifteen (15) minutes.

The "relaxed" and "peak" shear values were recorded. It is anticipated that, in the majority of samples tested, the fifteen (15) minutes relaxing of the sample is sufficient to allow dissipation of pore pressures set up in the samples due to application of shearing force. The relaxed values are therefore judged to be a good estimation of effective strength parameters. The test results were plotted on "Table 2 – Direct Shear Test".

Residual Direct Shear Test

The samples were sheared, as described in the preceding paragraph, with the rate of shearing of five hundredths (0.05) of an inch per minute. The upper portion of the specimen was pulled back to the original position and the shearing process was repeated until no further decrease in shear strength was observed with continued shearing (at least three times resheared). There are two methods to obtain the shear values: (a) the shearing process was repeated for each normal load applied and the shear value for each normal load recorded. One or more than one specimen can be used in this method; (b) only one specimen was needed, and a very high normal load (approximately nine thousand (9,000) psf) was applied from the beginning of the shearing process. After the equilibrium state was reached (after "relaxed"), the shear value for that normal load was recorded. The normal loads were then reduced gradually without shearing the sample (the motor was stopped). The shear values were recorded for different normal loads after they were reduced and the sample was "relaxed.

Atterberg Limits

The Atterberg Limits were determined in accordance with ASTM D – 4318 - 2005 for engineering classification of the fine-grained materials.

Maximum Density Test

The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D – 1557 - 2007 (five (5) layers). The results of these tests are presented in the test data.

Soluble Sulfates

The California Materials Test Method No. 417 determined the soluble sulfate contents of selected samples.

Resistivity Test

The resistivity test and selected samples and the results were determined by the California Materials Test Method # 643 as prescribed and forwarded from the California Department of Transportation Materials Lab determined the resistivity test, selected samples, and results. The sample was prepared for testing as follows: Bulk sample material was sieved through a number eight (8) sieve and sixteen hundred (1,600) grams of natural material was collected, weighed, and dried. The sample was removed from the oven and thirteen hundred (1,300) grams of material was separated and prepared as follows: The sample was oven dried and one hundred fifty (150) ml of distilled (deionized) water was added to the material and mixed thoroughly and placed into a calibrated soil box suitable for use with a Nilson Model 400 resistivity meter. The sample was compacted into the soil box by hand level with the top of the soil box.

The material was then tested for resistivity and removed from the soil box and an additional one hundred (100) ml of distilled (deionized) water was added. With two hundred fifty (250) ml. of water added to the sample the material was returned to the soil box in the manner mentioned hereinabove and the material was tested again. Both test results were recorded in an appropriate manner for recording such data.

TABLE I

Maximum Density Test Results

ASTM D - 1557

Sample	Soil Description	USCS	Maximum Dry Density (pcf)	Optimum Moisture (%)
A	Silty Sand / Gravel	SM	133.2 pcf	7.9 %

TABLE II

Direct Shear – Undisturbed Saturated Samples

Trench	Angle Of Friction (degrees)	Cohesion (psf)
T-1 @ 4'	25.1 °	199.3 psf

APPENDIX

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

General

These specifications and the Grading details attached to the Grading Plans, if required, represent **AZ Geo Technics, Inc.s'** minimum requirements for Grading and other associated operations on construction projects. These specifications and recommendations of the regulatory agencies should be considered a portion of the project specifications.

Clients' contractor (prior to Site Grading) should arrange to meet at the Site along with Client, the design engineer and/or architect, the soils engineer (Consultant), and representatives of the governing authorities. *All parties should be given at least forty-eight (48) hours notice.*

It is Clients' contractor's responsibility to prepare the ground surface to receive the fills, spread, mix, and compact the fill in accordance with the job specifications. Clients' contractor should also have suitable and sufficient equipment in operation to handle the amount of fill being placed.

PREPARATION OF AREA TO BE FILLED

Clearing And Grubbing

All structures marked for removal; timber, logs, trees, brush, and other rubbish shall be removed, piled, and burned or otherwise disposed of off-Site. This is to leave the areas that have been disturbed with a neat appearance and free from unsightly debris.

A thorough search shall be made of the Site for all existing structures to be removed and for possible underground storage tanks and/or septic tanks as well as cesspools. Concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the Site.

All trees to be removed from the Site shall be pulled in such a manner so as to remove as much of the root system as possible. Any existing brush, topsoil, loose fill, and porous soils shall be excavated to competent native materials.

Prior to placement of any fill soils, the exposed surface shall be scarified, cleansed of debris, and re-compacted to ninety percent (90%) of the laboratory standard under the direction of the soils engineer (Consultant). This is to be done in accordance with the following guidelines for placing, spreading, and compacting fill materials.

Processing

The existing ground, which is determined to be satisfactory for support of fill, shall be scarified to a minimum depth of six (6) inches. Existing ground, which is not satisfactory, shall be over excavated. Scarification shall continue until the soils are broken down and free of large clay lumps and until the working surface is reasonably uniformed and free of uneven features which would inhibit uniform compaction.

Moisture Conditioning

Over-excavated and processed soils shall be watered, dried-back, and blended or mixed as required to attain uniform moisture content. For field-testing purposes, "near optimum" moisture should be considered to mean "optimum moisture to three percent (3%) above optimum moisture".

Prior to placement of additional compacted fill following a Grading delay, the exposed surface of previously compacted fill should be reprocessed. This should be accomplished by scarification, watering conditioning, and then re-compacted to a minimum of ninety percent (90%) of the laboratory maximum dry density.

No Additional fill should be placed following a period of flooding, rainfall, or over watering until damage assessments have been made and remedial Grading performed.

Benching

Where fills are to be placed on the ground with slopes steeper than five to one (5:1) the ground shall be stepped or benched. The lowest bench shall be a minimum of fifteen (15) feet wide and two (2) feet deep. This should expose firm material; it also should be approved by the soils engineer (Consultant). Other benches shall be excavated into firm material to a minimum width of four (4) feet. If Grading plans are required, typical benching and keying details are included in the Grading details on the Grading plans.

Approval

All areas to receive fill, including processed areas, removal areas, and toe-of-fill benches shall be approved by the soils engineer (Consultant) prior to fill placement.

All Grading operations should be inspected by a soils engineer (Consultant). The presence of the soils engineer (Consultant) will be for the purpose of providing observation and field-testing. This will not include any supervision of the actual work by Clients' contractor, Clients' contractor's employees and/or agents.

It is understood that the soils engineer (Consultant) will not be responsible for job or site safety on this project, which will be the sole responsibility of Client.

It should be stressed that operations undertaken at the Site without the presence of the soils engineer (Consultant) may result in exclusion of certain areas from the final compaction report.

Fill Placement

All fill material should be placed in layers a maximum of six (6) to eight (8) inches thick, moisture conditioned (as necessary), and compacted to a minimum relative compaction of ninety percent (90%) of their maximum dry density as determined by Test Method ASTM D - 1557 - 78.

FILL MATERIAL

General

Material to be placed as fill shall be free of organic matter and other deleterious substances. This shall be approved by the soils engineer (Consultant). Soils of poor gradation and expansion at strength characteristics shall be placed in areas designated by the soils engineer (Consultant) or shall be mixed with other soils to serve as satisfactory fill material.

Import materials shall meet the following minimum requirements:

A. Plasticity index not to exceed twelve (12).

B. R-Value not less than twenty-five (25).

Oversized Material

Rocks eight (8) inches and smaller may be utilized within the compacted fill provided that they are placed in such a manner that nesting of the rock is avoided. Fill should be placed and thoroughly compacted to the minimum requirement over and around all rock.

During the course of grading operations rocks or similar irreducible materials greater than twelve (12) inches may be generated. These rocks should not be placed within the compacted fill unless placed as recommended by the soils engineer (Consultant).

Rocks that are greater than twelve (12) inches but less than three (3) feet that are generated during Grading, may be placed within an approved compacted fill provided that it is in accordance with the recommendations in the Grading details on the Grading plans, if any. Rocks greater than three (3) feet should be broken down or disposed of off-Site. Rocks up to three (3) feet should be placed ten (10) feet below the finished grade and should not be closer than fifteen (15) feet from any slope face. Where practical oversized material should not be placed below areas where structures or deep utilities are proposed.

Oversized material should be placed in windrows on a clean over-excavated/unyielding compacted fill or firm natural ground. Select native or imported granular soils (SE = 30 or better) should be placed or thoroughly flooded over as well as around all windrowed rock (such that no voids remain). Windrows of oversized material should be staggered so that successive strata of oversized material are not in the same vertical plane.

COMPACTION

After each layer has been placed, mixed, and spread evenly is shall be thoroughly compacted to no less than ninety percent (90%) of the maximum density in accordance with ASTM D - 1557. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tire rollers, or other types of rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is at the specified moisture content. Rolling of each layer shall be continuous over its entire area. The roller shall make sufficient trips to ensure that the desired density has been attained.

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting operations shall be continued until the slopes are stable, but not too dense for planting; and that there is no appreciable amount of loose soil on the slopes. Compacting of the slopes may be done progressively in increments of two (2) to four (4) feet in fill height or after the fill is brought to its total height.

Field density tests of each compacted layer of fill shall be made by the soils engineer (Consultant). Density tests may be made at intervals not exceeding two (2) feet of fill height provided that at least every one thousand (1,000) cubic yards of fill are tested. Where sheepsfoot rollers are used, the soils may be disturbed to a depth of several inches. Density test shall be taken in the compacted material below the disturbed surface.

When these tests indicate that the density of a layer or portion is below the required density, that layer or portion shall be reworked until the required density has been attained.

The fill operations shall be continued in six (6) inch compacted layers (as specified above) until the fill has been brought to the finished slopes and grades as shown on the approved Grading plans, if applicable.

SITE PROTECTION

Precautions should be taken to protect the Site from flooding, ponding, or inundation by improper surface drainage. Temporary provisions should be made during the rainy season to direct surface drainage away from the Site. Plastic sheeting should be kept on hand to prevent unprotected slopes from becoming saturated.

Where necessary, Clients' contractor should install check dams, de-silting basins, sandbags, and other devices to control erosion.

Following periods of rainfall, Clients' contractor should arrange a walk-through with the soils engineer (Consultant) to visually assess rain related damage. At the request of the soils engineer (Consultant), Clients' contractor shall make all excavations as necessary to evaluate the extent of rain related damage. Rain related damage might include erosion, silting, saturation, swelling, structural distress, or any other adverse condition observed by the soils engineer (Consultant). Soils adversely affected should be over-excavated and replaced with compacted fill as directed by the soils engineer (Consultant).

SLOPES

Compacted fill or backrolled slopes should be limited to a slope ratio of no steeper than two to one (2:1). All compacted fill slopes shall be overbuilt and cut back to grade, exposing the firm compacted fill liner core.

The actual amount of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by Clients' contractor to provide thorough mechanical compaction to the outer edges of the overbuilt slope surface.

If excavations for cut slopes expose loose, cohesion less, significantly fractured or otherwise unsuitable material; over-excavation, and replacement with a compacted stabilization fill should be done. Stabilization fill construction should conform to the requirements of the Grading details outlined on the Grading plans, if applicable. For cut slopes made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top-of-cut.

SLOPE MAINTENANCE

In order to enhance surficial slope stability, slope planting should consist of de-rooted vegetation requiring little water. Plants native to Southern California and plants that are relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A qualified Landscape Architect should be contracted for specific recommendations.

DRAINAGE

Canyon sub-drain systems should be installed in accordance with the Grading details on the Grading plans, if applicable. Typical sub-drains for compacted fill buttresses, slope stabilizations, or side hill masses should also be installed in accordance with grading details on the Grading plans, if applicable.

All roof, pad, and slope drainage should be directed away from slope area structures to approved disposal areas via gutters, down spouts, or swales. For pad areas created above cut natural slopes, a positive drainage should be established away from the top-of-slopes. This may be accomplished by using a berm and/or appropriate pad gradient. A recommended overall gradient away from the top-of-slope should be two percent (2%) or greater. For-drainage immediately away from structures, a minimum five percent (5%) gradient should be maintained.

Pad drainage may be reduced to one percent (1%) for projects where no slopes exist, either natural or manmade.

TRENCH BACKFILLS

Utility trench backfill can be best placed by mechanical compaction. Unless otherwise specified, compaction shall be a minimum of ninety percent (90%) of the laboratory maximum density. As an alternative, where specifically approved by the soils engineer (Consultant) clean sand (sand equivalent thirty (30)) may be thoroughly jetted in place. Jetting should only be considered to apply to trenches no greater than two (2) feet in width and four (4) feet in depth. Following jetting operations, trench backfill should be thoroughly compacted by mechanical means.

AZ GEO TECHNICS, INC.

Geotechnical and Environmental Consultants

38713 9th Street East
Palmdale, California 93550
Phone: (661) 273-3123 Fax: (661) 273-4245

PERCOLATION FEASIBILITY STUDY VIA LEACH LINE

PROJECT NO.

GT-3503-P

SITE LOCATION:

BETWEEN TRIUMPH AND TANNAHILL AVENUE
IN THE CITY OF SANTA CLARITA,
COUNTY OF LOS ANGELES,
STATE OF CALIFORNIA.

LEGAL DESCRIPTION:

APN # 2841-018-035

DATE

November 11, 2018

PREPARED FOR

Bill Rex

A Z Geo Technics, Inc.

Geotechnical, Environmental and General Building Services

NOVEMBER 11, 2018

BILL REX
REXHALL COMPANY
45640 23RD STREET WEST
LANCASTER, CA 93536

SUBJECT: PERCOLATION FEASIBILITY STUDY FOR PRIVATE SEWAGE DISPOSAL SYSTEMS ON A PROPOSED FOUR LOT SUBDIVISION LOCATED IN BETWEEN TRIUMPH AND TANNAHILL AVENUE @ THE NORTHWEST CORNER OF RADCLAY STREET, IN THE CITY OF SANTA CLARITA, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.
APN: 2841-018-035 ("Site")

Dear Mr. Rex:

Pursuant to your authorization, **A.Z. Geo Technics, Inc.**, referred to herein as "**Consultant"**, has visited the Site and performed a percolation evaluation for **Bill Rex**, referred to herein as "**Client"**. The findings and recommendations contained in this "Report" are based upon four (4) specific exploratory trenches on each proposed lot for a total of twenty-four (24) test pits as noted within our described limitations.

Client, and/or Clients' contractor(s)/agents, are the responsible parties for the implementation of all recommendations during the life of the project. Any variances not approved in writing by Consultant would nullify and void this Report for any use. No other warranties are expressed or implied. Please note, this Report is valid for only one (1) year from the date hereof, subject to Consultants' review and approval prior to further use.

If you have any questions regarding this Report, please contact our office at your convenience. We appreciate this opportunity to be of service and will be available for future developments at your convenience.

Respectfully submitted for:

A.Z. Geo Technics, Inc.

REGISTERED PROFESSIONAL ENGINEER NORIK BEDASSIAN C 53083 Exp. 6/30/19 CIVIL STATE OF CALIFORNIA

By: Norik Bedassian, P.E.
NB:jr/GT-3503

PROPOSED DEVELOPMENT

The proposed development is reported to be a four (4) lot subdivision. Though no building plans were made available to Consultant at the time of the preparation of this Report, it was represented by Client that the proposed single-family dwellings shall be one or two story structures with the number of bedrooms and bathrooms to be determined at a later date.

Should something other than what is represented here be utilized during construction, Consultant should be notified immediately to review the proposed changes and modify this Report as necessary.

BACKGROUND OF SUBJECT SITE

At the time of the preparation of this Report, the subject Site is vacant.

SITE DESCRIPTION

The Site is located in the City of Santa Clarita, County of Los Angeles, State of California. The Site is bounded on the north, east and west by Single-Family Dwellings, and on the south by vacant land. The Site is approximately twenty (20) acres in size, rectangular in shape, and mostly accessible. The Site terrain is relatively flat with some gentle slopes.

Surface and Sub-Surface Water

At the time of the preparation of this report, no surface water or ponding were observed. No groundwater was encountered during the field exploration.

Vegetation

At the time of the reconnaissance, the Site was sparsely covered with native vegetation. There are numerous Oak trees scattered throughout the property, which have been surveyed and tagged with numbers by an Oak tree specialist.

Rock Outcroppings

No rock outcrops were observed at the subject Site during the site reconnaissance.

FIELD EXPLORATION

Subsurface evaluation consisted of one (1) exploratory trench, excavated to a depth of fifteen (15') feet on each proposed lot for a total of four (4) exploratory trenches. This was done in order to determine the condition of the near-surface natural material as well as to determine the presence/absence of groundwater and / or evidence of historical groundwater, if any. *Please refer to the Trench Logs for a description of the subsurface materials observed in the exploratory trench*. The subsurface conditions shown on the Trench Logs apply only at the specific locations and dates indicated. It is not warranted to be a representative of subsurface conditions at any other locations and/or times

PERCOLATION TEST PROCEDURES

Percolation testing involved the excavation of six (6) percolation test pits on each proposed lot, excavated to a depth of approximately five (5') feet below the ground surface. Once the percolation test pits were excavated, a one (1) foot by one (1) foot hole was excavated one (1) foot deep at the bottom of the percolation test trenches to be used as the test hole. The test hole was completely submerged with water, in accordance with approved test method. The initial pre-saturation was performed approximately 24 hours prior to the performance test.

After the 24-hour pre-saturation, the test holes were filled again with water. The performance test began when the hole was completely filled and that time recorded. Additional timed readings were made for each one (1) inch of fall of water. Please refer to the attached Table for actual readings.

Percolation testing was completed after recording the time between the 5th and 6th inch below the top of the hole.

All testing was performed in accordance with the Los Angeles County Health Department requirements.

SUBSURFACE CONDITIONS

Based on our findings from the Site observation and exploratory trenches, the on-Site earth materials

generally consist of materials described as follows. Please refer to the Trench Logs for a brief description of the on-Site earth materials encountered during the excavation operations.

Top Soil	Sandy Silt with Organics
Near Surface	Silty Sand to Sandy Silt w/ Gravel & trace roots
Subsurface at Depth Explored	Silty Sand w/ Gravel & trace Cobbles
Depth to Groundwater	None Encountered
Depth to Bedrock	None Encountered

Historic High Groundwater

Based upon observations from exploratory trench TP-1, there was no evidence to suggest the presence of high ground water. Consultant is not expecting the groundwater to rise within ten (10') feet of the bottom of the proposed percolation trench throughout the year.

CONCLUSION AND RECOMMENDATIONS

Based on Consultants' observation and analysis of the field data, it is Consultants' opinion that the subject Site is feasible for installation of an individual sewage disposal system under normal use and conditions, depending on the proposed disposal area and the final project plan.

The data was obtained through Consultants' percolation feasibility study on the date and approximate locations of our exploration; however, this should not be considered to preclude more restrictive requirements that may be imposed by City or County requirements. Prior to approval, building layouts will be shown on the plot plan, due to the size of the lot.

Areas not explored by Consultants' percolation test pits or trenches are not assumed to be consistent with areas tested. Other areas not for disposal, delineated on the enclosed Plot Plan, must be tested on an individual basis.

Consultant will be available to make a final review of the project plan and specifications to assist in assuring correct interpretation of this Report's recommendations for use in applicable sections. It is the responsibility of Client and/or Clients' Contractor to ensure that all recommendations are carried out properly and all backfill of the trench/the percolation test pits are periodically checked as well as restored to acceptable conditions. This Report is issued to the Client named on this Report only and is not transferable without written

consent of Consultant. Furthermore, all systems must be cared for properly. Adequate maintenance should be scheduled and records should be kept.

LIMITATIONS

Consultant has performed these services within the limits described by Client. There is no other warranty or representation, either expressed or implied.

The conclusions and recommendations in this Report are based upon data obtained from the field percolation test per County/City agencies' requirements. It should not be assumed or expected that the conditions between locations are similar to those encountered at the individual locations. It is possible that conditions between sampling locations may vary. Should conditions be encountered in the field that appear different from those described in this Report, Consultant should be contacted immediately in order that Consultant might evaluate their effect.

If this Report or portions hereof are provided to contractors or included in specifications, it should be understood by all parties that they are provided for preliminary information only and should be used as such.

This Report and its contents resulting from this investigation are not intended or represented to be suitable for reuse, extensions, modifications of the project, or for use on any other project. Any variance from Consultants prescribed requirements/recommendations would nullify this Report and Client and/or Clients' Contractor would indemnify Consultant and its representatives from any and all liabilities and/or obligations.

Consultant will be further available to assist in assuring correct interpretation of this Report's conclusions and recommendations.

PERCOLATION TEST DATA

LOT #1

(Ryon Method)

Date of Pre-Saturation September 12, 2017 Date of Test September 13, 2017

	Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’
6 Inches	7 min.	10 min.	9 min.	7 min.	11 min.	8 min.

Lot #1 Time Interval Between 5th and 6th Inch

Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
7 min.	10 min.	9 min.	7 min.	11 min.	8 min.

*Use a minimum of seventeen (17) minutes for design purposes.

PERCOLATION TEST DATA

LOT #2

(Ryon Method)

Date of Pre-Saturation September 12, 2017 Date of Test September 13, 2017

	Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’
6 Inches	7 min.	10 min.	10 min.	11 min.	11 min.	9 min.

Lot #2 Time Interval Between 5th and 6th Inch

Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
7 min.	10 min.	10 min.	11 min.	11 min.	9 min.

*Use a minimum of seventeen (17) minutes for design purposes.

PERCOLATION TEST DATA

LOT #3

(Ryon Method)

Date of Pre-Saturation September 12, 2017 Date of Test September 13, 2017

	Test Hole No. P-1	**Test Hole No. P-2**	**Test Hole No. P-3**	**Test Hole No. P-4**	**Test Hole No. P-5**	**Test Hole No. P-6**
	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’
6 Inches	16 min.	12 min.	8 min.	10 min.	11 min.	12 min.

Lot # 3 Time Interval Between 5th and 6th Inch

Test Hole No. P-1	**Test Hole No. P-2**	**Test Hole No. P-3**	**Test Hole No. P-4**	**Test Hole No. P-5**	**Test Hole No. P-6**
16 min.	12 min.	8 min.	10 min.	11 min.	12 min.

*Use a minimum of seventeen (17) minutes for design purposes.

PERCOLATION TEST DATA

LOT #4

(Ryon Method)

Date of Pre-Saturation September 12, 2017 Date of Test September 13, 2017

	Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’	Depth = 5’
6 Inches	10 min.	18 min.	29 min.	25 min.	17 min.	31 min.

Lot #4 Time Interval Between 5th and 6th Inch

Test Hole No. P-1	Test Hole No. P-2	Test Hole No. P-3	Test Hole No. P-4	Test Hole No. P-5	Test Hole No. P-6
10 min.	18 min.	29 min.	25 min.	17 min.	31 min.*

*Use thirty-one (31) minutes for design purposes.

PERCOLATION TEST DATA CALCULATIONS
BY THE RYON METHOD

LEACH TRENCH

Ryon Formula: $A = \frac{T + 6.24}{29} \times \frac{C}{2} =$

A = square feet of leaching area per gallon of effluent in 24 hours

T = time in minutes for 6th inch of drop

C = capacity of septic tank

Septic Tank @ 2000 Gallons.

LOT #'s 1, 2 & 3 : $A = \frac{17 + 6.24}{29} \times \frac{2000}{2} = 802\ ft^2$

LOT # 4 : $A = \frac{31 + 6.24}{29} \times \frac{2000}{2} = 1285\ ft^2$

LEACH FIELDS

For leach fields, the leaching area should be increased by fifty percent (50%).

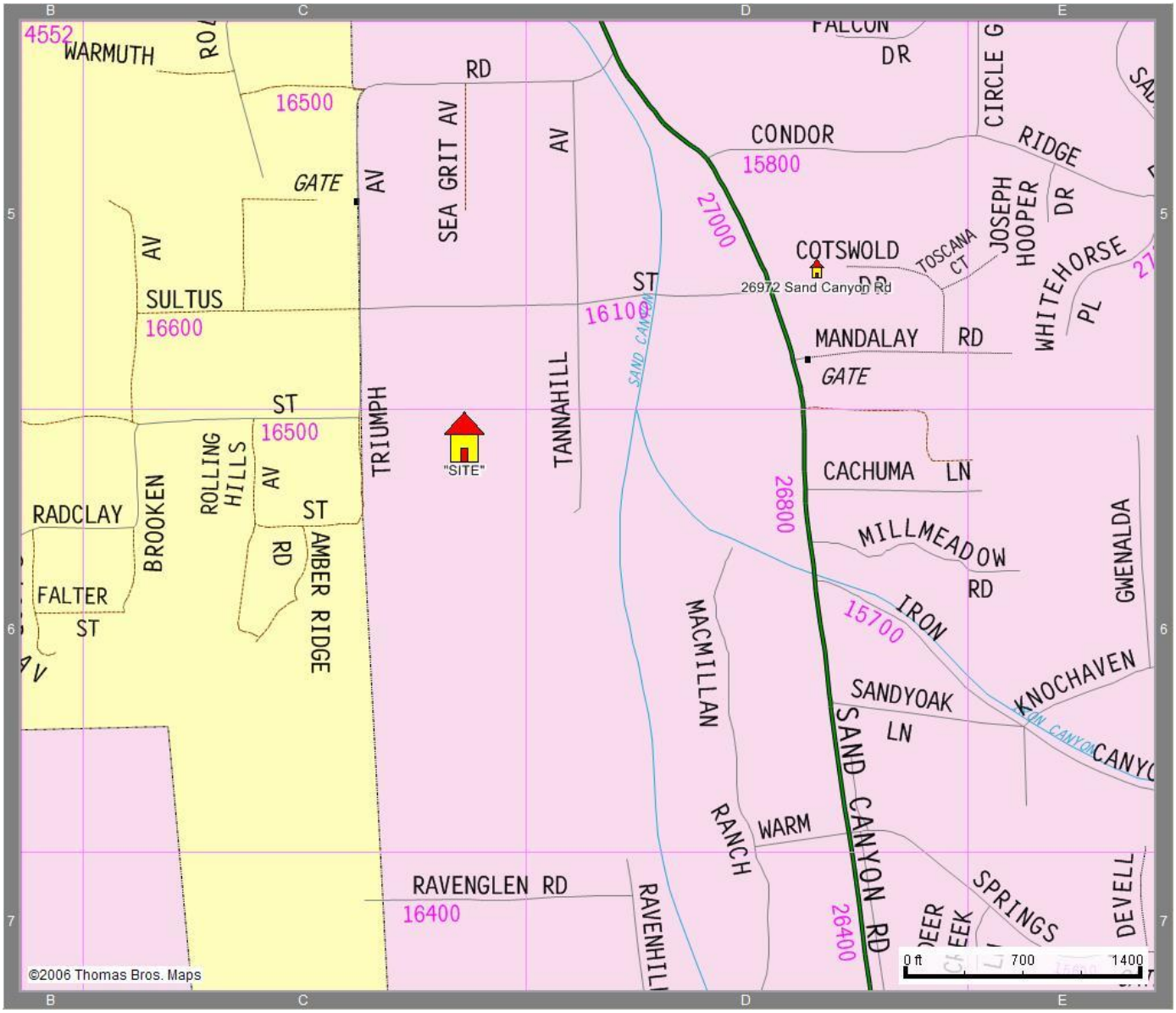
REQUIRED LEACHING AREAS FOR LOTS 1, 2 & 3

Septic Tank Capacity (gallons)	Trench Depth (feet)	No. of Leach Trenches	Trench Length (feet)	Absorption Area (sq. ft.)	Gravel Depth (feet)	Fill Cover (feet)	Trench Separation (feet)
2000	5'	2	60'	802	3'	2'	8'

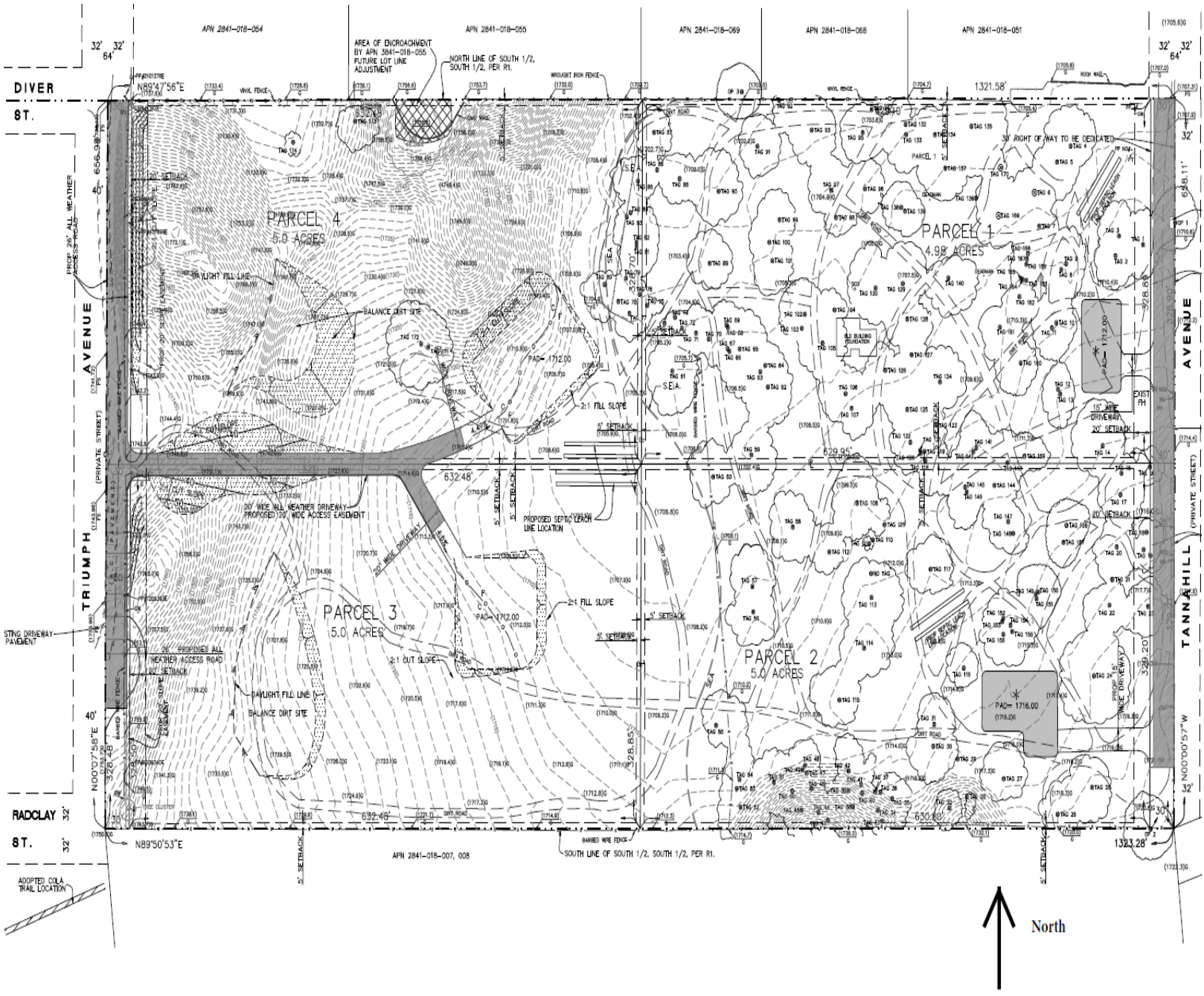
REQUIRED LEACHING AREAS FOR LOT # 4

Septic Tank Capacity (gallons)	Trench Depth (feet)	No. of Leach Trenches	Trench Length (feet)	Absorption Area (sq. ft.)	Gravel Depth (feet)	Fill Cover (feet)	Trench Separation (feet)
2000	5'	2	95'	1285	3'	2'	8'

VICINITY MAP



LEACH LINE LOCATION PLAN



Size of Leach Lines

Depth:	5.0 ft.	Width:	3.0 ft.	Lot # 1, 2 & 3 = 2 lines @ 60'each
Distance to Building:		8.0 ft.		Lot # 4 = 2 lines @ 95' each
				Distance Between Trenches: 8 ft.
Depth of Rock:		3.0 ft.		Soil Type: Silty Sand w/ Gravel
Size of Tank:		2000 GAL.		Scale: 1" = 40'

CONSTRUCTION CONSIDERATIONS

1. The width of the absorption trenches should be at least thirty-six (36) inches nine hundred fourteen and four tenths millimeters (914.4mm). The individual laterals (preferably) should not be over one hundred (100) feet long.
2. All smeared or compacted surfaces should be raked to a depth of one (1) inch and loose material shall be removed before the gravel is placed in the trench.
3. The pipe, laid in a trench of sufficient width and depth, should be surrounded by clean graded gravel/rock, broken hard burned clay brick, or similar filtering material. The material may range in size from three-fourths (3/4) to two and a half (2 ½) inches. Cinders, broken shells, or similar materials are not recommended because they are usually too fine and may lead to premature clogging. The material should extend from at least two (2) inches above the top of the pipe to at least twelve (12) inches below the bottom of the pipe.
4. The pervious barrier will be untreated building paper, straw, or similar porous material to prevent the closure of voids with earth backfill.
5. Evapotranspiration is often an important factor in the operation of horizontal absorption systems; therefore, an impervious covering should not be used since it would interfere with evapotranspiraton at the surface.
6. The top of the new absorption trench should be hand tamped and should be overfilled with about four (4) to six (6) inches of earth. Unless this is done, the top of the trench may settle to a point lower than the surface of adjacent ground. This will cause the collection of storm water in the trench, which can lead to premature saturation of the absorption field and possibly a complete washout of the trench. Machine tapping or hydraulic backfilling of the trench should be prohibited.

CONSTRUCTION CONSIDERATIONS (con't)

7. A heavy vehicle would readily crush the tile in a shallow absorption field. For this reason, heavy machinery should be excluded from the disposal area unless special provisions are made to support the weight. All machine grading should be done before the field is laid.
8. Clogging (due to roots) occurs mostly in lines with insufficient gravel under the tile. Root problems may be prevented best by using a liberal amount of gravel and stone around the tile. In general, trenches constructed within ten (10) feet of large trees or dense shrubbery should have at least eighteen (18) inches of crushed stone or gravel beneath the tile.
9. When the disposal fields are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be at least fifteen (15) feet.
10. Where the sloping ground is used for the disposal area, it is usually necessary to construct a small temporary dike or surface water diversion ditch, of which should be kept free of obstructions until the field becomes well covered with vegetation. The leach lines should be placed at an area with slopes less than thirty (30) percent.
11. The use of the filled area must be restricted to activities, of which will not contribute to the compaction of the soil with the consequent reduction in soil aeration.

HOME OWNERS GENERAL GUIDELINES FOR PRIVATE SEPTIC SYSTEM

1. The septic tank should be inspected annually for scum and sludge levels and pumped as necessary.
2. At all times, only biodegradable household products approved for a septic (cleaning products, toilet paper, laundry soaps, etc.) system should be used.
3. All discharging water fixtures in the dwelling should be designed for low flow devices.
4. Never dispose of coffee grounds, grease, paint, caustic liquids, oily liquids, flues, cooking fats, motor oils, sanitary napkins, tampons, condoms, cigarettes, plastic or disposable diapers into the septic system.
5. Always be water wise and train your family on ways to save water. Spread your laundry cleaning over several days.
6. Generally three wash loads discharging into the septic system can be greater than the water use for one person per day, not counting the chemicals damage to the bacteria in the septic tank.
7. Repair any leaky plumbing fixture as soon as possible.
8. Dispose of waste products as much as possible by using your garbage waste disposal, rather than the septic system.