



R2 Soils Report

For

Craig Lehman

A Portion of Sections 20 & 21, T4N, R5E H. B. & M.

**Town of Harris, County
of Humboldt California**

APN: 216-136-006

APPS #12573



December 2018

Table of Contents

INTRODUCTION 1

PROJECT SITE LOCATION 1

PROJECT SITE GEOLOGY 1

PROPOSED PROJECT 2

SOIL CONDITIONS 2

 Existing Locations 2

SITE SOIL EVALUATION 2

SEISMIC CONSIDERATIONS AND FLOOD CONSIDERATIONS 2

CONCLUSION 3

RECOMMENDATIONS 3

 Setback Recommendations 3

 Site Preparation 3

 Subgrade Preparation 3

 Temporary Excavations 4

 Cut & Fill Slopes 4

 Fill Materials 4

 Aggregate Base 4

 Select Fill 5

 Compaction Standards 5

 Drainage and Landscaping 5

 Erosion Control 5

LIMITATIONS 6

REFERENCES 6

ATTACHMENTS:

- APPENDIX A: LOCATION MAP
- APPENDIX B: SITE MAP
- APPENDIX C: USGS SPECTRAL RESPONSE ACCELERATIONS
- APPENDIX D SOIL Test Data

Date:	November 30, 2018	County APPS #:	12573
Applicant:	Craig Lehman	Project Name:	R2 Soils Report
Location:	Harris, California	APN:	216-136-006

Introduction:

DTN Engineering (Engineer) was secured by Andrea Morris (client) to evaluate the existing conditions for the above referenced parcel. The client is seeking permitting for existing grading and proposed green houses at the location identified on the site map (Exhibit B). The following is an outline of our findings and recommendations.

Project Site Location:

The project site is located approximately 12.5 miles east of Garberville, California, where access is provided from Harris via private drive (see **Appendix A** for Location Map and **Appendix B** for Site Map). Latitude and Longitude of the project site is 40.1035 N and -123.6342° W. The parcel is approximately 276 acres in size (Parcel Map Book 216 and Page 13 Exhibit B). The parcel is zoned both AE-B-5 Agricultural Exclusive and Timber Production Zone (TPZ) under the County of Humboldt zoning code. Surrounding the parcels are primarily agricultural and timberlands. The approximate site elevation of the project site is from approximately 720' to 1,400' above mean sea level. Ingress/egress is provided from Private Drive via Harris Rd.

Project Site Geology:

The subject property is mostly undeveloped besides pre-existing access roads, landings, and agricultural structures. Slopes on site in general are slightly inclined (approximately less than 15% to greater than 35%) with an easterly aspect towards Jewett Creek. Geologically, the site lies within Central Belt of the Franciscan Complex apart of the greater Coast Range Physiographic Province (McLaughlin and others, 2000). The existing development primarily lies atop of early Tertiary to Late Cretaceous-age mélange of the Central Belt (cm2). The cm2 portion of the assemblage is described as predominately subequal amounts of metasandstone and meta-argillite. The geomorphology exhibited by this portion of the Franciscan assemblage is irregular topography that lacks well incised sidehill drainages but is less lumpy than cm1 (mélange unit). No active sliding or faulting was observed during the site visit within and outside of the graded areas.

The project parcel is located approximately 1.5 miles from unnamed fault to the southwest

(<http://earthquake.usgs.gov/hazards/qfaults/map/>). This fault is considered active by the State of California, with the last surface rupture within the last 1,600,000 years.

Proposed Project:

The proposed project for this site is to perform a general soils investigation as needed to provide recommendations and evaluate existing grading. All anticipated grading and erosion control features will meet the grading requirements of the County of Humboldt. Improvements.

Soil Conditions:

A field investigation was conducted by the Engineer at this site on October 10, 2018. This investigation consisted of site observations and general observations of the area of the existing development. Soil observations were field-logged and classified in general accordance with ASTM D-2488 visual-manual procedures. Two 8 foot excavations were utilized to infer soil and bedrock types. Soils observed within the area of the existing grading were sandy clay loams (SCL). Weathered bedrock was encountered throughout the site, primarily comprised of argillite and (meta) sandstone.

Site Locations

Graded flat for four 20 foot by 110 foot greenhouses (401053° N, -123.6369°W)

The location of the green graded flat will be approximately .75 miles from the site entrance. and this clearing is presently unoccupied. This landing is 10,000 square feet (SF). Adjoining slopes based from the County of Humboldt GIS data are approximately less than 15 to 33%.

Site Soil Evaluation:

Conservatively, site soils will yield a bearing pressure of two thousand (1500) psf for vertical bearing and one hundred and fifty (100) psf for lateral bearing (2016 California Building Code, Table 1806.2).

Seismic Considerations and Flood Considerations:

An Unnamed fault passes within 1.5 miles of the project site to the northwest. The site does not lie within an Alquist-Priolo zone.

The following coefficients shall be used for seismic design (See **Attachment 3** for USGS Seismic Hazard Data):

Site Class	C
Mapped Spectral Response Acceleration (short), S_s :	1.500 g
Mapped Spectral Response Acceleration (1-sec), S_1 :	0.628
g Site Coefficient, F_a :	.942

Site Coefficient, F_v :	1.5
Acceleration Spectral Response (short), S_{DS} :	1.000 g
Acceleration Spectral Response (1-sec), S_{D1} :	0.628 g
Seismic Design Category:	D
Occupancy Category:	I
Importance Factor:	1.0

The project site is listed to be in an area that is *highly instable* by the County of Humboldt GIS mapping.

Based on the location and geographical setting, the project site lies outside any flood prone areas.

Due to the site soils, depth to groundwater, distance to the nearest known quaternary fault, and distance to descending slopes, the potential for liquefaction, surface rupture, soil strength loss, or faulting at this site is Low, and no special mitigation hazards are necessary.

Conclusion:

This report documents the history, present conditions and subsurface materials, as well as the geologic hazards associated with the site. Included in this report are design and construction recommendations based on the site conditions encountered, the requirements of the 2016 CBC and County of Humboldt grading ordinance. Based on our review of historical data, site exploration and observations, it is in our opinion that if our site-specific recommendations are implemented as intended, then no further actions will be necessary.

Recommendations:

The following recommendations are general recommendations for any future grading activities to be performed:

Setback Recommendations

From an engineering geologic viewpoint, we have no setback recommendations to mitigate the potential geologic hazards. Slope setbacks are neither relevant nor necessary for the proposed project. Zoning setbacks remain applicable.

Site Preparation

Earthwork (grading and excavations) should be undertaken only during the dry season. All debris and vegetation should be removed from within 2 feet of the footprint of the proposed earthwork and disposed of or recycled appropriately. Topsoil should be removed and should be stockpiled on-site for later use as landscaping material and non-structural fill. Following the work, topsoil should be replaced or used as landscaping fill, and seeded to establish vegetation prior to the winter wet season.

Subgrade Preparation

Segregate and stockpile topsoil for later use as non-structural or landscaping fill. Alternately, dispose of these materials at an appropriate location. If the native soils exposed below the topsoil are loose or disturbed, they should be further excavated to expose more-competent native soils

consisting of grayish brown, dense well-graded sandy gravel with clay (GW).

Temporary Excavations

Temporary construction slopes are anticipated for this project as currently proposed. Temporary construction slopes are proposed, they should be designed and excavated in strict compliance with applicable local, state, and Federal safety regulations including the current OSHA Excavation and Trench Safety Standards.

Construction equipment, building materials, excavated soil, vehicular traffic, and other similar loads should not be allowed near the top of any unshored or unbraced excavation greater than four feet in height. Where the stability of adjoining buildings, wall, pavements, utilities, or other similar improvements is, or may be endangered by excavation operations, support systems such as shoring, bracing, or underpinning, may be required to provide structural stability and to protect personnel.

Excavation operations are dependent on construction methods and scheduling; therefore, the owner, designer, and contractor share responsibility for the design, installation, maintenance, and performance of all shoring, bracing, underpinning, and other similar systems. LGC assumes no responsibility for the safety of temporary excavations or shoring systems.

Cut and Fill Slopes

Fill embankments should be constructed with slopes not exceeding 2:1 horizontal to vertical (50% slope), maximum. Any new permanent cut slopes should also be limited to a maximum slope of 2:1. Construction (temporary) slopes may be steeper. Slope grades may be modified only if previously reviewed and approved in writing by the geotechnical engineer or his designated representative. All new cut slopes, fill embankments and bare soil areas created in this development work should be re-vegetated promptly to minimize the potential for erosion.

Fill Materials

All structural fill materials should be suitable granular native material or well-graded imported granular material such as crushed quarry rock or river-run gravels (100 percent passing 3-inch sieve). Fill materials should be reviewed and approved for use by the project engineer prior to importing it to the site. Fill should be placed in loose lifts not exceeding 8 inches, on a suitably-prepared (flat) surface, and should be compacted mechanically so that no settlement will occur. A suitably-prepared surface should consist of native soil material scarified and compacted in-place. We recommend compaction to a minimum of 90 percent relative compaction (RC) under driveways, sidewalks and landscaped areas. Fill materials should be placed at a uniform moisture content, at or near optimum.

Aggregate Base

Aggregate base material may be used for pavement subgrade, placed beneath footings or floor slabs, or used as trench backfill. This material should be compacted mechanically and should meet the requirements in the Caltrans Standard Specifications for Class 2 Aggregate Base; 1.5 inch maximum particle size.

Select Fill

In the case of new construction requiring select fill, that select fill should consist of granular material that may be used as non-expansive fill beneath floor slabs. Select fill should be a well-graded soil/rock mixture free of organics and other deleterious material; on-site native soils may not be suitable for use as select fill.

Select fill material should contain low plasticity clay, well-graded sand, and/or gravel. The material should contain no more than three percent by weight of rocks larger than 3 inches in greatest dimension, or more than 15 percent larger than 2-inches. Additionally, the material should meet the following specifications:

Plasticity index (PI):	<12
Liquid Limit (LL):	<30
Percent passing No. 200 sieve:	50 maximum, 5 minimum

Compaction Standard

Where compacted fill is required, that structural fill should be compacted in accordance with the specifications listed in the table below. Place material in horizontal lifts not exceeding 8- inches in loose thickness. A qualified field technician should be present to observe fill placement and to perform field density tests at random locations throughout each lift to verify that the specified compaction is being achieved by the contractor.

Where trenches closely parallel a footing and the trench bottom is within a two horizontal to one vertical plane, projected outward and downward from any structural element, concrete slurry should be utilized to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.

Fill Placement Location	Compaction (ASTM D 1557)	Moisture % Optimum
Roadways within 2.0' of Base of Pavement	95%	-1 to +3 percent
Fill below Base of Pavement Subgrade	90%	-1 to +3 percent
Utility trenches: Building/Pavement areas	95%	-1 to +3 percent
Utility trenches: Landscape Areas	90%	-1 to +3 percent

Drainage and Landscaping

The site should be graded to provide drainage such that no water is allowed to: 1) pond anywhere on the site, 2) migrate beneath the proposed developments, or 3) pond at the base of cuts.

Erosion Control

Site-specific erosion/sediment control and stabilization recommendations are presented in the bulleted list below. As used herein, *exposed soil areas* and *disturbed areas* include all grading and excavation work performed in connection with the proposed project.

- Storm water erosion and pollution prevention measures should be taken as soon as possible prior to the onset of the winter rains.
- Humboldt County Erosion Control Standards should be viewed as *minimum* standards for erosion and sediment control at this site.
- Revegetate all disturbed areas immediately by seeding with Caltrans erosion control mix (or equivalent).
- To protect against erosion, heavily mulch all exposed soil areas with straw, or an approved alternate material.
- Poke the straw mulch into the upper 2 inches of the soil to limit loss of straw.
- Stake straw wattles parallel to slope contours into any side cast fills.
- Install silt fencing at toes of any new side cast fill slopes.
- Replant the site with trees and shrubs native to the area.
- Cover any soil stockpiles with 6-mil (min) plastic sheeting, securely anchored to prevent wind disturbance.
- Native gravel-surfaced roadways to the proposed ponds and other areas where vehicle traffic may occur; should be maintained in good condition.
- Drive and park vehicles only on gravel-paved areas during wet weather.
- Monitor the site before and after runoff-generating rainfall events to verify suitable and appropriate functioning of all erosion-control measures.
- Promptly repair all erosion-control measures as needed.

Limitations

This report, recommendations, and conclusions are solely intended for the site discussed above. The information contained in this report is only intended for use at the stated site using the stated uses. This report should not be used as justification for any other project or site, and only be used for information purposes if referenced and reviewed for other projects. The ENGINEER recognize that the site is in a dynamically active area and conditions can and will change. The ENGINEER has used the best professional judgment to assess the present and future risks and assist the landowner in proposing development that does not increase the

References:

County of Humboldt GIS Mapping (<http://gis.co.humboldt.ca.us/>)

U.S. Geological Survey and California Geological Survey, 2018, Quaternary fault and fold database for the United States, accessed 5/28/2018, from website: <http://earthquake.usgs.gov/hazards/qfaults/>.

U.S. Geological Survey Earthquake Hazard Program, 2018, US Seismic Design Maps, accessed 5/28/2018, from USGS website: <http://earthquake.usgs.gov/hazards/designmaps/>.

Appendix A

Location Map

Location Map

APN 216-136-006

R-2 Soil Test Location



2.jpg a.jpg

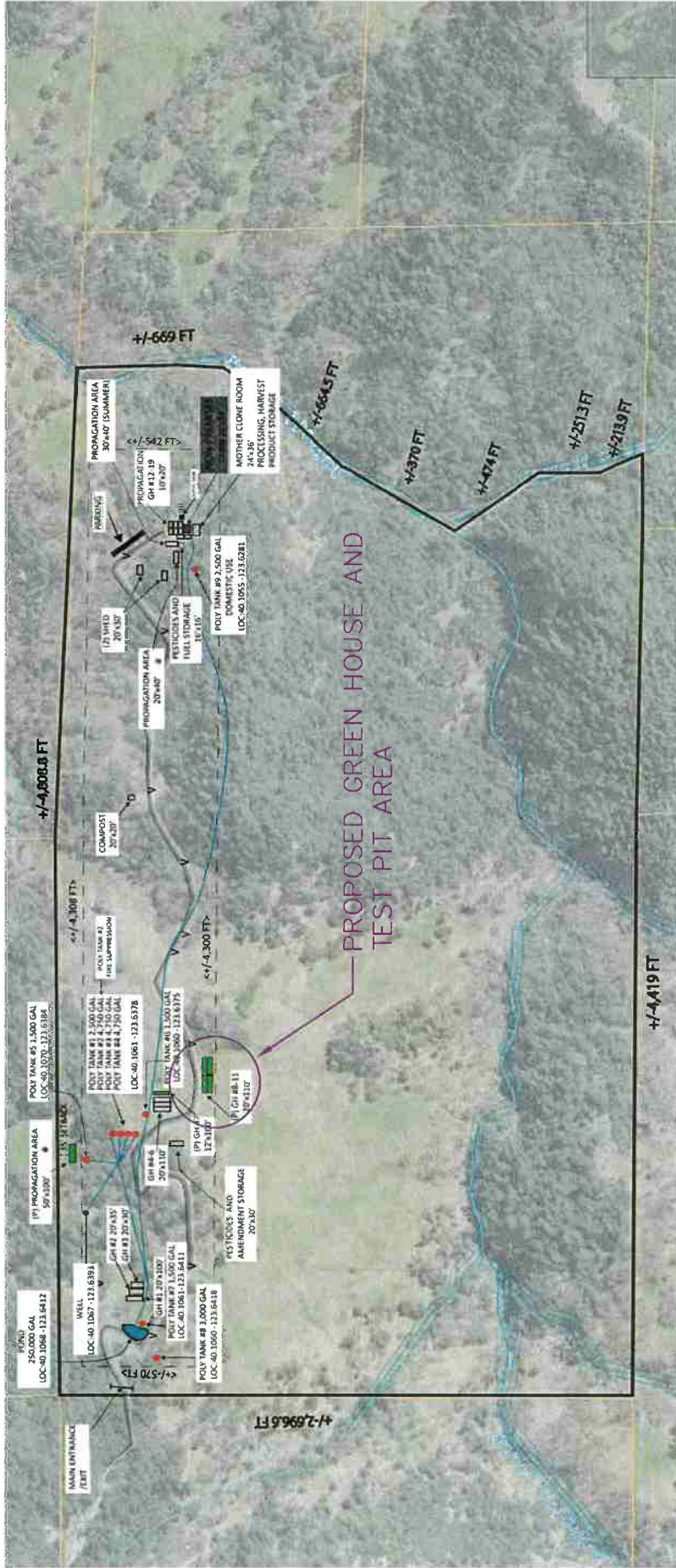
Google Earth

© 2018 Google

Appendix B

Plot Plan and Test Pit Locations

CRAIG LEHMAN - APN: 216-136-006



TOTAL CULTIVATION AREA: 19,900 SQ FT

GH #1	20'x100'	2,000 SQ FT
GH #2	20'x35'	700 SQ FT
GH #3	20'x30'	600 SQ FT
GH #4-6	20'x110'	6,600 SQ FT
GH #7	12'x100'	1,200 SQ FT
GH #8-11	20'x110'	8,800 SQ FT

LEGEND:

- WELL
- POLY WATER TANK
- PROPAGATION AREA
- DITCH RELIEF CULVERT
- PROPOSED AREA
- LEACHFIELD
- SEPTIC TANK
- IRRIGATION
- WATERWAY
- PARKING

SCALE:

0 350 700 1,400 Feet

RF = 1:9,028
1" = 752 ft

Source: NRCS Humboldt County GIS Esri, HERE, Garmin © OpenStreetMap contributors, and the GIS User community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
FRAP, FEMA, USGS

R-2 Soil Test Location

APN 216-136-006

R-2 Soil Test Location



Appendix C

USGS SPECTRAL RESPONSE ACCELERATIONS

USGS Design Maps Summary Report

User-Specified Input

Report Title Andrea Morris
Fri November 30, 2018 20:50:12 UTC

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 40.1053°N, 123.6369°W

Site Soil Classification Site Class D – “Stiff Soil”

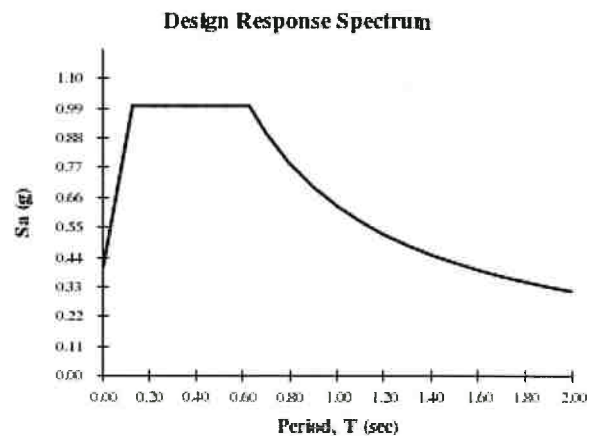
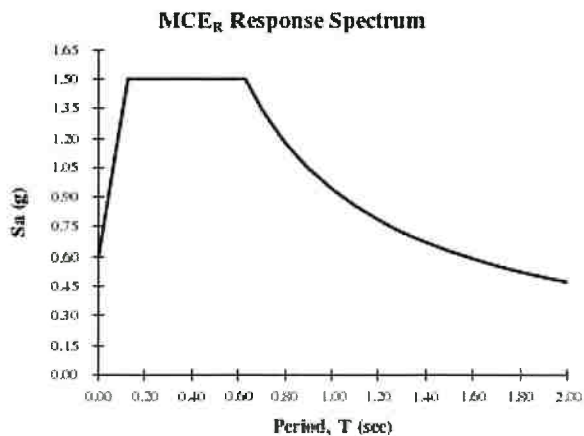
Risk Category I/II/III



USGS-Provided Output

$S_s = 1.500 \text{ g}$	$S_{M5} = 1.500 \text{ g}$	$S_{D5} = 1.000 \text{ g}$
$S_1 = 0.628 \text{ g}$	$S_{M1} = 0.942 \text{ g}$	$S_{D1} = 0.628 \text{ g}$

For information on how the S_S and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.



For PGA_M , T_L , C_{RS} , and C_{R1} values, please [view the detailed report](#).

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

Appendix D

Laboratory Soil Test Results



CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shrinfo@shn-engr.com

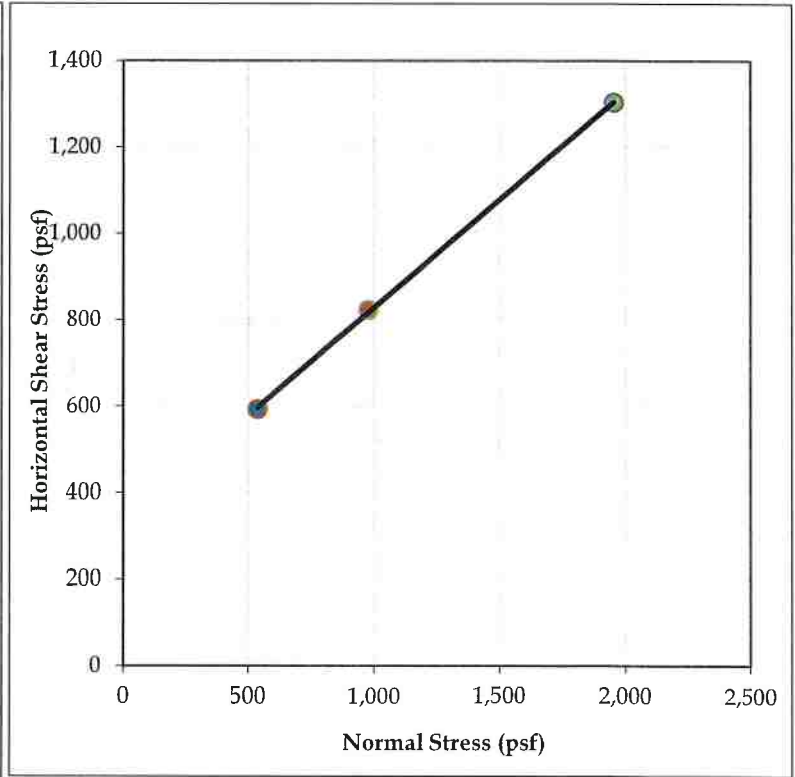
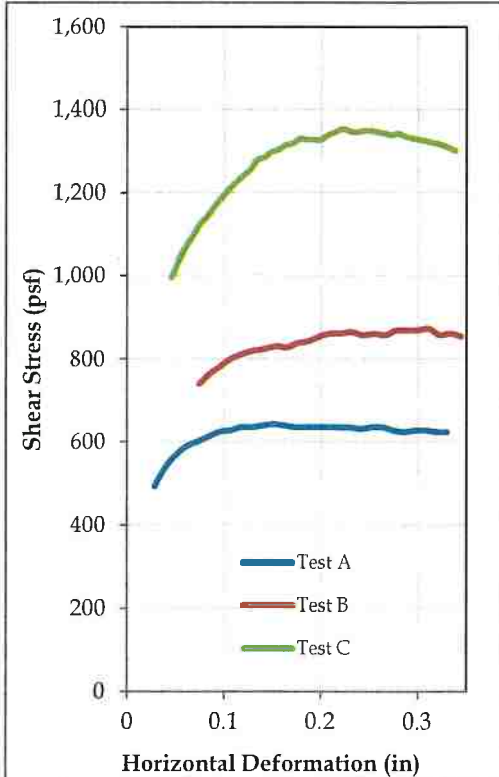
DIRECT SHEAR TEST RESULTS
ASTM D3080

JOB NAME: DTN Engineering & Consulting JOB #: 018113 LAB #: 18-923
SAMPLE ID: TP1 PERFORMED BY: JMA DATE: 11/8/18
PROJECT MNGR: NAN CHECKED BY: NAN DATE: 11/15/18

SAMPLE
DESCRIPTION: CLAY with sand

REMARKS: Remolded to 90% of 127.6 at 12.0% moisture

Test Number	Initial Water Content (%)	Initial Dry Density (pcf)	Vertical Load (psf)	Horizontal Shear Stress (psf)	C (psf)	f (deg)	Tan f (deg)
18-923A	12.0	115.4	538	593	329	27	0.50
18-923B	12.0	115.4	976	822			
18-923C	12.0	115.4	1,957	1,303			





CONSULTING ENGINEERS & GEOLOGISTS, INC.

812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

DIRECT SHEAR TEST RESULTS ASTM D3080

JOB NAME: <u>DTN Engineering & Consulting</u>	JOB #: <u>018113</u>	LAB #: <u>18-925</u>
SAMPLE ID: <u>TP3</u>	PERFORMED BY: <u>JMA</u>	DATE: <u>11/12/18</u>
PROJECT MNGR: <u>NAN</u>	CHECKED BY: <u>NAN</u>	DATE: <u>11/15/18</u>

SAMPLE
DESCRIPTION: GRAVEL with sand and clay
REMARKS: remolded to 90% of 142.2 PCF at 7.2% moisture

Test Number	Initial Water Content (%)	Initial Dry Density (pcf)	Vertical Load (psf)	Horizontal Shear Stress (psf)	C (psf)	f (deg)	Tan f (deg)
18-925A	7.6	128.1	599	863	434	33	0.65
18-925B	7.6	128.1	1,142	1,107			
18-925C	7.6	128.1	2,035	1,776			

