Geotechnical Report

Proposed New Building and Parking Area
Parents and Friends, Inc.
350 Cypress Street, Fort Bragg, California

Prepared for:

Leventhal Schlosser Newberger Architects

SHN Consulting Engineers & Geologists, Inc.

335 S. Main Street
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May 2012
411045

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Reference: 411045

May 3, 2012

Mr. Robert Schlosser
Leventhal Schlosser Newberger Architects
435 North Main Street
Fort Bragg, CA 95437

Subject: Geotechnical Report, Proposed New Building and Parking Area for Parents and Friends, Inc., Fort Bragg, California

Dear Mr. Schlosser:

In accordance with your authorization, we have performed a geotechnical investigation for the proposed new building and parking area at the Parents and Friends Inc. facility, located at 350 Cypress Street, Fort Bragg, California. The accompanying report presents the results of our field exploration and laboratory testing, and outlines our conclusions and recommendations to assist the project design consultants in addressing site preparation and grading, and design of the new building foundation.

If you have any questions regarding the information contained in this report, please call either of us at 707-441-8855.

Respectfully submitted,

SHN Consulting Engineers & Geologists, Inc.

Richard W. Hanford, PE, GE
Senior Geotechnical Engineer

Paul Sundberg
Staff Geologist

RWH:PRS:lms
Enclosure: Geotechnical Report

Reference: 411045

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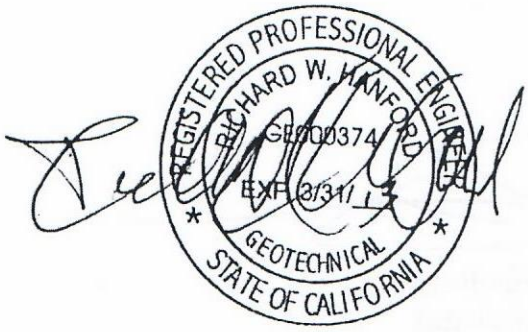

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May 2012

QA/QC: JPB

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Abbreviations and Acronyms

pcf	pounds per cubic foot
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials-International
BS-#	Bulk Sample-number
CBC	California Building Code
CDMG	California Division of Mines and Geology
H:V	horizontal to vertical
HB-#	Hand Boring number
SHN	SHN Consulting Engineers & Geologists, Inc.
TI	Traffic Index
USGS	U.S. Geologic Survey

1.0 Introduction

This report presents the results of a geotechnical investigation conducted by SHN Consulting Engineers & Geologists, Inc.'s (SHN) for the proposed developments of a two-story mixed use (commercial/office/residential) building and asphalt parking area to the Parents and Friends Inc. facility located at 350 Cypress Street, Fort Bragg, California (Figure 1). The purpose of the investigation was to explore and evaluate the subsurface conditions in the vicinity of the proposed developments and, based on the information obtained, provide geotechnical recommendations for the proposed developments.

The conclusions and recommendations presented in this report are provided to assist the project design consultants in addressing site preparation and grading, and for design of the new building foundation and parking area. This report is based on the data obtained from our site reconnaissance, and the results of laboratory testing performed on samples obtained from our exploratory borings.

2.0 Proposed Project and Scope of Work

The project consists of the demolition of some of the existing buildings, and the development and construction of a new mixed-use building and a new asphalt parking area. Our understanding of the proposed configuration is based on the site plan entitled, "Proposed Site Plan – 'A'," by Schlosser, Newberger Architects, dated February 27, 2012. The proposed improvements include a two-story mixed use building, a remodel of the existing furniture repair store and workshop building, and the development of a paved parking area consisting of 36 parking spaces with a proposed new driveway to provide access to River Drive on the east side of the property.

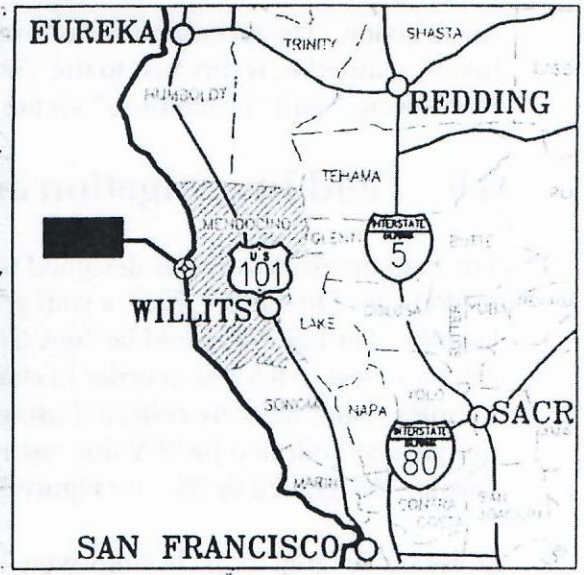
Our scope of work was designed to provide an evaluation of the project site to assess the geologic hazards and develop appropriate geotechnical design criteria to aid in project planning, design, and construction.

Specifically, our scope of work included the following tasks:

- reviewing previous geotechnical and geological reports and maps pertinent to the project
- conducting field reconnaissance of the site and vicinity
- conducting a subsurface investigation, consisting of the drilling of four hand-augered borings adjacent to the proposed footprint for the new building, and collecting representative undisturbed and composite samples for analysis testing
- performing laboratory testing on materials obtained from the borings
- preparing this report

This report is intended to comply with criteria presented in the 2010 California Building Code (CBC).

This report provides Leventhal Schlosser Newberger Architects and the project team with findings, conclusions, and recommendations related to the geotechnical aspects of the project design and



SOURCE: FORT BRAGG USGS
7.5 MINUTE QUADRANGLE

N

1"=3000'±

SHN Consulting Engineers & Geologists, Inc.	Parents and Friends, Inc. Geologic Report 350 Cypress Street, Fort Bragg, California		Site Location Map SHN 411045
	April 2012	411045-LOCATION	Figure 1

construction. The recommendations presented in this report are subject to the limitations presented herein. Attention is directed to the "Site Preparation and Grading," "Construction Phase Monitoring," and "Limitations" sections of this report.

3.0 Field Investigation and Laboratory Testing

The field investigation was designed to evaluate subsurface soil and groundwater conditions at the project site. On April 4, 2012, a staff geologist from SHN logged and sampled four hand-augered borings. The hand-augered borings (HB-1 through HB-4, Figure 2) were drilled to depths ranging from 5.75 feet to 6.5 feet in order to characterize the soil profile and for the collection of undisturbed samples. Samples were collected using 2.5-inch, hand-driven, thin-walled brass tubes. A bulk sample was collected for R-Value testing from a depth of 1 to 2 feet below the ground surface at the location designated as BS-1 on Figure 2.

Soils encountered in the borings were logged in general accordance with the Unified Soil Classification System (American Society for Testing and Materials-International [ASTM] D-2488). The approximate locations of our borings are indicated on Figure 2. Detailed logs of the soil encountered in each of the borings are included as Appendix A.

SHN's materials testing laboratory analyzed selected samples. Laboratory testing for index properties included in-place moisture content, dry density, fine sieve analysis, percent fines, and direct shear. An R-Value test was conducted; results are presented in Appendix B.

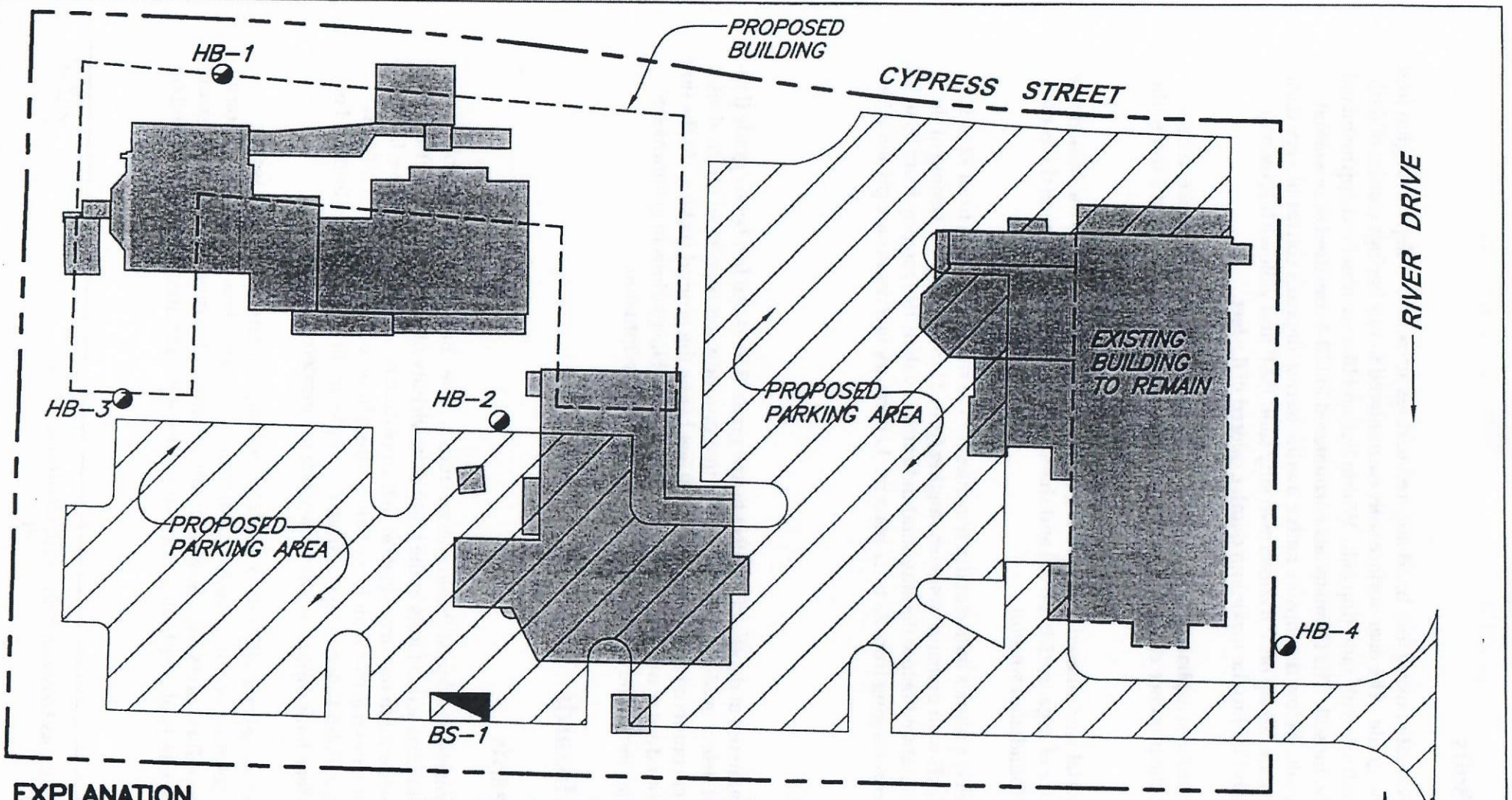
4.0 Site Conditions

4.1 General

The site is located on the south side of Cypress Street, approximately 740 feet east of the intersection of S. Franklin Street and Cypress Street at an elevation of 107 feet above mean sea level. The ground surface of the subject property is essentially flat with a maximum change in elevation of 2 feet from south to north across the site. The proposed improvements will be located in the northwestern and southern portions of the property, which are currently occupied by a building, shed, garden, and gravel parking area (Figure 2). There appears to be an underground storage tank present in the northwest portion of the property, adjacent to HB-1. The tank is noted as "tank fill" and "tank vent" on the "Topographic Map" survey, generated by I.L. Welty & Associates, dated January 2012. We were not provided with any information regarding the depth of the underground tank. In addition, an aboveground propane tank is located in the northwest corner of the property. The new parking area will be located primarily in the south and is currently developed with three sheds and a building. The site is bordered by a doctor's office to the south and by a vacant field to the west. The existing parking area consists of an approximately 6-inch thick section of gravel fill.

4.2 Geology

The project site is in an area mapped as marine terrace deposits consisting of a late Pleistocene age sequence of sediments that were deposited onto a wave-cut abrasion platform (Kilbourne, 1983). Terrace sediments in the project area consist of medium dense to very dense silty sand. Directly overlying these marine sediments is typically a ±2-foot thick veneer of dark brown sandy silty topsoil. Terrace sediments within the project area are observed to unconformably overly sandstone bedrock of the Franciscan Formation.



EXPLANATION

- HB-3 — BORING LOCATION AND DESIGNATION
- BS-1 — BULK SAMPLE LOCATION
- EXISTING STRUCTURES
- PROPOSED PARKING IMPROVEMENTS
- PROPOSED STRUCTURE

SOURCES: "TOPOGRAPHIC MAP"– I.L WELTY & ASSOCIATES, DATED 1/2012

"PROPOSED SITE PLAN–'A'"– SCHLOSSER NEWBERGER ARCHITECTS, DATED FEB 27, 2012

NOTE: ALL LOCATIONS ARE APPROXIMATE

0 30'

1"=30'±

SHN Consulting Engineers & Geologists, Inc.

Parents & Friends, Inc. Geologic Report 350 Cypress Street, Fort Bragg, California		Site Plan SHN 411045
April 2012	411045-SITE	Figure 2

4.3 Subsurface Soils

Subsurface soils were evaluated using four hand-augered borings advanced to depths ranging from 5.75 feet to 6.5 feet below grade. The near-surface soils encountered in our borings consist of dark brown to black, moist, soft silt with sand (topsoil). Within boring HB-4 we observed approximately 3 feet of fill overlying the topsoil. The fill materials encountered in HB-4 consisted of reworked native silty sand/sandy silt. Below the topsoil, native marine terrace deposits consist of very dark brownish-gray, olive brown, strong brown and brown silty sand (SM) and yellowish-brown to yellow poorly graded sand (SP) to the maximum depth explored of 6.5 feet.

Hand boring HB-2 encountered asphalt at a depth of 6 inches below the ground surface, when initially drilled. Due to the presence of this asphalt, HB-2 was abandoned and moved 5 feet to the west.

The upper 3 feet of material encountered (HB-1 through HB-3) is generally loose to medium dense, partly due to the presence of organic-rich topsoil and shallow groundwater. This material is not considered suitable for foundation support.

Laboratory testing of select samples indicates dry densities for the silty sand range from 72 to 90 pounds per cubic foot (pcf) with moisture contents ranging from 32 to 40 percent. Testing of the poorly graded sand encountered below the silty sand indicates dry densities ranging from 89 to 97 pcf with moisture contents ranging from 23 to 27 percent. Laboratory test results are presented in Appendix B.

4.4 Groundwater

Groundwater was encountered at depths of 1.25 feet below grade (HB-2), 2.0 feet below grade (HB-1 and HB-3) and 3.0 feet below grade (HB-4). It is likely that groundwater is perched on the denser marine terrace deposit encountered at approximately 3.0 feet below the ground surface. At the time of our investigation, groundwater was at or near its seasonal high. Fluctuations in groundwater can be expected both seasonally and in response to variability in precipitation.

5.0 Geologic Hazards

5.1 Seismic Hazards

The site is not located within an Alquist-Priolo special studies zone. Based on the available literature, there are no known active faults in the immediate vicinity of the Parents and Friends Inc. site and we found no evidence in our investigation that a previously unrecognized active fault may be present. The nearest known active fault is the San Andreas fault, which is mapped offshore between Point Arena and Point Delgada (approximately 7 miles to the west at the latitude of Fort Bragg). The risk of surface fault rupture at the project site is considered negligible.

Liquefaction is a secondary seismic effect of earthquake shaking that can cause loose, water-saturated, and weakly cohesive or non-cohesive earth materials to lose shear strength temporarily, due to an increase in pore-fluid pressures. Susceptibility to liquefaction decreases with increasing geologic age, due to the effects of weathering, and the degree of densification, compaction, and/or cementation.

Based on the published results of geotechnical testing and post-earthquake studies, the susceptibility of sediments to liquefaction can be directly correlated to the type, origin, and age of the deposits. Geologic materials most susceptible to liquefaction are geologically recent (that is, late Holocene age) sand- and silt-rich deposits, located adjacent to streams, rivers, bays, or ocean shorelines. It should be noted that these "most susceptible" conditions do not exist in the marine terrace deposits at the site.

Liquefaction occurs only when susceptible materials are saturated. Youd and Perkins (1978) estimated liquefaction susceptibility of Holocene marine terraces as low, and Pleistocene marine terraces as very low. All portions of the subject property are concluded to be underlain by Pleistocene age marine terrace materials (except where artificial fills may be present). Based on the age of the underlying marine terrace sediments, the hazard of liquefaction is considered low.

Considering the proximity to the active San Andreas fault, it is possible that the project site will be subject to periodic, moderate- to very strong levels of seismic shaking produced by earthquakes. Consequently, strong seismic shaking should be anticipated for the project within the design life of the structure. We recommend that the proposed structure be built to withstand strong seismic shaking. The minimum standard for construction of the structure should be in accordance with the latest edition of the CBC.

5.2 Slope Stability

The project site is located on a low gradient marine terrace surface, which by nature has a negligible potential for slope failure. The nearest significant slope to the proposed development is the north bank of the Noyo River, approximately 1,400 feet southwest of the site. The slope is approximately 80 to 90 feet high with a steep (1.5:1 Horizontal to Vertical [H:V]) face. The slope stability hazard to the proposed project is considered negligible.

5.3 Flooding

The project site is situated approximately 100 feet above the Noyo River, the nearest significant source of floodwaters. The site is not situated within a designated Federal Emergency Management Association flood zone and we consider the flooding hazard to be negligible. The elevation of the project site also puts it out of the areas that may be affected by tsunami inundation.

6.0 Conclusions

Based on the results of the field and laboratory investigation, SHN believes that the site can be developed as planned, provided our recommendations are followed and that the noted conditions and risks are acknowledged. The following conditions may require specific consideration during the design and/or construction of the improvements:

1. Strong seismic shaking should be anticipated for the project site within the design life of the structure. The minimum standard for design/construction of the structure should be in accordance with the current CBC. We provide site-specific seismic design criteria based on the 2010 CBC in section 7.1.
2. The underground storage tank believed to be present in the northwestern corner of the property lies directly under the proposed building footprint and will need to be removed. This excavation will then need to be backfilled. It is anticipated that site

disturbance associated with the removal of existing structures will occur. We provide special recommendations for removing of existing structures and backfilling with suitably engineered fill in the section 7.2.

3. The location of the footprint for the proposed new building is underlain by as much as 3 feet of soft compressible silt with sand that is not considered suitable for foundation support. In addition, the presence of shallow groundwater conditions should be taken into consideration. We provide special recommendations for the foundation elements and slab-on-grade for the new building in section 7.3.

7.0 Recommendations

In our opinion, the risk of significant post-construction settlement of the structure will be mitigated to a low level if the structure is supported on shallow foundations that penetrate down through near-surface, potentially compressible soils. We estimate that with the project constructed in accordance with the following recommendations, total post-construction settlement of the structure is not likely to exceed 1 inch, and post-construction differential settlement is not likely to exceed ½ inch.

7.1 Seismic Design Criteria

We recommend that the proposed structure be designed and built to withstand strong seismic shaking. The minimum standard for construction of the structure should be in accordance with the latest edition of the CBC.

The 2010 CBC requires the following information for seismic design. Based on a Site Class D (stiff soil profile), Occupancy Category II, and a latitude and longitude of 39.430626° N and -123.799925° W, respectively, we calculated the design spectral response acceleration parameters for the project area.

Table 1
Seismic Design Criteria
Parents and Friends Inc., Fort Bragg, CA

Latitude	39.430626
Longitude	-123.799925
Site Class	D
S_S	1.500
S_1	0.666
F_a	1.0
F_v	1.5
S_{MS}	1.500
S_{M1}	0.999
S_{DS}	1.0
S_{D1}	0.666
Occupancy Category	II
Seismic Design Category	D

We used the United States Geological Survey (USGS) seismic calculator software program, "Seismic Hazard Curves, Response Parameters, Design Parameters: Seismic Hazard Curves, and Uniform Hazard response Spectra, v. 5.1.0," dated February 11, 2011. Calculated values are presented in Table 1.

7.2 Site Preparation and Grading

Site preparation will include the demolition and clearing of existing improvements. Site grading is anticipated to involve cutting and filling (removal of any existing fill and construction waste, and filling to design grades), and will include preparation of building pads to receive building floor slabs and sub-slab materials. Structural elements (buried asphalt) were encountered adjacent to HB-2. In the following recommendations, "compact" and "compacted" refer to obtaining a minimum of 90% of the maximum relative dry density as referenced to the current ASTM D1557 test method.

We recommend the following:

1. As appropriate, notify Underground Service Alert (1-800-642-2444) prior to commencing site work, and use this location service and other methods to avoid injury or risk to life from underground and overhead utilities, and to avoid damaging them.
2. Concrete and other debris resulting from the demolition of existing building foundations should be removed from the site, and the resulting voids should be backfilled prior to preparation of the subgrade soil in proposed building areas. Where existing fill or areas of soft/wet soil are exposed at the designed subgrade elevations, these materials should also be removed and replaced with engineered fill. To prepare subgrade surfaces to support improvements or structural fill, strip and remove surface debris, vegetation, and major root systems. Stripping should extend out 5 feet beyond building perimeters, and 3 feet beyond the perimeters of concrete flatwork or other appurtenant structures (not including sidewalks or other essentially non-loaded elements), provided there is no conflict with existing structures to remain. Additionally, excavate as required to accommodate design grades.
3. With the exception of vertical sides or steps, subgrade surfaces to receive structural fill should be cut-graded to slope no steeper than 15%.
4. Prior to the placement of fill, the exposed subgrade surface should be proof-rolled to detect any potential soft or weak areas. Typically, proof-rolling is undertaken with a loaded 10-wheel dump truck or other loaded rubber tire equipment. Zones of weak or saturated soil that are encountered during proof-rolling should be removed by further excavation to expose firm natural soil and replaced with properly compacted structural fill. Proof-rolling should be observed and approved in the field by the soil engineer.
5. Scarify and compact (90% minimum ASTM 1557) the upper 6 inches of exposed subgrade soils that are to receive structural fill, or improvements such as floor slabs or concrete flatwork on grade.
6. Structural fill material should consist of relatively non-plastic (Liquid Limit less than 40, Plasticity Index less than 15) material containing no organic material or debris, and no individual particles over 6 inches across. Undocumented fills or soft/wet soils that are over-excavated (as recommended above) may be reused for structural fill provided they meet these criteria. It should be noted that where fine-grained materials are over-excavated, these materials may require additional effort to moisture condition and/or compact to design specifications. If gravel is used, it should be well-graded, to include a variety of particle sizes to minimize relatively large void spaces, into which fine-grained soils can migrate.
7. Structural fill should be moisture conditioned, placed in lifts 8 inches or less in loose thickness, and mechanically compacted to a minimum of 90% of the maximum relative dry density as determined by the current ASTM D1557 test method.
8. Cut-and-fill slopes up to 3 feet in height should be placed no steeper than 1.5:1 and 2:1 (H:V), respectively.

7.3 Foundation Design

Based on discussions with Leventhal, Schlosser, Newberger Architects (Project Architect), a conventional foundation system, consisting of perimeter spread footing with a slab-on-grade floor system, is anticipated to be used on this site. The primary geotechnical site consideration is establishing the perimeter building foundations beneath any soft soil and/or disrupted topsoil. Soft, potentially compressible soils were logged to maximum depths of up to 3 feet in the hand-augured borings.

We recommend that all foundation elements be embedded a minimum of 6 inches into the yellowish brown, native undisturbed soils encountered at a depth of approximately 3 feet below grade. Such foundations may be designed so they do not exceed an allowable bearing capacity of 3,000 pounds per square foot for dead plus live loads. This value may be increased by one-third to account for the short-term effects of wind and/or seismic loading. The provided bearing values are applicable to both competent, undisturbed, native soils, and structural fill placed as recommended.

A horizontal friction coefficient of 0.35 may be used for the footing/soil contact. Frictional resistance may be calculated in conjunction with an allowable lateral passive pressure represented by an equivalent fluid weighing 325 pcf for short term loadings, such as lateral foundation resistance in response to wind or earthquake loadings. Lateral passive pressure can be calculated where footings bear laterally against competent undisturbed native subsoils, or structural fill.

The ground surface around the structure perimeter should be sloped away, or other design measures implemented to provide positive surface water drainage away from perimeter foundation areas.

7.4 Slab-on-Grade

We understand the floor system will consist of a slab-on-grade. We have identified soft, compressible soils to a total depth of 3 feet below grade across much of the site. Although we have recommended that foundation elements bear on strong soils below 3 feet, we do not recommend removing all of this material below the slabs.

Remedial grading for preparation of the subgrade below the slab should include removal and replacement of subgrade material such that a minimum of 1.5 feet of structural fill, placed and compacted as specified in section 7.2 is supporting the slab structural section. We are not aware of final design grades for the slab. In areas where final grade is higher than existing, remove at least 1.5 feet below existing grade and reconstruct to design grades with minimum of 90% compacted fills. In areas where the slab is lower than existing grade, undercut at least 1.5 feet and reconstruct to design grades with minimum 90% compacted fills. The subgrade preparation should include the removal of all the soft, compressible topsoil (up to 1.5 feet) and replacement with suitable structural fill, placed and compacted as specified in section 7.2.

We recommend the floor slab be designed and constructed to support the anticipated loads. Care should be taken to ensure that floor slab reinforcing bars remain in correct position during concrete placement. We also recommend the floor slab be structurally integrated with the building foundations so that the slab and foundation system tends to act as a unit, instead of as two independent structural elements, under strong seismic conditions.

Concrete slabs-on-grade can become damp from capillary water migration. As a precaution to minimize transmission of soil moisture up through floor slabs in habitable areas or other areas where damp slabs should be avoided, we recommend that the slabs be underlain by a moisture/vapor barrier manufactured for the purpose, or a polyethylene vapor reduction membrane at least 10 mils in thickness. The membrane should be overlapped at least 2 feet and taped at joints. This membrane should overlie a capillary break consisting of a 6-inch layer of No. 4 U.S. Sieve (0.187 inch) minimum, up to 1-inch maximum, gravel. (The capillary break provides a layer with relatively large, intergranular, void spaces, which inhibits the capillary rise of ground moisture.)

It has been common practice to cover the membrane with a few inches of sand, to protect the membrane during construction, and to aid in concrete curing. Whether or not a sand layer is placed above the membrane, the membrane should be protected from tearing or puncture during construction. The sand layer (up to 2 inches) can be counted toward the recommended 6-inch capillary break.

7.5 Utility Trenches

Utility trenches greater than 5 feet deep should be braced and shored in accordance with good construction practice and all applicable safety ordinances. The actual construction of the trench walls and worker safety is the responsibility of the contractor.

Pipe bedding for utilities should consist of sand, gravel, or crushed rock with a maximum size of ¾-inch, it should be well-graded, and have a minimum sand equivalent of 28. The bedding material should extend a minimum of 3 inches below and 1 foot above the pipe for the entire trench width. The bedding material should be compacted to a minimum of 90% relative compaction with care given to ensure compaction in the pipeline haunch area. Settling by inundation or jetting should not be allowed.

Groundwater may be encountered within the depths of typical trench excavations, depending upon the depth of excavation and the season of construction. The contractor should install measures to divert groundwater, or channel groundwater to flow towards collection points to be removed from the trench and disposed of at an approved area.

7.6 Drainage and Erosion

To mitigate erosion potential, we recommend the following measures:

1. Whenever possible, design finished grade to allow sheet runoff rather than concentrated runoff
2. Where concentrated runoff will occur, minimize its velocity by controlling slopes, and protect the channel and discharge area by dissipating flow energy, using rock or other erosion resistant surfacing as appropriate.
3. Perform site work and vegetation establishment during the seasons not subject to repeated or prolonged rainfall.
4. Fiber rolls, hay bales, or other appropriate erosion control measures should be implemented if the grading is conducted between October 1st and April 30th.
5. Provide periodic maintenance of erosion control measures.

7.7 Flexible Asphaltic-Concrete Pavement Sections

Flexible asphaltic-concrete pavement will be used for the proposed driveway and parking area. One bulk sample (BS-1, Figure 2) of the near-surface soil was collected during our field investigation for R-Value testing. The sample, anticipated to be representative of the near-surface soil for the southern portion of the proposed new parking area, had an R-Value of 66.

In order to account for potential variability in the subgrade soil, our pavement section design was performed using a subgrade R-Value of 66. Table 2 presents recommended flexible asphaltic-concrete pavement sections using the above-noted R-Values and Traffic Indices (TI) of 4.0 for the parking area, and 5.5 for the driveway. The pavement sections presented have a 20-year design life. We recommend the thicker section (TI=5.5) be used for the driveway or areas which may be subjected to heavier truck and/or bus loadings.

Table 2
Recommended Flexible Asphaltic-Concrete Pavement Sections
Parents and Friends Inc., Fort Bragg, CA

Pavement Location	Traffic Index (T.I.)	Asphaltic Concrete Thickness (inches)	Caltrans Class II Aggregate Base Thickness (inches)
Parking Area	4.0	2.0	4.0
Driveway	5.5	3.0	4.0

Material specifications and procedures should be in accordance with Caltrans current Standard Specifications (Caltrans, 2010). One inch of asphaltic-concrete may be substituted for 2 inches of aggregate base in the above pavement section thicknesses. However, a minimum of 4 inches of aggregate base and a minimum of 2 inches of asphaltic concrete should be maintained in the proposed driveway and parking areas, and at least 4 inches of aggregate base should be maintained.

Pavement sections recommended above are based on the soil conditions encountered during our field exploration at the sampling locations indicated. During site grading, the design subgrade should be observed to confirm that the materials exposed are substantially the same as those collected during our site exploration. Should different subgrade conditions be encountered, supplemental sampling and R-Value testing should be performed to verify the pavement section design values. Such supplemental testing could result in either thicker or thinner pavement section design values. For example, where imported fill is placed over native soils in order to raise grade, and the pavement section is supported by imported fill, the design needs to be based on the R-value of the imported fill rather than that of the native soil.

7.8 Construction Phase Monitoring

In order to assess construction conformance with the intent of our recommendations, it is important that a representative of our firm:

- Verify adequate subgrade preparation.
- Monitor placement of structural fill.
- Observe foundation excavations.

This construction phase monitoring is important because it provides SHN the opportunity to verify anticipated site conditions, and recommend appropriate changes in design or construction procedures if site conditions encountered during construction vary from those described in this report. It also allows SHN to recommend appropriate changes in design or construction procedures if construction methods adversely affect the competence of on-site soils to support the structural improvements.

8.0 Limitations

This report has been prepared for the specific application to the design and construction of the proposed addition as discussed herein. SHN prepared the findings, conclusions, and recommendations presented herein in accordance with generally accepted geotechnical engineering practices at the time and location that this report was prepared. No other warranty, express or implied, is made.

Typically, soil materials typically are not homogeneous in type, strength, and other geotechnical properties, and can vary between points of observation and exploration. In addition, groundwater and soil moisture conditions can vary seasonally and for other reasons. SHN does not and cannot have a complete knowledge of the subsurface conditions underlying a site. The conclusions and recommendations presented in this report are based upon the findings at the points of exploration, interpolation and extrapolation of information between and beyond the points of observation, and are subject to confirmation of the conditions revealed by construction. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by our firm during the construction phase in order to evaluate compliance with our recommendations.

Findings of this report are valid as of the date of issuance; however, changes in condition of a property can and will occur with the passage of time. If the scope of the proposed construction, including the proposed loads, grades, or structural locations, changes from that described in this report, our recommendations should be reviewed.

The scope of SHN's geotechnical services did not include assessment for the presence or absence of hazardous/toxic substances in the soil, groundwater, surface water, or atmosphere, or the presence of any environmentally sensitive habitats or culturally significant areas.

9.0 References

California Building Standards Commission. (2010). ***2010 California Building Code.*** Based on International Building Code (2009) by the International Code Council. Sacramento:California Building Standards Commission.

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Appendix A

Boring Logs

Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Parents and Friends Geotech
LOCATION: Fort Bragg
GROUND SURFACE ELEVATION: 107 Feet MSL (Survey)
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 411045
DATE DRILLED: 4/4/12
TOTAL DEPTH OF BORING: 6 Feet
SAMPLER TYPE: 2.5" O.D. brass tube

BORING NUMBER HB-1

DEPTH (FT)	BULK SAMPLES	TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (tsf) by P.P.	% Passing 200	REMARKS
0.0			ML		SILT with SAND; Black, moist, soft, contains roots. (Topsoil)						
-1.0											
-2.0			SM		SILTY SAND; Very dark brownish-gray, wet to saturated, loose, contains clasts of strong brown cemented sand. (Marine Terrace Deposit)	40	75			30	
-3.0					Grades olive brown to strong brown becomes medium dense						
-4.0					Grades yellowish-brown becomes medium dense to dense						
-5.0			SP		POORLY GRADED SAND; Yellowish-brown, saturated, dense. (Marine Terrace Deposit)	23	97			4	
-6.0					Boring terminated at a depth of 6.0 feet. Groundwater encountered at a depth of 2.0 feet. Bore hole backfilled with soil cuttings.						
-7.0											
-8.0											
-9.0											
-10.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF BORING

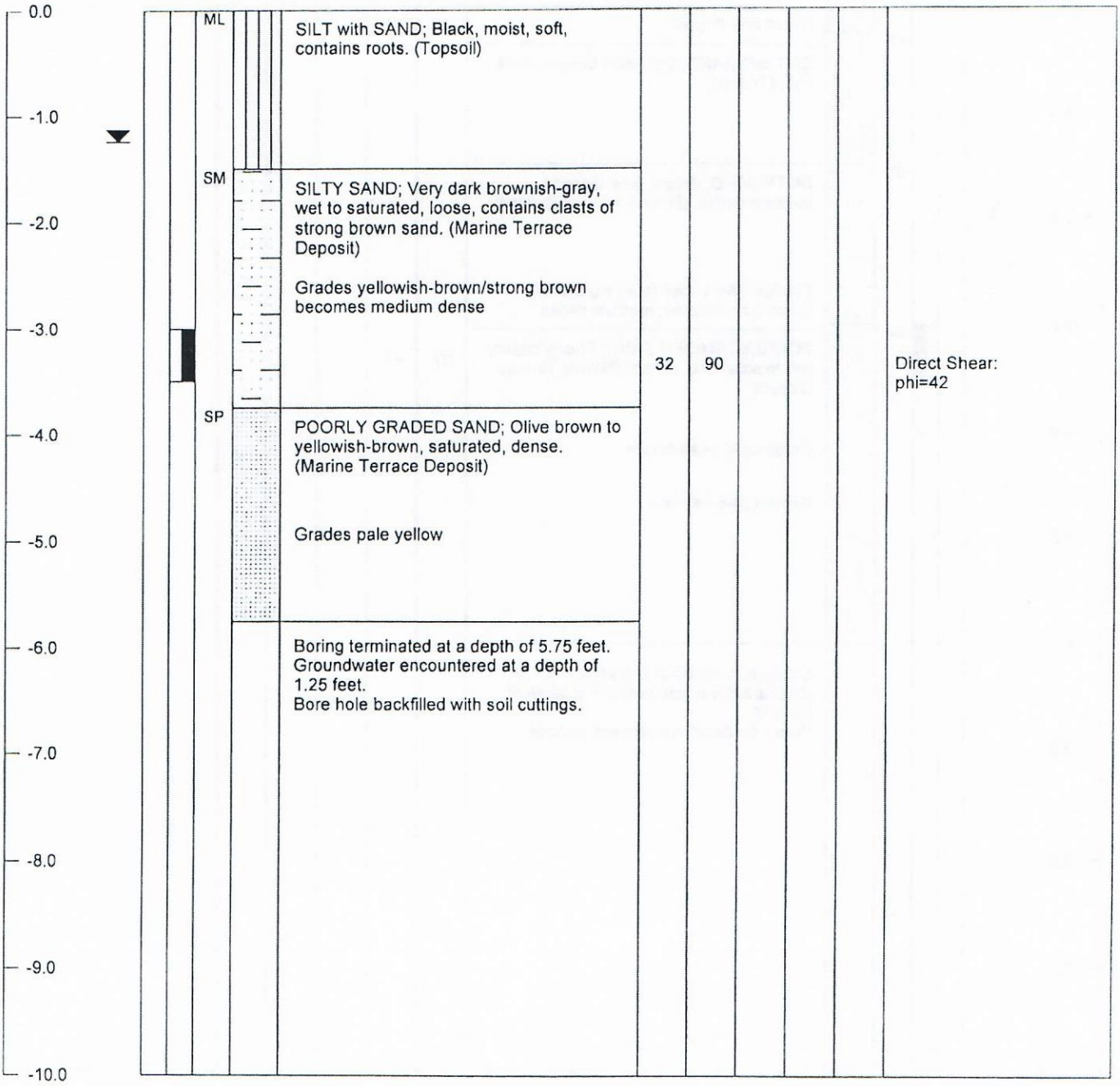
Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Parents and Friends Geotech
LOCATION: Fort Bragg
GROUND SURFACE ELEVATION: 107 Feet MSL (Survey)
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 411045
DATE DRILLED: 4/4/12
TOTAL DEPTH OF BORING: 5.75 Feet
SAMPLER TYPE: 2.5" O.D. brass tube

BORING NUMBER HB-2



The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF BORING

Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Parents and Friends Geotech
LOCATION: Fort Bragg
GROUND SURFACE ELEVATION: 107 Feet MSL (Survey)
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 411045
DATE DRILLED: 4/4/12
TOTAL DEPTH OF BORING: 6.0 Feet
SAMPLER TYPE: 2.5" O.D. brass tube

BORING NUMBER HB-3

DEPTH (FT)	BULK SAMPLES	TUBE SAMPLE	USCS	PROFILE	SOIL DESCRIPTION (ASTM D 2488)	% Moisture	Dry Density (pcf)	Unc. Com. (psf)	U.C. (tsf) by P.P.	% Passing 200	REMARKS
0.0					Grass and Topsoil						
			ML		SILT with SAND; Very dark brown, moist, soft. (Topsoil)						
-1.0											
			SM		SILTY SAND; Brown, wet, loose to medium dense. (Marine Terrace Deposit)						
-2.0 ▼											
					Grades olive brown to strong brown becomes saturated, medium dense.						
-3.0			SP		POORLY GRADED SAND; Strong brown, wet to saturated, dense. (Marine Terrace Deposit)	27	89				
-4.0					Grades yellowish-brown						
					Grades pale yellow						
-5.0											
-6.0					Boring terminated at a depth of 6.0 feet. Groundwater encountered at a depth of 2.0 feet. Bore hole backfilled with soil cuttings.						
-7.0											
-8.0											
-9.0											
-10.0											

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF BORING

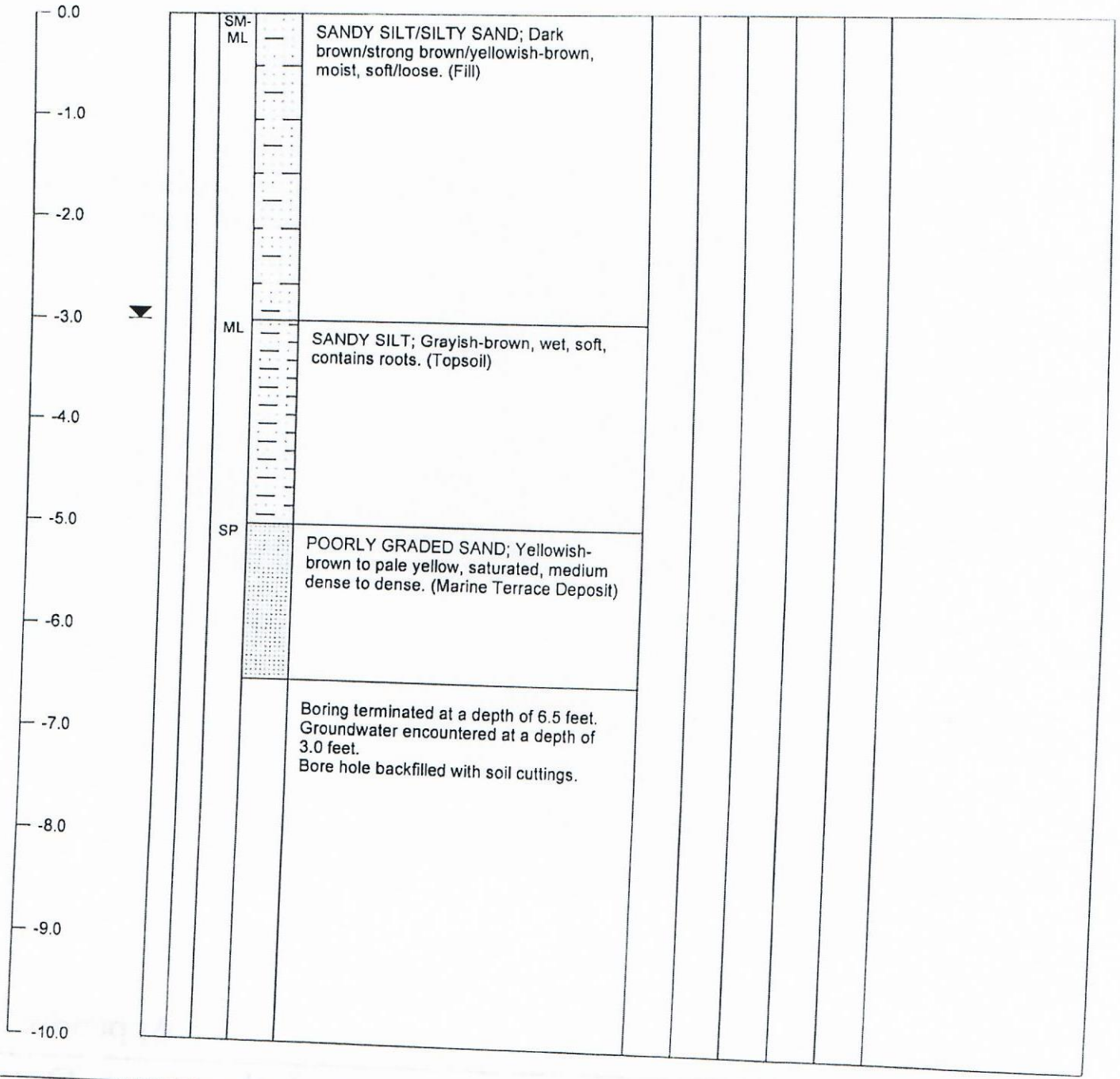
Consulting Engineers & Geologists, Inc.

812 West Wabash, Eureka, CA 95501 ph. (707) 441-8855 fax. (707) 441-8877

PROJECT: Parents and Friends Geotech
LOCATION: Fort Bragg
GROUND SURFACE ELEVATION: 108 Feet MSL (Survey)
EXCAVATION METHOD: Hand Auger
LOGGED BY: PRS

JOB NUMBER: 411045
DATE DRILLED: 4/4/12
TOTAL DEPTH OF BORING: 6.5 Feet
SAMPLER TYPE: 2.5" O.D. brass tube

BORING NUMBER **HB-4**



The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF BORING

Appendix B

Laboratory Data

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

DENSITY BY DRIVE- CYLINDER METHOD (ASTM D2937)

Project Name:	Parants/Friends	Project Number:	411045
Performed By:	JMA	Date:	4/23/12
Checked By:	[illegible]	Date:	4/24/12
Project Manager:	TH		

Lab Sample Number	12-319	12-320	12-322		
Boring Label	HB-1	HB-1	HB-3		
Sample Depth (ft)	2-2.5	5-5.5	3-3.5		
Diameter of Cylinder, in	2.38	2.38	2.38		
Total Length of Cylinder, in.	7.90	9.71	7.92		
Length of Empty Cylinder A, in.	0.23	0.35	2.80		
Length of Empty Cylinder B, in.	2.33	2.32	0.31		
Length of Cylinder Filled, in	5.34	7.04	4.81		
Volume of Sample, in^3	23.76	31.32	21.40		
Volume of Sample, cc.	389.30	513.23	350.66		

Pan #	ss8	ss9	s11		
Weight of Wet Soil and Pan	844.7	1175.3	827.0		
Weight of Dry Soil and Pan	658.5	989.8	690.5		
Weight of Water	186.2	185.5	136.5		
Weight of Pan	193.1	196.7	192.7		
Weight of Dry Soil	465.4	793.1	497.8		
Percent Moisture	40.0	23.4	27.4		
Dry Density, g/cc	1.20	1.55	1.42		
Dry Density, lb/ft^3	74.6	96.5	88.6		

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

PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	Parents/Friends	Project Number:	411045
Performed By:	JMA	Date:	4/23/12
Checked By:	[illegible]	Date:	4/24/12
Project Manager:	TH		

Lab Sample Number	12-319				
Boring Label	HB-1				
Sample Depth	2-2.5'				
Pan Number	ss11				
Dry Weight of Soil & Pan	340.2				
Pan Weight	192.7				
Weight of Dry Soil	147.5				
Soil Weight Retained on #200&Pan	296.6				
Soil Weight Passing #200	43.6				
Percent Passing #200	**29.6**				

Lab Sample Number					
Boring Label					
Sample Depth					
Pan Number					
Dry Weight of Soil & Pan					
Pan Weight					
Weight of Dry Soil					
Soil Weight Retained on #200&Pan					
Soil Weight Passing #200					
Percent Passing #200					

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

SIEVE ANALYSIS WORKSHEET ASTM C136

JOB NAME:	Parents/Friends	JOB NUMBER:	411045	DATE:	4/23/12
PROJECT MANAGER:	TH	PERFORMED BY:	JMA	CHECKED BY:	
SAMPLE I.D.:	HB-1 @ 5.0-5.5'	LAB SAMPLE NO:	12-320		

TOTAL SAMPLE WEIGHT BEFORE WASH: 346.5 SAMPLE WEIGHT AFTER WASH: 333.0

PERCENT LOST= **0.33** MUST BE 0.3% OR LESS TO COMPLY W/ ASTM C136-01 AND AASHTO T 27-93

SIEVE #	WEIGHT RETAINED SCREEN	WEIGHT RETAINED TOTAL	% PASSED
#4 (4.75mm)	0	0	**100.0**
Pan	347	346.5	

FINE FRACTION GRADING WEIGHT 346.5

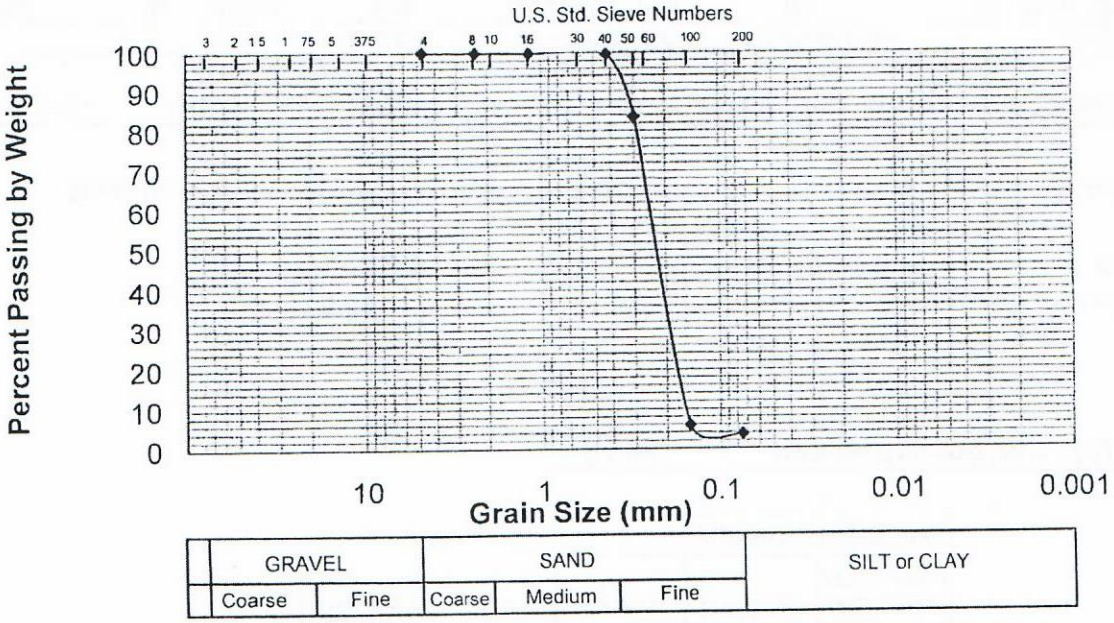
	WEIGHT RETAINED REDUCED PORTION	WEIGHT RETAINED SCREEN	WEIGHT RETAINED TOTAL	%PASSED
#8 (2.36mm)	0.3	0	0	**99.9**
#16 (1.18mm)	0.7	0.7	1	**99.7**
#30 (600um)	0.5	0.5	1.5	**99.6**
#50 (300um)	55.5	55.5	57.0	**83.5**
#100 (150um)	269.1	269.1	326.1	**5.9**
#200 (75um)	7.5	7.5	333.6	**3.7**
PAN	0.5	1	334.1	

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

PROJECT NAME:	Parents/Friends	PROJECT NUMBER:	411045
SAMPLE ID:	HB-1 @ 5.0-5.5'	Lab Sample#:	12-320
DATE TESTED:	4/23/12		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#30	#40	#50	#60	#100	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.36	2.00	1.18	0.600	0.425	0.300	0.250	0.150	0.075
PERCENT PASSING									100	99.9		99.7		99.6	83.5		5.9	3.7
SPEC REQUIRED																		

Gradation Test Results



Revised 1/03

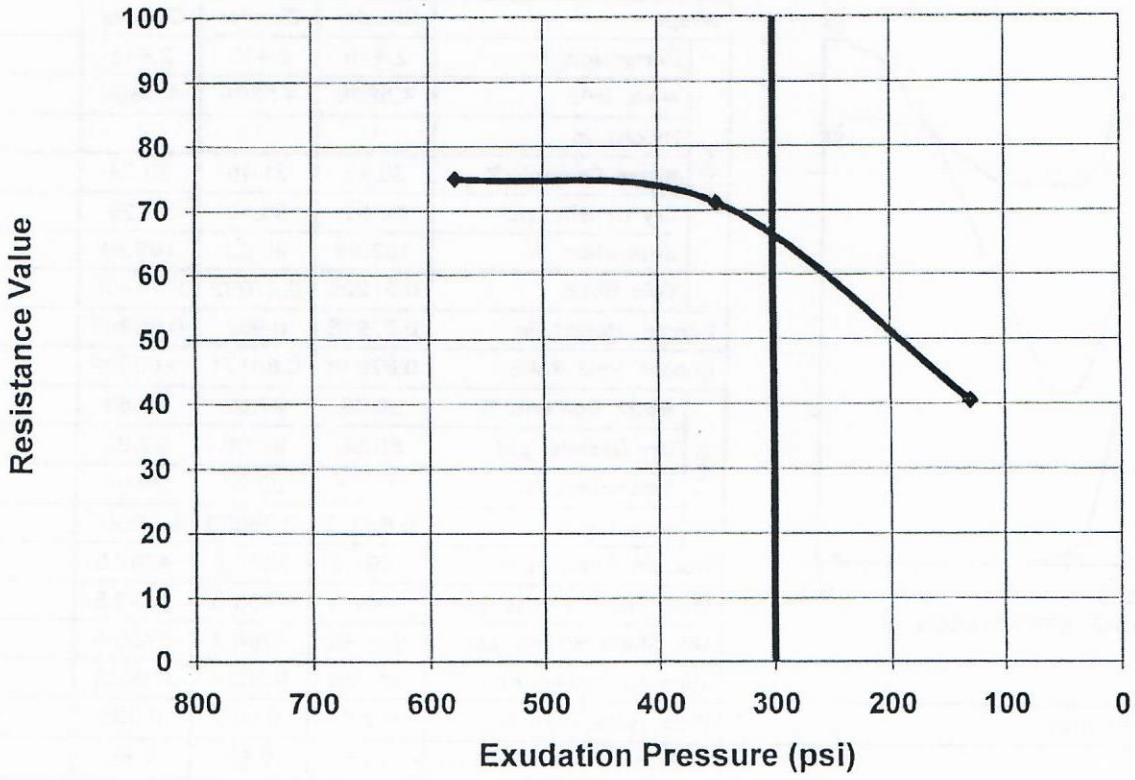
Resistance, R-Value

Caltrans Method 301

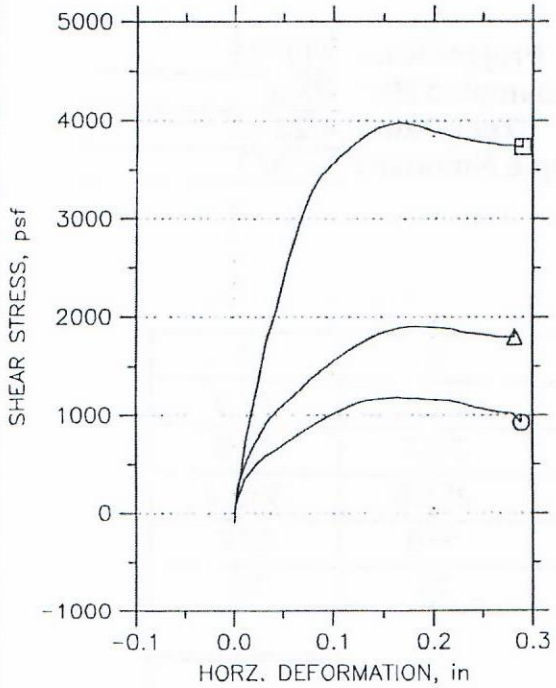
Project :	Parents/Friends	**Project No. :**	411045
Client :	Parents/Friends	**Sampled By :**	PRS
Sample Location :	BS-1 @ 1-2'	**Test Date :**	4/23/12
Sample Description :	ML	**Sample Number :**	12-323

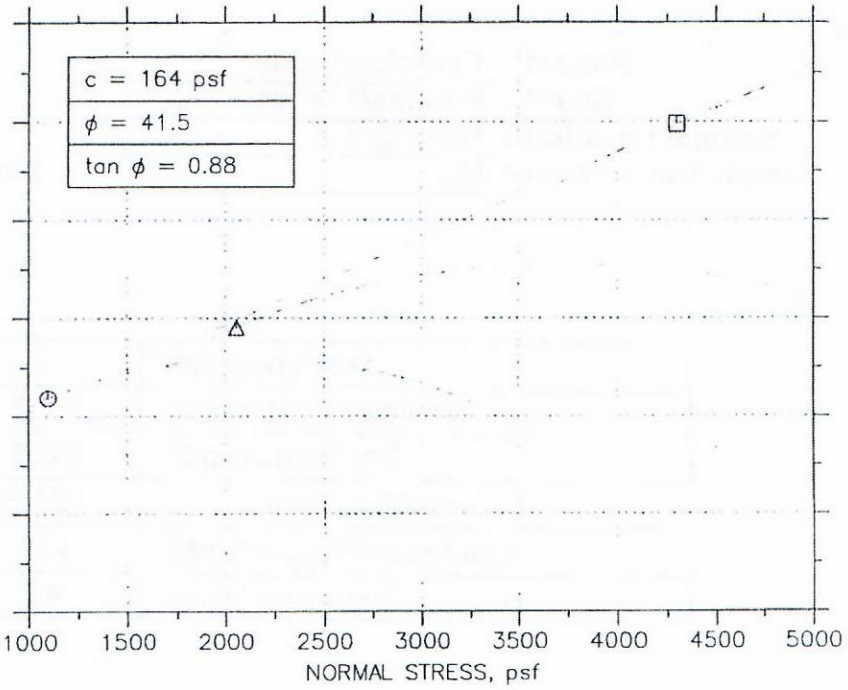
Test Specimen	1	2	3
Moisture Content (%)	23.2	21.1	20.5
Dry Density (pcf)	28.8	28.7	27.6
Expansion Pressure (psf)	121.2	285.8	368.1
Exudation Pressure (psi)	131	350	577
Resistance Value	40	71	75

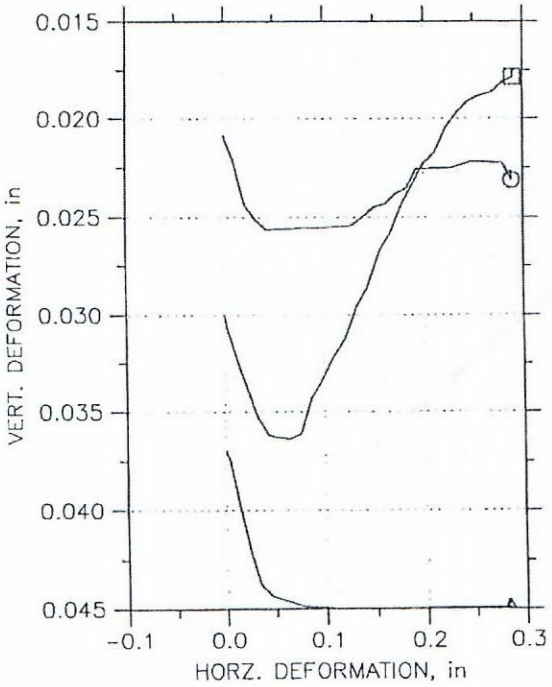
R Value at 300 psi Exudation Pressure: **66**



DIRECT SHEAR TEST REPORT







Symbol		⏲	△	☐	
Test No.		12-321A	12-321B	12-321C	
Sample No.		12-321	12-321	12-321	
Shape		Circular	Circular	Circular	
Initial	Dimension, in	2.415	2.415	2.415	
	Area, in^2	4.5806	4.5806	4.5806	
	Height, in	1	1	1	
	Water Content, %	35.45	31.49	29.34	
	Dry Density, pcf	86.51	88.42	95.29	
	Saturation, %	102.99	95.82	105.64	
	Void Ratio	0.91229	0.87092	0.73605	
Consol. Height, in		0.97918	0.963	0.96997	
Consol. Void Ratio		0.87248	0.80171	0.68392	
Final	Water Content, %	30.38	27.62	25.69	
	Dry Density, pcf	88.56	92.58	97.02	
	Saturation, %	92.73	93.03	96.54	
	Void Ratio	0.86812	0.78689	0.70507	
Normal Stress, psf		1097.9	2057.3	4297.5	
Max. Shear Stress, psf		1187.5	1905.3	3983.5	
Ult. Shear Stress, psf		924.46	1796.3	3735.4	
Time to Failure, min		8.0039	8.5039	8.0039	
Disp. Rate, in/min		0.025	0.025	0.025	
Estimated Specific Gravity		2.65	2.65	2.65	
Liquid Limit		0	0	0	
Plastic Limit		0	0	0	
Plasticity Index		0	0	0	

Project: Parents And Friends
Location: Willits
Project No.: 411045
Boring No.: HB2 3-3.5'
Sample Type: 2.38" shelb
Description: Sand
Remarks: