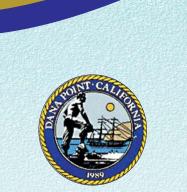
Final Environmental Impact Report Volume III - Appendices E - J

South Shores Church Master Plan City of Dana Point

SCH No. 2009041129



Prepared by LSA ASSOCIATES, INC.

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GEOTECHNICAL REPORTS

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Geotechnical Evaluation and Slope Stabilization Design for Environmental Impact Report Purposes, for Proposed New Structures at the South Shores Church, City of Dana Point, California

Volume I

Prepared For:

Mr. GG Kohlhagan

South Shores Church 32712 Crown Valley Parkway Dana Point, CA 92629

Dated: May 22, 2013

Project No. 10132-01

Project No. 10132-01



May 20, 2013

Mr. GG Kohlhagan *South Shores Church* 32712 Crown Valley Parkway Dana Point, CA 92629

Subject: Geotechnical Evaluation and Slope Stabilization Design for Environmental Impact Report Purposes, for Proposed New Structures at the South Shores Church, City of Dana Point, California

In accordance with your request, LGC Geotechnical, Inc. has performed a geotechnical evaluation of subsurface conditions relative to the proposed construction of new structures at the South Shores Church located in the City of Dana Point, California. The proposed site development includes phased construction of four, two-story buildings, associated walls, a parking structure, and a meditation garden. Previous iterations of this report have been submitted and reviewed by the City of Dana Point. This integrated report encompasses our previous findings, conclusions, and recommendations as well as responses to review questions in a stand-alone report. It is intended to provide sufficient geotechnical information and design recommendations, as required for environmental impact report purposes, to show that the project can be successfully developed from a geotechnical point of view. Subsequent, specific design reports will be required prior to actual construction.

Please note that the proposed "Master Plan Alternative" was also considered from a geotechnical perspective within the report in order to present the possible design for review as part of the EIR process. The Master Plan Alternative project can also be successfully developed from a geotechnical point of view.

Should you have any questions regarding this report, please do not hesitate to contact our office. We appreciate this opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Katie Maes, CEG 2216 Project Geologist



Tim Lawson, GE 2626 Geotechnical Engineer



Distribution: (4) Addressee (includes 3 wet-signs for City of Dana Point, 1 sealed)

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1.0 INTRODUCTION

The purpose of this evaluation was to review previous geotechnical data relevant to the South Shores Church property located in the City of Dana Point, California (Site Location Map, Page 4), refine and update the geologic model, and provide geotechnical recommendations for the proposed re-development of the site. During previous geotechnical evaluations of the site, numerous borings and trenches were excavated, logged, tested, and reported. LGC Geotechnical has reviewed the referenced geotechnical reports and drilled two additional borings in order to gain supplemental information and to create a baseline of comparison with borings and trenches previously excavated and logged by others (References, Appendix A). Off-site borings, regional and local geologic maps by others, and interpretations of aerial photographs were incorporated into our geotechnical evaluation. The combination of previously available data and supplemental data has provided detailed characterization of the subsurface conditions that may affect the proposed re-development of the site. Specific geologic features were stratigraphically and structurally correlated between borings and a refined geologic model was created for engineering analysis.

The available suite of subsurface data was geotechnically analyzed with the intent to improve the previously proposed mitigation design. The previous mitigation design involved construction of a replacement fill buttress with significant earthwork grading and construction phasing, in addition to installation of a mechanical stabilization system at the completion of earthwork grading (Nicoll, 2006 through 2008d). A revised plan was desired in order to reduce the complexity of construction and potential impact to surrounding neighborhoods. Also, the overall development plan for the Proposed Master Plan has been reduced in scope at the northeast portion of the project with a scaling back of the previously proposed, stabilized flat area and retaining wall to the east of the proposed Christian Education Buildings. The development plan for the Proposed Master Plan Alternative is even further scaled back in overall scope and square footage of structures and incorporates additional setbacks from the property limits. The combined benefits of a refined geologic model, reduced development, and revised stabilization methods presented herein are anticipated to significantly reduce the level of earthwork grading and construction that was previously required. The intent of this report is to present the refined geologic model and to demonstrate feasibility of construction of the planned re-development project using the stabilization methods presented herein.

1.1 <u>Project Description</u>

The South Shores Church is a hilltop property located on the east side of Crown Valley Parkway, approximately a quarter-mile from its intersection with Pacific Coast Highway, in the City of Dana Point, California, as shown in the Site Location Map (Figure 1, Page 4).

The subject site is bounded at the west by Crown Valley Parkway, at the south by an existing residential community, and at the north by a descending graded cut slope and vacant area within an existing apartment complex. At the east boundary, a large, natural slope descends to a graded area with a portion of a golf course and a bike path near the toe-of-slope. Salt Creek runs through the golf course that is adjacent to and below the site.

The proposed re-development of the subject site will include phased demolition of the existing Preschool, Chapel, and Administration/Fellowship Hall. Ground improvement in the form of mechanical slope stabilization will be undertaken at the northeast portion of the site, and various new buildings and retaining walls will be constructed. New buildings will be constructed to the south and

north of the existing Sanctuary, which will remain. The new buildings will consist of a Preschool/Administration Building with a Meditation Garden to the south of the Sanctuary, and two Christian Education Buildings and a Community Life Center to the north of the Sanctuary. The proposed buildings are one- and two-story structures, to be set into gently variable topography with the use of interior and exterior retaining walls. Parking areas and access pathways will be reconfigured with relatively minor cut and fill grading and a second-story parking deck is proposed for a portion of the parking area. Proposed structures, relative to each respective design, are depicted on the Geotechnical Maps, Sheets 1 and 5.

This evaluation includes information pertaining to both the Proposed Master Plan and the Proposed Master Plan Alternative. The Alternative Design generally represents a significantly lesser footprint of environmental impact in the majority of areas in comparison to the Proposed Master Plan. Per the Alternative Design, the Christian Education Buildings are reduced in size, the retaining wall at the east side of the property is removed, and the Preschool/Administration Building and parking structure become smaller and further set back from the property limits. Additionally, the Community Life Center becomes a smaller, one-story structure and moves slopeward in order to accommodate an increased distance from Crown Valley Parkway. We anticipate that the City's review of the project can be evaluated for both cases with regards to environmental impact, utilizing the information presented herein.

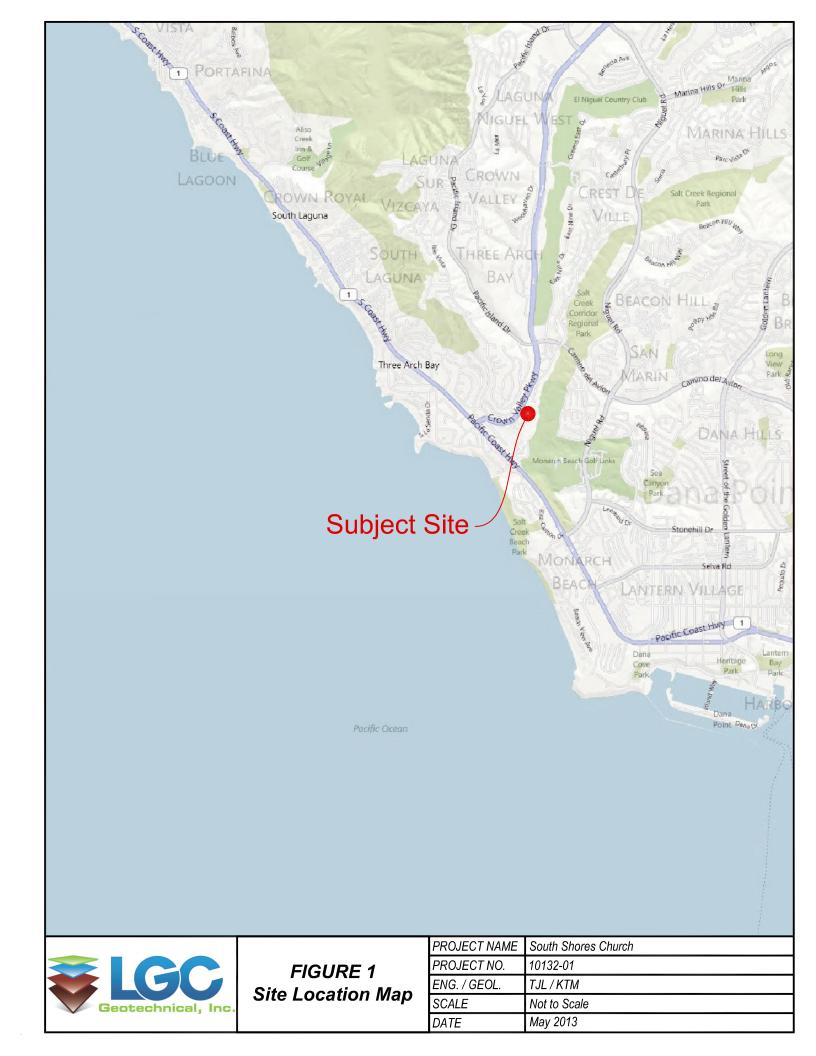
1.2 Background

The existing structures at the subject site have been constructed over the many years of existence of the South Shores Church. The existing Sanctuary building is the most modern structure onsite, and it will remain during construction of the proposed improvements. The previous consultant, G.A. Nicoll and Associates, Inc. (Nicoll), provided geotechnical engineering services for the design and construction of the existing crib wall at the southern boundary of the site and Sanctuary (1992 & 1993), and then continued as the geotechnical consultant during the majority of the subsurface investigation that forms the basis for the geologic model presented here.

A series of subsurface investigation and review response reports was provided by Nicoll (References), in support of a previous iteration of the South Shores Church plan. The plan has since been refined, and the geologic model has also been refined based on the subsurface evaluation conducted by LGC Geotechnical that is described below.

1.3 <u>Subsurface Evaluation</u>

The recent subsurface evaluation by LGC Geotechnical consisted of the excavation of two largediameter borings, LGC-1 and LGC-2, at the locations shown on the Geotechnical Maps, Sheets 1 and 6. The purpose of the borings was to obtain additional structural geologic data and to establish a baseline of comparison with previous subsurface excavations by others over the years (References). Previous subsurface investigations both onsite and off-site have been compiled and reviewed, data included herein. Boring and trench locations are depicted on the Geotechnical Maps (Sheets 1 and 6), and boring and trench logs have been included in Appendix B. Results of laboratory testing on samples from recent borings are noted on boring logs and included in Appendix C, Laboratory Test Results. The combination of the previous investigations and the recent borings by LGC Geotechnical provide a sufficient amount of data for design of mitigation measures for the geotechnical issues that affect the site. Additionally, laboratory testing has been performed by LGC Geotechnical and by others during previous investigations and earthwork activities at the site, and the data will be incorporated into a future grading plan review of the proposed development.



2.0 <u>GEOTECHNICAL CONDITIONS</u>

2.1 <u>Geologic Structure</u>

The subject site is generally located within the Peninsular Ranges Geomorphic Province, more specifically within the San Joaquin Hills that are located along the southern boundary of the broad Los Angeles Sedimentary Basin. The San Joaquin Hills is an area of coastal uplift estimated to be based on a blind thrust fault at depth. The property is near the top of a hill that is underlain by materials of the Tertiary-age San Onofre Formation, landslide derived from the San Onofre Formation, and artificial fill.

The majority of the subject site is underlain by the San Onofre Breccia, one of the most resilient bedrock formations in South Orange County. The marine sedimentary formation consists of cobble conglomerate zones, cemented zones, and a few zones of well-bedded, fine grained material. The few zones of fine grained material consisting of silt and clay form weaker layers within the otherwise resilient bedrock. Another formational material, the Tertiary Monterey Formation, was identified off-site, near the toe of the large descending slope that underlies the site. The Monterey Formation is primarily a siltstone, and it is known for its potential for landsliding. The two bedrock formations, landslides, and graded areas of artificial fill have altogether created a variable complex of materials at the off-site, toe-of-slope area.

A landslide is present at the northeast portion of the site that follows one of the weak layers of the San Onofre Breccia described above, at depth. A second weak layer at depth below the landslide at the northeast corner of the site was specifically noted by both the previous consultant and LGC Geotechnical as an important geologic control for slope stabilization. Formerly labeled "hypothetical shear" in Nicoll, 2008a, the feature is now labeled "Silty Clay Bed" in this report. The character of the material between the identified landslide and the Silty Clay Bed is variously described as tectonically fractured bedrock and queried landslide. The material below the Silty Clay Bed was observed by LGC Geotechnical to be bedrock.

In general, site data regarding bedding and jointing/fractures can be summarized as follows. Within the formational materials at the site, the fine grained bedding has been interpreted to posses the actual strike and dip of the bedding that underlies the site. Based on review of previous borings and downhole logging observations of a recently excavated large-diameter boring LGC-1, bedding within the coarse grained/cobble beds indicates a large variation of strikes, and a lesser variation of dips. Strike of the coarse grain deposits as measured ranged widely between N85E and N20W, and dips range between 12 degrees south/east and 38 south/east. Fine grain materials are considered to be more representative of actual, originally horizontal bedding. Strike of the fine grain beds generally range between N25W and N10E, while dips range between 12 degrees east and 25 degrees east. More variation is present within the landslide-affected outer slope areas and areas to the south where the east boundary hillside shallows and significantly decreases in height.

In general, within the critical location of areas north of the existing Sanctuary structure, the upper portion of the hillside has a slightly steeper dip range than the lower portion of the hillside indicating a slight synclinal component but with an overall trend close to the character of a dip-slope. The recently excavated boring LGC-2 at the southern portion of the site indicates the bedding there is anomalously southwest-dipping. Fracture orientation was relatively sporadic within the landslide portion of the observed geologic structure, and few fracture attitudes were recorded in previous logs, especially within the predominantly coarse-grained material. Minor shears indicative of tectonic faulting were recorded within various borings, however.

A fault was observed in boring LB-7(B) at a depth of 18 feet, oriented into-slope and within the bedrock core of the site, presented on the Geotechnical Maps (Sheets 1 and 6). The fault is interpreted as a normal fault due to the inclination of the feature and the general extensional regional geologic regime related to uplift (not compression) of the San Joaquin Hills. No geomorphic indicators of the fault were observed in review of aerial photographs. A similarly oriented shear is recorded within nearby boring BA-3. The presence of minor faulting has been considered with relation to the Silty Clay Bed and overall site geologic conditions.

Specific stratigraphic correlation between borings and interpretation of the large suite of available data was necessary for refining the geologic model for geotechnical mitigation of the site relative to the previous consultant's interpretations. The recent boring LGC-1 was advanced at a critical location where previous borings by others had terminated on refusal. Information obtained from the boring was used to compare stratigraphy between previous borings. The Silty Clay Bed observed at 68 feet in depth in LGC-1 was correlated to similarly-described features in older borings and projected to the surface along strike and dip. Previous interpretations did not present the surface location of the feature and did not project the bed to the north and south along bedding.

The surface expression of the Silty Clay Bed was constructed one point at a time, starting with Cross-Sections A-A' and B-B'. Boring BN-1 supports the location of the feature in addition to the information gathered in LGC-1. The total depth of those borings helps to constrain against the presence of additional weak beds at depth. Off-site Boring LB-1(B) behind and below the Silty Clay Bed also helps to constrain against the presence of additional weak beds at depth.

For establishing the location of the Silty Clay Bed in the area of Cross-Section C-C', presence of the fault in LB-7 and the feature at 28.5 feet in depth within Boring BB-106 were important. The fault is interpreted to offset the Silty Clay Bed down to the northwest (normal movement), putting the Silty Clay Bed at the location observed in BB-106. This was supported by a fence diagram constructed through borings BB-106 and BA-1(X) in the area of the existing Sanctuary. The Silty Clay Bed was observed in BB-106 but was not observed in BA-1(X) below the Sanctuary. The feature in Boring BB-104, at 9 feet in depth, established another location of the Silty Clay Bed further to the south in the area of Cross-Section D-D' that lines up with the feature as observed in BB-106.

At the southern portion of the site between the areas of Cross-Sections D-D' and E-E', the descending offsite slope is reduced to a gently-inclined ridgeline. Areas previously graded under the observation and testing of Nicoll (1993) were provided with a stabilization fill and subdrain. The southern boundary of the subject property was provided with a crib wall approximately 215 feet long, backfilled with engineered fill. Recent boring LGC-2 was excavated through the existing engineered fill to evaluate the fill and underlying geologic conditions, as depicted on Cross-Section G-G'. Orientation of bedding is south to southwest in this area, significantly different from the northeast portion of the site. The change in bedding direction may be related to the change in geomorphology of the hillside (reduction in slope height and inclination), as may occur with a resistant anticline within the bedrock. Such an anticline, if present, would not influence the slope stability evaluation of the eastern perimeter slope. The bedding orientation at LGC-2 is geotechnically favorable in that it is into-slope relative to the site's eastern boundary condition.

The Geotechnical Maps, Sheets 1 and 6, present the borings and geologic attitudes of the critical surfaces in each boring depicted with overlays of the Proposed Master Plan and Alternative Design, respectively. The approximate surface location of the Silty Clay Bed is also depicted. Cross Sections A-A' through G-G' depict the interpreted subsurface geologic structure relative to each plan also. Boring logs and trenches from the recent investigation and previous investigations are included in Appendix B for reference.

2.2 <u>Seismicity and Faulting</u>

Southern California is an area known for its active faults, and seismic hazards exist for areas of active faulting in the form of ground rupture and ground shaking due to earthquakes. The subject site is not located within an active fault zone, but may still be affected by ground shaking. Some of the active faults that may affect the subject site include the San Andreas Fault, the Newport-Inglewood Fault, and the Whittier Elsinore Fault. The closest significant fault to the site is the active off-shore portion of the Newport-Inglewood Fault Zone, located approximately 3 miles west of the site. The site is located within the San Joaquin Hills; these coastal hills are inferred by indirect evidence to be uplifted along a blind thrust fault at depth.

The subject site is not located within an Alquist-Priolo/Special Studies Earthquake Fault Zone and there are no known active or potentially active faults onsite (CDMG, 2001). Therefore ground rupture due to faulting is not anticipated to affect the site. Secondary hazards from ground shaking are discussed below in the section titled "Geotechnical Hazards".

2.3 Geologic Material Types

The following materials were encountered during the recent and previous subsurface investigations. The approximate extent of materials described below is depicted on the Geotechnical Maps and Cross Sections (Sheets 1 through 10).

2.3.1 <u>Artificial Fill Soils (Map Symbol - Af)</u>

Artificial fill soils are present across the site with the exception of the central area of the existing parking lot. The maximum depth of fill is estimated to be 25 feet at the southeast portion of the site, placed under the observation and testing of the previous consultant and reported in the referenced grading report (Nicoll, 1993). Boring LGC-2 was recently excavated by LGC Geotechnical for evaluation of the quality of the engineered fill material at the southern portion of the site adjacent to the existing crib wall. The boring log is presented in Appendix B, and laboratory test results are presented on the boring and in Appendix C. Where encountered, the fill was observed to be reddish-brown to dark brown clayey sand with gravel, moist and dense.

2.3.2 Quaternary Landslide (Map Symbol –Qls)

Recent boring LGC-1 was excavated through the upper portion of a landslide at the northeastern portion of the site. At depth, the basal rupture surface of the landslide is estimated to follow one of the weak beds of the San Onofre Breccia or Monterey Formation near the toe-of-slope. The landslide material, where encountered, was highly to moderately weathered cobble breccia and clayey sandstone, moist, and dense.

2.3.3 <u>Tertiary San Onofre Breccia (Map Symbol – Tso)</u>

The primary bedrock formation underlying the site is the San Onofre Breccia Formation. Variable brecciated cobbles and gravels of metamorphic origin are weakly to well cemented within a matrix of clayey sandstone, brown to gray, moist, and very dense. Few, thin beds of clay and silty clay materials were encountered during various phases of subsurface exploration, generally traceable between borings. Also, zones of nested cobbles and boulders were encountered, typically at the base of a coarsening-downward stratigraphic sequence. Correlation of the cobble and boulder zones between borings indicated these high-energy deposits have variable thickness.

The upper, weathered portion of the San Onofre Breccia Formation was observed to be relatively more oxidized, slightly less dense, and weakly cemented in comparison to the same material at depth. There is some question in the recent and previous boring logs and reports as to whether the queried San Onofre Breccia material (Map Symbol - Tso?) on the Geotechnical Map is landslide material or weathered bedrock affected by tectonic shearing. Below the Silty Clay Bed feature, the bedrock in LGC-1 was observed to be fresh, unoxidized, consistently gray, very dense, and weakly to well cemented. Approximate locations of the oxidized to unoxidized bedrock are presented for locations where the contact was encountered in borings at depth or projected, then contoured to match site topography.

2.3.4 <u>Tertiary Monterey Formation (Map Symbol – Tm)</u>

Monterey Formation material is located off-site near the base of the large descending natural slope east of the site. This material generally consists of thinly interbedded siltstone, clayey siltstone, and fine sand lenses, typically brown to dark gray, moist, and stiff to moderately hard in comparison to "soil", moderately soft in comparison to "rock".

2.4 <u>Expansion and Corrosion Potential</u>

The expansion potential of the near-surface soils underlying the subject site have been identified by others during construction of the existing improvements as low to moderate based on visual observation. Testing in accordance with ASTM D4829 Test Method indicated site soils possess an expansion index of 78, indicating "moderate" expansion potential (Nicoll, 2006).

Corrosion potential of near surface soils has been evaluated by Nicoll in the referenced report (2007a). Test results indicated that the level of sulfate exposure for concrete is classified as "not applicable", however, onsite soils are considered very highly corrosive to buried metals (ACI, 2008).

2.5 Geotechnical Hazards

Geotechnical hazards that may affect development of any site include earthquake-induced landslides, liquefaction potential, lateral spreading, subsidence, soil collapse, and potential for tsunami or seiche. Based on review of the Dana Point Seismic Hazards Report (CDMG, 2001), the subject site is located in an area with potential for earthquake-induced landslide, however, the potential hazard to development at the site can be mitigated with implementation of the geotechnical recommendations of this report and future applicable reports.

The site is not located within an area of potential liquefaction (CDMG, 2001), and it is not considered a potential risk for lateral spreading, subsidence, or soil collapse, based on the material types underlying the site, and anticipation that site earthwork will be performed in accordance with project specifications.

The site is not considered to have potential for tsunami or seiche hazard due to the elevation above sea level and lack of a major body of water in the proximity.

2.6 Infiltration Feasibility

Based on the geotechnical conditions encountered during subsurface evaluations by this firm and previous consultants, LGC Geotechnical recommends that no water be purposefully infiltrated to the subsurface on a permanent basis. However, it is our opinion that watering to "mimic ambient rainfall" may be performed for establishment of plantings within the un-improved portions of the site such as the Fuel Management Zone.

Additionally, based on review of the Preliminary Water Quality Management Plan and proposed "bioretention BMPs" planned to be installed adjacent to the proposed buildings, it is our opinion that the planted retention areas will not lead to infiltration of water to the subsurface. The areas are lined with impermeable materials and collected water is ultimately transported to site drainage conveyances (Adam-Streeter, 2012a and 2012b).

2.7 <u>Groundwater</u>

Minor groundwater seepage was encountered sporadically during the subject evaluation and previous evaluations at various depths within deep borings. A static water table was encountered in LGC-1 at approximately 90 feet in depth.

3.0 ENGINEERING ANALYSES

3.1 Soil Shear Strength Parameters

Soil shear strength parameters for the materials that comprise the site, utilized in our slope stability analysis, are provided in Table 1. These values are based upon our experience in the area and review of parameters used by Nicoll, supported by back-calculation of the existing conditions and published shear strength data (References). The back calculations are included in the attached Appendix D, Slope Stability Analyses. The site soil shear strength values were applied to the existing slope in the original condition, without engineered fill at the toe-of-slope, along both the defined landslide rupture surface and the Silty Clay Bed, respectively.

Shear strength values for the controlling feature, the Silty Clay Bed, are the same as the landslide rupture surface shear strength value previously used by Nicoll, reviewed by LGC Geotechnical and accepted for the project. The material noted as Tso(?), on the Geotechnical Maps and Cross Sections has been modeled using shear strength values obtained during direct shear testing of multiple saturated samples taken from the same material interval (Nicoll, 2008), also reviewed and geotechnically accepted for the project.

One additional shear strength value has been added for the unoxidized zone of the San Onofre bedrock as encountered during drilling at depth within the hillside. The zone of unoxidized bedrock was observed in limited areas within borings excavated at the site and it has been delineated on the Geotechnical Cross-Sections provided herein, for areas where it has been observed. The material is too hard to sample and has therefore not been specifically tested; it represents the cemented and partially cemented material that can be difficult to excavate, sometimes resulting in drilling refusal with conventional bucket auger drill rigs.

The laboratory testing performed by G.A. Nicoll and Associates, Inc. and others (References), has been gathered and provided in the attached Appendix C, Laboratory Test Results.

TABLE 1

Soil Shear Strength Parameters

Soil Type	φ (Degrees)	Cohesion (psf)
Landslide Material, Landslide Rupture Plane, and Silty Clay Bed	19	270
Compacted Fill (Af)	29	200
Weathered San Onofre Breccia (Tso),and Queried San Onofre Breccia	30	500
Unoxidized San Onofre Breccia (Tso), across bedding	39	1,500

3.2 <u>Slope Stability Analyses</u>

Slope stability analyses were based on modeling the two-dimensional geotechnical Cross-Sections A-A' through F-F' for both the Proposed Master Plan and the Alternative. Slope stability analyses for the critical area of the slope at the northeast portion of the site were performed utilizing a conceptual design of caissons (a.k.a. "piers") and tiebacks in order to stabilize the ground supporting the proposed building locations. Caisson depths and tieback array details including unbonded length, strength, and spacing of tiebacks were modeled to increase the static factor of safety to a minimum of 1.5 and pseudo-static factor of safety to a minimum of 1.1. These analyses were performed using the computer program GSTABL7 with STEDwin version 2.002. Block failure modes were analyzed using Janbu's Simplified Method. Pseudo-static analysis was performed utilizing a vertical acceleration coefficient of 0.4g and a horizontal coefficient of 0.15g. The engineering analyses have been provided in Appendix D. The Preliminary Remedial Measures Maps (Sheets 2 and 7) and selected cross-sections depict the proposed tieback and caisson mitigation plan.

The areas depicted by Cross-Sections D-D' and E-E' at the southeast portion of the site have been analyzed for slope stability using the Modified Bishop Method. Factors of safety for the proposed development of the southeast portion of the site were calculated to exceed code minimums. Engineering analyses for Cross-Sections D-D' and E-E' are included in Appendix D.

The proposed new structures to the north of the existing Sanctuary will be protected in their entirety with the caisson and tieback array. The existing Sanctuary structure is founded on bedrock of the San Onofre Formation as reported by Nicoll and additionally determined by LGC Geotechnical based on review of site geologic structure. The Sanctuary building is supported by engineered fill placed on bedrock reviewed and accepted by Nicoll, within a zone where underlying geologic conditions for construction of the Sanctuary are supported by their excavation and analysis of data from Boring BA-1(X) at the outer edge of the structure. In the unlikely event of failure through the engineered fill materials that overlie the projected location of the Silty Clay Bed east of the Sanctuary, a bedrock slope would be left in-place for support of the Sanctuary structure.

For the proposed Master Plan, an additional row of caissons has been recommended south of the tieback system in order to extend the increase in stability gained with the tieback system southward, toward the existing Sanctuary. The caissons are depicted in plan view on the Preliminary Remedial Measures Map (Sheet 2) to the limits of existing engineered fill placed for support of the slope below the Sanctuary. Although presence of caissons in this area would limit potential size of a hypothetical failure east of the Sanctuary, such a failure would require slope repairs to be implemented in accordance with standard geotechnical recommendations.

3.3 <u>Risk Assessment of Unimproved Areas</u>

Slope stability analysis for the slope area to the east of the proposed structures at the northern portion of the site has been performed for estimation of post-construction stability of unimproved areas. The method of averaging the results of slope stability analyses across multiple, equally spaced, parallel cross-sections is an engineering technique for estimating potential for failure in three dimensions. Analysis has been performed for Cross-Sections A-A', B-B', C-C', and two intermediate cross-sections equally spaced between the original three parallel cross-sections. The landslide basal rupture surface has been modeled along with site improvements (tiebacks and caissons) within the five analyses. The

average factor of safety against reactivation of the landslide is approximately 1.2. Results of the analyses are presented in Appendix D within the section titled "Risk Assessment of Unimproved Areas". The line noted as "Approximate Limit of Factor of Safety of 1.5" on the Preliminary Remedial Measures Maps (Sheets 2 and 7) represents the approximate line of demarcation between portions of the site which will possess slope stability factors of safety of at least 1.5 for static and 1.1 for seismic, and portions of the site that do not.

After construction of site improvements in general accordance with the recommendations presented herein, unimproved slope areas will remain at risk for failure. The size of potential failure is significantly reduced, however, and there is some reduction in the risk for global failure as the solution provides for mechanical support of the upper portion of the slope instead of bearing on the lower portion of slope. Practices such as establishing plants, avoiding concentration of water to the subsurface, discouraging rodent activities, and repairing erosion rills that may occur will help to limit potential for failure of unimproved areas. Slope maintenance recommendations will be provided in a future grading plan review report. In the event of failure, slope repairs should be implemented in accordance with geotechnical recommendations on a case-by-case basis.

A typical mudflow or mudslide is a failure of the upper 4 feet of saturated hillside material. The potential for mudslide or mudflow after construction of site improvements is lessened with the implementation of a slope maintenance program within the limits of the property. Potential for mudflow or mudslide for hillside areas outside of the property limits would also be incrementally lessened by the recommended slope maintenance program due to the decreased potential for the upper portion of the slope to fail as a mudflow or mudslide.

It should be noted that the neighboring site to the north was subject to a post-construction landslide during 1991. The Bluffs Development was constructed near the toe of slope area within the Monterey Formation. The Monterey Formation is known for its higher potential for landslide occurrence in comparison to the San Onofre Breccia due to the nature of the material; it is considered weaker than the San Onofre Breccia from a geotechnical perspective. The South Shores Church is sited fully within the San Onofre Breccia, and the proposed tieback and caisson system will tie the development to the stronger material.

3.4 <u>Seismic Design Criteria</u>

The site seismic characteristics were evaluated per the guidelines set forth in Chapter 16, Section 1613 of the 2010 C.B.C. Site coordinates of latitude 33.4880 degrees north and longitude -117.7213 degrees west, which are representative of the site, were utilized in our analyses. The initial results of our analyses for the maximum considered earthquake spectral response accelerations (S_s and S_1) are presented in Table 2A.

TABLE 2A

Seismic Design Values

Selected Parameters from the 2010 C.B.C. Section 1613 - Earthquake Loads	Seismic Design Values
Site Class per Table 1613.5.2	С
Spectral Acceleration for Short Periods $(S_S)^*$	1.629 g
Spectral Accelerations for 1-Second Periods $(S_1)^*$	0.593 g
Site Coefficient F _a per Table 1613.5.3(1)	1.0
Site Coefficient F _v per Table 1613.5.3(2)	1.3

* Calculated from the USGS computer program "Seismic Hazard Curves, Response Parameters and Design Parameters" v5.1.0 (02/10/11)

The spectral response accelerations (S_{MS} and S_{M1}) and design spectral response acceleration parameters (S_{DS} and S_{D1}), adjusted for Site Class C, were evaluated for the site in general accordance with section 1613 of the 2010 C.B.C. These site class adjusted parameters are presented in Table 2B.

TABLE 2B

Selected Parameters from the 2010 C.B.C. Section 1613 - Earthquake Loads	Seismic Design Values Modified for Site Class C
Site Modified Spectral Acceleration for Short	
Periods (S_{MS}) for Site Class C	1.629 g
[Note: $S_{MS} = F_a S_S$]	
Site Modified Spectral Acceleration for 1-Second	
Periods (S _{M1}) for Site Class C	0.771 g
[Note: $S_{M1} = F_v S_1$]	
Design Spectral Acceleration for Short Periods	
(S _{DS}) for Site Class C	1.086 g
[Note: $S_{DS} = (^2/_3)S_{MS}$]	
Design Spectral Acceleration for 1-Second Periods	
(S _{D1}) for Site Class C	0.514 g
[Note: $S_{D1} = (^{2}/_{3})S_{M1}$]	

Seismic Design Values Modified for Site Class C

In accordance with Tables 1613.5.6 (1 & 2), the Seismic Design Category for the subject site is Category D, where $S_{DS} \ge 0.50g$ and $S_{D1} \ge 0.20g$.

Section 1803.5.12 of the 2010 C.B.C. states that the PGA for a site may be defined as $S_{DS}/2.5$. The S_{DS} for the subject site has been calculated as 1.086g. Therefore, PGA = 1.086g/2.5 = 0.43g

4.0 <u>CONCLUSIONS</u>

The following conclusions have been determined to be applicable to the proposed re-development of the subject site.

- The site is feasible for construction and is suitable for the proposed re-development in accordance with both the Proposed Master Plan and Alternative Design from a geotechnical viewpoint, provided the recommendations of this report and a future grading plan review report are implemented.
- The northeast portion of the site will require slope stabilization in order to achieve stable land to the current building code for construction of the Community Life Center Building and the Christian Education Buildings.
- The site is potentially affected by earthquake-induced landslides that can be mitigated by slope stabilization in accordance with the geotechnical recommendations of this report and future reports.
- Seismic design parameters indicate the site is subject to a peak ground acceleration of approximately 0.43g.
- No liquefaction hazard is present, based on our subsurface evaluation and the Seismic Hazard Map applicable to the City of Dana Point.
- Expansive soil potential at the site is anticipated to range from "low" to "moderate", based on visual observation and testing of on-site, near surface soils in accordance with ASTM D4829 Test Method.
- Groundwater was encountered during the subsurface investigations as random seepages and as a static water table as observed at approximately 90 feet below ground in boring LGC-1.
- It is our opinion that no substantial soil erosion or loss of topsoil (including mudflows and mudslides) in ungraded areas will occur as a result of the proposed development, as long as the recommendations presented here and in future reports are implemented.

5.0 PRELIMINARY RECOMMENDATIONS

The following recommendations are to be considered preliminary, and should be finalized and expanded in a grading plan review report. In addition, all recommendations from LGC Geotechnical should be considered minimal from a geotechnical viewpoint, as there may be more restrictive requirements from the architect, structural engineer, building codes, governing agencies, or the City of Dana Point.

Please note that the proposed tieback and caisson solution presented below for mitigation of onsite stabilization issues also significantly lessens the potential for off-site failure of northeastern slope areas in the future. The solution provides for mechanical support of the upper portion of the slope instead of bearing on the lower portion of the slope.

5.1 <u>Mechanical Slope Stabilization</u>

In order to increase the gross stability of the northeast portion of the site to the minimum factor of safety required for new construction, a slope stabilization system consisting of tiebacks and caissons is proposed as presented on the Preliminary Remedial Measures Maps (Sheets 2 and 7). The geologic feature that controls the engineering analysis is labeled Silty Clay Bed on the Geotechnical Maps (Sheets 1 and 6). The feature is angled at depth as shown on the cross-sections. Based on slope stability analysis of the most critical Cross-Section A-A' for the Proposed Master Plan, the proposed tieback and caisson array for stabilization of the area furthest from the design geologic feature is achievable and stabilizes the slope to the required minimum factor of safety of 1.5 for static conditions, and to the minimum factor of safety of 1.1 for pseudo-static conditions. Slope stability analysis is presented in Appendix D.

The tieback array as modeled is recommended to be 5-foot on center for both rows and columns. Recommended preliminary positions of reaction walls, tieback columns, and caissons are presented on the Preliminary Remedial Measures Maps. Tieback columns are shown in cross-sectional view at 5-foot on center vertical spacing showing 4 tiebacks, 3 tiebacks, and 2 tiebacks per column depending on distance to the design feature. Based on the geometry of the design geologic feature (Silty Clay Bed), stabilization of areas closer to the feature requires fewer tiebacks (or lower-capacity tiebacks) and shallower caissons. Stabilization of areas further from the feature requires more, higher-capacity tiebacks and deeper caissons.

The restraining loads needed to stabilize the slope at the location of the highest anticipated loads, Cross-Section A-A' for the Proposed Master Plan, are approximately 360 kips per anchor for the analyzed tieback array, as shown on the slope stability analysis for the cross-section. This load is achievable in accordance with the current standards of tieback installation, using approximately 11 strands per anchor. It is our understanding that loads of up to 420 kips are constructible with standard equipment, using 14-strand anchors. Therefore, there is some room for a greater load in the unlikely event that distance to the design feature was to increase.

There is a great deal of flexibility in the potential design in that an additional row of tieback anchors could be designed to reduce the restraining loads of each anchor, or a row could be removed and the loads increased for areas of lesser distance from the design feature. The maximum load of 360 kips per anchor is an achievable load that will allow excavation of the anticipated access pad geometry for the

number of rows proposed at each area for both the Proposed Master Plan and the Alternative Design as represented by Cross-Sections A-A', B-B', and C-C'.

Please note that with the Alternative Design, the critical cross-section becomes Cross-Section B-B'; all other tieback wall locations would be pulled back toward the Silty Clay Bed and have lesser loads or fewer tiebacks than the Proposed Master Plan. Restraining loads are approximately 250 kips per anchor at Cross-Section B-B' in this preliminary design.

Caissons recommended to be constructed in conjunction with the tieback array are modeled to be 3 feet in diameter, and should extend to depths that exceed approximately 40 feet of horizontal setback from the Silty Clay Bed at depth. This relationship is presented on applicable cross-sections for clarity. Grade beams connecting the caissons will be utilized.

For the Proposed Master Plan, additional grade beams will be recommended to tie all caissons supporting the proposed retaining wall east of the Christian Education Buildings to the caissons adjacent to the tieback array, in order to ensure stability. Three locations where the retaining wall is outside of the tieback wall create respective structural triangles in plan view. The caissons supporting the eastern retaining wall will be sufficiently deepened and reinforced to take deflection due to the small wedge of earth between the tieback reaction wall and the retaining wall. Within the structural triangles, interior grade beams and additional caissons may be added by the structural engineer during design. The retaining wall should be constructed on a grade beam supported by the caissons, and designed with geogrid or similar locally stabilizing elements. The caisson array will be tied to the tieback reaction wall within an additionally reinforced grade beam at the base of the tieback wall. A caisson row is recommended to extend past the tiebacks to the south in order to extend the increase in stability gained with the tieback wall toward the existing Sanctuary.

Caissons that are recommended for the horizontal slope setback should be specifically designed in accordance with slope setback/deepened footing requirements as discussed in Section 5.7.

Precise location of the stabilization system relative to structures will be finalized and specific details of the proposed tieback and caisson array and grade beam connections will be designed at the grading plan review phase.

5.2 <u>Tieback Access Excavation</u>

In order to construct the recommended tieback and caisson stabilization system, an excavation will be necessary to achieve access. It is anticipated that the tieback and caisson access excavation will be performed in stages, where the first section is cut down to the level required to install the system, and the next section is cut to the required level while backfilling the first section. Please note that a completed, installed stabilization system does not depend on the presence of backfill for achieving stability, therefore timing of backfill of the access excavation is not critical to the interim stability of the site.

Approximate limits of the proposed tieback access excavation are depicted on the Preliminary Remedial Measures Maps, Sheets 2 and 7.

5.3 <u>Community Life Center and Christian Education Building Retaining Walls</u>

Retaining walls are proposed at the northeast area of the subject site for both the Proposed Master Plan and the Alternative Design. The most structurally significant wall for the Proposed Master Plan is the approximately 270-foot long wall proposed for local support of both the Community Life Center and the walkway and drive aisles adjacent to the Christian Education Buildings. The Alternative Design depicts a similar length of variable retaining walls that are smaller in general and obscured by the Christian Education Buildings in most locations.

For each of the respective designs presented herein, the retaining structure adjacent to the Community Life Center would begin along the north-facing side of the building pad, turn a corner, and extend the length of either the Community Life Building (Master Plan) or the west side of a Christian Education Building (Alternative Plan). Going south, a wall for support of walkways and drive aisles is proposed adjacent to the west side of the Christian Education Building(s). Specifics of these proposed retaining structures have not been provided at this time, however, they are considered feasible for construction from a geotechnical viewpoint. Cross-Sections A-A', B-B', and F-F' generally depict the walls relative to the respective designs. Deepened foundations for the northern boundary of the wall adjacent to the Community Life Center are recommended as presented on the Preliminary Remedial Measures Maps, Sheets 2 and 7, and in profile on the noted cross-sections. See Section 5.7 for further discussion on deepened footings.

For the Proposed Master Plan only, a retaining wall is proposed at the eastern side of the Christian Education buildings that provides for a small area of fill between approximately 6 feet and 12 feet high, supported on caissons. Structural support for the wall is discussed in Section 5.1 titled "Mechanical Slope Stabilization". The retaining wall is depicted on the Preliminary Remedial Measures Map (Sheet 2), and within profiles on Cross-Sections A-A' and C-C'. The additional fill has been modeled on slope stability analyses for the noted cross-sections, as presented in Appendix D.

Once final design plans for the proposed retaining walls are completed, LGC Geotechnical will provide specific geotechnical recommendations for structural design and construction. Provisional geotechnical analysis indicates the proposed retaining walls can be constructed without off-site geotechnical impact.

5.4 <u>Pre-School/Administration Building and Meditation Garden</u>

The Pre-School/Administration Building at the southeastern portion of the site is planned to be contiguous with the adjacent Meditation Garden. For the Alternative Design, the Pre-School/Administration structure is significantly smaller than the Proposed Master Plan and pulled back from the eastern property line. A series of retaining walls have been proposed along the east and south facing outside slope face, to create the curving walls for the Meditation Garden at variable levels, to be combined with water features and landscaping. Cross-Sections D-D' and E-E' for both the Proposed Master Plan and the Alternative Design depict the area in profile, and global slope stability analysis of the cross-sections for each respective design are presented in Appendix D.

Once final design plans for the proposed retaining walls are completed, LGC Geotechnical will provide specific geotechnical recommendations for structural design and construction. Provisional geotechnical analysis indicates the proposed retaining walls can be constructed without off-site geotechnical impact.

5.5 <u>Existing Crib Wall</u>

The existing crib wall structure and engineered backfill at the southern boundary of the project was geotechnically reviewed with regards to the additional load of the parking structure to be placed near the top of the crib wall. An exploratory boring was excavated through the approximately thickest portion of engineered fill for confirmation of the competency of the fill placed under observation and testing by Nicoll (1992). Boring LGC-2, depicted on the Geotechnical Maps (Sheets 1 and 6), was sampled, downhole logged, and laboratory testing was performed on representative samples. Boring information and laboratory testing results are presented in Appendix B and C, respectively. Minor tension cracks are visible within the existing parking lot parallel to the top of the ascending slope above the existing crib wall; however, no vertical offset was observed within the relatively old cracks. The approximately 20-year-old certified fill was observed, tested, and determined to be competent for future continued use in support of parking areas. Specific recommendations for construction of new improvements adjacent to the existing crib wall are required in order to ensure no additional structural loads are placed on the wall. Refer to Section 5.7, Deepened Foundations for Top-of-Slope Structures, for additional details.

5.6 <u>Parking Structure</u>

A two-story parking structure is proposed within both the Proposed Master Plan and Alternative Design. Within the Alternative Design, however, the majority of the southern boundary of the structure is pulled back from the crib wall by an additional 10 feet in comparison to the Proposed Master Plan. The structure will be constructed with several conventional retaining walls at the northern and western perimeters, and it will overlie a portion of the backfill for the existing crib wall at the southern perimeter. Although actual design loads for the parking structure are not available at this time, we anticipate that all structural loads over existing fill material will be transmitted to bedrock below by caissons or deepened footings in the area of the existing crib wall. Areas of the structure underlain directly by the San Onofre Breccia can be provisionally designed as spread footings.

For evaluation of the parking structure relative to the crib wall, an Existing Crib Wall Exhibit was provided by Adams-Streeter, presented at the rear of text. The exhibit depicts the subsurface configuration of the existing crib wall at approximately the maximum height of the wall, and the relative distance between existing and proposed foundation elements for the parking structure. Cross-Section G-G' by LGC Geotechnical (Sheets 5 and 10) depicts our geotechnical recommendations for construction of the proposed parking structure. The approximate locations of the recommended deepened foundation elements, or caissons, are presented in plan view on the Preliminary Remedial Measures Maps (Sheets 2 and 7). See Section 5.7 for further discussion on deepened footings.

Once final design plans for the parking structure are completed and structural loads are finalized, LGC Geotechnical will provide specific geotechnical recommendations for construction. Provisional geotechnical analysis indicates the structure can be constructed without off-site geotechnical impact.

5.7 Deepened Foundations for Top-of-Slope Structures

The City of Dana Point and the current California Building Code are applicable in determining the appropriate depth of deepened foundations for reducing the required top-of-slope setback for proposed structures. Foundation criteria should be reviewed by LGC Geotechnical based on the final grading plan. Specific foundation systems for each area are not fully designed at this time, however, the following guidelines are recommended.

In general, the intent of the geotechnical slope setback requirements is to ensure the stability of proposed structures. As such, since the majority of the Community Life Center and the Christian Education Buildings are to be founded above an extensive system of slope stabilizing caissons and tiebacks, no additional setbacks are recommended. This condition applies to Geologic Cross-Sections A-A', B-B', and C-C' for both the Proposed Master Plan and the Alternative Design. The Christian Education Buildings are recommended to be founded on conventional footings for both designs. For the Proposed Master Plan, the northwest corner of Christian Education Building No. 2 will require a small zone of deepened footings to ensure the entire foundation is within competent native soils.

The variable height wall at the northern perimeter of the Community Life Center is recommended to be supported by deepened footings in accordance with horizontal setbacks per code. As shown in the slope stability analysis for Cross-Section F-F' that is included within this report (Appendix D), the location does not require global stabilization due to the shallower inclination of the slope, the presence of fill at the toe-of-slope, and slightly more favorable structural geology (apparent dip). However, we recommend that the wall structure at the top of the slope be founded on a deep foundation system to negate the effects of slope creep. The approximate locations of caissons for deepened foundations are presented on the Preliminary Remedial Measures Maps (Sheets 2 and 7). Specific recommendations for these caissons, including anticipated deflection, will be provided in the design phase of the project. The Community Life Center structure is located behind the wall and is recommended to be founded on conventional footings. The entire foundation will be constructed on engineered fill that is a minimum of 5 feet thick.

The Pre-School/Administration Building at the southeastern portion of the site is proposed to be founded on conventional footings. The foundation will be constructed on the engineered fill that is a minimum of 5 feet thick. The retaining walls for the adjacent Meditation Garden will require deepened footings. For geologic Cross-Sections D-D' and E-E', where slopes are relatively gradual below the proposed improvements, we will provide specific foundation setbacks from slope faces at the design phase of the project. As a general rule, we recommend that the base of retaining wall footings be a minimum of 10 feet from slope faces and other habitable structure footings be a minimum of 20 feet from slope faces. These recommendations will be finalized at the grading plan review/design stage of the project.

The southern boundary of the proposed parking structure will require caissons and deepened foundation elements in consideration of its proximity with the existing crib wall near the southern property line, as discussed in the section titled Parking Structure (Section 5.6), and in accordance with the Existing Crib Wall Exhibit (Rear of Text) and Cross-Sections G-G' (Sheets 5 and 10). We anticipate all these caissons will extend through fill to bedrock. Approximate locations of proposed caissons are depicted on the Preliminary Remedial Measures Maps (Sheets 2 and 7).

5.8 <u>Site Earthwork</u>

The proposed remedial grading for the project will include site preparation, design cuts and fills in accordance with the civil engineering plan, overexcavation of structures supported on conventional (non-deepened) footings on cut to fill transitions where the exposed cut is formational material, excavation of an access pad for installation of tiebacks at the eastern boundary of the tieback reaction wall area, and retaining wall and utility line excavation and backfill. Design cuts and fills planned for achieving the terracing effect of the Meditation Garden are intended to work with the natural topography of the area. Both the Proposed Master Plan and Alternative Design incorporate these grading features.

Some export of excess soils is anticipated in order to balance site earthwork. The "South Shores Church Corrective Grading Exhibit, Rough Grade Earthwork Quantities, Sheets C-2.0 through C-2.5" by Adams-Streeter Civil Engineers, Inc. (2013), specifically details the design cuts and fills for the proposed plan. Material that is removed during remedial grading may be placed as fill. Placement and compaction of fill should be performed in accordance with the grading plan review report, local grading ordinances, and under the observation and testing of LGC Geotechnical. General Earthwork and Grading Specifications for Rough Grading have been included as Appendix E for reference. All areas to accept fill placement shall be geotechnically accepted prior to placement of fill.

Design cuts of up to 5 feet and design fills of up to 10 feet are anticipated to be required at the southeast portion of the site, below the proposed Pre-School/Administration structure. The structure is sited within previously placed artificial fill soils and will therefore require minimal remedial grading including surficial reprocessing estimated to be approximately 2 to 3 feet below existing grades in order to moisture condition and re-compact any weathered existing engineered fill. The existing engineered fill placed under observation and testing by Nicoll (1992) was evaluated by LGC Geotechnical within the recently excavated boring LGC-2, and it was found to be generally acceptable for support of future fill and structures constructed in accordance with project specifications. Additionally, a relatively small area of shallow fill at the northern corner of the building will require 5 feet of overexcavation, as depicted in plan view of the Preliminary Remedial Measures Maps, Sheets 2 and 7.

The parking structure is generally proposed to be a variable design cut of up to 10 feet. The parking areas are not recommended to be overexcavated, and the materials that will be exposed at grade are anticipated to be acceptable for construction. Conventional retaining walls, proposed at the parking structure boundaries, will range between approximately 3 and 10 feet in height, and will require standard backcut excavations for construction access. The southern boundary of the parking structure will require additional foundation recommendations as outlined above in Section 5.6, Parking Structure.

The proposed Community Life Center per the Proposed Master Plan is sited over a cut to fill transition of design cut up to 5 feet, and design fill of up to 15 feet for the variable-height retaining wall supporting the overall structure at the northern and eastern boundary. The Alternative Design improves conditions by siting the Community Life Center at a lower elevation, thereby minimizing the amount of fill and height of retaining walls adjacent to that structure. Cross-Sections B-B' (Sheets 3 and 8) depict the proposed geometry of the most critical location in this area for each respective design. To reduce differential settlement, the cut portion of the building footprint is recommended to be overexcavated 5 feet below pad grade. The material will be removed and replaced as engineered fill to achieve pad grade.

The Christian Education Buildings are generally within design cut, up to 18 feet at the west boundary. For the Proposed Master Plan, a very small zone of sliver fill at the northeast corner of the north building of up to 5 feet will be required. Based on the materials observed within the upper portion of Boring LGC-1, it is our opinion that remedial measures were performed prior to placement of engineered fill, and the landslide materials are competent at approximate foundation grade (to be verified during grading). This area will be provided with recommendations for deepened footings as necessary, placing footing foundations into native materials throughout.

The remaining area of important grading activity is the access pad for construction of the proposed tieback reaction wall at the eastern boundary of the Community Life Center and Christian Education Buildings. The approximate elevations and limits of the access pad for each design are depicted on the Preliminary Remedial Measures Maps and detailed in the corrective grading plan by Adams-Streeter. Section 5.2 titled "Tieback Access Excavation" provides additional details regarding the anticipated earthwork for this area. We recommend the access pad be removed in stages and backfilled concurrently, in order to minimize overall disturbance and/or stockpiling activities at the site.

5.9 Geotechnical Role during Construction

During construction of the project, the geotechnical consultant must observe and geologically map native materials within all overexcavation bottoms, design cuts, temporary slopes, and tieback access pad exposures. Areas of pre-existing engineered fill shall be verified to be competent in accordance with project specifications prior to additional fill placement. Landslide materials to be left in place below the Christian Education Buildings shall be verified to be competent for support of structures. Caissons shall be downhole-logged as required in order to verify geologic conditions at regular intervals. More detailed specifications for the geotechnical consultant's role during construction will be provided at the grading plan review phase of work. This will include observation and testing requirements for fill placement, tieback and caisson installation, subsurface drainage, and wall construction.

5.10 <u>Temporary Stability</u>

The most significant temporary slopes that will be exposed during grading of the subject site are the tieback reaction walls depicted on Cross-Sections A-A', B-B', and C-C' for both the Master Proposed Plan and Alternative Design. The method of construction of the tieback walls is anticipated to be from top to bottom with installation of upper tieback anchors prior to excavation of lower portions of each section of wall. This type of installation will be recommended unless the contractor prefers and defends an alternative that is similarly protective. The individual tieback anchors will provide both temporary and permanent shoring.

The temporary 1:1 (H:V) slopes proposed for interim earthwork construction within the interior of the site are a maximum of 15 feet in height and anticipated to be constructed within bedrock and engineered fill. Temporary slopes are noted on the cross sections herein. These temporary slopes are anticipated to be sufficiently stable for the interim condition. The project geologist should review these slopes during construction and provide additional recommendations in the event that unanticipated geotechnical conditions are observed.

The retaining walls proposed at other locations throughout the subject site are either design fill construction or conventional retaining walls less than 10 feet in height without surcharged backcuts. It is the responsibility of the contractor to construct temporary backcuts for the conventional walls in accordance with OSHA regulations and standard of care for the industry.

Temporary stability of interim slopes and the caisson and tieback stabilization system is not anticipated to be affected by the presence of groundwater at depth within the subject hillside. The groundwater as observed during our recent geotechnical investigation was well below the work area for the tiebacks, at approximately 90 feet below proposed foundation level for new structures. Some minor amounts of groundwater may be present at the bottoms of the deepest proposed caissons; however, the structural design of the caissons will take groundwater into account. The construction method for the deep caissons should include direction of minor amounts of displaced water to approved collection areas as necessary. No mudflow or mudslide due to construction activities is anticipated.

5.11 <u>Subsurface Drainage</u>

Tieback reaction wall backdrains and retaining wall drains should be planned and constructed in accordance with current standards of practice and reviewed by LGC Geotechnical prior to construction. We anticipate the elevation of the lowest tieback reaction wall drainage outlet will allow drainage utilizing the conventional drain system currently proposed for the subject property.

LGC Geotechnical specifically recommends that no purposeful storm water or other infiltration to the subsurface be planned at the site. Review of the Preliminary Water Quality Management Plan and related exhibit (Adam-Streeter, 2012a and 2012b) indicates general conformance with this recommendation. Landscape watering should primarily drain to site surface drainage conveyances. However, as noted in Section 2.6, Infiltration Feasibility, a minimal watering to establish healthy plant growth may be implemented for the Fuel Management areas that generally "mimics ambient rainfall."

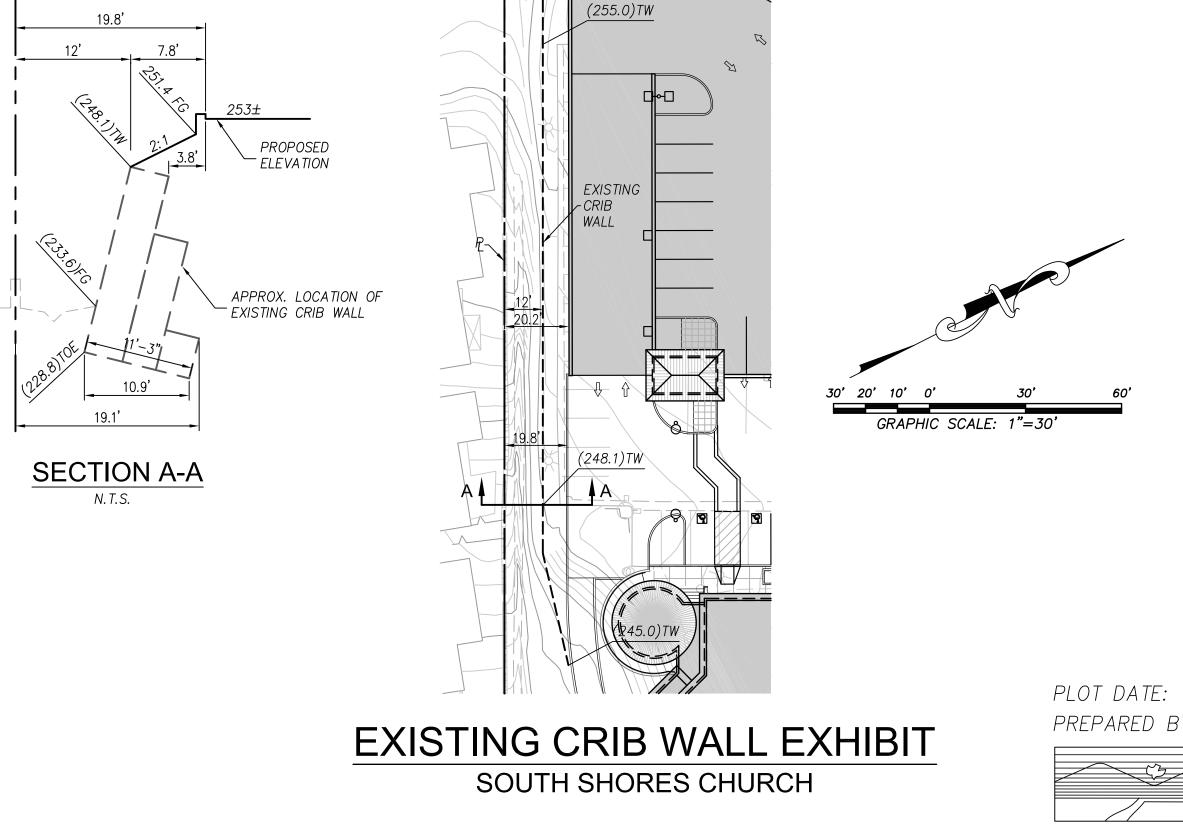
5.12 Grading Plan Review

We have reviewed the referenced preliminary plans (Matlock, 2013 & Adams-Streeter, 2013) and find them to be in general accordance with our geotechnical recommendations. Once the plans are approved, LGC Geotechnical should perform a grading plan review in order to provide full ground stabilization, foundation, and earthwork construction recommendations. Future versions of the development plan and all subsequent plans should be provided to this office for geotechnical review for conformance with the geotechnical recommendations provided in this and subsequent reports.

6.0 <u>LIMITATIONS</u>

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

It should be understood that LGC Geotechnical has relied on the accuracy of documents, verbal information, and other material and information provided by you and other associated parties in preparation of this report. LGC Geotechnical makes no warranties or guarantees as to the accuracy or completeness of information obtained from or compiled by others.



PL

PLOT DATE: JUNE 6, 2012 PREPARED BY:

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Appendix A References

APPENDIX A

References

- Adams-Streeter, 2012a, Preliminary Water Quality Management Plan for South Shores Church, dated November 21, 2012.
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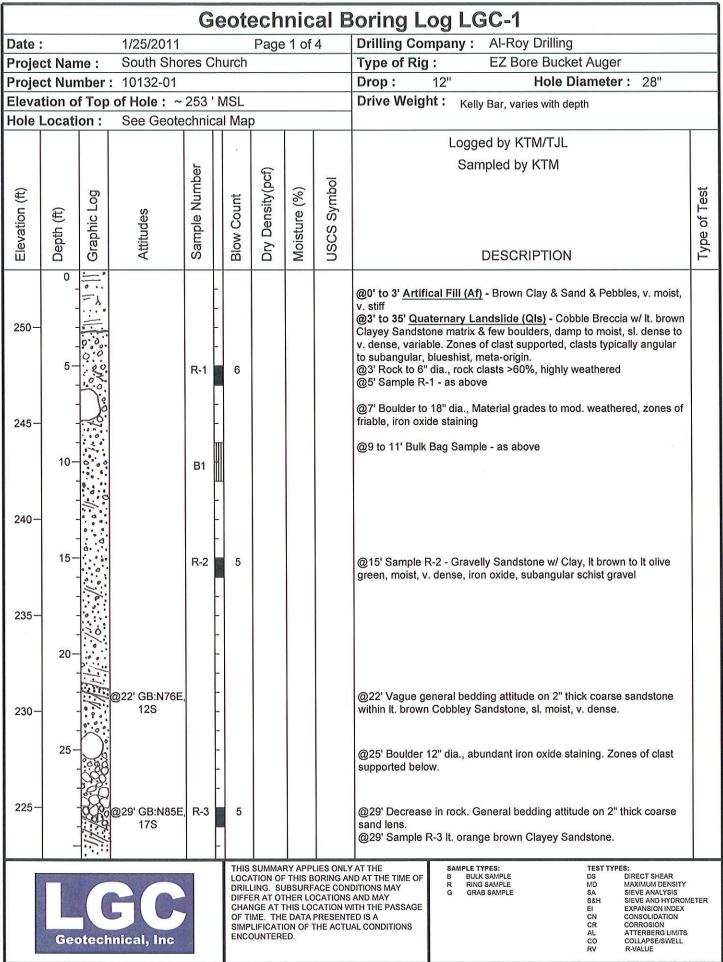
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Appendix B Boring Logs and Trench Logs



Last Edited: 2/17/2011

				G	eot	ech	nic	al B	Boring Log LGC-1	
Date :	i.		1/25/2011			Page	e 2 of	4	Drilling Company: Al-Roy Drilling	
Proje	ct Nan	ne :	South Shore	res Cl	nurch				Type of Rig : EZ Bore Bucket Auger	
	ct Nun	and the second							Drop: 12" Hole Diameter: 28"	_
			of Hole: ~						Drive Weight: Kelly Bar, varies with depth	
Hole	_ocati	on :	See Geote	chnica	al Ma	р	1 1			
									Logged by KTM/TJL	
				Der		ନ୍ତ		_	Sampled by KTM	
(f)		D		Sample Number	Lt	Dry Density(pcf)	(%	USCS Symbol		st
uo ((Ħ)	CLO	S	e N	our	nsit	,) Le	Syn		f Te
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	ldu	Blow Count	De	Moisture (%)	S		Type of Test
Ele	Dep	Gra	Atti	Sai	Blo	Dry	Moi	NSI	DESCRIPTION	Typ
	30	C'IL		-	8				@31' Broken zones of cementation, up to 1' dia. angular, cemented material w/ clayey infill.	
220-	-	ALL D								
	-									
	35-		@35' RS:N25W 42E		e.				@35' Rupture Surface attitude, well-defined, oxidized, barely clay-lined, faint striations trend E-W. Surface enters at 34' 6", exits	
	-	0.	726						hole at 36' 9". Zone splits to 3" wide at exit.	
215-	_	0.00					1		@35' to 68' <u>Tertiary San Onofre Breccia (Tso)?</u> (Possible Landslide) - Cobble Breccia & fine to coarse Sandstone w/ Clay, It.	
210		666							orange brown, dense to v. dense, sl. moist. Cobbles are angular, blueshist common, quartz, meta-origin.	
	40-	-//	@40'		-				@39' Cobble supported zone, 1 ft. thick	
			GB:N80E,13S						@40' Generalized Bedding attitude on 2" thick Clayey Sand bed, varies in portion of beorewall by up to 1'. Below is coarse Sandstone	
	-			-	-				w/ Gravel, dense, moist.	
210-										
	-				•					
	45-	100								
	-	XXO			-				@46' Mod. cemented zone, well cemented lens, rock is 2" to 6" dia. in zone	
205-		0.00							2016	
205-	2	XO.							@49' Base of cemented zone, becomes Silty Sandstone w/ Gravels,	
	50-	1:1	@501	R-4	10				SI. moist,v. dense @50' Joint attitiude, iron oxide lined	
		+	@50' J:N25E,85W	K-4					@50' Sample R-4 - Lt. olive green & gray mottled Silty Coarse	
	5-				-				Sandstone, moist, v. dense, some oxidation. @52' Becomes mod. cemented to 59'	
200-		· · ·			•					
		·			-					
	55 -				-					
		×			-					
					-					
195-		- ×								
	-	C			-				@59' Top of rock-supported zone, rock to 18" dia., subangular, remains sl. moist	
		N-C	1					LIES ONLY		
		LOCATION OF THIS BORING DRILLING. SUBSURFACE CO DIFFER AT OTHER LOCATION							IDITIONS MAY R RING SAMPLE MD MAXIMUM DENSITY G GRAB SAMPLE SA SIEVE ANALYSIS	
				AND MAY S&H SIEVE AND HVDROMET VITH THE PASSAGE EI EXPANSION INDEX ED IS A CN CONSOLIDATION	ER					
					SIM	PLIFICAT	ION OF		JAL CONDITIONS CR CORROSION AL ATTERBERG LIMITS	
	Geo	Geotechnical, Inc							CO COLLAPSE/SWELL RV R-VALUE	

a				G	eote	ech	nic	al B	Boring Log LGC-1	
Date :			1/25/2011			Page	3 of	4	Drilling Company: Al-Roy Drilling	
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			: 10132-01						Drop: 12" Hole Diameter: 28"	
			of Hole: ~			-			Drive Weight: Kelly Bar, varies with depth	
Hole	_ocati	on :	See Geote	cnnic	ai Map I	2				_
									Logged by KTM/TJL	
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	Sampled by KTM DESCRIPTION	Type of Test
190-	60 - - - 65-		000	-					@66' Contact attitude, sub-planar, below is It. brown Clayey	
185—	- - 70-		@66' C:N5E,13E @68' CS:N25E,16SE	R-5	20/8"				Sandstone, v. dense, wet (no free water visible), sand to 1/8" dia. @66' Sample R-5 - Lt. olive brown Clayey Siltstone, grades to Silty Sandstone, v. dense, v. moist to wet, @68' Base of sandstone, oxidation stained. @68' Clay Seam attitude, possible Rupture Surface. Olive green Clayey Siltstone bed is soft to stiff, v. moist to wet. V. thin (1/16") polished, striated, sl. undulatory clay seam near top of 4" thick bed. Bentonitic clay, small grab sample taken. @68' to TD - Tertiary San Onofre Breccia (Tso) - Cobble Breccia &	
180-	- - 75- -	00010 00010 X		-					Sandstone, It. blue gray, v. dense, moist to wet. Variable, lenses of Siltstone w/ coarse sand. Grades to rock-supported zone, slight belling of borewalls. @75' Decrease belling, becomes predominantly It. blue gray Gravelly Sandstone, v. dense, v. moist, unoxidized/fresh, gradual increase cementation, increase moisture w/ depth.	
175-	- - 80 - -	× × × ×								
165-	85- - -	· × / ×							 @84' Lens of Siltstone, 2" thick, poorly defined. Increase cementation below. @86' Zone of highly cemented material, 10" thick. @87' Decrease cementation, becomes Siltstone. 	
	Geo		BC Inical, Inc		LOCA DRILL DIFFE CHAN OF TI SIMP	TION OF ING. SU R AT OT IGE AT T ME. THE	THIS B JBSURF HER LO HIS LOO DATA F ON OF T	ACE CONI CATIONS CATION W PRESENT	ND AT THE TIME OF B BULK SAMPLE DS DIRECT SHEAR DITIONS MAY R RING SAMPLE MD MAXIMUM DENSITY AND MAY G GRAB SAMPLE SA SIEVE ANALYSIS AND MAY SAH SIEVE AND HYDROMETE ITH THE PASSAGE EI EXPANSION INDEX	ER

				G	ec	ote	ch	nic	al B	oring Log LGC-1	
Date :			1/25/2011				Page	4 of	4	Drilling Company: Al-Roy Drilling	
	ct Nan		South Sho	res C	hur	rch				Type of Rig : EZ Bore Bucket Auger	
	ct Nun									Drop: 12" Hole Diameter: 28"	
			of Hole : \sim							Drive Weight: Kelly Bar, varies with depth	
Hole	_ocati	on :	See Geote	chnic	al N	Map	<u></u>				
										Logged by KTM/TJL	
				e			Ĵ			Sampled by KTM	
ť)		5		qu			/(bc	()	lodi		เร
n (f	ft)	Lo	S	NC		unc	lsity	e (%	Syn		<u>0</u>
atic	th (1	ohic	nde	Jple	C	ŭ	Der	stur	ŝ	5	5 0
Elevation (ft)	Depth (ft)	Graphic Log	Attitudes	Sample Number		Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	I ype or I est
	90	3.4.5		ļ.,	+	<u> </u>	<u> </u>	<		@90' Groundwater level. Water seeping from walls. Grades to	
	- 30	0.00			-					rock-supported zone below.	
	-	BE			-						
160-	-	SX			-						
	-	82			-						
	95 —	留			-						
	-	Q:E			-						
1.55	-			1	-					@97' Base of rock supported zone. Decrease rock size and amount, increase sandstone matrix. Wet, v. dense.	
155-		0.0		[Increase sanusione matrix, wei, v. dense.	
	100-	000									
	-	0.0									
	-										
150-	-	. 0			-						
	-				-					Downhole logged to 104'	
	105-				-						
	-				-						
	-	0									_
145-	-				F					Total Depth = 107' Groundwater Encountered at 90'	
	-				r					Backfilled with Cuttings and Tamped on 1/25/2011	
	110-				F						
	-				-						
	-				F						
140-	-				-						
	115-	e.									
135-											
100											
l.	-				-						
					+	THIS S	SUMMAI	RY APPL	LIES ONLY	AT THE SAMPLE TYPES: TEST TYPES:	
		-			L	LOCAT DRILLI	tion of Ing. Su	THIS BO	ORING AN	ID AT THE TIME OF B BULK SAMPLE DS DIRECT SHEAR DITIONS MAY R RING SAMPLE MD MAXIMUM DENSITY C G DAB SAMPLE SA SIEVE ANALYSIS	
			MA		0	CHAN	GE AT T	THIS LOC	CATION W	AND MAY S&H SIEVE AND HYDROMETE ITH THE PASSAGE EI EXPANSION INDEX	R
					5	SIMPL	IFICATI	ON OF T	PRESENTE		
	Geo	Geotechnical, Inc								CO COLLAPSE/SWELL RV R-VALUE	

				G	ec	ote	ech	nic	al B	oring Log LGC-2	
Date :			5/14/2012				Page			Drilling Company : Al Roy Drilling	-
Proje		ne :	South Sho	res C	hur				A CONTRACT OF	Type of Rig : Bucket Auger	
Proje			: 10132-01				1.			Drop: 30" Hole Diameter: 26"	
			of Hole: ~	252 '	MS	SL				Drive Weight : Between 0' and 30' = 2400 pounds	
Hole I			See Geote			-)			Between 31' and 60' = 1550 pounds	
										Logged by KTM	
				5						Sampled by KTM	
				Sample Number			Dry Density(pcf)		lo		.
Elevation (ft)		Graphic Log		Nui	4	nut	sity	Moisture (%)	USCS Symbol		Type of Test
tior	Depth (ft)	nic	Attitudes	ole	6		en:	nre	S S		of
eva	epth	apl	ttitu	am		N 0	УD	oist	SS		/pe
Ē	ď	Ū	Ă	ŝ	ā	n	D	Š	ň	DESCRIPTION	F
	0	1-100X			-					Asphalt 4" over Base @0.5' to 19' - Artificial Fill; Older (Af)	
250-	-	0		R-1		2	112.6	15.9	SC	@2.5 R-1 Dark & light gray with some bluish gray mottled, CLAYEY	
	5	0								fine to coarse SAND with some GRAVELS, very moist, stiff, gravels to 3" dia, angular, metamorphic origin, and rounded (5 rings only,	
	-	80:			Ш					disturbed sample)	
	5-	0_0		R-2 B-1		3	127.4	9.8			CN
	-			D-1						very moist, stiff, slightly odorous @4' to 7' - Bag Sample B-1, as above	
245-	-			R-3		3	124.5	15.1	SC-SM	@7.5' R-3 Brown, gray, & greenish brown mottled, CLAY, SILT, &	
	-	10								fine to coarse SAND with some GRAVELS, very moist, stiff, gravels subrounded. Slight seepage.	
	10	8			-						
	10-	2:00		R-4		2	110.5	13.8	SC	@10' R-4 As above, (5 rings, disturbed sample)	CN
240-	-	-									
	-	2			_					@13' Fill changes to material at 15'	
	-	0			-					@15' R-5 Light & dark reddish brown mottled, fine to coarse SAND	6
	15-			R-5		4	116.2	122	sc	with CLAY & GRAVELS, moist, very stiff. Gravels to 4" typically	
	-	0.		238 8						angular, highly oxidized. @15' to 18' - Bag Sample B-2 Contact with bedrock along undulatory tight contact, lacks topsoil, etc.	
235-	-	0-		B-2						@19' to TD - Tertiary San Onofre Breccia (Tso) -	
	-	-4			Щ					Light yellowish & reddish brown, SANDSTONE w/ CLAY & GRAVELS	
	-	Tot								& COBBLES and some SILTSTONE, moist, very dense, highly weathered upper portion	
	20-	7:0		R-6	10)/9"	N/A	10.5	[SM]	@20 R-6 Light yellowish & reddish brown mottled, SILTY	
	-	100								SANDSTONE with CLAY & GRAVELS, slightly moist, very dense.	
230-	-	10	B: N40W,		-					Gravels to 1" dia, metamorphic. @22' Bedding defined by 1" to 2" thick, non-continuous, subplanar	
	-	06	28SW		cemented opaque white mineral. Fabric of sandstone similar						
	-	0								orientation, highly oxidixed, weakly cemented matrix.	
	25-	10%			2.8						
225-		1	GB: EW, 24 S		- 44					@26' Generalized Bedding, defined by elongate clasts, increase rocks, belling. @29' Cemented zone 1' dia., tight	
225-		20.0									
		2								р.	
	1	1.1.			-						
	0	2.1			Т	HIS S	SUMMAR	Y APP	LIES ONLY	AT THE SAMPLE TYPES: TEST TYPES:	_
	2				L	OCA.	TION OF	THIS B	ORING AN	D AT THE TIME OF B BULK SAMPLE DS DIRECT SHEAR ITIONS MAY R RING SAMPLE MD MAXIMUM DENSITY	
	~				С	HAN	GE AT TI	HIS LO		TH THE PASSAGE S&H SIEVE AND HYDROMET	TER
	7_				S	IMPL	IFICATIO	ON OF 1	PRESENTE	L CONDITIONS CR CORROSION	
	G	Geotechnical, Inc. ENCOUNTERED. AL ATTERBERG LIMITS CO COLLAPSE/SWELL RV R-VALUE									
-		OG OGELI DEDITEE									

				G	eote	ech	nic	al B	oring Log LGC-2				
Date :			5/14/2012			Page	2 of	2	Drilling Company : Al Roy Drilling	_			
Projec	ct Nan	ne:	South Sho	res C	nurch				Type of Rig : Bucket Auger				
Proje	ct Nun	nber :	: 10132-01						Drop : 30" Hole Diameter : 26"				
			of Hole: ~	252 '	MSL				Drive Weight : Between 0' and 30' = 2400 pounds				
Hole I	ocati	on :	See Geote	chnic	al Map	כ			Between 31' and 60' = 1550 pounds				
									Logged by KTM				
				Ŀ		f)			Sampled by KTM				
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n (f	ť)	Ľ	S	N	unt	Isity	e (%	ym	, F	ot lest			
atio	th (f	ohic	nde	ble	U U	Der	sture	ŝ		of of			
Elevation (ft)	Jepth (ft)	Graphic Log	Attitudes	Sample Number	Blow Count	Dry Density(pcf)	Moisture (%)	USCS Symbol	DESCRIPTION	Iype			
	30	813.		R-7	30	N/A	5.6	[SM]		_			
	50 -	80.00		1.5-7	50	10/4	0.0		@30' R-7 Light yellowish brown, SANDY SILTSTONE/SILTY SANDSTONE with GRAVELS, slightly moist, very dense. Clasts				
220 —	÷	500	GB: N40W,	-					oxidized, meta, angular.				
	-	200	25SW	-				GM-GC	@31' Generalized Bedding, well defined by fabric of elongate/flat clasts. Gradual increase in rock content (gravels and cobbles) to				
	1	0.0							about 50%.				
	35 —	302							@35' Becomes clast-supported, up to 1' dia., both angular (elongate				
	200	Bie							& flat) metamorphic & subrounded granitic. Clayey matrix becomes light gray with some white mineral, micaceous. Belling of borehole				
215-	-	500							walls up to 1 foot.				
	-	200											
	- 40-	200			-		@40' R-8 (disturbed) Note drive weight decreased to 1550 pounds. Light brown, GRAVELS with CLAY and SAND, slightly moist, very						
	40-	2/e		R-8	14/6"	N/A	7.9		dense.				
210-													
210													
	_								Total Depth = 40'				
	45-			-					No Ground Water Encountered				
	-								Backfilled with Tamped Cuttings and Capped with AC to 4 inches on 5/14/2012				
205-	-			-	8								
	-				5.								
	-			-	3								
	50 —			-									
	-			-									
200-					•								
	5				•								
	-												
	55 —												
195-				[
190				[
	10												
								LIES ONLY BORING AN	D AT THE TIME OF B BULK SAMPLE DS DIRECT SHEAR	_			
	2		CC	2	DRILL	ING. SU	BSURF HER LC	ACE CONE	NTIONS MAY R RING SAMPLE MD MAXIMUM DENSITY G GRAB SAMPLE SA SIEVE ANALYSIS SAH SIEVE AND HYDROMETE	R			
	4			7	OF TI	ME. THE	DATA	PRESENTE	TH THE PASSAGE EI EXPANSION INDEX ED IS A CN CONSOLIDATION				
	6	eote	echnical,	Inc.		UNTERE		THE ACTU	AL CONDITIONS CR CORROSION AL ATTERBERG LIMITS CO COLLAPSE/SWELL				
									RV R-VALUE				

Jrill E						_OG						
	lig:	Al-Roy Ho	ollow Stem	Mobile 57	Boring Di	ameter:	8 incl	hes	E	Boring Elevation: 275 feet		Boring No.
Date I		d:	2/17/2006	WGN	This log is a r	epresentatio	n of subsi	urface co	onditions at the tir	ne and place of drilling. With the passage	of time or at any	
SAM	<u></u>			ح	other location	, there may b	e conseq	uential c	hanges in conditio	ons.		<u>B-1</u>
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB.JCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL/ROCK SYMBOI	SOIL/ROCK TYPE		Descriptions and Rem	arks	
							_		@ 3 inches,	A.C. / 6 inches A.B.		
	Τ	43	0.0	110.0			_			stiff, gray-brown, moist, trace of	sand and grav F	rel ILL
		43	8.6	119.8			-		BRECCIA: 1		В	EDROC
_	1	21	25.9	95.2					@ 4 feet, ha	ira aniling		
Π						- 5 -		\	@ 6 feet, so	fter with CLAY: stiff		
Ц		65	11.2	103.0				BEDROCK				
						L _	-	BEDI				
							-					
	Т	41	17.8	108.3		- 10 -	-			1		
				100.0			-				SAN ONOFRE	BHEC
							-		Bottom of be	oring at 11 feet.		
									Note:	and and a second s		
						_ 15 .			1) Hard drilli	ing.		
							_		2) No water			
							-		3) No caving			
							-		4) Hole bac	kfilled, tamped and A.C. patched	i.	
						- 20 -	_		5) All 3-inch 30-inch drop	n O/D Ring Samples driven with p.	energy: 140# I	namme
							_					
6							_					
				1			-	-				
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						- 25						
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							-					
,		<u> </u>										
										South Shores Church		
										32712 Crown Valley Parkway Dana Point, California		
	6				G. A. M		Ass	ocia	tes, Inc.			

						OG	OF	B	ORIN	G		
Drill	1000.0	Al-Roy Hol	low Stem N	lobile 57	Boring Di	ameter:	8 incl	nes	E	Boring Elevation: 270 feet		Boring No.
Date	Drilled	1:	2/17/2006		This loo is a	oprocessient						110,
SAM	MPLE				other location,	, there may be	of subsu consequ	iential ci	nanges in condition	me and place of drilling. With the passage of ons.	time or at any	B-2
BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB.JCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL ROCK SYMBOI	SOILROCK TYPE		Descriptions and Remar	ks	
		N	O SAMPLE						@ 3 inches,	A.C. / 4 inches A.B. s, very hard rock drilling		
											ONOFRE B	RECCIA
-						 			Note:	oring at 2 feet.		
-									1) No water.			
-									2) No caving	g. kfilled, tamped and A.C. patched.		
						- 10 -						
-		Ē										
- 1							-					
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	I					- 20 -	-					
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-						- 25 -	-					
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		L	.I	J	_l	_I		1	1			
										South Shores Church 32712 Crown Valley Parkway Dana Point, California		ant - and the
		70			G. A. I	Vicoll &	Ass	ocia	ites, Inc.			
	0	25			EARTH S Irvine, Ca	BCIENCE C allfornia	CONS	JLTAN	NTS	Project No.: 6375-04	Figure No.	: В-3

						L	.OG	OF	B	ORING	à		
	Drill F			llow Stem N	Aobile 57	Boring Dia	ameter:	8 inch	ies	Bo	oring Elevation: 265	5 feet	Boring No.
	Date I		d: 2/1706		WGN				ential ch	nanges in condition	and place of drilling. With the s.	passage of time or at a	в-3
	BULK	TUBE	BLOWS/FT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPSISO. FT		SOIL/ROCK SYMBOL	YPE		Descriptions and	d Remarks	
Service Andrews			60	8.8	121.4				BEDROCK	@ 3 inches, A BRECCIA: ve	A.C. / 5 inches A.B.		
			89	7.2	109.1	-			<u> </u>		1-	SAN ONOF	RE BRECCIA
								-		Bottom of bo Note: 1) No water.	ring at 6 feet.		
								-		2) No caving 3) Hole back	filled, tamped and A.C.	patched.	
							15	-					
1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.								-					
Service States	-						- 20 -	_					
	-						- 25	-					
No.													
	Ē												
No. of Concession, Name											South Shores Church 32712 Crown Valley Pa Dana Point, California	arkway	
		(G			EARTH	Nicoll & I SCIENCE California			ates, Inc.	Project No.: 6375-04	Figure	e No.: B∙4

						.OG	OF	B	ORING	G	
Drill F		Al-Roy Ho	llow Stem N	Mobile 57	Boring Di		8 inic	hes	В	Boring Elevation: 265 feet	Boring No.
Date [Drilled	d:	2/17/2006		This log is a r	epresentation	of subsu	rface co	nditions at the tim nanges in conditio	he and place of drilling. With the passage of time or a	
BULK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPS/SQ. FT		SOIL ROCK SYMBOL	YPE		Descriptions and Remarks	
		51	15.2	105.8				BEDROCK	@ 3 inches,	A.C. / 5 inches A.B. ery hard drilling	BEDROG
		37 47	11.4 13.0	104.4 115.2			-	BEDF			FRE BREC
									Note: 1) No water. 2) No caving		
		3				SCIENCE			ates, Inc.	South Shores Church 32712 Crown Valley Parkway Dana Point, California Project No.: 6375-04	re No.: B-5

					L	.OG	OF	B	ORING	G				TA2654
Drill F		Al-Roy Ho	low Stem M	lohile 57	Boring Di	ameter:	Qical	200	В	oring Ele		00 6-1		orin
Date	Drilled						8 inch		L		2	263 feet		No.
SAM	IPLE		2/17/2006	WGN	This log is a r other location	epresentation there may be	of subsu consequ	ential ci	nditions at the tim nanges in conditio	ne and place Ins.	of drilling. With the	he passage of tir	ne or at any	B-5
BULK	TU _{BE}	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	^{DEPTH FEET}	SOIL/ROCK SYMBOL	SOILROCK TYPE			escriptions a	nd Remarks	3	
		N	O SAMPLE						@ 3 inches. /	A.C. / 4 in	ches A.B.			
							-		BRECCIA: H	nard	1_	SAN	ONOFRE BR	EC
- - -							-		Bottom of bo Note: 1) No water.		eet.			
-									2) No caving	J.				
_									3) Very hard	drilling to	2 feet and sa	ample not po	ssible.	
_									4) Hole back	filled, tam	ped and A.C.	. patched.		
-						- 10 -	-							
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				1						32712 Ci	ores Church rown Valley P int, California			
	6				GΔ	Nicoll &	Acc	ocl	ites Inc					
		5-			G. A. Nicoll & Associates, Inc. EARTH SCIENCE CONSULTANTS Project No.: Figure No.:									
					Irvine, C	alifornia					6375-04		E	3-6

LOG OF BORING

					<u>L</u>	JUG	OF	B	JRING
Drill F			ollow Stem N	Mobile 57	Boring Di	ameter:	8 inch	ies	Boring Elevation: Boring 262 feet No.
SAM			2/17/2006	WGN	This log is a r other location,	epresentation , there may be	consequ	ential ch	nditions at the time and place of drilling. With the passage of time or at any B-6
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPSISO. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE	Descriptions and Remarks
		17	9.5	107.9			-		@ 3 inches. A.C. / 5 inches A.B. Silty CLAY with Gravel and Sand: compacted, dark brown-gray, sti
		17	17.0	108.2		<u> </u>			F
		20	9.7	111.1			-	X	Silty CLAY: very stiff, angular rock fragments BEDROCK
-		35	15.8	115.2				BEDROCK	
		52	9.1	129.8					Bottom of boring at 16 feet. Note: 1) No water. 2) No caving. 3) Hole backfilled, tamped and AC patched. 4) Blows/ft. on 3° O/D ring sampler 5) Energy used: 140# hammer @ 30° drop
									South Shores Church 32712 Crown Valley Parkway Dana Point, California



G. A. Nicoll & Associates, Inc. EARTH SCIENCE CONSULTANTS Irvine, California

Project No.:	
	6375-04

Figure No.: B-7

Drill F		Al-Roy Ho	ollow Stem	Mobile 57	Boring Di	ameter:	8 inch	nes	E	Boring Elevation: 256	foot	1	Boring No.
Date	Drilled	1:	2/17/200		This log is a representation of subsurface conditions at the til								140.
SAM	IPLE		-1		This log is a representation of subsurface conditions at the tir other location, there may be consequential changes in condition					me and place of drilling. With the p ons.	assage of ti	me or at any	B-7
BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU, FT	SHEAR BESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILPOCK TYPE		Descriptions and	Remarks	3	
2		75	2.5	135.2				BEDROCK	@ 3 inches. BRECCIA: H	A.C. / 7 inches A.B.		B	EDRO
		50	7.1	110.0		- 5		BE					
and the second		50	7.1	113.3							SAN	ONOFRE I	BREC
									Pottom of b	oring at C fact			
							1			oring at 6 feet. kfilled, tamped and A.C. pa	tobod		
						- 10 -			.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	amped and A.O. pa			
							-						
s						- 15 -	-						
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						- 20 -							
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								175 H Aurora		South Shores Church 32712 Crown Valley Park Dana Point, California	way		
					G. A. I	Nicoll & science (Ass	ocia	tes, Inc.			r:	
					Irvine, C		501431	ULTAI	613	Project No.: 6375-04		Figure No.:	B-8

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Drill I		Al-Roy Ho	llow Stern N	Aobile 57	Boring Dia	ameter:	8 incl	าคร	B	Boring Elevation: 254 feet	Boring No.
Date	Drilled		2/17/2006		This log is a r	anresentation			nditions at the tim	ne and place of drilling. With the passage of time or at	
SAM	IPLE		Γ		other location,	there may be	consequ	iential ch	anges in conditio	ne and pade of drining. With the passage of time of at ons.	B-8
BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE	@ 2 inches	Descriptions and Remarks A.C. / 7 inches A.B.	
		10	13.7	107.8						vith angular Gravel: compacted, gray-brow	vn, soft, wet to
-		15 34	12.8	111.6					Stiff dark gra	ay Silty CLAY with Gravel and Asphalt	
\mathbf{F}							-				
								Ъ	Silty SANDS	STONE with cobbles: hard	FILL
-		-				_ 15 _		BEDROCK	1		
	┢┷	65	6.2	123.6		+				SAN ONC	OFRE BRECCI
									1) No water 2) No caving		
		9			G. A. I EARTH Irvine, C	SCIENCE	A Ase CONS	SOCIA	ites, Inc. NTS	South Shores Church 32712 Crown Valley Parkway Dana Point, California Project No.: 6375-04	e No.: B-9

Ying Wind Wind Wind Wind Wind Wind Wind Ying Ying Wind Wind Wind Wind Wind Ying Ying <t< th=""><th>ons and Remarks</th></t<>	ons and Remarks
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ons and Remarks B. ravel: very wet, soft to medium stiff FIL NE: olive-green; hard drilling to 10 fee
9 13.6 106.3 Gray-brown Silty CLAY with G 43 14.0 114.7 Sandy and Gravelly SILTSTO 52 14.8 113.7 Sandy and Gravelly SILTSTO 78 5.1 126.6 Bottom of boring at 11 feet. Note: 1) No water. 2) No caving.	ravel: very wet, soft to medium stiff FI NE: olive-green; hard drilling to 10 fe
52 14.8 113.7 Sandy and Gravelly SILTSTO 78 5.1 126.6 Bottom of boring at 11 feet. Note: 10 10 Bottom of boring at 11 feet. Note: 110 10 Bottom of boring at 11 feet. Note: 11 No water.	
78 5.1 126.6 Bottom of boring at 11 feet. Bottom of boring at 11 feet. 10 15 11 No water. 2) No caving. 2) No caving.	SAN ONOFRE BRECK
- 15 - 1) No water. 2) No caving.	
	ed, and A.C. capped.
South Shores Ch 32712 Crown Va Dana Point, Cali	lley Parkway

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					L	.OG	OF	B	ORIN	G	
Drill F		Al-Roy 0-2	24 2150		Boring Dia		24 inc			Boring Elevation:	Boring No.
Date		d:	2/17/2006	TH	This log is a r	epresentation	of subsu	urface co	onditions at the ti	me and place of drilling. With the passage of time or at ar	1
SAM	PLE		1		other location,	there may be	consequ	Jential cl	hanges in conditi	ons.	BA-1
BULK	TUBE	BLOWSFET	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL ROCK SYMBOL	SOIL ROCK TYPE		Descriptions and Remarks	
-		2	15.9	112.8				CL	Silty CLAY woist, stiff	with Gravel and Cobbles: mottled brown and	gray, very
-		3	13.7	116.5		5			@ 5 feet, m	ore sand	
-		2	11.2	117.5				SC	Clayey SAN	ID with Gravel and Cobbles: yellow-brown, m	FILL noist, loose FILL
		4	12.6	120.0		- 10 - 		SC	Sandy CLA gravel, cobb	Y: mottled gray and yellow-brown, moist, ver oles, copper pipe fragments, AC chunks, wire	y stiff with a
-		10	9.4	128.3		15 20			horizontal c	STONE with some fine Gravel: moist, very d ontact with fill above feet, SANDSTONE then hard, cobble BREC	
						25		7	Note: 1) No wate	boring at 21 feet.	
		3			G. A. N EARTH S Irvine, Ca	CIENCE (Ass	ocia JLTAN	tes, Inc.	South Shores Church 32712 Crown Valley Parkway Dana Point, California Project No.: 6375-04	».: B-11

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Drill I		Al-Roy 0-	24 2150#		Boring Di	ameter:	18 inc	hes	E	Boring Elevation:	Boi
Date	Drilled	d:	2/17/2006	тн	This los is a c	oprocestation					
SAM	IPLE				other location,	, there may be	e conseque	ential cl	hanges in condition	ne and place of drilling. With the passage o ons.	B/
BULK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SolLROCK SYMBOL	SOILROCK TYPE		Descriptions and Remai	rks
-		2	14.3	116.1 119.7				CL	moist, stiff	with Gravel and Cobbles: mottled eet, few A.C. fragments	gray and brown, v
		3	16.5	109.7							
-		2	15.2	108.9		15 15 					
-	\mathbf{H}	11	11.8	119.0		20 -	Λ·) ',				BEDROCK
								BEDROCK	Clayey in S	NDSTONE with Gravel and Cobbl PC, yellow-brown, very tight	es: weathered an
-	+-	10	9.1	117.3					@ 26 feet,	refusal on hard BRECCIA	
							_		1) No wate	boring at 26 feet. Note: er or caving. packfilled and tamped.	
					G. A.	Nicoll 8	Acc	ocla	ates, Inc.	South Shores Church 32712 Crown Valley Parkway Dana Point, California	
	1	5				SCIENCE				Project No.:	Figure No.:

					L	.OG	OF	B	ORING	Ê		
Drill F		Al-Roy 0-	24 2150#		Boring Di	ameter:	24 inc	hes	В	oring Elevation:	Bori	
Date I	Drilled	1:	2/17/2006	i TH	This log is a r	epresentation	of subsu	ríace co	onditions at the tim hanges in condition	ie and place of drilling. With the passage of tim		
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU, FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTHFEET	SolLROCK SYMBOL	YPE		Descriptions and Remarks		
-		1	18.4	104.7				CL		vith Gravel and Cobbles: motled gray	v and brown, ve	ry
-		2	24.1	97.5			0,000		Silty SAND v bedrock, mo	vith Clay, Gravel & Cobbles: weathe ist, hard	FILL red, then hard	
1 1 1 1 1 1 1 1		10	15.8	117.4			0,000		@ 6 feet, Be	dding: 42E,33SE		
-							0.2.00	BEDROCK	@ 13 to 15 f	feet, Gravelly zone, crude Bedding:	N10E,15-20SE	
-						15 				Clay Shear: N40E,56NW ellow-brown Silty SANDSTONE with lenses	Gravel and Col	bb
						- 20 -	0,00		@ 22.5 refu	isal SAN	I ONOFRE BRE	FC
-							-			1		
-						25 ·			Note:	oring at 22.5 feet.		
-							_		2) No grour 3) No cavin	1756		
	1	1		<u></u>					4) Boring b	ackfilled and tamped.		
	6				GΔ	Nicoll a	L Acc		ates, Inc.	South Shores Church 32712 Crown Valley Parkway Dana Point, California		
		5				SCIENCE				Project No.: 6375-04	Figure No.: B-1	13

Drill			uger EZ Bor	е	Boring Di	ameter:	28 ind	ches	Boring Elevation: Bori 253 feet No
Date	Drille	d:	2/20/2006	CDH					
SAM	IPLE				This log is a r other location	epresentation , there may be	of subsu consequ	uential ci	conditions at the time and place of drilling. With the passage of time or at any changes in conditions.
BULK	TUBE	BLOWSIFT	RIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPSISO. FT	DEPTH FEET	SOILROCK SYMBOL	SOILROCK TYPE	Descriptions and Remarks
-								ML	Sandy SILT: moist, rock fragments, s
-									@ 2 to 3 feet, Sandy CLAY: stiff
									@ 4 feet, very irregular contact, roughly horizontal FILL
-		4	10.2	126.7		5 	0.0.0.0.0.000		BRECCIA: Gravel and cobble-size clasts of subangular to subrounded dark gray (GLEY-1-N4) to dark greenish-gray (GLE 2-10G4/1) schist with some quartzite and white quartz fragmen some pockets and crude layers and lenses of cobbles and boulders in matrix of greenish-brown Sandy SILT and Silty SAN @ 6 to 8 feet, slightly clayey @ 8.5 feet, 16-inch boulder
-		3	10.7	116.3			Con Chille of Con	OCK	 In to 12 feet, crude layer of gravel and small cobbles, dips roughly 25°south 14 feet, 18-inch boulder 15 feet, 18-inch boulder
								BEDROCK	@ 18 feet, 12-inch boulder
-							100		@ 19 to 21 feet, cobble layer
-						- 20 -	QE	:	@ 21 to 23 feet, fewer clasts
_							Sh		@ 23 to 28 feet, numerous cobbles and few boulders
-							0		@ 23 feet, crude contact: approx.: N60W,15-18SW
1						- 25 -	0		 25 feet, hard cobble layer 25 to 30 feet, occasional coring required
-							200	0	
-							00		@ 29 to 30 feet, crude layer of cobbles and small boulders, co
L								01-1-7-2A-10	
									South Shores Church 32712 Crown Valley Parkway Dana Point, California

roject No.:	
	6375-04

	uger - EZ Bo	ore	Boring Di	ameter:	28 inc	hes		Boring Elevation: 253 feet	Boring No.
sample	2/20/2006	GDH	This log is a r	This log is a representation of subsurface conditions at the time and place of drilling. With the passage of tim other location, there may be consequential changes in conditions.					
BULK BLULK	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU, FT	RESISTANCE KIPS/SQ. FT		SOILROCK SYMBOL	TYPE	nanges in condi	Descriptions and Remarks	BA-4
	7.8	132.4			CONTROLOGIO STORED SECONDES CONTERED SECONDES CONDERED SECONDE	BEDROCK	 © 31 feet, greenish-br © 31.7 to C SAND math © 32.5 feet above, smostriations p © 33 to 40 grained Sill © 40 feet, © 41 feet, © 41 feet, © 44 feet, © 48 feet, © 50 feet, matrix © 52 feet, © 54 feet SAND matrix © 55 to 6 gravel and 	8-inch layer of finely micaceous, Sandy SILTS rown and medium greenish-gray (GLEY-1-10Y 32.4 feet, mostly gravel-size clasts in fine to co- rix at, Shear: N10W,25NE: with 1/2 to 1-inch Clayer ooth surface, dull to moderately polished, poss- olunge S85E 0 feet, mostly medium greenish-gray, fine- to co- ty SANDSTONE with fine to medium gravel-size clasts are mostly fine to medium gravel-size et, 8-inch irregular bed of fine to coarse Clayer DNE: N30E,28SE 1 fine to coarse gravel-size clasts 6 feet, cement lens on SE side, small cobble o , more silty matrix , greenish-brown to greenish-gray, very Silty C , gravel- and cobble-size clasts become more c, seepage from crude cobble lens, fine to coar attrix, less silty 50 feet, mostly fine to coarse Silty SANDSTON d cobble clasts and very moist, light greenish- gunoxidized)	5/1) parse Silty by SILT ible parse- ze clasts numerous se Silty E with fev



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G. A. Nicoll & Associates, Inc. EARTH SCIENCE CONSULTANTS Irvine, California

Project No .:	
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				L	OG	OF	B	ORIN	G	
Date Drillec		ger - EZ Bo 2/20/2006		Boring Dia	meter:	28 incl	hes face co	nditions at the	Boring Elevation: 253 feet time and place of drilling. With the passage of time or at any	Boring No. BA-4
SAMPLE דחפק דעוקק	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	other location, SHEAR RESISTANCE KIPS/SQ. FT	there may be	SYMBOL SYMBOL	YPE		Descriptions and Remarks	
	25	5.1	141.1			20.5. 20. 5. 20. 5. 20. 5. 20. 5. 10. 10. 10. 10. 20. 20. 20. 20. 20. 20. 20. 20. 20. 2	BEDROCK	5B5/1), un and very s @ 62 feet @ 63 to 7 some bou @ 66 feet @ 66 to 6 @ 70.5 fe @ 71.5 fe @ 72 to very moi @ 73.5 f % N10E,15 groug wi crystals @ 73.5 65SE; d @ 73.5 boulders @ 73.5 fe % 75 fe %	, coring 9 feet, slight seepage from crude gravel and co eet, 12-inch greenish-gray Sandy SILTSTONE eet, 12-inch cemented lens 73.5 feet, irregular bed of greenish-gray (GLEY- st, very stiff Sandy SILT eet, shear at base of SILTSTONE: N75W,11-13 -17 SE with 1/2-inch to 1-inch greenish-brown, 4 th some small rock fragments and few 1/4-inch to 78 feet, Fracture with red-brown oxide stainin oes not cut the shear above to 85 feet, numerous gravels and cobble-size cl s in dense matrix of Silty SAND et, seepage from fracture SAN ONOF of boring at 85 feet. Note: bages at 60', 66-69' and 75'.	-size clasts 5/2) s with bble lenses 1-10GY5/1] NE and Clayey SILT gypsum g: N10E,63 asts and fe RE BRECC



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Project No.:	
	6375-04

South Shores Church 32712 Crown Valley Parkway Dana Point, California

Drill F	Dia	EZD	ore Bucket /	lugor	Boring Dia	.OG				G Boring Elevation:	264.2 fee	at I	Boring
			ore Bucket A	Auger	Boring Dia	ameter:	31	30 inches		Boring Elevation:	204.2 100		No.
Date Drilled: 7/26/2006 GDH						This log is a representation of subsurface conditions at the time and place of drilling. With the passage of time or at an other location, there may be consequential changes in conditions.							
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	BRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET		TYPE		Descriptions a	nd Remarks		
		push								T with Clay, dark greenish	n-brown, very i	moist to	saturated
		push				- 5 -		CL Silt	y CLAY	/ with Sand, reddish-brow	n (5YR-4/3), v	very mois	
							10.00	@	7 feet,	irregular contact: N2 SE.	15-20 SE	RESI	DUAL SO
		2 4/10" 5/6"			(2)		A CONTRACT OF STATE AND A CONTRACT OF STATE	an 5/: cco @ G @ 2 ((() () () () () () () () (ad some 3) Sanc bbly/bc 0 7 to 9 ravel-si: 0 9.5 fe 0 13 fee 0 -22SE 0 15 fe 0 17 fe 0 17 fe 0 18.5 Sandy S	e (GLEY-1-N4) to dark gre e light colored quartzite cla dy SILT and Silty SAND M ouldery layers to feet, mostly fine- to coars ze clasts et, gravel to cobble-size of et, crude contact with peb et, crude boulder/cobble f eet, 18-inch boulder to 20.5 feet, cemented, p SILTSTONE: N25W,20NE if feet, becomes gravelly/co	asts in greenis latrix; some of st Silty SAND clasts more nu bly Silty SANI layer with bou nebbly, light ye	sh-browr rude STONE umerous DSTONE Iders to	n (2.5Y- with E: N65E, 16 inche
		4				25 25 	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ci ci p S	emente lasts: N @ 28.5 ockets Sand: N	et, crude contact with peb ed Silty SANDSTONE with 175 E, 25 SE to 30 feet, 4 to 6 inch she of dark greenish-gray CL/ -S, 35W eet, base of shear zone du	a some scatter ear zone with s AY in mostly (red cobb some rib Clayey S	le-size bons an ILT with



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Project No.: 6375-04.1 Figure No.: B-2

		LO	G OF	BC	ORIN	G		
Drill Rig: EZ Bore Date Drilled:	e Bucket Auger	Boring Diamet	er:	30 inc	hes	Boring Elevation:	264.2 feet	Boring No.
SAMPLE	7/26/2006 GDH	This log is a represent other location, there is	ntation of subst	uential cha	ditions at the inges in condi	time and place of drilling. With th tions.	e passage of time or at any	BN-1
BULK TUBE BLOWS/FT	PIELD MOISTURE % DRY WEIGHT DRY DENSITY	SHEAR SHEAR RESISTANCE KIPS/SQ. FT	Solurack	SOIL/ROCK TYPE		Descriptions ar	nd Remarks	
			40 40 40 40 40 40 40 40 40 40	O C K	 @ 31.5 to smaller claid @ 33 feet @ 35 feet @ 38 to 4 @ 38 feet @ 38 feet @ 39 to 4 @ 41 feet CLAY with moderatel portions o @ 42 to 4 Sandy SII @ 42 to 4 Sandy SII @ 42 feet @ 48 feet @ 48 feet @ 55 feet @ 55 feet mumerou @ 57 feet @ 58 to 	 becomes medium to dar no sample, too hard (box 40 feet: coring 18-inch boulder 11 feet, cemented. Lens light 11 feet, cemented. Lens light 11 feet, cemented. Lens light 12 to 4 inches shear zone 13 Sand and some pebbles 14 feet, crude, moderately 15 TONE dips N-S, 25-30 14 feet, crude, moderately 17 STONE dips N-S, 25-30 18 eet, moderately irregular sing 19 feet, crude arker green 10 eet, 20-inch x 10-inch rock feet, 20-inch x 10-inch rock feet, cobbles and boulder-sizes, matrix becomes very m 19 feet, crude cemented 19 feet, crude cemented 10 eet, slight increase in seep 	at brown and cementer k greenish-brown ulders) ght greenish-brown (5 e with mostly greenish and small rock fragm , moderately polished olunge N82E r cemented, light yello ol degrees E shear: N-S, 30-35E, so Y ish-brown (5y-4/3) ragment ze clasts becoming m oist	y-5/4) ents: I on wish-brown



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6375-04.1

Project No.:

Drill F			lucket Auge	r	Boring Diameter: 30 inches B					Boring Elevation:	oring Elevation: 264.2 feet	
)ate I	Drilled		7/27/2006					5				No.
SAM	PLE		1	5011	This log is a r other location,	epresentation there may be	consequ	ential ch	nditions at the anges in condi	time and place of drilling With the tions.	passage of time or at an	BN-1
BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOILROCK SYMBOL	SOIL/ROCK TYPE		Descriptions an	d Remarks	
							10:00:00:00:00:00:00:00:00:00:00:00:00:0	X	@ 60.5 fee @ 60 to 65 @ 65 feet, 	more numerous boulder si et, matrix slighty cemented is feet, coring required coring rate too slow and di <u>AN ONOFRE</u> boring at 65 feet. sepage at 57 to 59 feet (ater level at 63 feet overni pring down-hole logged to 6 oring backfilled and tamped	rilling terminated BRE	CCIA
	(GANICO Geotechnical, Inc.					South Shores Church 32712 Crown Valley Parkway Dana Point, California		

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Drill Ri	g:	EZ	Bore Bucke	t Auger	Boring Di	ameter:		30 ir	ches	Boring Elevation:	232 ± 1	feet	Borin
Date D	rilled	1:											No.
SAMPI	LE		7/26/200	6 GDH	This log is a r other location	epresentation there may b	of subs	uential c	hanges in co	ne time and place of drilling. With nditions.	the passage of t	me or at any	BN-
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOILROCK	SOILROCK TYPE		Descriptions a	and Remark	s	
				_	_	L _		SM	Silty SAN	ND: fine- to Coarse-grained		PAD F	ILL
.							-	SM	Silty SAN	ND with Clay: dark yellowis	h-brown, gra	vel-size ro	ick
							- 38'						UVIUM
						- 5 -	10/2/2		isolated matrix,	A: Sub-angular to rounded cobbles and small boulder t: crude lense of cobbles	, mostly grav s in a grreen	vel-size cla ish-brown,	sts with Silty S
		2	6.3	130.0			-30	ш					
							101.30		@ 8 to 9	eet: cobbles and small b	oulders		
-								S L					
. -						- 10 -	-38		@ 10 fe	et: mostly gravel-size clas	ts in Silty SA	ND Matrix	
• -		5	8.8	128.9			- 5-7	AA					
							10						19765 - 1500 1 976
							-20:0	2	@ 14 fe the core	et: began coring and core	d to 15 feet b	out unable	to extr
							- 34		@ 15 fe	et: refusal in cemented ma	atrix with coh	bles and b	oulder
						15 _			Ň			Λ	, o al a ol
									Bottom	of boring at 15 feet.		1	
									Notes:				
.									1) No g	round water encountered.			
-						- 20 -	_		2) No c	aving.			
-							_		3) Refu	sal at 15 feet.			
-							-		4) Borir	ng backfilled and tamped.			
-							-						
-							-						
-						- 25	-						
									6				
										Revitte Ol			
										South Shores 32712 Crown			V
										Dana Point, C			y
	1					CO Geo				1.00			
	0				EARTH S Irvine. Ca	SCIENCE	CONS	ULTA	NTS	Project No.:		Figure No.	-

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Drill	Rig:	EZ B	ore Bucket	Auger	Boring Diameter: 30 inches Boring					Boring Elevation:	232 ± fe	et	Boring No.		
	Drille	d:	7/26/2006	GDH	This log is a r	his log is a representation of subsurface conditions at the time and place of drilling. With the passage of time or at any ther location, there may be consequential changes in conditions.									
BULK	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPSISO. FT	<i>ВЕРТН FEET</i>		YPE		Descriptions a	and Remarks	.	BN-		
								SM		D: fine- to coarse, gravely		D FILL			
		5	4.9	138.6			1.24 1.14	LANDSLIDE? LANDSLIDE?	Displaced clasts in a xome isol lenses an @ 6 feet @ 8 to 9 @ 9 feet @ 15 fee @ 17 fee @ 17 fee @ 17 fee @ 20.5 20SE @ 21.5 20SE @ 22 to Seam d base:N1 Silty Sar Displace @ 24 to @ 26.5 @ 28 to cured for Note 1) f	d BRECCIA: mostly sub-a a tight, greenish-brown Sil lated cobbles and boulder id pockets :: cobbles lens if feet: cobbles and small b the mostly gravel-size in tight et: more numerous clasts et: 12-inch boulders feet: becomes Silty Sands feet: becomes Silty Sands feet: irregular 6-inch bed of feet: irregular 6-inch bed of b 23 feet: 1/4-inch thick, da lips 25 - 35° east, with pol 0E,35SE; well-developed indstone below with reddis ed (?) BRECCIA: dense, go o 26 feet: small boulder-a 5 to 27.5 feet: greenish-gra o 30 feet: cemented matri or 2 hours and could not e lefusal at 30 feet. tom of boring is at 30 feet es: No ground water encounted No caving	O L L U V I U ngular to roun ty sand to Sat s and crude c oulders at Silty Sand t gravel to cobl stone with gra of pebbly Silty of pebbly Silty of pebbly Silty ark greenish-bished shear s striations plui h-brown oxida _ A N D S L I greenish-gray nd cobble-size ay and very S x with cobbles xtract the cor	o Sandy S ble size vel-size c Sandstor r Sandstor prown, Sil urface at nge 585E ation D E e clasts ilty s and sma	el-size atrix w I bould Silt lasts ne: N40 ne: N40 ty Clay		
		J				CO Gec SCIENCE allifornia			l, Inc.	Boring backfilled and tame South Shores 32712 Crown Dana Point, C Project No.: 6375-04	Church Valley P alifornia	arkwa			

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						LC)G 0	FB	SOF	RINC	6		
Drill F	lig:		1	Bucket Auge	er.	Boring Dia	meter:	:	24 incl	nes	Boring Elevation:	160± feet	Boring No.
Date	Drillec			2/9/2007	GDH	This log is a re		conseque	ntial cha		time and place of drilling. With ditions.	the passage of time or at an	BN-4
^{12"} DR90 2450		TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU, FT	SHEAR RESISTANCE KIPSISQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE		Descriptions	and Remarks	
*	4									Silty SAN	D: brown, loose	PAD FILL	
			10	7.7	131.5			South and a start of the start	Ш	Displac BRECC mostly g some is @ 7.5 to some sol 26 SE @ 8.5 fe @ 11 to SE; 6-in @ 14 fe plastic S S86E, s Displac @ 15 @ 16 more g @ 20 bed, d @ 21 @ 22 gravel small @ 25 @ 26		weathered Silty Sand well-rounded gravel s h 2-inch Clayey SILT v ons, roots along the base ess weathered 1-inch greenish-brown 22-23 SE, well-develop the base LAND gray with mostly grave arker Sandstone bed, dips few small cobbles to bluish-gray Sandy SI ens, required coring my matrix of Sandy SIL nded clasts and few co 5 NW asts	matrix with ize clasts, with grit and ase: N15E, N30E, 20-25 h, moderately bed striations <u>ISLIDE</u> I-size clasts about 20° E, LTSTONE
								<u> </u> &4	<u></u>		South Shore		



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G. A. Nicoll & Associates, Inc. EARTH SCIENCE CONSULTANTS Irvine, California

South Shores Church 32712 Crown Valley Parkway Dana Point, California

		1.000				LC)G 0	FE	30	RING				
Drill Ri	g:		E	Bucket Aug	er	Boring Dia	ameter:		24 inc	ches B	oring Elevation:	160± fee	et	Boring No.
Date D	MPLE			2/9/2007	GDH			consequ	ential ch	nditions at the time anges in condition	e and place of drilling With I is.	he passage of tim	e or at any	BN-4
^{12.} DROP	BUL _K	TUBE	BLOWS/FT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPSISQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE		Descriptions a	and Remarks		
			25	10.1	127.2				BEDROCK	 @ 31 feet: @ 36.5 feet 16-17 SE) n shear on we @ 32.5 feet @ 35 feet: @ 42 feet: @ 43 feet: Bottom of Notes: 1) Very 2) Borin 	t: very slight seepage small boulder cemented, cored for 9 refusal	ented lens on -inch Silty Cla inch cementer on south side 0 minutes <u>N ONOFRE</u> and 31.5 feet.	iy with gr d lens be	it (N53E, neath the
EARTH						Nicoll (I SCIENCE California			ates, Inc . NTS	South Shores 32712 Crown Dana Point, (Project No.: 6375-04	Valley F California	arkw	550	

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						LC	DG O	FE	30	RING		
Drill I	Rig:		Boyle	37 Truck-m Core rig	ounted	Boring Di	ameter:		4 inc	thes E	Boring Elevation: 233± feel	t Borir No.
Date	Drilled	d:	2/13/07-2/		GDH					l		
	SAMPLE		2/13/07-2/	14/07	GDH	This log is a rother location	epresentation , there may be	of subsu cansequ	rface co iential ch	nditions at the tir langes in conditu	me and place of drilling With the passage of time ons	or at any BN-
¹² " DROP	BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE		Descriptions and Remarks	
										Silty SAND	with Gravel PAD	FILL
	L .								SM	Silty SAND	with Clay and gravel-size clasts	
								200 20 0 10 10 10 10 10 10 10 10 10 10 10 10		clasts in a g crude lense	COLL BRECCIA: mostly gravel-size, subangu greenish-brown, Silty Sand matrix, with as of cobbles and boulders and irregula Sandy Silt; soft and very weathered to	n pockets and ar beds of Silty
							_	A Star		@ 7 feet: s	soft, sheared, 60° - 70° NW	
								Noo!		@ 8 feet: 0	cobbles and small boulders	
	-						- 10 - 	0101010	LIDE	@ 10 to 1 matrix	1 feet: fine, sub-angular gravel-size cla	ists in Silty Sa
	-						 15 	00000	LANDS		: oxidized fracture dips 45° NW : 12 inches hard, bluish-gray boulder	
	F							1121-2		@ 16 to 1 Sandy SIL	9 feet: soft, very weathered, greenish-l TSTONE with sub-angular gravel-size	brown (5Y-5/3) clasts
							- 20 - - 20 -			@ 20.5 fe	: polished shear dips 30° east et: becomes soft and sheared et: shear with 1/8-inch Clay gouge: N4 LANDSLI	
	-							0000	6	Light gree	Displaced? BRECCIA enish-gray (5Y-6/2) fine- to medium-gra with fine, angular rock fragments.	
	Ē	1						C		@ 24 to 2	25 feet: hard boulder	
	F						- 25 -	10:5	DSL	@ 25 to 2 washed ou	27.5 feet: no recovery (probably Silty Si ut)	and matrix
	F						┝ -	THU:	AND		29 feet: hard boulders	
								000		@ 29 to 3 stained.	31.2 feet: soft, very weathered, yellowis	sh-brown, oxid
	6					G. A. I	Nicoll &	Ass	ocia	tes, Inc.	South Shores Church 32712 Crown Valley Pa Dana Point, California	rkway
			/	V		EARTH Irvine, C	SCIENCE (CONSI	ULTAN	NTS	Project No.: Fig 6375-04.1	gure No.: B-6.

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Service and

						LC	DG O	FI	30	RING	6	
Drill	Rig:		Boyle	37 Truck-M Core rig	ounted	Boring Di	ameter:		4 inc	hes	Boring Elevation: 233± feet	Boring
Date	Drille	d:		2/13/2007	CDH							No.
	SAMPLI	E [2/13/2007	GDH	This log is a r other location	epresentation , there may be	consequ	iential cr	nditions at the langes in cond	time and place of drilling. With the passage of time or at a itions.	BN-5
^{12"} DROP	BULK	TUBE	BLOWSIFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPSISQ. FT	DEPTH FEET		SOILROCK TYPE		Descriptions and Remarks	
								いいうないですが、そうないです。こうで、「ない」ないないないないないないないないで、「ない」ないで、「ない」ないで、「ない」ないで、「ない」ないないないないないないないないないないないないないないないない	BEDROCK LANDSLIDE ?	SANDSTO @ 31.5 fe E, 29 NWW @ 31.7 fe @ 32 to 3 brown Silt @ 33.5 to 3 size, sub- @ 35 to 3 size, sub- @ 36.8 fe @ 37 to 3 clasts @ 39 to 4 size clast oxidation @ 43 to 4 gravel- to 0 @ 43.5 fe @ 47 fee @ 47 fee @ 47 fee @ 47 fee @ 47 fee @ 47 fee @ 47 to 0 fractures @ 49 to @ 51 to @ 53 to @ 53 to @ 55 to @ 55 to sized class @ 55 to Sized class @ 58.5 ff Clayey S	eet: dull Shear with 1/4-inch Sandy SILT with eet; 4-inch cemented bed 33.5 feet: slightly cemented, with gravel in gravel by SANDSTONE o 35 feet: no recovery 36.8 feet: light green-gray, Silty Sandstone w angular clasts eet: small, hard cobble 38 feet: greenish-brown and more numerous 39 feet: cobbles 42.7 feet: moderately cemented, Silty SAND s, cobble at 42.7 feet some dark yellowish-br and irregular fractures 47 feet: moderately cemented with more nur small cobble-size clasts feet: irregular shear with thin Clayey SILT goi ned, dips 35° approximately east LAND A eet: 6-inch well cemented bed et: more cobbly: weathered and soft to 47 fee et: thin 1/4-inch, low-angle, Clayey Silt bed 49 feet: small boulders and cobbles and ranc 51 feet: no recovery 54.8 feet: closely fractured feet: 3-inch white quartz cobble 57 feet: no recovery 59 feet: closely fractured, weathered, gravel	Clay: N 18 eenish- th gravel- gravel-size with gravel- own nerous uge and SLIDE? om ngle



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G. A. Nicoll & Associates, Inc. EARTH SCIENCE CONSULTANTS Irvine, California

South Shores Church 32712 Crown Valley Parkway Dana Point, California

Project No.: 6375-04.1

rill F	Rig:		Boyle	37 Truck-Mo Core Rig	ounted	Boring Dia	ameter:	2	4 inch	les Bo	oring Elevation:	233± fee	et	Boring No.
	Drillec			2/14/2007	GDH					ditions at the time	and place of drilling With I	the passage of time	e or at any	BN-5
12" DROP	AMPLE ROLK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	RESISTANCE KIPS/SQ. FT	le de la compañía de		SOIL/ROCK TYPE	ngea in conditions	Descriptions a	and Remarks	I	
								ので、ひょうないないないので、「「「「」」」」」」」」」」」」」」」」」」」」」」」」」」」」」」」」」	BEDROCK	sampler tip) (a) 61.5 to 62. Siltstone with (a) 62 to 62. (a) 62.5 to 6 (a) 63 to 64. weathered, S (a) 64.8 to 66 Sandstone, f (a) 66 feet: f greenish-gra (a) 66.5 feet east with poo (a) 66.6 feet with gravel-s (a) 66.5 feet greenish-gra matrix, sligh size clasts (a) 70 feet: 3 bed with ran (a) 71.5 feet polished she has 1/2-inch (a) 73 feet: 1 (b) 73 feet vith Clay ma (c) 73 feet: 1 (c) 73 feet (c) 81 feet (c) 82.1 to 6 (c) 84.5 feet (c) 85 to 90 (c) 90 FTV lo	5 feet: cemented at 6 3 feet: greenish-brow 8 feet: mostly greenis Silty Sand with Clay m 6 feet: fine- to coarse- finer at 66 feet ine- to medium, weath y (5Y-6/2) : Shear with clay coat ssible striations S 45 : becomes moderatel size clasts : becomes dark bluisi ay (GLEY-2,10BG-4/1 t to moderately ceme b-inch dark greenish-g dom shears, dips app : becomes fine-coarse : 3-inch Clayey Siltsto ears, dip 12 degrees a very stiff Silty Clay t: moderately cemente atrix fine- to coarse-graine- t: becomes very dark (GLE-2, 5GB-4/1 to 51 Silty Sand matrix with avel-size clasts some larger clasts (co 6-inch pebbly Sandst 3-inch cemented bed 83.3 feet: fine-to coarse nted Silty Sandstone 84.5 feet: numerous (coarse) is to coarse-graine- ted Silty Sandstone 84.5 feet: numerous (coarse) some larger clasts (coarse) some larger (coarse)	ted, greenish-ted, greenish-ted, greenish-ted, sindy Silt w bh-brown (5Y-5 hatrix and sub- grained, greei hered, slightly ing, dips abou E y cemented Silt h-gray (GLEY-), fine to coars nted, with sub- gray, very stiff (proximately ease e, slightly classify (2) approximately ease ease (2) approximately (brown Sa cobble vith clay r /3), soft, angular, nsh-brow cemente t 5° appr ilty Sand 2, 5B-4/1 e, Silty S angular, Clayey Si st at aboi ented Sil ayey with east; she clasts in to bluish ate to wel -angular ize) with ular cont cement I ry dark g bbles with grav NOFRE	ndy matrix gravel- rn Silty d and oximately matrix) to dark and gravel- ltstone ut 5° 2 paralle ar at 72.3 Sandy Sil -gray, 1 to few small acts bed reenish-
	(C					. Nicoll			ates, Inc.	South Shore 32712 Crowr Dana Point, Project No.:	n Valley P	arkw	

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June 2

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BN-5

FEATURE TABLE

Borehole ID: BN-5

Azimuth values relative to magnetic north

Depth	Depth	Azimuth	Dip	Depth	Depth	Atimuth	Dip
193	偮	deg	dag	m	ft	ale g	ulada Mada
0.93	3.1	311	59	10.09	33.1	110	42
1.08	3.5	278	64	10.38	34.1	301	66
1.14	3.7	269	64	11.67	38.3	29	74
1.18	3.9	286	63	11.99	39.4	341	65
1.24	4.1	264	59	12.43	40.8	339	43
1.34	4.4	258	64	13.86	45.5	143	42
1.42	4.7	245	58	14.40	47.2	191	40
1.88	6.1	244	76	14.67	48.1	228	69
2.38	7.9	277	66	14.77	48.5	141	60
2.47	8.1	272	69	15.03	49.3	95	47
2.56	8.4	286	71	15.59	51.1	129	64
2.83	9.3	262	56	16,14	53.0	238	29
3.19	10.5	307	79	18.47	54.0	275	26
4.00	13.3	12	62	16.83	\$5.2	286	62
4.44	14.6	262	75	17.32	56.8	245	70
4.51	14.8	260	74	18.06	59.2	Ď	76
4.57	15.0	293	30	18.69	61.3	223	75
4.70	15.4	269	48	20.13	66.0	304	53
4.78	15.7	326	37	20.63	67.7	77	85
4.86	16.0	350	33	21.04	69.0	103	64
4.93	16.2	18	57	21.10	69.2	317	64
5.12	16.8	282	62	21.53	70.0	304	56
5,61	18.4	129	41	21.87	71.8	109	54
5.72	18.8	339	31	21,94	72.0	263	63
0.23	20.4	63	51	22.70	74.5	260	60
6,38	20.9	295	56	24,17	79,3	145	46
6.52	21.4	314	60	24.44	60.2	63	65
6.61	21.7	131	7	24.73	81.1	39	71
7.04	23.1	319	20	25.33	83.1	138	31
7.20	23.6	287	54	25.50	83.7	328	60
7.40	24.3	62	59	25.79	84.6	233	71
7.53	24.7	310	30	26.33	66.4	250	66
7.59	24.9	268	85	28.58	87.2	38	70
7.93	26.0	276	60			••	••
8.00	26.3	255	54				
8.15	26.7	302	50				
8.36	27.A	134	助				
8.38	27.5	294	29				
8.60	28.2	272	49				
8.64	28.4	122	49				
8.69	28.5	268	56				
8.86	29.1	315	28				
9.10	29.9	305	64				
9.10	30.1	71	四				
9.47	31.1	124	78				
9.48	31.1	273	29				



Fig. B-10.1

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						LC	DG O	FE	30	RING				
Drill F			Boyle	37 Truck-M Core Rig	ounted	Boring Di	ameter:		4 inc	thes E	Boring Elevation:	232±	feet	Boring No.
	Drilled			2/15/2007	GDH	This log is a r	epresentation	of subsu	face co	nditions at the tim	ne and place of drilling. With t	he passage of	time or at any	
	SAMPLE					other location	, there may be	consequ	ential ch	nanges in conditio	ons.			BN-6
12" DROP	BULK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOIL/ROCK SYMBOL	SOILROCK TYPE		Descriptions a	nd Remark	S	
									SM	@ 1 foot: n fragments) with Clay: dark brown, eddish-brown Silty CLA		d and rock	
								Werther and the stand of a second of the	LANDSLIDE?	Displaced If Sandy SILT rounded cla @ 6 to 8 fe Clayey SILT angular, gra @ 7 feet: ir Displaced E @ 8 to 9.5 ft @ 9 feet: ti @ 9.5 to 1: clasts in Sil random frac @ 13.5 feet @ 14 to 14 @ 14.5 feet @ 15 feet: @ 16 feet: feet and gre @ 17.2 to weathered @ 19 to 20 @ 20 feet: @ 21 feet: @ 20 to 26 brown (5Y cemented, @ 26 to 27 very weath @ 27.8 to @ 28.3 to SANDSTO @ 29 to 25	et: soft, weathered, gre TSTONE with isolated a avel-size clasts and son rregular Shear dips 45' BRECCIA feet: fine- to coarse-gra ight, 75° oxide-stained 3.5 feet: numerous sub ty SAND matrix, slightly ctures et: 5 inch Sandy SILTS 4.5 feet: Silty SANDSTC et: gravelly layer becomes fine- grained bedding: N 70 W, 21 S becomes fine- to coarse seenish-brown (5Y-5/3) 19 feet: some gravel-si: 0 feet: hard, dark bluish cobble bedding: N 75W, 12 N 6 feet: numerous gravel 5/3 to 6/3) Silty SAND r some oxide staining 7.8 feet: partial recovery ered 28.3 feet: 30° to 60° ra 29 feet: moderately we	ble-size, sub enish-brown and crude the ne random s aned Silty S fracture -angular to y cemented rONE bed and greenis SW (from Of be-grained, w ze clasts, so -gray, quart E -size clasts matrix, sligh y (loose clasts ndom fractu II cemented staining and	b-angular t n (5Y-5/3) in lenses of shears tely east L SANDSTOI rounded gu , some oxi h-brown PTV log ar with no cla oft and ver zite boulded in light gree tly to moded sts only), s gravelly not ceme	ND to o sub- Sandy to of sub- ANDSLIDE NE, tight ravel-size de-satined nd core sts to 17.2 y or eenish- erately soft and
	(G					SCIENCE			i tes, Inc . NTS	South Shores 32712 Crown Dana Point, C Project No.: 6375-04.	Valley I aliforni	Parkwa	

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						LC)G C	F E	30	RING				
rill F	Rig:		Boyle	37 Truck-Mo Core Rig	ounted	Boring Dia	ameter:		4 inc	hes Bo	ring Elevation:	232± fee	t	Boring No.
ate	Drillec	1:		2/15/2007	GDH	This log is a r	epresentation	of subsur	face co	nditions at the time	and place of drilling With	the passage of time	or at any	
5	SAMPLE			1 1		other location	there may be	e consequi	ential ch	anges in conditions				BN-6
¹² " DROP	BULK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU, FT	SHEAR RESISTANCE KIPS/SQ. FT	DEPTH FEET	SOILROCK SYMBOL	SOILROCK TYPE		Descriptions	and Remarks		
								1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Cotto	cemented at @ 30.8 feet: to greenish-g clasts @ 31 to 31. approximatel BRECCIA: @ 31.9 feet: greenish-bro stained fract @ 35 feet: B @ 36 feet: s @ 37 to 41 Sand (rock fr @ 41 to 43 staining @ 42 feet: SILT with Cla @ 43 to 43 @ 45.7 fee fragments a @ 46.5 fee @ 47.5 to 5 weatherd, S scattered, la @ 47.8 fee @ 49.8 feet: @ 49.8 fee @ 49.8 fee @ 49.8 fee @ 50 to 53 mostly San @ 53 to 54 SANDSTO gravel-size @ 54.6 to @ 55.6 fe gray (GLE @ 56.5 fe	numérous gravel- to wn Sandy SILT with ures Bedding from OPTV small white quartz co feet: no recovery; cu agment plug in the b feet: cobbles and sn approximately 30° pc ay gouge .8 feet: No recovery to feet: closely-fractu s with greenish-brow t: 3-inch Shear with 0 nd black (hornblend) t: maller clasts, sligh 50 feet: not cementer slity Sand matrix with arger clasts t: 25° polished Shea Bedding: N15 E, 10 t: larger clasts st: stiff Sandy SILTS b feet: no recovery, re	TSTONE, light oft and sheared ed shears dip 1 small boulder- Clay matrix wit log: N 65 E, 15 bble ttings are fine- it) nall boulders, fr olished shear w ured cobbles ar on Clayey SILT clayey SILT and fragment: N 43 tly cemented d, greenish-brov small gravel-si r and soft to 48 NW (from OPT FONE bed bock plug in cutti greenish-brown d with mostly fi n, irregular San sh-brown Claye ips 45° approxi	greenis f, few rai 5 to 20° <u>LANDS</u> size class h randor SE to coars actured ith 1/4-ir d small coating d small 5 E, 19 S wn, mos ize class 3 feet V log) ing head a Silty ne- to m dy Siltst y SILT mately of im to da ay (unox	h-brown ndom <u>CLIDE</u> sts in n, oxide- e-grained with oxide nch Sandy boulders, along rock SE tly s, with few (probably nedium- one beds east rk greenis idized) an
	(C	1			EART	. Nicoll H SCIENC California			i ates, Inc . ants	South Shore 32712 Crow Dana Point, Project No.: 6375-0	n Valley F California	arkw	

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Balada Loop

	Rig:		Boyle 3	37 Truck-Me Core Rig	ounted	Boring Di	ameter:		4 inc	hes	Boring Elevation:	232±	: feet	Boring
	Drilled			2/15/2007	GDH	This log is a r	epresentation	of subsu	uface co	nditions at the t ranges in condit	ime and place of drilling	With the passage o	f time or at any	No. BN-6
^{12"} DROP	BULK	TUBE	BLOWSIFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB./CU. FT	SHEAR RESISTANCE KIPS/SQ. FT	6	SOIL/ROCK SYMBOI	YPE			ons and Rema	rks	
								8 O O O	BEDROCK	 @ 60 to 6 Silt inclusion @ 60.5 fe @ 60 to 6 clasts in da @ 61 to 61 CLAY beds few isolate degrees ap @ 63.8 fee Bottom of Notes: 1) No gi 2) OPT 	:: becomes harder, a1 feet: greenish-gra ons and mottling let: bedding: N 10 V 64 feet: mostly fine, ark greenishpgray, 1 .5 feet: several thir is with polished she d, rounded pebbles oproximately east et: small cobble of boring at 64 feet. round water encour V logged on 2/16/0 Ig backfilled with be	ay with light bro V, 18 NE gravel-size, sul unoxidized, Silty h, hard, dark gre ars along beddi a in the CLAY be Solution A subscription A subscripti	b-angular to y SAND mat eenish-gray ng and waxy eds; beds di SAN ONOFF	rounded rix Silty v texture; p 7 to 10
						G. A.	Nicoll 8	Δο	soci	ates Inc	South Sho 32712 Cro Dana Poin	wn Valley	Parkwa	ay

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BN-6

FEATURE TABLE

Azimuth values relative to magnetic north

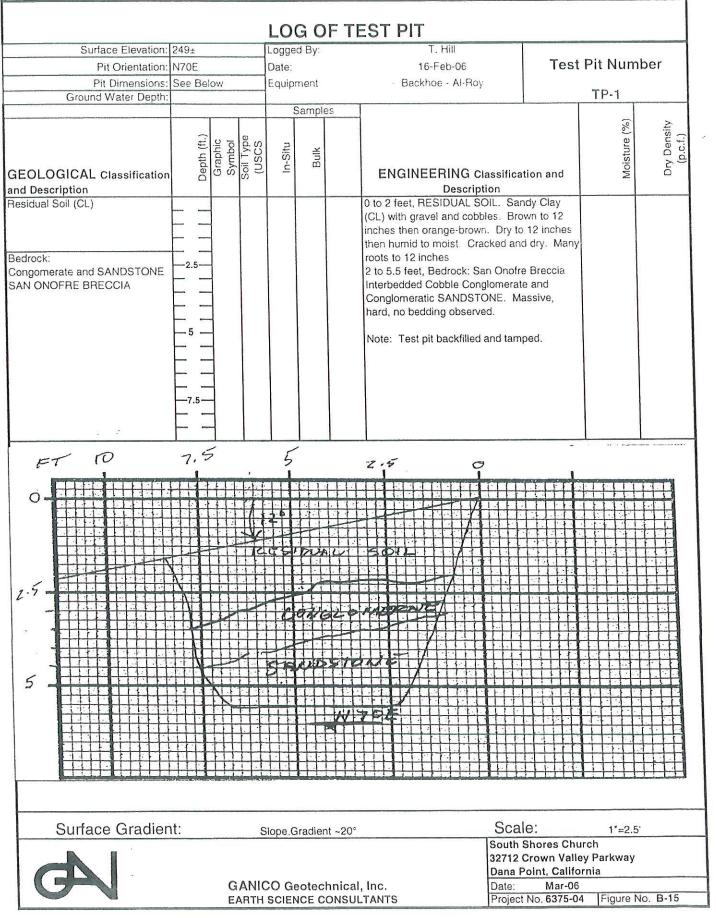
DepthDepthAzimuthDipmftdegdeg 0.28 0.9 237 46 0.53 1.8 247 18 0.56 1.8 232 51 0.72 2.4 164 43 0.98 3.2 235 9 1.27 4.2 274 32 1.36 4.5 288 38 1.87 6.1 256 36 2.02 6.6 200 50 2.30 7.5 64 50 2.30 7.6 257 48 2.57 8.4 90 35 2.59 8.5 268 35 2.74 9.0 60 31 2.78 9.1 198 54 3.04 10.0 72 40 3.43 11.3 243 44 3.65 12.0 253 52 3.68 12.1 247 41 4.37 14.3 138 32 4.57 15.0 200 21 4.84 15.9 341 32 5.00 16.4 302 32 5.14 16.9 253 39 5.69 18.7 283 25 5.95 19.5 54 38 6.24 20.5 264 46 6.38 20.9 0 12 8.29 27.2 2 27 8.86 29.1 </th <th></th> <th></th> <th></th> <th></th>				
mftdegdeg 0.28 0.9 237 46 0.53 1.8 247 18 0.56 1.8 232 51 0.72 2.4 164 43 0.98 3.2 235 9 1.27 4.2 274 32 1.36 4.5 288 38 1.87 6.1 256 36 2.02 6.6 200 50 2.30 7.5 64 50 2.30 7.6 257 48 2.57 8.4 90 35 2.59 8.5 268 35 2.74 9.0 60 31 2.78 9.1 198 54 3.04 10.0 72 40 3.43 11.3 243 44 3.65 12.0 253 52 3.68 12.1 247 41 4.37 14.3 138 32 4.57 15.0 200 21 4.84 15.9 341 32 5.00 16.4 302 32 5.14 16.9 253 39 5.69 18.7 283 25 5.95 19.5 106 31 5.95 19.5 54 38 6.24 20.5 264 46 6.38 20.9 0 12 8.29 27.2 2 27 8.35 27.4 <	Depth	Depth	Azimuth	Dip
0.28 0.9 237 46 0.53 1.8 247 18 0.56 1.8 232 51 0.72 2.4 164 43 0.98 3.2 235 9 1.27 4.2 274 32 1.36 4.5 288 38 1.87 6.1 256 36 2.02 6.6 200 50 2.30 7.5 64 50 2.30 7.6 257 48 2.57 8.4 90 35 2.59 8.5 268 35 2.74 9.0 60 31 2.78 9.1 198 54 3.04 10.0 72 40 3.43 11.3 243 44 3.65 12.0 253 52 3.68 12.1 247 41 4.37 14.3 138 32 4.57 15.0 200 21 4.84 15.9 341 32 5.00 16.4 302 32 5.14 16.9 253 39 5.69 18.7 283 25 5.95 19.5 106 31 5.95 19.5 106 31 5.95 19.5 54 38 6.24 20.5 264 46 6.38 20.9 0 12 8.29 27.2 2 27 8.35 </td <td>2 1 1</td> <td>59.27</td> <td></td> <td></td>	2 1 1	59.27		
0.53 1.8 247 18 0.56 1.8 232 51 0.72 2.4 164 43 0.98 3.2 235 9 1.27 4.2 274 32 1.36 4.5 288 38 1.87 6.1 256 36 2.02 6.6 200 50 2.30 7.5 64 50 2.30 7.6 257 48 2.57 8.4 90 35 2.59 8.5 268 35 2.74 9.0 60 31 2.78 9.1 198 54 3.04 10.0 72 40 3.43 11.3 243 44 3.65 12.0 253 52 3.68 12.1 247 41 4.37 14.3 138 32 4.57 15.0 200 21 4.84 15.9 341 32 5.00 16.4 302 32 5.14 16.9 253 39 5.69 18.7 283 25 5.95 19.5 106 31 5.95 19.5 54 38 6.24 20.5 264 46 6.38 20.9 0 12 8.29 27.2 2 27 8.35 27.4 211 21 8.49 27.9 49 14 8.57 </td <td>0.28</td> <td></td> <td></td> <td></td>	0.28			
0.56 1.8 232 51 0.72 2.4 164 43 0.98 3.2 235 9 1.27 4.2 274 32 1.36 4.5 288 38 1.87 6.1 256 36 2.02 6.6 200 50 2.30 7.5 64 50 2.30 7.6 257 48 2.57 8.4 90 35 2.59 8.5 268 35 2.74 9.0 60 31 2.78 9.1 198 54 3.04 10.0 72 40 3.43 11.3 243 44 3.65 12.0 253 52 3.68 12.1 247 41 4.37 14.3 138 32 4.57 15.0 200 21 4.84 15.9 341 32 5.00 16.4 302 32 5.14 16.9 253 39 5.69 18.7 283 25 5.95 19.5 106 31 5.95 19.5 106 31 5.95 19.5 54 38 6.24 20.5 264 46 6.38 20.9 0 12 8.29 27.2 2 27 8.35 27.4 211 21 8.49 27.9 49 14 8.57 <				
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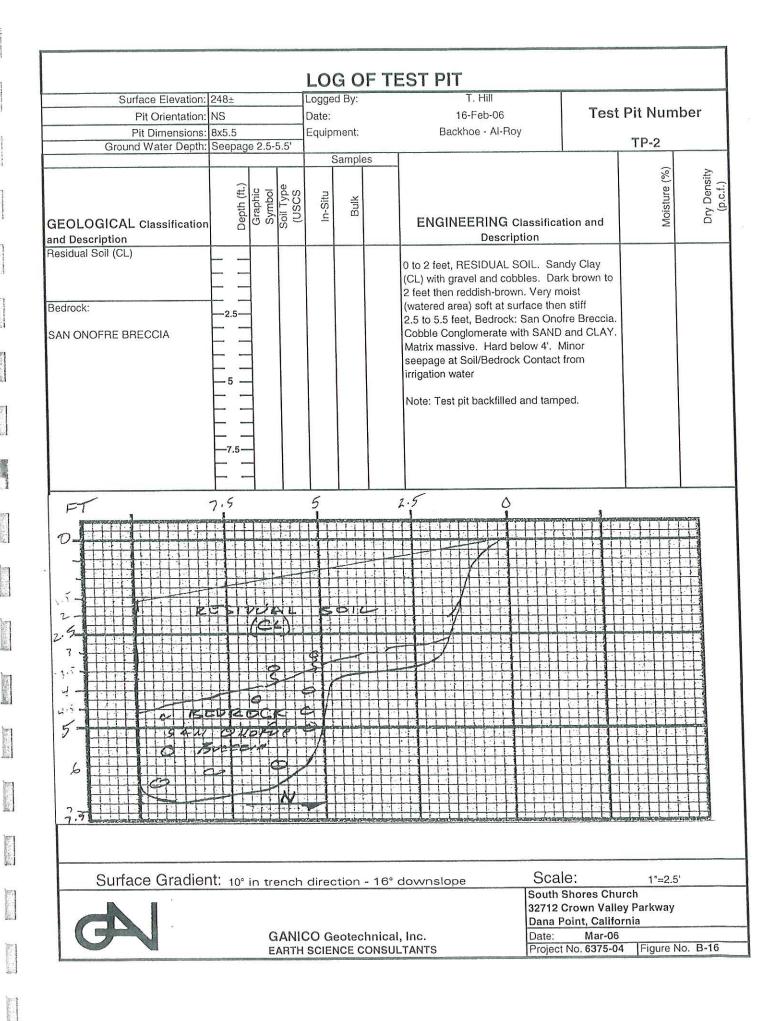
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Depth	Depth	Azimuth	Dip
m	ft	deg	deg
14.62	48.0	269	10
14.79	48.5	276	19
15.65	51.3	260	27
15.98	52.4	239	30
17.21	56.5	265	44
17.56	57.6	322	24
17.69	58.0	165	25
18.45	60.5	64	18
18.92	62.1	278	27
19.45	63.8	146	42

G. A. Nicoll & Associates, Inc.
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May 2007



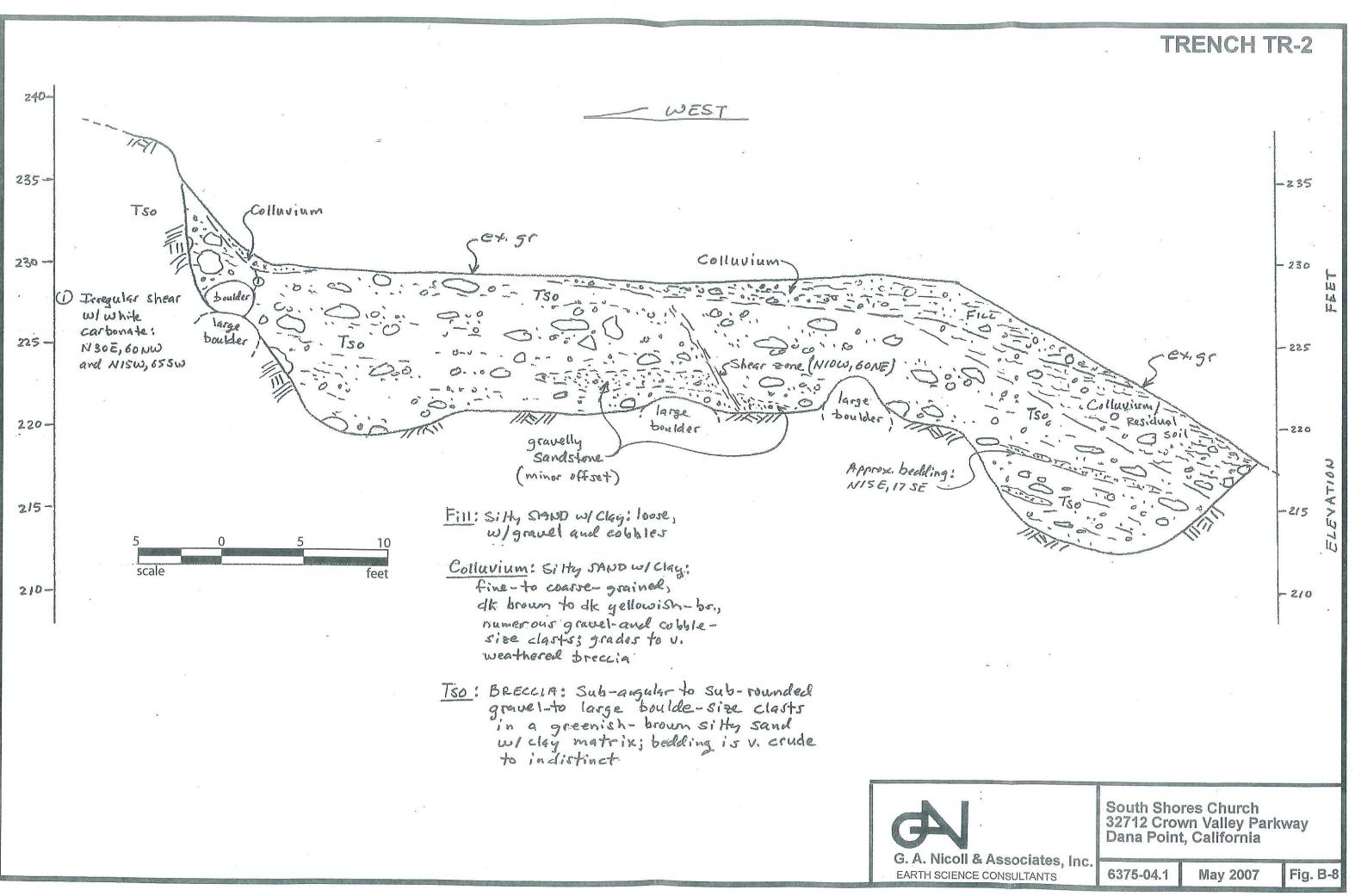


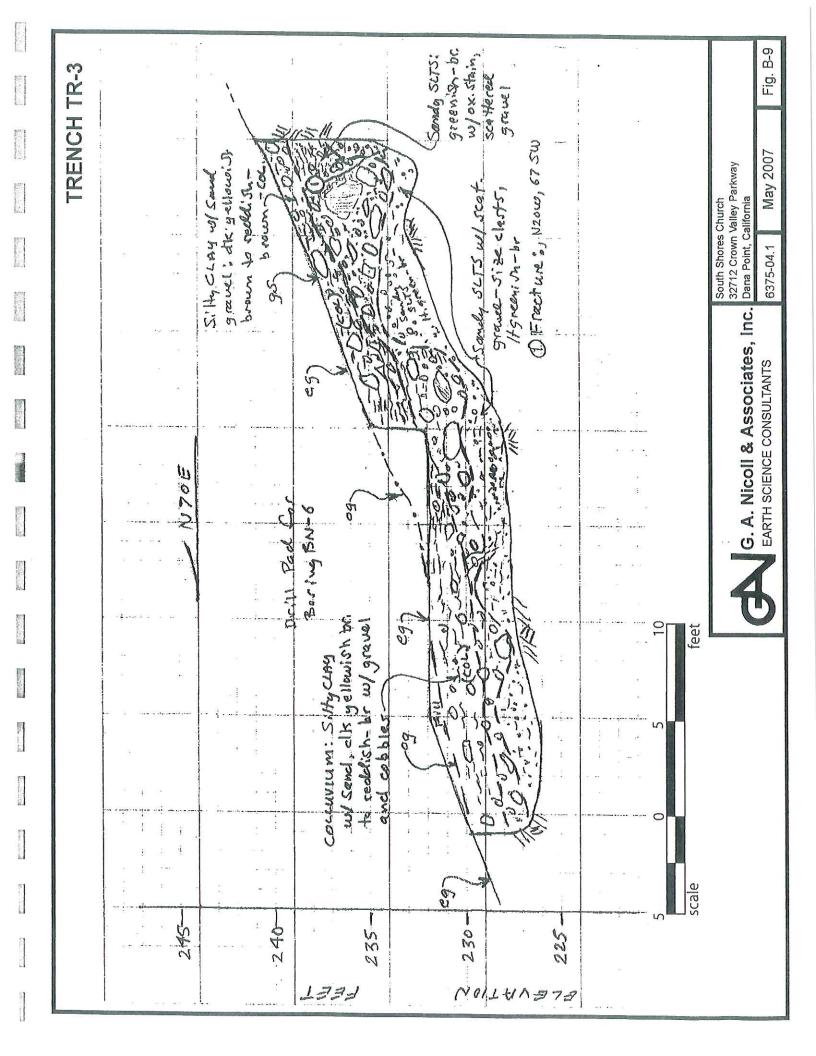
							an a							
1							LO	G OF	TEST P	ITS				
2011 - 171 325	Surfac Pit Ori Pit Din	entatio nensio	n: ns:	269± feet N/A 2'x3'x5.5'		Logged Date: Equipm		T. Hill 3/9/2006 Hand Auger				Test Pit Number T-1		
	Groun Sam		r Depth:	None Enco	ountered									
The second se	Bulk	Tube	Depth (ft.)	Moisture (%)	Dry Density (p.c.f.)	Graphic Symbol	Soil Type (USCS)		DESCRIPTION AND REMARKS					
				18.6	105.1		CL	Sandy CLAY:	dark brown, very moist, soft, many roots, 14" thick TOPSOIL					
1 157 1960				16.7	105.5	0.0.0	CL	Sandy CLAY:	reddish-brown, moi	ist, very stiff, fin	ie roots, fe	w cobbles (14 to 28") RESIDUAL SOIL		
Constant and			— 5 — — — —	14.7	114.2	200	BEDROCK		avel to boulder-size avate (28 to 66")	e clasts in a san	idstone ma	trix, no bedding found, very SAN ONOFRE BRECCIA		
								Bottom of pit Note: 1) No caving. 2) Pit backfille	at 5.5 feet. ed and tamped.					
	Pit O Pit D	rientat imensi	ons:	263± FEE N/A 1.5x1.5x2 a: None End	2.5'	Date:	ed By:	T. Hill 3/8/2006 Hand Equipn	nent			Test Pit Number T-2		
							CL CL		: dark brown, very r yellowish-brown, mo			ents FILL ck fragments, grades to bedrock RESIDUAL SOIL		
100]			N X	Gravelly SAI	NDSTONE: massive	e, hard	•	SAN ONOFRE BRECCIA		
				-			BEDROCK	Bottom of pi Note: 1) No caving 2) Pit backfi		·				
A second se			 15·											
									South Shores Chur 32712 Crown Valle	y Parkway		ann grudu lan an lan ann an tao na tha fhairt a' Brenn Rith ann an Air Ann an Air Ann an Air		
2	(0	. G	A. NICO		ssor	IATES, INC.	Dana Point, Califor	rnia April-06				
J.)					RTH SCIEN				Project No: 6375-0		Figure N	o. B-17		
	Eastering													

urfar	e Eleva	tion	265± feet		Logged		G OF TEST PIT	·					
it Ori it Dir iroun	entatio nensior	n: ns:	N/A 2x3x5' None Enco	ountered	Date: Equipm		1. mil 3/9/2006 Hand Equipment	2	Test Pit Number T-3				
Bulk	Tube	Depth (ft.)	Moisture (%)	Dry Density (p.c.f.)	Graphic Symbol	Soil Type (USCS)	DESCRIPTION AND REMARKS						
Τ.							Sandy CLAY: dark brown, very moist,	dy CLAY: dark brown, very moist, soft, roots LANDSCAPE SOIL					
			7.6	115.5		SC/ CL		SAND and Sandy CLAY: layered, brown and reddish-brown, very moist, stiff/dense, cobbles, few brick and branch fragments FILL					
			13.2	110.5			Sandy CLAY: reddish-brown BRECCIA: Boulders, hard	1	RESIDUAL SOIL				
		10 10 15	-			BEDROCK	lote:) No caving.) Pit backfilled and tamped.						
	ce Elev		351± feet	0	Logge	d By:			Test Pit Number				
Pit D	rientati imensio nd Wat	ons:	1.5x1.5x2		Date: Equipr	nent:	3/8/2006 Hand Equipment						
	-				D.T.A	CL	Sandy CLAY: dark brown, moist, stiff		COLLUVIUM				
					9.00 2.00			rk yellowish-brown, moist, stif, rock fragments RESIDUAL SOIL ONE with Gravel and Cobbles: yellowish-brown, massive, hard					
								1	SAN ONOFRE BREC				
						BEDROCK	Bottom of pit at 2.6 feet. Note: 1) No caving. 2) Pit backfilled and tamped.						
		South Shores Church 32712 Crown Valley Parkway											
		-15-						rkway					
(G			A. NICOI			32712 Crown Valley Par Dana Point, California ATES, INC. Date:	rkway April-06 Figure N					

							LO	GOF	TES	ST P	ITS			
	Pit Ori Pit Din		n: ns:	237± feet E-W 2x5x3.5' None Encc	ountered	Logged Date: Equipm		T. Hill 3/8/2006 Hand Equipr	nent				Test Pit Number T-5	
Transmission and the second	Bulk	Tube	Depth (ft.)	Moisture (%)	Dry Density (p.c.f.)	Graphic Symbol	Soil Type (USCS)			DESCI	RIPTION A	ND REM	ARKS	
			5 5 10 10 10 115	7.2	119.3	Q.5.5		diameter Sandy CLA	/: medium b DSTONE wi t at 3.5 feet. j.	rown, mois	st, stiff, rock f	ragments	oist, stiff, fragments to 12" COLLUVIUM RESIDUAL SOIL prown, massive, hard SAN ONOFRE BRECCIA	
]	Pit Or Pit Di	ce Elev ientatio mensic nd Wate	on:			Logged Date: Equipr							Test Pit Number	
harden bernand bernand bernand bernanden bernanden									South Shor	as Church				
		3			A. NICOL th scienc			ATES, INC. rs	32712 Crov Dana Point Date: Project No	vn Valley , California ;	Parkway	Figure No		
1	-			0.0						6375-04		1	B-19	

ENGING PROPERTIES		к) 3; 31 1384 1485 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.8.0. 0.8.0. AS X UTSIO 9MAS 9MAS 9MAS	0ห เ ากย				CH ORIENTATION:	
LEVEN LOG	PROJECT NAME: South Shores Church TRENCH NO.:	JOB NO.: 6375-04 DATE: 03-09-06	EQUIPMENT: Hand Dug	LOGGED BY: Tom Hill LOCATION: Hillside	0-9" Dark yenowisit-prowit, Janua Control of acturing. loose, with organics, roots, prismatic fracturing.	9"-2.5' Residual Soil/Weathered Bedrock: dark reddish-brown, Sandy CLAY with Bedrock fragments from gravel to boulder-size. Moist, stiff with roots. Blocky, prismatic fractures.	2.5-3.5' Bedrock: San Onofre Breccia. Yellow-brown gravel cobble breccia with sandstone matrix. Massive, hard, slightly to moderately fractured.	-> How Cookers	SCALE: 1"=5' TOPOGRAPHY: Hillside existing ground existing ground trench profile trench profile trench profile trench profile trench profile trench profile trench profile trench profile





10G OF BODING

					£.	-06	Ur	D	ORING	
Drili I	Rig:	Rucket A			Boring Di	ameter:			Boring Elevation:	
Date	Drille	Bucket Au d:	iger				28 Inc	hes	Boring Elevation: Boring 175 feet No.	
	IPLE	9/13-14/08	5	GDH	This log is a r	epresentation	of subsu	ríace co	nditions at the time and place of drilling. With the passage of time or at any	1
SAN	PLE		[[1			langes in conditions.	
BULK	TUBE	BLOWSRFT	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LBJCU. FT	SHEAR RESISTANCE KIPS/SO. FT	DEPTH FEET	Soll Proch	SOILROCK TYPE	Descriptions and Remarks	
		push	24.7	92.2				CL	Silty CLAY with Sand: dark greenish-brown, very moist, firm, som rock fragments	e
		push							@ 10 feet, large rock fragment	
-		push	24.2	96.3		 15			14 to 17 feet, mostly dark brownish-gray, odorous with some the some the some the source of the	
L	1								YOUNGER GENERATION (?) F	FILL
-		push				20 -			Clayey SILT to Silty CLAY with Sand: brown to greenish-brown, moist, firm to stiff, siltstone fragments	
-								ML/ CL	@ 21.5 to 22.5 feet, soft, very moist layer	
E		push	21.5	100.7		- 25 -			© 25 feet, becomes more stiff	
-									OLDER GENERATION @ 28 feet, contact, clean, slight dip to west FILL	√ (?)
							Server 1	ML/ SM	Displaced, Sandy SILT: dark brown (7.5 YR-3/3-4/3) to reddish- brown (5 YR-3/3), numerous gravel and cobble clasts, some "roti granitic clasts	ten"
			With and Party Street	and the second						
									Lyon - Monarch Coast Apartments Building 32 Reconstruction	



GANICO Geotechnical, Inc. EARTH SCIENCE CONSULTANTS Irvine, California

G6328-04

Project No.:

Figure No.: B-4.1

LOG	OF	BORING
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Drill Rig:	Bucket Au	aer		Boring Diar	neter:	28 ind		В	Boring Elevation:	Boring
Date Drille SAMPLE		9/14/2005	GDH	This log is a rep other location, U	presentation here may be				175 feet	No.
BULK - TUBE	BLOWSFT.	FIELD MOISTURE % DRY WEIGHT	DRY DENSITY LB.JCU. FT	SHEAR RESISTANCE KIPS/SQ. FT	F	SOIL ROCK SYMBOL	7PE		Descriptions and Remarks	BA-3
	4 4 2 2 8	25 E 33.4 40.0 46.5	77.3 77.1 67.3		<u>4</u> 	The start of the s	ML∕	 © 30 feet, m © 32.5 to 33 with only few and few sma © 34 feet, m © 35 feet, m Displaced, C numerous ra © 39 feet, S © 42.5 to 44 © 43.5 to 44 © 45 feet, ir silty inclusion 	 8.5 feet, irregular contact with greenish-gray S rounder gravel clasts; some yellowish-brown and roots at contact hore Sandy hore Clayey and mottled OLDER LANDSLID clayey SILTSTONE: greenish-gray, weathere indom, polished slicks chear: N55W,28NE 4 feet, dark gray and tightly folded 4.5 feet, broken cemented bed on west side or regular clay seam: N05E,14-15SE; with some regular clay seam: N05E, 14-15SE; with so	n oxidation E - QIs₀(Qt) d, stiff; of fold e light gray
	5 3 5 7	9.1	128.2			0.0.0011100 465555 46500 000 000 000	BEDROCK	 Ø 48 feet, s Ø 48.5 to 50 Ø 50 feet, s Ø 50.5 feet, Ø 52 feet, F Ø 53.5 to 5- grooves on s Sandy SILT clasts Ø 58 feet, F 	All provide the second state of the second sta	and shallov m) e gravel-siz
a.				-					Lyon - Monarch Coast Apartments Building 32 Reconstruction	



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Project No.: G6328-04

Figure No.: B-4.2

LOG OF BORING

	D 1 D			
Drill Rig: Bucket Auger	Boring Diameter:	28 inches	Boring Elevation: E	Boring No.
Date Drilled: 9/14/2005 GDH			1	MC)
SAMPLE	This log is a representation of other location, there may be of	consequential cha	ditions at the time and place of drilling. With the passage of time or at any	BA-3
BULK TUBE BLOWSFF, MOISTURE & MOISTURE & DRY DENSTTY DRY DENSTTY LB.CU. FT	SHEAR RESISTANCE KIPS/SQ. FT DEPTH FEET	SOLLAOCK SYMBOL SOLLAOCK TYPE	Descriptions and Remarks	
		BEDROCK	 60 feet, cemented lens SAN ONOFRE B Bottom of boring at 65 feet. Note: Slight seepage at 48 and 50 feet. No caving. Boring backfilled and tamped. 	BRECCIA
A	GANICO Geo	otechnica	Lyon - Monarch Coast Apartments Building 32 Reconstruction	

B-4.3

Figure No.:

EARTH SCIENCE CONSULTANTS Irvine, California

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Project No.:

G6328-04

G UF BURING	Logged by: 24inch bucket auger Logged by: RH/RM	Description	ARTIFICIAL FILL (Af) Asnhaltic Concrete	Silt: Clayey to sandy with fragments of rock, greenish gray to brown.	Silt: Sandy to clayey, brown, moist. Silt: Clayey to sandy with fragments of rock, greenish gray to	Silt: Clayey to sandy with fragments of rock, greenish gray to brown.]	[Silt: Clayey to sandy with fragments of rock, greenish gray to brown.]	large rock fragment	[Silt: Clayey to sandy with fragments of rock, greenish gray to brown.]	
	to	οιημία Γοg	AF AF				<i>Ş2</i>		<u>ک</u>	۲. ۲. ۲.
	177 feet	(tootni) noitavol∃		-175	-170			-165		-160
	+1	(test ni) dtqsQ			້		10-		15-	
	199 199 10110	Blows perfoot			push 3350 Ib.bar		push 3350 bbar		push 3350 Ib.bar	
24 1	o d i cimet	Dry Unit Weight (1bs. per cu. ft.)			100.3		93.4		97.6	
2	Boring No. Date: June Surface E	tnstncContent (%)			24.4		30.4		25.6	
and a	Bor Dat	diqsO bno .oV sigmu	PS		مر م		S-2 10,		S-3 15'	

3 25.6 97.6 push 15- 160 15- 160 19.5 103.9 push push push 19.5 20- 160 19.5 103.9 gaso gaso push push push push push push push push	[Silt: Clayey to sandy with fragments of rock, greenish gray to brown.]	 [Silt: Sandy to clayey, tan to brown.] [Silt: Sandy to clayey, tan to brown. Silt: Sandy to clayey, tan to brown. BEDROCK- SAN ONOFRE BRECCIA (Tso) Breccia: Angular fragments of rock (schistose) in silty sand matrix, brown. 	Breccia: Angular fragment of rock (schistose) in sandy silt matrix, blueish gray to rusty brown with veins of caliche.	Breccia: Clayey silt, brown, sheared.	Breccia: Angular fragments of rock (schistose) in sandy silt matrix, brown. Breccia: Angular fragments of rock (schistose) in clayey sand matrix, brown.	Breccia: Angular fragments of rock (schistose) in silty sand matrix, brown. Breccia: Angular fragments of rock (schistose) in sandy silt matrix, gray to reddish brown. water scepage Bottom of Boring at 43 feet (refusal)
3 25.6 97.6 push push 25.6 97.6 3350 15- 19.5 103.9 push 20- 19.5 103.9 push 20- 19.5 100.6 2045 30- 14.2 120.1 2045 30- 14.2 120.1 2045 30- 14.2 120.1 2045 35- 14.2 120.1 2045 35- 14.2 120.1 2045 35- 14.2 120.1 2045 35- 14.2 120.1 2045 35- 14.2 120.1 2045 30- 15.bar 133.1 2045 40- 7.7 133.1 2045 40- 1.1 1.0.5 10.5 1-	Af	1 m	1.		$\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$	1/2005
3 25.6 97.6 push 3350 10.5 97.6 3350 19.5 103.9 push 19.5 103.9 push 19.5 103.9 2350 19.5 103.9 24.7 19.5 100.6 2045 14.2 120.1 2045 14.2 120.1 2045 14.2 120.1 2045 14.2 133.1 2045 17.7 133.1 2045 1.14.5 100.6 55				<u>-</u>		
3 25.6 97.6 19.5 103.9 7.9 144.0 24.7 100.6 14.0 14.2 120.1 14.2 120.1	push 3350 Ib.bar	push 3350 b.bar	10 3350 Ib.bar	7 2045 Ib.bar	5 2045 lb.bar	14 2045 Ib.bar
3 25.6 19.5 7.9 7.7 7.3	97.6	the second s	the second se	the second se		
0, B 20, C 2		19.5	6.7			
	2, 3 7 - 3 7 - 3	S-4 20'	22'2 20'2	30, 30,	35' 35'	8-8 40,

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LOG OF BORING	Ig No.: LB-2 <u>August 7, 1997</u> Ice Elevation: ± 178.5 feet Logged by: <u>RH/RM</u>	Moisture Content (%) (1bs. per cu. ft.) Blows per foot Depth (in feet) Elevation (in feet) Graphic Log	ARTIFICIAL FILL (Af Asphaltic Concrete			.0 30.0 2400 0 15.bar	0	-1/0 Al Sand: Clayey to silty, brown.	137.2 12 10 D BEDROCK- SAN ONOFRE BRECCIA (Tso) 137.2 2400 Tso Breccia: Angular fragments of rock (schistose) in sandy matrix, brown.	-165 Breccia: Angular fragments of rock (schistose) in silty sand matrix, tan to brown.	15- Decode: Angular fragments of rock (schistose), some relatively large, in clayey to sandy silt matrix.
NC .	No.: El	Dry Unit Welght			0	2.0			CV.		1
	Boring Date: <u>A</u> Surface	Moisture Content			۲ د	2 7			8.0		, , I
		Sample No. and Depth		ingent officers and	ן גי	ີ້ ທ			S - 2		S-3 15

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Graphic Lc.	ARTIFICIAL FILL (Af) Asphaltic Concrete	Silt: S:	Sand: Silty to clayey, tan to brown.	Silt: Clayey, greenish gray to brown.	Sand: Silty, reddish brown.	Silt: Clayey to sandy, greenish gray to brown.	becomes somewhat moist	Sand: Clayey to silty, brown.	DEDROCK- BEDROCK- Breccia:	Breccia: Angular fragments of rock (schistose) in silty sand matrix,	Rreccia: Anoular fragments of rock (schistose), some relatively		D becomes very firm		Clay seam: Somewhat silty to sandy, white to light tan, somewhat	Attitude of Clay Seam: N20°W, 24°NE	Breccia: Angular fragments of rock (schistose) in sandy to slightly	\mathcal{O}	so Δ Bottom of Boring at 26 feet (refusal)
	A	ji Il				•.	0	¥ 		<u>s</u> C ···		ා. 	. :	S.	111	:	<u>ب</u> ر ب	/ ງ ດ	57
'ni) noitoval∃			-175					-170		. L (0			. 091-				-155	
rəîni) diqa D					'n				Ö.	э		15				Ö N			25
Blows perto				~	2400					10.0ar		I	÷	2		b.bar			
Dry Unit Wel (1bs. per cu.					96.3	· 20862704			137.2			1	(*)		136.2				
Moisture Cont (%)		24			27.5				8.0			1			8.8				
] bno .oN siqmo	s			1	1 in				S-2 10°			S-3). 		4-0.	G. 5			

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Boring No: LB-3 LOG OF BORING Job No: . 83-102 Boring No: LB-3 Dade: Augest 7, 1897 Logged by: 241neh bucket auger Dade: Augest 7, 1897 Excovated by: 241neh bucket auger Logged by: BH/RM Surface Elevation: 17, 1897 Excovated by: 241neh bucket auger Logged by: BH/RM Surface Elevation: 17, 1897 Excovated by: 241neh bucket auger Logged by: BH/RM Surface Elevation: 17, 1897 Excovated by: 241neh bucket auger Logged by: BH/RM Surface Elevation: 17, 1897 Description Description Solid Sinty recur, control Description Description Solid Sinty reddition Sinty reddition Description Solid Sinty reddition Descre														
Anisture Content Moisture Content 4.0 0.1 4.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 141.0 0.1 15.1 10	OF BORING		Description	ARTIFICIAL FILL (AI)	Asphaltic Concrete		Sand: Silty, reddish brown. Silt: Sandy to clayey, greenish gray to brown.	6	N N	BEDROCK- SAN ONOFRE BRECCIA (Tso)		0.000	lots of rock fragments large rock fragment (8 inches)	
rring No:LB-311 </td <td></td> <td>Ø</td> <td>οι σίμαριο</td> <td></td> <td>1 1</td> <td> *` *` </td> <td></td> <td>5</td> <td></td> <td>-</td> <td>Tso ()</td> <td></td> <td>$\frac{1}{2}$</td> <td></td>		Ø	οι σίμαριο		1 1	*` *` 		5		-	Tso ()		$\frac{1}{2}$	
Tring No:LB-3110.10.10.10.10.10.10.10.10.10.10.10.10.1141.00.1141.0141.0141.0141.0141.0141.01510151015101510		78.	(təətni) noitpvəl∃						-170			-165		
Noisture Content Noisture Con		+1	(tsəîni) diqəD					4					15	
Noisture Content Noisture Con		7, 19 Vatic	Blows perfoot				1 2400	ľb.bar		11 2400	ľb.bar			
Sample No. and Depth Sample No. and Depth 10.2 Sample No. and Depth 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.2 0.1 0.3 0.1		No.: J Jugust Ele	Dry Unit Weight				() ()			41.0	•			
Sample No. and Depth Supple No. and Depth		e: Au face					r Ce			4.8				
		Bor Dat Sur	ringe No. and Depth	٥S			S - 1	2 ¹		S - 2	0			

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A	Silt: Sandy to clayey, greenish gray to Silt: Sandy to clayey, greenish gray to BEDROCK- SAN ONOFRE BRECCIA (7 Breccia: Angular fragments of rock (s sand matrix, greenish gray to	Breccia:	Breccia: Angular fragments of rock (schistose) in a gravelly to silty eand matrix, greenish gray to reddish brown.	Deccia: Angular fragments of rock (schistose) in a sandy to clayey silt matrix, brown.	Breccia: Angular fragments of rock (schistose) in a sandy to clayey silt matrix, greenish gray to brown.	· · · · · · · · · · · · · · · · · · ·		Clay Seam: Somewhat silty to sandy, white to light tan, somewhat sheared.	Breccia: Angular fragments of rock (schistose) in a silty to clayey sand matrix, greenish gray to reddish brown.	Tso Jots of rock fragments		S (Bottom of Boring at 37 feet (refusal)
	021	165		160		155		150		-145		
	0	iu u	2	L	20-		25-		-0 8			0 0 0
ī	11 2400 b.bar						6 1550 1b.bar	, 15 ,	1550 Jb.bar			
·	4 1. 0 2 Jb						28.6 1	C	0.00			
,		<u></u>					1.0		 Ω.			
	S - 2 10.						8-13 25, 1	4	10			

-	I NOU		- 21- 8 REGIS	INRE.	A 15	DRILL	HOLE	No		LB-1 (B) Leighton Boring at N cut SHEETOF PROJECT NO. <u>1851456-6</u>
•.	DRIL Hole Eley	LING E DIAM VATION	Co ETER TOP OF	30-JA 24" HOLE-2	C / SH	ORINE DRIVE REF. C	<i>e En</i> Weigh R Dat	<u>GINE</u> T <u>250</u> UM	20 16, /1500 18	TYPE OF RIG BUCKET , Cas'/150 14, C 45' DROP 12 TECHNICAL MAP
	o Depth. ≪ Feet	GRAPHIC LOG	т Атттиреs	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	POISTURE CONTENT, Z	Sort CLASS.	Logged by _ Sampled by	
	0 		GB GITTING GB GITTING	(d) 1		/24.1	10.2	GNY GC	San Onofr Q 12' Q 14.5'	<pre>e Breccia: Orange-brn - mottled w/ gray, damo, dense, clayey sandy breccia; abdt cobbles & pebbles; clasts predom. blueschist; large amt thin roots to 4'; iron-stained; massive.</pre> Clasts smaller in size @ 12-18", increase in moisture. SE wall - large boulder 1-2' diam., above sandy zone. Large boulder on west side of hole 2' diam.; some discontinuous sand lenses, poorly developed. Increase in clayey sand. Kinor belling of bore hole.

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			- 21- REGIS						BORING LOG B-1 SHEET - OF - 3
	DRI	LLING	Co. B	D- JA	C / SH	ORIN	GENC	INEE.	PROJECT No. 1851456-01
and the second second	HOLI	e Diam vation	ETER	24" HOLE 2	55′±	DRIVE REE O	WEIGH	T _3800	TYPE OF RIG BUCKET MILI ASSAIL, ESS'/ JSOIL, EYS' DROP 12 SEE GEOTECNICAL MAP
1_				0.22				T	SEE BEUTECNICAL MAP
	Dертн Feet	GRAPHIC LOG	Αττιτυ DES	TUBE Sample No.	BLOWS PER FOOT	Y DENSITY PCF	PLDISTURE CONTENT, Z	\$015.CLASS.	GEOTECHNICAL DESCRIPTION
	W 30-		E	S		ДRΥ	20	So	SAMPLED BY WC
History and A	-	0000		2	16	110.9	12.9	GC GC	© 30' Color change from mottled grayish brn to orangeish brown.
PR STATE	-	Do Roo							@ 33' Grayish brn, mottled w/ orange; on west wall large boulder to 35'.
	35-	200							@ 35' NX wall - seepage below boulder
B 1		10/00	631'	3					0 38-40' 2' sand & gravel bed below large cobbles & boulders; seepage confined to north & west walls.
) " -1 1	40 -	1/20.00	ajt	د	16	123.5	9.5	6 M/ 6 C	@ 40' Seepage from gravel bed.
) (z			2 68: N35E 225E						0 43.5' Grayish brn, 2' sand bed; med grained, well-packed, grades below to a clayey
ີ 	45 -	Part C							9 44' Nottled gray brn to orange; pebbles, cobbles, small boulders.
а Ц Ц И		00/	6 41' 6 41' 6 6 (som bod): H35 or 5 6	E					0 48' Sand bed 1.5' thk.
) R	50.	990100	A Contraction	4	22	117.8	9.0	GM, GC	
) p		R							
,] R	55	P N N N							
] =									0 57' Less clay, more sand in matrix; very abdt cobbles & small boulders.
,] p	60	17							0 60' Caving below.

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						GEO	TECHN	ICAL I	BORING LOG
	DATE_ Proje	10 	- 21 - REGI	85 5/ARE	[<u>A 1</u> 5	DRILL	HOLE	No	B-1 SHEET B OF B
and the second second	DRILL	LING C	0 B	0. JAC	1540	RINC	ENG	INDI	PROJECT NO. 1851456-6 FRINC TYPE OF RIG BUCKET
	ELEV	ATION	TOP OF	HOLE 2	25'=	DRIVE Ref. c	weigh ir Dat	T <u></u> UM	SEE CEUTECHNICAL MAP
						Density Pcf			
	DEPTH FEET	GRAPHIC Log	ATTITUDES	TUBE Sample No.	BLOWS PER FOOT	Y DEN PCF	MOISTURE CONTENT, Z	14. S.	LOGGED BY WC
L.	60		¥	is 1		DRY	2.3	ŝ	SAMPLED BY
-	(-								·
	\-		1						
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1	65-								
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F									· .
-	. 70-) <u>x</u>		-				
Rel									
) ra									
	75-		ľ		-				075' Gray blue, damp, silty sandy breccia; fine-grained matrix; abdt subangular- subrounded clasts of blueschist &
1		-			Н				quartzite.
['])	-	-			H				
	•	-		-					TD 78.5'
, 					Ц				Downhole logged to 60' Light seepage at 35' & 40', heavy seepage below 60'.
]		4			Ц				heavy seepage below 60'. Caving below 60' After 1 hour, water level @ 70'
) jui		-			-				
J		-			Н				
) Ent								5	
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100									

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Date <u>12-10-85</u> Project <u>Stein-Bi</u> Drilling Co <u>c</u> Hole Diameter Elevation Top of	rief/Area 16 ontractors Dr 24"	DRILL Tilling Se DRIVE	HOLE rvice Weigh	No	BORING LOG <u>B-1</u> $(LAB-I)$ SHEET <u>1</u> OF <u>2</u> PROJECT NO. <u>1851354-01</u> TYPE OF RIG <u>Bucket</u> DROP <u>12</u> IN <u>ee Geotechnical Map</u>
DEPTH ★ FEET GRAPHIC LOG M ATTITUDES	TUBE SAMPLE No.	DRY DENSITY PCF	Moisture Content, %	Soil CLASS.	GEOTECHNICAL DESCRIPTION Logged by
W E 10 1 5 1 5 1 10 1 10 1 10 1 110 1 15 0 0 0 15 0 0 0 15 0 0 0 15 0 0 0 15 0 0 0 15 0 0 0 15 0 0 0 10 0 15 0 0 0 15 0 0 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 10 0 0 0	1 2/4 Di 2 2/ Di 3 2/ Di	." st. .0" st.	29.0	ML ML	<pre>SAMPLED BY Artificial Fill:</pre>

DRILLING HOLE DIA	Co, <u>Co</u> r METER <u>2</u>	ntractors 24"	Drill	DRILL ing Ser DRIVF	HOLE vice WELGH	No	BORING LOG B-1 (LAB-I) SHEET 2 OF 2 PROJECT NO. 1851354-01 PROJECT NO. 1851354-01 PROJECT NO. 1851354-01 TYPE OF RIG Bucket POL DROP 12 Pee Geotechnical Map DROP 12
E DEPTH FEET GRAPHIC LOG	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	Moisture Content, Z	Soll CLASS.	GEOTECHNICAL DESCRIPTION Logged by
		15	38	138.8	7.5	ML	 @ 30 Med blue gray sandy silt w/ cobbles & pebbles @ 33' Larger cobbles @ 33.5' Several large boulders up to 12" diam. @ 35' Med blue gray, sl. damp, soft, sdy clayey silt, w/ gravel & pebbles. @ 38' Zone of larger cobbles @ 40' Slightly clayier than above; soft, slightly moist

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AGRA Earth & Environmental, Inc.

TEST BORING LOG

1				en 1	DOTA	RYW				T	-		N +/-108.5 FEET BORING R-2
$\frac{\Gamma}{1}$	YPE			5.							ML	FILI	(Af): AYEY SILT, dark grayish brown, dry to moist, soft to firm
												••	(1.5 feet) rig chatter, COBBLE, dark gray, igneous in nature
			46	ş	91.4	5	2.4	1	5	11111111111111111111111			. (4 feet) SILTY CLAY, laminated light gray 2.5Y 7/1, light brownish gray 2.5Y 6/2, grayish brown 2.5Y 5/2 and light olive brown 2.5Y 5/3, diatomaceous, gypsiferous, scattered pockets of rust staining, rootlets, moist, soft
					I					11111111111111111111111111111111111111			
			4	2 1	.08.0	28	2.4	2	10	1111111111111111			(10 feet) Diatomaceous SILTSTONE, laminated white 2.5Y 8/1, light grayish brown 2.5Y 6/2, pale yellow 2.5Y 7/4 and brownish yellow 10YR 6/6, jointed/fractured,
										11111111111111			staining along fracture surfaces, interbedded with fine SAND, light brownish gray 2.5Y 6/4, micaceous, moist, firm to stiff
						F	ITCHER	3	15 -	101010100000000000000000000000000000000		-	(15 to 18 feet - 3 feet recovery) Diatomaceous SILTSTONE, laminated white 2.5Y 8/1,
					116.5 114.6					the life. life.	hu e la rela tela te		light grayish brown 2.5Y 6/2 and brownish yellow 10YR 6/6, high angle closed fractures, with up to 1/4" offset, fish scales, moist, soft
	Ŷ			40	113.7					the life life.	In I.M. I.M. I.		
	¥			52	94.2	30	2.4	4	20 -	ALL HALL HAL	In. wit. Wit. With		Diatomaceous SILTSTONE, laminated very pale brown 10YR 8/4, brownish yellow 10YR 6/8, light brownish gray 10YR 6/2 and gray 10YR 5/1, healed joints/fractures, abundant rip ups and rolled shears, moist, firm to stiff
										t bit bit bit.	habbahbhahla		
									-				
			z	23			щ						Continued THIS BORING LOG SUMMARY APPLIES ONLY AT THE
	STRIKE		COMPACTION	/ DENSIT s-cu.ft.	MOISTURE	BLQWS/FOOT	SAMPLE SIZE (INCHES)	SAMPLE NO.	DEPTH IN FEET		SYMBOL	UNIFIED SOIL CLASS.	TIME AND LOCATION INDICATED. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND TIMES.
		õ	20	DRY (Ibs	Σ	BL	SAL	SA			2	Sol	LOGGED BY DB/JG DATE 3-17-99

Job No. 8-212-107500 - March 20, 2000

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