

**GEOTECHNICAL ENGINEERING
AND FAULT RUPTURE HAZARD STUDY REPORT
ENVIRONMENTAL IMPACT STUDY
PROPOSED PONTE VISTA RESIDENTIAL DEVELOPMENT
SAN PEDRO AREA, CITY OF LOS ANGELES, CALIFORNIA**

Prepared for

**JMBM | Jeffer Mangels Butler & Mitchell LLP
1900 Avenue of the Stars, 7th Floor
Los Angeles, California 90067**

Prepared by

**GROUP DELTA CONSULTANTS, INC.
370 Amapola Avenue
Torrance, California 90501
Tel. (310) 320-5100
Fax (310) 320-2118**

**GDC Project No. L-923
June 23, 2011**

GROUP



**DELTA
CONSULTANTS**



June 23, 2011

Neill E. Brower
JMBM | Jeffer Mangels Butler & Mitchell LLP
1900 Avenue of the Stars, 7th Floor
Los Angeles, California 90067

*Geotechnical
Engineering*

Geology

Hydro Geology

*Earthquake
Engineering*

*Materials Testing
& Inspection*

Forensic Services

Attention: Mr. Neill Brower

Subject: Geotechnical Engineering and Fault Rupture Hazard Study Report
Environmental Impact Study
Proposed Ponte Vista Residential Development
San Pedro Area, City of Los Angeles, California
GDC Project No. L- 923

Mr. Brower:

Group Delta Consultants (GDC) is pleased to submit this geotechnical engineering and engineering geological report for the proposed Ponte Vista Residential Development in the San Pedro area of the city of Los Angeles. This report is prepared for the fulfillment of the Environmental Impact Study for development of the aforementioned site. This report addresses major geotechnical, geological, and seismic issues that may include profound impacts on site development.

We appreciate the opportunity to provide geotechnical services for this important project. Should you have any questions regarding this report, or if we can be of further service, please call us at 310 320-5100.

Yours Sincerely,
GROUP DELTA CONSULTANTS, INC.

Steven H. Kolthoff, CEG, 1965
Consulting Geologist, exp. 8-31-11



Ying Liu, Ph.D. P.E.
Senior Engineer

Distribution: Addressee (1 electronic and 2 hard copies)

Z:\Projects\900-999\L-923-02 Ponte Vista 2nd Phase\Report\L-923 Ponte Vista Final Geotechnical Report.doc

EXECUTIVE SUMMARY

Based on our geologic study, the result of our seismic tomography surveys, and engineering analysis, it is GDC's opinion that the project site is suitable for the proposed residential development. The major findings and geologic and seismic issues that have profound impacts on the proposed residential development at the project site are summarized below:

- o In accordance with the City of Los Angeles, building and safety guidelines, two fault traces (fault A and B) were found trending through the site using seismic reflection methods. Fault B is considered inactive while fault A's activity is unknown so considered active at this time, hence, a structural setback zone for fault A is recommended. The setback zone was drawn 50 feet wide on each side of the interpreted fault surface projection (100-foot total width) as shown on Figure 10. The setback shall be implemented during the development of the project.
- o Based on the age and subsurface soil profile and current groundwater level, liquefaction potential at this site is presently insignificant and presents no constraint on development.
- o Based on J. Byer Group, Inc. (2005) investigation, the project site is underlain by 2 to 24 feet of uncertified fill. For shallow foundation to be used, the entire uncertified fill shall be removed and replaced with compacted fill. Alternatively, instead of removing the uncertified fill, the proposed residential buildings may be supported on deep foundations.
- o Based on J. Byer Group, Inc. (2005) investigation, the bottom of the uncertified fill contains some petroleum in the form of tar and possibly fuel. Environmental impact and cost for removal, cleaning up, or replacement of the petroleum contaminated soil should be evaluated by an Environmental Engineering Consultant.
- o The near surface onsite sandy soils have low expansion potential. Therefore, no specific measures need to be required for soil expansion.

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Project Description	1
1.2	Purpose and Scope of Work	2
2.0	PREVIOUS AND CURRENT GEOTECHNICAL INVESTIGATIONS	4
2.1	Previous Investigation	4
2.2	Current Investigation	4
3.0	SITE AND SUBSURFACE CONDITIONS	6
3.1	Surface Conditions	6
3.2	Subsurface Conditions	6
3.3	Groundwater	7
4.0	EVALUATION OF SURFACE FAULT RUPTURE HAZARD	8
4.1	General	8
4.2	Structural Geology Analysis	8
4.2.1	Palos Verdes and other Faults	8
4.2.2	Local Faulting	9
4.2.3	Gaffey Anticline and Syncline	10
4.3	Aerial Photo Analysis	11
4.4	Seismic Reflection and Refraction Tomography Surveys	11
4.5	Cone Penetration Tests	12
4.6	Geological Discussions and Recommendations	13
4.6.1	Folding	13
4.6.2	Faulting	13
5.0	DISCUSSION AND RECOMMENDATIONS	15
5.1	General	15
5.2	Potential Seismic Hazards	15
5.2.1	Ground Surface Rupture	15
5.2.2	Liquefaction Potential	15
5.2.3	Other Seismic Hazards	16
5.2.4	CBC 2010 Seismic Design Parameters	17
5.3	Earthwork and Grading	17
5.4	Temporary Excavation	19
5.5	Preliminary Foundation Considerations	20
5.6	Retaining Wall	20
5.7	Retaining Wall Drainage	21
5.8	Utility Trenches	21
5.8.1	Excavation and Shoring	21
5.8.2	Bedding	21
5.8.3	Backfill	21

5.9	Expansion Potential	22
5.10	Methane	22
6.0	LIMITATIONS	23

LIST OF TABLES

Table 1	CBC 2010 Seismic Design Parameters
---------	------------------------------------

LIST OF FIGURES

Figure 1	Vicinity Map
Figure 2A - 2C	Geologic Maps
Figure 3	Thrust Fault Exposed during Construction of Western Avenue
Figure 4	Plate Velocities in Southern California by GPS
Figure 5A - 5C	Balanced Cross Sections of the area by Namson and Davis
Figure 6A - 6C	Historic Aerial Photos
Figure 7	Seismic Reflection Line Locations
Figure 8A - 8C	Cone Penetration Test (CPT) Locations
Figure 9A - 9C	Cross-Section of CPT Profile
Figure 10	Recommended Setback Zone
Figure 11	J.B.G. Boring Location Map
Figure 12	Geologic Cross-Section D-D'
Figure 13	CGS Historic Groundwater Contour Map
Figure 14	CGS Liquefaction Hazard Zone Map
Figure 15	Retaining Wall Backfill

APPENDICES

Appendix A	Field Exploration
Appendix B	Seismic Reflection and Refraction Tomography Survey Report
Appendix C	J. B. G. (2005) Investigation – Field Exploration and Laboratory Tests
Appendix D	City of Los Angeles Geology & Soils Report Correction Letter (2006)

**GEOTECHNICAL ENGINEERING AND
FAULT RUPTURE HAZARD STUDY REPORT
ENVIRONMENTAL IMPACT STUDY
PROPOSED PONTE VISTA RESIDENTIAL DEVELOPMENT,
SAN PEDRO AREA, CITY OF LOS ANGELES, CALIFORNIA**

1.0 INTRODUCTION

This report presents the findings of Group Delta Consultant, Inc. (GDC) geotechnical and geological investigation of the project site. The report also provides the basis of the geological impacts discussion in the Environmental Impact Report (EIR) for the proposed Ponte Vista by exploring the potential geotechnical, geological, and seismic constraints on site development and provides measures to address or avoid those constraints.

1.1 Project Description

Our understanding of the project is based on the descriptions provided by the project applicant as well as published data, maps, reports, a seismic reflection study, and reconnaissance of the site. Based on this information, we understand the following:

The project site includes approximately 61.5 acres of land and is located at 26900 South Western Avenue in the San Pedro area of the City of Los Angeles, approximately two miles northwest of the Port of Los Angeles (see Figure 1, Vicinity Map). The project site is the location of the former U.S. Navy San Pedro Housing complex. The site is bordered by Western Avenue (State Route 213) to the west, Fitness Drive and multi-family residential developments to the south, the U.S. Navy's Defense Fuel Support Point (DFSP) to the north and Mary Star of the Sea High School to the east. West of the site, across Western Avenue is Green Hills Memorial Park. The City of Los Angeles boundary with Rancho Palos Verdes is the centerline of Western Avenue.

The project site is currently improved with 245 vacant duplex residential units, a community center, and a retail convenience facility that were constructed in approximately 1962 by the U.S. Navy for the purpose of housing personnel stationed at the Long Beach Naval Shipyard. These units and facilities were built by the United States government and do not comply with City of Los Angeles building codes. These housing units, facilities, infrastructure, streets, and landscaping at the project location have all been abandoned since the site was closed in the late 1990s and are in a state of disrepair. As part of the project, all existing improvements will



be demolished and hauled off the site, consistent with the applicant's contractual obligation to the Department of the Navy.

Previously, the J. Byer Group completed a geotechnical study in 2005 for a previous version of the project, entitled:

"Preliminary Geotechnical Engineering Exploration, Proposed Multi-family Residential Development, Lot 1, Tract 3192, 26900 South Western Avenue, San Pedro, California, for Bisno Development Company, LLC, the J. Byer Group, Inc. project number: JB 20111-B, June 21, 2005"

1.2 Purpose and Scope of Work

The key issue for this study is to ascertain whether a potential trace of the Palos Verdes Fault system transects the site.

Our study includes a review of available geotechnical and geologic data and reports, as well as limited field exploration; however, laboratory testing is not included. Our scope of services includes the following:

- Review available previous geotechnical investigation reports for the property provided to us.
- Review published geologic and geotechnical maps and reports pertaining to the site.
- Conduct site visits to view the existing conditions, in consideration of the planned development.
- Conduct a geophysical seismic reflection and refraction survey to evaluate the existence and possible location of the Palos Verdes (PV) Fault.
- Conduct a total of thirty (30) closely spaced Cone Penetrometer Tests (CPTs) to aid in evaluation and location of the PV Fault near the surface.
- Summarize our findings and opinions in a written report to address existing geotechnical conditions, as well as geotechnical aspects of the site that will impact the proposed development including the need for shoring, seismic impacts, groundwater impact, and foundation alternatives. The report will include a discussion of the location of the PV Fault and or fault strands relative to the site.
- In addition, we will attend meetings to discuss the various aspects of the project as well as our findings.

This study excludes all issues related to environmental engineering, hazardous materials and related matters. We understand that a separate company be will responsible for performing an environmental analysis of the site.

2.0 PREVIOUS AND CURRENT GEOTECHNICAL INVESTIGATIONS

2.1 Previous Investigation

The J. Byer Group, Inc. (JBG) conducted a geotechnical site investigation at the project site in June 2005. The 2005 JBG investigation included 28 hollow stem auger borings to depths of 20 to 60 feet. JBG performed laboratory tests on soil samples collected from their field exploration program, including moisture content, dry density, expansion index, direct shear, and consolidation. GDC reviewed JBG's boring logs and included the data in this report's analysis as a reference to the soil conditions encountered. Pertinent boring logs and laboratory test results from the JBG 2005 report are presented in Appendix C.

The JBG 2005 report included a geological and seismic hazard evaluation section. However, the City of Los Angeles review of the report (City of Los Angeles Geology and Soils Report Correction Letter, Log # 50445, dated January 20, 2006) concluded that the report did not identify a potential splay of the Palos Verdes Fault (PV Fault) that, as published by the California Geological Survey (CGS 2003), which trends westerly through the site along the north side of the Gaffey Syncline. The portion of the CGS 2003 Geological Map in the area of this project is shown in Figures 2A and 2B. The City of Los Angeles Department of Building and Safety requested additional study of whether a fault rupture hazard exists on the site. The Soils Report Correction Letter by City of Los Angeles is attached in Appendix D.

2.2 Current Investigation

As discussed in the Scope of Work, the key issue for this investigation was to evaluate whether the mapped (but concealed) trace of the Palos Verdes Fault splay indicated on the state map transects the site. This investigation included two phases. In Phase I, Advanced GeoScience conducted a geophysical survey (Line 1), consisting of a seismic reflection and refraction tomography survey, to generate 2D seismic reflection profile which illustrates the subsurface geology associated with the CGS fault. Following the completion of the first geophysical study, GDC performed nine (9) closely spaced cone penetration tests (CPT) across the geophysical surface line to aid in determining whether faulting breaks the surface.

In Phase II of this study, Advanced GeoScience, Inc. conducted two additional geophysical surveys (Lines 2 and 3 on Figure 7), consisting of seismic reflection and refraction tomography surveys. GDC subsequently performed twenty one (21) additional closely spaced cone penetration tests (CPT) along Line 3 to evaluate whether faulting is present.



The CPTs were advanced to refusal, which generally occurred between 50 feet and 65 feet below existing grade. The following sections present the details and findings of geophysical survey and cone penetration tests.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Surface Conditions

The project site includes approximately 61.5 acres of developed land (U.S. Navy San Pedro Housing Complex) on a gentle, southeast-sloping, elevated marine terrace. The northwest portion of the site is at an elevation of 190 feet, and the lower southeast portion of the property is at elevation 120 feet. This site was graded in the past and the original terrain was leveled to accommodate the original development. Fill was placed in the central portion of the property and cuts were made along the north and northeast sides of the property. These cut slopes were graded at approximately 1.5H:1V (horizontal to vertical ratio) and are up to 50 feet high. The cut slopes are covered by rather mature vegetation and show only a few signs of past erosion. Interior fill slopes are graded at 2H:1V and are generally less than 15 feet high.

3.2 Subsurface Conditions

Based on the JBG (2005) exploration, the subsurface soils at this site consist of undocumented fill underlain by alluvium and material of the San Pedro Formation. The fill ranges from 2 feet to 24.5 feet in depth, and consists of an upper layer of silty sand that is dark to light brown, medium dense, and moist to very moist. A lower layer of fill consists of clayey sand that is brown and gray in layers, very moist, and medium dense. At the base of the fill is a layer of clayey sand that is dark gray, very moist to wet, and, determined from past studies, contains some petroleum in the form of tar and possibly fuel.

In the southeast portion of the property, the fill rests on an alluvium layer that is between 5 feet and 9 feet thick. The alluvium consists of alternating layers of sand and silty sand, and contains some gravel and some organic material. The recent alluvium sits on top of older alluvium that consists of clayey sand that is brown, moist, and dense. The older alluvium contains some gravel. In the north and central part of the property, the fill sits on Pleistocene San Pedro Formation material, consisting of silty sand and sand that is light brown to reddish brown, damp to moist, and dense. The San Pedro Formation, generally, consists of sandstone beds that range from massive (greater than 4 feet) to poorly bedded (having vague bedding) sandstone. On the south side of the anticline, the aforementioned beds are dipping in a southerly direction.

Generalized Cross-Sections A-A', B-B', and C-C' through the project site are presented in Figures 9A through 9C. Generalized cross-section D-D', based on JBG



(2005) site investigation is shown on Figure 12. The locations of these cross-sections are shown on Figures 8A through 8C, and Figure 11.

3.3 Groundwater

The CGS Open File Report 98-26 Torrance Quadrangle (CGS, 1998) includes Historically Highest Groundwater Contours and Borehole Log Data Locations for the Torrance Quadrangle, which includes the project site. However, the data coverage of this report is poor and includes virtually no data regarding the project site. The closest groundwater contour is located along N. Gaffey Street, which is about 0.6 miles east of the subject site and about 90 feet lower in elevation. Due to the dramatic difference in site elevations, the groundwater contour along N. Gaffey Street is likely not representative of the subject site. The historical groundwater map is shown in Figure 13.

Permanent groundwater was not encountered in the JBG (2005) investigation to the maximum depth of 60 feet. Perched water was encountered in Boring 22 at about 17 feet below existing grade.

We anticipate that groundwater will not affect at-grade residential development at this site. For preliminary analysis, the design groundwater level may be taken as 50 feet below existing grade.

4.0 EVALUATION OF SURFACE FAULT RUPTURE HAZARD

4.1 General

As illustrated in Figures 2A through 2C, a potential splay from the PV fault is mapped through the site. The site fault is mapped as a “concealed” fault, not an Alquist-Priolo Earthquake Fault Zone or known to have ruptured in the last 11,000 years.

The potential for surface fault rupture hazard was evaluated by conducting a structural geology study, as well as analysis of available historic oblique aerial photo analysis. We also conducted a seismic reflection and refraction tomography survey followed by an array of CPT tests to determine the existence (or non-existence) and possible location of the concealed fault across this site. No stratigraphic analysis, marine terrace evaluation or carbon 14 radio-dating was conducted.

4.2 Structural Geology Analysis

The project site is located in the Southwestern block of the Los Angeles Basin portion of the upper Peninsular Range Geomorphic Province of California, where it merges with the Transverse Range Geomorphic Province of California to the north.

During the Miocene, the area underwent tectonic tension where large sub-marine basins developed with faulting that had normal or downward movement. The area started to undergo compression during the Pliocene, inverting the normal faulting into strike-slip and thrust faults. Many of the blind thrusts in the Los Angeles Basin had their origin after the Miocene. During the Pleistocene and Holocene, the compression continued, resulting in the strike-slip and thrust fault earthquake activity of today.

4.2.1 Palos Verdes and other Faults

Geologic literature regarding the area at and around the site appears to recognize three fault systems in the surrounding Palos Verdes Hills. The first system consists of normal faults that dip steeply to the north or south with variable strike; the second system is a set of normal faults that dip very steeply easterly; and the third set consists of small thrust faults that dip to the north or south. The thrust faulting is most likely to be the youngest faulting out of the three systems, while the normal faulting the oldest.

The largest faulting feature near the site is the on-land PV Fault. The PV Fault is the dominant fault feature on the east side of the Palos Verdes Peninsula. As the PV Fault trends onshore from the Los Angeles Harbor, it diverges from its generally northerly trend to a more westerly trend east of the Gaffey Anticline. Where the fault starts its divergence westerly, the PV Fault converges with the Thums-Huntington Beach Fault (THB) varying in relative movement from strike-slip to reverse that may have minor oblique movement.

To be more detailed, the PV fault is trending north northwest with a dextral (right slip) wrench or strike-slip movement while the THB blind thrust fault trends along the southern edge of the offshore Wilmington oil field in a west to northwesterly trend as a offshore blind thrust fault. Little is known about the age of the most recent activity of the THB fault, and it is unknown whether the fault had Holocene movement and would therefore be considered an active fault.

In the Ponte Vista area, the THB fault trace is in the offshore Wilmington Oil Field, but is thought to converge with the PV Fault east of the project. Together, a series of concealed faults diverge along the north side of the Gaffey Anticline, with one concealed fault trending along the Gaffey Syncline to the south.

Within the surrounding area, the closest known onshore Holocene or active fault to this site, other than the possibility of the PV-THB faults, is the Newport-Inglewood Fault Zone (NIFZ). The NIFZ lies northeast of the site and divides the Los Angeles Basin southwest block, to the west, from the central block, to the east. The 1933 Long Beach Earthquake, caused by movement on the NIFZ, resulted in severe damage to the Long Beach area.

Although studies have not been able to determine whether the onshore PV Fault has Holocene movement, it most likely moved in late Pleistocene and is therefore likely not an active fault. However, the offshore PV Fault has been determined to have Holocene movement and therefore could be interpreted as an active fault. Until studies are performed to more precisely determine its activity, the PV Fault is considered active. A balanced cross section by Namson and Davis illustrates the correlation between the PV and THB faults (Figures 5A through 5C) and other associated structures in the vicinity of the Palos Verdes Hills.

4.2.2 Local Faulting

As stated above in section 3.2.1, a concealed fault trace has been mapped as trending across the southern portion of the site in the area of the Gaffey Syncline (Figures 2A and 2B). Because very little is known about the concealed fault, GDC completed a site-specific study including reviewing historic aerial photos and

performing seismic reflection and refraction tomography surveys, which are discussed in section 3.3 and 3.4, respectively. This study does not determine specifically whether the concealed fault is a southern splay of the PV fault system, but determines whether the fault exists.

On the south limb of the Gaffey Anticline, a thrust fault was found during the construction of Western Avenue in the early 1930's (see Figure 3). However, a lack of clear documentation prevents accurate location of this thrust fault. This thrust fault was neither mapped on the CGS map, found on the seismic reflection profile, nor evident on aerial photos, but its close proximity to the surface and cutting non-marine cover illustrates the fault could be young.

4.2.3 Gaffey Anticline and Syncline

The principal structural features of the area are the Gaffey Anticline to the north and the resultant Gaffey Syncline, south of the anticline that trends through the site. The anticline consists of a broad up-warpage feature. Subsidiary folding at and near the surface seems to be sympathetic to the main folding. Thrust faulting (see Figure 3) within the anticline, as well as subsidiary folding, indicates that the area is in a region of compression.

The Gaffey Anticline can be seen trending to the northwest along an elevated ridge north of the site. The Gaffey Syncline is located to the south and through the southern portion of the Ponte Vista development where the south flank of the anticline joins the north flank of the syncline to the south. The Gaffey Syncline is present in a low lying generally east-west valley. Both folds follow the regional trend of the Wilmington and Torrance anticlines and oil fields.

This anticline is the only oil producing geological structure in the Palos Verdes Hills. The Gaffey Oil field is a minor contributor to oil production of the area with the Torrance and Wilmington anticlines to the north and east, respectively, are the major oil producers of the area.

The sequence of faulting, jointing, and folding (not associated with the Gaffey folds) in the area consist of pre-Miocene faulting and jointing within the Catalina Schist basement rock. After the deposition of Miocene rock, there was widespread intrusion of the basaltic sills. As the sills cooled, another set of joints developed within the basalt. After the Miocene, but before the Pleistocene, the minor folding and erosion of the older folding in the area developed. Normal faulting proceeded, trending in the direction of the incipient Gaffey Anticline. During the late Pleistocene and possibly and into the Holocene, folding associated with the Gaffey Anticline and Syncline continued.

Review of geological literature suggests that the Gaffey Anticline had continuously uplifted since the end of the Miocene. The lowest terrace to the north of the anticline was deformed following emergence and deposition of the non-marine cover. An antecedent stream's flow was great enough to breach the Gaffey Anticline, formed the valley that Gaffey Street now runs through. The anticline's continuous growth resulted in slowing down the old antecedent stream's headwater erosion, flowing along Gaffey Street, overwhelming the breaching of the anticline and impounding the stream forming the Bixby Slough north of the anticline.

4.2.4 Plate Velocity in Palos Verdes/San Pedro Area

Starting in 1984, the Southern California Earthquake Center (SCEC) in conjunction with the academic community set up a series of Global Positioning Satellites (GPS) across Southern California to measure the relative plate velocities. Today, the GPS velocities have been compiled and placed on a Plate Boundary Velocity Map, illustrated in Figure 4. Figure 4 shows that the plate movement trends north by northeast at about 10 mm per year which is normal for the Palos Verdes Hills. This direction of movement illustrates that the Palos Verdes Hills are compressing, which is reflected in the uplift of the Gaffey Anticline.

4.3 Aerial Photo Analysis

Oblique aerial photos from the UCLA Spence and Fairchild collections were examined to evaluate the site for any surface traces of the mapped fault and other geomorphic problems that may exist. Review of the photographs indicates that the site was graded with cut/fill methods. An older (1919) oblique Spence aerial photo showed a lineation that correlates to the fault mapped on the Long Beach 30x60 degree Quadrangle. In the 1950 vintage and younger aerials, grading activities have masked the geology. These aerial photos are presented in Figures 6A to 6C.

4.4 Seismic Reflection and Refraction Tomography Surveys

Advanced GeoScience, Inc. conducted seismic reflection and refraction tomography surveys at this site in October, 2010 for the first phase and April, 2011 for the second phase. The locations of these seismic lines (Line 1 through 3) are shown on Figure 7. The data collection and processing procedures are discussed the Advanced GeoScience report entitled "Summary Report of the Seismic Reflection and Refraction Tomography Surveys, Investigation of Subsurface Faulting, Ponte Vista Development, San Pedro, California" (Appendix B to this report).



Both seismic reflection and seismic refraction tomography profiles showed evidence of two subsurface faults (A and B). Fault A appears to be associated with a fault plane that terminates below the surface. Fault A is found in reflection profile Line 1 through 3 and is illustrated as a normal fault, with its northern wall moving downward to the north with vertical separation on subsurface sedimentary layering ending just less than 200 feet below the ground surface. The location of this faulting coincides with the “concealed” potential splay of PV fault identified in the State Geology Map that follows the axis of the Gaffey Syncline.

Fault B is to the north of Fault A, as shown in Figure 7. As compared to Fault A, the reflection signature illustrates weaker evidence for Fault B, which is found in Lines 2 and 3. Fault B was found, on the seismic reflection lines projecting and terminating into Fault A at the western end and at depth. Since Fault B is cut off by Fault A near the surface to the west and at depth, and does not cross Fault A, our opinion is that Fault B is an old fault cut off by Fault A and is not an earthquake rupture hazard for the site.

4.5 Cone Penetration Tests

Following the completion of seismic reflection and refraction survey (October 2010 and April 2011), an array of cone penetration tests (nine CPT's across Fault A, Line 1, ten CPT's across Fault B, Line 3, and eleven CPT's across Fault A, Line 3), were performed (November 2010 and May 2011) approximately perpendicular to the CGS mapped fault line. The CPT logs are included in Appendix A to this report. The center of the CPT array for Line 1 was placed at Point A (Figure 8A) where the possible location of the potential surface rupture has been projected in the seismic reflection survey. CPTs along Line 3 were spaced closely together at the two possible locations of the potential surface rupture for Faults A and B. The locations of these CPTs are shown on Figures 8B and 8C. The CPTs along Line 1 reached refusal at depths of 50 feet to 65 feet due to a combination of high frictional resistance and tip resistance. Along Line 3, the CPTs ranged in depth from approximately 38 feet to 68 feet.

Geologic cross-sections, represented by the CPTs tip resistance versus depth, are shown in Figures 9A through 9C. The subsurface soils consist primarily of sand, silty sand, and clayey sand. However, a thin layer of clay was observed in Cross-Section A-A' at the depths of 12 to 17 feet, which appears to be uniform across all of the nine CPTs and could be used as a marker layer. A thin layer of silts with low tip resistance at the depth of 42 to 47 feet could also be used as a marker layer to identify any abrupt offset in layering. These two marker layers are shown in Figure 9A.

In Cross-Section B-B' on Line 3 at Fault B, the CPT profiles do not contain any abrupt offset in layering which could possibly indicate any strata offset caused by faulting at the concealed fault location. Cross-Section C-C' on Line 3 across Fault A shows a thickening of the stratigraphy which could be the result of a localized change in sedimentation or a paleo-ridge of unknown origin. The stratigraphy on each side of the fault levels off to the north and south of the fault, which does not give good evidence of recent movement from Fault B.

4.6 Geological Discussions and Recommendations

4.6.1 Folding

A review of geological reports and maps of the area, in conjunction with aerial photo analysis, shows that an old antecedent stream flowed down the present Gaffey Street forming the Gaffey Street Valley during the late Pleistocene. As the anticline grew, the flow from the stream may have slowed down, resulting in the termination of down-cutting of the stream across the anticline axis. Uplifted stream terraces and the termination of the stream that flowed across the anticline axis along Gaffey Street indicates that the Gaffey Anticline is still growing.

4.6.2 Faulting

In GDC's opinion information appears to indicate that the concealed fault mapped by CGS on the Long Beach 30' x 60' Quadrangle is present at depth at this site.

In Cross-Section A-A' at Line 1, the CPT profile does not contain any abrupt offset in layering which could possibly show strata offset near the surface caused by faulting. This indicates that Fault A may correlate with the mapped concealed fault but has not broken the surface. With Cross-Section C-C' at Line 3, a small anomalous thickening of the sediments was noted in the area where Fault A projects to the surface. The anomaly cannot be interpreted at this time.

In Cross-Section B-B' on Line 3 at Fault B, the CPT profiles do not contain any abrupt offset in layering which could possibly indicate any strata offset caused by faulting at the concealed fault location. Since Fault B is cut by Fault A near the upper terminus between Line 1 and 2 and at depth, Fault B is considered a non-active fault because of its cutoff by Fault A. The site is in an area of active compressional tectonics and Fault A has a component of normal movement which one could consider non-active in this compressional regime. Since the closely spaced CPT data and resulting cross sections do not indicate offset bedding of the upper San Pedro sand (Late Pleistocene Age), the fault splay located in the

Geophysical survey does not appear to be active. However, this conclusion is not definitive.

Due to the many uncertainties involved in this fault study and the lack of definitive evidence of the date of the last movement of the identified Fault A trace, the trace should be treated as a potential active fault for the purpose of development planning. Standard measures include a 50-foot wide setback zone on each side of the interpreted center line of projected surface rupture (Figure 10). However, if further study, such as fault trenching, CPT survey with continuous soil cores, soil stratigraphy dating and radiocarbon dating, shows definitive evidence that this fault did not rupture during the last 11,000 years, the suggested setback zone could be removed.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

Based on the findings of this study, two primary issues will affect site planning and development: 1) a potential surface fault rupture hazard, and 2) deep, variable, undocumented fill. The potential surface fault rupture hazard can be mitigated by planning a 100-foot wide set back zone (50 feet on each side of the center line of the interpreted fault A). The variable deep fill can be mitigated by either (a) removing and recompacting the affected material, or (b) supporting the proposed structures on deep foundations.

5.2 Potential Seismic Hazards

Potential geologic and seismic hazards for any site include ground rupture, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, tsunamis / flooding, and seismic shaking.

5.2.1 Ground Surface Rupture

As discussed in Section 4.6 above, the potential surface fault rupture hazard can be mitigated by planning a 50-foot wide structural setback zone on each side of the interpreted center line of the surface projection of Fault A (100-foot total width), as shown in Figure 10. However, if future study provides convincing evidence that this fault did not rupture during the last 11,000 years, the suggested setback zone could be removed.

5.2.2 Liquefaction Potential

Liquefaction involves sudden loss in strength of a saturated, cohesionless soil (predominantly sand) caused by the build-up of pore water pressure during cyclic loading, such as that produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in vertical settlement, and can also cause lateral ground deformation. Typically, liquefaction occurs in areas of loose sands where the depth to groundwater is less than 50 feet below ground surface. Seismic shaking can also cause soil compaction and ground settlement without liquefaction, including settlement of dry sands above the water table.

The majority of the site is not located in a California-designated liquefaction zone, except for a narrow finger located at the southeast portion of the site (Figure 14). Borings 12, 22, and 23 by JBG (2005) were advanced in this narrow area to determine the actual liquefaction potential.

The borings encountered fill to a depth of 24 feet, over 5 to 9 feet of alluvium, resting on either San Pedro sand or older alluvium. Perched groundwater was present in the lower portion of the existing fill and the upper part of the alluvium. Groundwater was not present in the San Pedro Formation or in the older alluvium. Permanent groundwater was not encountered to the maximum depth of 60 feet drilled. The San Pedro Formation is pre-consolidated Pleistocene sand that is dense and not subject to liquefaction. The older alluvium is clayey sand that has high clay content, is dense, not saturated, and not subject to liquefaction. Therefore, liquefaction potential at this site is insignificant and represents no constraint on development.

5.2.3 Other Seismic Hazards

This site has relatively high elevation (El. +120 to El. +190 feet). Therefore, tsunamis are not a hazard at the site. There are no continuous liquefiable soils underlying the subject site; therefore, lateral spreading is not a hazard at the site.

Cut slopes exist along the north and northeast sides of the property with slope angle of approximately 1.5H:1V. Static and seismic stability of these cut slopes (and any earth slopes on this site steeper than 2H:1V) would be analyzed as part of the final design process, as the project will likely involve modification of these slopes.

5.2.4 CBC 2010 Seismic Design Parameters

We evaluated the seismic design parameters using the USGS online web program “Seismic Hazard Curves, Response Parameters, and Design Parameters” (Version 5.0.9). The CBC 2010 seismic design parameters are provided in the following table.

Table 1 Seismic Ground Motion Values	
Latitude: 33.7688	Longitude: -118.3073
Site Class	D
Mapped MCE Spectral Response Acceleration at Short Period (S_s)	2.04
Mapped MCE Spectral Response Acceleration at Period of 1 Second (S_1)	0.818
Site Coefficient, F_a	1
Site Coefficient, F_v	1.5
Adjusted MCE Spectral Response Acceleration at Short Period (S_{MS})	2.04
Adjusted MCE Spectral Response Acceleration at Period of 1 Second (S_{M1})	1.228
Design Earthquake Spectral Response Acceleration at Short Period (S_{DS})	1.36
Design Earthquake Spectral Response Acceleration at Period of 1 Second (S_{D1})	0.818

5.3 Earthwork and Grading

All grading shall conform to City of Los Angeles requirements, as well as the following general grading recommendations:

1. The grading contractor is responsible for notifying the project Geotechnical Engineer of a pre-grading meeting prior to the start of grading operations and anytime that the operations are resumed after an interruption.
2. Prior to the start of earthwork, remove, relocate, or protect existing utilities as appropriate.
3. Prior to grading, strip and clear the project site of all vegetation.
4. Any existing fill is uncertified and shall be excavated.
5. The bottoms of completed excavations shall be inspected by the project geotechnical engineer, while it is proof-rolled with loaded equipment. Any loose or yielding soils shall be over-excavated and recompacted to at least 95 percent relative compaction, as determined by ASTM D1557.

6. The exposed bottoms of excavations for removals and pads shall then be scarified to a depth of 6 inches, moisture-conditioned to between 0 to 2 percent of the optimum moisture content, and compacted to at least 95 percent relative compaction as determined by ASTM D1557. If the exposed bottom is clayey, moisture conditioning shall be to 2 percent wet of optimum.
7. Any fill placed under structures or pavement and any backfill placed adjacent to buried walls is "structural fill." Structural fill shall be free of expansive clay, rock greater than 3 inches in maximum size, debris and other deleterious materials. All structural fill and backfill, shall be placed in maximum 8-inch lifts, moisture conditioned to optimum moisture, and compacted to at least 95 percent of the maximum dry density determined by ASTM D 1557. Any fill or backfill placed in non-structural areas shall be compacted to at least 90 percent of its maximum dry density.
8. In general, the soils to be excavated consist predominantly of silty sand and sandy silt and would be suitable for backfill. All fill soils shall be approved by the project geotechnical engineer and imported soils shall be similarly approved before being brought on site.
9. Retaining walls shall be backfilled with non-expansive granular soils with a Plasticity Index (PI) of less than 15 and with less than 15 percent fines (clay/silt) passing the No. 200 sieve. A drainage system shall also be provided behind the walls, as shown in Figure 15.
10. All earthwork and grading shall be performed under the observation of the project geotechnical engineer. Compaction testing of the fill soils shall be performed at the discretion of the project geotechnical engineer. Testing shall be performed for approximately every 2 feet in fill thickness or 2,000 cubic yards of fill placed, whichever occurs first. If specified compaction is not achieved, additional compactive effort, moisture conditioning, and/or removal and recompaction of the fill soils will be required.
11. All materials used for asphalt concrete and base shall conform to the 2009 "Green Book" or the equivalent, and shall be compacted to at least 95 percent relative compaction.

If, in the opinion of the Geotechnical Engineer, Contractor, or Owner, an unsafe condition is created or encountered during grading, all work in the area shall be stopped until measures can be taken to mitigate the unsafe condition.



5.4 Temporary Excavation

In general, temporary excavations up to 3 feet deep may stand in vertical cuts. However, sandier layers will slough as they dry out, and therefore shall be sloped at 1H:1V (horizontal to vertical ratio) or flatter.

Temporary construction excavations can be made at a 1.5H:1V slope without shoring to depths up to 25 ft below the adjacent surrounding grade. Flatter slopes may be necessary if existing fill or loose sandy soils are present. Where there is insufficient room to excavate 1.5H:1V slopes, and where an existing structure, street, or other improvement require protection, the use of temporary shoring shall be used. Soil parameters for shoring design can be provided if requested.

Surcharge loads, such as vehicular traffic, heavy construction equipment, and stockpiled materials, shall be kept away from the top of temporary excavations a horizontal distance at least equal to the depth of excavation. Surface drainage shall be controlled and prevented from running down the slope face. Ponding water shall not be allowed within the excavation. Even with the implementation of the above recommendations, some sloughing of slopes and unstable soil zones may still occur within temporary excavations, and workmen shall be adequately protected. Construction equipment and foot traffic shall be kept off of excavation slopes to minimize sloughing.

If the excavation is exposed during periods of heavy rainfall, provision for collection of the runoff shall be made. Any collected water shall be pumped out. Soils softened by wetting shall be removed and recompacted as directed by the geotechnical engineer.

All excavation slopes shall meet the minimum requirements of the Occupational Safety and Health (OSHA) Standards. Maintaining safe and stable slopes on excavations is the responsibility of the Contractor and will depend on the nature of the soils, any perched water encountered and his method of excavation. Excavations during construction shall be carried out in such a manner that failure or ground movement will not occur. The Contractor shall perform any additional studies deemed necessary to supplement the information contained in this report for the purpose of planning and executing his excavation plan.

5.5 Preliminary Foundation Considerations

At this time, building plans are not available for review. Therefore, no building-specific foundation recommendations are provided.

This site is underlain by 2 to 24 feet of uncertified fill. Uncertified fill shall not be used for support of building structures, retaining walls, and pavements. For shallow foundations to be used, any uncertified fill shall be removed and replaced with compacted fill. It should also be recognized that the bottom of the fill contains some petroleum in the form of tar and possibly fuel. Environmental impact and cost for removal, cleaning up, or replacement of the petroleum contaminated soil should be evaluated by an Environmental Engineering Consultant.

Alternatively, instead of removing the entire fill, the proposed residential buildings may be supported on deep foundations. Either 12- to 14-inch-square driven concrete piles or 24-inch diameter drilled shafts may be used for supporting the proposed residential buildings. Depending on actual building loads, the piles are estimated to be 30 to 50 foot long.

5.6 Retaining Wall

Retaining walls may be supported on spread footings founded on compacted fill or supported on piles. Retaining wall footings on level ground shall have a minimum embedment of 18-inches below finished grade. Retaining walls founded on a 2H:1V slope shall have a minimum embedment of 36-inches below finished grade above the slopeward edge of footing.

Retaining walls shall be backfilled with non-expansive granular soils with a PI less than 15 and percent passing No. 200 sieve of less than 15 percent. A 2-foot thick cap consisting of less pervious onsite materials shall be used to minimize infiltration of surface water. The finish surface shall be graded to drain away from the proposed structures. Heavy compaction equipment operating adjacent to retaining walls can cause excessively high lateral soil pressures to be exerted on the wall. Therefore, soils within 5 feet of the wall shall either be compacted with hand operated equipment or designed to withstand compaction pressure from heavy equipment.

Cantilever walls, which are free to move laterally at least $\frac{1}{2}$ in. for each 10-ft height, shall be designed for an equivalent fluid pressure of either 38 pcf (with level backfill) or 45 pcf (2H:1V sloping backfill).

5.7 Retaining Wall Drainage

Retaining walls shall be constructed with a properly designed drainage system to prevent buildup of hydrostatic pressures behind the wall. This may consist of geocomposite drain board or 12 inch of clean crushed rock encapsulated in filter fabric, discharging to weep holes or drain pipes. Typical wall drainage is shown in Figure 15.

5.8 Utility Trenches

5.8.1 Excavation and Shoring

Excavations for utility trenches shall be achievable with conventional excavating equipment. All shoring and excavation shall comply with current OSHA regulations, and observed by the designated competent person on site.

5.8.2 Bedding

The bedding zone shall be defined as area containing the material specified that is supporting, surrounding, and extending to 1 foot above the top of pipe. The bedding shall satisfy the requirements of Standard Specifications for Public Works Construction (SSPWC) Section 306-1.2.1. There shall be 4 inch minimum bedding thickness below the pipe and 1 inch minimum clearance below a projecting bell. There shall be a minimum side clearance of 6 inches on each side of the pipe. Bedding material shall be sand, gravel, crushed aggregate, or native free-draining material having a Sand Equivalent of not less than 20, or other material approved by the engineer. The materials used for the bedding zone shall be placed, and compacted with mechanical means. Jetting shall not be allowed.

5.8.3 Backfill

Backfill shall be considered as starting 12-inches above the pipe. On-site excavated materials are suitable as backfill. Any boulders or cobbles larger than 3 inches in any dimensions shall be removed before backfilling. All backfill shall be placed in lifts not exceeding six to eight inches in thickness and be compacted to at least 90 percent of relative compaction as determined by the ASTM D-1557. The upper 12 inches below pavement shall be compacted to at least 95 percent of maximum dry density. Mechanical compaction will be required to accomplish compaction above the bedding along the entire pipeline alignments.

In backfill areas, where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry shall contain one sack of cement per cubic yard and have a maximum slump of 5 inches. When set, such a mix typically has the consistency of hard compacted soil, and allows for future excavation.

5.9 Expansion Potential

JBG (2005) performed an expansion index test on the near surface onsite soils. The test result indicates that the near surface onsite sandy soils has low expansion potential. Therefore, no specific measures are required to address this soil characteristic.

5.10 Methane

The project site is located within City of Los Angeles methane buffer zone.

6.0 LIMITATIONS

The overall assessment of the geologic and seismic hazards, and general geotechnical site conditions in this report, reflects GDC's professional opinions, intended for the use by SFI Bridgeview, LLC., and their design consultants. This report has been prepared solely for assessing environmental impact of the proposed development, and may not contain sufficient information for other uses. The recommendations shall not be extrapolated to areas not covered by this report, or used for other facilities without the review and approval of GDC. This report or any portion of this report may be provided to contractors or included in specifications for informational purposes only.

Our investigation and evaluations were performed in accordance with generally accepted local standards using that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The recommendations for this project are, to a high degree dependent upon proper quality control of grading. Consequently, the recommendations are made contingent on the opportunity of GDC to observe grading operations. If parties other than GDC are engaged to provide such services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the recommendations in this report or provide alternate recommendations as deemed appropriate.

7.0 REFERENCES

- Bohannon, R.G., Gardner, J.V., and Sliter, R.W., 2004, Holocene to Pliocene tectonic evolution of the region offshore of the Los Angeles corridor, southern California, *Tectonics*, 23, TC1016, doi:10.1029/2003TC001504.
- California Geological Survey, 2003, *Geology map of the Long Beach 30x60 degree Quadrangle*, California,
- California Building Code (2010).
- Crouch, J. K., and J. Suppe, Late Cenozoic tectonic evolution of the Los Angeles basin and Inner California Borderland: A model for core-complex-like crustal extension, *Geol. Soc. Am. Bull.*, 105, 1415–1434, 1994.
- Dibblee, T.W. Jr., 1999, *Geologic map of the Palos Verdes Peninsula and vicinity, Redondo Beach, Torrance, and San Pedro Quadrangles, Los Angeles County, California*, Dibblee Geological Foundation, Camarillo, CA.
- Dolan, J.F., Sieh, K., and Rockwell, T.K., 2000, Late Quaternary activity and seismic potential of the Santa Monica fault system, Los Angeles, California, *Geol. Soc. Am. Bull.*, 112, 1559-1581.
- Fischer, P.J., Patterson, R.H., Darrow, A.C., Rudat, J.H., and Simila, G., 1987, The Palos Verdes Fault zone: onshore to offshore, in *Geology of the Palos Verdes Peninsula and San Pedro Bay*, SEPM Guidebook, edited by P.J. Fischer, 91-133.
- Fisher, M.A., Normark, W.R., Langenheim, V.E., Calvert, A.J., and Sliter, R., 2004, The offshore Palos Verdes Fault Zone near San Pedro, southern California, *Bull. of the Seismological Society of America*, 94/2, p.506-530.
- Jennings, C.W., 1994, *Fault Activity Map of California and Adjacent Areas*, California Division of Mines and Geology Data Map 6.
- Marlow, M.S., Gardner, J.V., and Normark, W.R., 2000, Using high-resolution multibeam bathymetry to identify seafloor surface rupture along the Palos Verdes fault complex in offshore southern California, *Geology*, 28, 587-590.
- McNeilan, T.W., Rockwell, T.K., and Resnick, G.S., 1996, Style and rate of Holocene slip, Palos Verdes fault, southern California, *Journal of Geophysical Research*, 101, 8317-8334.

Port of Los Angeles, 2007, internet web site, <http://www.portoflosangeles.org>, last accessed March 2007.

Rigor, A.W., 2003, Structure and deformation of the Palos Verdes Fault in San Pedro Bay, California, M.S. Thesis, San Diego State University, 87 pp.

Rivero, C., Shaw, J.H., and Mueller, K., 2000, Oceanside and Thirtymile Bank blind thrusts: Implications for earthquake hazards in coastal southern California, *Geology*, 28, 891-894.

Shaw, J.H., and Suppe, J., 1996, Earthquake hazards of active blind-thrust faults under the central Los Angeles Basin, *Journal of Geophysical Research*, 101, 8623-8642.

Shultz, J.R., 1937, Geology of the whites Point Outfall Sewer Tunnel, Thesis, Caltech, pp, 44 with plates.

Stephenson, W.J., Rockwell, T.K., Odum, J.K., Shedlock, K.M., and Okaya, D.A., 1995, Seismic reflection and geomorphic characterization of the onshore Palos Verdes Fault Zone, Los Angeles, California, *Bulletin of the Seismological Society of America*, 85, 3, 943-950.

Sylvester, A.G., 1988, Strike-slip faults, *Geological Society of America Bulletin*, 100, 1666-1703.

The J. Byer Group, Inc. (2005), "Preliminary Geotechnical Engineering Exploration, Proposed Multi-Family Residential Development, Lot 1, Tract 3192, 26900 South Western Avenue, San Pedro, California", for Bisno Development Company, LLC. The J. Byer Group, Inc. Project Number JB 20111-B, Dated June 21, 2005.

Ward, S.N., and Valensise, G., 1994, The Palos Verdes terraces, California: Bathtub rings from a buried reverse fault, *Journal of Geophysical Research*, 99, 4485-4494.

Woodring, W.P., Bramlette, M.N., and Kew, W.S.W., 1946, Geology and paleontology of the Palos Verdes Hills, California, U.S.G.S. Professional Paper 207, 145 pp.

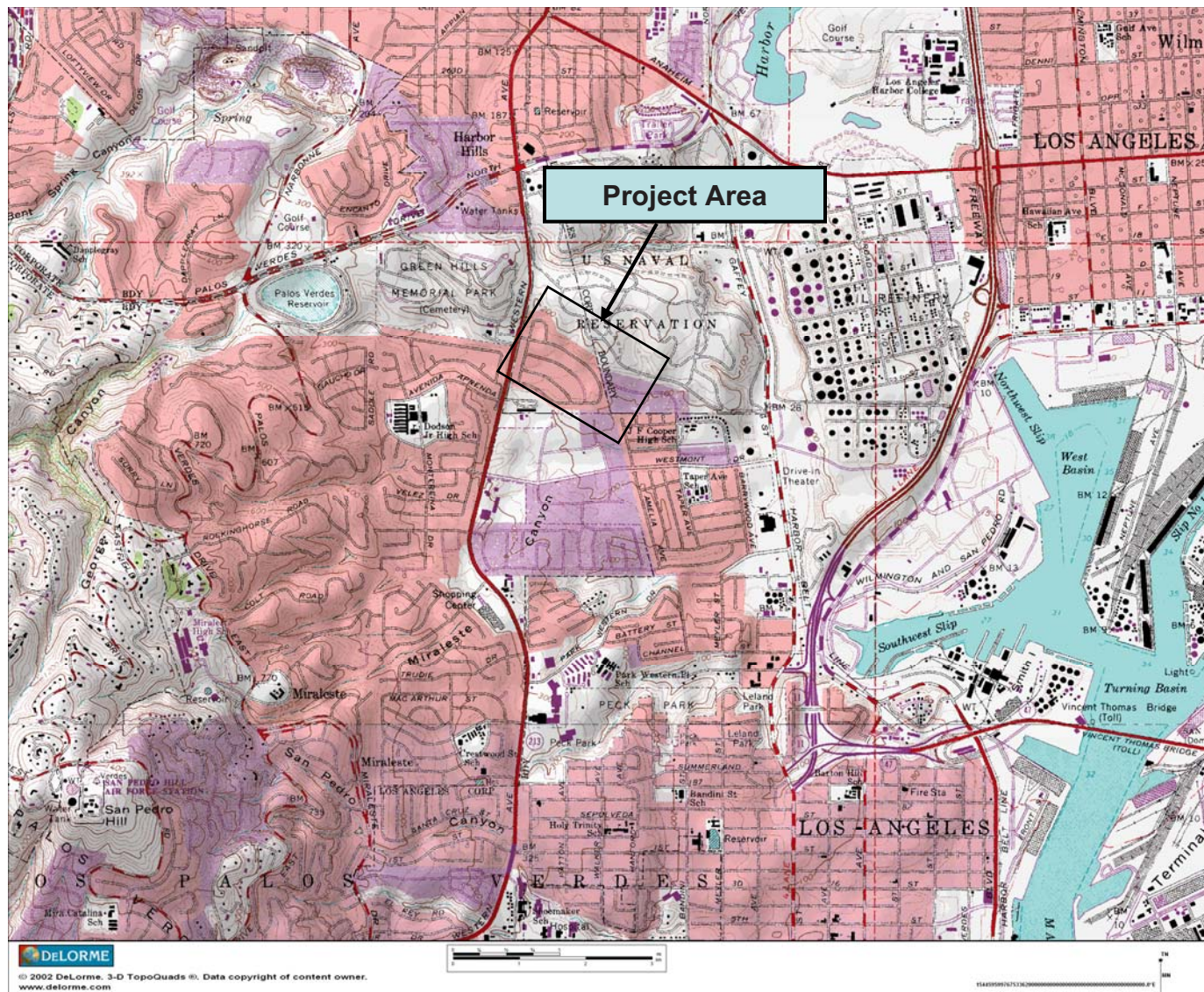
Wright, T.L., 1991, Structural geology and tectonic evolution of the Los Angeles Basin, California, in *Active Margin Basins*, edited by K.T. Biddle, AAPG Memoir 52, 35-134.



Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E., and Vedder, J.G., Geology of the Los Angeles basin, California – An introduction, U.S.G.S. Professional Paper 420-A, 57 pp.

Ziony, J.I., and Yerkes, R.F., 1985, Evaluating earthquake and surface faulting potential, in Ziony, J.I., ed., Evaluating earthquake hazards in the Los Angeles region--An earth-science perspective: U.S. Geological Survey Professional Paper 1360, p. 43-91.

FIGURES



Site Vicinity

Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista
San Pedro, CA

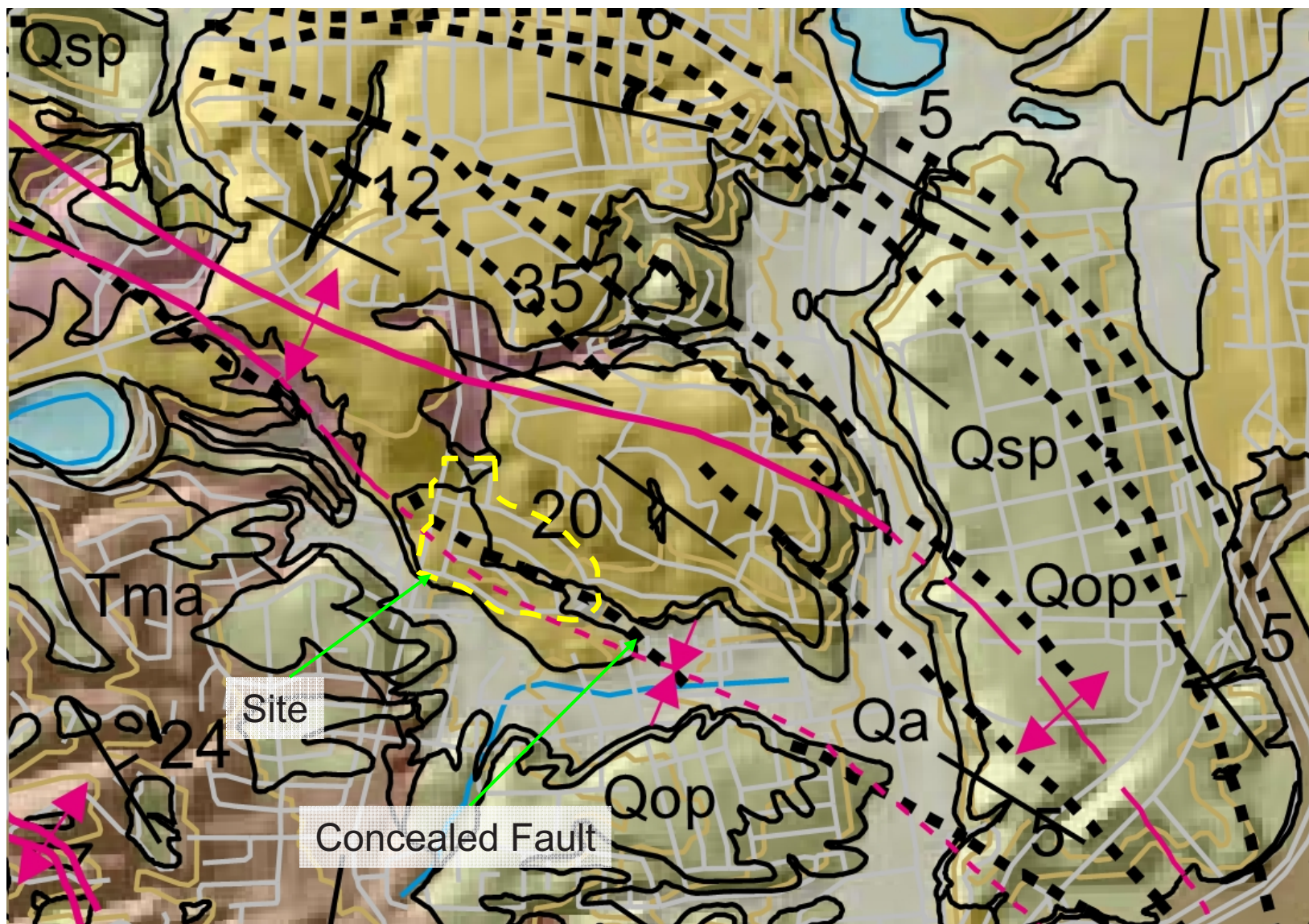
Project Number L-923

Date: 12/28/10

Figure 1



Figure 2A: Long Beach 30'x60' Quadrangle Geology Map



Geology Map (From Long Beach 30'x60' Quadrangle Geology Map)

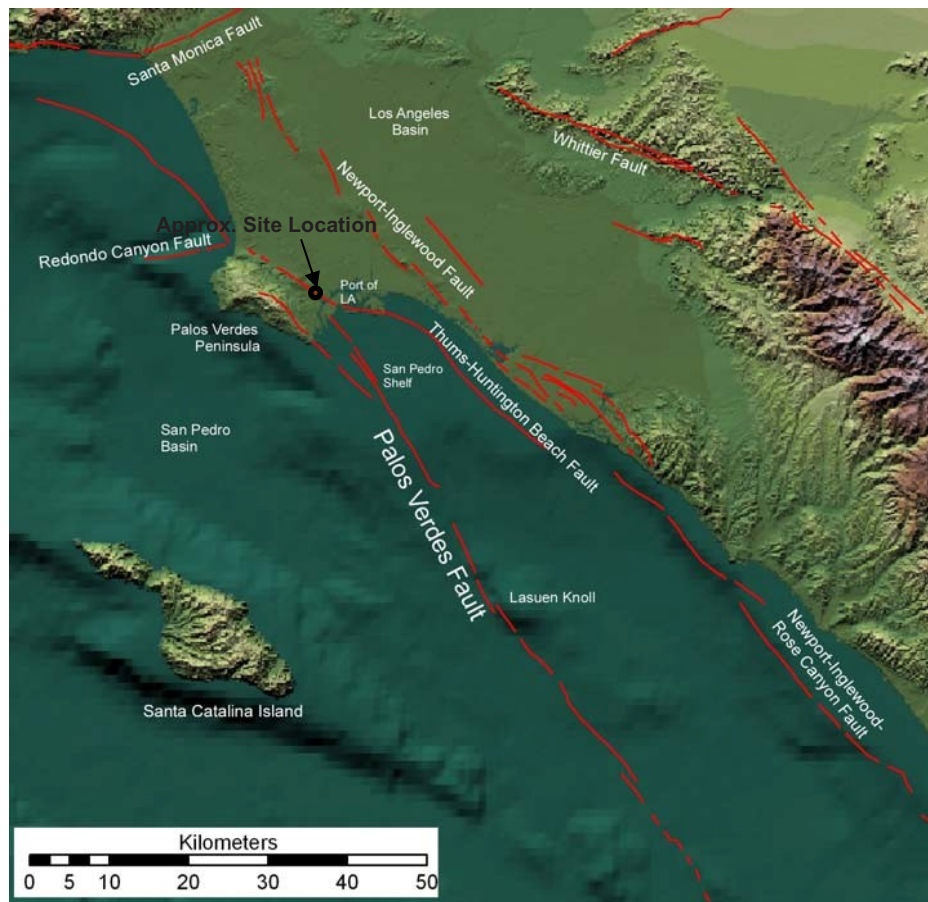
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista
San Pedro, CA

Project Number L-923

Date: 05/26/11

Figure 2B



Reference: John H Shaw (2007), "Subsurface geometry and segmentation of the Palos Verdes Fault and their implications For earthquake hazard in Southern California".

Reference: Steve Dubnewych, Jon Kaneshiro, and Calvin Jin (2007)M "Joint Water Pollution Control Plant Tunnel and Ocean Outfall Project".



Regional Geology

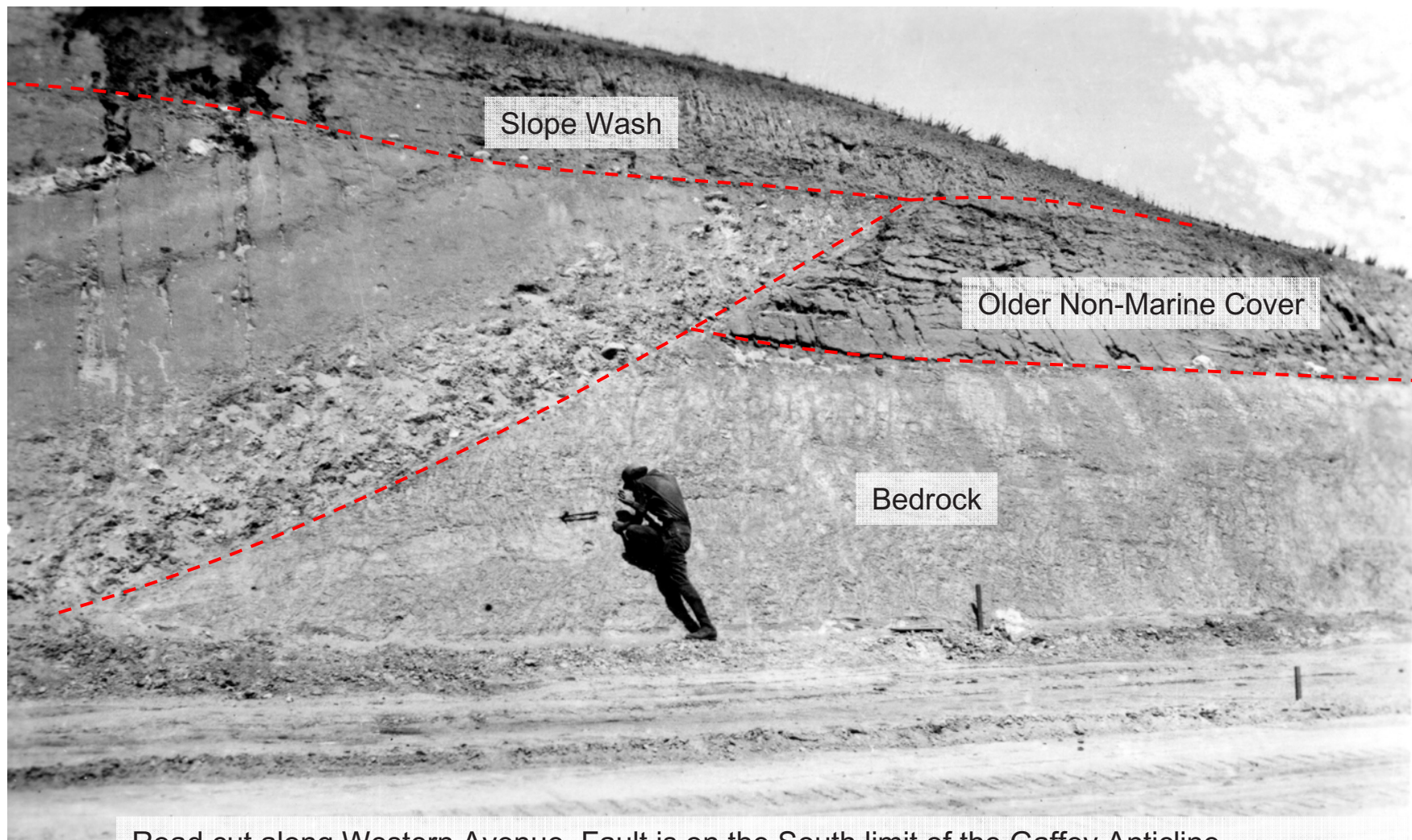
Group Delta Consultants. INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 05/23/11

Figure 2C



Road cut along Western Avenue. Fault is on the South limit of the Gaffey Anticline (exact location unclear).



Exposed Thrust Fault on Western Avenue

Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista
San Pedro, CA

Project Number L-923

Date: 05/23/11

Figure 3

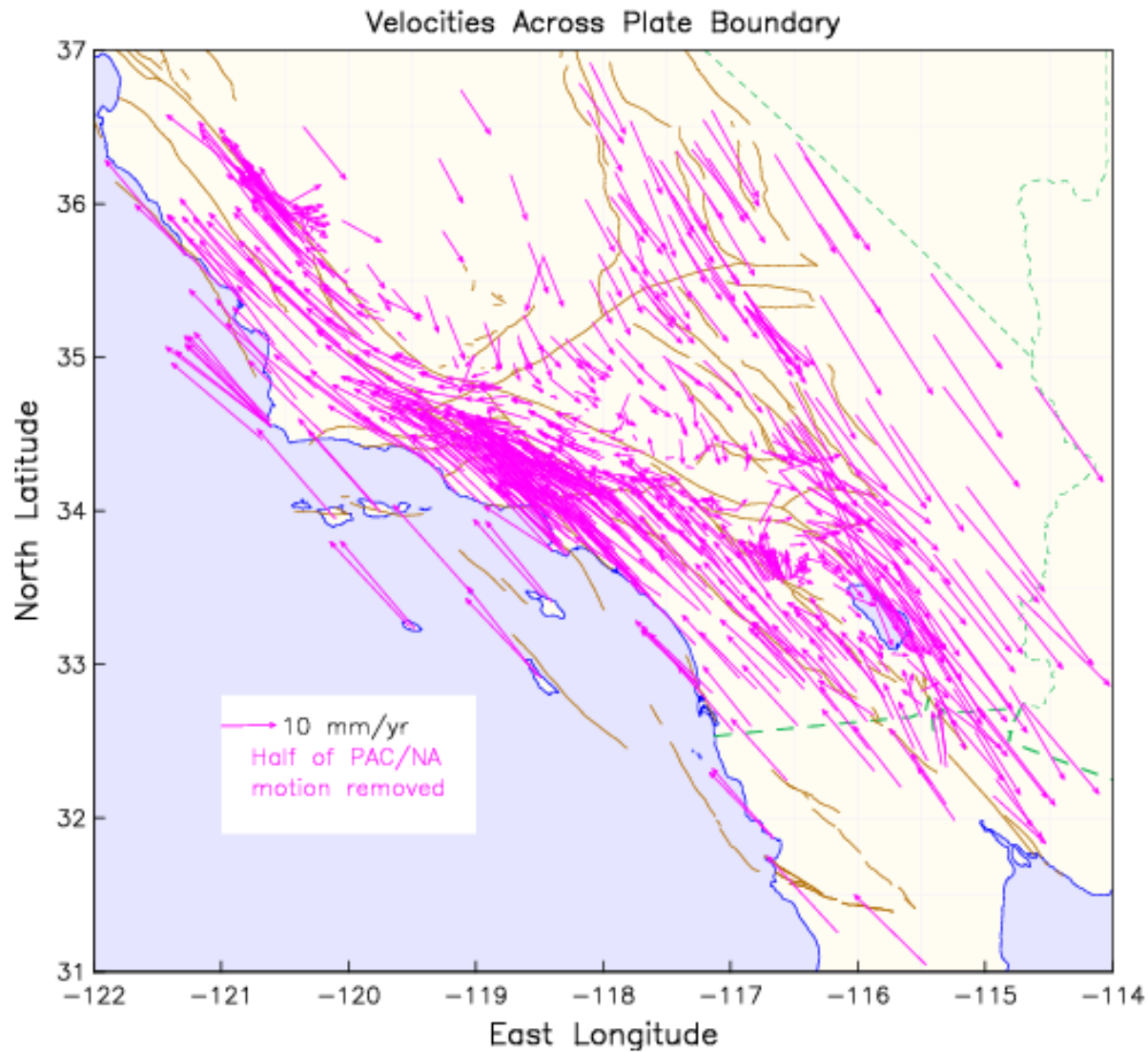


Plate Velocities in Southern California by GPS

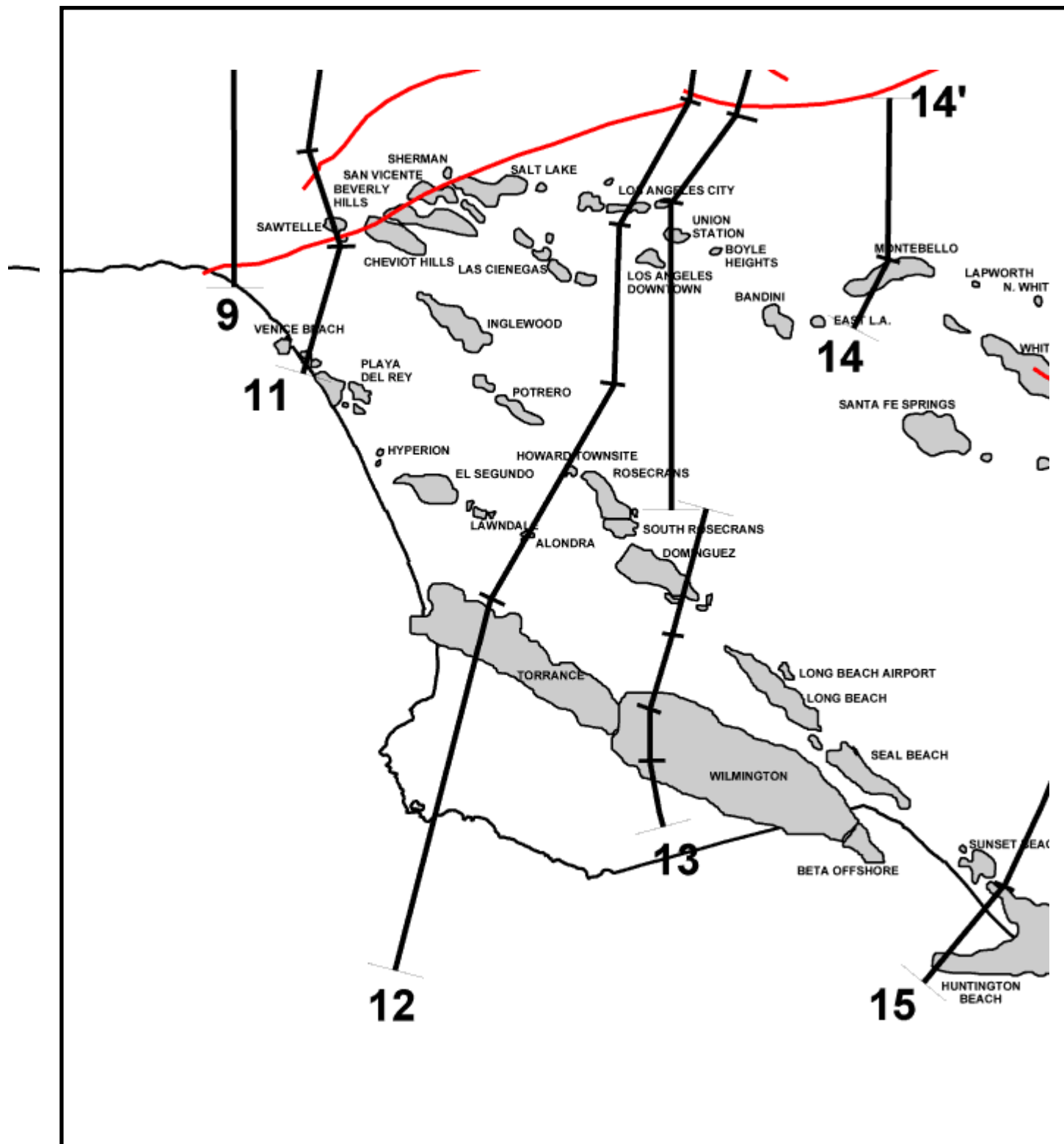
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 05/23/11

Figure 4



Namson and Davis Geologic Cross-Section Location Map

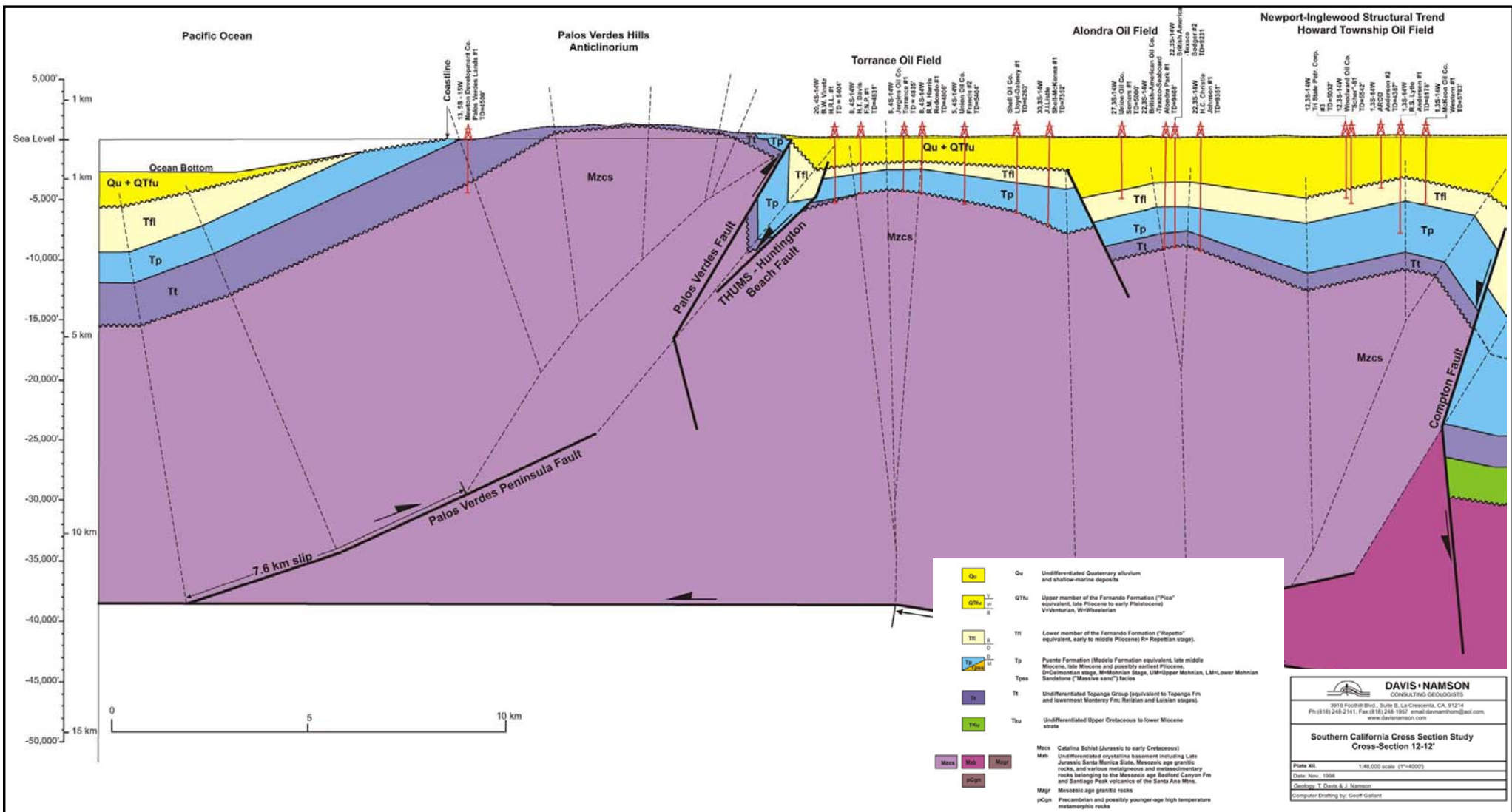
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential
Development

Project Number: L-923

Date: 05/23/11

Figure 5A



Namson and Davis Balanced Cross – Section 12-12'

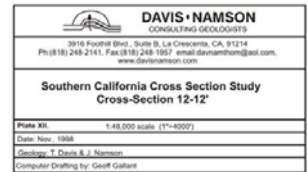
Group Delta Consultants, INC.
 370 Amapola Ave.
 Torrance, Ca 90501

Ponte Vista Residential Development
 San Pedro, California

Project Number: L-923

Date: 05/23/2011

Figure 5B





Historical Aerial Photo

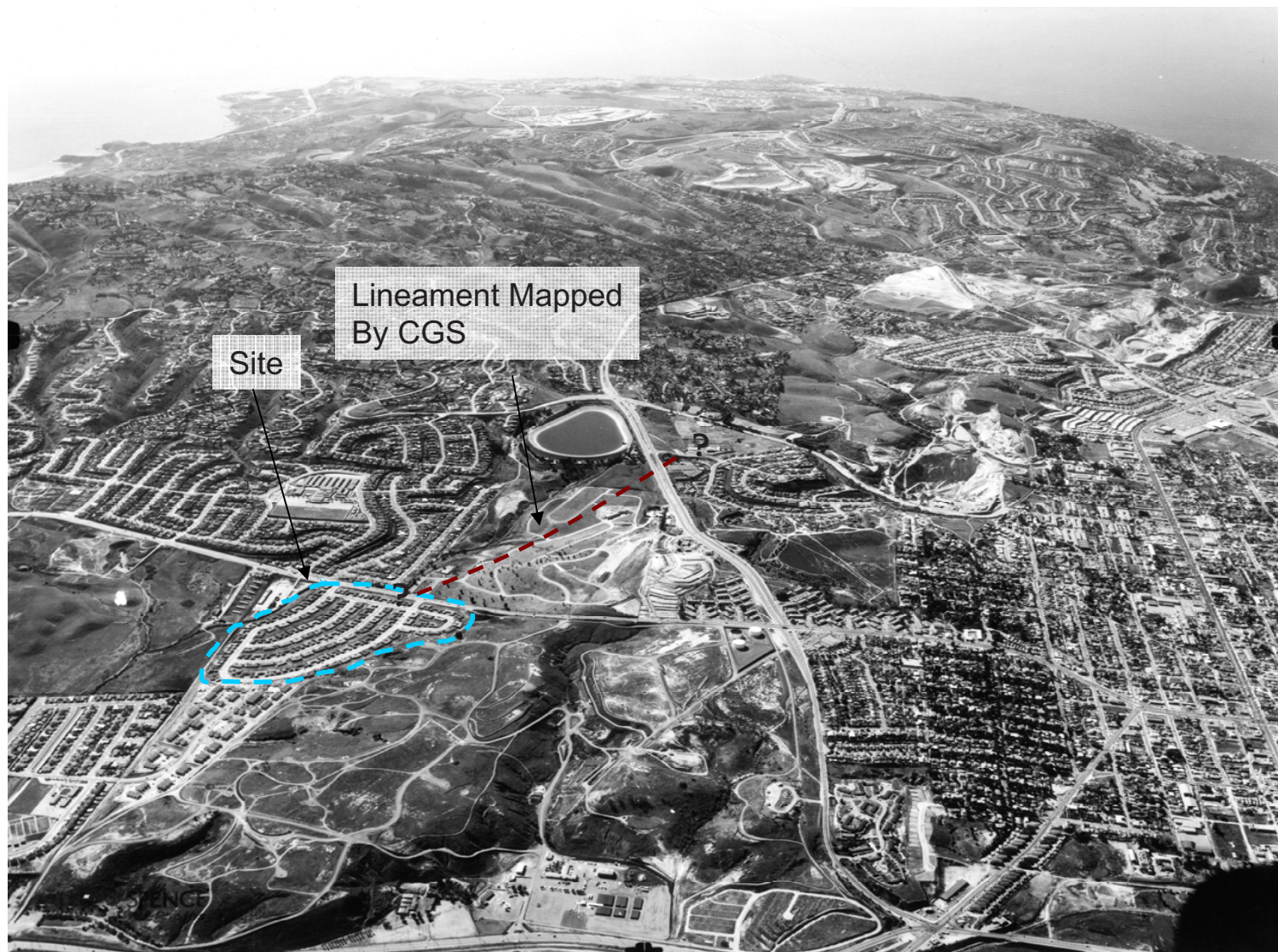
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 5/23/11

Figure 6A



Historical Aerial Photo

Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 5/23/11

Figure 6B

1919 Photo with Aerial photo linement co-existing with CGS concealed fault map



Historic Aerial Photo

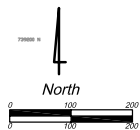
Project Number L-923

Date: 05/23/11

Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Figure 6C



Legend

— Positioning of Common Midpoint (CMP) Traces on Lines 1-3
CMP Traces are Subsurface Reflection Points Along Lines 1-3

..... Surface Projection of Fault

Fault A - Possible Splay of PV Fault

Fault B - Normal Fault - Non Seismogenic

CPT LOCATIONS
See Figure 8A

POINT A

SOUTH FLANK OF
GAFFEY ANTICLINE

CPT LOCATIONS
See Figure 8B

(Normal Fault - Non Seismogenic)

CPT LOCATIONS
See Figure 8C

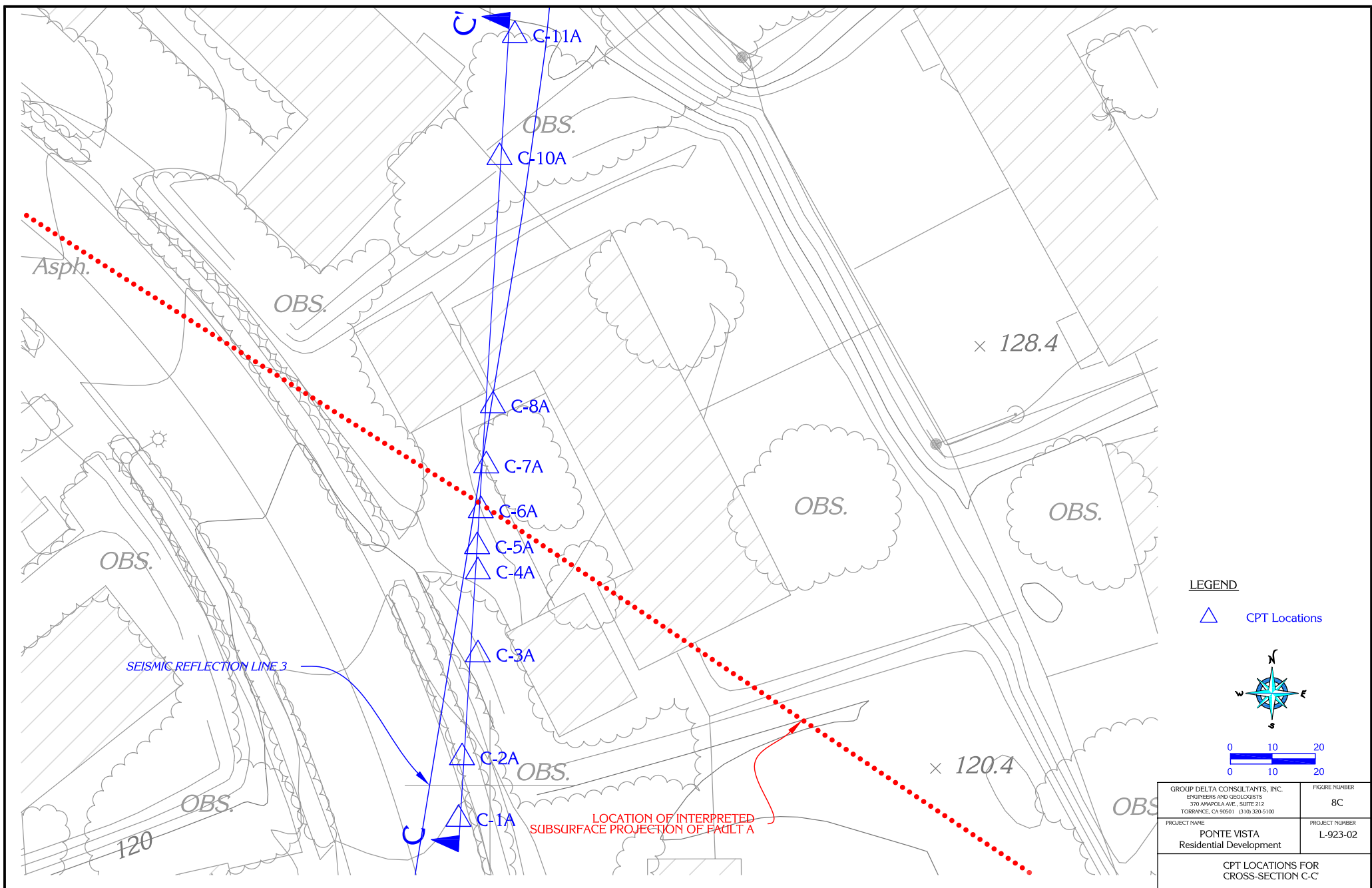
FAULT A
(Possible Splay of PV Fault)

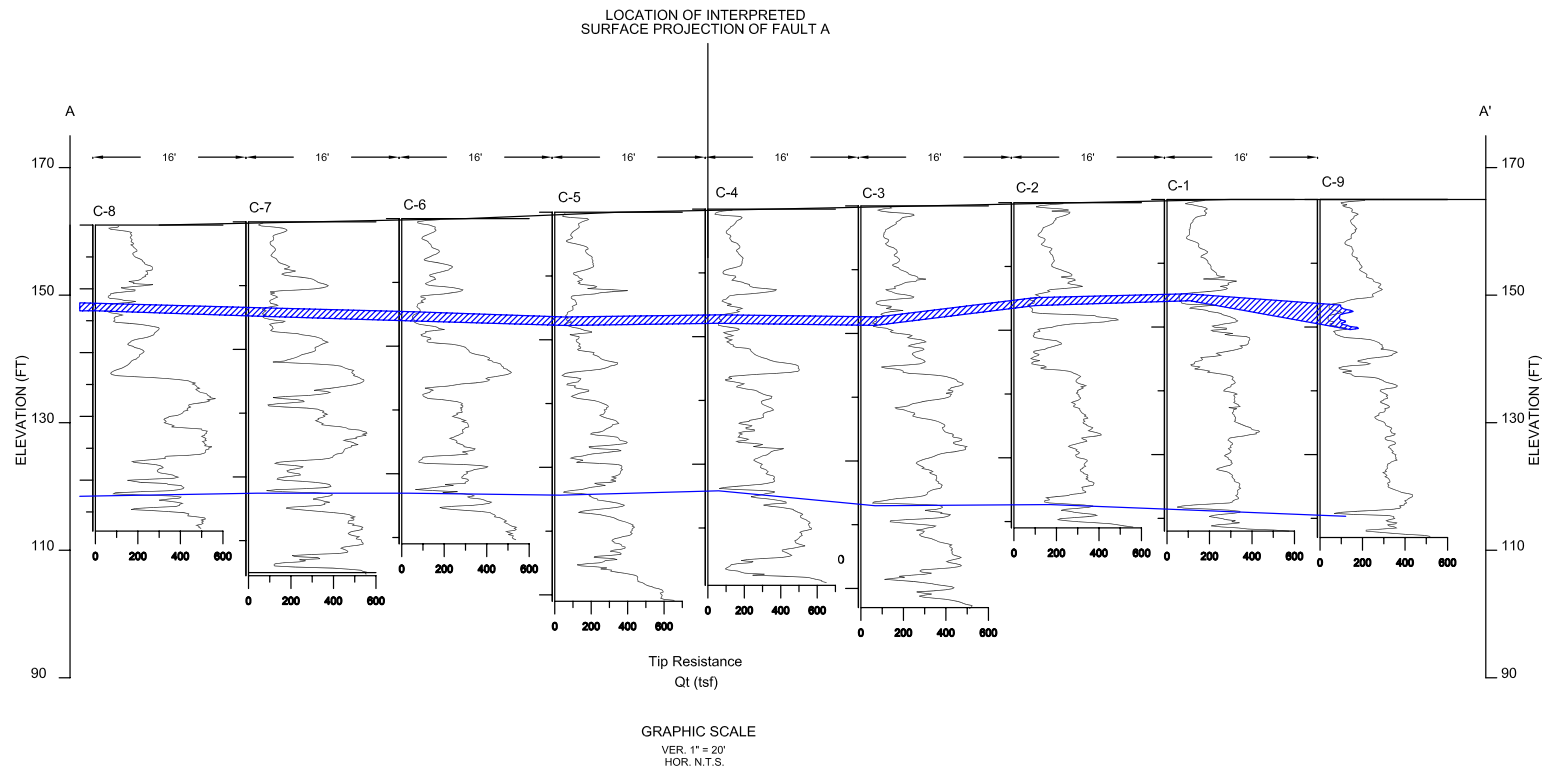
Site Map Showing
Seismic Survey Lines 1-3 with
Mapping of Subsurface Faulting
Based on Seismic Reflection Profiles

Ponte Vista Development
San Pedro, California

Rev. 1 May, 2011

GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 370 AMAPOLA AVE., SUITE 212 TOMBRAKE, CA 90591 (310) 320-5100	FIGURE NUMBER 7
PROJECT NAME PONTE VISTA Residential Development	PROJECT NUMBER L-923-02
LOCATIONS OF SEISMIC REFLECTION LINES	



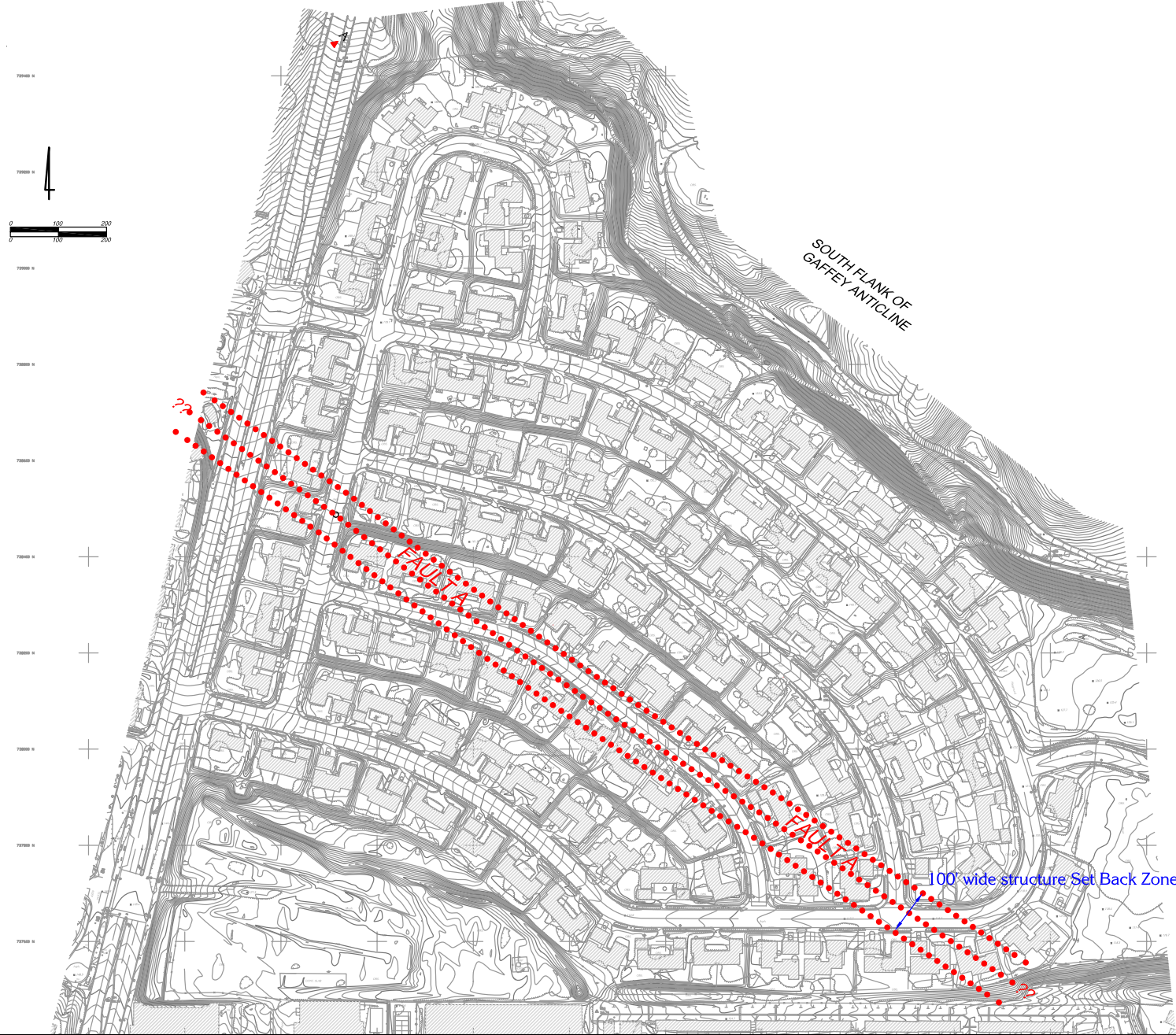


Legend

Thin Layer of Clay

Thin Layer of Silt

GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 370 ANAPOLA AVE., SUITE 212 TOWSON, CA 90901 (310) 320-5100	FIGURE NUMBER 9A
PROJECT NAME PONTE VISTA Residential Development	PROJECT NUMBER L-923-02
CROSS-SECTION A-A' OF CPT PROFILE	



GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 370 AMAPOLA AVE., SUITE 212 TORRANCE, CA 90501 (310) 320-6100		FIGURE NUMBER 10
PROJECT NAME PONTE VISTA Residential Development		PROJECT NUMBER L-923-02
RECOMMENDED SETBACK ZONE		



LEGEND



J.B.G. Boring Locations



Cross Section

Reference: Drawings prepared by The J. Byrt Group Inc, titled " Exploration Map".

DATE:	12/28/10	DRAWN BY:	A. Helma
REVISION:		APPROVED BY:	Y. Liu
REVISION:			

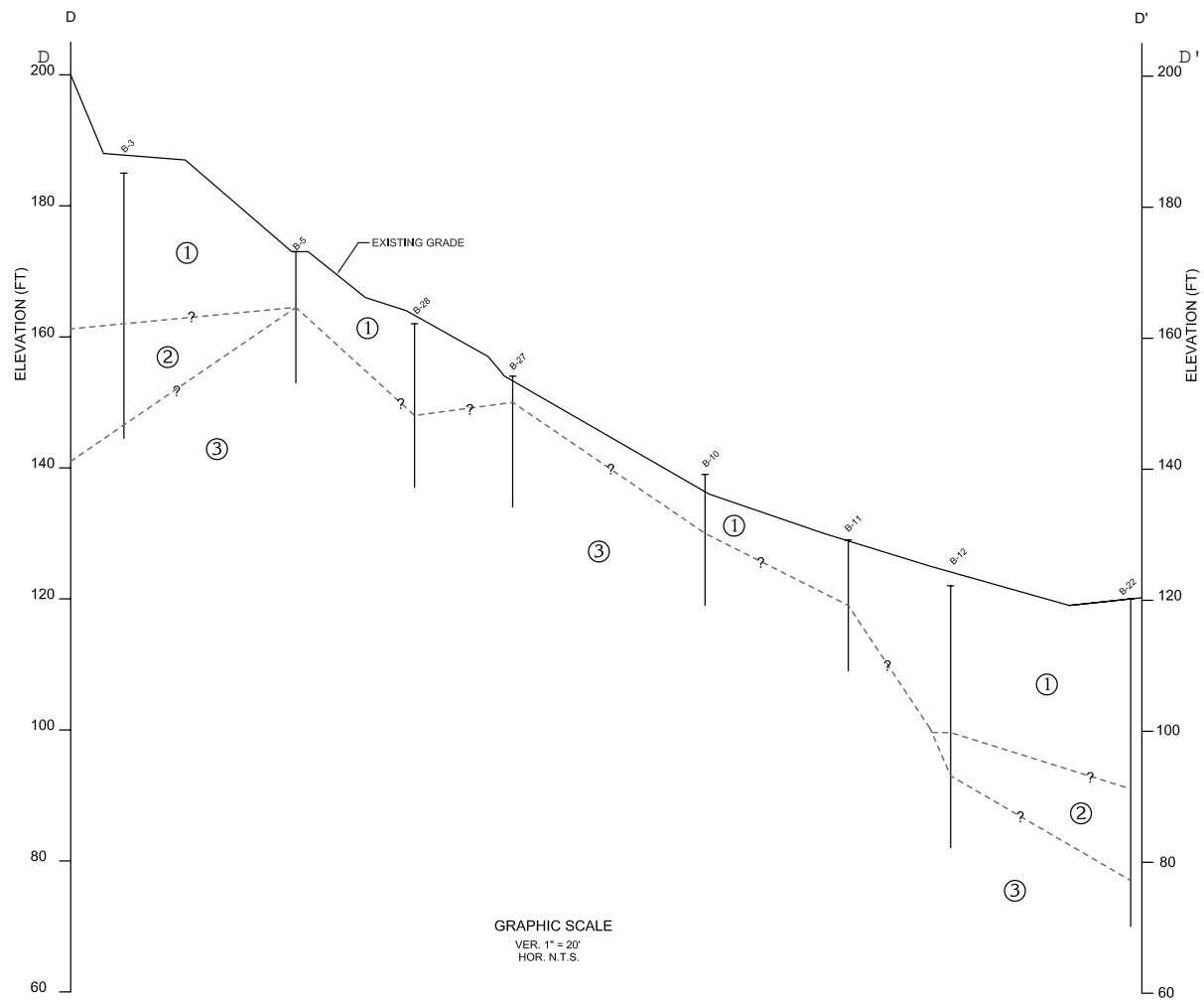


**GROUP DELTA
CONSULTANTS, INC**
370 Amapola Ave.
Suite 212
Torrance, CA. 90501

BORING LOCATION MAP

Ponte Vista
Los Angeles, CA

PROJECT NUMBER:	L-923
SCALE:	1" = 150'
FIGURE NUMBER:	11

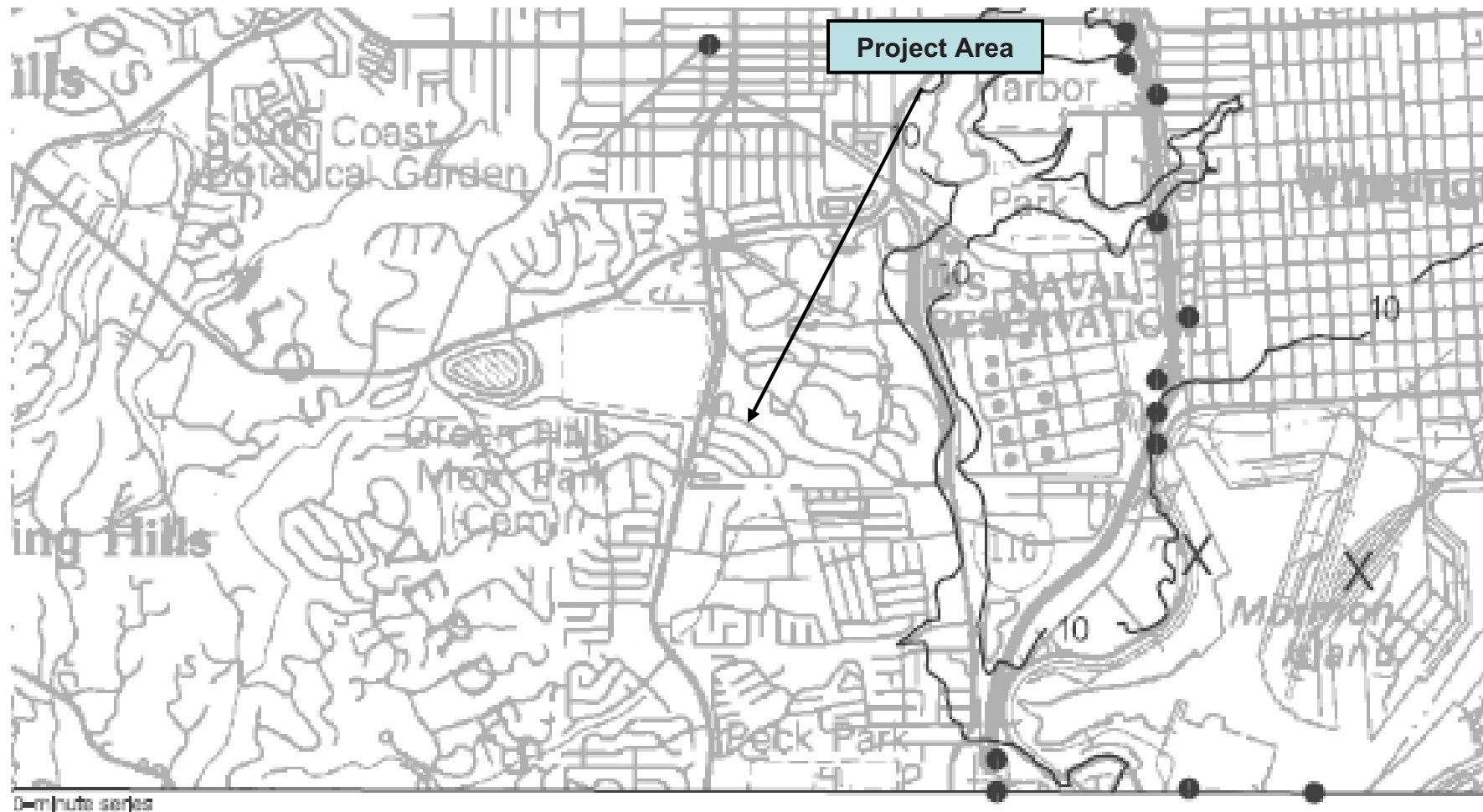


Soil Layering:

- ① Fill
- ② Alluvium
- ③ San Pedro Formation



GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 370 AMAPOLA AVE., SUITE 212 TORRANCE, CA 90501 (310) 320-6100		FIGURE NUMBER 12
PROJECT NAME PONTE VISTA		PROJECT NUMBER L-923-02
GEOLOGIC CROSS SECTION SECTION D-D'		



Historic Groundwater Contour Map

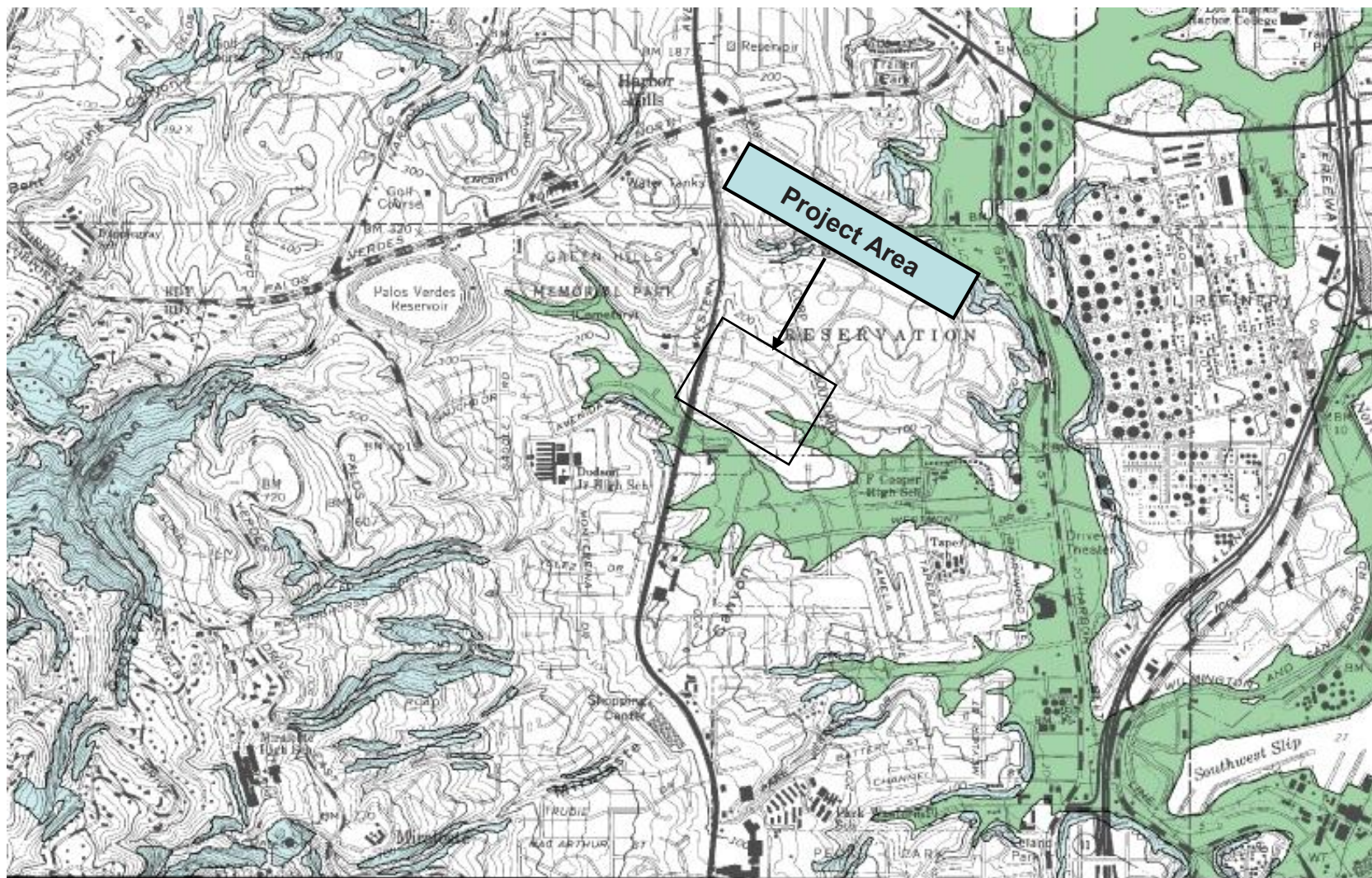
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 05/23/2011

Figure 13



SAN PEDRO



CGS Liquefaction Hazard Zone Map

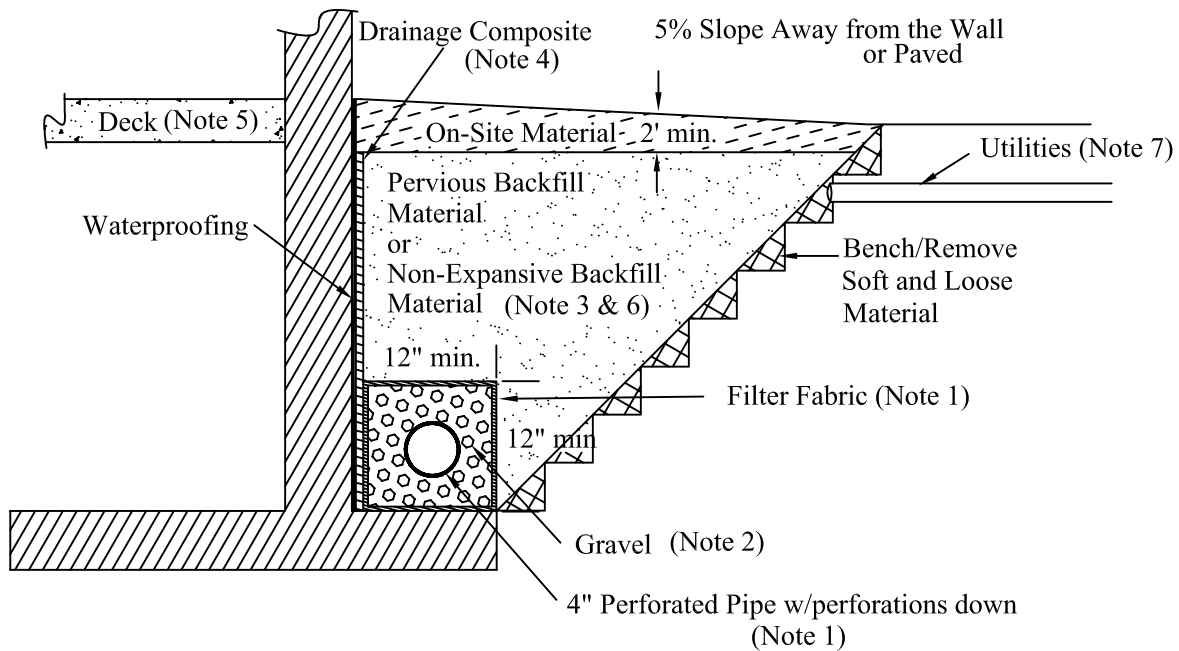
Group Delta Consultants, INC.
370 Amapola Ave.
Torrance, Ca 90501

Ponte Vista Residential Development
San Pedro, CA

Project Number L-923

Date: 05/23/2011

Figure 14



NOTES

- 1) Perforated pipe should be an ASTM standard Acrylonitrile Butadiene Styrene (ABS), Polyvinyl Chloride (PVC), or Polyethylene (PE) with a 0.25% slope for drainage and wrapped with a filter fabric (Mirafi 140 or equivalent).
- 2) Gravel - 3/8" or 3/4" gravel
- 3) If no drainage composite is used, Pervious Backfill material should be used above the gravel zone. Pervious Material should meet Public Works Standard (Greenbook 2000, 3.0.0-3.5.2) as follows:
 - 100% passing 3/4"
 - 80-100% passing 3/8"
 - 0-8% passing -100 sieve
 - 0-3% passing -200 sieve
- 4) If a drainage composite is used, non expansive backfill material may be used above the gravel zone. Drainage Composite Material should be MiraDrain 6000 material or equivalent. Backfill should have an EI<20 and conform to Group Delta Grading and Backfill Recommendations.
- 5) If the wall is supported by the deck, no backfill shall be placed before the deck is constructed and a structural engineer's approval is given.
- 6) No heavy equipment or compaction equipment should be used above the perforated pipe, or within 8 feet of the wall. Only hand compaction equipment should be used above adjacent to the walls.
- 7) Utility Laterals - Remove loose material and hand compact backfill or use 2-sack sand/cement slurry.

Retaining Wall Backfill			
Ponte Vista		PROJECT NUMBER: L-923	
		DATE: 12/23/10	
	SCALE:	DRAWN BY:	Y Liu
	Not To Scale	APPROVED BY:	Y Liu
		REVISD: 15	
GROUP DELTA CONSULTANTS, INC.			

APPENDIX A

FIELD EXPLORATION

APPENDIX A FIELD EXPLORATION

The subsurface conditions at the project site were previously investigated by the J. Byer Group, Inc. (JBG) in June 2005 which involved drilling of 28 hollow stem auger borings. JBG's boring locations are shown in Figure 11 of the main report. JBG's boring logs are presented in Appendix C.

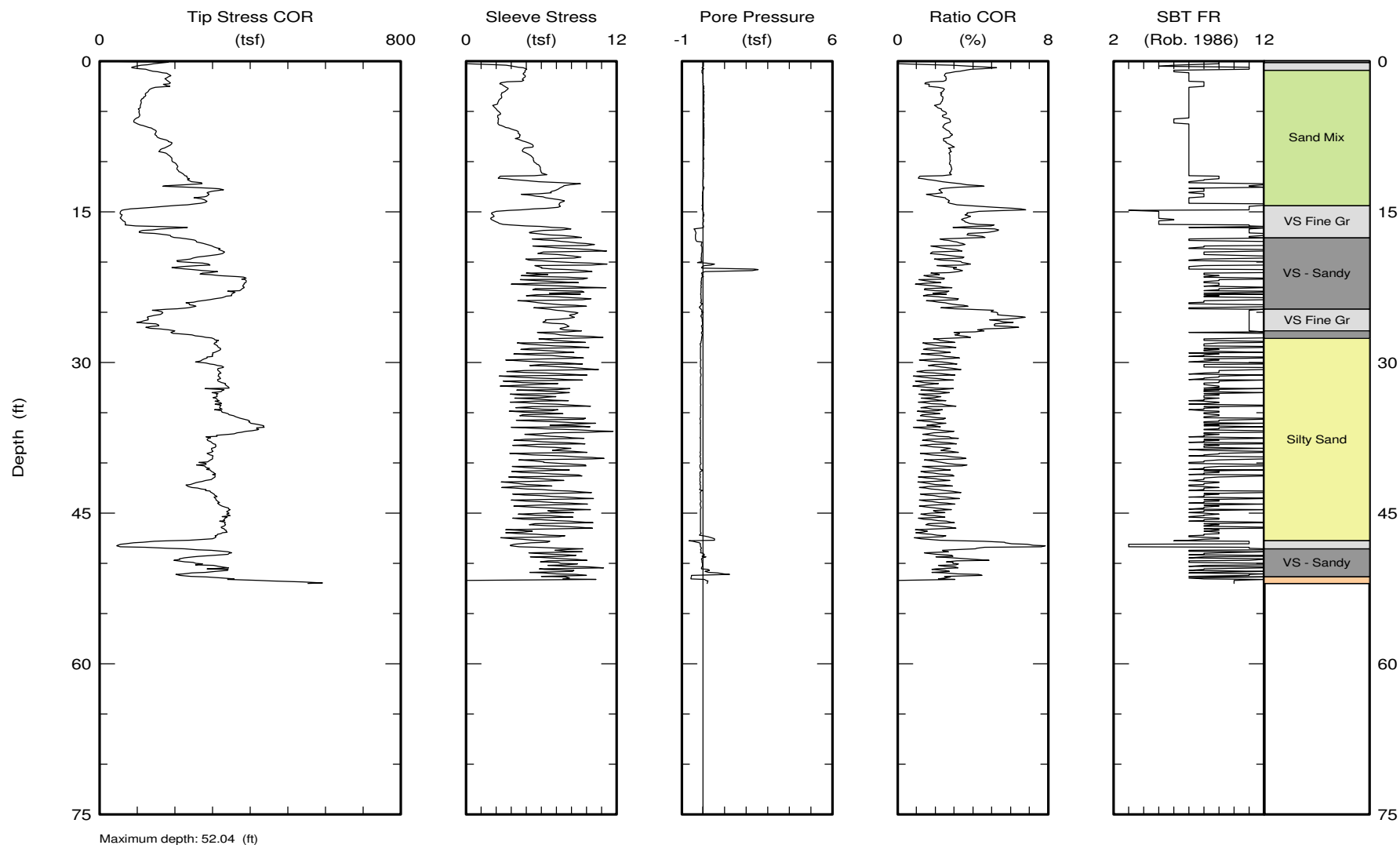
To investigate potential fault rupture hazard at the project site, Group Delta Consultants, Inc. (GDC) advanced a total of 30 Cone Penetration Tests (CPT). The CPTs were advanced to depths of 40 to 60 feet below existing grades. Locations of the CPTs are shown on Figures 8A to 8C of the main report.

The CPT probes were performed in general accordance to ASTM D3441-86. A CPT sounding is performed by pushing a conical tipped steel probe with a cylindrical friction sleeve into soil while simultaneously recording the end bearing and side friction resistance. The conical tip had a 60-degree apex angle and a projected cross sectional area of 1.55 square inches and is advanced with a hydraulic ram. The cylindrical friction sleeve has a surface area of 23.25 square inches. Both the tip and sleeve have outside diameters of 1.4 inch.

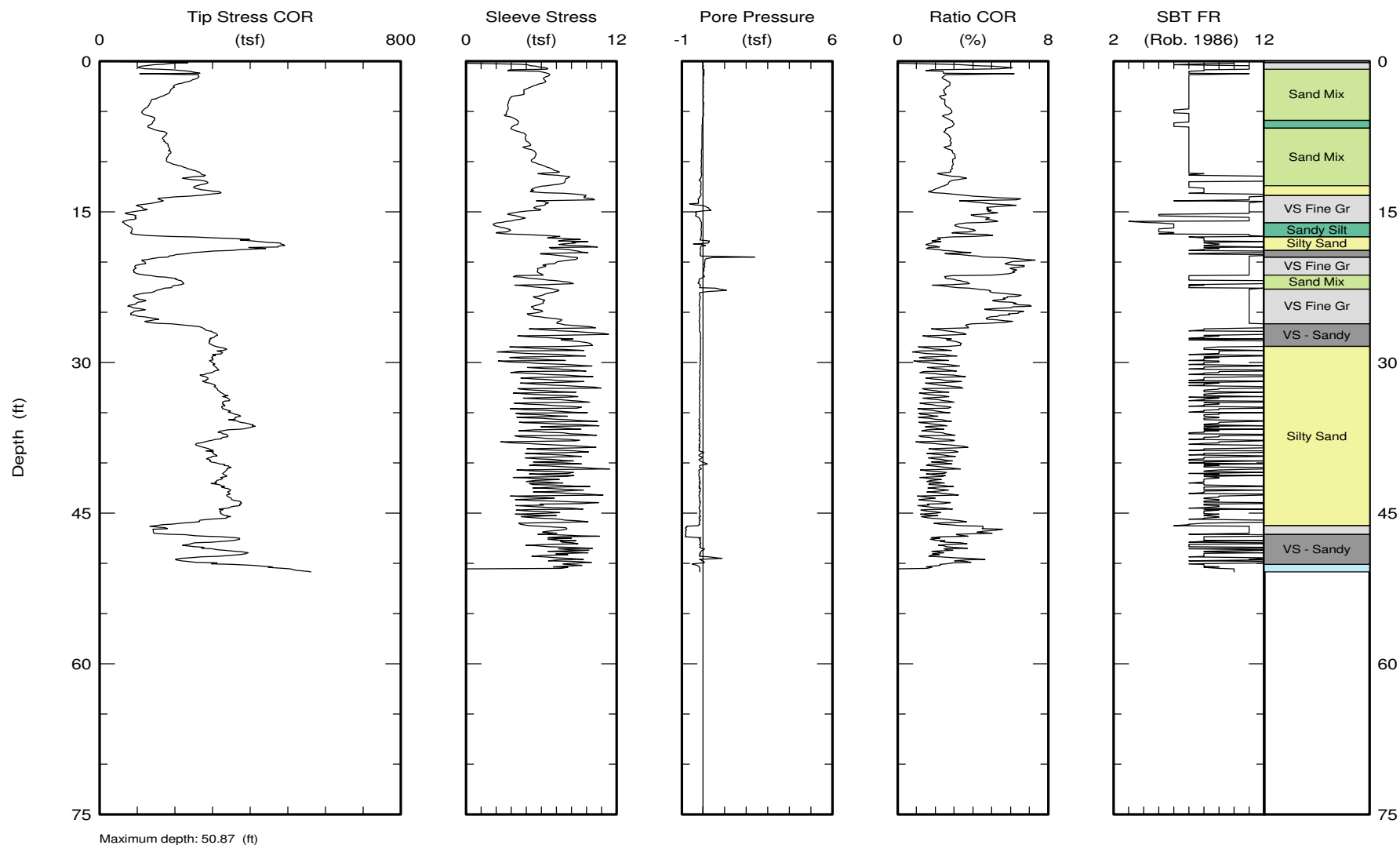
As the probe is advanced, electronic instruments measure and record both the tip resistance and the frictional resistance on the sleeve. The tip and frictional resistance are then analyzed, using available correlations, to estimate soil classification, density, strength and compressibility of subsurface materials.

CPT logs are presented in this appendix.

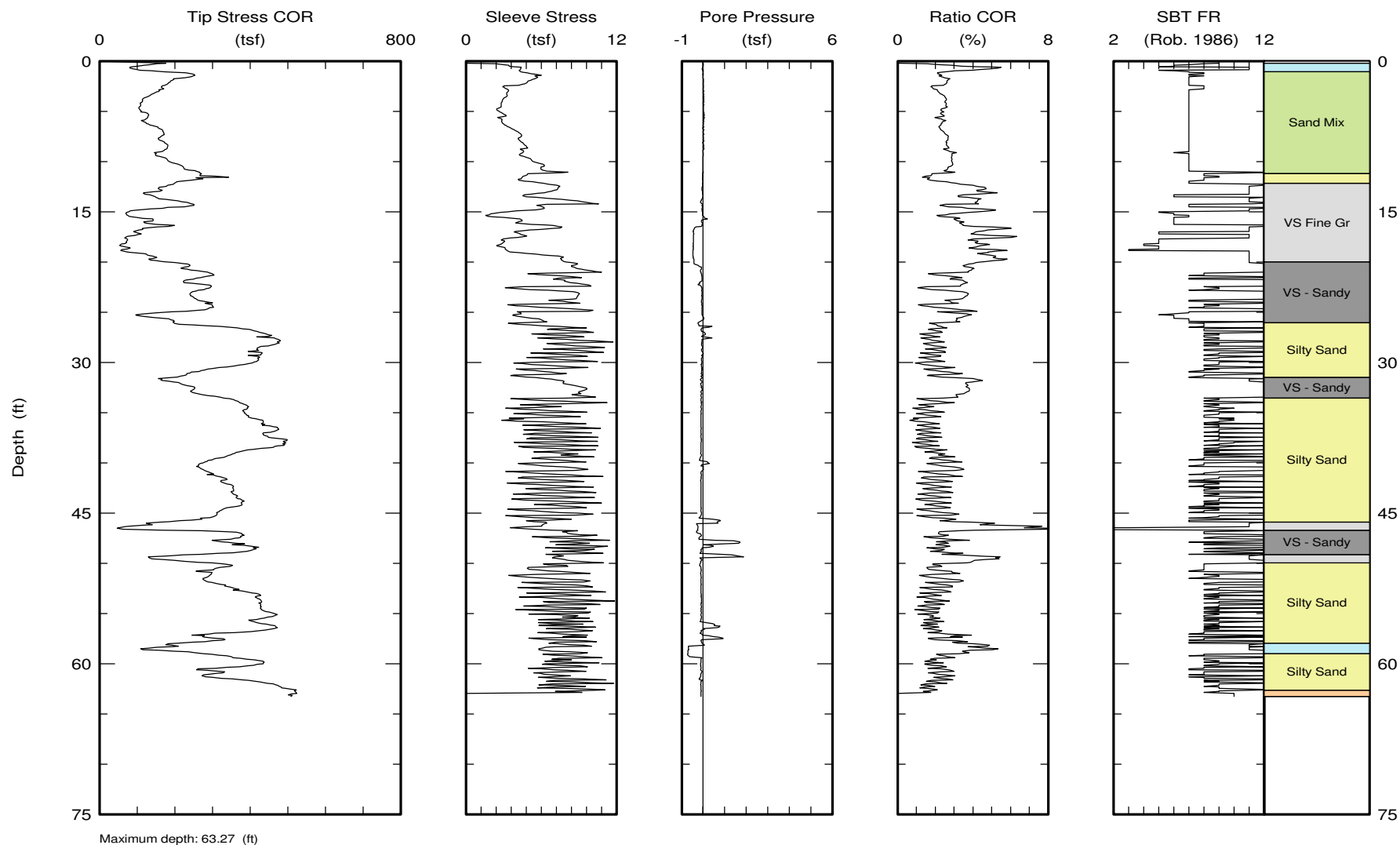
 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 30/Nov/2010 Test ID: C-1 Project: SanPedro
	Customer: Group Delta Consultants, Inc. Job Site: 27508 John Montgomery Drive	



 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 30/Nov/2010 Test ID: C-2 Project: SanPedro
	Customer: Group Delta Consultants, Inc. Job Site: 27508 John Montgomery Drive	



 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 29/Nov/2010 Test ID: C-3 Project: SanPedro
	Customer: Group Delta Consultants, Inc. Job Site: 27508 John Montgomery Drive	



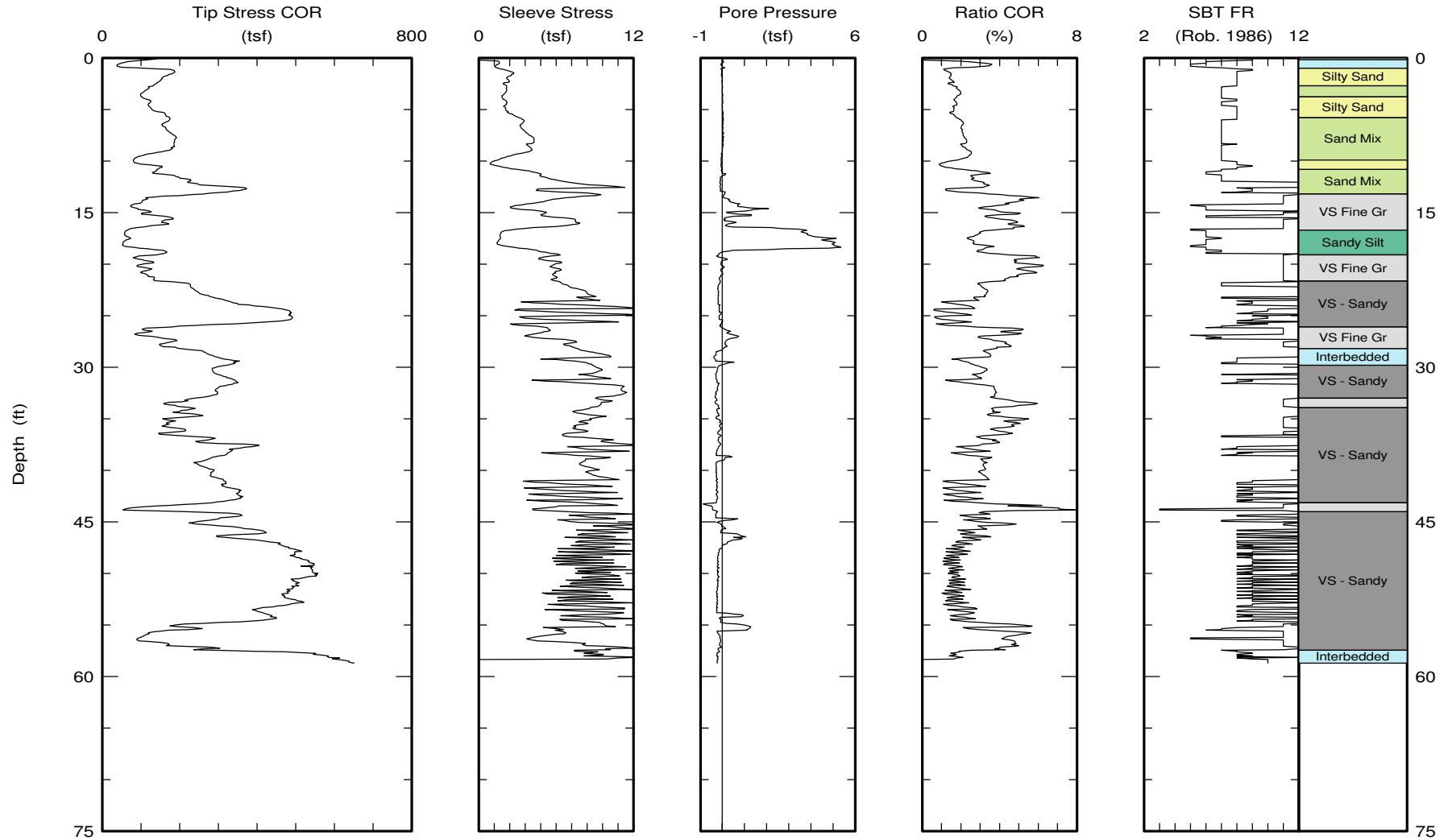


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 29/Nov/2010
Test ID: C-4
Project: SanPedro

Customer: Group Delta Consultants, Inc.
Job Site: 27508 John Montgomery Drive



Maximum depth: 58.70 (ft)

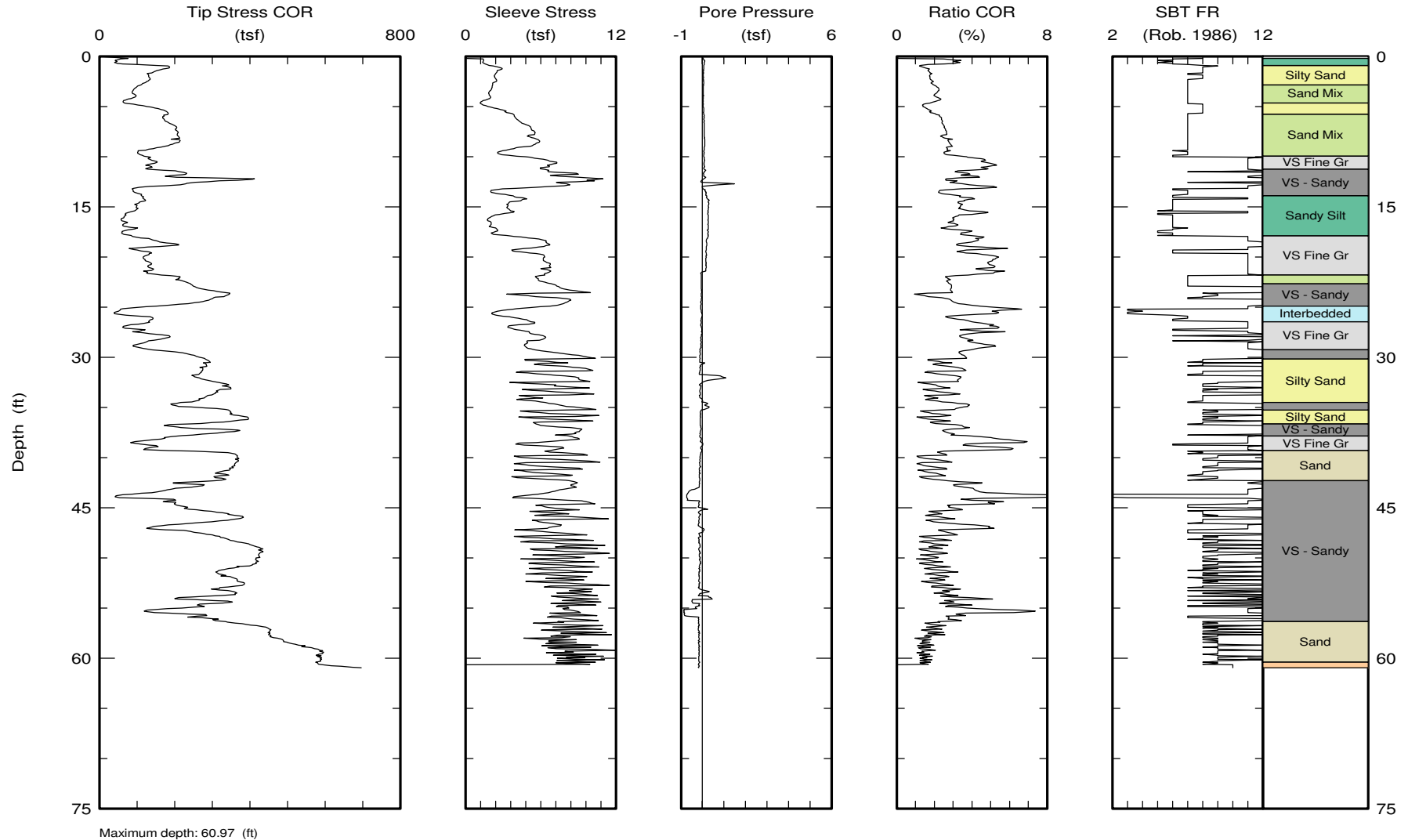


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 29/Nov/2010
Test ID: C-5
Project: SanPedro

Customer: Group Delta Consultants, Inc.
Job Site: 27508 John Montgomery Drive



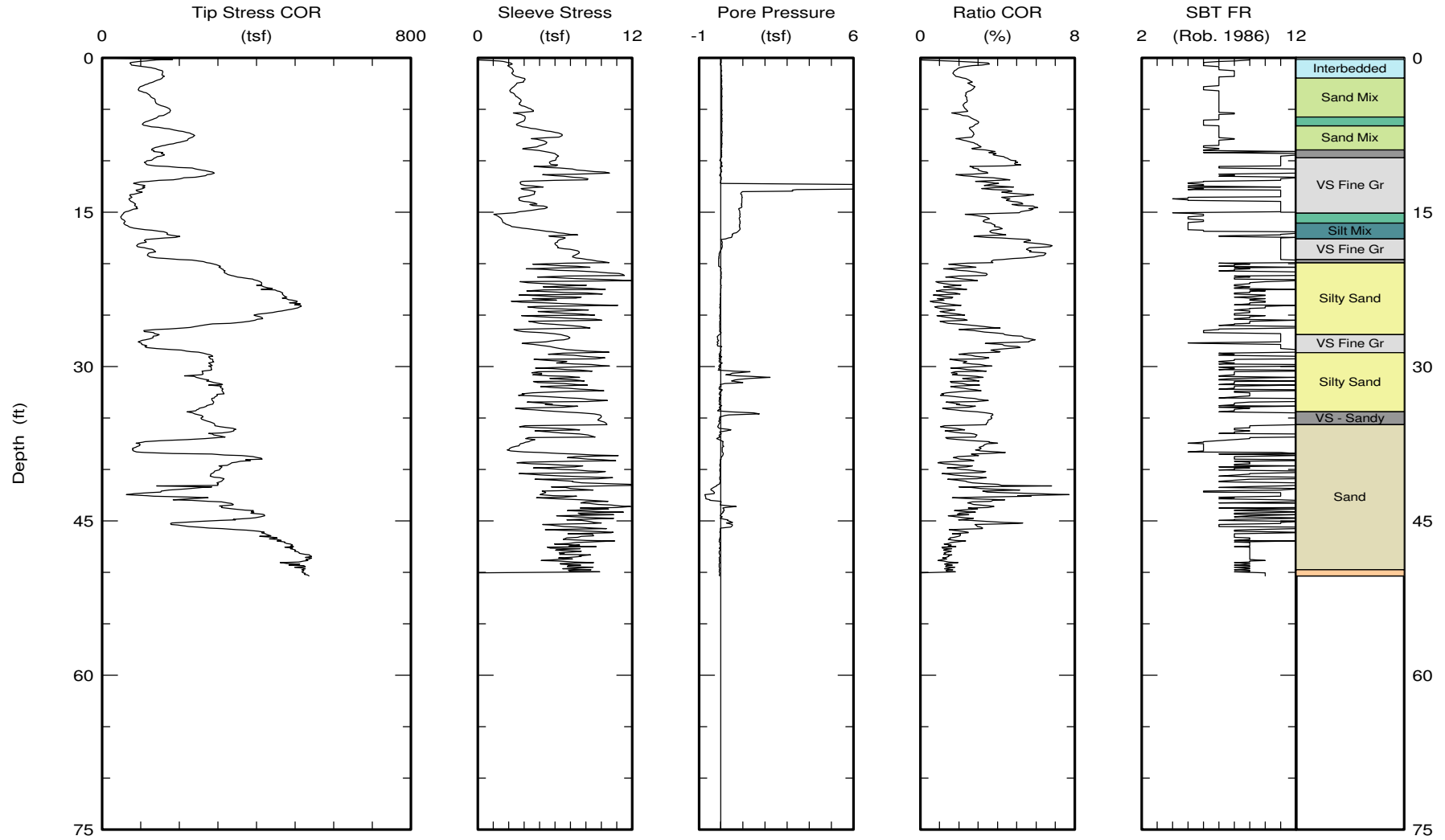


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

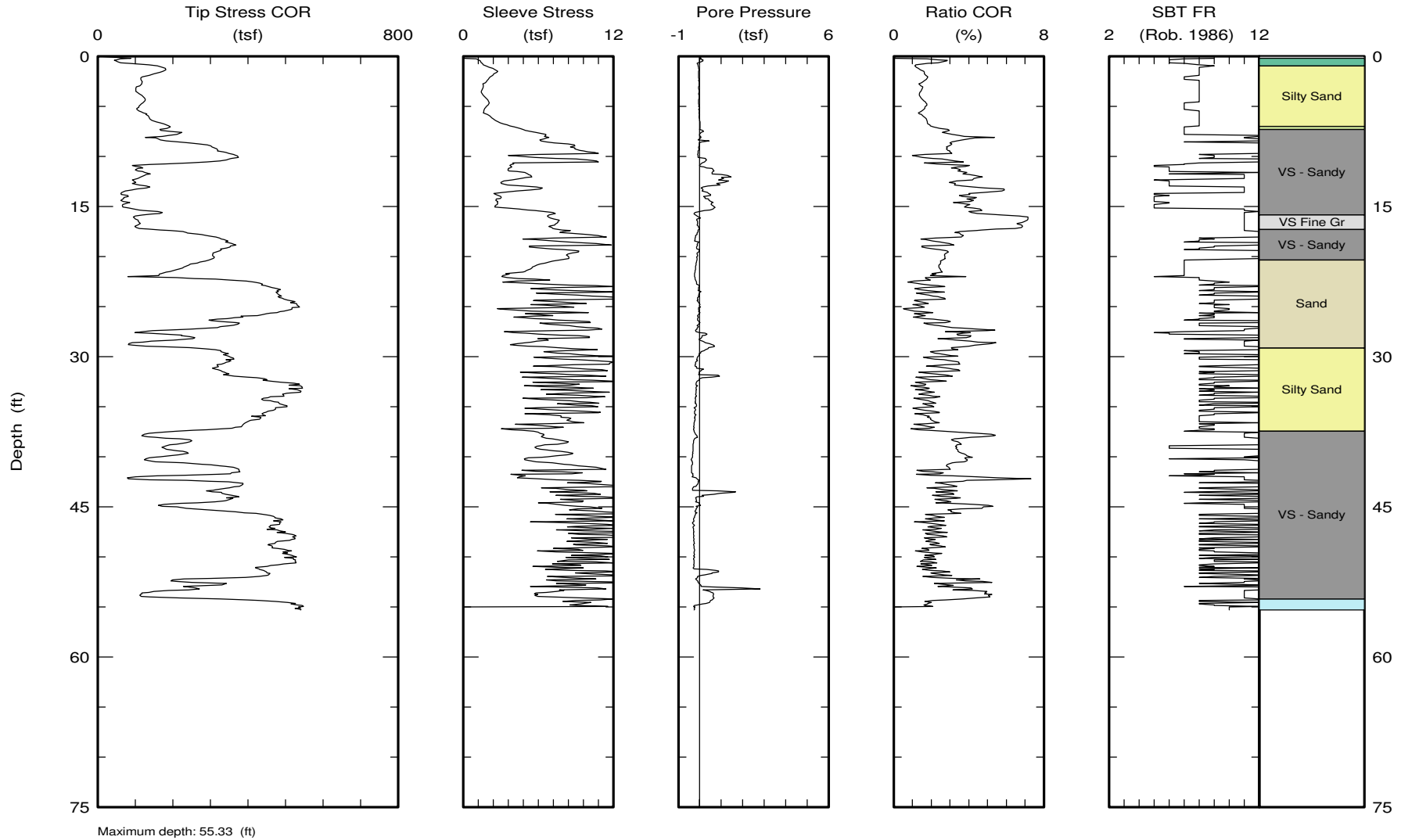
Date: 30/Nov/2010
Test ID: C-6
Project: SanPedro

Customer: Group Delta Consultants, Inc.
Job Site: 27508 John Montgomery Drive

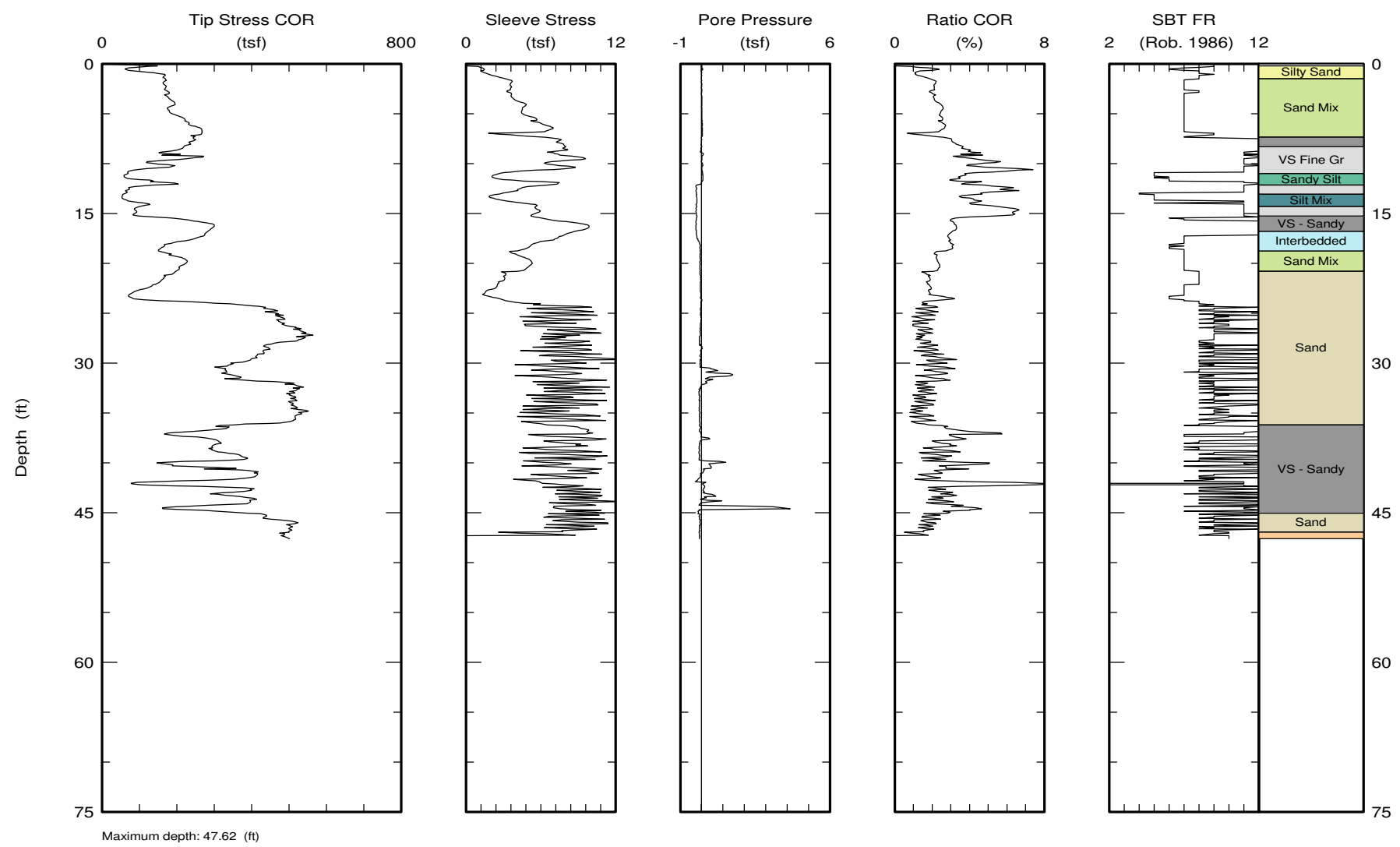


Maximum depth: 50.36 (ft)

 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 30/Nov/2010 Test ID: C-7 Project: SanPedro
	Customer: Group Delta Consultants, Inc. Job Site: 27508 John Montgomery Drive	



 Kehoe Testing & Engineering Office: (714) 901-7270 Fax: (714) 901-7289 rich@kehoetesting.com www.kehoetesting.com	CPT Data 30 ton rig	Date: 30/Nov/2010 Test ID: C-8 Project: SanPedro
	Customer: Group Delta Consultants, Inc. Job Site: 27508 John Montgomery Drive	



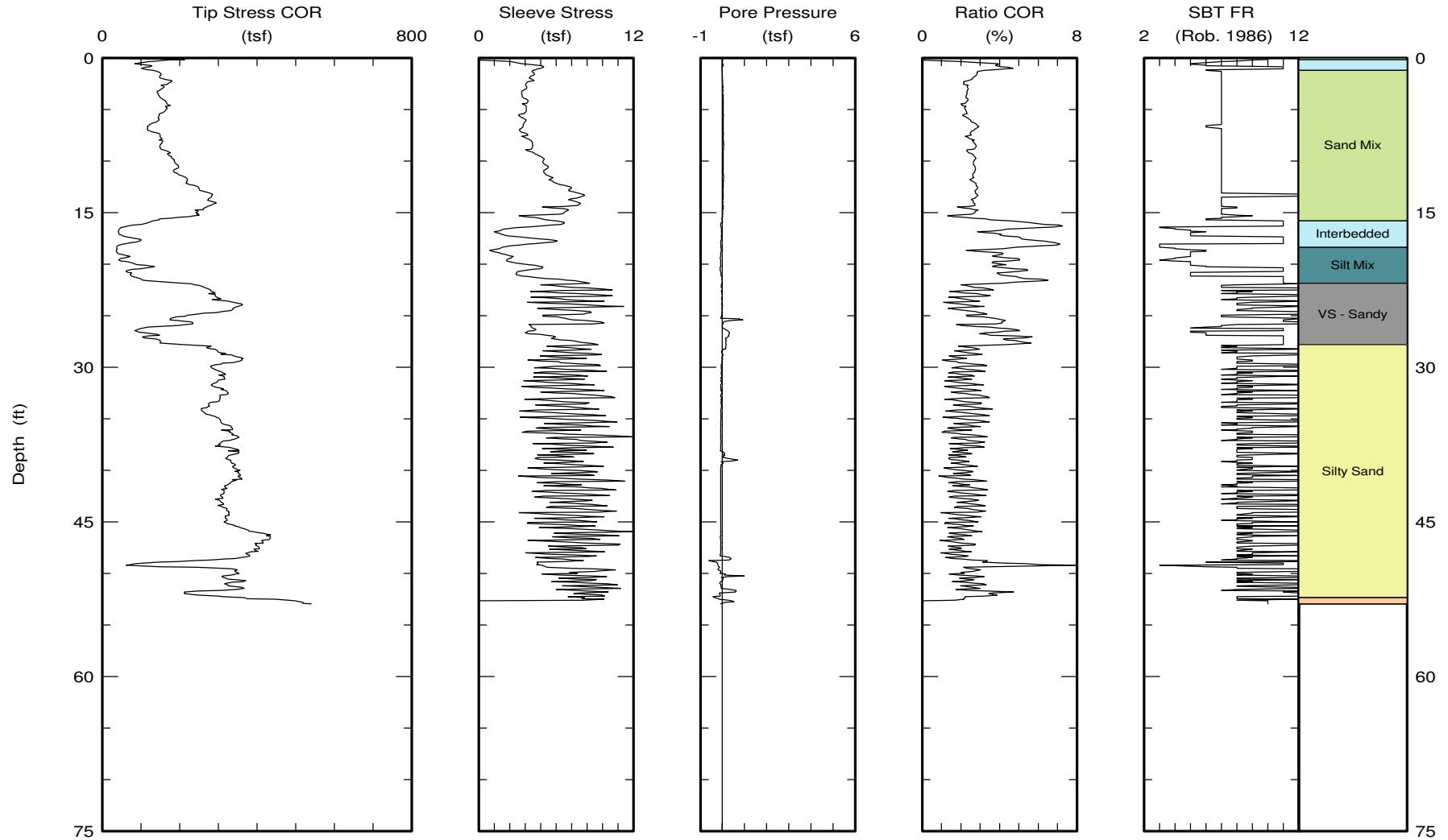


Kehoe Testing & Engineering
Office: (714) 901-7270
Fax: (714) 901-7289
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 30/Nov/2010
Test ID: C-9
Project: SanPedro

Customer: Group Delta Consultants, Inc.
Job Site: 27508 John Montgomery Drive





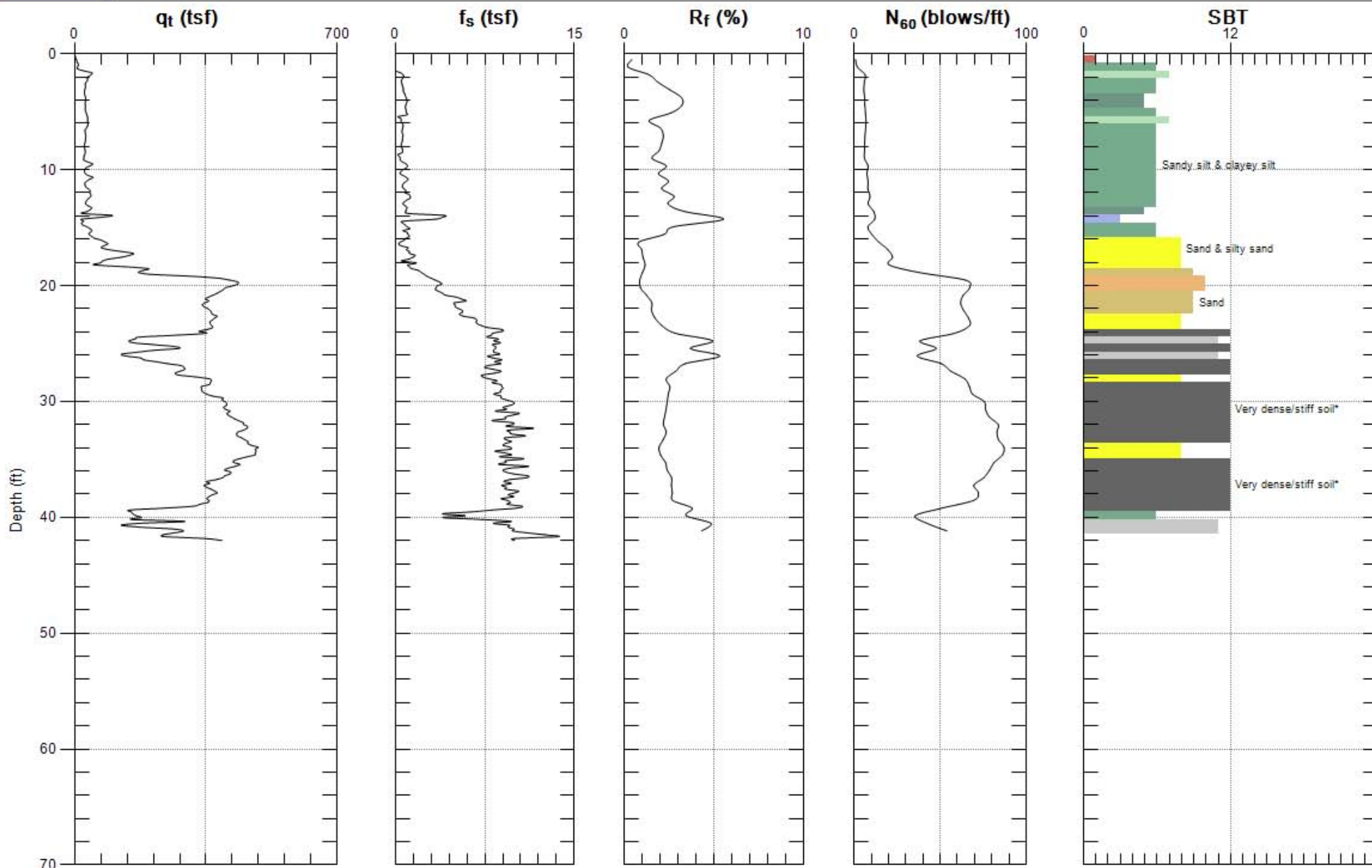
GROUP DELTA

Site: PONTE VISTA

Sounding: C-1A

Engineer: DEREK DEUTSCHER

Date: 5/11/2011 02:54



Max. Depth: 41.995 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



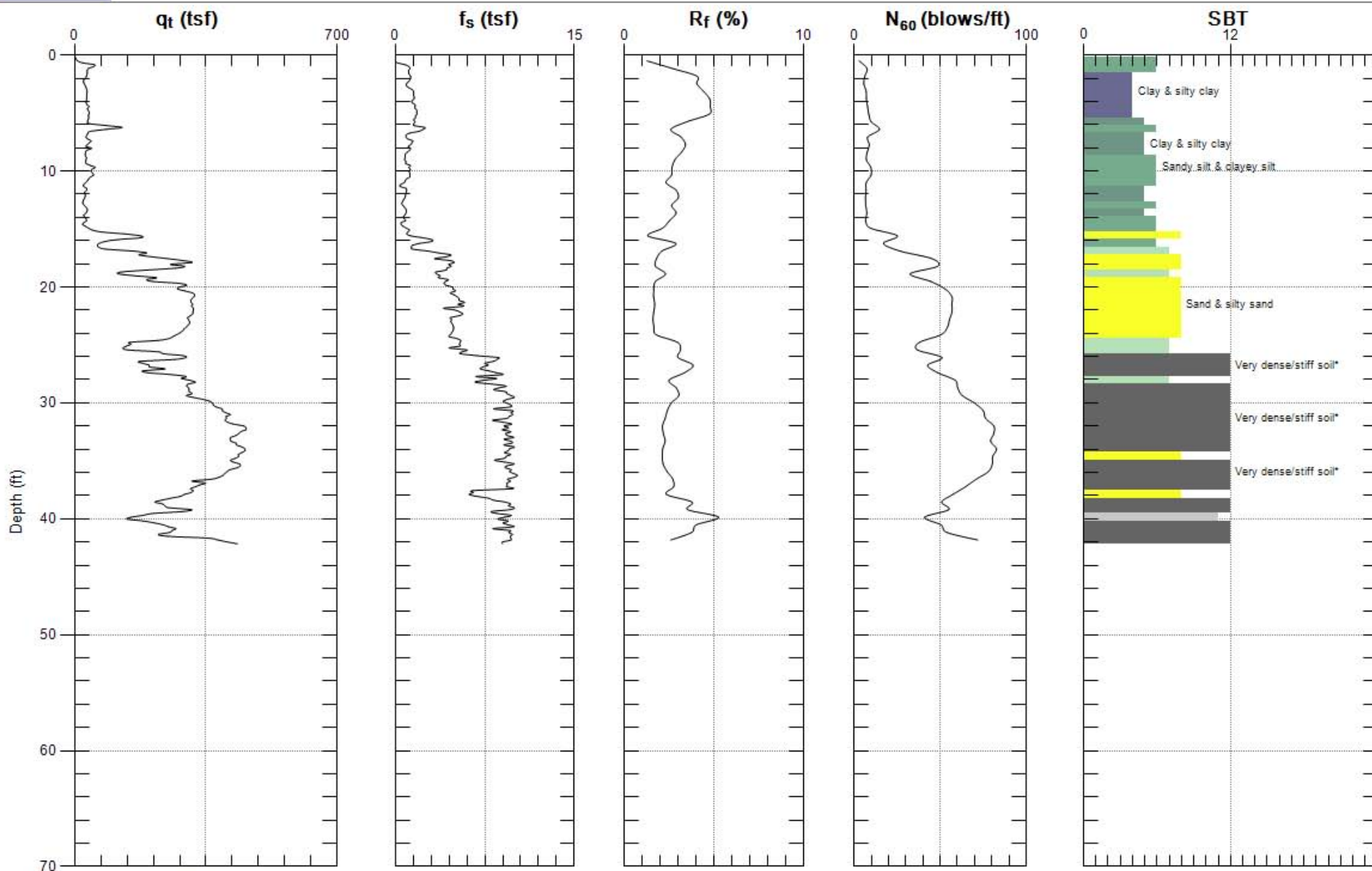
GROUP DELTA

Site: PONTE VISTA

Sounding: C-2A

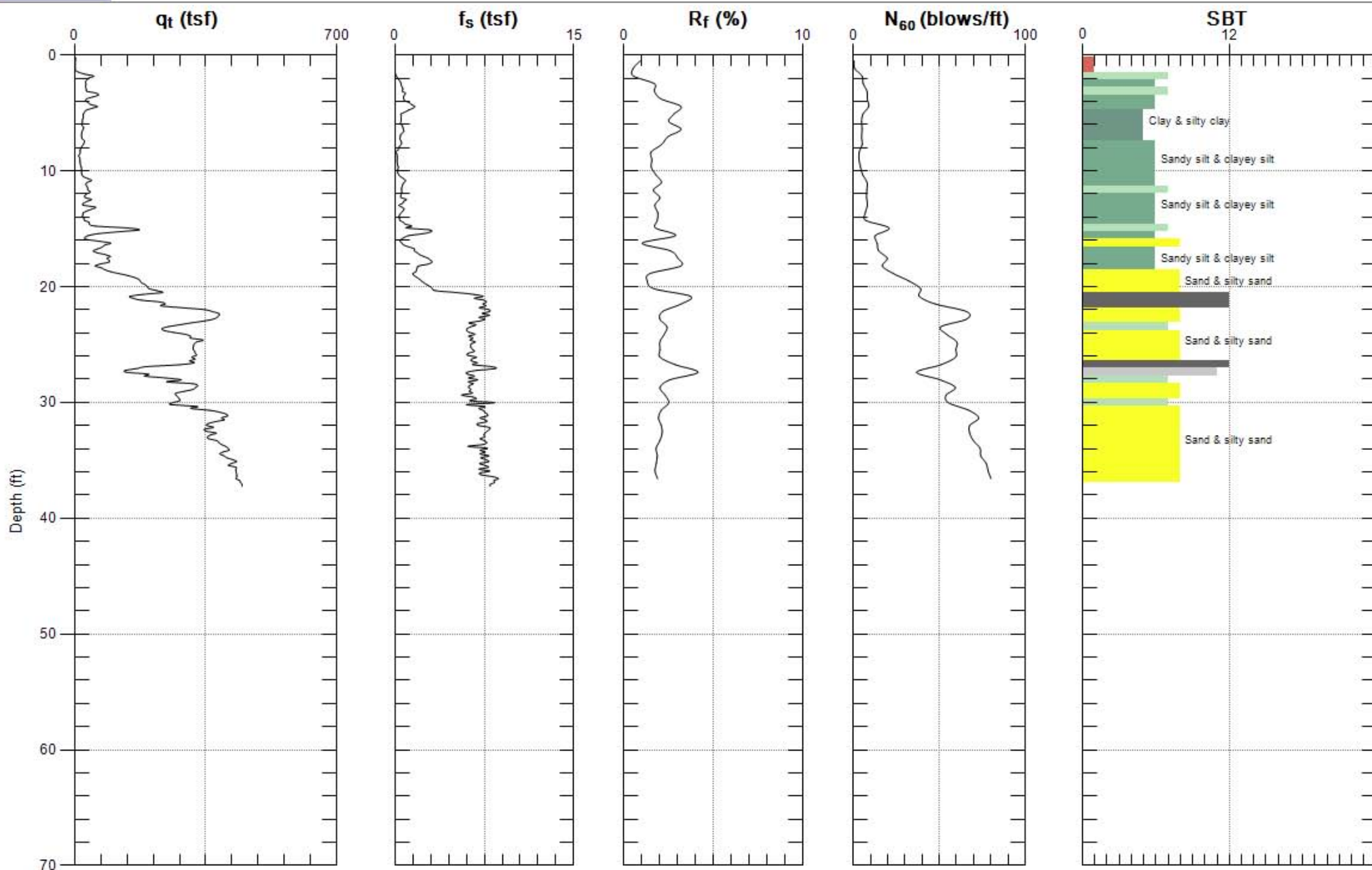
Engineer: DEREK DEUTSCHER

Date: 5/11/2011 02:29



Max. Depth: 42.159 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 37.238 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



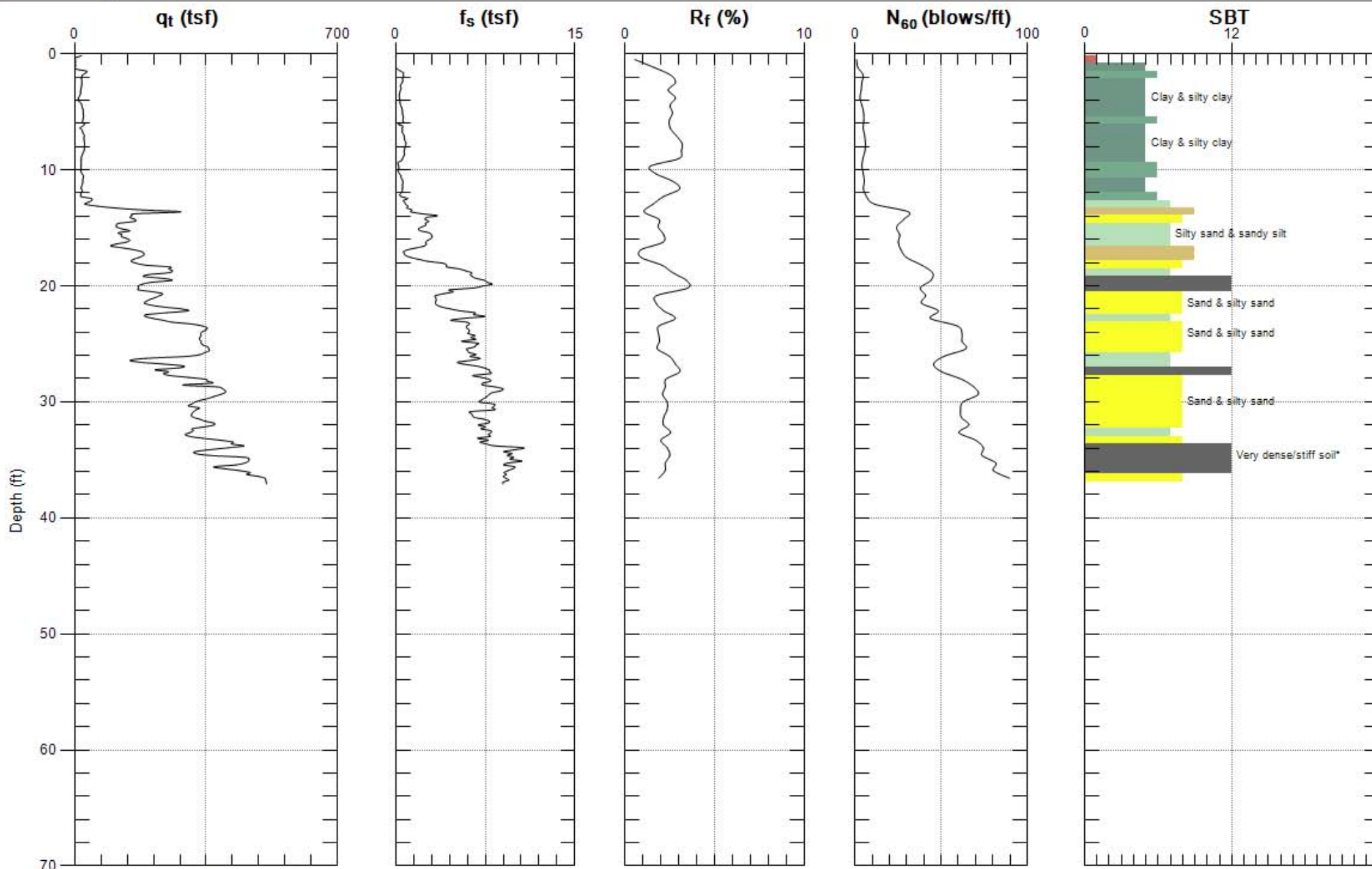
GROUP DELTA

Site: PONTE VISTA

Sounding: C-4A

Engineer: DEREK DEUTSCHER

Date: 5/11/2011 01:28



Max. Depth: 37.073 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



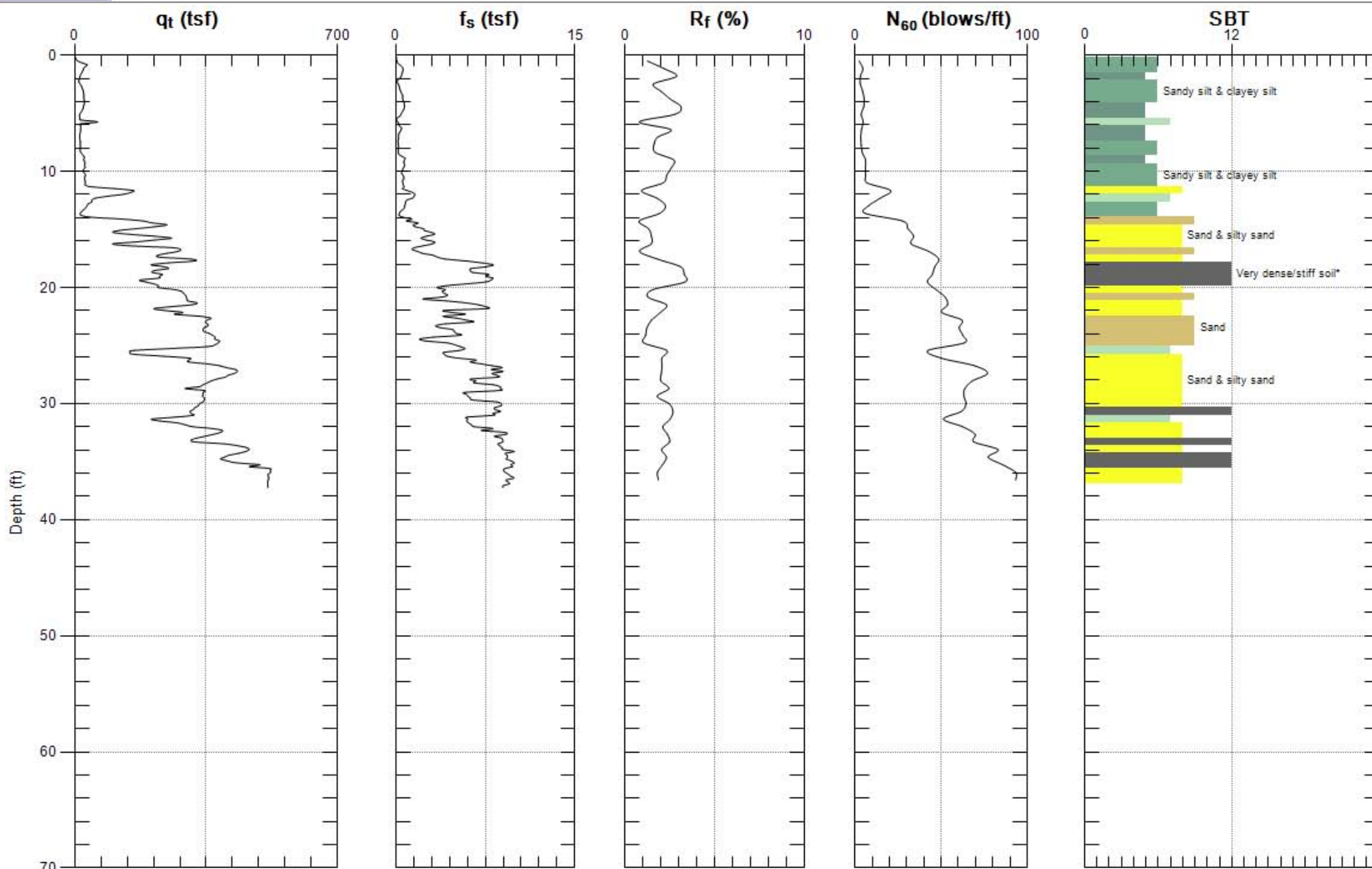
GROUP DELTA

Site: PONTE VISTA

Sounding: C-5A

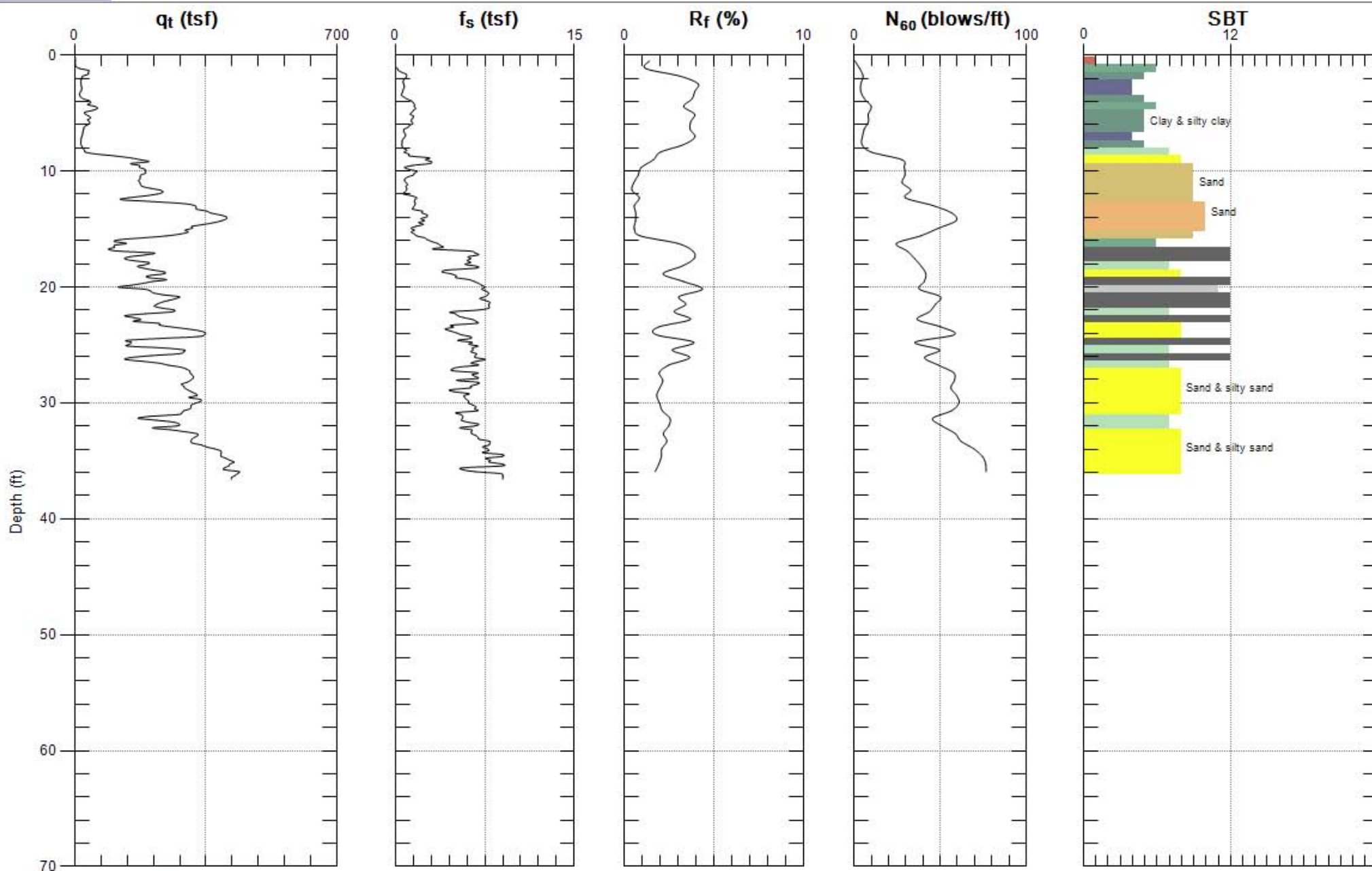
Engineer: DEREK DEUTSCHER

Date: 5/11/2011 12:58



Max. Depth: 37.238 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 36.581 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



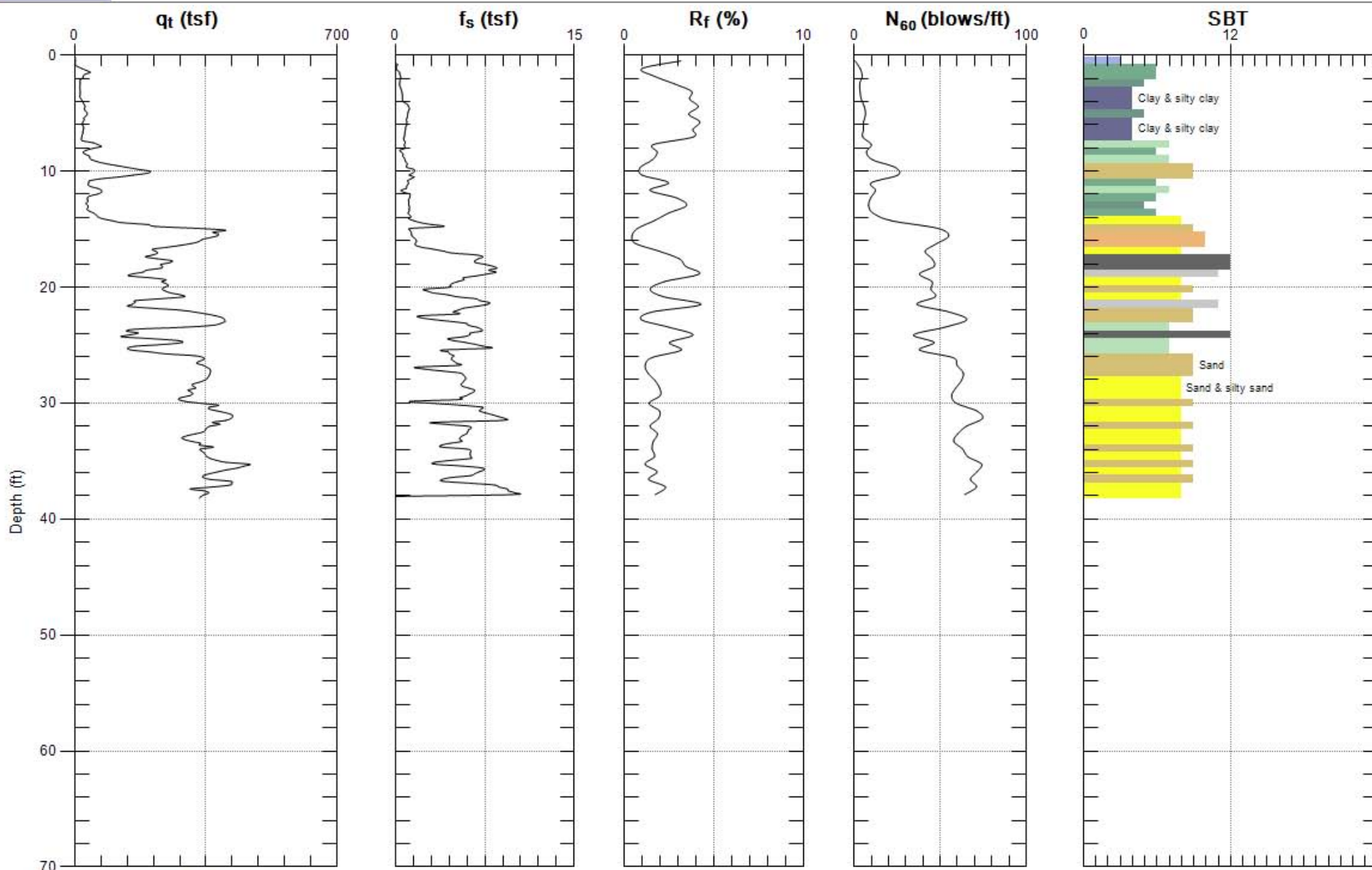
GROUP DELTA

Site: PONTE VISTA

Sounding: C-7A

Engineer: DEREK DEUTSCHER

Date: 5/11/2011 11:32



Max. Depth: 38.222 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



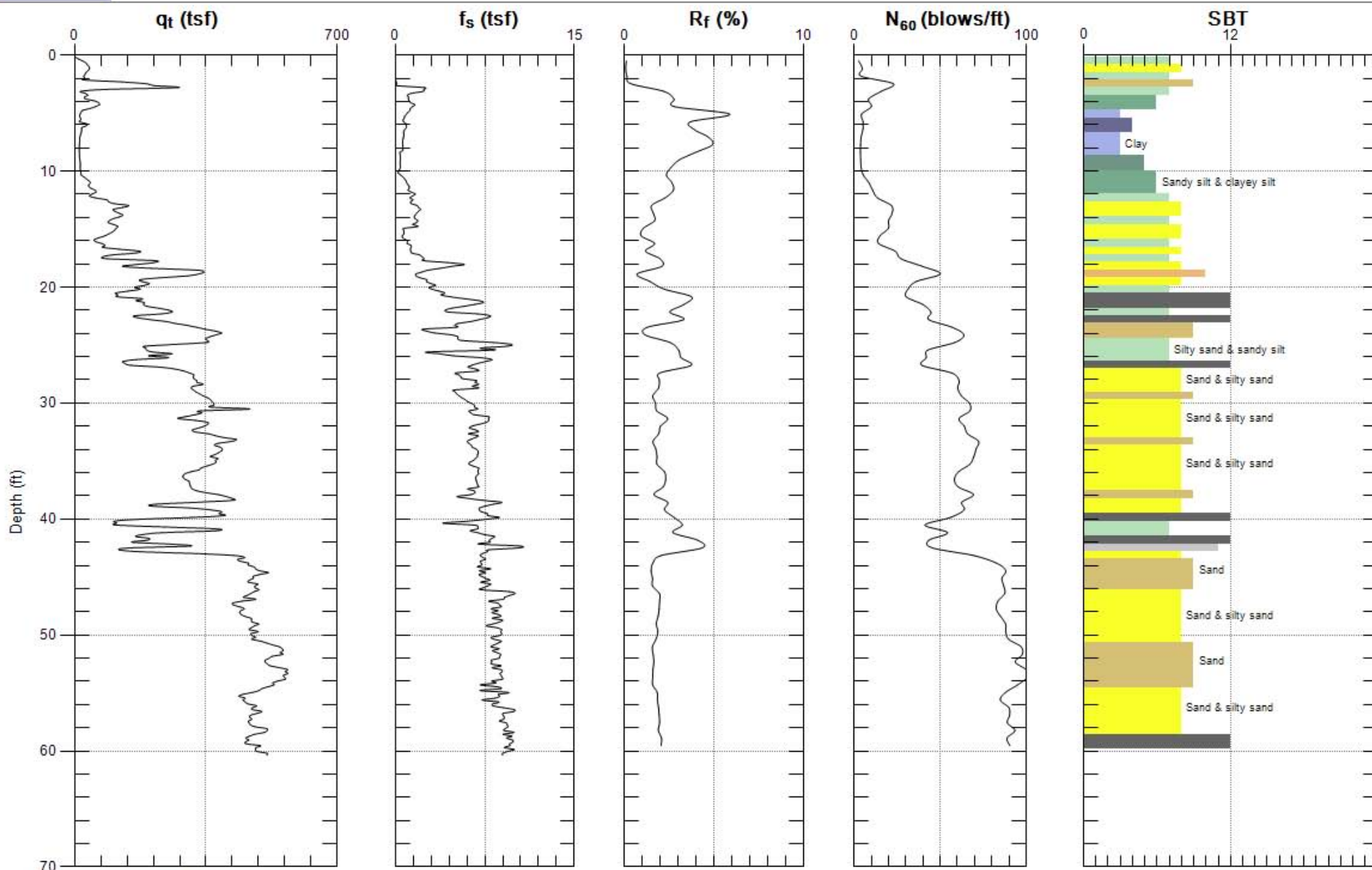
GROUP DELTA

Site: PONTE VISTA

Sounding: C-8A

Engineer: DEREK DEUTSCHER

Date: 5/11/2011 10:41



Max. Depth: 60.367 (ft)

Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



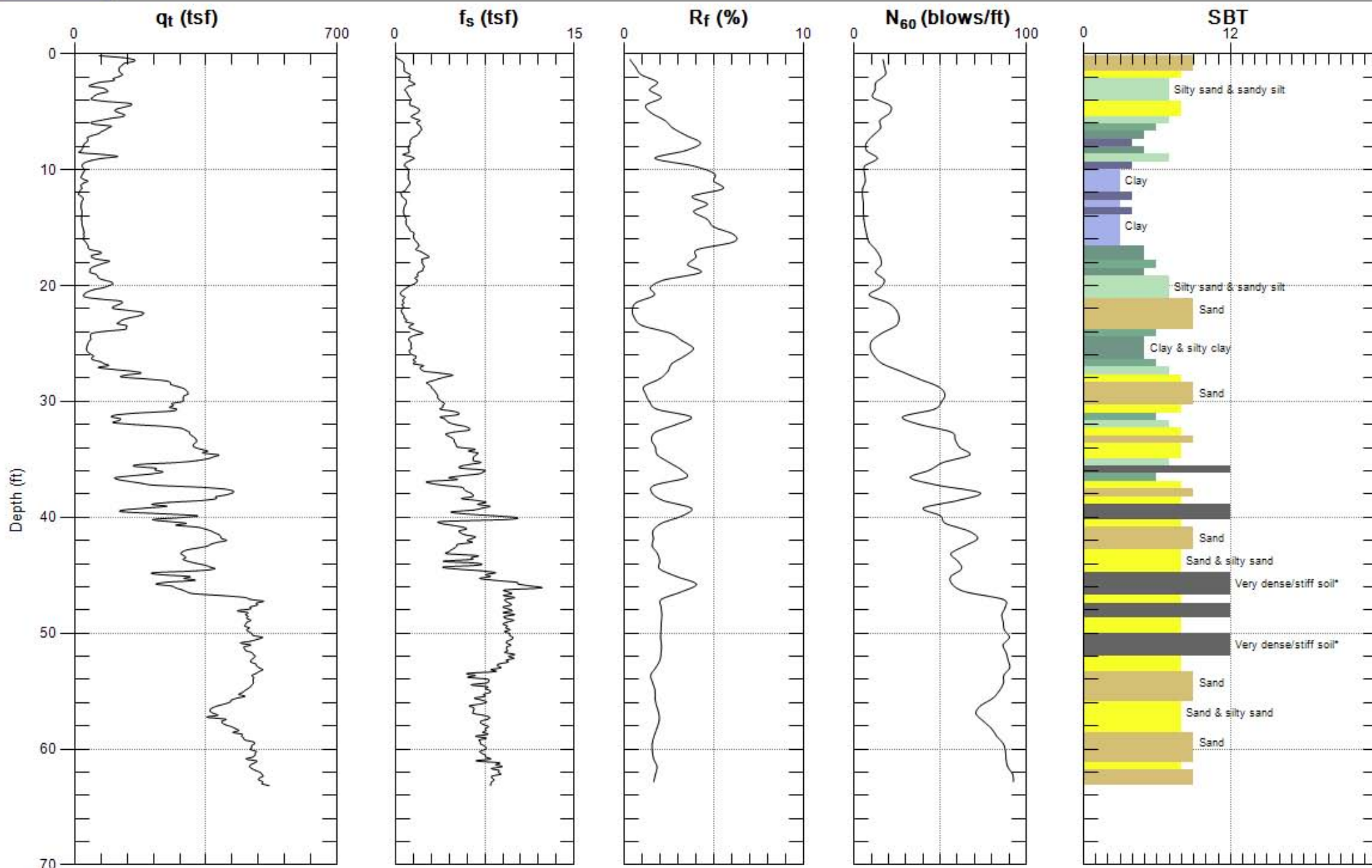
GROUP DELTA

Site: PONTE VISTA

Sounding: C-10A

Engineer: DEREK DEUTSCHER

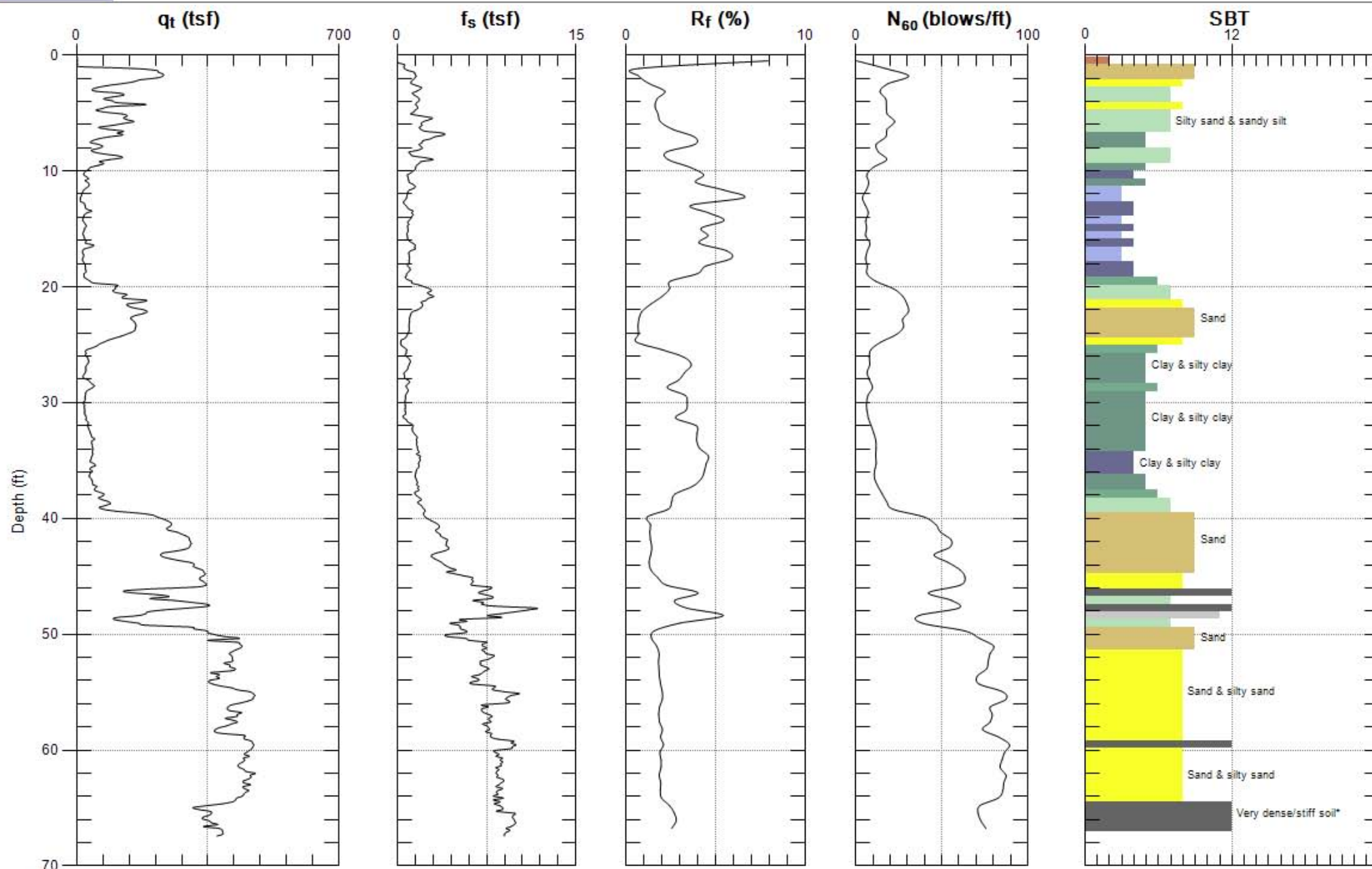
Date: 5/11/2011 09:47



Max. Depth: 63.156 (ft)

Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 67.421 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



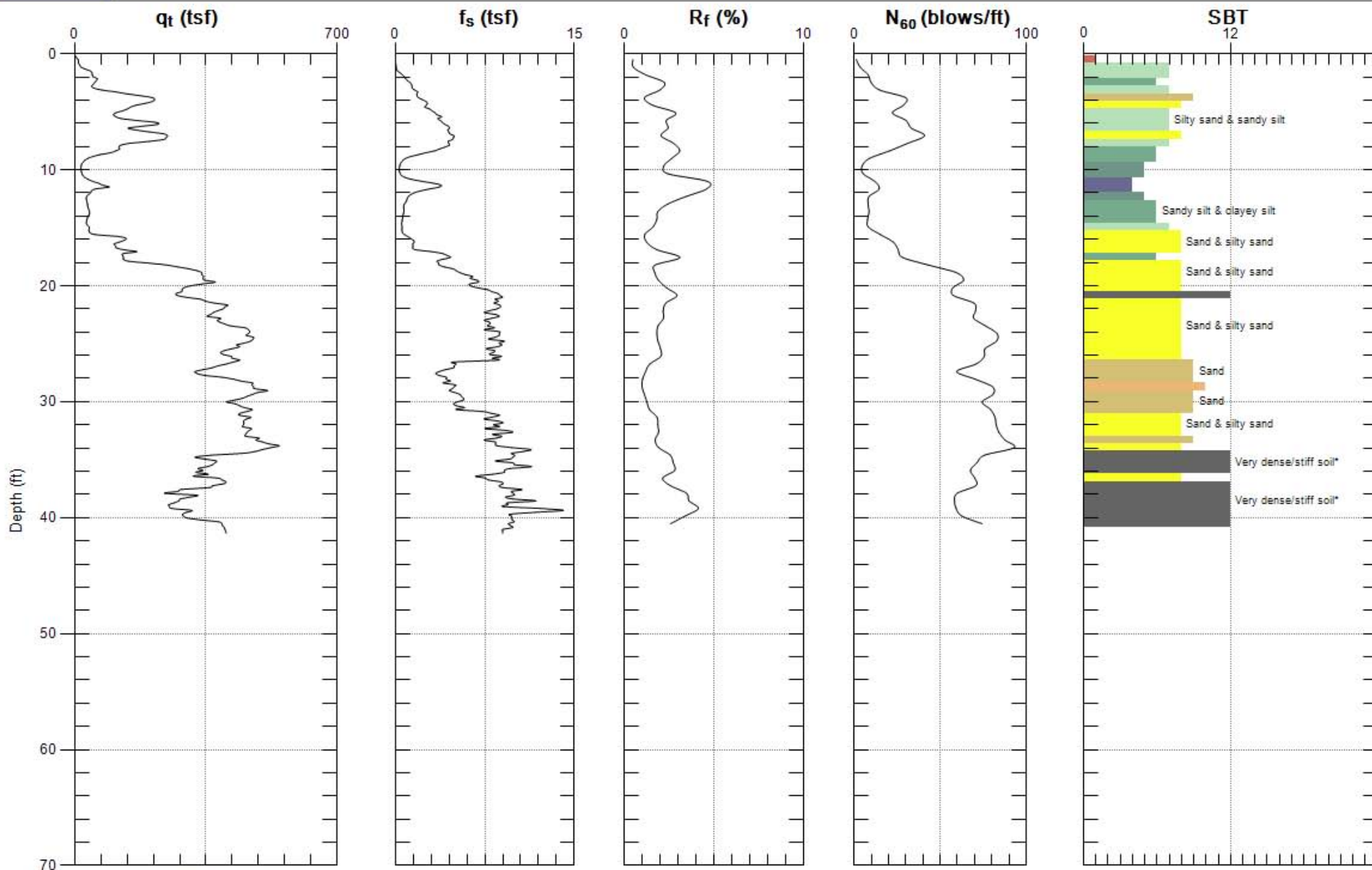
GROUP DELTA

Site: PONTE VISTA

Sounding: C-1B

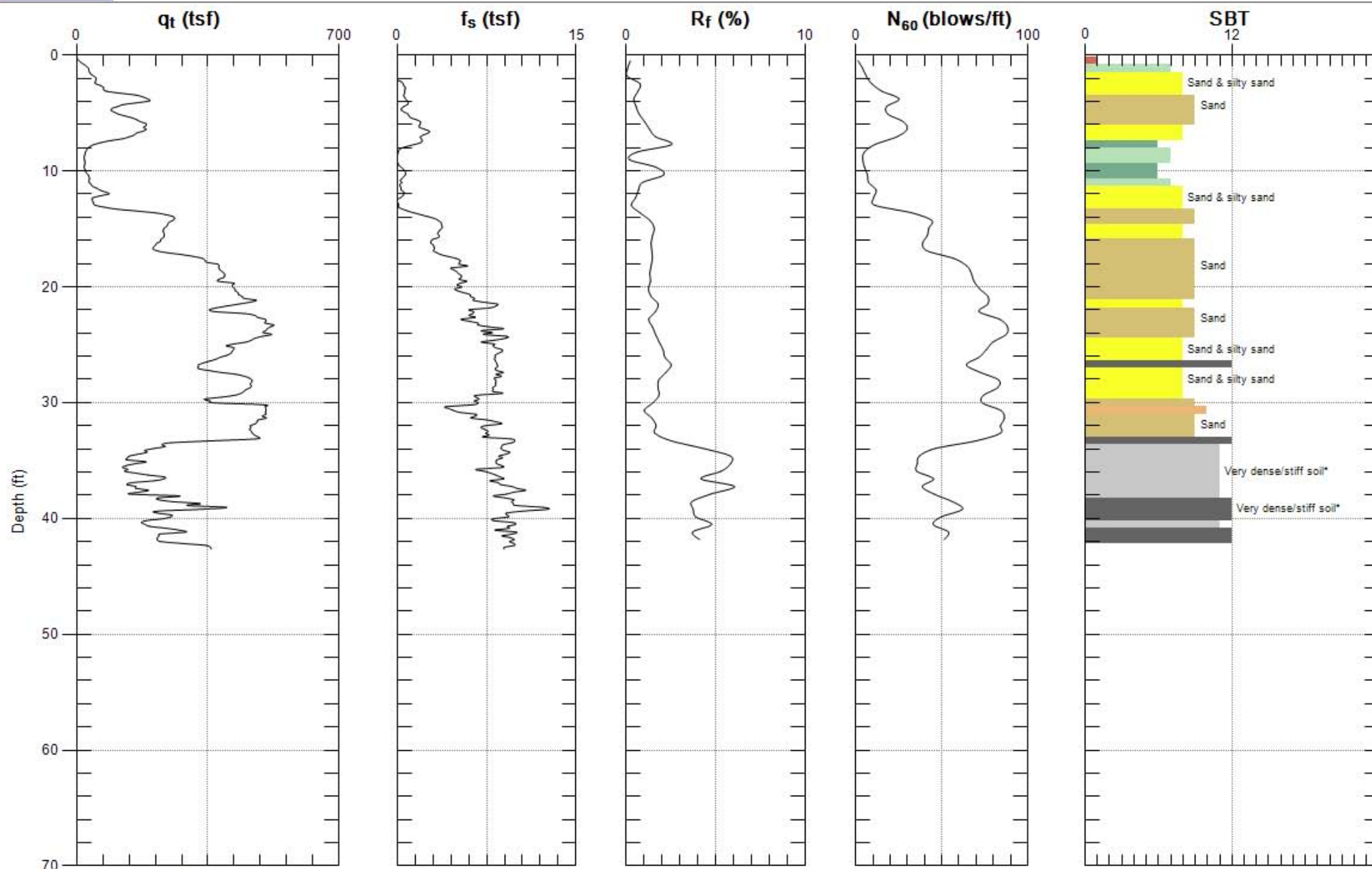
Engineer: DEREK DEUTSCHER

Date: 5/12/2011 06:53



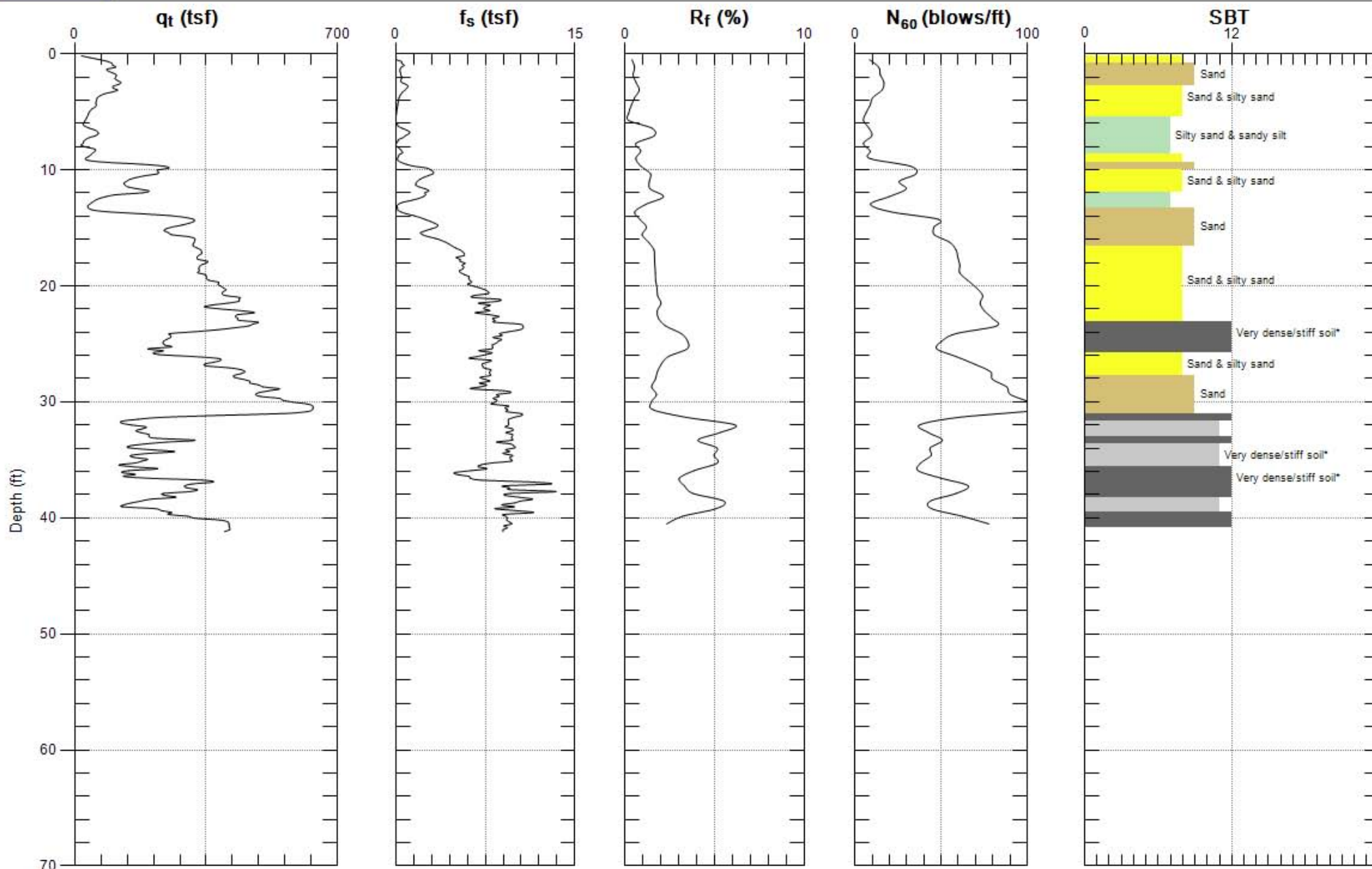
Max. Depth: 41.339 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 42.651 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 41.175 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



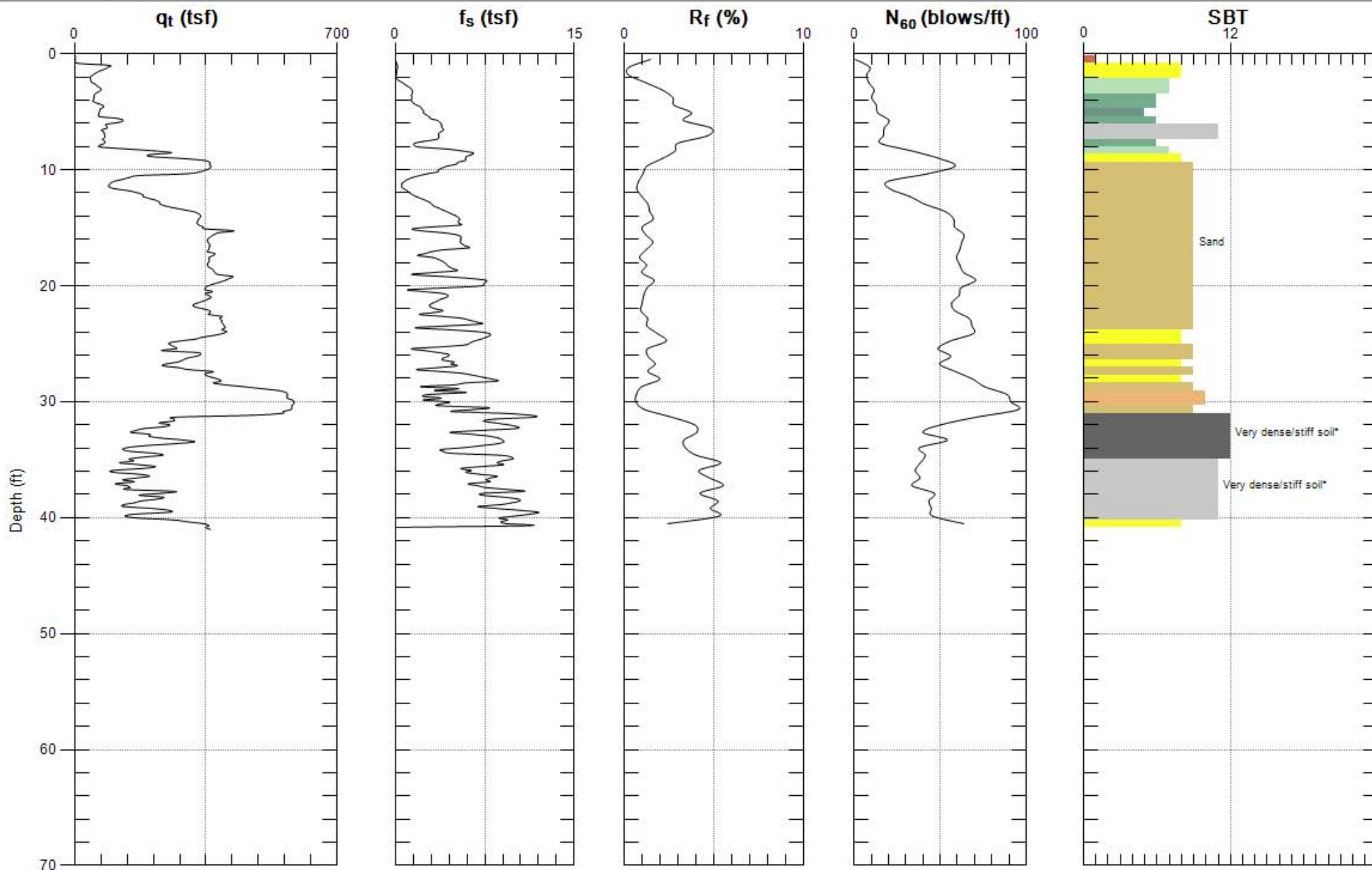
GROUP DELTA

Site: PONTE VISTA

Sounding: C-4B

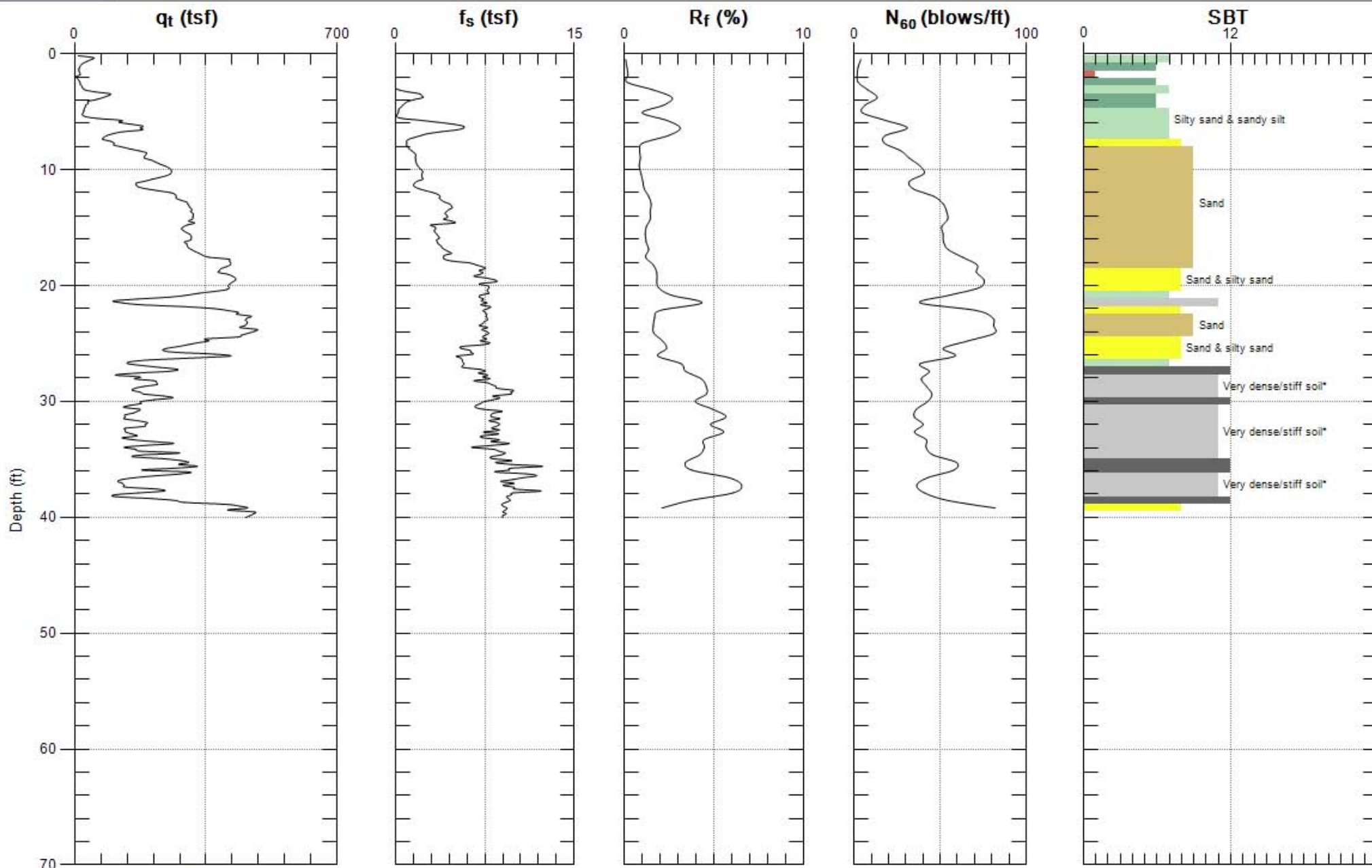
Engineer: DEREK DEUTSCHER

Date: 5/12/2011 08:18



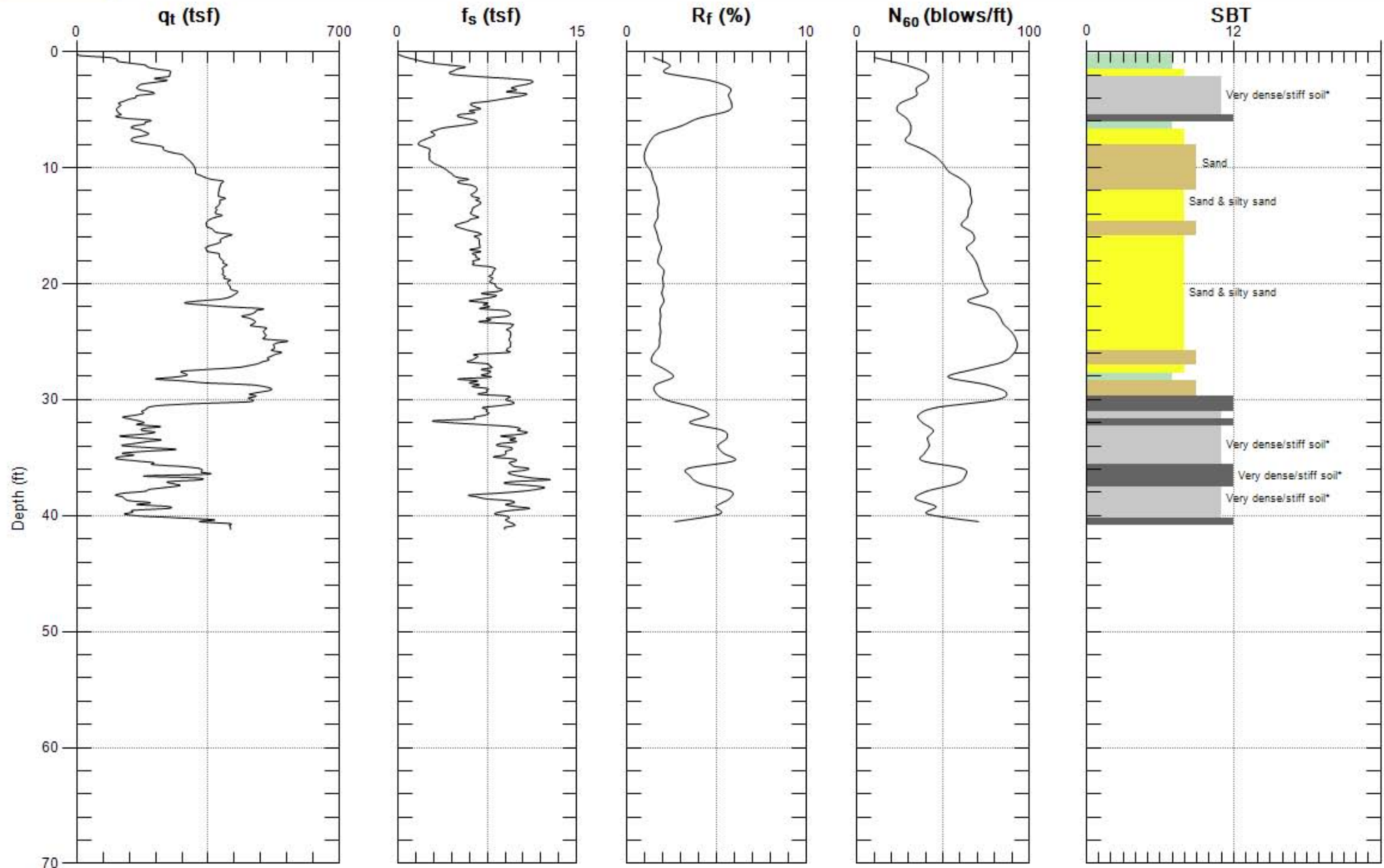
Max. Depth: 41.011 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



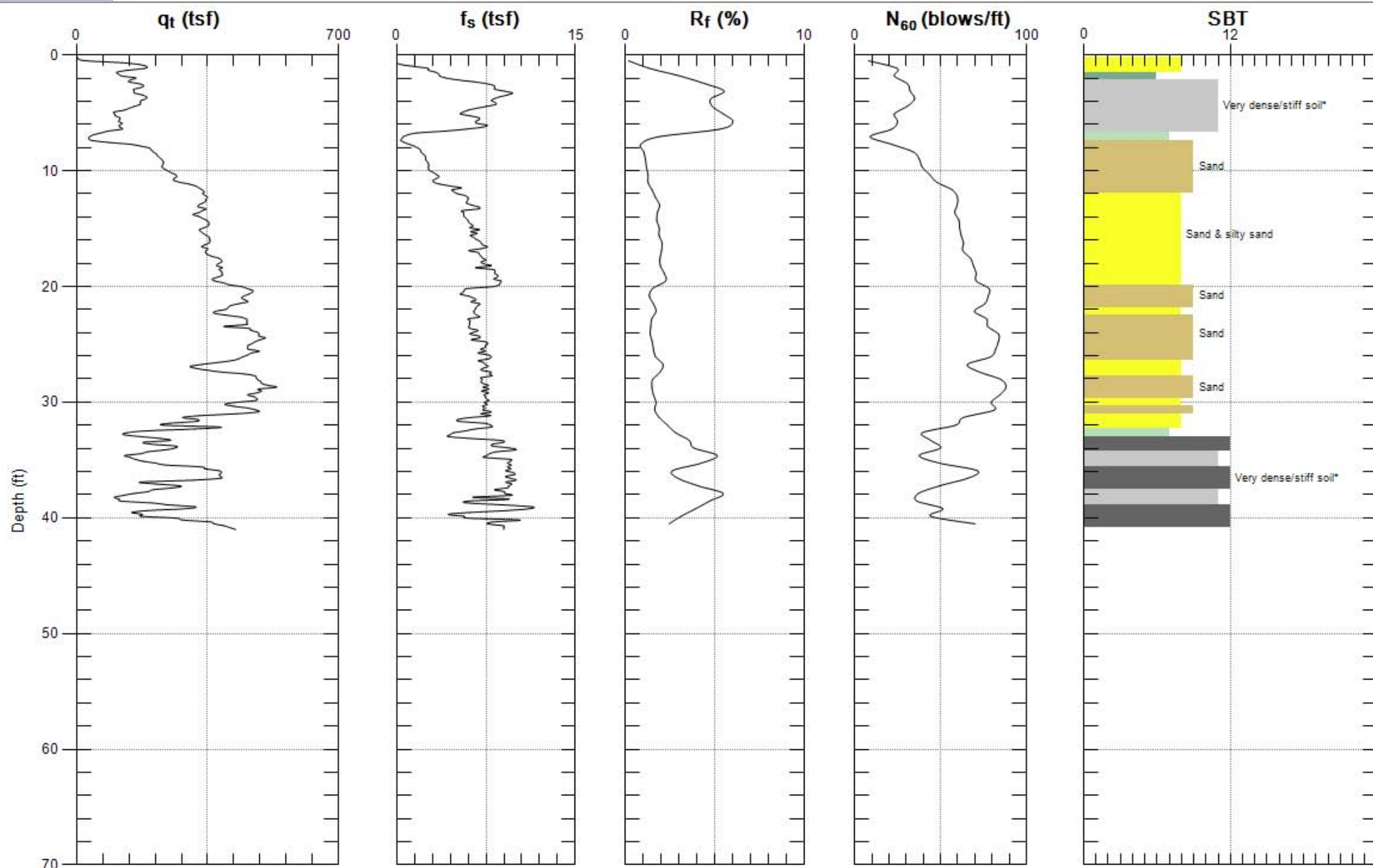
Max. Depth: 40.026 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



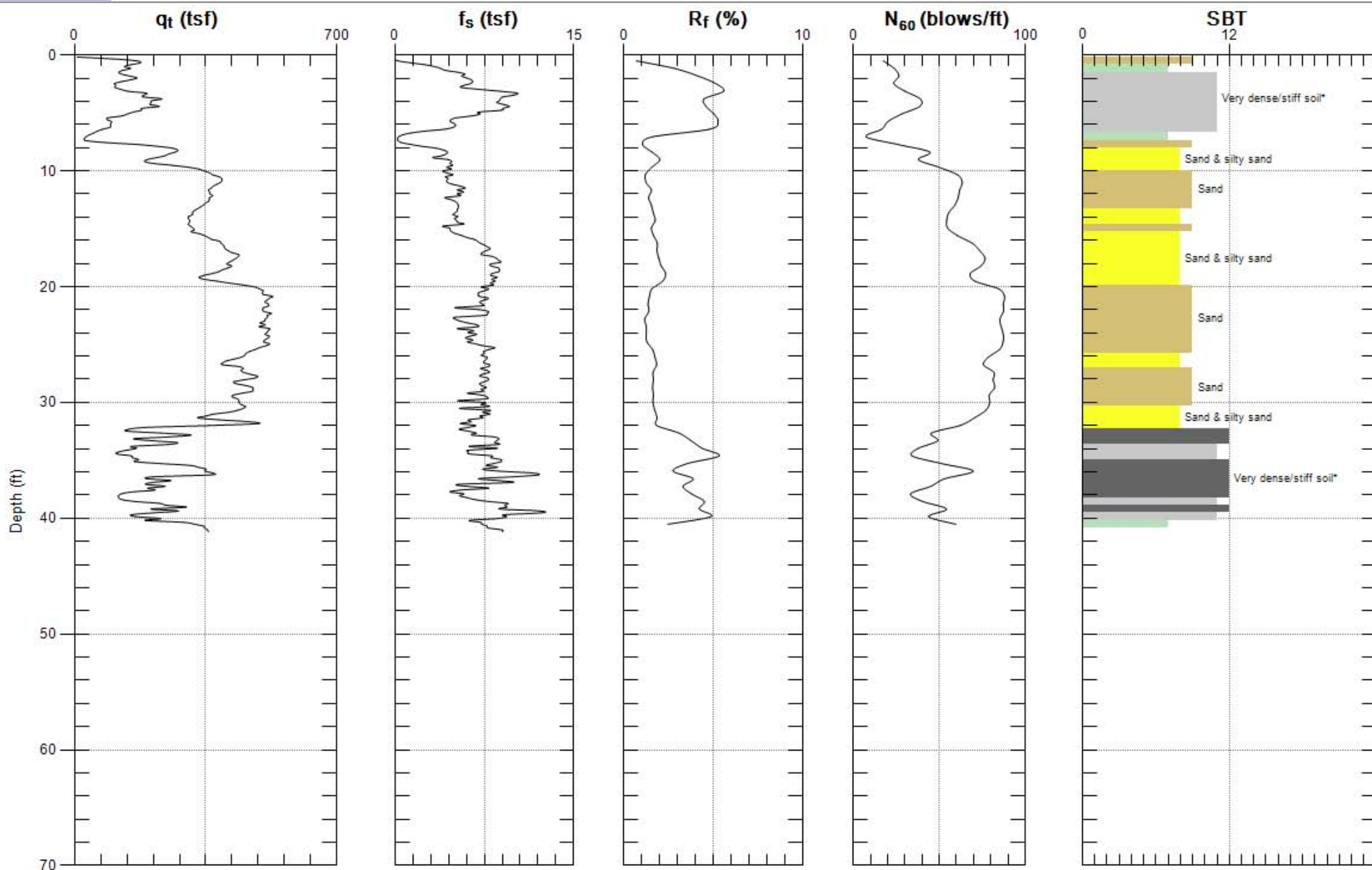
Max. Depth: 41.175 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



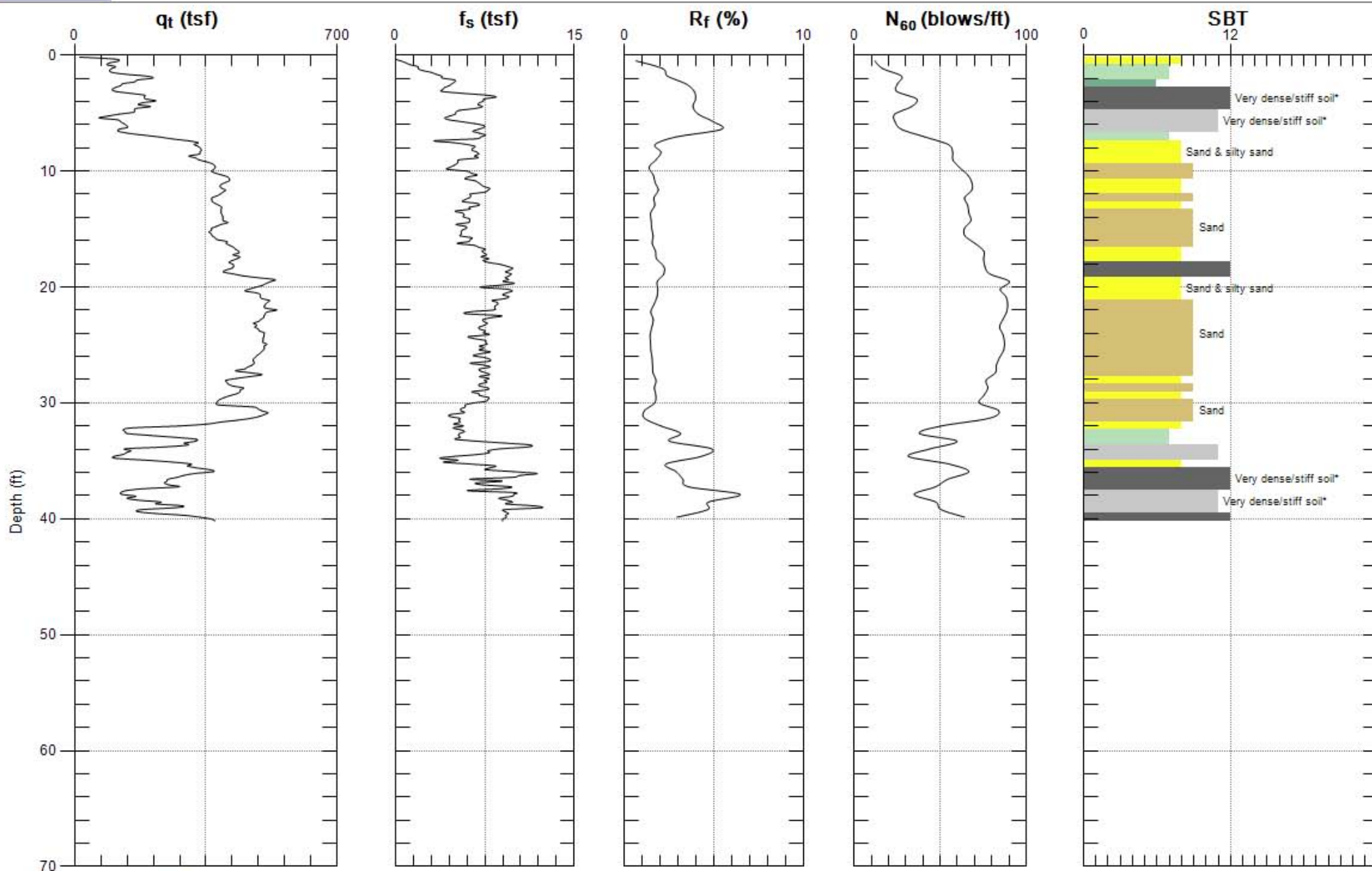
Max. Depth: 41.011 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



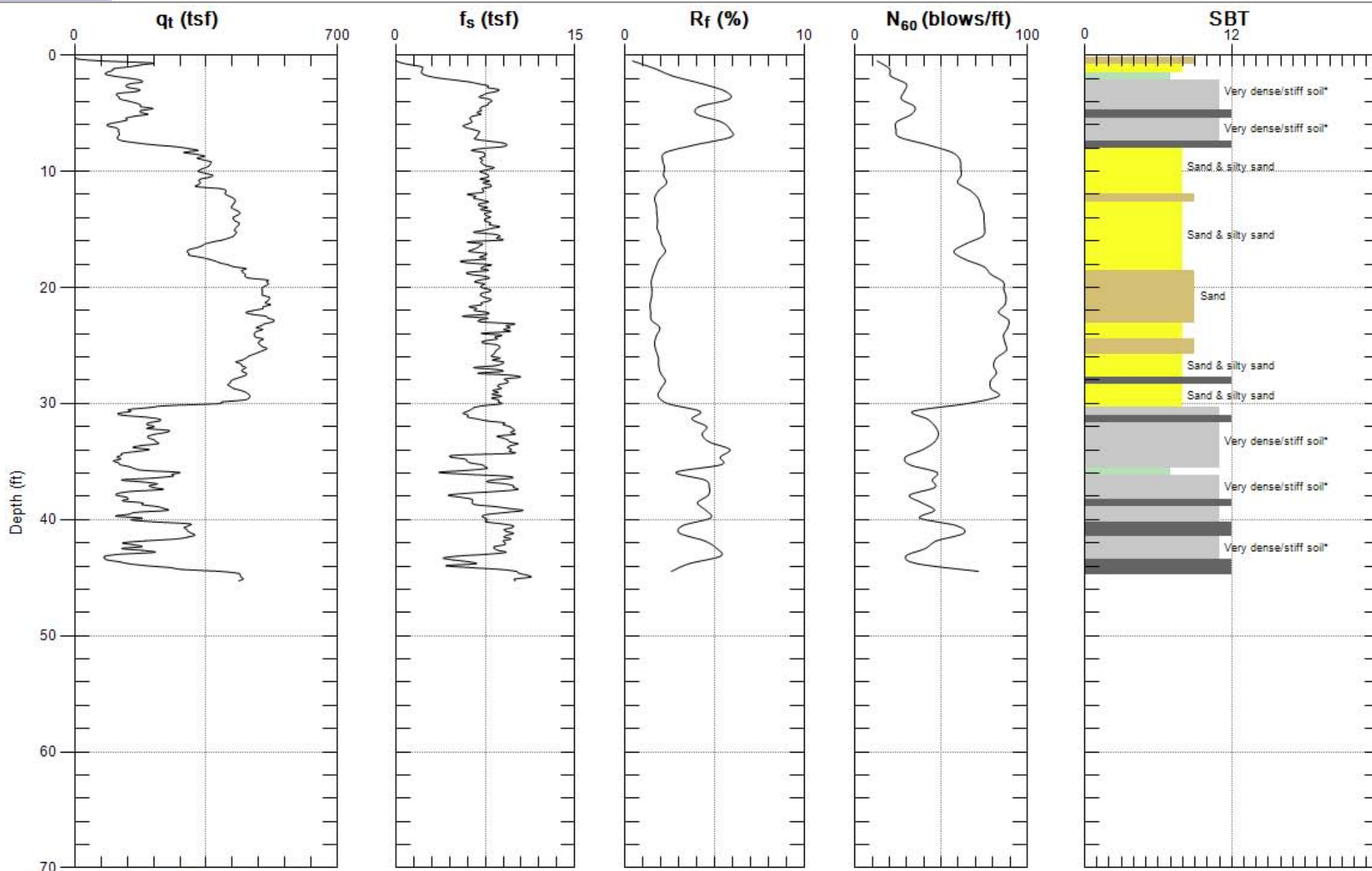
Max. Depth: 41.175 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



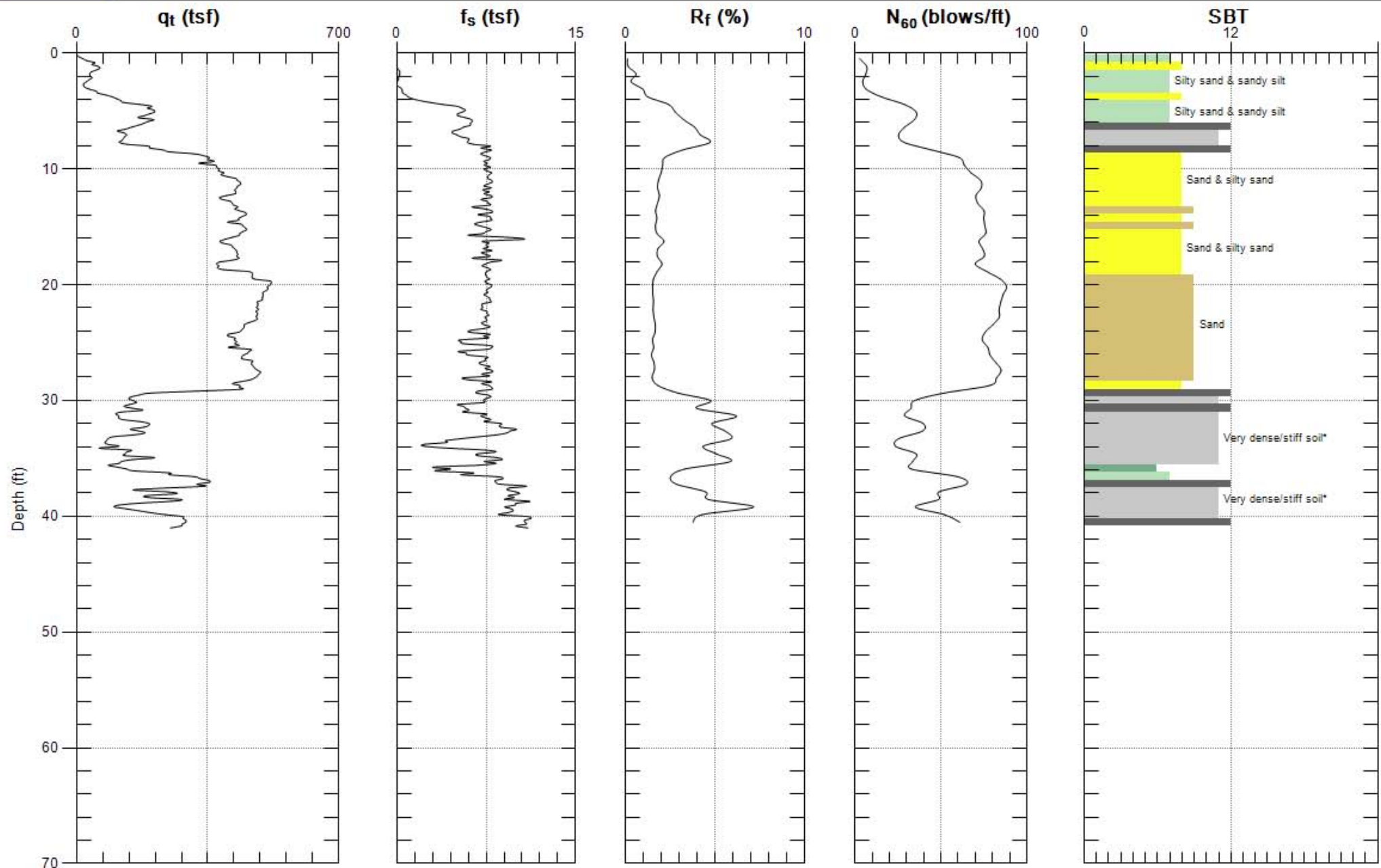
Max. Depth: 40.190 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 45.276 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)



Max. Depth: 41.011 (ft)
Avg. Interval: 0.656 (ft)

SBT: Soil Behavior Type (Robertson 1990)

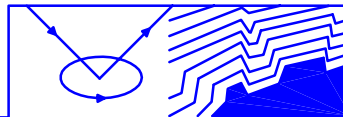
**APPENDIX B SEISMIC REFLECTION AND REFRACTION TOMOGRAPHY
SURVEY REPORT**

ADVANCED GEOSCIENCE, INC.

Geology and Geophysics

Subsurface Exploration

Non-Destructive Evaluation



24701 Crenshaw Blvd.

Torrance, California

90505 USA

Telephone (310) 378-7480

Fax (310) 872-5323

www.AdvancedGeoscience.com

May 18, 2011

Group Delta Consultants, Inc.
370 Amapola Avenue #212
Torrance, California 90501

Attention: Dr. Ying Liu, P.E.

**Subject: Summary Report
Seismic Reflection and Refraction Tomography Surveys
For Investigation of Subsurface Faulting
At Ponte Vista Development
San Pedro, California**

INTRODUCTION

This report summarizes the seismic reflection and refraction tomography surveys completed by Advanced Geoscience at the referenced site. These surveys were performed in two phases of field investigation in October, 2010 and April, 2011. The surveys were used to generate seismic profiles showing approximate images of subsurface layering to investigate faulting associated with the Palos Verdes fault. Published geologic cross sections prepared by T. W. Dibblee (1999) show the site is located south of the main trace of the Palos Verdes fault, and positioned on the folded hanging wall of this reverse fault block. A previous seismic reflection and geomorphic study by W. J. Stephenson and others (1995) identified several possible paralleling "secondary" fault splays south of this main fault trace.

Advanced Geoscience initially recorded seismic reflection and refraction data on October 17 and 21, 2010 along one survey line, designated as Line 1. Line 1 was positioned along a street crossing through the abandoned housing development, as shown on the site map in Figure 1. This southwest-to-northeast traverse was used to position this survey line across the mapped trend of the northwest-to-southeast trending faulting expected to cross the site. The seismic data were used to prepare a seismic reflection profile showing approximate images of subsurface layering in the upper 500 feet. These data were also used to prepare a shallower seismic velocity-depth profile using refraction tomography. Both profiles provided approximate images of geologic layering, which were evaluated for vertically-orientated breaks or other abrupt changes in subsurface layering that could indicate evidence of faulting.

The profiles generated along Line 1 revealed a fault plane that appeared to project towards the surface near “Point A” in Figure 1. Based on these findings additional seismic surveys were performed on April 4 through 13, 2011 along survey lines designated as Lines 2 and 3 to investigate the trend of this faulting designated as “Fault A”. These surveys were performed by positioning Lines 2 and 3 along similar southwest-to-northeast traverses located further to the east of Line 1, as shown in Figure 1.

The following sections summarize our data collection and processing procedures. A concluding section discusses our geologic interpretation of the seismic profiles and our evaluation of subsurface faulting.

SURVEY PROCEDURES

Data Collection

Line 1 was positioned along a straight-line traverse orientated approximately north 14 degrees east. This survey line was positioned along the center of the street shown in Figure 1. The geophone coverage setup along Line 1 was 1,288 feet.

The seismic data were recorded using a Seistronix EX-6, 132-channel seismic acquisition system. This system was connected to 120 geophones, spaced 8-feet apart along the survey line. The geophones consisted of single 40-Hertz vertical geophones commonly used for both high-resolution reflection and refraction surveys. The geophones were firmly coupled to the ground by pressing the metal spikes attached to their base plates into 3/8-inch diameter holes drilled in the asphalt.

The seismic waves were generated at “shot points” positioned along the geophone line and recorded separately into multiple overlapping 102-channel geophone spreads, which were shifted along the line. The shot points started 4 feet south of the first geophone position and continued along the line between the geophones at 8-foot intervals. The first 102-channel geophone spread was positioned from 0 to 808 feet. After the shot points moved 6 geophone positions past the center of this spread, the 102-channel spread was shifted forward by 12 geophone positions to setup a second spread from 96 to 904 feet. This pattern of shifting 102-channel geophone spread movement continued until the sixth geophone spread was positioned from 480 to 1,288 feet. The shot points then moved through the center of this spread and continued to the north until the last shot point position was 4 feet north of the last geophone position.

The seismic waves were generated at each shot point using a twenty-five pound sledge hammer impacting a thick steel plate placed on the ground. Multiple impacts were recorded and summed together at each shot point to increase the signal-to-noise ratio.

A total of 162, 102-channel field records were recorded along Line 1. Each field record was recorded with a 0.7 second record length and 0.25 millisecond sampling rate with 24-bit analog-to-digital resolution. The 8-foot shot point and receiver interval produced a reflection data set with nominal 40 to 70-fold subsurface coverage with 4-foot common-midpoint (CMP) reflection spacing.

Lines 2 and 3 were positioned along crooked-line traverses through the abandoned houses. These survey lines were setup to approximately parallel the southwest-to-north trend of Line 1, as shown in Figure 1. The geophone coverage setup along Line 2 was 1,528 feet and the coverage setup along Line 3 was 1,192 feet.

The seismic data were also recorded with the Seistronix EX-6 acquisition system with geophones spaced 8-feet apart along the survey lines. The geophones were planted into both asphalt pavement and dirt surfaces.

The seismic waves were also generated at shot points positioned at 8-foot intervals and recorded into multiple overlapping geophone spreads. However, to provide longer-offset data these shot points were recorded into 114-channel geophone spreads, which were shifted further apart along the line. The shot points started 4 feet south of the first geophone position and continued along the line between the geophones at 8-foot intervals. After the shot points moved 24 geophones past the center of the first spread, the 114-channel spread was shifted forward by 24 to 30 geophone positions to setup another spread. This pattern of shifting 114-channel geophone spread movement continued until the last geophone spread was positioned. The shot points then moved through the center of this spread and continued to the north until the last shot point position was 4 feet north of the last geophone position.

The seismic waves were also generated using a twenty-five pound sledge hammer impacting a thick steel plate placed on the ground.

A total of 193 114-channel field records were recorded along Line 2 and 151 records were recorded along Line 3. Each field record was recorded with a 0.7 second record length and 0.25 millisecond sampling rate with 24-bit analog-to-digital resolution. The 8-foot shot point and receiver interval produced reflection data sets with nominal 40 to 75-fold subsurface coverage with 4-foot common-midpoint (CMP) reflection spacing.

Seismic Data Processing and Modeling

The seismic field records for Line 1 were initially processed using the computer program Visual_SUNT developed by W_GeoSoft (Geneva, Switzerland). These data were later re-processed with similar results together with the seismic data from Lines 2 and 3 using the computer program VISTA developed by Gedco (Calgary, Alberta).

Prior to performing this processing the coordinates and elevations of the geophone stations were estimated along each survey line. The x-coordinates for Line 1 were determined from the straight-line stationing setup along this line. The x,y coordinates for Lines 2 and 3 were determined from UTM coordinates measured from Goggle Earth. The stationing of these two survey lines was mapped on to the Goggle Earth images to estimate the UTM coordinates of building corners and other features where the survey lines changed direction. The elevations of the geophone stations setup along Lines 1-3 were determined from the topographic site map in Figure 1.

The SEG2 format field records from Lines 1-3 were input into the program VISTA together with the survey line field geometry to perform a specialized sequence of digital filtering, trace sorting, and normal moveout velocity correction to prepare common-midpoint (CMP) summed traces of the reflection time profiles. The resulting reflection profiles for Lines 1, 2, and 3 are shown in Figures 2 through 4. The average “stacking velocities” used to correct the offset of the CMP traces for normal move out (NMO) were used to prepare the approximate depth scales shown on the profiles.

The data from Lines 2 and 3 underwent additional “2D crooked-line processing” to bin the traces according to their x,y positions into straighter-line CMP positions setup along the survey lines.

Elevation differences along the seismic reflection profiles were also accounted for in the processing by applying “surface consistent” static shifts to the field record traces, prior to CMP sorting and NMO correction. The time shifts introduced by this step effectively positioned time=0 on the reflection profiles to datum elevations.

The seismic field records from Lines 1-3 were also used to pick first arrival times (“first breaks”) for refracted seismic waves traveling along the surface layer and the deeper higher-velocity layers.

The travel time data from these first breaks were input together with geophone station coordinates and elevations into the computer program RAYFRACT written by Intelligent Resources, Inc. (Vancouver, Canada) to generate a velocity-depth model for Lines 1-3. RAYFRACT used the first break time picks to conduct refraction tomography imaging of the seismic velocity layering. An initial velocity-depth model was first estimated using the Delta-TV CMP velocity profiling procedure. This initial model was then refined to produce a closer fit to the first breaks using the Wavepath Eikonal Traveltime (WET) tomographic inversion method with 100 iterations. This best-fit, velocity-depth model was then gridded and color contoured with SURFER (Golden Software, Inc.) to show estimated vertical and lateral variations. The resulting velocity-depth profiles for Lines 1-3 are shown in Figures 5 through 7.

DISCUSSION OF RESULTS

Geologic Interpretation of Seismic Profiles

The seismic reflection profiles for Lines 1-3 show reflection patterns from two subsurface horizons highlighted by blue and green in Figures 2 through 4. These two reflection horizons are interpreted to be the upper and lower surfaces of the older Quaternary unit (Ql) beneath this area which is shown on the geologic cross sections by Dibblee and others. The San Pedro Formation (Qsp) is mapped above this unit and was also encountered in the shallow borings drilled at this site.

The green reflection horizon is interpreted as the upper surface of the Miocene section. This stronger-amplitude reflection pattern appears to truncate reflections highlighted in purple from north-dipping and south-dipping bedding planes above and below this unconformity surface. This interpretation is consistent with the geologic cross sections which show an unconformity at the base of the Quaternary section.

Subsurface faulting designated as "Fault A" is interpreted on the reflection profile for Line 1 near station 462 feet (Figure 2). At this location the green reflection horizon shows an abrupt change in slope and vertical separation. This fault plane interpretation is supported by the seismic refraction profile in Figure 5, which shows an abrupt down-to-the-north vertical separation in the 4,000 ft/sec velocity contour near this location.

Fault A is also interpreted on the reflection profiles for Lines 2 and 3, which were positioned to the east of Point A. This interpretation is based primarily on similar abrupt changes in slope on the green reflection horizon in Figures 3 and 4. The reflection profiles for these lines also show weaker evidence of second possible fault designated as "Fault B" which appears to be cut off by Fault A. Abrupt variations in the 3,000 to 4,000 ft/sec velocity layering in Figures 6 and 7 also provide evidence of this faulting.

The reflection profiles for Lines 2 and 3 show more sharply distorted reflection patterns on the north sides of these lines. These distorted reflection patterns appear to be caused by recent folding along the flank of the Gaffey Anticline. Unaccounted for variations in near-surface velocity and side reflections from buildings may also be contributing to some of these distortions.

Evaluation of Subsurface Faulting

The seismic profiles for Lines 1 through 3 show evidence of faulting along two fault planes extending beneath the site. Fault A was first interpreted along Line 1 and later extended to Lines 2 and 3. Fault B was interpreted based on somewhat weaker evidence only shown along Lines 2 and 3. Both of these fault interpretations are based reflection

patterns from subsurface horizons less than 200 feet below the ground surface that show abrupt changes in slope or vertical separation.

The map in Figure 1 shows the inferred trend of this concealed faulting beneath the site.

We recommend that exploratory boreholes or cone penetration testing (CPT) be used to investigate near-surface faulting at these fault locations. A series of closely-spaced boreholes or CPT points could be positioned along segments of Lines 1 through 3 crossing above Faults A and B to develop profiles of younger alluvial layers to further investigate the possibility of faulting.

§

Advanced Geoscience appreciates the opportunity to be of service to Group Delta Consultants and their clients. If you have any questions concerning this report please contact the undersigned. Thank you.

Sincerely,
Advanced Geoscience, Inc.

A handwritten signature in black ink, appearing to read "Mark G. Olson". The signature is fluid and cursive, with a large initial "M" and "O".

Mark G. Olson, P.Gp., P.G., C.H.G.
Principal Geophysicist/Geologist

Attachments: Figure 1- Site Map Showing Location of Lines 1-3 and Faults A and B
Figure 2- Line 1 Seismic Reflection Profile
Figure 3- Line 2 Seismic Reflection Profile
Figure 4- Line 3 Seismic Reflection Profile
Figure 5- Line 1 Seismic Refraction Tomography Profile
Figure 6- Line 2 Seismic Refraction Tomography Profile
Figure 7- Line 2 Seismic Refraction Tomography Profile

References:

T. W. Dibblee, Geologic Map of Palos Verdes Peninsula, Los Angeles County, California, 1999.

W. J. Stephenson, et al., Seismic Reflection and Geomorphic Characterization of Onshore Palos Verdes Fault Zone, Los Angeles, California, Bulletin of Seismological Society of America, Vol. 85, No. 3, June 1995.

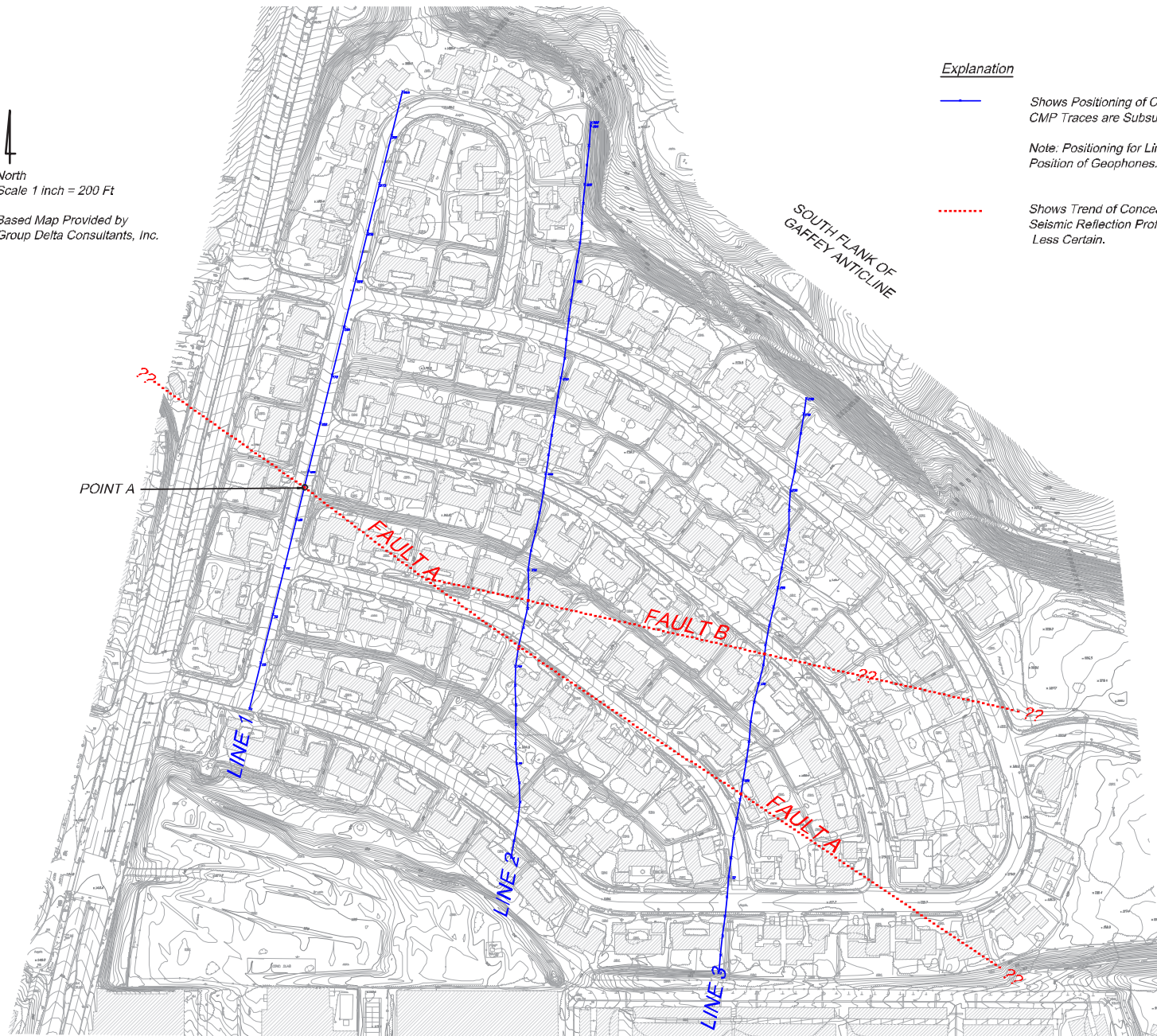

 North
 Scale 1 inch = 200 Ft
 Based Map Provided by
 Group Delta Consultants, Inc.

Explanation

 Shows Positioning of Common Midpoint (CMP) Traces on Lines 1-3. CMP Traces are Subsurface Reflection Points Along Lines 1-3.

Note: Positioning for Lines 2 and 3 is Not the Actual Ground Surface Position of Geophones.

 Shows Trend of Concealed Subsurface Faults A and B Interpreted on Seismic Reflection Profiles. Lines Queried Where Interpretation is Less Certain.

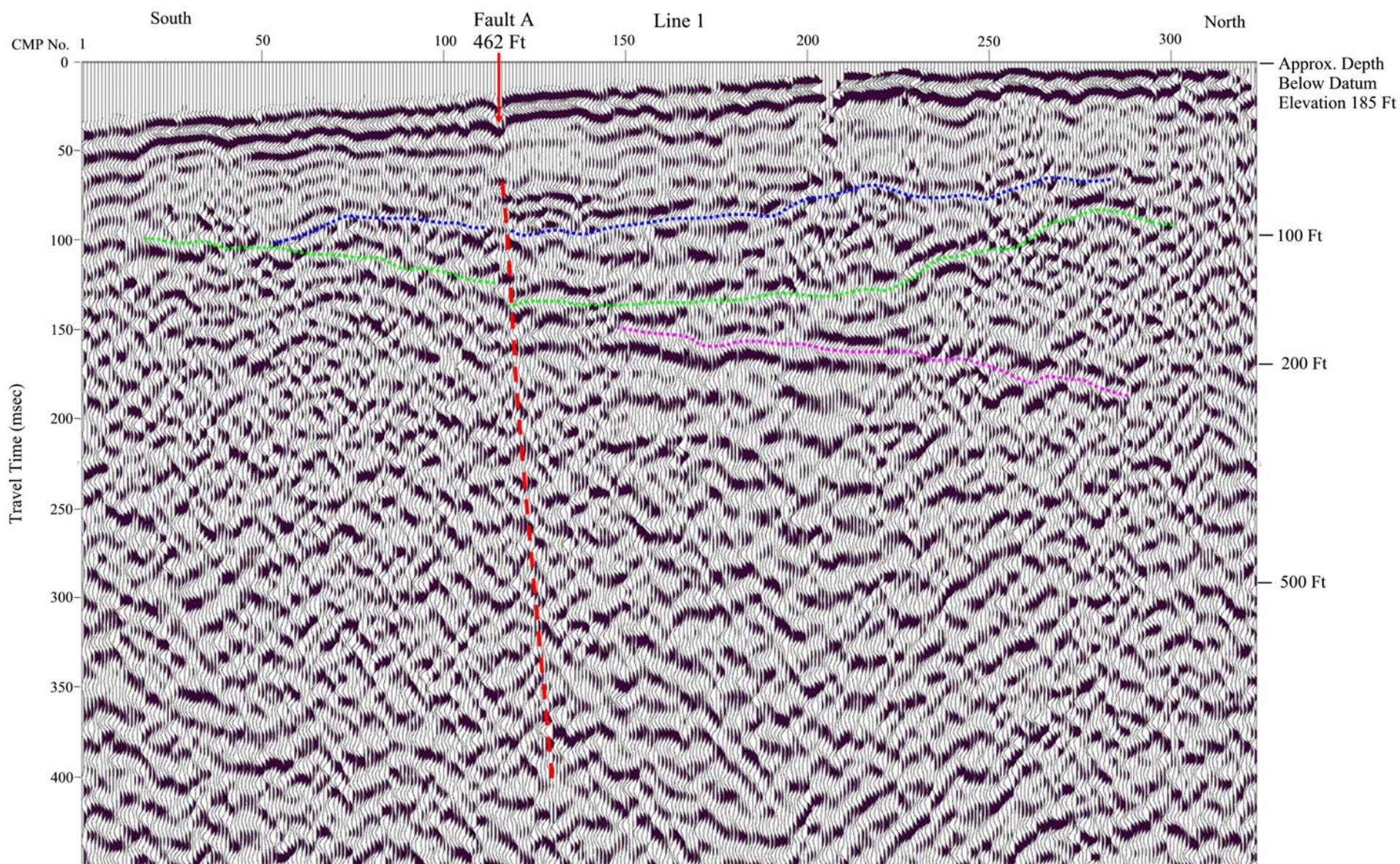


Site Map Showing
 Seismic Survey Lines 1-3 with
 Mapping of Subsurface Faulting
 Based on Seismic Reflection Profiles

Ponte Vista Development
 San Pedro, California

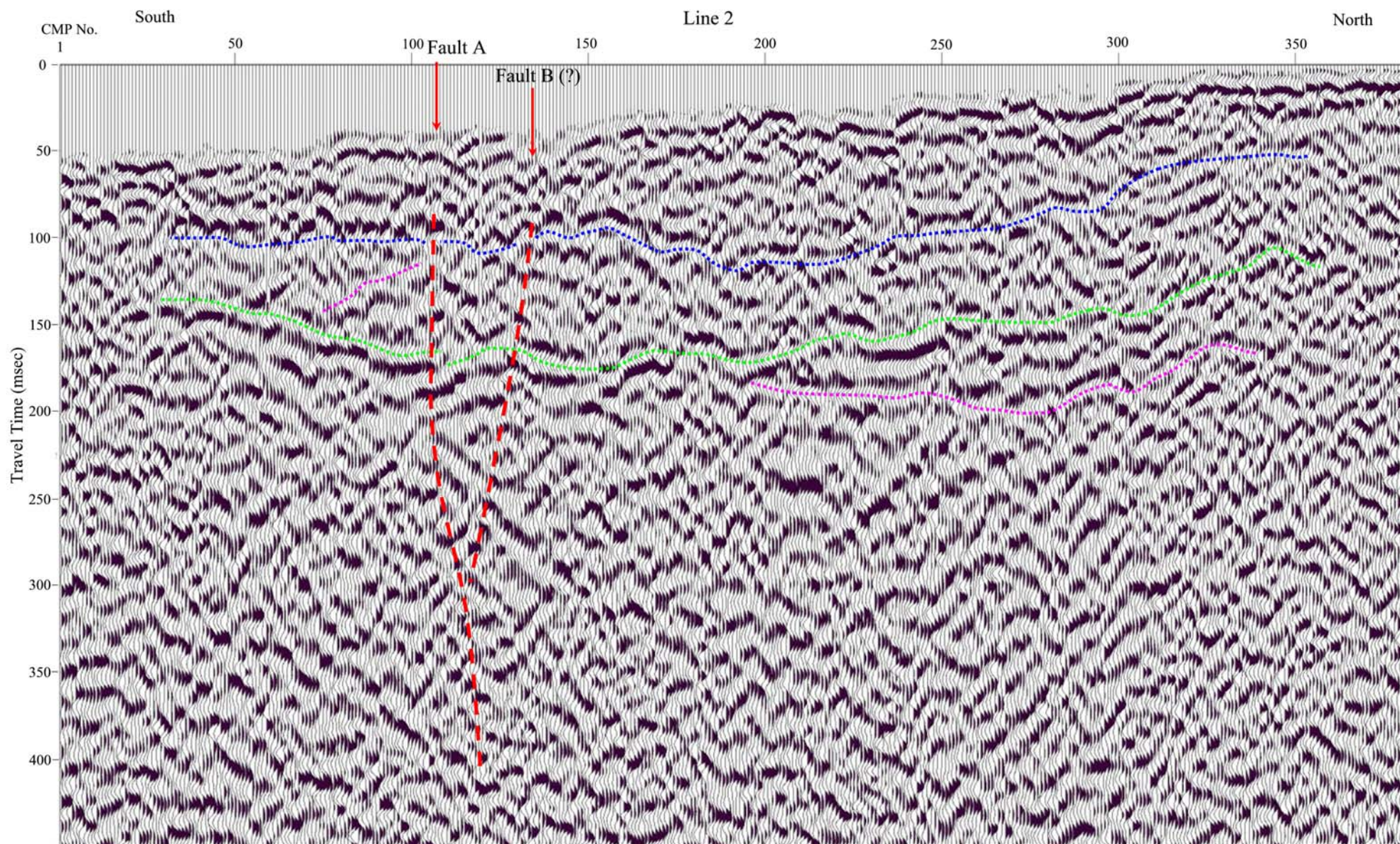
Rev. 1 May, 2011

Advanced Geoscience, Inc.
 Figure 1



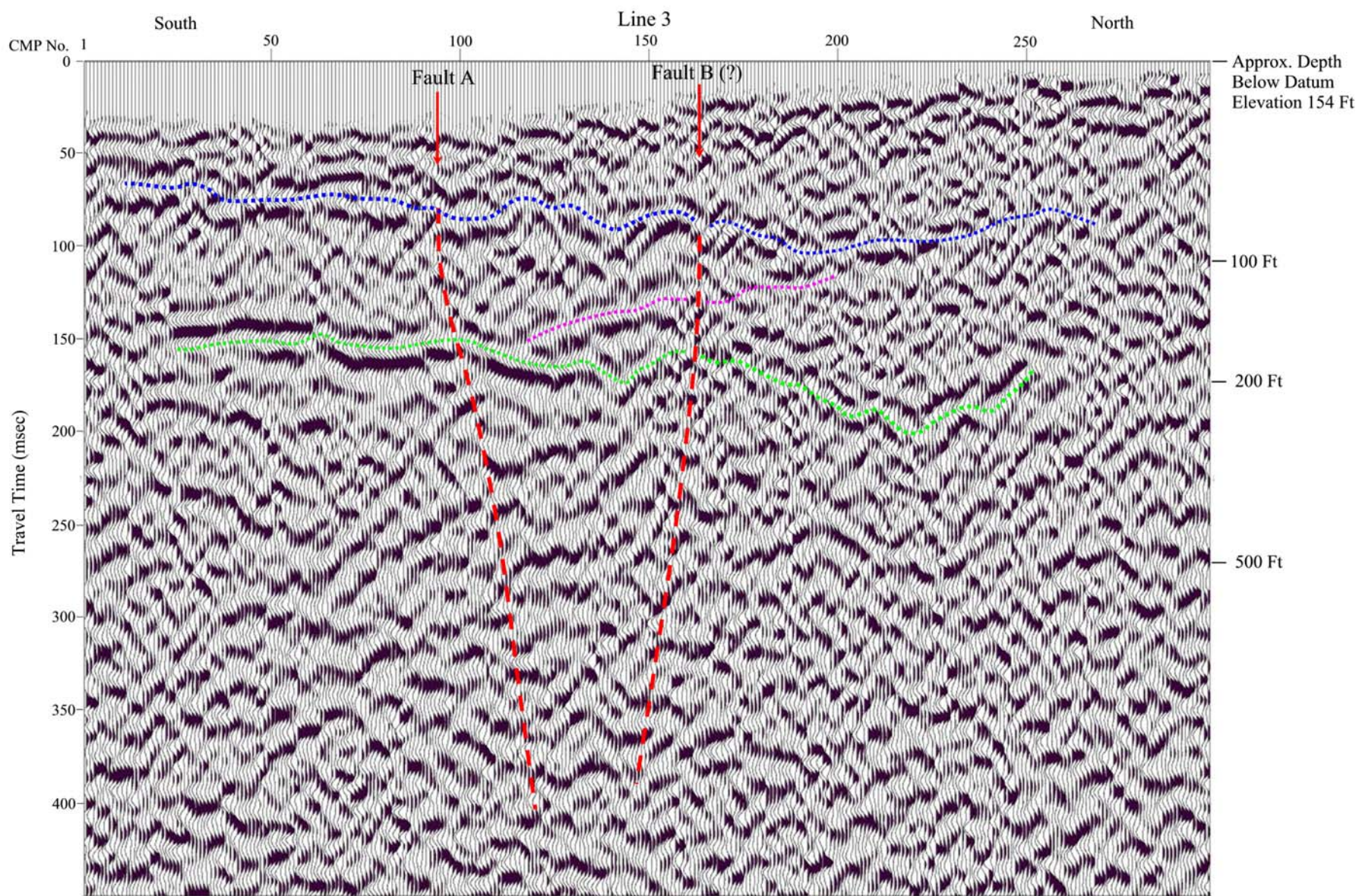
Line 1 Seismic Reflection Profile
Showing Interpretation of Subsurface Layering and Faulting

Figure 2
Advanced Geoscience, Inc.



Line 2 Seismic Reflection Profile
Showing Interpretation of Subsurface Layering and Faulting

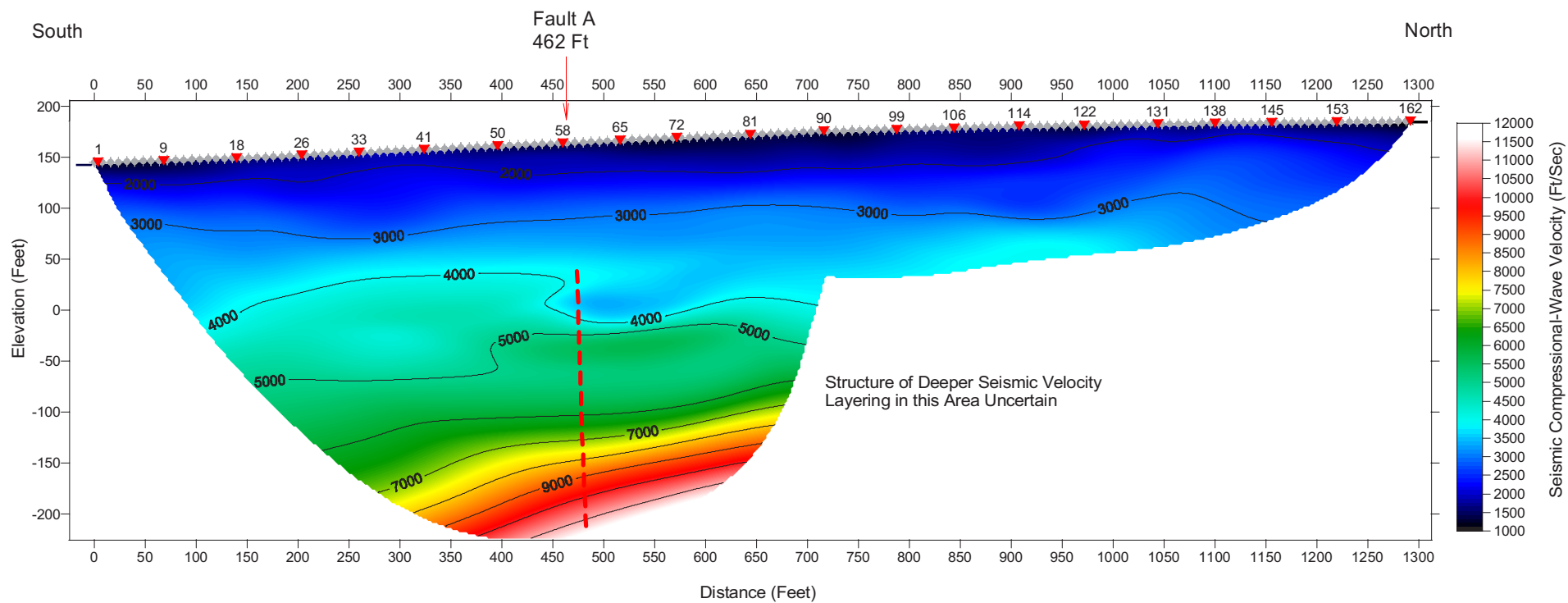
Figure 3
Advanced Geoscience, Inc.



Line 3 Seismic Reflection Profile
Showing Interpretation of Subsurface Layering and Faulting

Figure 4
Advanced Geoscience, Inc.

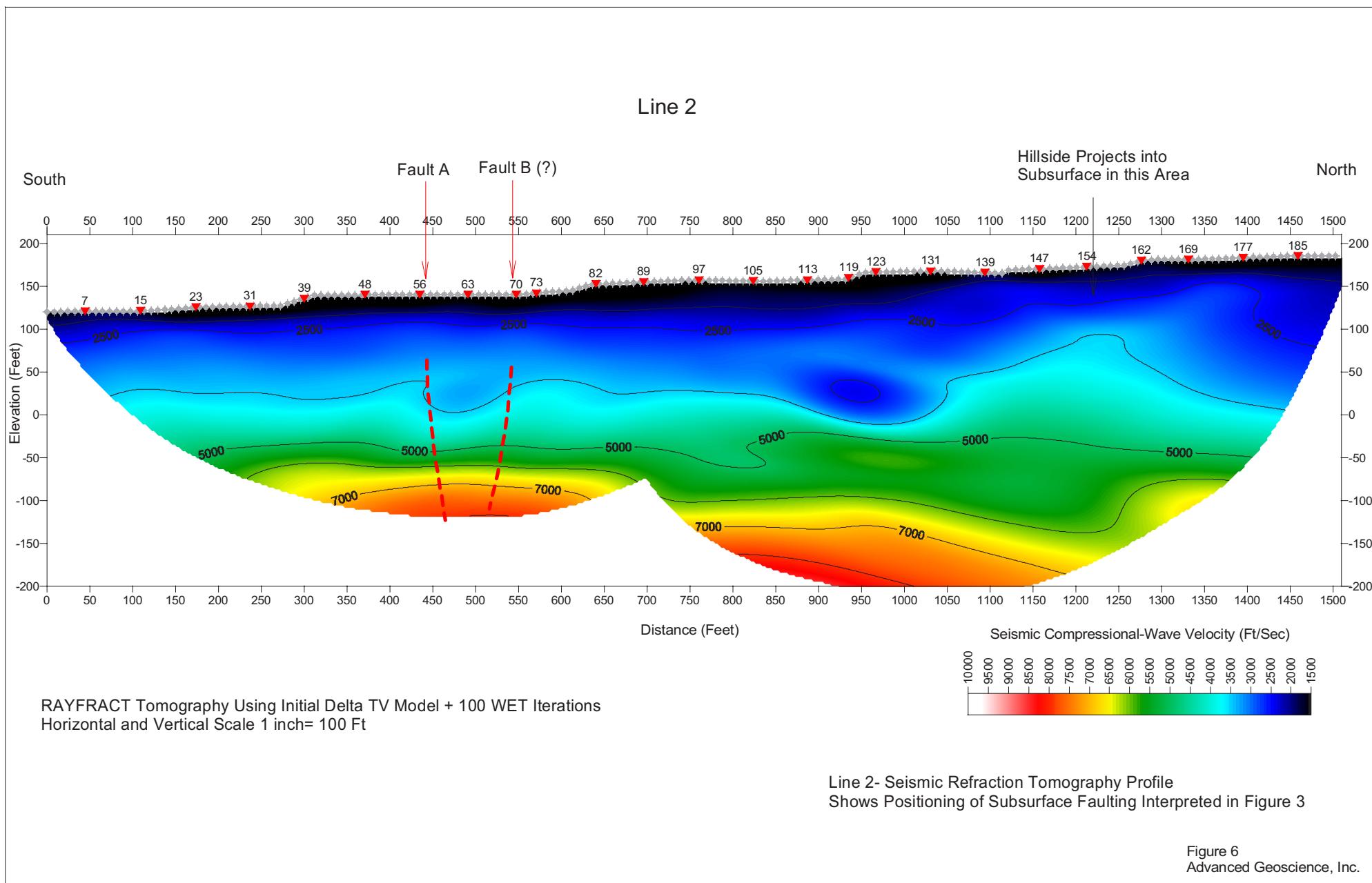
Line 1



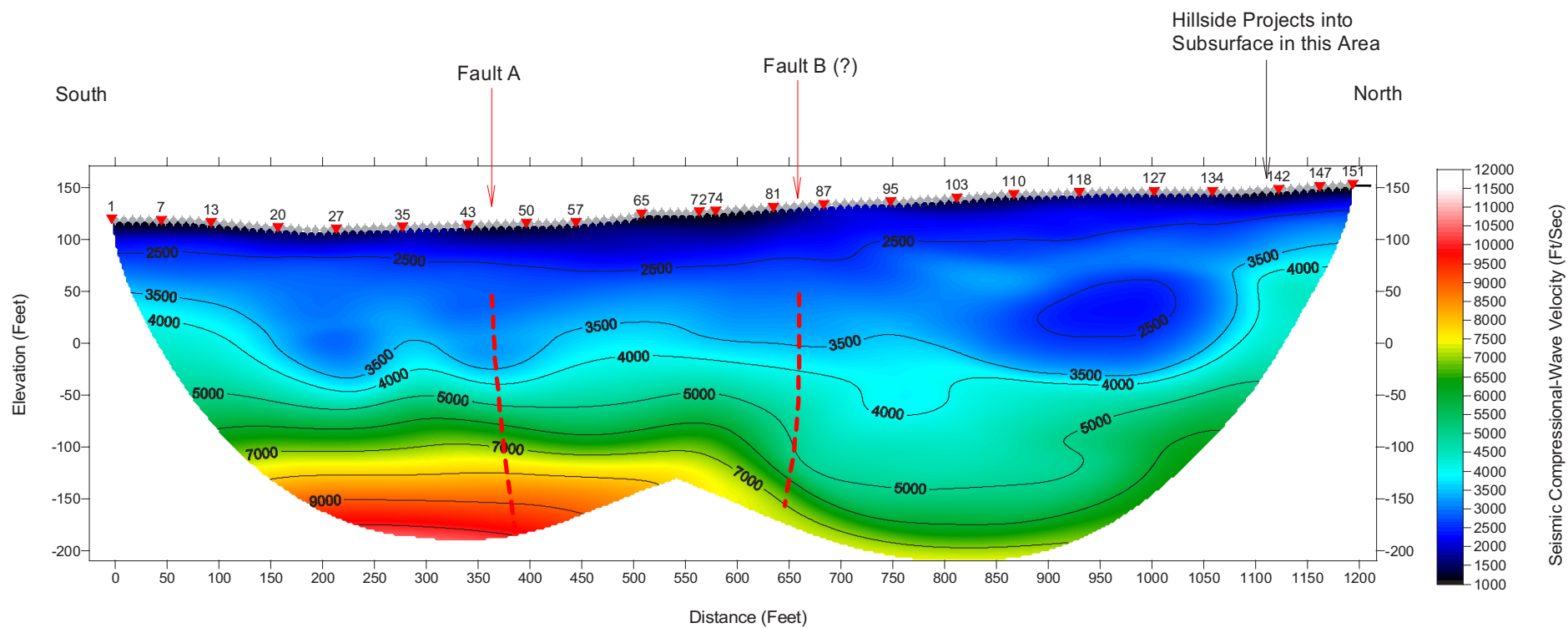
RAYFRACT Tomography Using Initial Delta TV Model + 100 WET Iterations
Horizontal and Vertical Scale 1 inch= 100 Ft

Line 1- Seismic Refraction Tomography Profile
Shows Positioning of Subsurface Fault Interpreted in Figure 2

Figure 5
Advanced Geoscience, Inc.



Line 3



RAYFRACT Tomography Using Initial Delta TV Model + 100 WET Iterations
Horizontal and Vertical Scale 1 inch= 100 Ft

Line 3- Seismic Refraction Tomography Profile
Shows Positioning of Subsurface Faulting Interpreted in Figure 4

Figure 7
Advanced Geoscience, Inc.

APPENDIX C

THE J. BYER GROUP (2005) INVESTIGATION – FIELD EXPLORATION AND LABORATORY TESTING

JB No: 20111-B

Log of Boring: 1

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: JWB

The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
181.0	1	FILL: Clayey Sand, dark brown, very moist, medium dense								
180.0	2	Silty Sand, light brown, very moist, medium dense								
179.0	3									
178.0	4	gray layer, mottled		----	R	14	18.0	104.0		
177.0	5	Clayey Sand, brown, very moist, medium dense								
176.0	6	alternating layers of brown and dark brown, very moist								
175.0	7									
174.0	8									
173.0	9			----	R	15	14.9	107.6		
172.0	10	Clayey Sand, brown and gray in layers, very moist, medium dense								
171.0	11									
170.0	12									
169.0	13	Sand, gray and brown, moist, dense								
168.0	14			----	R	33	----	----		No Recovery
167.0	15									
166.0	16									
165.0	17	Clayey Sand, dark gray, moist, dense, oil smell								
164.0	18									
163.0	19			----	R	55	12.2	120.1		
162.0	20									
161.0	21									
160.0	22									
159.0	23	SAN PEDRO FORMATION:								
158.0	24	Silty Sand, brown, damp, medium dense, few small gravel		----	R	14	9.9	107.8		
157.0	25									

Surface: Street - 6 Inches A/C

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 182 Feet

Drill Date: June 2, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 1

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: JWB

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
156.0	26			---	R	20	8.5	107.6		
155.0	27									
154.0	28									
153.0	29			----	R	14	8.8	98.3		
152.0	30									
151.0	31									
150.0	32									
149.0	33									
148.0	34									
147.0	35									End at 35 Feet; No Water; Fill to 23 Feet.
146.0	36									
145.0	37									
144.0	38									
143.0	39									
142.0	40									
141.0	41									
140.0	42									
139.0	43									
138.0	44									
137.0	45									
136.0	46									
135.0	47									
134.0	48									
133.0	49									
132.0	50									

Surface: Street - 6 Inches A/C

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 182 Feet

Drill Date: June 2, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 2

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: JWB

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
182.0	1	FILL: Silty Sand, medium brown, slightly moist, loose								
181.0	2	Silty Sand, light brown, slightly moist, loose								
180.0	3									
179.0	4	Silty Sand, mottled light brown, gray, reddish, slightly moist, medium dense, occasional roots		----	R	15	5.4	108.0		
178.0	5									
177.0	6	SAN PEDRO FORMATION: Silty Sand, light brown slightly moist, medium dense								
176.0	7									
175.0	8									
174.0	9	Silty Sand mottled reddish brown, gray, brown, slightly moist, dense, minor clay		----	R	55	16.2	105.2		
173.0	10									
172.0	11									
171.0	12									
170.0	13									
169.0	14	Silty Sand to Sand, light brown to tan, slightly moist, dense, shell fragments, occasional gravel		----	R	43	7.2	97.9		
168.0	15									
167.0	16									
166.0	17									
165.0	18									
164.0	19	Sand, tan, slightly moist, dense, occasional shell fragments and gravel		----	R	50	3.3	101.0		
163.0	20	End at 20 Feet; No Water; Fill to 4½ Feet.								
162.0	21									
161.0	22									
160.0	23									
159.0	24									
158.0	25									

Surface: Asphalt Street - 4 Inch Asphalt/No Base

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 183 Feet

Drill Date: June 2, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 3

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
184.0	1	FILL: Clayey Sand, greenish-gray, moist, medium dense, occasional gravel, orange inclusions								
183.0	2									
182.0	3									
181.0	4	Clayey Sand, greenish-gray, moist, medium dense		----	R	12	9.1	105.5		
180.0	5	Clayey Sand, medium to dark brown, moist, medium dense								
179.0	6	Clayey Sand, medium brown, moist, medium dense, coarse grained, occasional gravel								
178.0	7									
177.0	8									
176.0	9	Silty Sand, medium brown, slightly moist, medium dense, minor gravel, minor clay		----	R	25	7.3	112.3		
175.0	10									
174.0	11									
173.0	12									
172.0	13									
171.0	14	Silty Sand, interbedded light brown and brown, slightly moist, medium dense, minor gravel, minor clay		----	R	5	14.1	100.4		
170.0	15									
169.0	16									
168.0	17									
167.0	18									
166.0	19	Sand, minor silt, reddish brown, slightly moist, medium dense, minor gravel		----	R	13	8.3	113.6		
165.0	20									
164.0	21									
163.0	22									
162.0	23									
161.0	24	OLDER ALLUVIUM: Clayey Sand, brown, moist, medium dense to dense, few gravel		----	R	19	12.2	117.7	79.0	
160.0	25									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 185 Feet

Drill Date: June 2, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 3

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
159.0	26									
158.0	27									
157.0	28									
156.0	29	Clayey Sand, mottled brown, orange, tan, moist, dense, porous, gravel		---	R	23	19.9	107.7	99.0	
155.0	30	Clayey Sand, brown, moist, dense, porous, minor gravel								
154.0	31									
153.0	32									
152.0	33									
151.0	34	Clayey Sand, brown, slightly moist, medium dense, porous, minor gravel		---	R	18	18.2	109.0	93.0	
150.0	35									
149.0	36									
148.0	37									
147.0	38									
146.0	39	SAN PEDRO FORMATION:		---	SPT	10				
145.0	40	Clayey Sand, brown, moist, dense, minor gravel				35				
144.0	41	Clayey Sand, coarse grained, moist, dense, occasional sub-rounded rock fragments				48				
143.0	42									
142.0	43									
141.0	44	Sand, brown, moist, dense		---	SPT	30				
140.0	45					30				
139.0	46	End at 45½ Feet; No Water; Fill to 24 Feet.				35				
138.0	47									
137.0	48									
136.0	49									
135.0	50									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 185 Feet

Drill Date: June 2, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 4

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

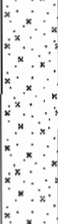
The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
183.0	1	FILL: Silty Sand, red-brown, moist, medium dense								
182.0	2									
181.0	3									
180.0	4	Silty Sand, reddish brown, moist, dense		----	R	32	10.0	120.3		
179.0	5									
178.0	6									
177.0	7									
176.0	8									
175.0	9	Clayey Sand, greenish-gray, moist, medium dense, mudstone fragments		----	R	17	19.3	110.7		
174.0	10									
173.0	11	gray-brown and reddish-brown layers								
172.0	12									
171.0	13									
170.0	14	SAN PEDRO FORMATION: Silty Sand, reddish-brown, moist, dense, minor gravel up to 1 inch, few pores, minor clay		----	R	8	9.2	113.1		
169.0	15									
168.0	16									
167.0	17									
166.0	18									
165.0	19	Silty Sand, reddish-brown, moist, dense, minor gravel		----	R	10	5.9	114.5		
164.0	20									
163.0	21									
162.0	22									
161.0	23									
160.0	24	Sand, light reddish-brown, moist, dense, medium grained		----	R	12	3.1	105.5		
159.0	25									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 184 Feet

Drill Date: June 2, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 4

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
158.0	26	Sand, light brown and gray, moist, dense, medium grained		----	SPT	16 35 40				
157.0	27									
156.0	28									
155.0	29									
154.0	30									
153.0	31	Sand, tan, gray, and reddish-brown, damp, dense, medium grained		----	R	50	2.2	97.5		
152.0	32									
151.0	33									
150.0	34									
149.0	35									
148.0	36	End at 35 Feet; No Water; Fill to 14 Feet.								
147.0	37									
146.0	38									
145.0	39									
144.0	40									
143.0	41									
142.0	42									
141.0	43									
140.0	44									
139.0	45									
138.0	46									
137.0	47									
136.0	48									
135.0	49									
134.0	50									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 184 Feet

Drill Date: June 2, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 5

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
172.0	1	FILL: Silty Sand, brown, moist, medium dense								
171.0	2									
170.0	3									
169.0	4	Silty Sand, medium red-brown, moist, medium dense		----	R	26	11.0	115.8		
168.0	5	Silty Sand, gray-brown, moist, medium dense								
167.0	6	Silty Sand, greenish-brown, moist, medium dense, medium grained								
166.0	7									
165.0	8									
164.0	9	SAN PEDRO FORMATION: Silty Sand, reddish-brown, moist, dense		----	R	50	12.9	107.4		
163.0	10	Gravelly Sand, reddish-brown, moist, dense, rounded gravel up to 3/4 inch								
162.0	11	Silty Sand, mottled medium brown, light brown, orange, moist, dense								
161.0	12									
160.0	13									
159.0	14	Silty Sand, mottled reddish orange, greenish brown, moist, dense, fine grained, occasional shells		----	R	50	7.0	103.3		
158.0	15									
157.0	16									
156.0	17									
155.0	18									
154.0	19	Silty Sand, mottled light brown, reddish brown, orange, moist, dense, fine grained		----	R	50	13.5	105.3		
153.0	20	End at 20 Feet; No Water; Fill to 9 Feet.								
152.0	21									
151.0	22									
150.0	23									
149.0	24									
148.0	25									

Surface: Asphalt Street - 4 Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 173 Feet

Drill Date: June 3, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 6

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
170.0	1	FILL: Silty Sand, reddish-brown, moist, medium dense, minor gravel, some clay								
169.0	2									
168.0	3									
167.0	4	Clayey Sand, dark gray, moist, medium dense, minor gravel		----	R	10	27.3	97.5		
166.0	5									
165.0	6	layers of dark gray Clayey Sand, moist, dense								
164.0	7									
163.0	8									
162.0	9	Clayey Sand, dark gray, moist, dense, some gravel		----	R	17	19.9	102.3		
161.0	10									
160.0	11									
159.0	12	Silty Sand, brown, moist, medium dense, sub-rounded gravel to 2 inches								
158.0	13									
157.0	14	Silty Sand, gray, moist, medium dense, some gravel		----	R	30	13.0	117.2		
156.0	15									
155.0	16									
154.0	17	layers of brown and gray-brown								
153.0	18	Clayey Sand, reddish brown, very moist, medium dense, gray layers		----	R	35	9.0	116.4		
152.0	19									
151.0	20	Silty Sand, mottled reddish brown, gray-brown, moist, dense, medium grained								
150.0	21									
149.0	22									
148.0	23									
147.0	24	Silty Sand, gray, slightly moist, medium dense		----	R	19	16.6	109.4	86.0	
146.0	25									

Surface: Asphalt Street - 7 Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 171 Feet

Drill Date: June 3, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 6

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
145.0	26	OLDER ALLUVIUM: Clayey Sand, gray, green, moist, medium dense, occasional gravel, weeds, slightly porous (24.5 Feet)		----	R	15	14.4	113.5	84.0	
144.0	27									
143.0	28									
142.0	29									
141.0	30									
140.0	31	Clayey Sand, brown, moist, medium dense, few pores		----	R	15	14.4	113.5	84.0	
139.0	32									
138.0	33									
137.0	34									
136.0	35									
135.0	36	SAN PEDRO FORMATION: Sand, reddish-brown, moist, dense, medium grained		----	R	22	13.5	118.2	90.0	
134.0	37									
133.0	38									
132.0	39									
131.0	40									
130.0	41	Sand, reddish- brown, moist, dense, fine grained		----	R	34	13.5	118.1	89.0	
129.0	42									
128.0	43									
127.0	44									
126.0	45									
125.0	46	End at 40 Feet; No Water; Fill to 24½ Feet.		----	R	34	13.5	118.1	89.0	
124.0	47									
123.0	48									
122.0	49									
121.0	50									

Surface: Asphalt Street - 7 Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 171 Feet

Drill Date: June 3, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 7

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
154.0	1	FILL: Silty Sand, brown, moist, medium dense								
153.0	2									
152.0	3									
151.0	4									
150.0	5	Clayey Sand, light brown, moist, medium dense								
149.0	6									
148.0	7									
147.0	8									
146.0	9	SAN PEDRO FORMATION: Silty Sand, mottled light brown and brown, moist, medium dense, fine grained		----	R	16	10.4	90.0		
145.0	10									
144.0	11									
143.0	12									
142.0	13									
141.0	14									
140.0	15									
139.0	16									
138.0	17									
137.0	18									
136.0	19	Sand, tan, moist, dense, fine grained, minor silt		----	R	34	3.9	92.1		
135.0	20	End at 20 Feet; No Water; Fill to 8 Feet.								
134.0	21									
133.0	22									
132.0	23									
131.0	24									
130.0	25									

Surface: Asphalt Street - 1 Inch

Size: 8 inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 155 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

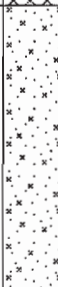
Log of Boring: 8

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
161.0	1	FILL: Silty Sand, medium brown, moist, medium dense								
160.0	2									
159.0	3									
158.0	4									
157.0	5	Clayey Sand, brown, moist, medium dense								
156.0	6									
155.0	7	Clayey Sand, dark brown, moist, medium dense								
154.0	8									
153.0	9	SAN PEDRO FORMATION: Silty Sand, medium brown, slightly moist, medium dense, fine grained		----	R	11	14.7	101.9		
152.0	10									
151.0	11									
150.0	12									
149.0	13									
148.0	14	Sand, light brown, moist, medium dense, fine grained		----	R	18	9.1	94.3		
147.0	15									
146.0	16									
145.0	17									
144.0	18									
143.0	19	Sand, golden brown, moist, dense, coarse grained, occasional rounded gravel		----	R	45	9.1	104.5		
142.0	20	End at 20 Feet; No Water; Fill to 9 Feet.								
141.0	21									
140.0	22									
139.0	23									
138.0	24									
137.0	25									

Surface: Asphalt Street (3 Inches, ½ Inch Coarse Grade)

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 162 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

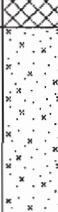
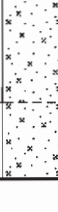
Log of Boring: 9

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
154.0	1	FILL: Silty Sand, brown, moist, medium dense								
153.0	2									
152.0	3									
151.0	4	Silty Sand, greenish-brown, moist, dense		----	R	22	12.0	119.1		
150.0	5									
149.0	6									
148.0	7									
147.0	8									
146.0	9	Silty Sand and Clayey Sand, reddish brown, moist, medium dense, gravel up to 2½ inches		----	R	16	17.8	105.3		
145.0	10									
144.0	11									
143.0	12									
142.0	13									
141.0	14	Silty Sand, mottled reddish-brown, greenish-gray, moist, dense, minor clay		----	R	33	11.7	118.2		
140.0	15									
139.0	16									
138.0	17									
137.0	18									
136.0	19	SAN PEDRO FORMATION: Silty Sand, reddish-brown, moist, dense		----	R	16	11.9	117.7		
135.0	20									
134.0	21									
133.0	22									
132.0	23									
131.0	24	Silty Sand, light brown, moist, dense, medium grained		----	R	19	4.8	107.6		
130.0	25									

Surface: 2 Inches Asphalt No Base

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 155 Feet

Drill Date: June 3, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 9

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
129.0	26	Silty Sand, reddish-brown, moist, dense, minor gravel, medium to coarse grained		----	R	38	6.9	107.6		
128.0	27									
127.0	28									
126.0	29									
125.0	30									
124.0	31	Silty Sand, reddish-brown, moist, dense, medium grained		----	R	40	7.6	112.3		
123.0	32									
122.0	33									
121.0	34									
120.0	35									
119.0	36	End at 35 Feet; No Water; Fill to 19 Feet.								
118.0	37									
117.0	38									
116.0	39									
115.0	40									
114.0	41									
113.0	42									
112.0	43									
111.0	44									
110.0	45									
109.0	46									
108.0	47									
107.0	48									
106.0	49									
105.0	50									

Surface: 2 Inches Asphalt No Base

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 155 Feet

Drill Date: June 3, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 10

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
138.0	1	FILL: Silty Sand, light brown, moist, medium dense								
137.0	2									
136.0	3									
135.0	4									
134.0	5									
133.0	6									
132.0	7									
131.0	8									
130.0	9									
129.0	10	SAN PEDRO FORMATION: Silty Sand to Sand, mottled light brown and brown, moist, dense mudstone fragment in sample tip		----	R	39	25.8	95.1		
128.0	11									
127.0	12									
126.0	13									
125.0	14	Sand, golden brown, moist, dense, medium grained, some darker layers		----	R	45	3.1	97.9		
124.0	15									
123.0	16									
122.0	17									
121.0	18									
120.0	19	Sand, golden brown, moist, medium grained, dense		----	R	55	4.1	98.0		
119.0	20	End at 20 Feet; No Water; Fill to 9 Feet.								
118.0	21									
117.0	22									
116.0	23									
115.0	24									
114.0	25									

Surface: Asphalt Street - 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 139 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 11

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
128.0	1	FILL: Silty Sand, light brown, moist, medium dense								
127.0	2									
126.0	3									
125.0	4	Clayey Sand, brown, moist, medium dense								
124.0	5									
123.0	6									
122.0	7									
121.0	8									
120.0	9	Clayey Sand, brown, moist, medium dense, fine grained		----	R	14	----	----	----	No Recovery
119.0	10	SAN PEDRO FORMATION: Silty Sand, brown, moist, dense, medium to fine grained								
118.0	11									
117.0	12									
116.0	13									
115.0	14			----	R	32	9.1	117.4		
114.0	15									
113.0	16									
112.0	17									
111.0	18									
110.0	19	Silty Sand, reddish brown, moist, dense, medium grained		----	R	16	5.0	106.5		
109.0	20	End at 20 Feet; No Water; Fill to 10 Feet.								
108.0	21									
107.0	22									
106.0	23									
105.0	24									
104.0	25									

Surface: Asphalt Street - 4 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 129 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 12

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
121.0	1	FILL: Silty Sand, light brown, moist, medium dense	[Cross-hatched symbol]							
120.0	2									
119.0	3	layers of Clayey Sand, brown, very moist, medium dense								
118.0	4			----	R	35	15.4	105.7		
117.0	5									
116.0	6									
115.0	7									
114.0	8	Silty Sand, gray-brown, moist, medium dense								
113.0	9			----	R	20	18.6	101.6		
112.0	10	layer of Clayey Sand, dark gray-brown, moist, medium dense								
111.0	11									
110.0	12									
109.0	13									
108.0	14			----	R	32	10.6	119.6		
107.0	15	Clayey Sand, dark gray, very moist, medium dense								
106.0	16									
105.0	17									
104.0	18									
103.0	19			----	R	16	18.3	106.8		
102.0	20	Clayey Sand, reddish-brown, very moist, medium dense, some gravel								
101.0	21									
100.0	22									
99.0	23	seep at 24 feet								
98.0	24	ALLUVIUM: Silty Sand, brown, wet, medium dense, porous, some peat	[Stippled symbol]	----	R	8	15.1	96.4		
97.0	25									

Surface: Street - 3 Inches A/C

Size: 8 inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 122 Feet

Drill Date: June 3, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 12

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
96.0	26									
95.0	27	layers of Clayey Silt, brown, saturated, soft to firm								
94.0	28									
93.0	29	SAN PEDRO FORMATION:		---	R	25	12.3	120.6	88.0	
92.0	30	Clayey Sand, reddish-brown, moist, dense, some gravel								
91.0	31									
90.0	32									
89.0	33	Clayey Sand, light gray-brown with iron stain, moist, dense		---	R	23	16.5	107.1	80.0	
88.0	34									
87.0	35									
86.0	36									
85.0	37									
84.0	38									
83.0	39			---	R	41	18.7	100.5	77.0	
82.0	40	End at 40 Feet; Seep at 24 Feet; Fill to 24 Feet.								
81.0	41									
80.0	42									
79.0	43									
78.0	44									
77.0	45									
76.0	46									
75.0	47									
74.0	48									
73.0	49									
72.0	50									

Surface: Street - 3 Inches A/C

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 122 Feet

Drill Date: June 3, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 13

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
118.0	1	FILL: Silty Sand, brown, moist, medium dense, gravel								
117.0	2	Clayey Sand, brown, moist, medium dense								
116.0	3									
115.0	4	Silty Sand, brown, moist, medium dense, gravel								
114.0	5			---	R	15	19.2	104.2		
113.0	6									
112.0	7									
111.0	8	Clayey Sand, reddish-brown, moist, medium dense								
110.0	9	Clayey Sand, medium and dark brown, moist, medium dense, fine grained		---	R	17	10.3	102.2		
109.0	10	OLDER ALLUVIUM: Clayey Sand, brown, moist, medium dense, porous, fine grained								
108.0	11									
107.0	12									
106.0	13			---	R	25	8.1	93.1		
105.0	14									
104.0	15	Gravelly Sand, brown, moist, medium dense, rock fragments up to 1 inch								
103.0	16									
102.0	17			---	R					
101.0	18	SAN PEDRO FORMATION: Silty Sand, brown and orange-brown, moist, dense, fine grained								
100.0	19									
99.0	20	End at 20 Feet; No Water; Fill to 10 Feet.								
98.0	21									
97.0	22									
96.0	23									
95.0	24									
94.0	25									

Surface: Asphalt Street - 2½ Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 119 Feet

Drill Date: June 7, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 14

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
123.0	1	FILL: Silty Sand, brown, moist, medium dense								
122.0	2	Clayey Sand, dark brown, moist, medium dense, minor gravel								
121.0	3									
120.0	4									
119.0	5	Clayey Sand, brown, moist, medium dense								
118.0	6			----	R	14	10.4	91.1		
117.0	7									
116.0	8									
115.0	9	OLDER ALLUVIUM: Clayey Sand, red-brown, moist, medium dense, gravel up to 1 inch, fine grained								
114.0	10									
113.0	11			----	R	15	24.2	93.6		
112.0	12									
111.0	13									
110.0	14	Clayey Sand, brown and reddish-brown, slightly moist, medium dense								
109.0	15									
108.0	16			----	R	33	36.8	72.7		
107.0	17									
106.0	18									
105.0	19	SAN PEDRO FORMATION: Sand, golden brown, moist, dense, fine grained								
104.0	20									
103.0	21			----	R	26	6.1	94.0		
102.0	22									
101.0	23									
100.0	24	Sand, tan and orange-brown, moist, dense, fine grained								
99.0	25									

Surface: Asphalt Street -1½ Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 124 Feet

Drill Date: June 7, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 14

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
		End at 25 Feet; No Water; Fill to 9 Feet.								
98.0	26									
97.0	27									
96.0	28									
95.0	29									
94.0	30									
93.0	31									
92.0	32									
91.0	33									
90.0	34									
89.0	35									
88.0	36									
87.0	37									
86.0	38									
85.0	39									
84.0	40									
83.0	41									
82.0	42									
81.0	43									
80.0	44									
79.0	45									
78.0	46									
77.0	47									
76.0	48									
75.0	49									
74.0	50									

Surface: Asphalt Street -1½ Inches

Drill Method: Hollow-Stem Auger Drill Rig

Drill Date: June 7, 2005

Size: 8 Inch Diameter

Elevation: 124 Feet

Sheet: 2 of 2

JB No: 20111-B

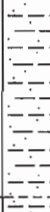
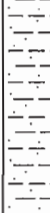
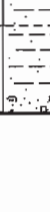
Log of Boring: 15

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
131.0	1	FILL: Clayey Sand, brown, moist, medium dense								
130.0	2									
129.0	3									
128.0	4	Clayey Sand, mottled gray-brown, moist, medium dense, slate chips and rock fragments		----	R	15	18.7	105.4		
127.0	5									
126.0	6	Clayey Sand, gray-brown, moist, medium dense								
125.0	7									
124.0	8									
123.0	9	Clayey Sand, mottled brown, gray, light brown, moist, dense, minor gravel		----	R	28	18.9	104.5		
122.0	10									
121.0	11									
120.0	12	Clayey Sand, brown, moist, medium dense								
119.0	13									
118.0	14			----	R	14	16.0	107.0		
117.0	15	OLDER ALLUVIUM: Clayey Sand, brown, moist, dense								
116.0	16									
115.0	17									
114.0	18									
113.0	19	Silty Sand to Clayey Sand, brown and reddish-brown, moist, medium dense, fine grained		----	R	14	10.9	103.4		
112.0	20									
111.0	21									
110.0	22									
109.0	23									
108.0	24	Silty Sand to Clayey Sand, medium reddish-brown, slightly moist, medium dense, fine grained		----	R	18	17.3	91.4		
107.0	25									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 132 Feet

Drill Date: June 7, 2005

Sheet: 1 of 2

JB No: 20111-B

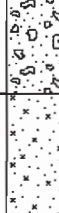
Log of Boring: 15

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
106.0	26	Gravelly Sand, medium reddish-brown, slightly moist, medium dense, rock fragments to 1½ inches, fine grained matrix		----	R	50	4.0	113.8		
105.0	27									
104.0	28									
103.0	29									
102.0	30									
101.0	31	Gravelly Sand, brown, slightly moist, dense, angular gravel up to 1½ inches, 2½ inch mudstone fragment in sampler tip		----	R	50	4.0	113.8		
100.0	32									
99.0	33									
98.0	34									
97.0	35									
96.0	36	SAN PEDRO FORMATION: Silty Sand, mottled reddish-gray brown, slightly moist, dense, fine grained, high mica content		----	R	43	20.2	103.9		
95.0	37									
94.0	38									
93.0	39									
92.0	40									
91.0	41	Silty Sand, mottled brown, orange-brown, reddish-brown, slightly moist, dense, fine grained, high mica content		----	R	38	22.3	82.2		
90.0	42									
89.0	43	End at 40 Feet; No Water; Fill to 14½ Feet.								
88.0	44									
87.0	45									
86.0	46									
85.0	47									
84.0	48									
83.0	49									
82.0	50									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 132 Feet

Drill Date: June 7, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 16

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
143.0	1	FILL: Silty Sand, brown, moist, medium dense								
142.0	2	Silty Sand, light brown, moist, medium dense, mudstone fragments								
141.0	3									
140.0	4	Silty Sand, brown, moist, medium dense								
139.0	5									
138.0	6									
137.0	7									
136.0	8									
135.0	9	SAN PEDRO FORMATION: Silty Sand, light brown and orange-brown, moist, dense, fine grained		----	R	40	18.5	103.3		
134.0	10									
133.0	11									
132.0	12									
131.0	13									
130.0	14									
129.0	15									
128.0	16									
127.0	17									
126.0	18									
125.0	19	Sand, light brown, moist, dense, gravel up to 3/4 inches		----	R	31	3.3	104.8		
124.0	20	End at 20 Feet; No Water; Fill to 8½ Feet.								
123.0	21									
122.0	22									
121.0	23									
120.0	24									
119.0	25									

Surface: Asphalt Street - 3½ Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 144 Feet

Drill Date: June 7, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 17

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
153.0	1	FILL: Silty Sand, brown, moist, medium dense								
152.0	2									
151.0	3									
150.0	4									
149.0	5	Silty Sand, brown, moist, medium dense								
148.0	6									
147.0	7									
146.0	8	Clayey Sand, medium brown, slightly moist, medium dense, minor gravel								
145.0	9	SAN PEDRO FORMATION: Silty Sand, brown, moist, dense, fine grained, high mica content		----	R	40	9.0	91.5		
144.0	10									
143.0	11									
142.0	12									
141.0	13									
140.0	14	Sand, light brown and orange, moist, dense, fine grained, high mica content		----	R	23	5.9	92.7		
139.0	15									
138.0	16									
137.0	17									
136.0	18									
135.0	19	Sand, mottled tan and orange-brown, moist, dense, fine grained		----	R	34	3.3	100.1		
134.0	20	End at 20 Feet; No Water; Fill to 9 Feet.								
133.0	21									
132.0	22									
131.0	23									
130.0	24									
129.0	25									

Surface: Asphalt Street 4 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 154 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 18

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
148.0	1	FILL: Clayey Sand, brown, slightly moist, medium dense								
147.0	2									
146.0	3									
145.0	4	Silty Sand, light brown, moist, medium dense		----	R	18	11.7	99.1		
144.0	5	OLDER ALLUVIUM: Gravelly Sand, brown, moist, medium dense, gravel up to 1/2 inch								
143.0	6									
142.0	7									
141.0	8									
140.0	9	Silty Sand, light brown, moist, medium dense, occasional roots		----	R	13	27.8	86.9		
139.0	10									
138.0	11									
137.0	12									
136.0	13									
135.0	14	Silty Sand, brown, slightly moist, medium dense, minor gravel		----	R	13	13.8	91.4		
134.0	15									
133.0	16									
132.0	17									
131.0	18									
130.0	19	Silty Sand, medium brown, slightly moist, dense		----	R	33	7.3	114.4		
129.0	20	Gravelly Sand, brown, slightly moist, dense, rock fragments up to 1 1/2 inches								
128.0	21	Silty Sand, medium brown, slightly moist, dense								
127.0	22									
126.0	23									
125.0	24	SAN PEDRO FORMATION: Silty Sand, light brown and orange-brown, moist, dense, fine grained, high mica content		----	R	38	6.1	94.3		
124.0	25									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 149 Feet

Drill Date: June 7, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 18

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC**Logged By:** YH**Site Location:** South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
123.0	26	End at 25 Feet; No Water; Fill to 5 Feet.								
122.0	27									
121.0	28									
120.0	29									
119.0	30									
118.0	31									
117.0	32									
116.0	33									
115.0	34									
114.0	35									
113.0	36									
112.0	37									
111.0	38									
110.0	39									
109.0	40									
108.0	41									
107.0	42									
106.0	43									
105.0	44									
104.0	45									
103.0	46									
102.0	47									
101.0	48									
100.0	49									
99.0	50									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 149 Feet

Drill Date: June 7, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 19

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

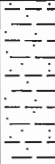
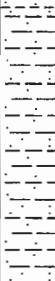
The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
135.0	1	FILL: Clayey Sand, dark brown, moist, medium dense								
134.0	2									
133.0	3									
132.0	4									
131.0	5									
130.0	6	OLDER ALLUVIUM: Clayey Sand, brown, moist, medium dense								
129.0	7									
128.0	8									
127.0	9	Clayey Sand, brown, moist, medium dense, rock fragments up to 1 inch								
126.0	10									
125.0	11									
124.0	12									
123.0	13	Gravelly Sand layer								
122.0	14	Gravelly Sand, brown, moist, dense								
121.0	15									
120.0	16	SAN PEDRO FORMATION: Silty Sand, light brown and orange-brown, moist, dense, fine grained, high mica content								
119.0	17									
118.0	18									
117.0	19									
116.0	20	Silty Sand, light brown and orange-brown, moist, dense, fine grained, high mica content								
115.0	21	End at 20 Feet; No Water; Fill to 5 Feet.								
114.0	22									
113.0	23									
112.0	24									
111.0	25									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 136 Feet

Drill Date: June 7, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 20

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
123.0	1	FILL: Silty Sand, medium brown, slightly moist, medium dense								
122.0	2	Clayey Sand, medium brown, slightly moist, medium dense								
121.0	3									
120.0	4	Silty Sand, medium brown, slightly moist, medium dense		----	R	13	20.8	100.5		
119.0	5									
118.0	6	OLDER ALLUVIUM: Silty Sand, medium brown, slightly moist, dense								
117.0	7									
116.0	8									
115.0	9									
114.0	10	Gravelly Sand, brown, slightly moist, dense, gravel to 2 inches		----	R	34	6.2	115.4		
113.0	11	End at 9½ Feet; Refusal, No Water; Fill to 5 Feet.								
112.0	12									
111.0	13									
110.0	14									
109.0	15									
108.0	16									
107.0	17									
106.0	18									
105.0	19									
104.0	20									
103.0	21									
102.0	22									
101.0	23									
100.0	24									
99.0	25									

Surface: Asphalt Street 3½ Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 124 Feet

Drill Date: June 7, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 21

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

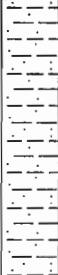
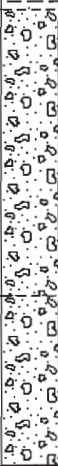
The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
117.0	1	FILL: Clayey Sand, brown, moist, medium dense								
116.0	2									
115.0	3	Silty Sand, brown, moist, medium dense								
114.0	4									
113.0	5									
112.0	6									
111.0	7	Silty and Clayey Sand, medium to dark brown, moist, medium dense, gravel up to ½ inch								
110.0	8									
109.0	9	OLDER ALLUVIUM: Clayey Sand, brown, moist, medium dense, porous, minor gravel		----	R	18	16.2	95.6		
108.0	10									
107.0	11									
106.0	12									
105.0	13									
104.0	14	Gravelly Sand, brown, moist, dense, gravel up to 1½ inch		----	R	31	6.4	104.6		
103.0	15									
102.0	16									
101.0	17									
100.0	18									
99.0	19	Gravelly Sand, brown, moist, dense, 3 inch rock in sampler tip		----	R	50	5.6	106.1		
98.0	20									
97.0	21									
96.0	22	End at 22 Feet Refusal; No Water; Fill to 9 Feet.								
95.0	23									
94.0	24									
93.0	25									

Surface: Asphalt Street - 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 118 Feet

Drill Date: June 7, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 22

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
119.0	1	FILL: Silty Sand, brown, moist, medium dense, medium grained								
118.0	2	Silty Sand, light brown, moist, medium dense, medium grained								
117.0	3									
116.0	4	Silty Sand, light brown, moist, dense, fine to medium grained		----	R	27	15.8	101.4		
115.0	5									
114.0	6									
113.0	7									
112.0	8	Clayey Sand, brown, moist, medium dense								
111.0	9	Clayey Sand, mottled gray, greenish-brown, moist, dense, minor organics, minor gravel		----	R	28	12.5	117.4		
110.0	10	Sand, brown, moist, dense, medium to fine grained, some clay								
109.0	11									
108.0	12									
107.0	13									
106.0	14	Silty Sand and Clayey Sand, mottled gray and reddish-brown, very moist, dense		----	R	26	24.3	101.6		
105.0	15									
104.0	16									
103.0	17	saturated at 17 feet								
102.0	18									
101.0	19	Silty and Clayey Sand, gray and greenish-gray, saturated, medium to fine grained		----	R	20	20.5	106.5	98.0	
100.0	20									
99.0	21									
98.0	22									
97.0	23	Clayey Sand, gray-brown, wet, medium dense								
96.0	24	ALLUVIUM: Clayey Sand, greenish gray, wet, medium dense to dense, medium grained, gravel, minor organics		----	R	13	27.7	95.8	101.0	
95.0	25									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 1 of 3

JB No: 20111-B

Log of Boring: 22

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
94.0	26									
93.0	27	alternating layers medium brown and dark brown, saturated								
92.0	28									
91.0	29	OLDER ALLUVIUM:			SPT	4 10 9				
90.0	30	Clayey Sand, brown, saturated, medium dense to dense, fine grained								
89.0	31									
88.0	32	Clayey Sand, chocolate brown, moist, medium dense, gravel subrounded to ½ inch			SPT	3 7 9				
87.0	33									
86.0	34									
85.0	35				SPT	6 8 9				
84.0	36									
83.0	37									
82.0	38									
81.0	39	Clayey Sand, slight reddish brown to brown, slightly moist, medium dense, gravel up to ½ inch			R	18	16.6	108.5	84.0	
80.0	40									
79.0	41									
78.0	42									
77.0	43	SAN PEDRO FORMATION:								
76.0	44	Silty Sand, reddish brown, moist, dense, fine grained, high mica content			R	27	16.4	100.7	68.0	
75.0	45									
74.0	46									
73.0	47									
72.0	48									
71.0	49	Silty Sand, brown and orange-brown, moist, dense, fine grained			SPT	15 22 36				
70.0	50									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 2 of 3

JB No: 20111-B

Log of Boring: 22

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
69.0	51	End at 50 Feet; Water perched in fill 17 to 24 feet on top of alluvium; Fill to 24 Feet								
68.0	52									
67.0	53									
66.0	54									
65.0	55									
64.0	56									
63.0	57									
62.0	58									
61.0	59									
60.0	60									
59.0	61									
58.0	62									
57.0	63									
56.0	64									
55.0	65									
54.0	66									
53.0	67									
52.0	68									
51.0	69									
50.0	70									
49.0	71									
48.0	72									
47.0	73									
46.0	74									
45.0	75									

Surface: Asphalt Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 3 of 3

JB No: 20111-B

Log of Boring: 23

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA: 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
119.0	1	FILL: Silty Sand, light brown, moist, medium dense								
118.0	2									
117.0	3									
116.0	4	Clayey Sand, mottled brown and reddish brown, moist, medium dense		----	R	13	11.9	105.2		
115.0	5									
114.0	6									
113.0	7									
112.0	8									
111.0	9	Silty Sand, mottled brown and reddish brown, moist, dense, fine to medium grained		----	R	27	15.6	113.4		
110.0	10									
109.0	11									
108.0	12									
107.0	13									
106.0	14	Clayey Sand, brown, moist, dense		----	R	27	15.9	105.5		
105.0	15									
104.0	16									
103.0	17									
102.0	18									
101.0	19	Clayey Sand, gray, wet, dense		----	R	43	14.6	116.3	92.0	
100.0	20									
99.0	21									
98.0	22	perched water at 21½ feet								
97.0	23									
96.0	24	ALLUVIUM: Sand, gray, moist, dense, medium grained		----	R	40	8.3	103.7	37.0	
95.0	25									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 1 of 3

JB No: 20111-B

Log of Boring: 23

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
94.0	26	Sand to Gravelly Sand, gray, moist, dense, gravel up to ¼ inch								
93.0	27									
92.0	28									
91.0	29	Silty Sand, brown, moist, medium dense, fine grained		----	SPT	4 3 3	----	----	----	
90.0	30									
89.0	31									
88.0	32			----	SPT	2 3 4	----	----	----	
87.0	33									
86.0	34	OLDER ALLUVIUM: Clayey Sand, brown, moist, dense		----	SPT	5 7 13	----	----	----	
85.0	35	Clayey Sand, dark brown, moist, dense								
84.0	36									
83.0	37	Clayey Sand, brown, moist, dense, gravel up to 1 inch		----	SPT	6 9 9	----	----	----	
82.0	38									
81.0	39			----	SPT	7 8 10	----	----	----	
80.0	40									
79.0	41									
78.0	42	Silty Sand, reddish-brown, moist, dense		----	SPT	8 16 11	----	----	----	
77.0	43	Gravelly Sand, reddish-brown, moist, dense, gravel up to ½ inch								
76.0	44	Silty Sand, reddish-brown, moist, dense		----	SPT	5 12 15	----	----	----	
75.0	45									
74.0	46									
73.0	47	Silty Sand, reddish-brown, moist, dense		----	SPT	4 6 7	----	----	----	
72.0	48									
71.0	49	Clayey Sand, reddish-brown, moist, dense, medium grained, minor gravel		----	SPT	3 4 5	----	----	----	
70.0	50									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 2 of 3

JB No: 20111-B

Log of Boring: 23

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

The J. Byer Group, Inc.

1461 E. Chevy Chase Dr., Ste 200

Glendale, CA. 91206

(818) 549-9959

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
69.0	51									
68.0	52									
67.0	53									
66.0	54									
65.0	55									
64.0	56									
63.0	57									
62.0	58									
61.0	59									
60.0	60			---	R	16	16.4	111.9	91.0	
59.0	61	Clayey Sand, reddish-brown, moist, dense, minor gravel up to ½ inch, medium to fine grained								
58.0	62	End at 61 Feet; Water at 21½ to 24 Feet; Fill to 24 Feet.								
57.0	63									
56.0	64									
55.0	65									
54.0	66									
53.0	67									
52.0	68									
51.0	69									
50.0	70									
49.0	71									
48.0	72									
47.0	73									
46.0	74									
45.0	75									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 120 Feet

Drill Date: June 6, 2005

Sheet: 3 of 3

JB No: 20111-B

Log of Boring: 24

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks	
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation		
121.0	1	FILL: Silty Sand, brown, moist, medium dense		----	R	43	14.3	115.2			
120.0	2										
119.0	3										
118.0	4										
117.0	5	Clayey Sand, gray-brown, moist, medium dense									
116.0	6										
115.0	7										
114.0	8										
113.0	9										
112.0	10										
111.0	11	alternating layers of gray-brown and light brown, very moist									
110.0	12										
109.0	13										
108.0	14										
107.0	15										
106.0	16	Clayey Sand, gray-brown, very moist, medium dense									
105.0	17										
104.0	18	Clayey Sand, reddish-brown, very moist, medium dense									
103.0	19	SAN PEDRO FORMATION: Silty Sand, reddish-brown, moist, dense									
102.0	20										
101.0	21										
100.0	22										
99.0	23										
98.0	24		----	R	15	6.9	106.1				
97.0	25	Silty Sand, reddish-brown, moist, dense									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 121.5 Feet

Drill Date: June 6, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 24

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC**Logged By:** YH**Site Location:** South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
96.0	26									
95.0	27									
94.0	28									
93.0	29	Gravel layer		----	R	29	5.2	105.8		
92.0	30	End at 30 Feet; No Water; Fill to 18 Feet.								
91.0	31									
90.0	32									
89.0	33									
88.0	34									
87.0	35									
86.0	36									
85.0	37									
84.0	38									
83.0	39									
82.0	40									
81.0	41									
80.0	42									
79.0	43									
78.0	44									
77.0	45									
76.0	46									
75.0	47									
74.0	48									
73.0	49									
72.0	50									

Surface: Asphalt Street 3 Inches

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 121.5 Feet

Drill Date: June 6, 2005

Sheet: 2 of 2

JB No: 20111-B

Log of Boring: 25

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
128.0	1	FILL: Silty Sand, brown, moist, medium dense								
127.0	2									
126.0	3									
125.0	4									
124.0	5									
123.0	6	Clayey Sand, brown, moist, medium dense		----	R	27	13.5	105.1		
122.0	7									
121.0	8									
120.0	9	Clayey Sand, dark gray, moist, medium dense, some tar, petroleum smell								
119.0	10									
118.0	11	SAN PEDRO FORMATION: Silty Sand, light brown, moist, dense, few fines		----	R	18	5.1	106.9		
117.0	12									
116.0	13									
115.0	14									
114.0	15									
113.0	16			----	R	32	3.6	97.0		
112.0	17									
111.0	18									
110.0	19									
109.0	20									
108.0	21	End at 20 Feet; Fill to 10 Feet.								
107.0	22									
106.0	23									
105.0	24									
104.0	25									

Surface: Street

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 129 Feet

Drill Date: June 6, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 26

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
-1.0	1	FILL: Silty Sand, reddish-brown, moist, medium dense								
-2.0	2	SAN PEDRO FORMATION: Silty Sand, brown, moist, dense								
-3.0	3									
-4.0	4									
-5.0	5									
-6.0	6									
-7.0	7									
-8.0	8									
-9.0	9									
-10.0	10	Sand, light brown, moist, dense, medium to fine grained			R	25	4.5	96.4		
-11.0	11	End at 10 Feet; No Water; Fill to 2 Feet.								
-12.0	12									
-13.0	13									
-14.0	14									
-15.0	15									
-16.0	16									
-17.0	17									
-18.0	18									
-19.0	19									
-20.0	20									
-21.0	21									
-22.0	22									
-23.0	23									
-24.0	24									
-25.0	25									

Surface: Asphalt Street 1½ Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation:

Drill Date: June 3, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 27

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
-1.0	1	FILL: Silty Sand, medium brown, slightly moist, medium dense								
-2.0	2	Silty Sand, reddish-brown, slightly moist, medium dense								
-3.0	3									
-4.0	4	SAN PEDRO FORMATION: Silty Sand, brown, moist, medium dense								
-5.0	5									
-6.0	6									
-7.0	7									
-8.0	8									
-9.0	9									
-10.0	10									
-11.0	11									
-12.0	12									
-13.0	13									
-14.0	14	Sand, golden to reddish-brown, moist, dense, rounded gravel up to 1/8 inch, medium to coarse grained		----	R	13	3.8	107.5		
-15.0	15									
-16.0	16									
-17.0	17									
-18.0	18									
-19.0	19	Gravelly Sand, reddish brown, moist, dense, rounded gravel up to 1/2 inch		----	R	28	3.7	105.2		
-20.0	20	End at 20 Feet; No Water; Fill to 4 Feet.								
-21.0	21									
-22.0	22									
-23.0	23									
-24.0	24									
-25.0	25									

Surface: Asphalt Road/Street 3 Inches A/C

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation:

Drill Date: June 3, 2005

Sheet: 1 of 1

JB No: 20111-B

Log of Boring: 28

The J. Byer Group, Inc.
1461 E. Chevy Chase Dr., Ste 200
Glendale, CA. 91206
(818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC

Logged By: YH

Site Location: South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
161.0	1	FILL: Silty Sand, reddish-brown, moist, medium dense		----	R	20	9.2	111.6		
160.0	2									
159.0	3									
158.0	4									
157.0	5	Silty Sand, reddish-brown and brown, moist, medium dense								
156.0	6									
155.0	7									
154.0	8									
153.0	9									
152.0	10	Clayey Sand, mottled gray, reddish-brown, and brown, moist, medium dense, occasional gravel up to 1/8 inch		----	R	12	26.3	100.0		
151.0	11									
150.0	12									
149.0	13									
148.0	14									
147.0	15	SAN PEDRO FORMATION: Clayey Sand, reddish-brown, moist, medium dense, minor gravel								
146.0	16									
145.0	17									
144.0	18									
143.0	19									
142.0	20	Silty Sand, reddish-brown, moist, dense		----	R	9	5.2	103.3		
141.0	21									
140.0	22									
139.0	23									
138.0	24									
137.0	25	Sand, reddish-brown, moist, dense, minor silt, medium to coarse grained								

Surface: Asphalt Street 3 Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 162 Feet

Drill Date: June 3, 2005

Sheet: 1 of 2

JB No: 20111-B

Log of Boring: 28

The J. Byer Group, Inc.
 1461 E. Chevy Chase Dr., Ste 200
 Glendale, CA. 91206
 (818) 549-9959

Client: BISNO DEVELOPMENT COMPANY, LLC**Logged By:** YH**Site Location:** South Western Avenue, San Pedro

SUBSURFACE PROFILE				SAMPLE						Remarks
Elevation	Depth	Description	Symbol	USCS	Type	Blow Count	Moisture Content (%)	Dry Density	% Saturation	
		End at 25 Feet; No Water; Fill to 14 Feet.								
136.0	26									
135.0	27									
134.0	28									
133.0	29									
132.0	30									
131.0	31									
130.0	32									
129.0	33									
128.0	34									
127.0	35									
126.0	36									
125.0	37									
124.0	38									
123.0	39									
122.0	40									
121.0	41									
120.0	42									
119.0	43									
118.0	44									
117.0	45									
116.0	46									
115.0	47									
114.0	48									
113.0	49									
112.0	50									

Surface: Asphalt Street 3 Inches Asphalt

Size: 8 Inch Diameter

Drill Method: Hollow-Stem Auger Drill Rig

Elevation: 162 Feet

Drill Date: June 3, 2005

Sheet: 2 of 2

APPENDIX I

LABORATORY TESTING

Undisturbed and bulk samples of the fill, older alluvium, and San Pedro Formation were obtained from borings and transported to the laboratory for testing and analysis. The samples were obtained by driving a ring lined barrel sampler conforming to ASTM D-3550-01 with successive drops of the sampler weight. Experience has shown that sampling causes some disturbance of the sample, however the test results remain within a reasonable range. The samples were retained in brass rings of 2.50 inches outside diameter and 1.00 inches in height. The central portions of the samples were stored in close fitting, waterproof containers for transportation to the laboratory.

Moisture-Density

The dry density of the samples was determined using the procedures outlined in ASTM D-2937-00. The moisture content of the samples was determined using the procedures outlined in ASTM D-2216-98. The results are shown on the Log of Borings.

Maximum Density

The maximum dry density and optimum moisture content of the future compacted fill was determined by remolding bulk samples of the existing fill using the procedures outlined in ASTM D 1557-02, a five-layer standard. Remolded samples were prepared at 90 percent of the maximum density. The remolded samples were tested for shear strength.

Boring	Depth (Feet)	Soil Type	Maximum Density (pcf)	Optimum Moisture %	Expansion Index
3	4-7	Fill-Brown Clayey Sand	123.0	11.0	37-Low
3	9-13	Fill-Light Brown Silty Sand	126.0	11.0	Nil

Expansion Test

To find the expansiveness of the soil, a swell test was performed using the procedures outlined in ASTM D-4829-03. Based upon the testing, the expansive potential is low.

Shear-Tests

Shear tests were performed on samples of the future compacted fill using the procedures outlined in ASTM D-3080-03 and a strain controlled, direct shear machine manufactured by Soil Test, Inc. The rate of deformation was 0.025 inches per minute. The samples were tested in an artificially saturated condition. Following the shear test, the moisture content of the samples was determined to verify saturation. The results are plotted on the "Shear Test Diagram."

Consolidation

Consolidation tests were performed on insitu samples of the older alluvium and San Pedro Formation using the procedures outlined in ASTM D-2435-03. Results are graphed on the "Consolidation Curves."

THE J. BYER GROUP, INC.
A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

SHEAR DIAGRAM

JB: 20111-B
CLIENT: BISNO

CONSULT: JWB

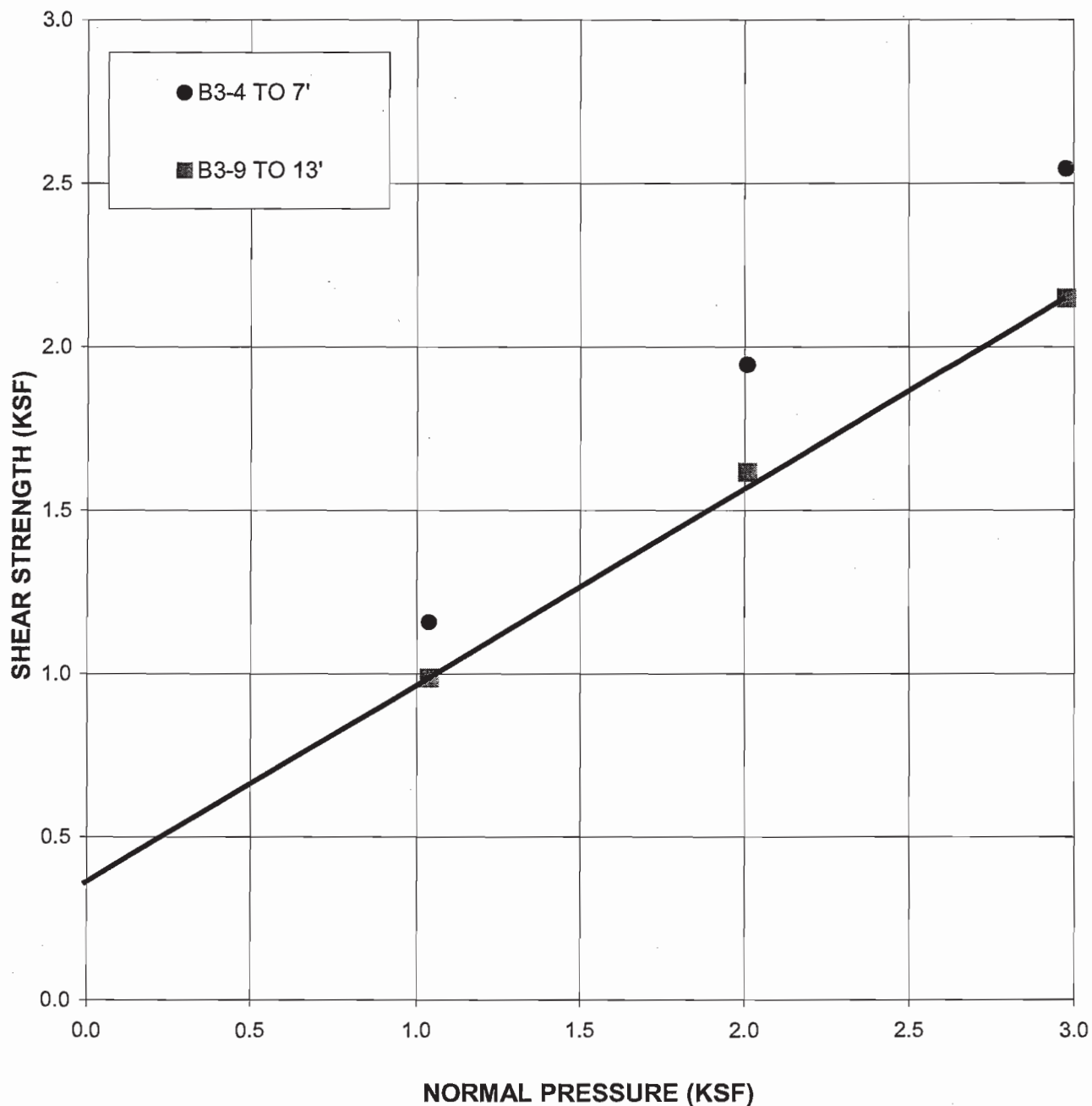
EARTH MATERIAL: FUTURE FILL

SAMPLES REMOLDED TO 90% OF THE MAXIMUM DRY DENSITY

Phi Angle = 31 degrees
Cohesion = 364 psf

Moisture Content 17.0%
Dry Density (pcf) 112.1
Percent Saturation 98.4%

DIRECT SHEAR TEST - ASTM D-3080 (ULTIMATE VALUES)



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206

(818) 549-9959 Tel

(818) 543-3747 FAX

CONSOLIDATION DIAGRAM #1

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B3-24'

Specific Gravity:

2.55

Dry Weight (pcf): 117.6

Initial Void Ratio:

0.353

Initial Moisture: 12.2%

Water Added At (psf):

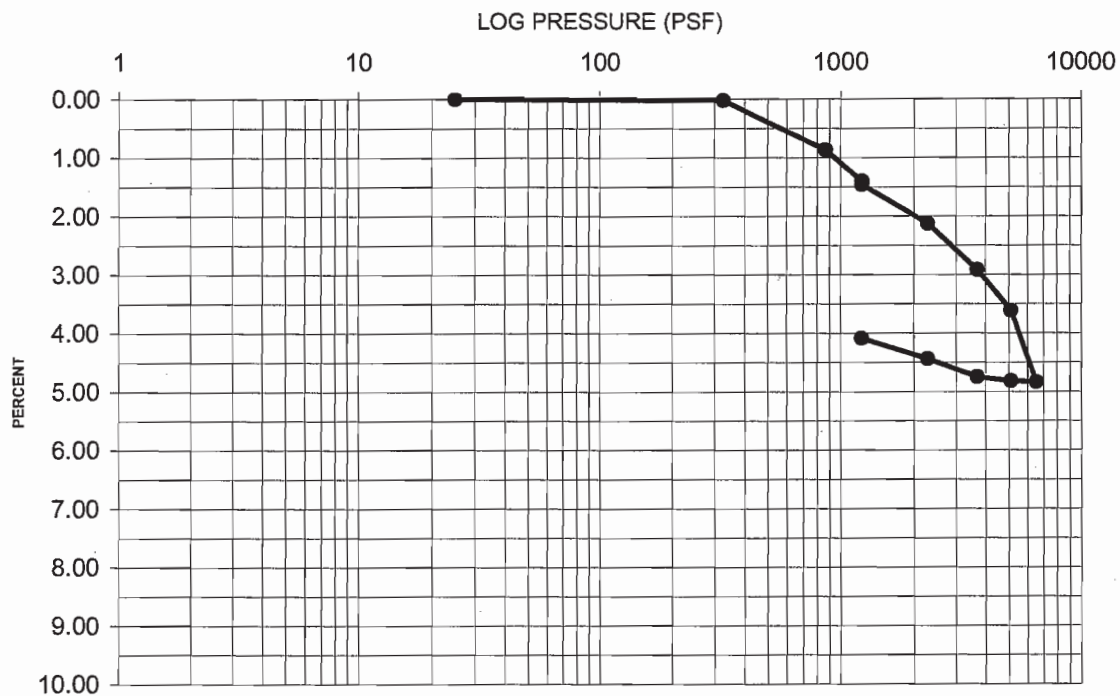
1222.0

Initial Saturation: 88.2%

Consolidation Coef. (Cc):

0.1552

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206

(818) 549-9959 Tel

(818) 543-3747 FAX

CONSOLIDATION DIAGRAM #2

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B3-29'

Specific Gravity: 2.65

Dry Weight (pcf): 107.7

Initial Void Ratio: 0.535

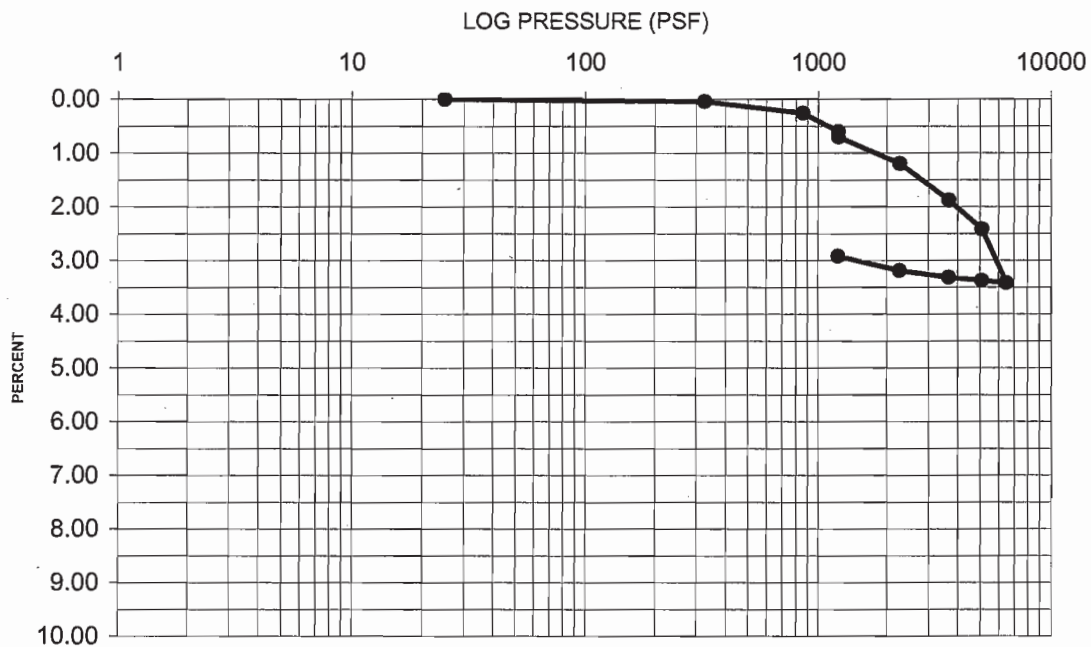
Initial Moisture: 19.9%

Water Added At (psf): 1228.0

Initial Saturation: 98.6%

Consolidation Coef. (Cc): 0.1451

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

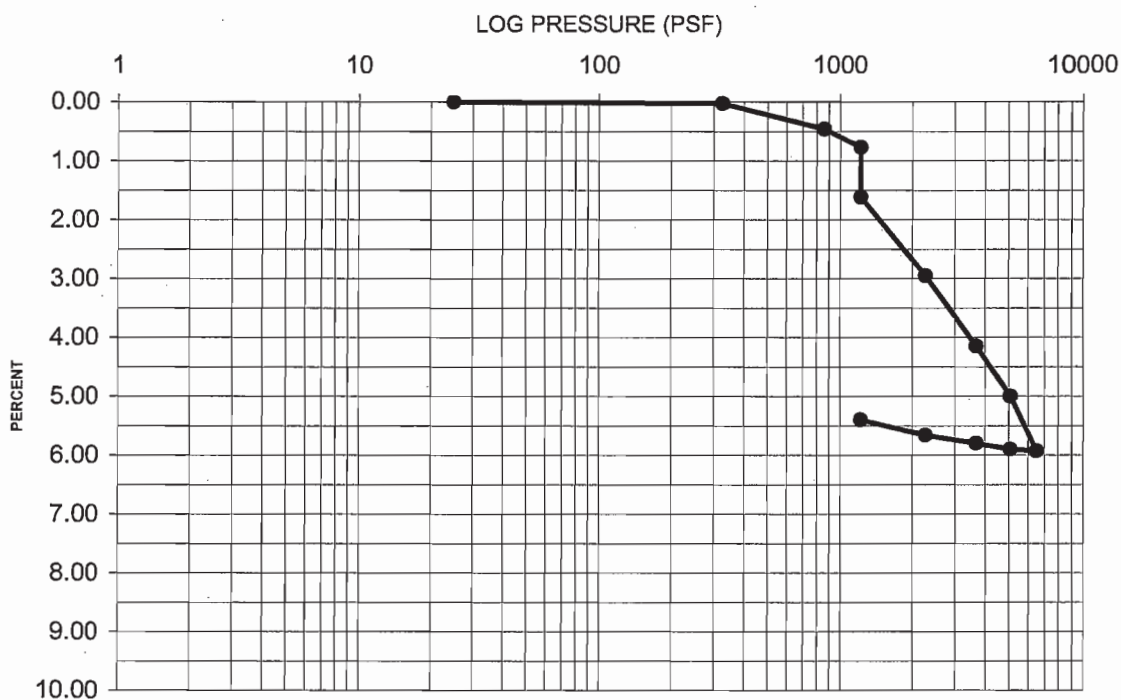
CONSOLIDATION DIAGRAM #3

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	SAN PEDRO SAND		
Sample Location:	B4-14'	Specific Gravity:	2.55
Dry Weight (pcf):	113.1	Initial Void Ratio:	0.407
Initial Moisture:	9.2%	Water Added At (psf):	1225.0
Initial Saturation:	88.2%	Consolidation Coef. (Cc):	0.0942

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

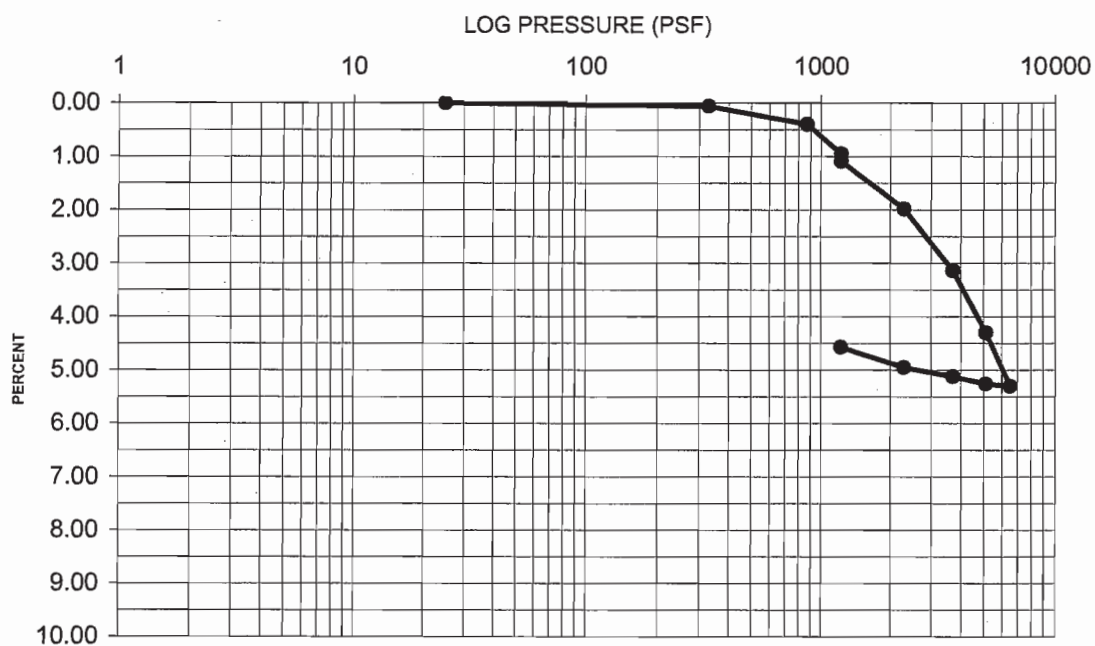
CONSOLIDATION DIAGRAM #4

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	OLDER ALLUVIUM		
Sample Location:	B6-24'	Specific Gravity:	2.55
Dry Weight (pcf):	109.4	Initial Void Ratio:	0.45
Initial Moisture:	16.6%	Water Added At (psf):	1228.0
Initial Saturation:	93.1%	Consolidation Coef. (Cc):	0.1127

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

CONSOLIDATION DIAGRAM #5

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B6-29'

Dry Weight (pcf): 113.5

Initial Moisture: 14.4%

Initial Saturation: 91.4%

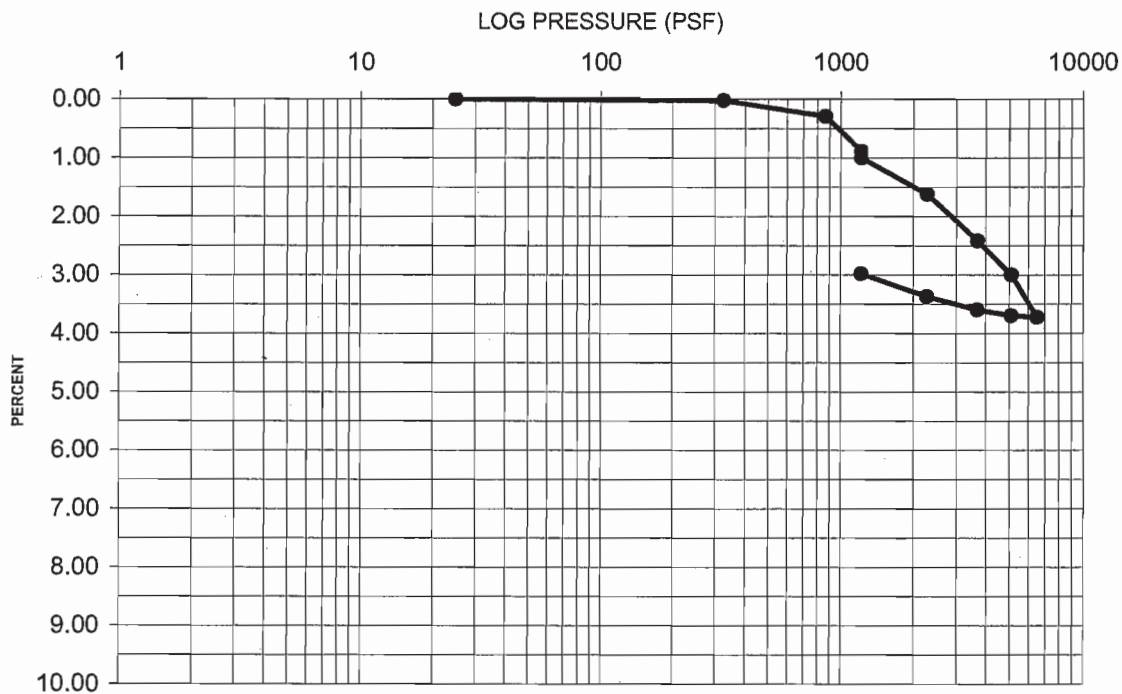
Specific Gravity: 2.55

Initial Void Ratio: 0.402

Water Added At (psf): 1222.0

Consolidation Coef. (Cc): 0.0962

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

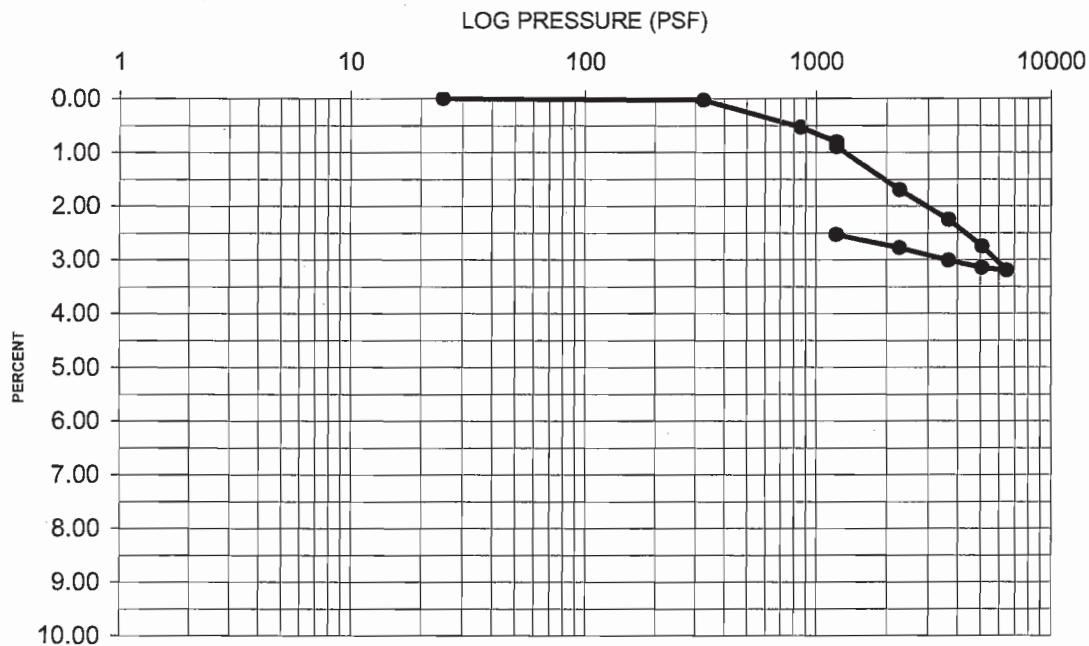
CONSOLIDATION DIAGRAM #6

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	SAN PEDRO SAND		
Sample Location:	B8-9'	Specific Gravity:	2.55
Dry Weight (pcf):	101.9	Initial Void Ratio:	0.561
Initial Moisture:	14.7%	Water Added At (psf):	1228.0
Initial Saturation:	66.8%	Consolidation Coef. (Cc):	0.0665

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

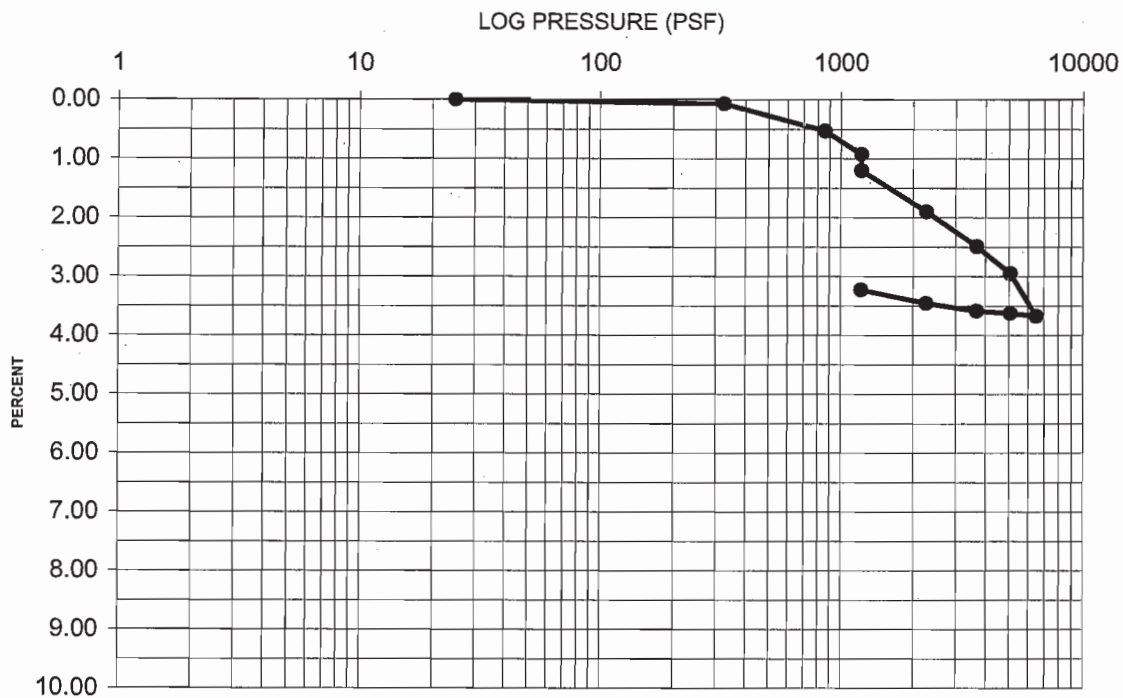
CONSOLIDATION DIAGRAM #7

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	SAN PEDRO SAND		
Sample Location:	B8-14'	Specific Gravity:	2.55
Dry Weight (pcf):	94.3	Initial Void Ratio:	0.688
Initial Moisture:	9.1%	Water Added At (psf):	1225.0
Initial Saturation:	91.4%	Consolidation Coef. (Cc):	0.0698

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

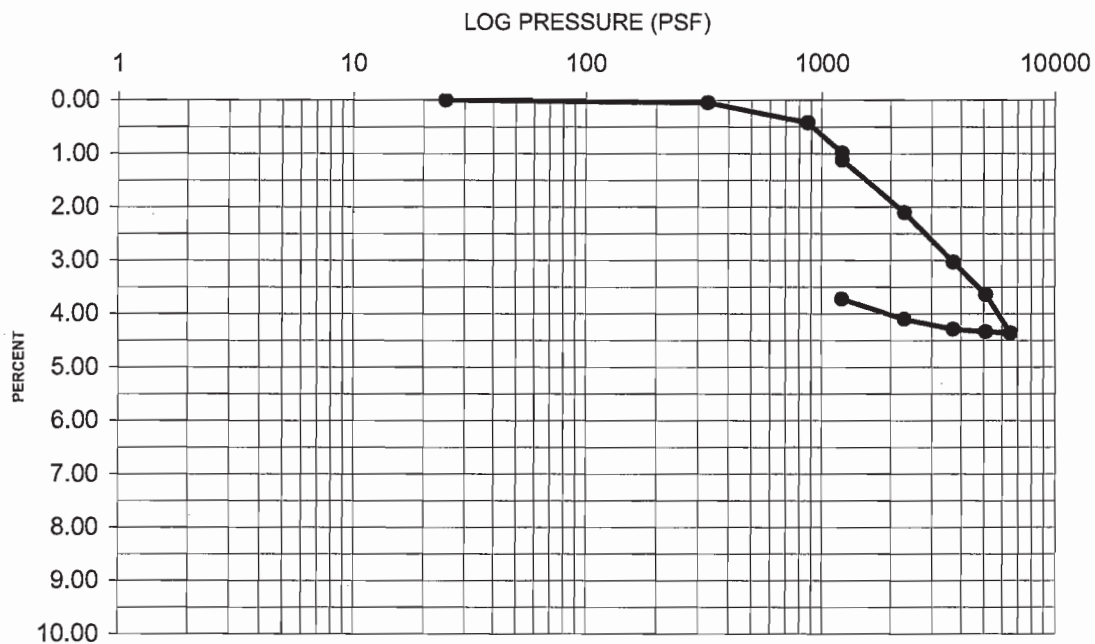
CONSOLIDATION DIAGRAM #8

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	SAN PEDRO SAND		
Sample Location:	B12-29'	Specific Gravity:	2.55
Dry Weight (pcf):	120.6	Initial Void Ratio:	0.32
Initial Moisture:	12.3%	Water Added At (psf):	1228.0
Initial Saturation:	98.3%	Consolidation Coef. (Cc):	0.0672

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

CONSOLIDATION DIAGRAM #9

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B13-14'

Specific Gravity: 2.55

Dry Weight (pcf): 102.2

Initial Void Ratio: 0.557

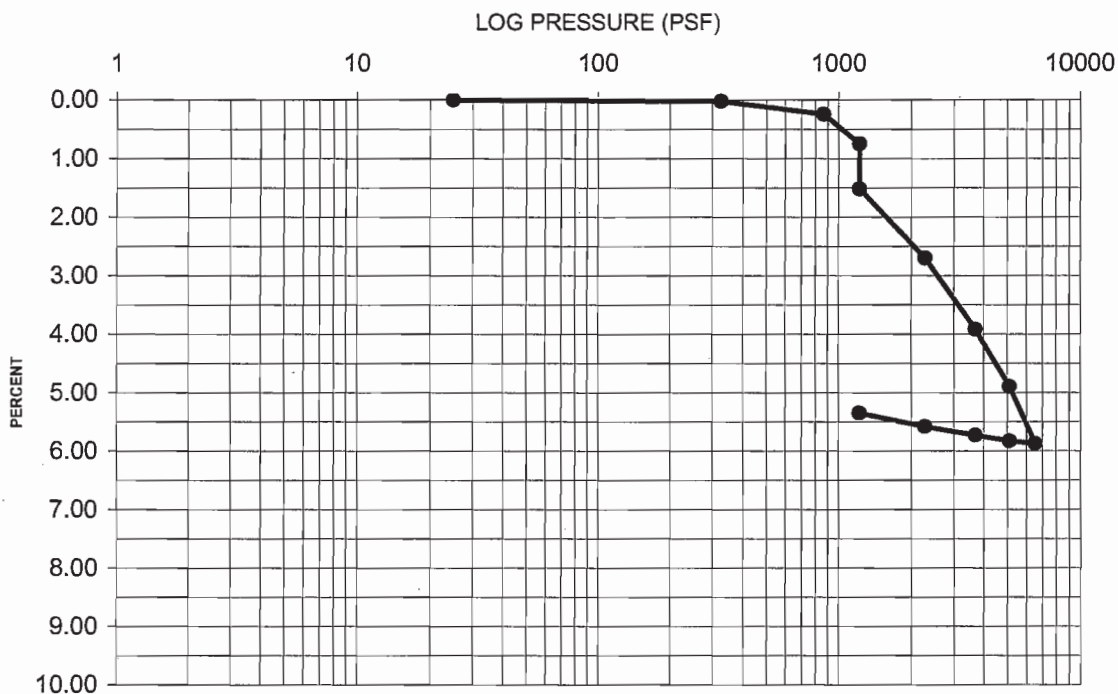
Initial Moisture: 10.3%

Water Added At (psf): 1222.0

Initial Saturation: 47.2%

Consolidation Coef. (Cc): 0.1420

CONSOLIDATION DIAGRAM



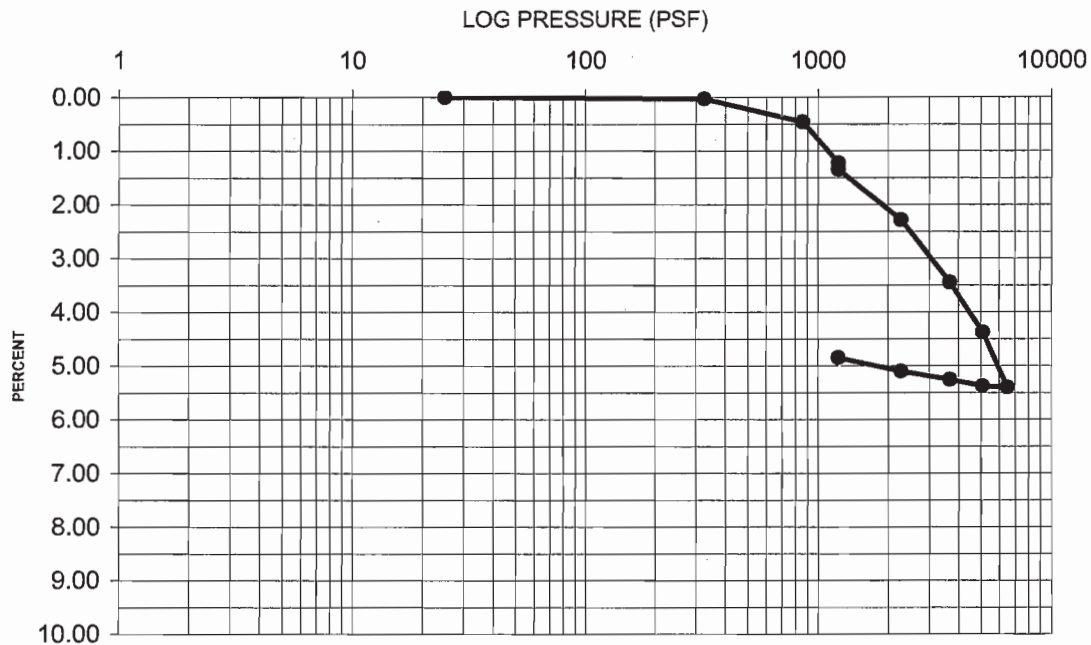
CONSOLIDATION DIAGRAM #10

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	OLDER ALLUVIUM		
Sample Location:	B14-9'	Specific Gravity:	2.55
Dry Weight (pcf):	91.1	Initial Void Ratio:	0.746
Initial Moisture:	10.4%	Water Added At (psf):	1228.0
Initial Saturation:	35.5%	Consolidation Coef. (Cc):	0.1684

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.
A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

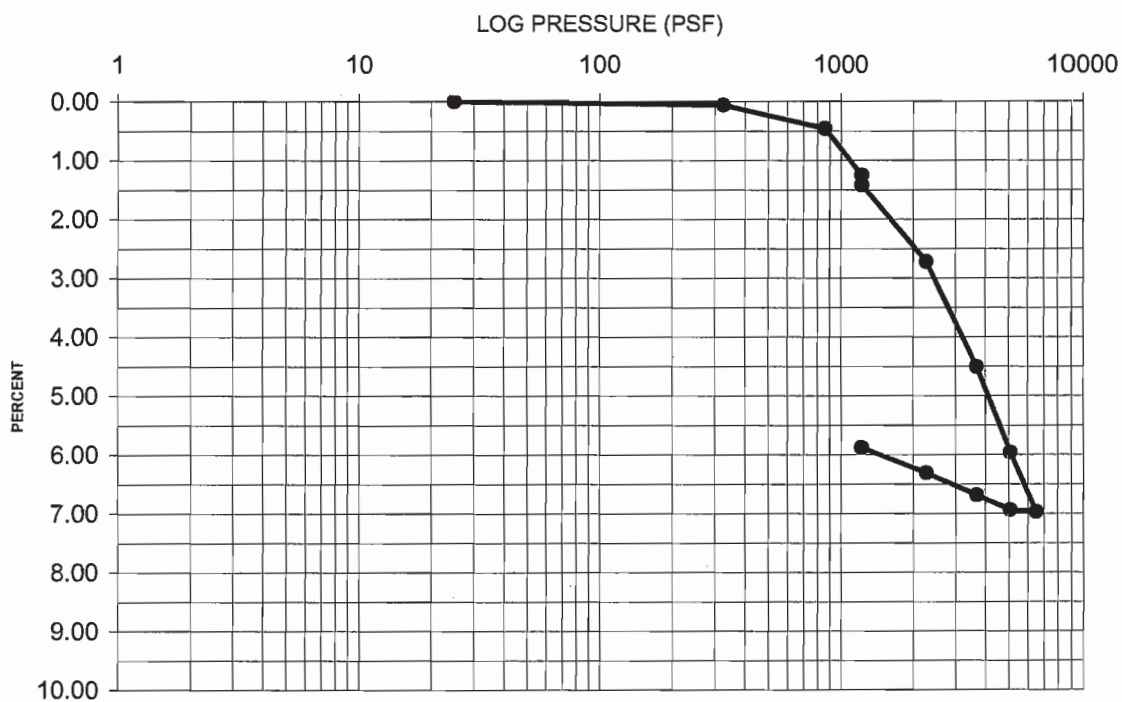
CONSOLIDATION DIAGRAM #11

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	SAN PEDRO SAND		
Sample Location:	B14-14'	Specific Gravity:	2.55
Dry Weight (pcf):	93.6	Initial Void Ratio:	0.699
Initial Moisture:	24.2%	Water Added At (psf):	1225.0
Initial Saturation:	47.2%	Consolidation Coef. (Cc):	0.1614

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206

(818) 549-9959 Tel

(818) 543-3747 FAX

CONSOLIDATION DIAGRAM #12

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B15-14'

Dry Weight (pcf): 107.0

Initial Moisture: 16.0%

Initial Saturation: 83.8%

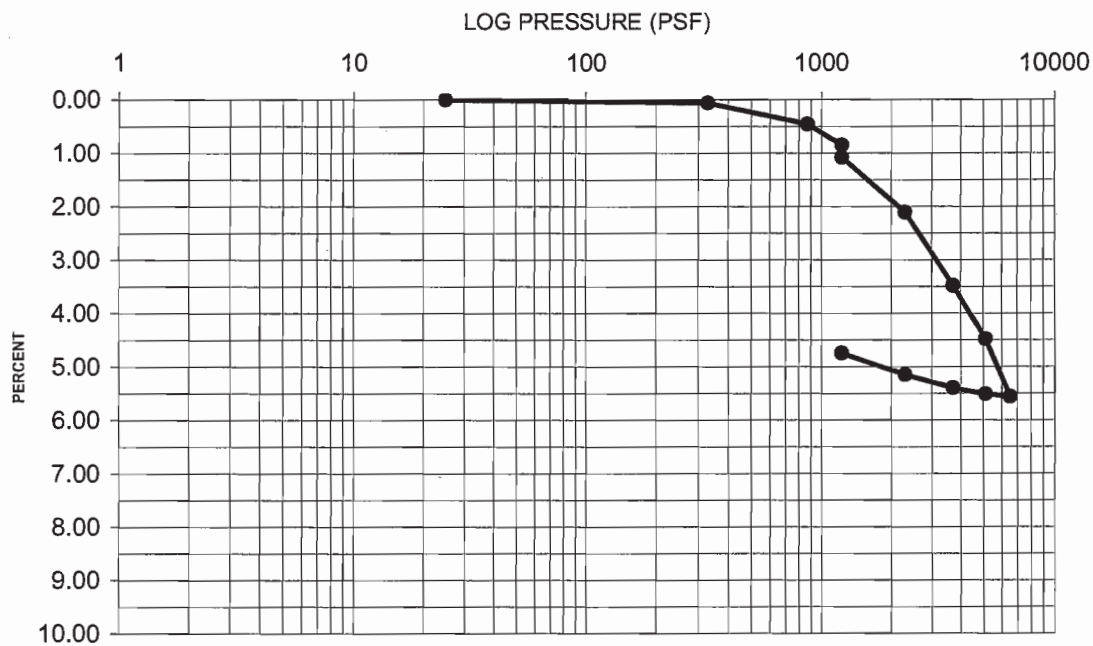
Specific Gravity: 2.55

Initial Void Ratio: 0.49

Water Added At (psf): 1228.0

Consolidation Coef. (Cc): 0.1165

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 · GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

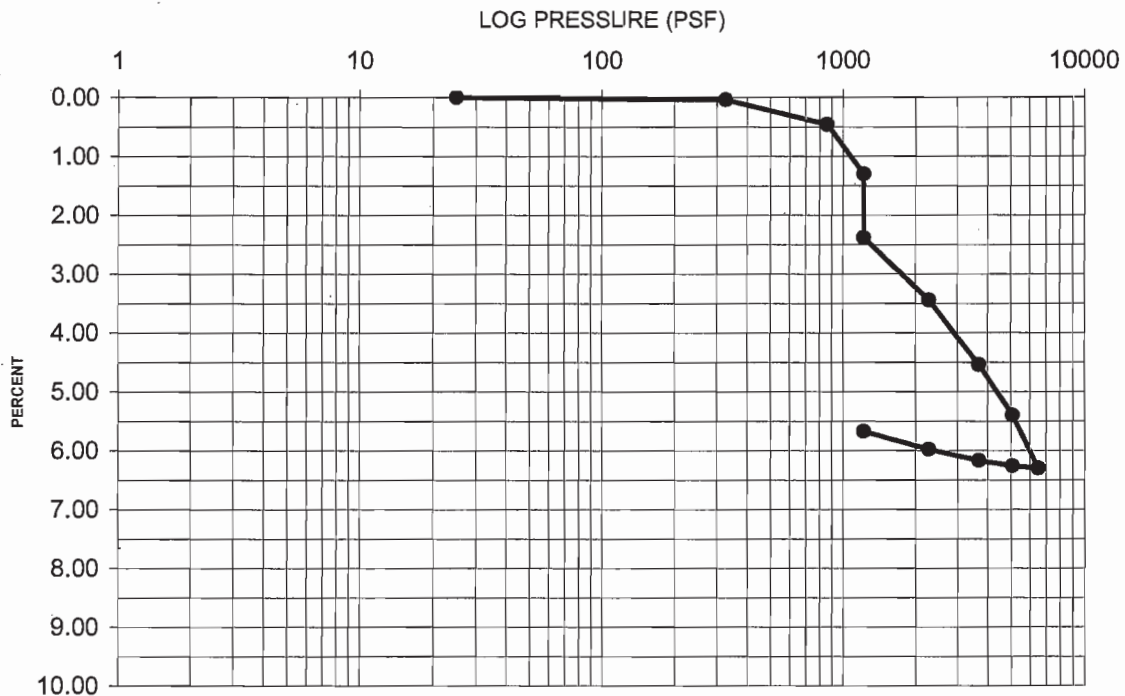
CONSOLIDATION DIAGRAM #13

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material:	OLDER ALLUVIUM		
Sample Location:	B15-19'	Specific Gravity:	2.55
Dry Weight (pcf):	103.4	Initial Void Ratio:	0.539
Initial Moisture:	10.9%	Water Added At (psf):	1225.0
Initial Saturation:	47.2%	Consolidation Coef. (Cc):	0.0999

CONSOLIDATION DIAGRAM



THE J. BYER GROUP, INC.

A GEOTECHNICAL CONSULTING FIRM

1461 E. CHEVY CHASE DRIVE, SUITE 200 GLENDALE, CA 91206
(818) 549-9959 Tel (818) 543-3747 FAX

CONSOLIDATION DIAGRAM #14

JB: 20111-B CONSULT: JWB

CLIENT: BISNO

Earth Material: OLDER ALLUVIUM

Sample Location: B21-9'

Specific Gravity: 2.55

Dry Weight (pcf): 95.5

Initial Void Ratio: 0.67

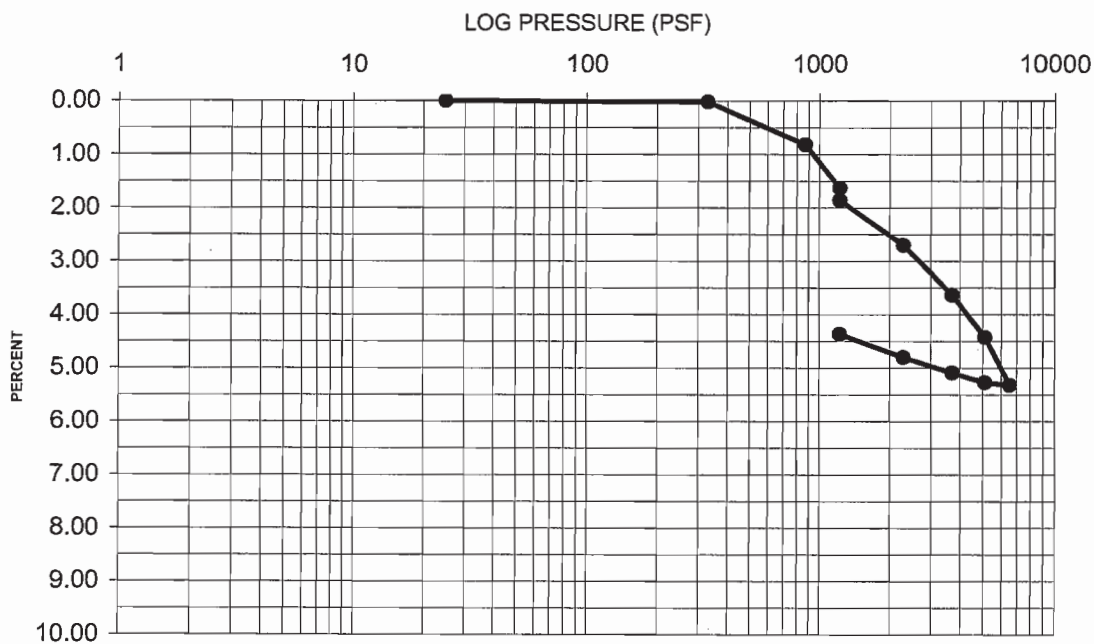
Initial Moisture: 16.2%

Water Added At (psf): 1228.0

Initial Saturation: 62.1%

Consolidation Coef. (Cc): 0.1014

CONSOLIDATION DIAGRAM



APPENDIX D

**CITY OF LOS ANGELES GEOLOGY & SOIL REPORT
CORRECTION LETTER (1/20/2006)**

CITY OF LOS ANGELES
INTER-DEPARTMENTAL CORRESPONDENCE

GEOLOGY & SOIL REPORT CORRECTION LETTER

Log # 50445
SOILS/GEOLOGY FILE - 2
LIQ

DATE: January 20, 2006

To: Emily Gabel-Luddy, Deputy Advisory Agency
Department of City Planning

PCT

FROM: Robert C. Steinbach, Chief of Grading Division
Dana V. Prevost, Engineering Geologist II
Department of Building and SafetyVESTING TRACT MAP: 63399
LOTS: 1
LOCATION: 26900 S. Western Avenue

CURRENT REFERENCE REPORT/LETTER(S)	REPORT NO.	DATE(S) OF DOCUMENT	PREPARED BY
Geology/Soil Report	JB 20111-B	06/21/05	The J. Byer Group
Ovrszd Doc	"	"	"

Grading Division of the Department of Building and Safety has reviewed the referenced report and Tentative Tract Map for the proposed construction of multi-family residents, each with 5 stories over 2 levels of subterranean parking.

According to the report, the property is about 60 acres and currently occupied by interior streets and vacant residences and duplexes. The site was previously graded with fill in the central portion and with cuts up to 50 feet high along the north and northeast sides. The gradient of the cuts is 1.5:1 (H:V). The report recommends flattening the slopes to a gradient of 2:1 (H:V). The subsurface materials consist of 2 to 24.5 feet of fill over alluvium and underlying San Pedro Formation of Pleistocene sand. A layer of wet clayey sand containing tar and fuel is at the base of the fill. Perched groundwater was encountered during exploration at 17 feet below grade within the lower part of the existing fill. The report recommends removing and recompacting the unsuitable materials, and supporting the proposed structures on conventional footings or friction piles. Temporary excavations up to 20 feet by shoring are proposed.

The site is located within the liquefaction hazards zone as mapped by the State of California. The analysis in the report determines that the property does not possess liquefaction potential requiring remedial construction.

The Field Trip Guide Book from the Southern California Earthquake Center (SCEC) dated 1994 titled the "Palos Verdes Field Trip Guide" states on page 12: "The Palos Verdes Fault, which cuts across the northern side of the Peninsula, has recently been recognized by geologists and geophysicists as being one of the most active and potentially hazardous faults in the L.A. Basin."

The review of the subject reports cannot be completed at this time as they lack sufficient

information to determine the stability or safety of the proposed development. The review will be continued upon submittal of an addendum to the reports which includes, but need not be limited to, the following:

1. The consultant notes on page 6 of their referenced report: "The nearest known potentially active fault is the Palos Verdes Fault, located within two kilometers of the subject property." However, that statement does not determine that the fault is not impacting the site itself. The Field Trip Guide Book from the Southern California Earthquake Center (SCEC) dated 1994 titled the "*Palos Verdes Field Trip Guide*" provides a map at the end of the publication depicting the location of the Palos Verdes Fault. The southern splay of the fault appears to triangulate in the southwest the intersection of Western Avenue and Palos Verdes Drive North as the fault trends to the northwest. It appears that the fault either just touches the northeast edge of the property or it trends through the property itself. Because of the fault's close proximity, it is appropriate to fault trench the proposed development. Please provide detailed illustrated trench logs with a detailed description of the findings in the trench(es).
2. Provide scaled cross-sections showing the existing topography with subsoil strata, groundwater, limits of over-excavations and new fill, proposed improvements and foundation systems.
3. Provide scaled cross-sections showing the proposed regrading of the existing cut and fill slopes, including the terrace drains as recommended in page 8 of the report, limits of over-excavations, keys, benching, and canyon subdrains as recommended in page 10 of the report.
4. Provide recommendations on constructing atop the existing sewers, and clarify if constructing within the existing sewer easements have been approved by the jurisdictional agency.
5. Provide recommendations on designing stacked retaining walls as shown on Sheet 8 of 8 of the Tentative Tract Map.
6. Provide slope stability analyses for any slopes steeper than 2:1 (H:V) onsite and offsite that may affect the proposed improvements.

JW JTW/RHC:jtw/rhc *pure*
50445
(213) 482-0480

cc: J Byer Group, Inc.
SP District Office