

**Geotechnical Feasibility Investigation
For
Lands Of Krassow, McFadden & Bostwick
Ocean Street Extension
APN 008-044-01 & 02
Santa Cruz, California**

**Prepared For
Starker Services
c/o Richard Moe**

**Prepared By
HARO, KASUNICH & ASSOCIATES, INC.
Geotechnical & Coastal Engineers
Project No. SC9395
April 2007**

Project No. SC9395

5 April 2007

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Subject: Geotechnical Feasibility Investigation

Reference: Proposed Multiple Housing Development
APN 008-044-01 & 02
Ocean Street Extension
Santa Cruz, California

Dear Mr. Moe:

In accordance with your request, we have performed a geotechnical feasibility investigation for the proposed multiple housing development on an empty lot across from the Santa Cruz Memorial Park cemetery between Ocean Street Extension and Graham Hill Road, Santa Cruz, California.

The results of our investigation indicate there are no adverse geotechnical hazards that would preclude the development of this project. Primary geotechnical concerns at the site include strong seismic shaking, slope instability, liquefaction, uniform bearing support for engineered structures and appropriate control of surface runoff and erosion.

The accompanying report presents our conclusions and recommendations from a geotechnical feasibility perspective.

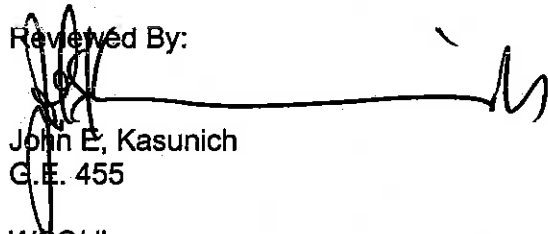
We refer you to the text of the report for general conclusions and recommendations. If you have any questions concerning the data or conclusions presented in this report, please call our office.

We thank you for this opportunity to be of service on this interesting and challenging project.

Very truly yours,

HARO, KASUNICH AND ASSOCIATES, INC.

Reviewed By:


John E. Kasunich
C.E. 455

William E. St. Clair
Staff Engineer

WSC/dk

Copies: 4 to Addressee

TABLE OF CONTENTS

GEOTECHNICAL FEASIBILITY INVESTIGATION	1
Introduction	1
Scope of Services	1
Site and Project Description	2
Field Exploration	3
Laboratory Testing	4
Surface and Subsurface Soil Conditions	5
Groundwater	6
 CONCLUSIONS AND RECOMMENDATIONS	 7
General Site Grading	12
 APPENDIX A	 15
Site Vicinity Map	16
Geologic Site Plan	17
Liquefaction Potential Plan	18
R-Value Test Report	19
Boring Logs	20
Boring Site Plan	28

**GEOTECHNICAL FEASIBILITY INVESTIGATION
Proposed Multiple Housing Development
APN 008-044-01 & 02
Ocean Street Extension**

Introduction

This report summarizes recommendations and conclusions from our geotechnical feasibility investigation for the multiple housing development between Ocean Street Extension and Graham Hill Road in the City of Santa Cruz, California.

At the time of this report, preliminary structural and grading plans had not yet been developed. Therefore, some of the recommendations presented in this report are general in nature. Our firm should be provided the opportunity for geotechnical review of preliminary project plans prior to final civil and structural engineering design of the project so that further geotechnical investigation work can be performed from a site specific standpoint. Further geotechnical investigation work would include, but not be limited to additional exploratory borings, laboratory and geotechnical engineering analysis. Further evaluation will allow us to provide to your civil and structural engineers geotechnical design parameters for specific structures proposed.

Scope of Services

The specific scope of our services was as follows:

1. Site reconnaissance and review of available data in our files regarding the site and region. The following documents were reviewed:
 - a. Geologic Map of Santa Cruz County California compiled By Earl E. Brabb 1997.

b. Liquefaction Potential Map by William Dupre' 1975.

2. Field exploration program consisting of eight (8) continuous flight-auger borings drilled to depths of 3½ to 21½ feet.
3. Field and laboratory testing and classification of select samples obtained.
4. Geotechnical analysis and interpretation of field and laboratory data, which provided the basis for our geotechnical feasibility study.
5. Preparation of this report and graphics, presenting our geotechnical engineering conclusions and recommendations for the proposed multi-housing development.

Site and Project Description

The site is located 2000 feet northwest of Highway 1 between Ocean Street Extension and Graham Hill Road across from the Santa Cruz Memorial Park Cemetery (see Site Vicinity Map Figure 1). The project site is an empty lot with grass, shrubs and sparsely spaced oak trees growing on it. The lot slopes down from Graham Hill Road to Ocean Street Extension. Slope gradients range from 10 to 15 percent above Ocean Street Extension and 25 to 70 percent downslope of Graham Hill Road.

We understand the empty lot will be developed for multi housing with a central street accessing future buildings. The proposed buildings will be founded on cut and fill pads. Retaining walls are planned to retain portions of the proposed cut slopes below Graham

Hill Road to accommodate building pads. The segment of Ocean Street between the project site and Graham Hill Road will be widened and the existing road surface improved as part of the development. Balanced grading is anticipated.

Field Exploration

Our investigation included several site visits by a Haro, Kasunich & Associates engineer. Subsurface conditions were explored on 10 January 2007 and 9 February 2007 by drilling eight (8) exploratory borings from 3½ to 21½ feet in depth. The borings were advanced with 6 inch diameter continuous flight-auger equipment mounted on a truck and by a 4 inch diameter manual hand auger.

The approximate location of the test borings are shown on the topographic plan by Bowman and Williams, dated 24 January 2007 presented in Appendix A of this report (see Sheet 1 of 3). The borings were located in the field using tape measurements from known landmarks, and are therefore within the accuracy of such measurements.

Representative soil samples were obtained from the exploratory borings at selected depths, or at major strata changes. These samples were recovered using a 2.5 inch O.D. Modified California (M), 3.0 inch O.D. Modified California Sampler (L), or by a Standard Terzaghi Sampler (T). The soils encountered in the borings were continuously logged in the field and visually described in accordance with the Unified Soil Classification System. The soil classification was verified and/or modified upon completion of laboratory testing. The Logs of Test Borings and related graphical laboratory test data are included as Figure No. 4 through 11 in Appendix A of this report.

The penetration blow counts noted on the boring logs were obtained by driving a sampler into the soil with a 140-pound hammer dropping through a 30-inch fall. The sampler was driven up to 18 inches into the soil and the number of blows counted for each 6-inch penetration interval. The numbers indicated on the logs are the total number of blows that were recorded for the second and third 6-inch intervals, or the blows that were required to drive the penetration depth shown if high resistance was encountered.

The boring logs depict subsurface conditions at the approximate locations shown on the Boring Site Plan; subsurface conditions at other locations may differ from those encountered at the explored locations. Stratification lines shown on the logs represent the approximate boundaries between soil types; actual transitions may be gradual.

Laboratory Testing

Soil samples obtained from the borings at selected depths were taken to our laboratory for further examination and laboratory testing. The laboratory testing program was directed toward determining pertinent engineering properties of the subsurface soils.

The soils were classified based on visual observation during drilling and laboratory test results. Sieve analysis and atterberg limit tests were performed on select samples to aid in soil classification. Natural moisture contents and dry densities were determined on selected samples and are recorded on the boring logs at the appropriate depths. Since water has a significant influence on soil, the natural moisture content provides a rough indicator of the soil's compressibility, strength, and potential expansion characteristics.

Atterberg limits were performed on select samples to determine their plastic index and potential expansion characteristics. The strength parameters of the underlying earth materials were determined from field test values derived from Standard Penetration Test (SPT) blow count measurements recorded during sampling of the in-situ soil, and laboratory direct shear tests. Resistance values (R-Values) were determined on the existing subgrade soils along the proposed Ocean Street Extension widening

The results of the laboratory testing appear on the "Logs of Test Borings" opposite the sample tested. Selected test results are also presented graphically in Appendix A.

Surface and Subsurface Soil Conditions

Based on the geologic map by Earl E. Brabb 1997, the project site is underlined by Santa Margarita Sandstone (Tsm). Undifferentiated Alluvial Deposits (Qal) are mapped down slope of the site and undifferentiated Terrace Deposits (Qt) are mapped upslope of the site (See Figure 2 Appendix A).

Based on the Liquefaction Potential Map by William R. Dupre' 1975 the site is not located within an area of potential liquefaction (See Figure 3 Appendix A).

Our firm performed six (6) exploratory borings on the vacant lot and two (2) borings along the west side of Ocean Street Extension. The exploratory borings indicate a variety of soil conditions underline the site in the top 21½ feet of the ground surface. Borings performed on the north side of the lot (Borings 1, 2, and 3) generally indicate dry to damp, medium dense to very dense or very stiff to hard silty sands or lean clay to the depths

explored. Borings performed in the central region of the lot (Borings 4, 5 and 6) generally indicate damp to wet, very loose to medium dense or hard silty sands or sandy clays to the depths explored. Borings 3, 4 and 6 indicate a perched ground water condition at about 3 feet below ground surface. We were unable to perform exploratory borings in the southern region of the lot due to very wet, soft soil conditions at the surface in relation to drilling access. The two (2) hand auger borings (Borings 7 and 8) performed along the west side of Ocean Street Extension indicates 3 to 3.5 feet of loose to medium dense fill over loose to medium dense native silty sand. The Logs of Test Borings provide, in more descriptive terms, the soils encountered. The logs of our test borings are presented in Appendix A of this report.

Groundwater

As previously mentioned, a perched groundwater condition was encountered at a depth of about 3 feet below the ground surface in Borings 3, 4 and 6. Moist to wet soil conditions were encountered in Boring 5 from 5 to 15 feet below the ground surface.

Notwithstanding the perched ground water levels mentioned above, a phreatic ground water level was not encountered in any of our borings. It should be noted that ground water levels may fluctuate due to variations in rainfall or other factors not evident during our investigation. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time may also result in changes to the conditions observed or inferred from our investigation.

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Based on our geotechnical feasibility study, it is our opinion the proposed multi housing development is feasible as long as the recommendations in this report are applied to the preliminary design of the project. Recommendations presented in this feasibility report assume relatively light structures consisting of 1 to 3 story wood frame residential structures.

Primary geotechnical concerns at the site include strong seismic shaking, slope instability, liquefaction, uniform soil support for foundations, appropriate control of surface runoff and erosion.

Based on the soils encountered in the six (6) borings drilled on the lot in relation to existing slope gradients, our firm has divided the lot into 4 zones (A, B, C and D). Each zone has its own geotechnical related concerns that can be mitigated through appropriate foundation structural design, constructing foundations on firm uniform and undisturbed native soil, processing and redensifying loose non-uniform native soils and retain potentially unstable slopes.

Listed below are the zones, the geotechnical concerns in each zone and conceptual mitigation measures to address the concerns. Please see the attached 24" x 36" plan sheet by Bowman and Williams showing each zone and boring location.

Zone A:

Zone A is mainly the northwest corner of the lot, extending upslope to the toe of the fill slope supporting Graham Hill Road. Existing slope gradients are 5 to 15 percent at the lower elevations and up to 25 percent in the upper elevations. Borings 1, 3, 4 and 6 were located in this zone. Soils encountered in these borings consisted of grey to brown, loose to dense, silty sands in the upper 2 feet overlying medium dense to very dense silty sands and very stiff to hard non expansive lean clays with sands and granite cobble. Due to the non-uniformity of the native soils in this zone, we recommend processing and redensifying the native soils to provide uniform bearing support for new foundations. After a uniform building pad is established, conventional spread footings bearing on 2 feet of redensified native soil may be used on slopes less than 15 percent. Where slopes are between 15 and 25 percent, a pier and grade beam foundation should be considered, however additional borings should be performed to identify a uniform bearing strata for the piers. Perch ground water conditions were encountered in this zone at about 3 feet below the ground surface. Back drains or curtain drains may be required next to foundations and behind basement retaining walls in this zone depending on the final elevations of the proposed foundations and basements relative to the elevation of the seepage zones.

Zone B:

Zone B is located in the northeast corner of the lot and extending upslope to the base of the fill slope supporting Graham Hill Road. Existing slope gradients are 25 to 40 percent in this area. Boring 2 was drilled in this zone. Soils encountered in this boring consisted of grey brown, very stiff to hard, non-expansive lean clay with sand and granite cobble to a depth of 8 feet overlying white, weakly cemented medium dense sand with silt. In this

zone, we recommend establishing a level cut building pad and retaining the resultant cut slope. Structures may be supported by pier and grade beam foundations or conventional spread footings bearing into uniform weakly cemented sand. Where cut and fills are performed to establish a level building pad and where the building pad consists of non-uniform soils, conventional spread footings bearing on to 2 feet of redensified native soil should be used in this zone.

Zone C:

Zone C is located in the southern third of the lot and extends upslope to the toe of the fill slope supporting Graham Hill Road. Existing slope gradients are 15 to 25 percent in this area. Boring 5 was performed in this zone. Soils encountered in this boring consisted of grey brown moist to wet loose silty sands or stiff lean clays in the top 15 feet of the soil surface overlying medium dense silty sands. This zone was very wet and loose at the surface and therefore only one boring was performed on the most northern portion of the zone. Qualitatively speaking, liquefaction in the top 15 feet is a concern in this zone where ground water reaches the surface. Liquefaction below 15 feet is uncertain at this time without further subsurface investigation and quantitative liquefaction analysis of the upper 50 feet of the soil surface. To mitigate potential damage to structures resulting from liquefaction would include utilizing piers to penetrate through the liquefiable layers that bear into non-liquefiable soils. With a properly designed pier system, damage to foundations due to liquefaction would be reduced to tolerable levels or eliminated. If non-liquefiable soils are not encountered at a reasonable depth, it may be more cost effective to "float" structures on an earthen mat with structural slabs or grid foundation systems. It should be understood that "floating" foundations systems will experience differential

settlement over time and may require repair in the future (i.e. re-leveling with injection grouting). We recommend further subsurface investigation in this zone to screen for liquefaction potential and to develop more detailed geotechnical parameters than the ones mentioned above for Zone C.

Zone D:

Zone D is located on the eastern side of the lot that comprises the fill slope that supports Graham Hill Road. Borings were not performed in this zone and therefore we cannot comment on the fill soil type and consistency. Existing slope gradients are about 70 percent in this area. We do not recommend developing this zone with residential type structures in its current configuration.

We understand you are considering a retaining wall to buttress the fill along the top of the property below Graham Hill Road to accommodate level building pads in Zones A, B and C. We concur that a retaining wall is the best solution to buttress the existing fill and accommodate level building pads. In addition, retaining walls would address our concern with the potential slope instability of this fill slope. The retaining wall height should be such that a 2:1 (horizontal to vertical) maximum gradient is achieved for final backfill grades. Where uniform, undisturbed, weakly cemented white sands are exposed at the bottom of the retaining wall a spread footing may be used to support retaining walls. Where the weakly cemented white sands are not exposed at the base of the wall, retaining walls should be supported by piers.

We do not recommend constructing buildings on slopes greater than 25 percent without quantitative slope stability analysis performed by a qualified geotechnical engineer. We do not recommend supporting structures on a combination of spread footings and piers.

The proposed Ocean Street widening and improvements should be constructed on a prism of redensified soil to provide uniform bearing support of the road pavements and curbs. The zone of redensification should be 24 inches thick as measured below subgrade to receive aggregate base material.

We recommend surface runoff be strictly controlled and not allowed to pond above or next to any engineered structure (i.e. retaining walls, building foundations, abutments etc.), surface runoff should not discharge onto existing or proposed fill slopes. We recommend a drainage plan be designed and prepared for the final project by a licensed civil engineer.

We recommend including erosion control measures on the final design sheets. We recommend retaining the services of an erosion control specialist to work with the project civil and geotechnical engineers to determine the most appropriate erosion control measures for the project.

The geotechnical-related aspects of the preliminary grading and foundation plans should be reviewed by our office so further geotechnical investigation work can be performed on the lot to develop specific geotechnical design criteria for the planned development.

The following recommendations should be used as guidelines for preparing preliminary project plans and specifications, and assume that **Haro, Kasunich & Associates** will be commissioned to performed additional geotechnical related work to present specific design criteria for the proposed structures.

General Site Grading

1. Where referenced in this report, Percent Relative Compaction and Optimum Moisture Content shall be based on ASTM Test Designation D1557.
2. Areas to receive engineered fill should be cleared of all obstructions, including existing fill and other unsuitable material. Existing depressions or voids created during site clearing should be backfilled with engineered fill
3. Retaining walls should be backfilled with engineered fill that is processed in accordance with recommendation presented in this section.
4. Engineered fill should be placed in thin lifts not exceeding 8 inches in loose thickness; water conditioned to a moisture content about 2 percent above optimum, and compacted to at least 90 percent relative compaction. The upper 8 inches of slab and pavement subgrades and aggregate base should be compacted to at least 95 percent relative compaction.

5. Engineered fill should consist of a predominantly granular soil. Based on our limited borings, the on-site soils are suitable for use as engineered fill as long as the native soils are well mixed. Imported material used for engineered fill should be free of organic and deleterious material, contain no rocks or clods over 4 inches in dimension, and should contain no more than 15 percent by weight of rocks larger than 2½ inches. Imported fill should also be granular, have a Plasticity Index of less than 18, and should have sufficient binder to allow excavations to stand without caving.
6. If grading is performed during or shortly after the rainy season, the grading contractor may encounter compaction difficulty with wet soil. If compaction of the native soil cannot be achieved after adjusting the soil moisture content, it may be necessary to stabilize the bottom of the excavation with stabilization fabric. The need for ground stabilization measures to complete grading effectively should be determined in the field at the time of grading, based on exposed soil conditions.
7. We estimate shrinkage factors of the onsite rock will range between 15 to 25 percent.
8. Engineered fill slopes should be inclined no steeper than 2:1 (horizontal to vertical) and be keyed at their toe into firm native soil and benched into firm native soil.
9. Placement of engineered fill should be done under the observation of a **Haro, Kasunich and Associates** representative to verify the intent of our recommendations have been met and followed.

10. Following completion of the work, exposed areas disturbed by construction should be planted as soon as practicable with erosion-resistant vegetation and covered with erosion control fabric.

11. After the earthwork operations have been completed and the soil engineer has finished his or her observation of the work, no further earthwork operations shall be performed except with the approval of the owner and under the observation of the geotechnical engineer.



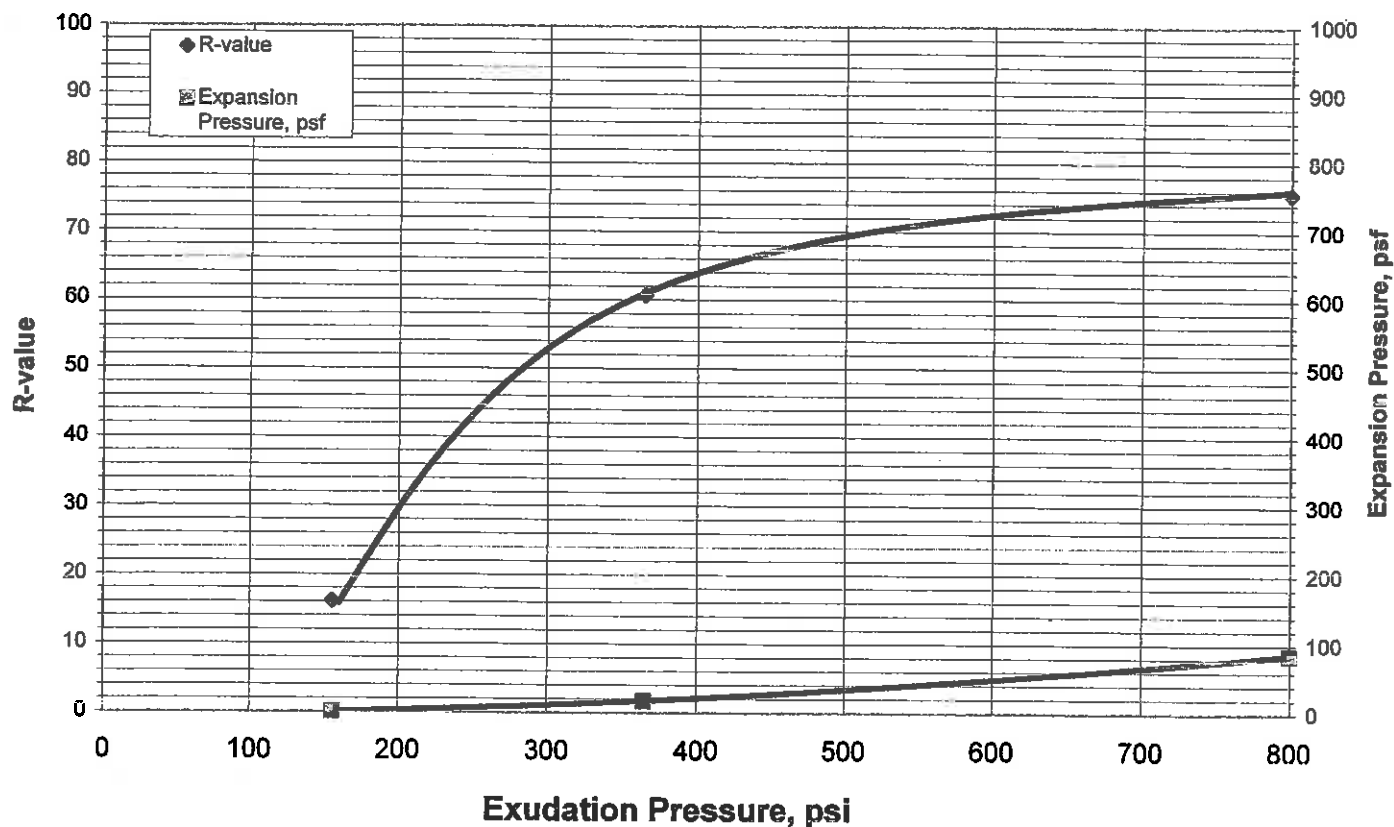
SITE VICINITY MAP THE LANDS OF KRASSOW, McFADDEN & BOSTWICK OCEAN STREET EXTENSION APN 008-044-01 & 02 SANTA CRUZ COUNTY, CALIFORNIA	
SCALE:	AS SHOWN
DRAWN BY:	BILL S.
DATE:	2-28-07
REVISION:	
JOB NO:	SC9395
HARO, KASUNICH & ASSOCIATES, INC. GEOTECHNICAL AND COASTAL ENGINEERS 116 E. LAKE AVENUE, WATSONVILLE, CA 95076 (831) 722-4175	
FIGURE NO. 1	
SHEET NO. OF 1	



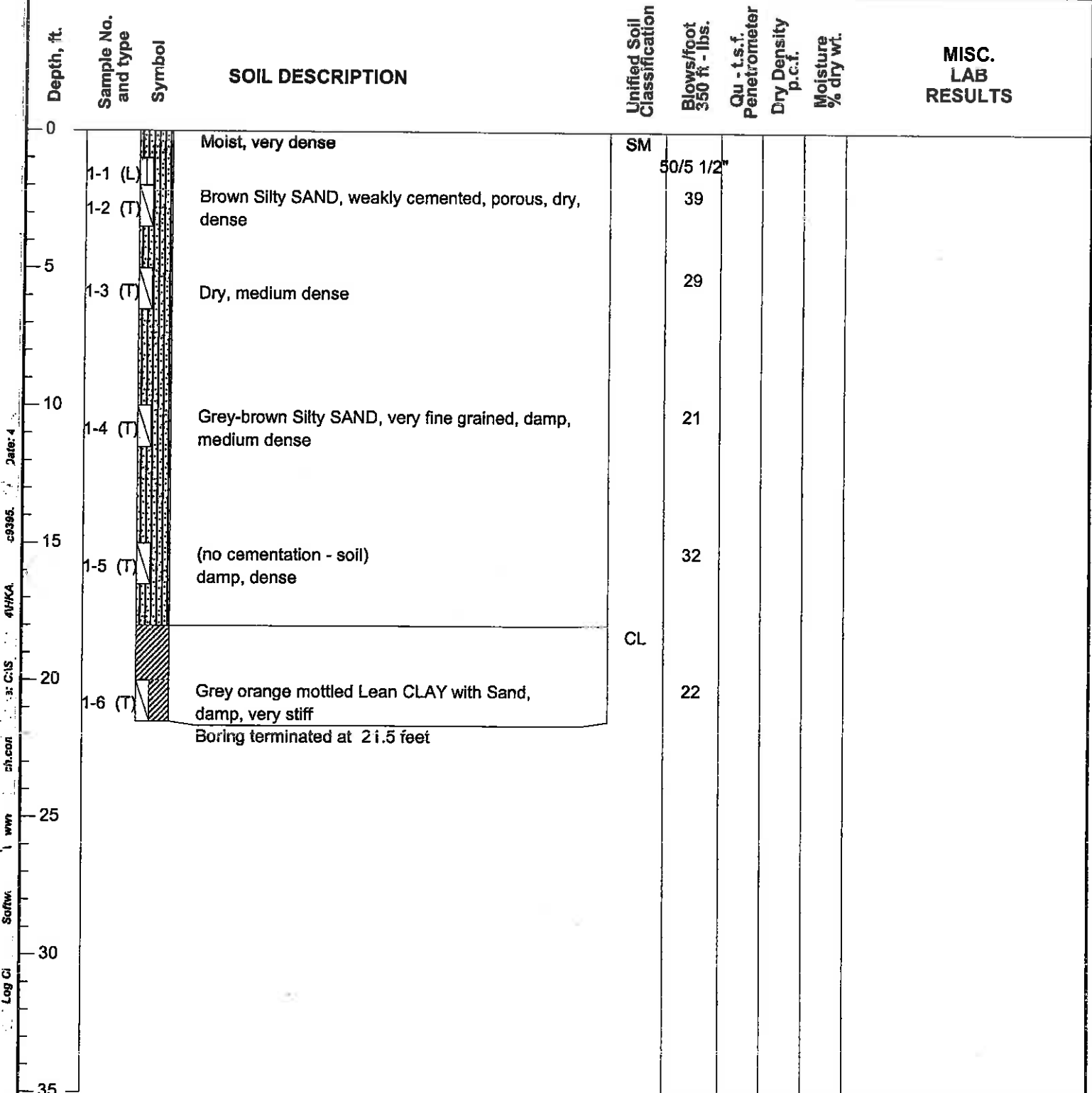
R-value Test Report (Caltrans 301)

Job No.:	032-319	Date:	02/27/07	Initial Moisture,	8.9%
Client:	Haro, Kasunich & Associates	Tested	MD	R-value by	
Project:	Ocean Street Ext - SC9395	Reduced	RU	Stabilometer	53
Sample	7-1	Checked	DC	Expansion	
Soil Type:	Brown Sandy SILT, trace Gravel			Pressure	15 psf

Specimen Number	A	B	C	D	Remarks:
Exudation Pressure, psi	155	365	800		
Prepared Weight, grams	1200	1200	1200		
Final Water Added, grams/cc	50	20	12		
Weight of Soil & Mold, grams	3230	3131	3100		
Weight of Mold, grams	2111	2109	2081		
Height After Compaction, in.	2.66	2.38	2.37		
Moisture Content, %	13.4	10.7	9.9		
Dry Density, pcf	112.3	117.5	118.4		
Expansion Pressure, psf	0.0	17.2	86.0		
Stabilometer @ 1000					
Stabilometer @ 2000	120	46	29		
Turns Displacement	4.8	3.55	3.28		
R-value	16	61	76		



LOGGED BY BSC DATE DRILLED January 10, 2007 BORING DIAMETER 6" BORING NO. B-1



IARO, KASUNICH AND ASSOCIATES, INC.

BY: dk

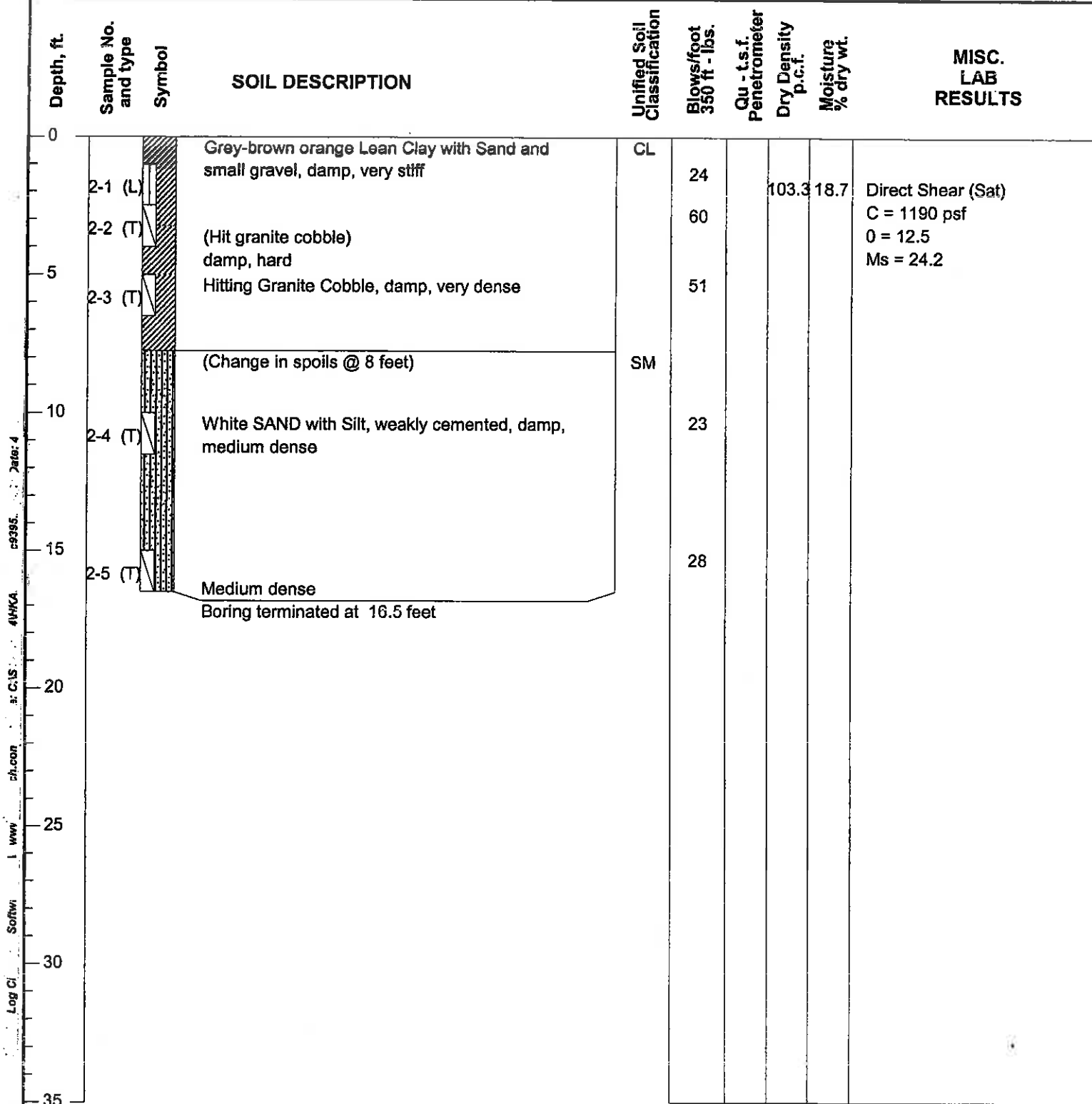
FIGURE NO. 4

LOGGED BY BSC

DATE DRILLED January 10, 2007

BORING DIAMETER 6"

BORING NO. B-2



LARO, KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 5

LOGGED BY BSC DATE DRILLED January 10, 2007 BORING DIAMETER 6" BORING NO. B-3

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Black-grey Silty SAND, very moist-wet (no retrieval), loose	SM CL	11				
3-1 (L)					51			8.5	Atterberg Limits LL = 20.9% PL = 10.9% PI = 10 Sieve Analysis % Gravel = 2.1 % Sand = 42.3 % Fines = 55.6
3-2 (T)			Perched water at 3 feet Brown-grey, orange mottled Lean Clay with Sand, damp, hard		58				
3-3 (T)			Grey Silty SAND, slightly cemented porous, dry, very dense		63				
3-4 (T)			Dry, very dense		35				
3-5 (T)			Grey Silty SAND with decomposed granite Cobble, damp, dense Cobble @ 17 feet		50/5"				
3-6 (T)			Red-orange Silty SAND, shist/decomposed granite, damp, very dense Boring terminated at 21.5 feet						

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 6

LOGGED BY BSC DATE DRILLED January 10, 2006 BORING DIAMETER 6" BORING NO. B-4

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Grey brown orange mottled Silty SAND with Clay and roots, wet very loose	SM	8				
4-1 (L)					25				
4-2 (T)			Perched water @ 3 feet, damp, medium dense						
5									
4-3 (T)			Grey brown orange mottled Sandy SILT Damp, hard	ML	32				Sieve Analysis % Gravel = 0 % Sand = 28.1 % Fines = 71.9
10									
4-4 (T)			Damp, hard		33				
15									
4-5 (T)			Lighter grey, orange mottled Silty SAND, signs of decomposed granite, damp, medium dense	SM	27				
20									
4-6 (T)			(possibly in very weathered mudstone) damp, medium dense		24				
			Boring terminated at 21.5 feet						
25									
30									
35									

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BY: dk

FIGURE NO. 7

LOGGED BY BSC DATE DRILLED January 10, 2007 BORING DIAMETER 6" BORING NO. B-5

Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Grey-brown orange mottled Lean CLAY with Sand, moist, loose, damp, very stiff	CL	23				
5-1 (L)					12			14.7	Atterberg Limits LL = 18.8% PL = 12.9% PI = 6 Direct Shear (Sat) C = 570 psf φ = 37.4 Ms = 17.5%
5-2 (T)			Very damp, stiff						
5					14				
5-3 (L)			Grey-brown orange mottled Clayey SAND Moist, wet, loose						
10					7		113.3	15.6	
5-4 (T)			Wet, loose						
15					10				
5-5 (T)			Moist, medium dense						
20					15				
5-6 (T)			Orange mottling, less pronounced and round gravels present, damp, medium dense Boring terminated at 21.5 feet						
25									
30									
35									

H&K, KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 8

LOGGED BY BSC DATE DRILLED January 10, 2007 BORING DIAMETER 6" BORING NO. B-6

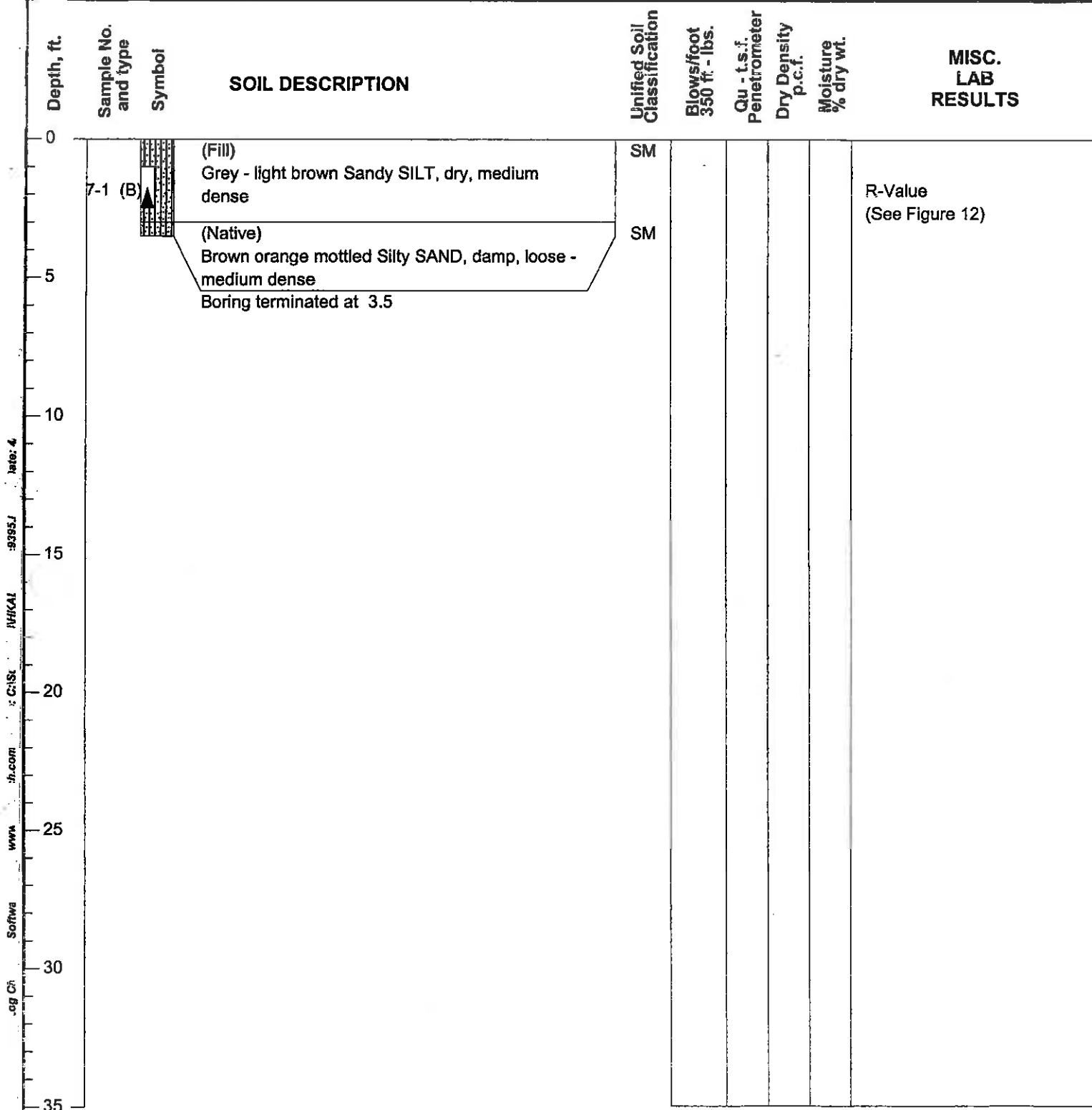
Depth, ft.	Sample No. and type	Symbol	SOIL DESCRIPTION	Unified Soil Classification	Blows/foot 350 ft - lbs.	Qu - t.s.f. Penetrometer	Dry Density p.c.f.	Moisture % dry wt.	MISC. LAB RESULTS
0			Grey-brown orange mottled Clayey SAND, wet-damp, loose-medium dense	SC	34				
6-1 (L)			(Perched water at 2 feet)		30				
6-2 (T)			Decomposed Granite Gravel present, damp, dense		25				
6-3 (T)			Dark brown Silty SAND, damp, medium dense		22				
6-4 (T)			Grey-brown orange mottled Silty SAND, damp, medium dense		20				
6-5 (T)			Damp, medium dense		21				
6-6 (T)			Damp, medium dense						
			Boring terminated at 21.5 feet						

HARO, KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 9

LOGGED BY BSC/MH DATE DRILLED February 9, 2007 BORING DIAMETER 4" HA BORING NO. B-7

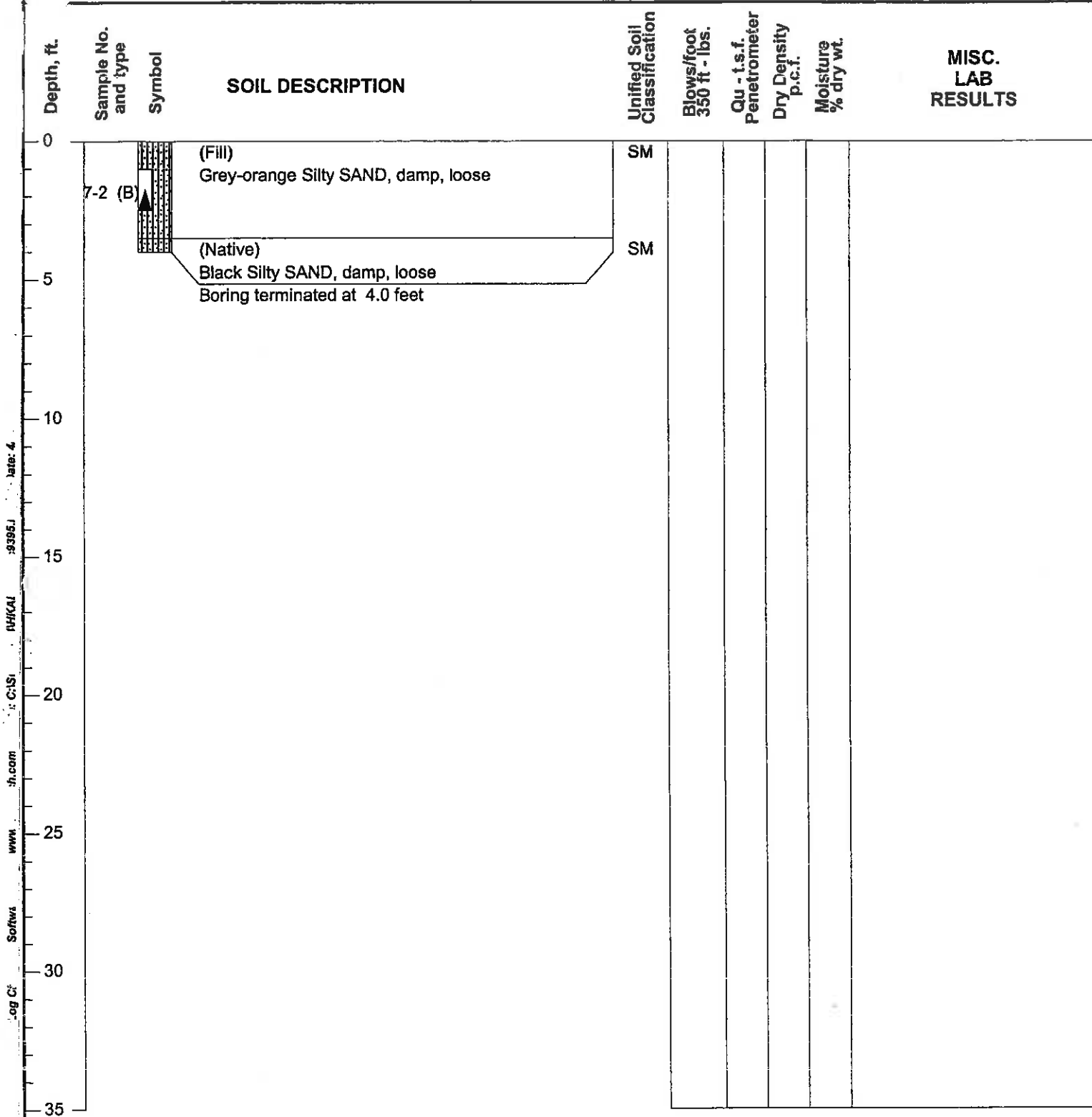


IARO, KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 10

LOGGED BY BSC/MH DATE DRILLED February 9, 2007 BORING DIAMETER 4" HA BORING NO. B-8



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 H/KAL
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 .fa.com
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H. K. KASUNICH AND ASSOCIATES, INC.

BY: dk

FIGURE NO. 11