APPENDIX D

Geology and Soils

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Geotechnical Design Report, Goleta Mixed Use Village, Hollister Avenue, City of Goleta, California

Prepared For
WESTAR ASSOCIATES

July 13, 2011

GMU Project No. 07-036-00

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TRANSMITTAL

WESTAR ASSOCIATES
2925 South Bristol Street
Costa Mesa, CA 92626

DATE: July 13, 2011

PROJECT: 07-036-00

ATTENTION: Mr. Peter Koetting

SUBJECT: Geotechnical Design Report, Goleta Mixed Use Village, Hollister Avenue, City of Goleta, California

WE ARE SENDING THE FOLLOWING:

Four (4) original signature copies of our "Geotechnical Design Report, Goleta Mixed Use Village, Hollister Avenue, City of Goleta, California," dated July 13, 2011.

COPIES DISTRIBUTED TO:

Penfield & Smith
Attn: Mr. Don Donaldson (1 copy)

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INTRODUCTION

PURPOSE

This geotechnical design report presents the results of our geotechnical investigation for Westar's proposed Goleta Mixed Use Village on Hollister Road in the City of Goleta. The primary purposes of this report are to provide a geotechnical assessment of site soils and provide geotechnical design recommendations for the proposed grading and structural improvements. Based on a review of the conceptual site plan and preliminary grading plan, GMU understands that the ~23.5-acre site will be developed with apartment buildings, retail buildings, and associated site improvements. For ease of reference, the preliminary grading plan is utilized as the base map for Plate 3 – Geotechnical Map.

SCOPE

To date, the scope of our studies has included the following:

1. Performed a background review that focused on published geologic maps, geotechnical reports, historic aerial photographs, the proposed site plan, and City, County, and State regulations.

2. Conducted a comprehensive fault investigation in order to assess the potential for active faults within the site. GMU prepared the reference (1) Fault Investigation Report, which is summarized briefly herein.

3. Conducted field percolation testing at various site locations where potential infiltration basins may be located. The percolation testing targeted soils at various depths up to about 25 feet deep. GMU prepared the reference (2) Report of Percolation Testing, which is summarized briefly herein.

4. Prepared the reference (3) Preliminary Geotechnical Overview Report in order to assess project feasibility and provide initial geotechnical design information.

5. Performed additional subsurface exploration which included 12 hollow stem auger borings, 5 cone penetration test probes, and 8 backhoe test pits. Borings and test pit explorations were logged by our geologist and soils samples were obtained for laboratory testing.

6. Performed laboratory testing on in-situ and remolded samples for determining soil engineering properties, including soil characterization, shear strength, compaction, consolidation, expansion, corrosion, and R-value.

7. Performed geotechnical analyses on the field and laboratory data for this investigation. Analyses address corrective grading, settlement, seismic design, foundations, liquefaction, retaining walls, and structural pavement.

8. Prepared this geotechnical design report that presents our findings, conclusions, and recommendations for the proposed grading and structural improvements.

PROJECT DESCRIPTION

Based on a review of the Site Plan (Plate 2.1; reference (4)) and the Conceptual Grading and Drainage Plan (Plate 2.2; reference (5)) prepared by Penfield & Smith, it is our understanding that the proposed project will consist of the following:

- 2- to 3-story multi-family residences with paved parking, access roads, walkways, pool and recreation area, and additional appurtenances.
- Elevated 1-story masonry- and wood-framed retail buildings with paved parking, paved access roads, and additional appurtenances.
- Retaining walls up to 6 feet high.
- Minor paving improvements on South Glen Annie Road and Hollister Avenue.
- Numerous bio-retention and bio-swale areas connected to a storm drain system and underground storm water storage (see below for additional data).
- Cuts and fills up to roughly 5 feet.

Surface drainage from driveway aisles and parking will be directed to bio-retention and bio-swale areas connected to a storm drain pipe collection system. The storm water collection system will drain to an underground concrete vault located under a parking lot in the southwest corner of the parcel. We understand the underground storage system planned includes plastic chambers and gravel backfill.

Anticipated residential building loads provided by Patel Burica & Associates, Inc. are not to exceed 3,000 plf for continuous footings and 30 kip column dead loads. Anticipated retail building dead loads of 2,500 plf for perimeter walls and 60 kip for interior columns were provided by the retail project architect (Menemsha).

SITE LOCATION

The general location of the project site is shown on Plate 1. The project is located along the south side of the Highway 101 and Union Pacific Railroad corridor. The site is bounded by the Union Pacific Railroad property to the north, South Glen Annie Road to the east, Hollister Avenue to the south, and a commercial development to the west.

SITE CONDITIONS

The majority of the site is currently undeveloped and is characterized by grassland vegetation with some shrubs and trees near the perimeter of the site. The site currently supports two structures, satellite dishes, paved driveways and parking spaces located at the southeast corner of the parcel.

The topography at the site is illustrated on Plate 3 and is generally gently sloping, with gradients typically ranging from 1% to 10%. An artificial cut that forms an east-trending drainage has been made near the northern portion of the site and is bordered by 10-foot-high slopes at about 2:1 (horizontal:vertical) gradients. The topography described above generally results in sheet flow runoff in a southward direction. Several underground and overhead utilities were observed along the property lines and easements.

BACKGROUND AND AERIAL PHOTOGRAPHY REVIEW

PREVIOUS RESEARCH

Published maps and reports of the site vicinity and the Goleta – Santa Barbara area were reviewed in order to identify previously mapped faults and other geologic conditions on the subject property. Also, unpublished theses, consulting reports, and other reports were reviewed including geologic reports and maps by Dibblee (1966; 1987), Olson (1982), Gurrola (2005), and the United States Geological Survey (rev. 2006). A discussion of previous mapping related to faulting is included in the reference (1) Fault Investigation Report.

ANALYSIS OF AERIAL PHOTOGRAPHY

The initial phase of our investigation consisted of a comprehensive review of representative stereo pair aerial photographs that were available for the site. The primary goal of the aerial photo review was to identify photo-lineations that may or may not be evidence of subsurface fault structures. The reference (1) Fault Investigation Report includes a complete listing of aerial photographs that we reviewed, and a detailed description of our assessment. To summarize, one geomorphic photo-lineation was identified and that location was the site of a subsequent fault trench. No other relevant lineations were found within the site.

The aerial photography review also indicated that a majority of the site is in an essentially undeveloped and natural condition. The exception to this is an artificial cut that forms an east-trending drainage near the northern portion of the site.

SUBSURFACE EXPLORATION AND TESTING

GMU has conducted three phases of subsurface exploration at the site. The first phase included three fault trenches to evaluate the potential for active faults within the property. The fault trenches were up to 8 feet deep and totaled 158 feet in length. The fault study also included a geophysical survey which was designed to locate/model potential subsurface fault structures. Details of the fault trenching and geophysical survey are provided in the reference (1) report.

The second phase of exploration included six hollow stem auger borings for the purpose of in situ percolation testing. These borings were drilled to various depths up to 25 feet in the vicinity of proposed infiltration basins. Boring logs and details of the percolation study are provided in the reference (2) Report of Percolation Testing.

Our final phase of exploration included 12 hollow stem auger borings, 5 cone penetration test probes, and 8 backhoe test pits. Our exploration procedures, sample data, logs, and CPT results are presented in Appendix A.

A summary table of the subsurface exploration and depth explored is provided below.

Table I Summary of Subsurface Exploration	
Identification	**Depth Explored**
DH-1	25.5'
DH-2	21.5'
DH-3	15'
DH-4	10'
DH-5	16.5'
DH-6	7'
DH-7 to 10	26'
DH-11 to 14	51'
DH-15 to 18	26'
TP-1	15'
TP-2	14'
TP-3 to 8	10'
CPT-1	47' (Refusal)
CPT-2	42' (Refusal)
CPT-3	49' (Refusal)
CPT-4	40' (Refusal)
CPT-5	38' (Refusal)

Approximate locations of all our subsurface explorations to date are shown on the attached Geotechnical Map, Plate 3.

Laboratory testing of soil engineering properties included Atterberg limits, consolidation, corrosion, direct shear, expansion potential, in-place moisture content/dry density, particle size distribution, maximum density, direct shear, and R-value. Geotechnical laboratory procedures and test results are presented in Appendix B.

GEOLOGIC AND GEOTECHNICAL CONDITIONS

REGIONAL GEOLOGY

The site is located on the Goleta-Santa Barbara Coastal Piedmont, which is an uplifted terrain characterized by elongated, east-west trending folds and faults with preserved flights of late Pleistocene marine terrace landforms and deposits (Gurrola, 2005; Dibblee, 1966; 1987). The

subject property is underlain by one of these uplifted marine terraces. A more detailed description of the tectonic setting is included in the reference (1) Fault Investigation Report.

SITE GEOLOGY AND GEOMORPHOLOGY

The geology and geomorphology of the site is characteristic of marine terrace deposits and landforms in the Goleta - Santa Barbara area. Several late Pleistocene marine terrace landforms and associated deposits were identified by Gurrola (2005) in the Goleta area, north and south of the subject property. Marine terrace landforms and associated deposits form a seaward sloping, stair-stepped geomorphic expression in the Goleta area. The youngest of the terrace landforms and deposits is age-dated at 47 ka and the northern margin of the terrace is located south of the subject property. The next flight of marine terrace deposits underlies the subject property and is associated with the 58 ka-60 ka paleo-high sea level stand.

The ground surface of the subject property is relatively planar with a gentle gradient to the south which is consistent with marine terrace landforms. Typically, the underlying marine terrace deposits are mantled with colluvium and consist of gently south-dipping marine and alluvial deposits.

SUBSURFACE SOIL CONDITIONS

The near-surface soils consist of a layer of topsoil over Pleistocene marine terrace deposits. Detailed soil descriptions are shown on the test pit and boring logs in Appendix A

Well-developed soil profiles were observed in the test pits. These soil profiles typically contained 2- to 6-foot-thick Bt soil horizons (i.e., topsoil) that are generally fine grained and comprised of sandy silt, clayey silt, silty clay, and sandy clay. The topsoil thickness, density, moisture content, and plasticity vary throughout the site. Recommendations are provided in a subsequent section of this report for remedial grading where improvements are planned.

The marine terrace deposits are primarily composed of varying percentages of sand, silt, and clay. Terrace deposits were relatively dense to very stiff as indicated by the high blow counts recorded during sampling at select locations. Terrace deposits are considered suitable for support of the planned improvements, provided our recommendations are followed.

GROUNDWATER

Groundwater or seepage was encountered during our subsurface exploration in limited locations including borings DH-11 and DH-12 at approximately 35 to 37 feet below existing site grade (12 to 14 feet above mean sea level). Groundwater is therefore not anticipated to directly influence the proposed grading and use of the property.

FAULTING AND SEISMICITY

As discussed previously, GMU conducted a comprehensive fault investigation and prepared the reference (1) Fault Investigation Report. Our fault investigation concluded that there are no sufficiently active and well-defined faults present within the site, and an earthquake fault hazard zone is therefore not required per CGS SP-42. Furthermore, the geologic and geochronologic evidence suggests that there has not been surface fault rupture at the site within at least the past 58-60 ka (thousand years). In the absence of Holocene surface rupture, a fault zone is not defined and a setback is not required per CGS SP-42. Similarly, a fault setback is not required per the City of Goleta General Plan because there are no active surface faults on the subject property.

Although no active faults are located within the property, the site is within close proximity to several active and potentially active faults within Southern California. Given this, the site will likely be subject to earthquake ground motions in the future. In order to evaluate the likelihood of future earthquake ground motions occurring at the site, a probabilistic seismic hazard analysis (PSHA) of horizontal ground shaking was performed using the commercial computer program EZ-FRISK ver. 7.43. The PSHA utilized seismic sources and attenuation equations consistent with the 2008 USGS National Seismic Hazard Mapping Project. The shear wave velocity of the upper 100 feet of soil was measured to be about 1,055 ft/sec (320 m/sec) in CPT-3. Assuming a risk level of 10 percent probability of exceedance in 50 years (i.e., ~475 year ARP), the site specific PHGA is 0.58g.

Site-specific seismic design parameters were determined using the USGS computer program titled "Seismic Hazard Curves and Uniform Hazard Response Spectra, Version 5.1.0." The site coordinates used in the analysis were 34.4315° North Latitude and 119.8737° West Longitude. On-site structures should be designed in accordance with the following 2010 California Building Code criteria:

Table II Seismic Hazard and Response Spectra		
Parameter	**Factor**	**Value**
0.2s Period Spectral Response	S_S	1.66g
1.0s Period Spectral Response	S_1	0.64g
Soil Profile Type	Site Class	D
Site Coefficient	F_a	1.0
Site Coefficient	F_v	1.5
Adjusted Spectral Response	SM_S	1.66g
	SM_1	0.96g
Design Spectral Response	SD_S	1.11g
	SD_1	0.64g

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2010 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

GEOTECHNICAL ENGINEERING FINDINGS

LIQUEFACTION, SEISMIC SETTLEMENT, AND LATERAL SPREADING

Liquefaction Investigation

A seismic hazard zone report has not been published by the California Geological Survey for the subject area. The potential for liquefaction is generally based on the presence of three factors: (1) strong ground motion, (2) unconsolidated granular soils (usually associated with young geologic age), and (3) groundwater within the uppermost 50 feet.

GMU performed CPT exploration within the subject site in order to quantify liquefaction potential and magnitude of seismic settlement. Five CPT soundings were advanced to refusal. Depths to refusal varied from 38 feet to 49 feet below existing site grade. Additionally, two borings with

Standard Penetration Tests were drilled to approximately 51 feet below existing grade. Liquefaction design parameters and method of analysis are described below.

Design Earthquake and Mode Magnitude

Design PGA used in the liquefaction analyses was 0.58 g and a mode magnitude earthquake of M7.4 were calculated by the probabilistic seismic hazard analysis described herein.

Design Groundwater Level

Based on our investigation and research, liquefaction was analyzed utilizing the highest groundwater level obtained from the USGS water resource web site within 2 miles of the site since 1972 (USGS, 2001). It should also be noted that the project site is located in an elevated basin that drains towards the referenced study data. The groundwater levels utilized are more conservative (i.e., shallower) than the groundwater levels observed in our investigation.

Soil Types

Residual and native soils below the site are primarily composed of varying percentages of sand, silt, and clay.

Liquefaction Analysis

GMU utilized specialized computer software called Cliq (version 1.3.0.48) to evaluate CPT field data for liquefaction. Cliq software aids interpretation of CPT field data and the calculation of liquefaction safety factors, seismic settlement, and additional parameters. This software was developed with technical support by Gregg Drilling and Testing, Inc. and Dr. Peter Robertson, and applies the National Center for Earthquake Engineering Research (NCEER) Method (Youd et al., 2001) along with calibrated procedures for post-earthquake displacements by Zhang et al. (2002 and 2004).

Liquefaction Potential and Seismic Settlement

The results of our liquefaction analyses are contained in Appendix C. The analyses indicate that discrete thin zones (i.e., thin zones of potentially granular materials) within the upper 50 foot stratum may be subject to liquefaction during the design seismic event. Estimates of seismic settlement at each CPT location are summarized below.

Table III Summary Seismic Settlement Estimates	
Location	**Seismic Settlement**
CPT-1	0.21"
CPT-2	0.04"
CPT-3	0.03"
CPT-4	0.10"
CPT-5	0.15"

The analytical results, as shown in Appendix C and summarized above, indicate a maximum of 0.21" of seismic settlement occurring below a depth of 25 to 30 feet below existing grade. Consequently, seismic settlement at the ground surface is anticipated to be neglible.

Lateral Spreading

Liquefaction-induced lateral spreading is considered to be unlikely at the subject site due to the lack of a free face or significant sloping ground, the negligible potential for liquefaction, and the significant depth to potentially liquefiable strata.

COMPRESSIBILITY/STATIC SETTLEMENT

Based on GMU's subsurface exploration and laboratory testing, we anticipate that only the near surface soils will be significantly compressible. More specifically, the uppermost 5 feet of soil is judged to be compressible. Below that depth, the soils become relatively dense and are estimated to have low compressibility and not subject to significant hydro-collapse. Based on anticipated building loads and shallow foundation depths, all foundations will need to be underlain by a minimum thickness of compacted fill to keep static settlement uniform and within normal levels. With the implementation of the required corrective grading, static settlement for the buildings should not exceed 1.0 inch total and 0.5 inch over 40 feet differential.

SLOPE STABILITY

No significant existing slopes are present within or immediately adjacent to the site. The maximum proposed slope is 12 feet high, at 2:1 slope ratio, in a fill over cut condition. Following the recommended remedial grading, the entire slope will be comprised of engineered fill and no additional stabilization is required. This slope will be grossly and surficially stable provided our recommendations are followed.

SOIL EXPANSION

Expansion index and plasticity tests conducted during our studies within the proposed grading depths (0 to 7 feet below existing grade) indicate medium to high expansion potential. A high expansion potential should be assumed for preliminary design purposes. Note that additional testing for expansive soils should be performed at the completion of grading to document the expansion potential of on-site soils in the finished condition.

CORROSIVITY

Bulk soil samples were collected at depths of 2 to 8 feet during our subsurface investigations. Testing was performed on each sample to determine soil corrosivity. The results are tabulated below.

Table IV
Test Summary of Corrosion Potential

Location	Depth (ft.)	pH	Soluble Sulfates (ppm)	Soluble Chlorides (ppm)	Minimum Resistivity Ohm-cm
T-1	2'	5.7	ND	700	830
T-1	4'	5.5	ND	620	650
DH-8	4-7'	6.9	32	ND	930
DH-17	6-8'	7.6	16	530	1,090

Tests performed in general accordance with CALTRANS TEST METHODS 417/422/643
ND = Non Detected

The results provided above indicate that tested soils possess severe corrosion potential to ferrous metals. Note that the web-based USDA Soil Survey also rates the site soils as high risk for corrosion to uncoated steel. Sulfate tests were also performed to determine sulfate exposure for concrete. Test results indicate a negligible sulfate exposure to concrete; therefore, special cement types are not required from a geotechnical perspective. We recommend additional corrosion testing be performed at the completion of grading to confirm that the near-surface soils have corrosion characteristics in accordance with those documented in this report.

PERCOLATION TESTING

Based on our reference (2) percolation investigation, the underground stormwater storage area (see Plate 2.2) is underlain by marine terrace deposits that primarily consist of dense, silty fine sand and fine sandy silt. The percolation testing indicated that these soil materials are characterized by low percolation rates that are typically less than 1 $in^3/min/ft^2$ (i.e., less than 0.5 in/hour). Detailed percolation results are contained in our reference (2) Report of Percolation Testing, which has been provided to Penfield & Smith for use in designing the planned underground stormwater storage system.

EXCAVATION CHARACTERISTICS

Rippability

The soil materials underlying the site can be excavated with scrapers and other conventional grading equipment.

Trenching

We expect that excavation of utility trenches can be accomplished utilizing conventional trenching machines and backhoes. Trench support requirements will be limited to those required by safety laws or other locations where trench slopes will need to be flattened or supported by shoring designed to suit the specific conditions exposed.

Volume Change

In order to aid planning for the anticipated grading, we estimate that the change in volume of on-site topsoil and the upper portions of terrace deposits excavated and placed as compacted fill at an average relative compaction of 92% will result in about 10 to 15% loss in volume. It should be noted that the aforementioned value is very approximate and is for rough planning purposes only. The actual volume change may be different for any imported soils.

CONCLUSIONS

Based on geologic and geotechnical findings, it is our opinion that the proposed grading and improvements, as reflected by the reference (4) and (5) Site Plan and Concept Grading Plan, are feasible and practical from a geotechnical standpoint if accomplished in accordance with City of Goleta requirements and the recommendations presented herein. The proposed structures are also feasible from a geotechnical standpoint provided that the foundation recommendations presented in

subsequent sections of this report are followed. Additional conclusions pertaining to the site are as follows:

1. The site is characterized as an uplifted marine terrace that is underlain by topsoil and terrace deposits.

2. Groundwater or seepage is present at about 35 feet below existing grade, and will therefore not have a direct influence on the proposed grading and site construction.

3. GMU's previous fault investigation concluded that there are no active surface faults within the property. However, the site is located within close proximity to several active faults, and may therefore be subject to strong ground motions in the future. GMU's site-specific probabilistic seismic hazard analysis indicated a PGA of 0.58g for a 10% probability of exceedence in 50 years.

4. The potential for liquefaction is minimal. Liquefaction-induced seismic settlement is negligible (i.e., <0.21"), and lateral spreading is not considered a site hazard.

5. The uppermost 5 feet of existing soil is compressible and will need to be removed and recompacted as part of the grading operation.

6. Static settlement should not exceed 1.0 inch total and 0.5 inch over 40 feet differential if the recommendations in this report are followed.

7. The on-site soils should be considered highly expansive and severely corrosive to ferrous metals. The on-site soils have a negligible sulfate exposure for concrete.

8. The native soils that underlie the stormwater storage area have low infiltration rates, typically less than 0.5 in/hr.

RECOMMENDATIONS

SITE PREPARATION AND GRADING

General

All site preparation and grading should be performed in accordance with the City of Goleta requirements and the recommendations presented in this report.

Clearing and Demolition

All significant organic material such as weeds, brush, tree branches, roots, or other decomposable material should be removed from areas to be graded. If encountered, construction debris over 6 inches in diameter such as asphalt, concrete, etc. should either be removed or crushed prior to initiating grading operations. Excavations that result from demolition activities, if any, such as those for removal of footings or underground utilities, should be backfilled with engineered fill in accordance with the fill placement recommendations presented in this report.

Remedial Grading

In order to support the proposed site development, remedial grading will be required in order to: (1) remove and recompact the upper 5 feet of low-density topsoil or weathered terrace deposits, and (2) provide a uniform blanket of engineered fill below the proposed site improvements.

Remedial grading should extend 5 feet below the existing ground surface, or 3 feet below the bottom of proposed foundations, whichever is greater. These removals should extend across the entire site. The exception to this is that the interior of the stormwater storage area should be cut to grade without any additional remedial grading, such that the bottom of the basin is founded in relatively undisturbed native terrace soils. The perimeter retaining wall footings for the stormwater storage area are subject to the remedial grading requirement and should be underlain by at least 3 feet of engineered fill as discussed above.

The corrective grading described above is based on the field and laboratory data obtained in this investigation. All corrective grading must be monitored by the geotechnical engineer of record in order to confirm that the conditions exposed during grading are in accordance with the conditions described herein and those used to generate the remedial grading recommendations. It should be noted that actual remedial grading removals may vary based on actual conditions encountered during grading.

Processing

The bottom of all remedial grading removals should be scarified, moisture conditioned (if necessary) to at least 2% above the optimum moisture content, and compacted to at least 90% relative compaction prior to placing fill.

FILL MATERIAL AND PLACEMENT

Suitability of Fill Materials

The on-site soils are suitable for use as engineered fill. If any imported soils are used, these soils should be tested to conform to the physical and chemical characteristics of the on-site soils and the soil characteristics described herein. No rock or broken concrete greater than 6 inches in maximum diameter should be utilized in the fills. All fill materials should be approved by the geotechnical engineer.

Placement of Fill

All soil material used as compacted fill, or material processed in-place or used to backfill trenches, should be moistened, dried, or blended as necessary to achieve a minimum of 2% over optimum moisture content, and compacted to at least 90% relative compaction as determined by ASTM Test Method D 1557. Engineered fill should be placed in lifts not exceeding 6 to 8 inches in loose thickness, and thoroughly compacted to meet the criteria indicated above.

Field Density Testing

Methods, locations, and frequency of testing shall be determined by the geotechnical engineer of record and City of Goleta requirements.

FOUNDATION SYSTEM DESIGN CRITERIA

General

All applicable guidelines, codes, and ordinances should be followed in the design of the foundation system. The following recommendations are based on our geotechnical foundation investigation for the subject project.

Based on test results, it is anticipated that soils exposed at the surface and in the foundation influence zone following remedial and design grading will generally have a medium to high expansion potential. Based on the results of chemical testing, it is anticipated that the soils within the foundation influence zone will be severely corrosive to ferrous metals and possess a negligible potential for sulfate exposure to concrete (as defined by the CBC). The nature of the soil materials was considered in arriving at the design recommendations included in the following sections of this report.

Seismic Design Parameters

Seismic design of structures should be in minimum accordance with the parameters provided in the Faulting and Seismicity section of this report.

Bearing Material

All structural foundations shall be placed on a minimum of 3 feet of engineered fill, as described in the Remedial Grading section of this report.

Settlement

All building foundations should be designed for total settlement on the order of 1.0 inch and differential settlements on the order of 0.5 inch over 40 feet.

Retail Foundation Design Parameters

The following parameters may be utilized for retail use foundation design:

Slab Design Specifications:	Section 1808.6.2 of the 2010 CBC with WRI/CRSI Design of Slab-on-Grade Foundations using a PI of 30
Foundation Type:	Stiffened Slab
Minimum Exterior Footing Depth:	30 inches below lowest adjacent grade
Minimum Interior Footing Depth:	24 inches below top of slab
Minimum Footing Width:	12 inches
Allowable Bearing Value:	2000 psf - may be increased by 250 psf with each additional foot of width or depth to a maximum of 3000 psf
Ultimate Passive Resistance:	300 psf per ft of depth to a maximum of 3000 psf
Coefficient of Sliding:	0.35
Continuous Footing Reinforcement:	No less than four No. 4 bars; two placed near the top and two near the bottom of each footing.

Minimum Slab Thickness:	5-inches minimum
Minimum Slab Reinforcement:	No. 4 bars placed at 12 inches on center at mid-height.

Values of passive resistance should be reduced by one-third when combining friction. Passive resistance should be disregarded in the upper 6 inches to account for future ground disturbance.

Welded wire mesh is not recommended. Care should be taken to position the reinforcement bars in the center of the slab.

Residential Foundation Design Parameters

It is our understanding that a mat post-tension (PT) foundation system will be utilized. The PT mat foundation system should be designed for both potential expansion and settlement. The following parameters are presented assuming that the PTI method of design is utilized.

The following design parameters assume a high expansive soil condition and assume the structural design for the foundation will be in accordance with the Post-Tensioning Institute publication entitled "Design of Post-Tensioned Slabs on Ground," Third Edition.

Edge Moisture Variation Distance, e_m	
Edge Lift	4.2 feet
Center Lift	8.0 feet
Differential Swell, y_m	
Edge Lift	1.7 inches
Center Lift	0.9 inch

The above recommendation for differential swell in the edge lift condition requires a minimum edge beam embedment of 18 inches. A modulus of subgrade reaction of 125 pounds per cubic inch per inch may be utilized in the design of the selected foundation system.

Our foundation design recommendations assume that the moisture content of the subgrade soils will be maintained above the optimum moisture content (i.e., at least 5% over optimum) prior to and during foundation construction, that the site will be developed in a timely manner following construction of the selected foundation system, and that the site will be maintained in such a manner that extreme changes in soil moisture content do not occur.

Minimum Footing Depth:	18 inches below lowest adjacent grade
Minimum Footing Width:	12 inches
Allowable Bearing Value:	2000 psf - may be increased by 250 psf with each additional foot of width or depth to a maximum of 3000 psf
Ultimate Passive Resistance:	300 psf per ft of depth to a maximum of 3000 psf
Coefficient of Sliding:	0.35

Concrete

Based on the negligible sulfate exposure to concrete, no specific concrete recommendations are needed from a geotechnical perspective. However, based on the corrosive nature of the on-site soils to ferrous metal (and hence reinforcement) and to minimize the potential for flooring moisture problems, a minimum water cement ratio of 0.45 is recommended.

Final concrete mix design is beyond our purview. All applicable codes, ordinances, regulations, and guidelines should be followed in regard to designing a durable concrete with respect to the on-site soils and/or changes in the environment.

Moisture Vapor Retarder

It is recommended that a moisture vapor retarder be placed below all slab areas. The moisture barrier should be in minimum conformance with the specifications of Stego-Wrap 15 mil.

The moisture vapor retarder should be installed in accordance with the manufacturer's recommendations as well as with all applicable recognized installation procedures such as ASTM E 1643-98. The joints between the sheets and the openings for utility piping should be lapped and taped. The barrier should be lapped into the sides of the footing trenches. Punctures in the vapor barrier should be repaired prior to concrete placement.

It should be noted that the moisture vapor retarder is intended only to reduce moisture vapor transmissions from the soil beneath the concrete and is consistent with the current standard of the industry in commercial building construction in Southern California. It is not intended to provide a "waterproof" or "vapor proof" barrier or reduce vapor transmission from sources above the retarder. Sources above the retarder include any sand placed on top of the retarder (i.e., to protect the moisture vapor retarder during construction) and from the concrete itself (i.e., vapor emitted during the curing process). The evaluation of water vapor from any source and its effect on any aspect of the proposed

building space above the slab (i.e., floor covering applicability, mold growth, etc.) is outside our purview and the scope of this report.

Moisture Retarder Protection/Capillary Break

The moisture vapor retarder should overlie a capillary break consisting of a 4-inch layer of No. 4 U.S. Sieve (0.187 inch) minimum, up to 1 inch maximum, clean gravel for all retail structures. Residential moisture vapor retarder should overlie a 2-inch layer of clean sand.

The need for sand and/or the amount of sand above the moisture vapor retarders should be specified by the architect or structural engineer. The selection of sand above the retarders is not a geotechnical engineering issue and is hence outside our purview. However, if sand is to be placed above the barriers for this project, the sand should be placed in a dry condition.

Whether or not a sand layer is placed above the retarder, care should be taken to protect the retarder from tears or punctures during construction.

Floor Coverings

Prior to the placement of flooring, floor slabs should be properly cured and tested to verify that the water vapor transmission rate (WVTR) is compatible with the flooring requirements.

RETAINING WALL RECOMMENDATIONS

General

Proposed retaining walls up to 6 feet high are shown on the reference (5) conceptual grading plan. These retaining walls will likely be on-grade reinforced concrete masonry unit walls with spread footing foundation systems. The following recommendations reflect these conditions.

Minimum Footing Depth

All footings for the retaining wall must be a minimum depth of 24 inches below the lowest adjacent grade.

Bearing and Foundation Resistance

An allowable bearing pressure of 2000 pounds per square foot may be used for foundations at least 12 inches wide and embedded a minimum of 24 inches below the lowest adjacent grade. The bearing value may be increased by 200 psf for each additional foot of width up to a maximum of 3000 psf.

Lateral loads may be resisted by friction at the base of the foundations and by passive resistance within the adjacent earth materials. A coefficient of friction of 0.30 may be used between the foundations and the bearing material. Passive resistance equal to 300 pounds per square foot per foot of embedment may be assumed. The above values may be increased by one-third when designing for short duration wind or seismic forces. When combining passive resistance of lateral loads, the passive component should be reduced by one-third. In addition, passive resistance should be disregarded in the upper 6 inches to account for future ground disturbance. A seismic/dynamic lateral point load is not considered necessary for the proposed low-height retaining walls, but can be provided upon request.

Wall Backfill

In general, site walls should be backfilled to within 1 to 2 feet of final grade with granular material possessing a very low expansion potential (i.e., EI < 20). However, the final determination of the material to be used for backfill shall be made by the geotechnical engineer of record prior to use. Gravel backfill should possess a gradation that will not allow significant fines migration. Gravels such as open, poorly graded rock (i.e., ¾-inch rock) will require filter (Mirafi 140N or equivalent) to minimize the potential for migration of fines into the gravel. The width of this backfill zone should be equal to at least one-half the height of the wall. The on-site soils to be encountered during grading will likely <u>not</u> be suitable for this select backfill, and imported materials will be needed.

Fine-grained native soils should be used to cap the upper 2 feet of the select backfill zone where walls are greater than 3 feet in height. Where walls are less than 3 feet in height but greater than 2 feet, the fine-grained cap should not be greater than 1.5 feet, and where walls are less than 2 feet in height, the fine-grained cap should be limited to 1 foot.

All select and native wall backfill should be moisture conditioned as necessary to a minimum 2% over the optimum moisture content and compacted to at least 90% relative compaction as determined by ASTM Test Method D 1557. The unit weight of select and native wall backfill can be assumed to be 125 pcf.

Active Lateral Earth Pressure

The following equivalent fluid pressures in pounds per cubic foot are presented for their applicable condition for the retaining wall portions:

Level Backfill	Restrained Wall:	60 pcf
	Unrestrained Wall:	45 pcf
Sloping Backfill up to 2:1	Unrestrained Wall:	65 pcf
	Restrained Wall:	80 pcf

The above values assume that wall backfill will meet the above "Wall Backfill" criteria. The unrestrained values are applicable only when the walls are designed and constructed as cantilevered walls allowing sufficient wall movement to mobilize "active" pressure conditions. This wall movement should not be less than 0.01 H (H=height of wall) for the unrestrained values to be applicable. The structural engineer's retaining wall design will need to account for all loads and surcharges (i.e., building loads, traffic loads, etc.) in addition to that imposed by the wall backfill.

Drainage

Retaining walls should be constructed to provide for subdrainage at the back of the walls. A backdrain consisting of 4-inch-diameter perforated plastic pipe surrounded by at least 1 cubic foot of an approved filter material per lineal foot of pipe is recommended.

For site walls, the wall design should attempt to provide backdrain outlets spaced no greater than about every 200 feet. Alternatively, backdrain systems should outlet into area drain or storm drain facilities. Backdrain gradients should not be less than 1% where possible.

Waterproofing

The back side of all retaining walls should be waterproofed prior to placing subdrains or backfill.

Control Joints

The structural engineer should place vertical joints at regular intervals, at angle points, and at other locations where differential movement is likely to occur.

Concrete

Based on the negligible sulfate exposure to concrete, no specific concrete recommendations are needed from a geotechnical perspective. The minimum strength of the concrete should be determined by the structural engineer.

Retaining Wall Plan Review

Prior to construction, all retaining wall plans should be reviewed by our office to confirm proper application of the geotechnical recommendations.

SCREEN WALLS

For standard screen walls on flat ground, the following minimum recommendations should be utilized:

- Screen wall footings should be a minimum 24 inches deep and reinforced with two #5 bars
- Joints in the wall should be placed at regular intervals on the order of 10 to 20 feet.

CONCRETE FLATWORK

Flatwork subgrade soils should be moisture conditioned to at least 2% over optimum moisture content to a depth of 12 inches, and compacted to at least 90% relative compaction. The geotechnical engineer of record should verify the subgrade moisture conditioning and compaction prior to placing concrete.

The proposed concrete flatwork should be designed to accommodate movements from highly expansive soils. Flatwork should be constructed in accordance with the criteria provided on Plate 4 – Flatwork Recommendations. All other aspects of concrete design for flatwork (i.e., concrete mix design, curing, type and location of joints, etc.) are outside our purview.

PAVEMENT DESIGN

Asphalt Pavement Design

To evaluate the required thickness of asphalt pavement for various locations and traffic indices at the site, several R-value tests were performed on a near surface bulk sample collected at the site. Based on an R-value of 12 at the completion of grading, the following pavement thicknesses should be anticipated:

Table V

Location	R-Value	Traffic Index	Asphalt Concrete (in.)	Aggregate Base (in.)
Parking Stalls	12	4.0	3.0	6.0
Drive Aisles	12	5.5	4.0	9.0

Final design sections should be based on additional R-value testing performed at the completion of grading of the specific locations. Actual R-values for subgrade soils may be higher at the completion of grading depending on how the on-site soils are blended during grading operations.

Concrete Pavement Design

Driveways and appurtenant concrete paving, such as loading docks and trash receptacle bays, will require Portland cement concrete (PCC) pavement. Assuming a T.I. of 6 to 7, a design section of 8 inches of PCC over 6 inches AB should be adequate. The AB should be compacted to a minimum of 95% relative compaction as per ASTM D 1557.

Interlocking Concrete Pavers

Drive aisles and non-traffic areas that are surfaced with interlocking concrete pavers over aggregate base should utilize the following preliminary structural sections:

Table VI

Location	R-Value	Traffic Index	Interlocking Paver * (in)	Aggregate Base (in.)
Non-traffic Areas	12	NA	3.0	6.0
Parking Stalls	12	4.0	3.0	9.0
Drive Aisles	12	5.5	3.0	13.0

* Assumes a 1.0-inch thick layer of leveling sand below interlocking paver

Additional recommendations for concrete interlocking pavers can be provided during review of precise grading plans. Preliminary design should include a geotextile fabric, such as Mirafi 600X, placed on top of compacted subgrade prior to placement of aggregate base, bedding sand, and interlocking paving stone. Additionally concrete pavers should meet the requirements of ASTM C936 with a minimum compressive strength of 8,000 psi per ASTM C140. The aggregate base should be compacted to at least 95% relative compaction. Final design sections should be based on additional R-value testing performed at the completion of grading of the specific locations.

CORROSION PROTECTION OF METAL STRUCTURES

The results of the laboratory chemical tests of samples taken within and adjacent to the subject area indicate that the on-site soils are severely corrosive to ferrous metals. Consequently, structures that will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, metal door frames, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. Use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. However, the need for additional protection, such as epoxy coating to reinforcing elements, is outside our purview and should be determined by a corrosion engineer. The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary). Alternatively, the on-site soils can be considered corrosive to copper. The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements is beyond our purview.

TRENCH BACKFILL CONSIDERATIONS

Backfill compaction of irrigation and utility trenches should be such that no significant settlement will occur. Backfill for all of these trenches should be compacted to at least 90% relative compaction subject to sufficient observation and testing. In the event that granular material having a sand equivalent of 30 or greater is used for backfill and this material is thoroughly flooded into place, extensive testing is not required. If native material with a sand equivalent less than 30 is used for backfill, it should be placed above optimum moisture content and mechanically compacted to at least 90% relative compaction. Jetting or flooding will not densify native soil materials with a sand equivalent less than 30 due to its silty to clayey nature. Also, jetting or flooding of granular material should not be used to consolidate backfill in trenches adjacent to any foundation elements. We suggest that these recommendations be included as a specification in all subcontracts for underground improvements.

SURFACE DRAINAGE

All site drainage should be in minimum accordance with the CBC and City of Goleta requirements. Maintaining positive drainage of all landscaping areas along with avoiding over-irrigation will help minimize the possibility of "perched" groundwater accumulating slightly below the graded surfaces. Surface drainage should be carefully controlled during and after grading to prevent ponding and to avoid uncontrolled runoff onto adjacent streets and/or properties. Particular care will be required

during grading to maintain temporary berms, swales, and other erosion control measures needed to direct runoff toward temporary or permanent surface drainage facilities.

LANDSCAPE ADJACENT TO BUILDINGS

Planters placed within 15 feet of the building should be constructed with both subdrains and surface area drains to drain excess water away from the foundation systems. In general, landscape areas adjacent to buildings should be sloped in minimum accordance with the CBC and City of Goleta requirements. It is further recommended that landscape areas that have plants with root structures deeper than 12 inches should utilize planter subdrains that slope away from the buildings and connect to the site storm drain system. Roof drains and surface planter drains should also be considered so that rain water and surface landscape water do not pond next to the building perimeters and will drain away from the buildings into the site storm drain system. The locations of the drains and outlets will need to be based on a review of the landscape plans. Subterranean and surface planter drains which drain into the site storm drain system should also be considered in the site design in order to further mitigate lateral migration of landscape or nuisance water.

PLAN REVIEW / GEOTECHNICAL TESTING DURING GRADING / FUTURE REPORTS

Plan Review

GMU should review the final plans for the site and comment on any significant variations from the plans reviewed in this report. The following plans should be reviewed by GMU when they are available:

- Final grading plan
- Foundation plans for retail buildings
- Foundation plans for residential buildings
- Retaining wall plans
- Pool and recreation area plans

Geotechnical Testing

Geotechnical observation and testing should be performed by the geotechnical engineer of record during the following stages of construction in order for the recommendations in this report to be valid:

- During site clearing and grubbing
- During demolition and removal of any existing structures
- During all phases of grading including remedial grading, scarification, ground preparation, moisture conditioning, proof-rolling, and placement and compaction of all fill materials
- During construction of all foundations
- During all utility trench backfill
- During subgrade preparation for all pavement, hardscape, and flatwork areas
- During placement and compaction of all aggregate base
- During placement and compaction of all asphalt concrete
- When any unusual conditions are encountered

Future Reports

A Report of Geotechnical Observation and Testing will be required at the completion of grading and on-site construction.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and construction will be identical to those observed and sampled during our study or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the grading and use of the property.

Because our conclusions and recommendations are based on a limited amount of geotechnical exploration and analysis, all parties should recognize the need for possible revisions to our conclusions and recommendations during grading of the project. If differing conditions are encountered during construction, our firm should be notified immediately so that we can reevaluate the applicability of our conclusions and recommendations and provide our revised conclusions and recommendations. It should be further noted that the recommendations presented herein are intended solely to minimize the effects of post-construction soil movements. Consequently, minor cracking and/or distortion of all on-site improvements should be anticipated.

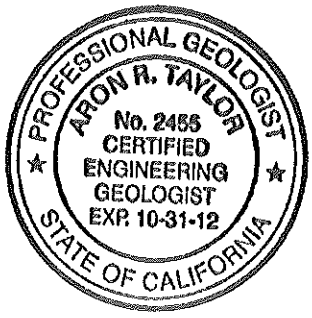
SUPPORTING DATA

The following Plates and Appendices that complete this report are listed in the Table of Contents.

Respectfully submitted,

GMU GEOTECHNICAL, INC.

Chandler Koehn, PE, GE 2895
Senior Geotechnical Engineer



Aron R. Taylor, M.S., PG, CEG 2455
Principal Engineering Geologist

REFERENCES

Site-Specific References

(1) Our "Fault Investigation Report for Proposed Development at Hollister Avenue and South Glen Annie Road, Goleta, Santa Barbara County, California," dated September 21, 2007 (GMU Proj. No. 07-036-00).

(2) Our "Report of Percolation Testing at Westar Goleta Mixed Use Village, Hollister Avenue, City of Goleta, California," dated February 16, 2009 (GMU Proj. No. 07-036-00).

(3) Our "Preliminary Geotechnical Overview Report, Goleta Mixed Use Village, Hollister Avenue, City of Goleta, California," dated September 18, 2009 (GMU Proj. No. 07-036-00).

(4) "Goleta Mixed Use Village, Site Plan," prepared by Penfield & Smith, dated July 7, 2011.

(5) "Goleta Mixed Use Village, Conceptual Grading and Drainage Plan," prepared by Penfield & Smith, dated August 23, 2010.

General References

General Street Specifications, County of Santa Barbara, CA – Department of Pacific Works – Roads Division, 1987.

Goleta General Plan/Coastal Land Use Plan, EIR, September 2006.

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Gurrola, L. D., 2005, Earthquake Hazard of the Santa Barbara Fold Belt, Santa Barbara, California, unpub. UC Santa Barbara Dissertation, 224 p.

Minor, S.A. Kellogg, K.S., Stanley, R.G., Stone, P., Powell, II, C.L., Gurrola, L.D., Setling, A.J., and Brandt, T.R. 2002, rev. 2006, Preliminary Geologic Map of the Santa Barbara Coastal Plain Area, Santa Barbara County, California. (http://pubs.usgs.gov/of/2002/ofr-02-0136).

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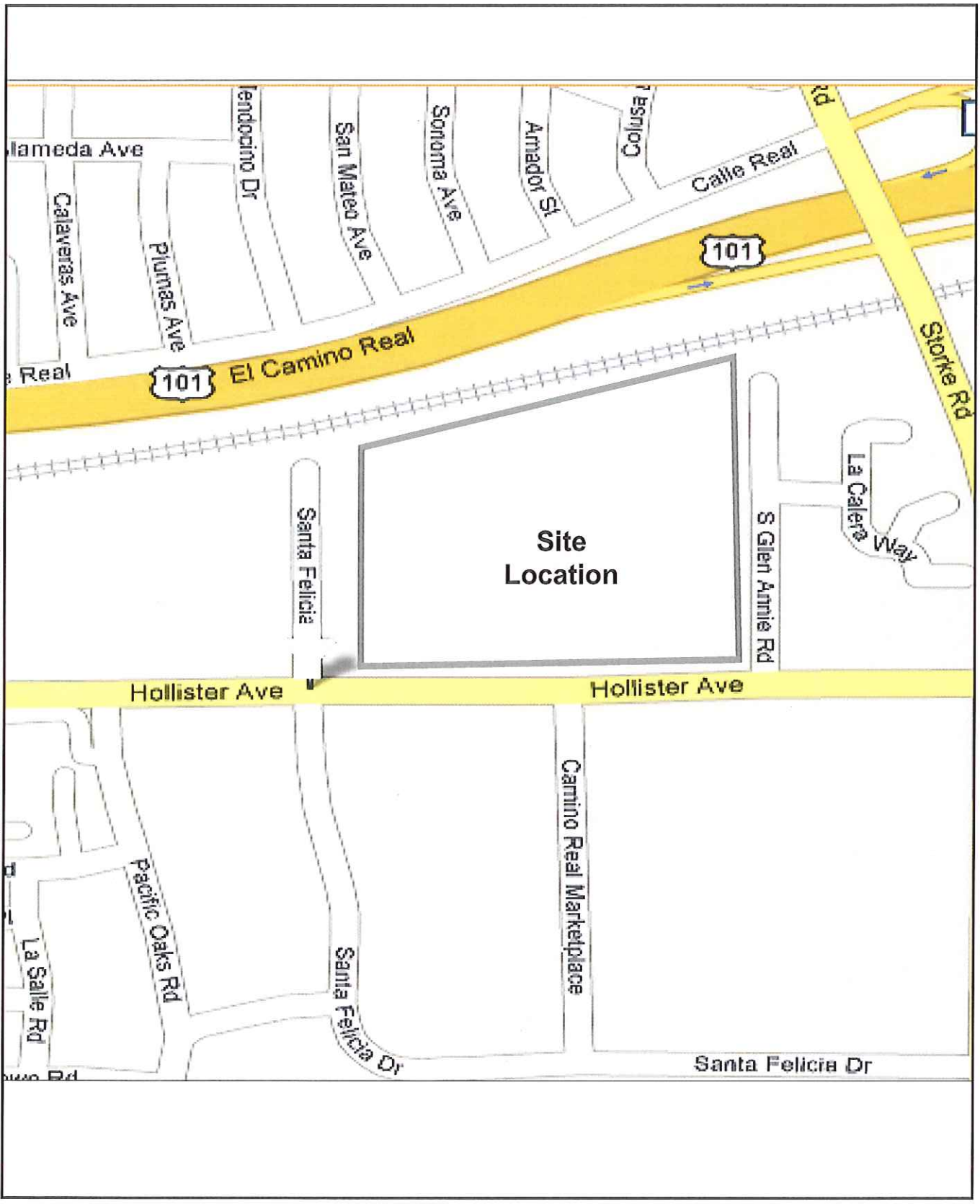
Zhang, G., Robertson, P.K., and Brachman, R., 2002, Estimating Liquefaction Induced Ground Settlements from the CPT, Canadian Geotechnical Journal, Vol. 39: pp 1168-1180.

Zhang, G., Robertson, P.K., Brachman, R., 2004, Estimating Liquefaction Induced Lateral Displacements using the SPT and CPT, ASCE, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 130, No. 8, pp 861-871.



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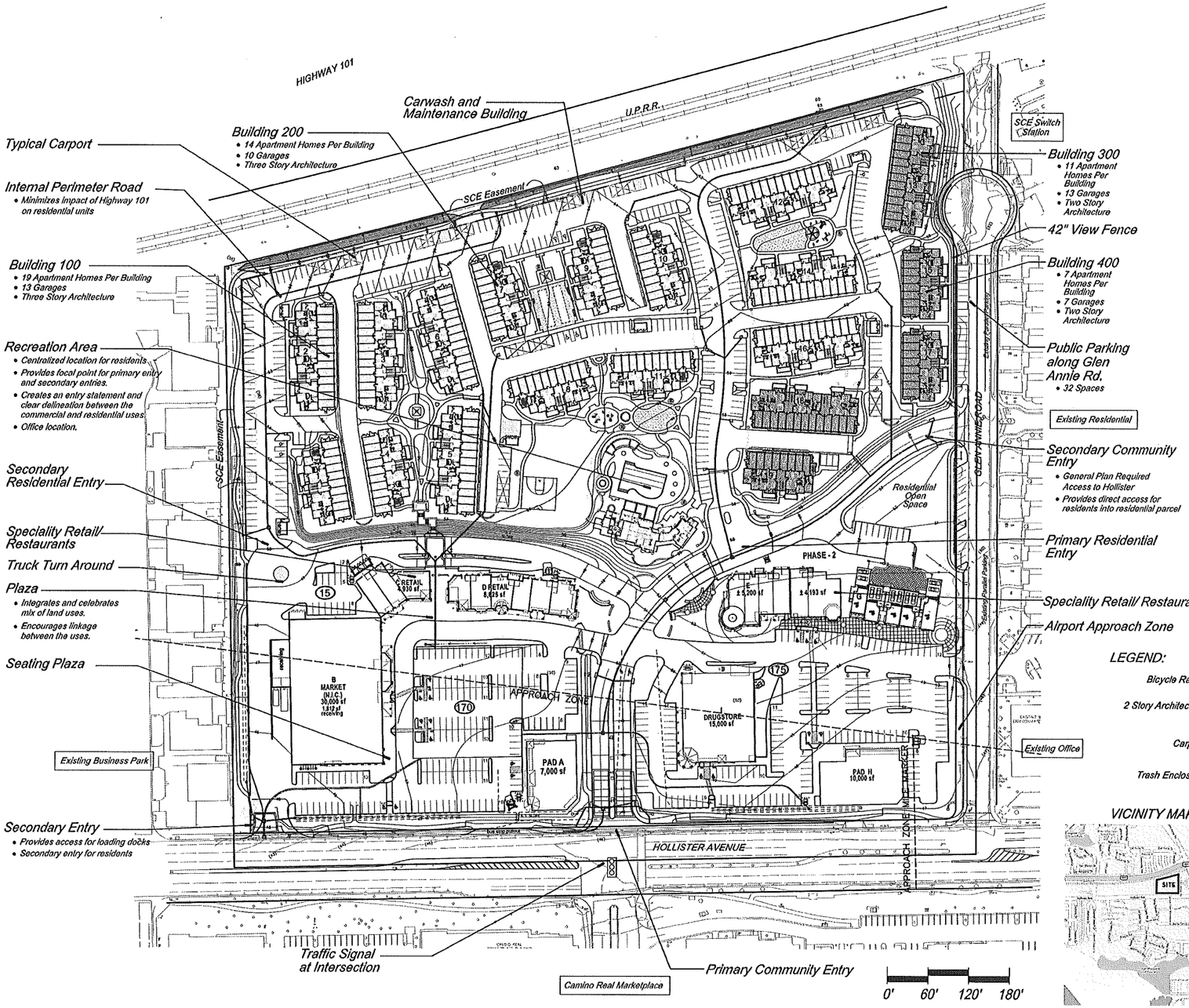
GMU GEOTECHNICAL, INC.

Location Map

Project Name:	Project No: 07-036-00	Date:

Plate 1



LEGEND:

- Bicycle Racks (B)
- 2 Story Architecture
- Carport
- Trash Enclosure

VICINITY MAP:

Total Project Summary

Total Site Area:	23.55 Acres ±
Residential:	13.7 Acres ±
Retail:	9.85 Acres ±
Total Units:	274 Homes (Plus 5 live work units in retail)
Total Retail:	90,054 s.f.
Residential Density:	20.0 Homes/Acre ±

Retail Land Use Summary:

Building Coverage:	90,054s.f.	21.0% (Includes total live work footprint area of 3,094 SF)
Open Space:	108,240 s.f.	25.3%

Retail Project Summary:

Total Retail SF:	90,060 SF ±
Pad A:	7,000 s.f.
Market B:	31,812 s.f.
Shops C:	4,930 s.f.
Shops D:	8,825 s.f.
Shops E:	±5,200 s.f.
Shops F:	±4,193 s.f.
* Live Work G: (Work Space Only)	±3,100 s.f.
Future Restaurant H:	10,000 s.f.
Drug I:	15,000 s.f.

Retail Parking Summary:

Total Spaces Required:	204 Spaces
Restaurant 1/300 s.f. (17,000 SF) 57 Required	
Retail 1/500 s.f. (73,060 SF) 147 Required	
Total Spaces Provided: 347 Open & 13 HCAP	360 Spaces (4.05 / 1000 sf)

* Plan 1 - Live Work 1618 S.F., 3 Bdrm, 2 Bath ± 520 S.F. Work Space, 2 Car Garage	3 Units
Plan 2 - Live Work 1789 S.F., 3 Bdrm, 2.5 Bath + 867 S.F. Work Space, 2 Car Garage	2 Units
	5 Units

Residential Land Use Summary:

Building Coverage:	133,116 s.f.	22.3%
Open Space:	253,563 s.f.	42.5%
Streets/ Sidewalks:	210,093 s.f.	
Total:	596,772 s.f. (13.7 acres)	

Residential Unit Summary :

Plan A1 678 S.F., 1 Bdrm, 1 Bath	63 Units
Plan A2 718 S.F., 1 Bdrm, 1 Bath	33 Units
Plan B1 949 S.F., 2 Bdrm, 2 Bath	16 Units
Plan B2 955 S.F., 2 Bdrm, 2 Bath	33 Units
Plan B3 1,132 S.F., 2 Bdrm, 2 Bath	16 Units
Plan B4 1,149 S.F., 2 Bdrm, 2 Bath	33 Units
Plan B5 1,149 S.F., 3 Bdrm, 2 Bath Garage Access	19 Units
Plan B6 1,177 S.F., 2 Bdrm, 2 Bath Garage Access	09 Units
Plan C1 1,260 S.F., 3 Bdrm, 2 Bath	33 Units
Plan C2 1,355 S.F., 3 Bdrm, 2 Bath Garage Access	19 Units
	274 Units

Residential Parking Summary:

Total Spaces Required:	533 Spaces (1.95 sp/du)
Residents:	478 Spaces
Visitor:	55 Spaces
Total Spaces Provided:	542 Spaces (1.97 sp/du)
Garages:	208 Spaces
Carports:	66 Spaces
Open:	259 Spaces
HCAP:	9 Spaces

13.7 AC. RESIDENTIAL ZONING ANALYSIS

	ALLOWED	PROVIDED
• GENERAL PLAN:	Medium Density	Medium Density
• ZONING: - Use	Retail Commercial	RD-20
• LOT AREA: - Density	20 Du/ Ac.	20 Du/ Ac.
• BUILDING SEPARATIONS 19.100-18: - Side to Side - Front to Front - Side to Front	- - -	20'± Min. per C.B.C. Per CBC Per CBC
• BUILDING HEIGHT: - # of Stories	35' N.A.	35'± 2 & 3 Stories
• SETBACKS: - Front - Side East - Side West - Rear	- 20' 20' 20'	- 100' Min. 20' Min. 64' Average
• PARKING REQUIREMENTS: - One Bedroom	1 Space per Du. (96 spaces req.)	533 Spaces Required
- Two Bedroom	2 Spaces per Du. (252 spaces req.)	
- Three Bedroom	2.5 Spaces per Du. (130 spaces req.)	
- Guest	1 Space per 5 Du. (55 spaces req.)	
- Handicap	- -	9 Spaces
• PARKING SIZE: - Standard	8.5'x16.5'	9'x18'
• PARKING ACCESS (19.580.060B): - Aisle width	28.5'	28.5'
• OPEN SPACE: - Common Area - Private (Patios & Decks)	40% -	43% -
• BUILDING COVERAGE:	30%	21.7%

NOTES:
1. NFP 13 R Fire System Required (Under C.B.C. Increase to NFPA 13)
2. Type of Construction: VB, 3- Story
3. Group: R1U
4. F.S.D. > 10'-0" (20'-4")

08-143-GPA-RZ-OA-TM (TM 32,048) -DP-CUP-DRB

GOLETA MIXED USE VILLAGE GOLETA, CA

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LANDSCAPE ARCHITECTURE

Penfield & Smith
Engineering · Surveying · Planning · Construction Management
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Phone: (805) 963-9532 Fax: (805) 966-9801

JUL 07 2011

SITE PLAN

SP

GMU Plate 2.1

EARTHWORK QUANTITIES

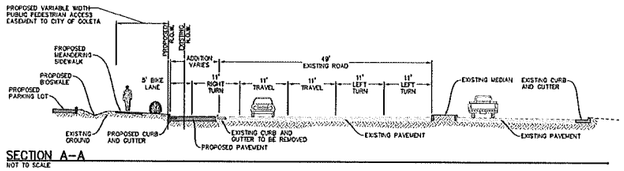
ESTIMATED EARTHWORK QUANTITIES

RAW CUT = 48,100 C.Y.
RAW FILL = 39,500 C.Y.

THE ABOVE QUANTITIES ARE APPROXIMATE IN PLACE VOLUMES CALCULATED FROM THE EXISTING GROUND TO THE PROPOSED FINISH GRADE OR SUBGRADE. EXISTING GROUND IS DEFINED BY THE TOPOGRAPHIC CONTOURS AND/OR SPOT ELEVATIONS ON THE PLAN. PROPOSED FINISH GRADE IS DEFINED AS THE DESIGN SURFACE ELEVATION OF EARTH TO BE CONSTRUCTED. PROPOSED SUBGRADE ELEVATION IS DEFINED AS THE DESIGN SURFACE ELEVATION OF EARTH TO BE CONSTRUCTED BENEATH PAVEMENTS OR STRUCTURES.

THE ABOVE QUANTITIES ARE FOR BUILDING PERMIT PURPOSES ONLY AND HAVE NOT BEEN FACTORED TO INCLUDE ALLOWANCES FOR BULKING, CLEARING AND GRUBBING, SUBSIDENCE, SHRINKAGE, OVER EXCAVATION AND RECOMPACTION, UNDERGROUND UTILITY AND SUBSTRUCTURE SPOILS AND CONSTRUCTION METHODS.

THE CONTRACTOR SHALL PERFORM AN EARTHWORK ESTIMATE FOR THE PURPOSE OF PREPARING A LUMP SUM BID PRICE FOR EARTHWORK. THE BID PRICE SHALL INCLUDE COSTS FOR ANY NECESSARY IMPORT AND PLACEMENT OF EARTH MATERIALS OR THE EXPORT AND PROPER DISPOSAL OF EXCESS EARTH MATERIALS.



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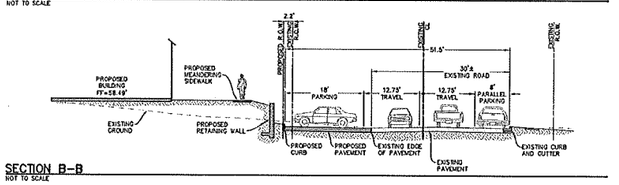

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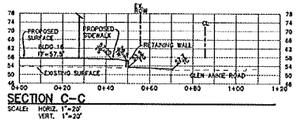

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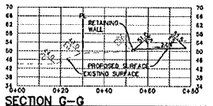

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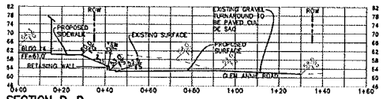

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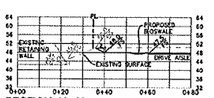

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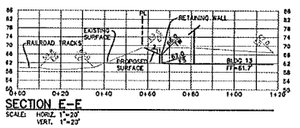

SECTION E–E
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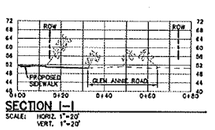
VERT. 1"=20'



SECTION I–I
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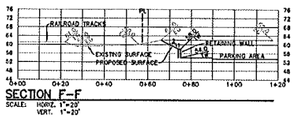
VERT. 1"=20'



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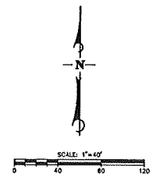
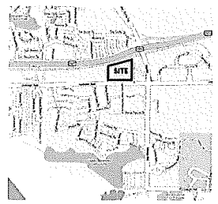




CONCEPTUAL GRADING AND DRAINAGE PLAN
08-143-GPA-RZ-OA TM (TM 32048)-DP-CUP-DRB
AUGUST 23, 2010

Goleta Mixed Use Village

Goleta, CA

Westar Associates

WESTAR ASSOCIATES

CPAC architects

LAND CONCERN Landscape Architecture

WILLIAM HEZMALHALCH ARCHITECTS INC

Penfield & Smith Engineering · Surveying · Planning · Construction Management

C-1

GMU Plate 2.2

RECORD EASEMENTS

LISTED PER PRELIMINARY TITLE REPORT ORDER NO. 4201-2270091, PREPARED BY FIRST AMERICAN TITLE COMPANY, DATED FEBRUARY 3, 2006. PENFIELD AND SMITH CANNOT WARRANT THE COMPLETENESS OR ACCURACY OF THIS REPORT.

(A) A THREE FOOT WIDE EASEMENT IN FAVOR OF FIRST NATIONAL TRUST AND SAVINGS BANK OF SANTA BARBARA FOR WATER LINE PURPOSES RECORDED AUGUST 31, 1936, INSTRUMENT No. 6690 IN BOOK 370, PAGES 346 OF OFFICIAL RECORDS. (ITEM 7)

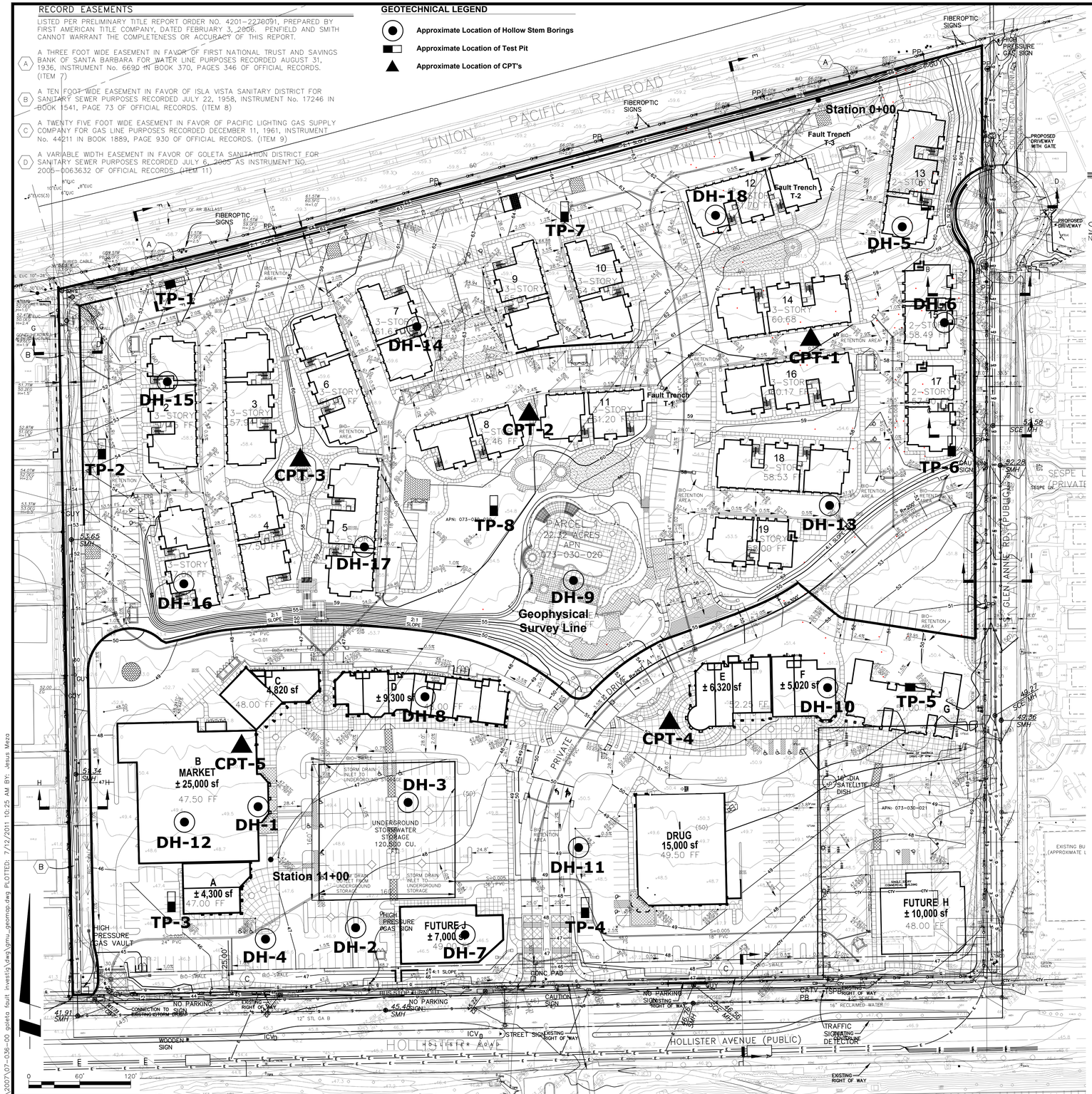
(B) A TEN FOOT WIDE EASEMENT IN FAVOR OF ISLA VISTA SANITARY DISTRICT FOR SANITARY SEWER PURPOSES RECORDED JULY 22, 1958, INSTRUMENT No. 17246 IN BOOK 1541, PAGE 73 OF OFFICIAL RECORDS. (ITEM 8)

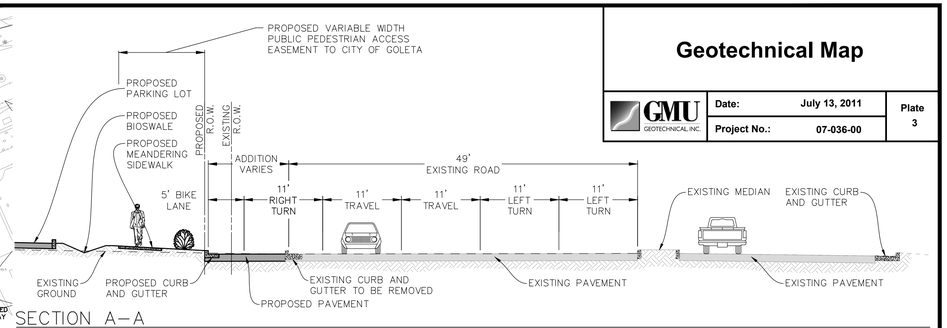
(C) A TWENTY FIVE FOOT WIDE EASEMENT IN FAVOR OF PACIFIC LIGHTING GAS SUPPLY COMPANY FOR GAS LINE PURPOSES RECORDED DECEMBER 11, 1961, INSTRUMENT No. 44211 IN BOOK 1889, PAGE 930 OF OFFICIAL RECORDS. (ITEM 9)

(D) A VARIABLE WIDTH EASEMENT IN FAVOR OF GOLETA SANITATION DISTRICT FOR SANITARY SEWER PURPOSES RECORDED JULY 6, 2005 AS INSTRUMENT NO. 2005-0063632 OF OFFICIAL RECORDS. (ITEM 11)

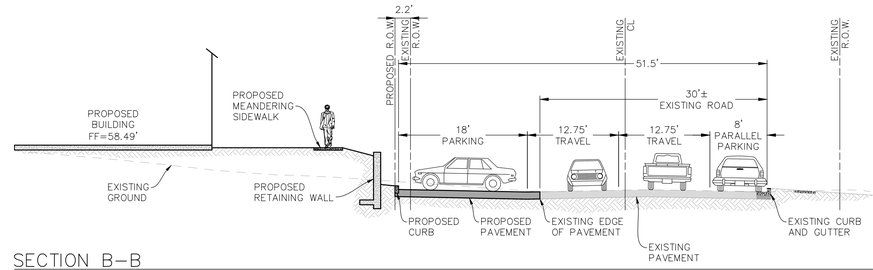
GEOTECHNICAL LEGEND

- Approximate Location of Hollow Stem Borings
- Approximate Location of Test Pit
- Approximate Location of CPT's





SECTION A–A
NOT TO SCALE



SECTION B–B
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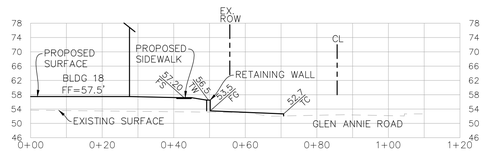

SECTION C–C
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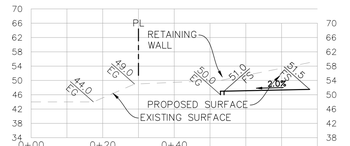
VERT. 1"=20'



SECTION G–G
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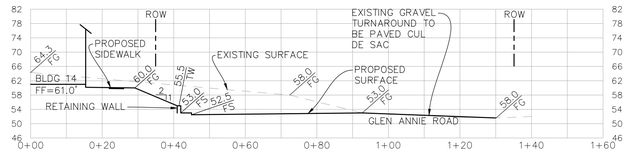
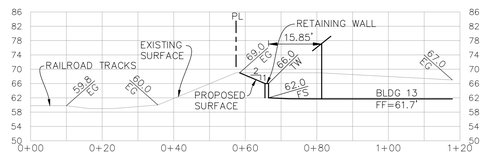
VERT. 1"=20'



SECTION D–D
SCALE: HORIZ. 1"=20'
VERT. 1"=20'



SECTION E–E
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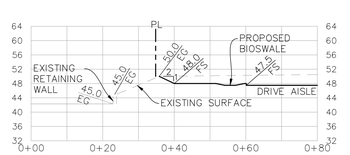
VERT. 1"=20'



SECTION H–H
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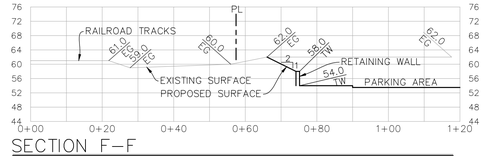
VERT. 1"=20'



SECTION F–F
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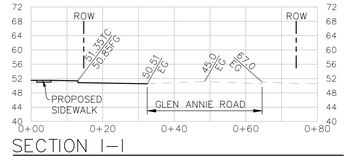
VERT. 1"=20'



SECTION I–I
SCALE: HORIZ. 1"=20'
VERT. 1"=20'

Geotechnical Map

GMU GEOTECHNICAL, INC.

Date:	July 13, 2011	Plate 3
Project No.:	07-036-00	

REFERENCES:
DRAWING FILE: 15944A1.DWG
DATA FILE:
PROJECT FILE:
VIEW NAME:
XREF NAME(S):
DATE: 3-16-06

BENCHMARK:
SEE SURVEYOR'S NOTES SHEET 1

DATUM:
SEE SURVEYOR'S NOTES SHEET 1

CLIENT:
WESTAR ASSOCIATES
2925 BRISTOL STREET
COSTA MESA, CA 92626-5991
(714) 241-0400
ATTN: MARILYN RUSSELL

NO.	DATE	REVISIONS	APPD.
1	3-20-06	UPDATE FLIGHT APPROCH LIMITS	

Penfield & Smith
ENGINEERS • SURVEYORS
101 E. VICTORIA ST. SANTA BARBARA
(805) 963 – 9532 CALIFORNIA 93101
MAILING ADDRESS: P.O. BOX 98 (93102)

DRAWN ACF/KSH CHECKED
KENNETH J. WILSON DATE: 3-16-06
PROJECT SURVEYOR
P.L.S. 7911 (EXP. 12-31-07)

COUNTY OF SANTA BARBARA, CALIFORNIA
FIELD PARTY: RAE-CJG, CGG-KJF, MAC-SKW
DATE OF SURVEY: 8-22-03 & 3-13&15-06

A.L.T.A./A.C.S.M. LAND TITLE SURVEY
PARCEL "B" OF PARCEL MAP NO. 11218
GOLETA, CALIFORNIA
MARCH 2006

WORK ORDER 15944.02
SHEET 3 OF 3
DWG: 15944A1.DWG

35-SIB-C DRAWING: o:\2007\07-036-00 goleta fault investig\dwg\gmu_geomap.dwg PLOTTED: 7/12/2011 10:25 AM BY: Jesus Mazo

FLATWORK RECOMMENDATIONS
Westar Goleta Mixed Use Village

GMU GEOTECHNICAL, INC.

Description	Subgrade Preparation	Minimum Concrete Thickness (Full)	Cut-off Barrier or Edge Thickness	Reinforcement[2]	Joint Spacing (Maximum)	Cement Type	Sulfate Resistance
Sidewalks and Walkways <10 Feet Wide	1) 2% over optimum to 12"[1], 2) Minimum 2 full inches of sand or well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	4"	Not Required	#3 bars @ 18" o.c.; also dowel into adjacent curb where applicable	5 feet	II or II/V	(3)
Walkways or Flatwork ≥10 Feet Wide	1) 2% over optimum to 12"[1], 2) Minimum 2 full inches of sand or well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	5"	12" below adjacent finish grade. Min. 8" width	1) Slab - #3 bars @ 18" o.c. bent into cut-off; 2) Cut-off - one #3 bar placed in long direction	10 feet	II or II/V	(3)

(1) The moisture content of the subgrade must be verified by the geotechnical consultant prior to sand/rock placement.
(2) Reinforcement to be placed at or above the mid-point of the slab (i.e., a minimum of 2.0 to 2.5 inches above the prepared subgrade).
(3) The site has negligible levels of sulfates as defined by the CBC. Concrete mix design is outside the geotechnical engineer's purview.

General Note: Minor deviations to the above recommendations may be required during construction at the discretion of the geotechnical engineer or his representative.

APPENDIX A

Geotechnical Exploration Procedures, Test Pit Logs, and CPT Results

GMU GEOTECHNICAL, INC.

APPENDIX A

GMU GEOTECHNICAL EXPLORATION PROCEDURES, TEST PIT LOGS, AND CPT RESULTS

Our exploration at the subject site consisted of 12 hollow stem auger borings, 5 cone penetration test soundings (CPT), and 8 backhoe test pits. Six additional hollow stem auger borings and three fault trenches were previously conducted by GMU. The estimated locations of the explorations are shown on Plate 1 – Geotechnical Map. Our drill holes and test pits were logged, and bulk and undisturbed samples of the soils were collected. "Undisturbed" samples were taken with a 3.0-inch outside-diameter split spoon drive sampler which contained 2.416-inch-diameter brass sample sleeve 6 inches in length. Additionally, standard penetration testing (SPT) with a 2.0-inch outside diameter split spoon sampler was performed in the borings during advancement per ASTM Test Standard 1586. Blow counts recorded during sampling from the drive sampler and SPT are shown on the drill hole logs. The logs of each boring and test pit are contained in this Appendix A, and the Legend to Logs is presented as Plate A-1.

Cone penetration test probes utilized a 30-ton CPT rig pushing a 15 cm^2 cone with 2.5 cm depth sounding intervals. A downhole shear wave survey with 5-foot depth interval readings was also obtained on the CPT-3 sounding. Results of the five CPT soundings are also contained in this Appendix A.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the description and classification that appear on the logs are intended to be that which most accurately describe a given interval of a boring or test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study and is summarized as follows:

a. Soil Type - per Legend to Logs

b. Color - at field moisture

c. Moisture - (as estimated during exploration)
"dry" - very little or no moisture
"damp" - some moisture but less than optimum for compaction
"moist" - near optimum
"very moist - above optimum
"wet/saturated"- containing free moisture

d. Grain size - "fine", "medium" and "coarse"

e. Density (granular soils)
"very loose"
"loose"
"medium dense"
"dense"
"very dense"

f. Consistency (cohesive soils)
"very soft"
"soft"
"firm"
"stiff"
"very stiff"
"hard"

MAJOR DIVISIONS			Group Letter	Symbol	TYPICAL NAMES
COARSE-GRAINED SOILS More Than 50% Retained On No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	GRAVELS 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW		Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
			GP		Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
		Gravels With Fines	GM		Silty Gravels, Gravel-Sand-Silt Mixtures.
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures.
	SANDS More Than 50% of Coarse Fraction Passes No.4 Sieve	Clean Sands	SW		Well Graded Sands and Gravelly Sands, Little or No Fines.
			SP		Poorly Graded Sands and Gravelly Sands, Little or No Fines.
		Sands With Fines	SM		Silty Sands, Sand-Silt Mixtures.
			SC		Clayey Sands, Sand-Clay Mixtures.
FINE-GRAINED SOILS 50% or More Passe The No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	SILTS AND CLAYS Liquid Limit Less Than 50%		ML		Inorganic Silts, Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts With Slight Plasticity.
			CL		Inorganic Clays of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays.
			OL		Organic Silts and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS Liquid Limit 50% or Greater		MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.
			CH		Inorganic Clays of High Plasticity, Fat Clays.
			OH		Organic Clays of Medium To High Plasticity, Organic Silts.
HIGHLY ORGANIC SOILS			PT		Peat and Other Highly Organic Soils.

ADDITIONAL TESTS

DS = Direct Shear
HY = Hydrometer Test
TC = Triaxial Compression Test
UC = Unconfined Compression
CN = Consolidation Test
(T) = Time Rate
EX = Expansion Test
CP = Compaction Test
PS = Particle Size Distribution
EI = Expansion Index
SE = Sand Equivalent Test
AL = Atterberg Limits
FC = Chemical Tests
RV = Resistance Value
SG = Specific Gravity
SU = Sulfates
CH = Chlorides
MR = Minimum Resistivity
pH
(N) = Natural Undisturbed Sample
(R) = Remolded Sample
CS = Collapse Test/Swell-Settlement

SAMPLE SYMBOLS

Undisturbed Sample (California Sample)
Undisturbed Sample (Shelby Tube)
Bulk Sample
Unsuccessful Sampling Attempt
SPT Sample

10: 10 Blows for 12-Inches Penetration
6/4: 6 Blows Per 4-Inches Penetration
P: Push
(13): Uncorrected Blow Counts ("N" Values) for 12-Inches Penetration- Standard Penetration Test (SPT)

GEOLOGIC NOMENCLATURE

B = Bedding
S = Shear
C = Contact
F = Fracture
J = Joint
Flt = Fault
RS = Rupture Surface

▼ = Groundwater

GMU GEOTECHNICAL, INC.

LEGEND TO LOGS

ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate
A-1

P8-1/1/2002

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 1

Sheet 1 of 2

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drilling	Total Depth of Drill Hole	25.5 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	49.5
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SANDY SILT (ML); tan, damp, firm, fine grained sand						
			MARINE TERRACE (Qtm)		Becomes moist		(38)	140	16	115	
45	5				Becomes stiff						
					Becomes reddish brown		(52)	140	12	116	
40	10						(53)	140	17	113	
							(64)	140	19	110	
35	15						(53)	140	18	110	
					SILTY SAND (SM); light reddish brown, moist, dense, fine grained		(68)	140	12	117	
30											

DH_REV3 07-036-00.GPJ GMULAB.GPJ 7/12/11

GMU GEOTECHNICAL, INC.

Drill Hole DH- 1

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 1

Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					SILTY SAND (SM); light reddish brown, moist, dense, fine grained						
					Some tan Silty Sand beds		(45)	140	17	102	
25	25						(78/9")	140	9	106	

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 1

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH- 2** Sheet 1 of 2

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drilling	Total Depth of Drill Hole	21.5 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	47.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		CLAYEY SAND (SC); brown, moist, medium dense, fine grained						
45			**MARINE TERRACE (Qtm)**		SILTY SAND (SM); reddish brown, moist, medium dense, fine grained						
	5						(36)	140	12	110	
40											
	10				Becomes tan to reddish brown, and dense		(49)	140	19	107	
35											
	15		Hard drilling from 15 to 20 feet		Same as above, with increase in sand content		(43)	140	13	107	
30											

DH_REV3 07-036-00.GPJ GMULAB.GPJ 7/12/11

GMU GEOTECHNICAL, INC.

Drill Hole DH- 2

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					SILTY SAND (SM); tan to reddish brown, moist, dense, fine grained		(43)	140	22	109	
25											

DH_REV3 07-036-00.GPJ GMULAB.GPJ 7/12/11

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH- 3** Sheet 1 of 1

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drilling	Total Depth of Drill Hole	15.0 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	49.5
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		CLAYEY SAND (SC); brown, moist, medium dense, fine grained						
45	5		**MARINE TERRACE (Qtm)**		SILTY SAND (SM); reddish brown, moist, medium dense to dense, fine grained						
40	10										
					CLAYEY SILT (ML); reddish brown, moist, stiff						
35	15										

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 3

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 4

Sheet 1 of 1

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drilling	Total Depth of Drill Hole	10.0 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	46.5
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		CLAYEY SAND (SC); brown, moist, medium dense, fine grained						
45			MARINE TERRACE (Qtm)		SILTY SAND (SM); reddish brown, moist, medium dense to dense, fine grained						
	5										
40											
	10										

DH_REV3 07-036-00.GPJ GMULAB.GPJ 7/12/11

GMU GEOTECHNICAL, INC.

Drill Hole DH- 4

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH- 5** Sheet 1 of 1

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drillling	Total Depth of Drill Hole	16.5 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	64.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		CLAYEY SAND (SC); brown, moist, medium dense, fine grained						
			MARINE TERRACE (Qtm)		SILTY SAND (SM); reddish brown, moist, medium dense to dense, fine grained						
60	5				Becomes dense		(72)	140	9	114	
55	10						(51)	140	10	110	
50	15						(70/8")	140	10	118	

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 5

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 6

Sheet 1 of 1

Date(s) Drilled	February 11, 2009	Logged By	JSC	Checked By	ART
Drilling Method	Hollow Stem Auger	Drilling Contractor	S&G Drilling	Total Depth of Drill Hole	7.0 feet
Drill Rig Type		Diameter(s) of Hole, inches	12	Approx. Surface Elevation, ft MSL	55.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qafu)		CLAYEY SAND (SC); brown, very moist, loose, some AC fragments						
			MARINE TERRACE (Qfm)		SILTY SAND (SM); reddish brown, moist, medium dense, fine grained						
50	5										

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 6

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH- 7** Sheet 1 of 2

Date(s) Drilled	6/13/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	47.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
45			**TOPSOIL** some caliche		SILTY CLAY (CL); brown, damp, firm to stiff, some sand						
			MARINE TERRACE (Qtm)								
	5				CLAYEY SAND to SANDY CLAY (SC-CL); reddish brown, moist, very stiff/dense, fine to coarse grained, some gravel of subrounded to rounded rocks and subangular siltstone		44	140	14	117	
40											
	10				CLAYEY SILT (ML); reddish brown, moist, very stiff, some fine grained sand		41	140	18	111	
35											
	15		few charcoal				39	140	16	111	
30											

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 7

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 7

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					increase in sand, fine to medium grained, some rounded gravel		76/11"	140	10	118	
	25										
	25				SAND (SW); light tan to white, damp, very dense, fine to medium grained, to GRAVELLY SAND (SW); reddish brown, moist, very dense, fine to coarse grained with rounded to subrounded gravel up to 1/2" diameter, not well cemented		67	140	9	105	

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 8

Sheet 1 of 2

Date(s) Drilled	6/13/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	53.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SILTY SAND (SM); brown, dry to damp, firm, fine to medium grained						
			MARINE TERRACE (Qtm)								
50									13		PS, CP, AL, FC, DS
	5		rootlets		CLAYEY SILT (ML); reddish brown, damp to moist, very stiff, some fine to medium grained sand, some rootlets		59	140	12	98	
45											
	10		some pinhole porosity		increase in clay, then grades into SANDY CLAY (CL); light brown to tan, damp, very stiff to hard, fine to medium grained		93/10"	140	14	113	
40											
	15		rootlets, charcoal, some pinhole sized pores		CLAYEY SAND to SAND (SC-SP); light reddish brown, moist, medium dense, fine to medium grained		31	140	17	99	CN
35											

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 8

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 8

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			numerous pinhole sized pores		CLAYEY SAND (SC); mottles orange and tan, very dense, fine to medium grained		70	140	9	107	CN
30											
	25		trace pinhole porosity				25	140	9	105	CN

DH_REV3 07-036-00.GPJ GMULAB.GPJ 7/12/11

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH- 9** Sheet 1 of 2

Date(s) Drilled	6/13/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	54.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SILTY CLAY (CL); brown, damp, soft, some sand						
			MARINE TERRACE (Qtm)								
50	5		pinhole porosity, some orangey clayey sand and siltstone gravel		SILTY SAND (SM); brown, moist, medium dense to dense, fine to coarse grained		40		10	117	
45	10				CLAYEY SILT (ML); reddish brown, moist, stiff, grades into more clayey material		(13)		15		
40	15		few charcoal		SILTY CLAY (CL); reddish brown to orange brown, moist, stiff to very stiff, some fine to medium grained sand		32		14	111	
35											

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GMU GEOTECHNICAL, INC.

Drill Hole DH- 9

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH- 9

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SILTY CLAY (CL); mottled gray, orangey brown, reddish brown, and yellowish brown, moist, very stiff		(19)		18		
30											
	25				some fine to medium grained sand		70		17	115	

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location:** Hollister Ave, Goleta, CA **Project Number:** 07-036-00	**Log of Drill Hole DH-10** Sheet 1 of 2

Date(s) Drilled	6/13/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	51.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
50			**TOPSOIL**		SILTY CLAY to CLAYEY SILT (CL-ML); brown to light gray brown, dry, firm to stiff						
	5		**MARINE TERRACE (Qtm)** some pinhole porosity		SAND (SP); brown, damp to moist, stiff to very stiff, fine to medium grained, grades into a SILTY CLAY to SANDY CLAY (CL); brown, damp to moist, stiff to very stiff		(26)	140	10		
45											
	10		few charcoal		CLAYEY SAND (SC); reddish brown, damp to moist, dense to very dense, fine to coarse grained, becomes more clayey at tip of sampler		65	140	5	126	
40											
	15		sandy to clayey with a thin gravel layer		CLAYEY SAND (SC); tan to orange brown, damp, dense, fine to medium grained, overlying a CLAY (CL); orange brown to brown, moist, stiff, some mottling		(19)	140	18		
35											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-10

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-10

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
30			abundant pinhole porosity		SILTY CLAY (CL); brown to orange brown, moist, stiff to very stiff		43	140	19	109	
	25				SANDY SILT (SM); mottled tan, orange brown, and brown, moist, very stiff, fine grained, some clay		(35)	140	10		
25											

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location: Hollister Ave, Goleta, CA** **Project Number: 07-036-00**	**Log of Drill Hole DH-11** Sheet 1 of 3

Date(s) Drilled	6/13/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	51.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	49.0
Groundwater Depth [Elevation], feet	36.7 [12.3]	Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SILTY CLAY (CL); brown, damp, firm to stiff, some sand						
45	5		**MARINE TERRACE (Qtm)**		CLAYEY SILT (ML); brown to light brown, damp, very stiff to hard		(31)	140	10		PS
40	10		some sand and gravel layers within the clayey silt		GRAVELLY SAND (SP); tan to orangey brown, damp, very dense, medium grained with gravel		80	140	4	119	CN
35	15		no porosity		CLAYEY SILT to SANDY SILT (ML); light orange brown, damp to moist, stiff, fine grained		(16)	140	14		
30											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-11

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-11

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			some charcoal, some pinhole sized pores		SILTY CLAY to CLAYEY SAND (CL-SC); mottled light tan, orangey brown, and brown, damp to moist, very stiff		56	140	15	115	CN
25	25				SILTY CLAY to CLAYEY SILT (CL-ML); mottled orange, brown, and gray, moist, stiff		(16)	140	19		
20	30				CLAYEY SILT (ML); mottled orange, gray and brown, moist, stiff, some fine grained sand		48	140	17	110	CN
15	35				SAND (SP); orange brown, wet, medium dense to dense, fine to coarse grained		(30)	140	20		
			Groundwater at 36'9"								
10	40				SAND (SP); gray, wet, dense to very dense, fine to medium grained		50/6"	140	15	107	
5											

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-11

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SAND (SP); gray, saturated, very dense, fine to medium grained		50/1"	140	20		
0											
	50		Saturated sand in sampler tip above a concretionary layer of sandstone, sandstone is oxidized and stained red at the contact		SAND (SP); gray, damp, very dense, fine to coarse grained		50/4"	140	19	107	

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH-12** Sheet 1 of 3

Date(s) Drilled: 6/13/2011	Logged By: KMF	Checked By:
Drilling Method: Hollow Stem Auger	Drilling Contractor: 2R Drilling	Total Depth of Drill Hole: 51.0 feet
Drill Rig Type: CME 55	Diameter(s) of Hole, inches: 6	Approx. Surface Elevation, ft MSL: 49.0
Groundwater Depth [Elevation], feet: 35.0 [14.0]	Sampling Method(s): Open drive sampler with 6-inch sleeve	Drill Hole Backfill: Native
Remarks		Driving Method and Drop: 140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SILTY CLAY (CL); brown, damp, soft, some sand						
			MARINE TERRACE (Qtm)								
45	5				SAND to CLAYEY SAND (SP-SC); light brown with some orange mottling, dry, very dense, fine to very coarse grained		74/11"	140	8		PS
40	10		some charcoal		SANDY CLAY (CL); brown to reddish brown, damp, stiff to very stiff, very fine to medium grained, becomes CLAY (CL); dark brown, damp, stiff to very stiff		(21)	140	17		
35	15		some orange and brown mottling		layers of SILT (ML); tan to orange, dry to damp, very stiff; SILTY CLAY (CL); dark brown to brown, damp, very stiff; and SAND (SP); tan to light brown, dry to damp, dense to very dense		43	140	16	110	CN
30											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-12

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-12

Sheet 2 of 3

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SILTY SAND (SM); gray to light orangey tan, damp, dense, fine grained		(48)	140	5		
25	25				SAND (SP); light gray to light orangey tan, damp, dense, fine to medium grained, grades into GRAVELLY SAND (SP); mottled dark brown to orangey brown with some gray and black, fine grained sand to gravel less then 1/3" in diameter		83/11"	140	14	111	CN
20	30		gravelly sand within a clay matrix		SILTY CLAY to CLAYEY SILT (CL-ML); brown to orange brown, damp to moist, stiff, some fine grained sand		(18)	140	17		
15	35		Groundwater interbedded clay, silt, and sand		CLAY (CL); dark brown, moist, very stiff; SAND (SP); light brown, wet, dense, fine to medium grained; and SILT (ML); light tan, damp, very stiff to hard		50/6"	140	15	115	CN
10	40				SAND (SP); gray, saturated, very dense, fine to coarse grained, some very coarse grained		(86)	140	19		
5											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-12

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-12

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
						○	50/6"	140			
0											
	50				SAND (SP); gray to tannish gray, saturated, very dense, fine to coarse grained, grades into a finer grained SAND (SP); orangish tan with some black mottling, 1" layer of medium to coarse grained gray and black sand within the finer grained orangish tan sand		(78/11")	140	21		

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH-13** Sheet 1 of 3

Date(s) Drilled: 6/13/2011	Logged By: KMF	Checked By:
Drilling Method: Hollow Stem Auger	Drilling Contractor: 2R Drilling	Total Depth of Drill Hole: 51.0 feet
Drill Rig Type: CME 55	Diameter(s) of Hole, inches: 6	Approx. Surface Elevation, ft MSL: 53.0
Groundwater Depth [Elevation], feet: 40.0 [13.0]	Sampling Method(s): Open drive sampler with 6-inch sleeve	Drill Hole Backfill: Native
Remarks		Driving Method and Drop: 140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
50			**TOPSOIL**		SILTY SAND (SM); brown, damp, loose to medium dense, fine to coarse grained						
			MARINE TERRACE (Qtm)								
	5				SANDY CLAY (CL); red brown, damp to moist, very stiff, fine to coarse grained		65	140	15	116	
45											
	10		clast supported gravelly sand contains pea sized pieces of siltstone and sandstone in a coarse sand and clay matrix		SANDY CLAY (CL); red brown, damp to moist, very stiff, fine to coarse grained, becomes a CLAYEY SAND (SC); light brown to tan, damp, dense to very dense, grades into a GRAVELLY SAND with CLAY (SP); mottled orange, black, gray and brown, damp, very stiff to hard		85/11"	140	7	113	
40											
	15		few charcoal		SAND (SP); light brown, damp to moist, dense, fine to medium grained		59	140	8	110	
35											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-13

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
30					SANDY CLAY to SILTY CLAY (CL); reddish brown, moist, very stiff, fine to coarse grained		71	140	16	116	
	25				CLAYEY SILT to SILTY CLAY (ML-CL); mottled brown, orange, gray, and some black, moist, very stiff		40	140	20	107	
25											
	30				SAND (SP); light brown, damp to moist, dense, fine to medium grained with some coarse grained sand, becomes a CLAYEY SAND (SC); orange and light tan, moist, dense to very dense, fine to medium grained		50/4"	140	11	98	
20											
	35		charcoal		SANDY CLAY (CL); reddish brown with some gray mottling, very dense		73	140	11	116	
15											
	40		Groundwater at 40'		CLAYEY SAND (SC); orangish brown, moist, dense to very dense, grades into a CLAYEY SILT to SILTY CLAY (ML-CL); orangish brown to brown with some black mottling, moist, stiff to very stiff, some sand		72	140	21	106	
10											

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-13

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SAND (SP); light gray, saturated, dense, fine to medium grained		50/5"	140	22	102	
	5										
	50		numerous shell pieces and a 3" in diameter subangular cobble within the sampler		SAND (SP); grayish brown, saturated, medium dense, fine to coarse grained		50/5"	140	25	95	

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH-14** Sheet 1 of 3

Date(s) Drilled: 6/14/2011	Logged By: KMF	Checked By:
Drilling Method: Hollow Stem Auger	Drilling Contractor: 2R Drilling	Total Depth of Drill Hole: 51.0 feet
Drill Rig Type: CME 55	Diameter(s) of Hole, inches: 6	Approx. Surface Elevation, ft MSL: 60.0
Groundwater Depth [Elevation], feet: 48.0 [12.0]	Sampling Method(s): Open drive sampler with 6-inch sleeve	Drill Hole Backfill: Native
Remarks		Driving Method and Drop: 140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL abundant roots		CLAYEY SAND (SC); brown to dark brown, damp, medium dense, fine to medium grained, grades into coarser grained						
			MARINE TERRACE (Qtm)								
55	5		porous		SANDY CLAY to CLAYEY SAND (CL-SC); reddish brown, damp, very stiff, fine to very coarse grained		48		12	120	PS, AL
50	10		few charcoal		SILTY CLAY to SANDY CLAY (CL); light brown to brown, damp to moist, very stiff		86		14	113	
45	15				SILTY SAND (SM); orangish tan, damp, very dense, fine to medium grained		67		9	107	

GMU GEOTECHNICAL, INC.

Drill Hole DH-14

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-14

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			charcoal		SILTY SAND (SM); orange and tan mottled, samp, very stiff, grades into a SANDY CLAY (CL); brown, moist, very stiff to hard		92/10"		10	119	
35	25		pinhole sized porosity in silty clay		SILTY CLAY to SANDY CLAY (CL); brown and orange mottled, moist, very stiff, overlying a SANDY CLAY to CLAYEY SAND (CL-SC); tan and orange mottled, moist, very stiff to hard, less porous then above		84/10"		10	119	
30	30				SILTY CLAY (CL); brown and orange mottled, moist, very stiff, and SILTY SAND (SM); orangish tan, moist, very dense, fine to medium grained		74		16	117	
25	35				SANDY CLAY to SILTY CLAY (CL); brown, moist, very stiff, fine grained		75		13	113	
20	40				SAND (SP); tan, moist to wet, very dense, fine to medium grained		50/6"		14	121	

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GMU GEOTECHNICAL, INC.

Drill Hole DH-14

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-14

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SAND (SP); tan, wet, very dense, fine to medium grained		50/6"		13	93	
			Groundwater at 48'								
10	50				some coarse grained sand with some black Mg staining		50/5"		25	92	
							(71)		25		

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Drill Hole DH-15** Sheet 1 of 2

Date(s) Drilled	6/14/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, Inches	6	Approx. Surface Elevation, ft MSL	60.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		CLAYEY SILT (ML); brown, damp, loose, roots						
			MARINE TERRACE (Qtm)								
55	5		rootlets		CLAYEY SAND to SANDY CLAY (SC-CL); light brown to brown, damp, medium dense to dense, fine to coarse grained		(35)	140	9		PS, AL
50	10				CLAYEY SAND (SC); brown to orangish brown, dry to damp, dense to very dense, fine to coarse grained, overlying a thin layer of SILT (ML); tan, damp, very stiff, overlying CLAY (CL); brown to reddish brown, damp to moist, very stiff		66	140	14	112	
45	15				CLAY (CL); mottled brown and red, damp to moist, stiff, with thin lenses of SILT (ML); light brown, moist, very stiff, some fine grained sand		(20)	140	17		

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GMU GEOTECHNICAL, INC.

Drill Hole DH-15

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-15

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SANDY CLAY (CL); brown, orange, and tan, damp to moist, very stiff to hard, some black and orange staining		82/5"	140	14	121	
35	25				SILTY SAND (SM); tan to orange, damp, medium dense to dense, fine to medium grained		(33)	140	11		PS

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location: Hollister Ave, Goleta, CA** **Project Number: 07-036-00**	**Log of Drill Hole DH-16** Sheet 1 of 2

Date(s) Drilled	6/14/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	55.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			TOPSOIL		SILTY CLAY (CL); brown, damp, soft, some sand						
			MARINE TERRACE (Qtm)						16		PS, HY, AL, RV
50	5				SILTY CLAY (CL); brown, damp, very stiff, then CLAYEY SAND (SC); light brown, dry to damp, hard		73	140	12	121	
45	10				SILTY CLAY to CLAYEY SAND (CL-SC); tan to dark brown, dry to damp, very stiff, fine to coarse grained		50/6"	140	16	113	
40	15				CLAYEY SILT to SILTY CLAY (ML-CL); brown to light brown, damp to moist, very stiff, some fine grained sand		54	140	22	107	

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Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-16

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					SAND to CLAYEY SAND (SP-SC); orangish tan, damp, very dense, fine to medium grained		50/4"	140	12	113	
30	25						78/11"	140	11	120	

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location:** Hollister Ave, Goleta, CA **Project Number:** 07-036-00	**Log of Drill Hole DH-17** Sheet 1 of 2

Date(s) Drilled	6/14/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	56.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	NUMBER OF BLOWS	DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
55	0		**TOPSOIL**		CLAYEY SILT (ML); brown, dry to damp, loose to firm						
			MARINE TERRACE (Qtm)								
	5				CLAYEY SILT (ML); orangish brown, moist, very stiff to hard, some fine to coarse grained sand		85/11"	140	9	114	FC
50											
	10										
45											
	15				CLAY (CH) dark brown, damp, very stiff to hard; and CLAYEY SAND to SANDY CLAY (SC-CL); brown with some orange mottling, damp, stiff, very dense, fine to coarse grained		60	140	11	117	
40											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-17

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-17

Sheet 2 of 2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
35											
	25				SILT (ML); tan and orange mottled, damp to moist, very stiff, overlying a CLAYEY SAND (SC); orangish tan, moist, very dense, fine to coarse grained		50/6"	140	6	119	
30											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-17

Project: Westar Goleta Mixed Use Village **Project Location:** Hollister Ave, Goleta, CA **Project Number:** 07-036-00	**Log of Drill Hole DH-18** Sheet 1 of 2

Date(s) Drilled	6/14/2011	Logged By	KMF	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	26.0 feet
Drill Rig Type	CME 55	Diameter(s) of Hole, inches	6	Approx. Surface Elevation, ft MSL	64.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 6-inch sleeve	Drill Hole Backfill	Native
Remarks	No Groundwater; No Caving			Driving Method and Drop	140 lbs; 30" drop

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
60			**TOPSOIL**		SANDY SILT (SM); brown, dry to damp, loose to firm, fine grained						
	5		**MARINE TERRACE (Qtm)**		SILTY CLAY to SANDY CLAY (CL); brown to orange brown, damp, very stiff		54	140	16	114	PS, AL
55											
	10				SILTY SAND (SM); orange to brown, damp, medium dense		(18)	140	6		PS
50											
	15				SAND to CLAYEY SAND (SP-SC); orange brown, moist, dense, fine to medium grained		64	140	8	108	
45											

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GMU GEOTECHNICAL, INC.

Drill Hole DH-18

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Drill Hole DH-18

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
					coarser grained		(35)	140	6		
40	25				SAND (SW); gray to white to light tan, moist, very dense, fine to coarse grained		50/6"	140	4	104	

GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Test Pit TP- 1

Sheet 1 of 1

Date(s) Excavated: 6/15/2011	Logged By: KMF	Checked By:
Excavation Equipment: Backhoe	Excavation Contractor: Schwan Brothers	Total Depth of Test Pit: 15.0 feet
Sampling Method(s): NA		Approx. Surface Elevation, ft MSL: 63.0
Groundwater Depth [Elevation], feet: NA []	Test Pit Dimensions: Width: 3 ft; Length: 28 ft; Depth: 15 ft	
Remarks: No Groundwater; No Caving		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
0	**TOPSOIL** disturbed top soil and highly weathered marine terrace numerous roots and highly porous in the top 2'	SANDY SILT (SM); light brown, dry, loose fine to medium grained CLAYEY SILT to SILTY CLAY (ML-CL); brown, damp to moist, soft to firm, abundant pin hole sized pores	62	0						
2	**MARINE TERRACE (Qtm)** Relatively flat alternating 0.5' to 1' thick beds of silty clay to sandy clay	SANDY SILT (SM); mottled light gray, orange, and brown, damp, very stiff, fine grained	60	2						
4		SILTY CLAY (CL); mottled brown and orange, samp to moist, very stiff, some fine grained sand less mottled SILTY CLAY (CL); brown to dark brown, moist, very stiff	58	4						
6	Krotovina infilled with sand and silty clay	becomes more orangish brown SANDY CLAY to SILTY CLAY (CL); dark brown to orange brown, to brown, moist, very stiff	56	6						
8			54	8						
10			52	10						
12			50	12						
14				14						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Test Pit TP- 2** Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	14.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	55.0
Groundwater Depth [Elevation], feet	NA ▯	Test Pit Dimensions	Width: 2 ft; Length: 28 ft; Depth: 14 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
0	**TOPSOIL** rootlets to 5', abundant pinhole sized pores to 3'	SANDY SILT (SM); light brown to brown, damp, loose, fine grained								
		CLAYEY SILT to SILTY CLAY (ML-CL); brown, damp, firm, some fine to medium grained sand	54							
2		SANDY SILT (SM); mottled light gray, orange, and brown, damp, very stiff, fine grained		2						
	MARINE TERRACE (Qtm) highly weathered to about 6', rootlets and columnar pedogenic surfaces	SANDY CLAY (CL); dark brown to reddish brown, damp to moist, very stiff, fine to coarse grained	52							
4				4						
		CLAYEY SAND (SC); reddish brown, damp to moist, dense, fine to coarse grained	50							
6				6						
			48							
8				8						
			46							
10				10						
			44							
12				12						
			42							
14				14						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location:** Hollister Ave, Goleta, CA **Project Number:** 07-036-00	**Log of Test Pit TP- 3** Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	47.0
Groundwater Depth [Elevation], feet	NA ▯	Test Pit Dimensions	Width: 2 ft; Length: 19 ft; Depth: 10 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
	TOPSOIL Contains charcoal and/or mg staining, rootlets and highly porous in top 2'	SANDY SILT (SM); light brown, dry, loose, fine to medium grained								
		CLAYEY SILT (ML); light grayish brown, damp, firm, abundant porosity	46							
2	**MARINE TERRACE (Qtm)**	SANDY CLAY (CL); orangish brown, moist, stiff, fine to coarse grained		2						
		grades downward to...	44							
4		CLAYEY SAND (SC); reddish brown, moist, dense, fine to coarse grained		4						
			42							
6				6						
		SILTY CLAY (CL); reddish brown to brown, damp, very stiff, grades down to a SANDY CLAY (CL); brown to reddish brown	40							
8				8						
			38							
10				10						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Test Pit TP- 4** Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	48.0
Groundwater Depth [Elevation], feet	NA []	Test Pit Dimensions	Width: 2 ft; Length: 16 ft; Depth: 10 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
0	**TOPSOIL**	SILTY CLAY (CL); brown, damp, firm to stiff, some sand								RV
	platy pedogenic surfaces in top 1', abundant pores to 3'	decrease in clay, increase in sand								
2			46	2						
		SANDY SILT (ML); light brown with some orange staining, damp, stiff								
	MARINE TERRACE (Qtm)	CLAY (CH); orange brown, moist, firm								
4			44	4						
	Krotovina									
		SANDY CLAY (CL); orange brown, moist, stiff								
6			42	6						
8		SILT (ML); tan to orangey tan, damp, stiff	40	8						
10			38	10						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village **Project Location: Hollister Ave, Goleta, CA** **Project Number: 07-036-00**	**Log of Test Pit TP- 5** Sheet 1 of 1

Date(s) Excavated: 6/15/2011	Logged By: KMF	Checked By:
Excavation Equipment: Backhoe	Excavation Contractor: Schwan Brothers	Total Depth of Test Pit: 10.0 feet
Sampling Method(s): NA		Approx. Surface Elevation, ft MSL: 50.0
Groundwater Depth [Elevation], feet: NA []	Test Pit Dimensions: Width: 2 ft; Length: 20 ft; Depth: 10 ft	
Remarks: No Groundwater; No Caving		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
0	**TOPSOIL**	SILTY CLAY (CL); brown, damp, soft, some fine grained sand								
		CLAYEY SILT (ML); light gray brown, dry, firm to stiff								
2	topsoil/highly weathered terrace	SILTY CLAY (CL/CH); brown to orange brown, moist, stiff	48	2						
4			46	4						
6	**MARINE TERRACE (Qtm)**	SANDY CLAY (CL); orangey brown, moist, stiff, fine to coarse grained, grades down to SILTY CLAY (CL); reddish brown, moist, stiff, some sand	44	6						
8			42	8						
10			40	10						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Test Pit TP- 6** Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	54.0
Groundwater Depth [Elevation], feet	NA []	Test Pit Dimensions	Width: 2 ft; Length: 20 ft; Depth: 10 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
2	**TOPSOIL** abundant pinhole sized pores	SILTY CLAY to SANDY CLAY (CL); brown, damp, loose firm to stiff	52	2						
4	topsoil/highly weathered terrace	SILTY CLAY (CH); brown, moist, stiff, some orange staining	50	4						
6	**MARINE TERRACE (Qtm)**	CLAYEY SILT (ML); light orange brown, damp to moist, very stiff	48	6						
8		CLAYEY SAND to SANDY CLAY (SC-CL); red brown, damp to moist, stiff, fine to coarse grained	46	8						
10		SANDY SILT (ML); light brown, damp	44	10						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village Project Location: Hollister Ave, Goleta, CA Project Number: 07-036-00	**Log of Test Pit TP- 7** Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	63.0
Groundwater Depth [Elevation], feet	NA ▯	Test Pit Dimensions	Width: 2 ft; Length: 19 ft; Depth: 10 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
	TOPSOIL	CLAYEY SILT to SILTY CLAY (ML-CL); brown, moist, soft/loose								
	abundant pinhole sized pores, rootlets to 2'	hardens downward	62							
2	topsoil/highly weathered terrace	firm to stiff		2						
		CLAY (CH); brown, moist, firm to stiff	60							
4				4						
	MARINE TERRACE (Qtm)	SANDY CLAY (CL); reddish brown, moist, stiff to very stiff, fine to medium grained	58							
6				6						
			56							
8				8						
			54							
10				10						

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GMU GEOTECHNICAL, INC.

Project: Westar Goleta Mixed Use Village
Project Location: Hollister Ave, Goleta, CA
Project Number: 07-036-00

Log of Test Pit TP- 8

Sheet 1 of 1

Date(s) Excavated	6/15/2011	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	Schwan Brothers	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	NA			Approx. Surface Elevation, ft MSL	55.0
Groundwater Depth [Elevation], feet	NA []	Test Pit Dimensions	Width: 2 ft; Length: 20 ft; Depth: 10 ft		
Remarks	No Groundwater; No Caving				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: MAXIMUM DENSITY, pcf	TEST DATA: ADDITIONAL TESTS
0	**TOPSOIL** abundant pores within topsoil	SILTY CLAY (CL); brown, damp, soft, some sand	54	0						
2	**MARINE TERRACE (Qtm)** infilled root holes to about 5'	CLAYEY SILT (ML); light grayish tan, dry, firm to stiff SANDY CLAY (CL); brown with orange mottling, damp to moist, firm to stiff, fine to medium grained, grades downward to a CLAYEY SAND	52	2						
4				4						
		CLAYEY SAND (SC); brown to orange brown, moist, dense, fine to coarse grained	50							
6		CLAYEY SILT (ML); orangey brown, moist, stiff		6						
			48							
8				8						
			46							
10				10						

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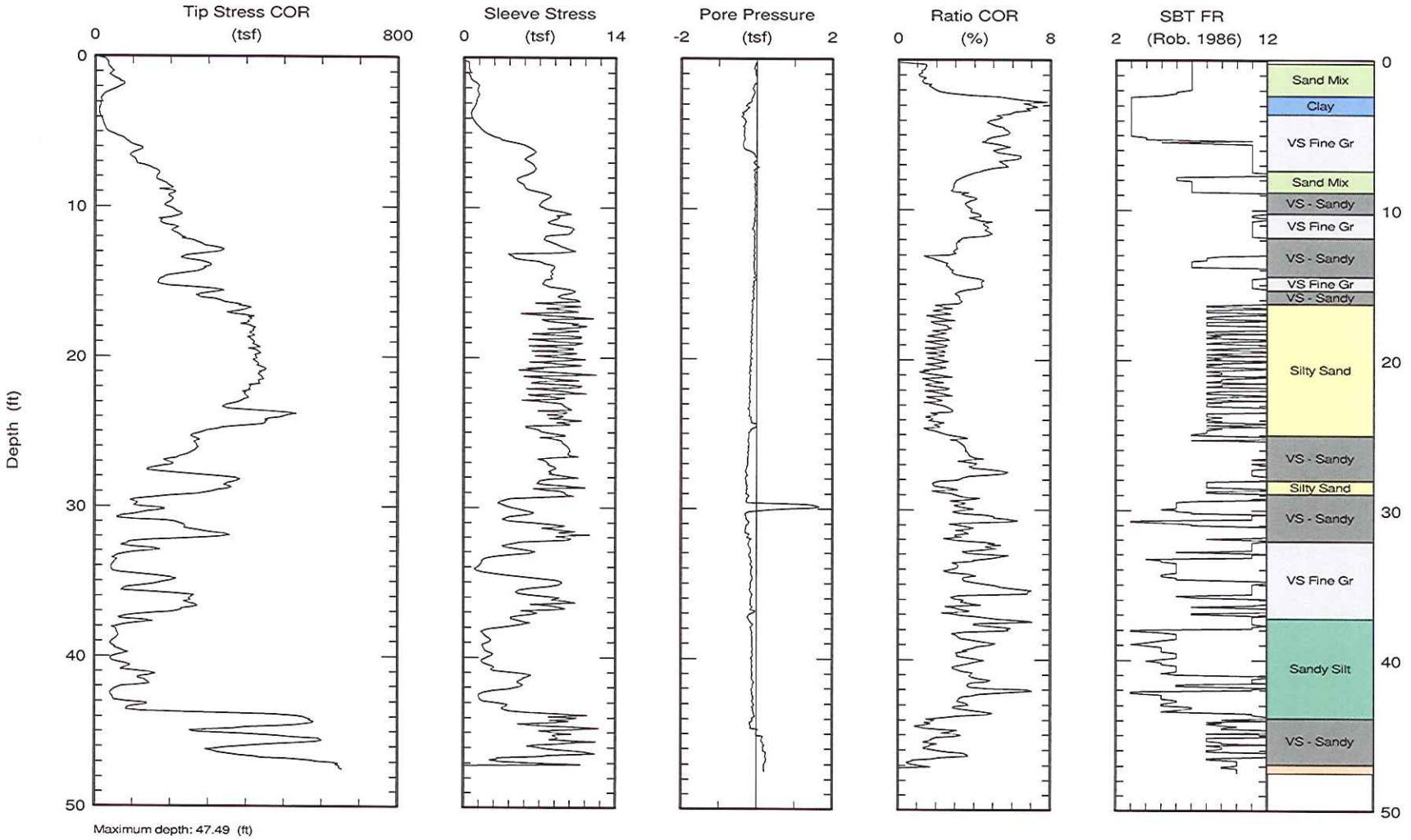
GMU GEOTECHNICAL, INC.

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

CPT Data
30 ton rig

Date: 15/Jun/2011
Test ID: CPT-1
Project: Goleta

Customer: GMU Geotechnical, Inc.
Job Site: Hollister Ave & Glenn Annie Rd



Maximum depth: 47.49 (ft)

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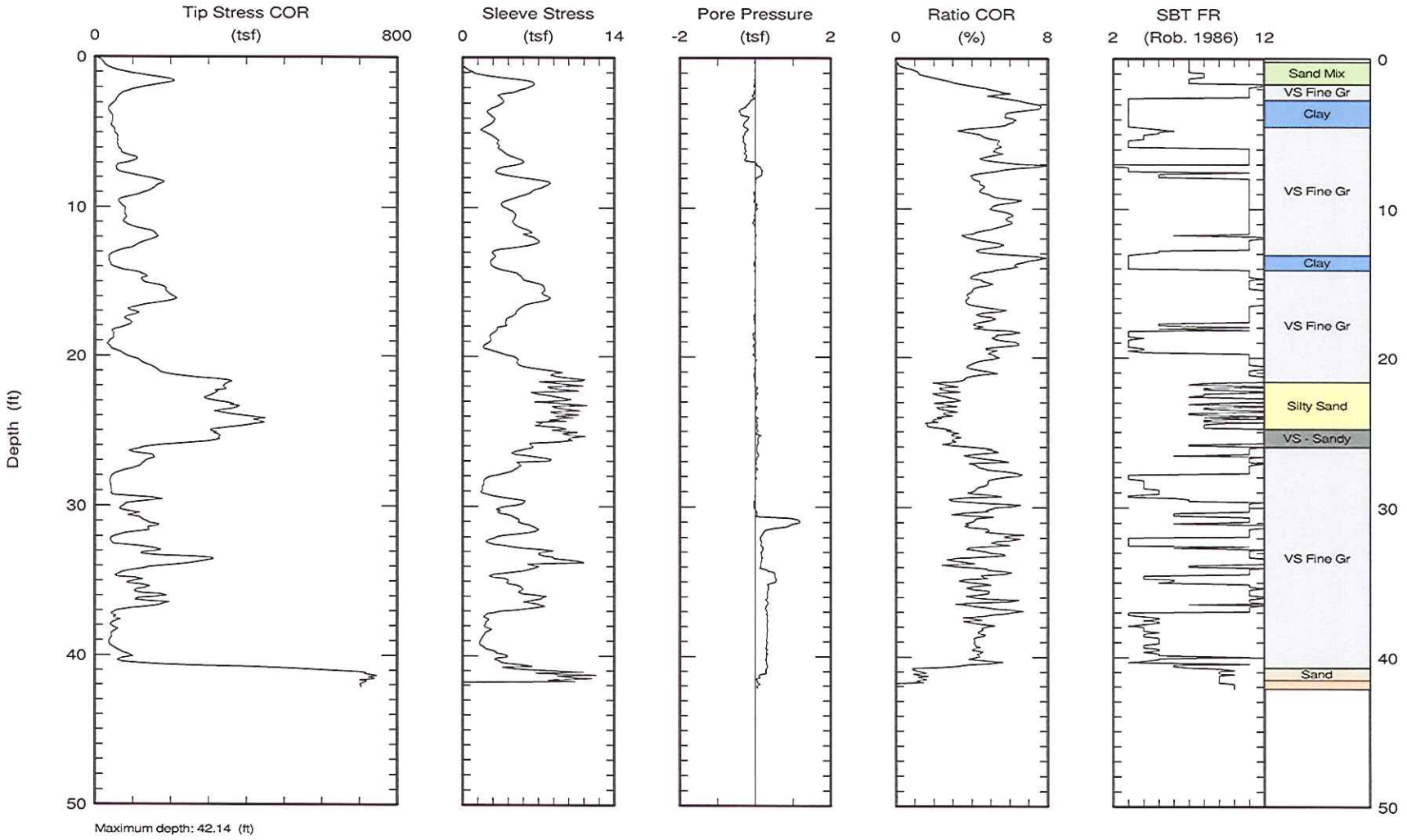
rich@kehoetesting.com
www.kehoetesting.com

CPT Data
30 ton rig

Date: 15/Jun/2011
Test ID: CPT-2
Project: Goleta

Customer: GMU Geotechnical, Inc.
Job Site: Hollister Ave & Glenn Annie Rd



Maximum depth: 42.14 (ft)

Kehoe Testing & Engineering
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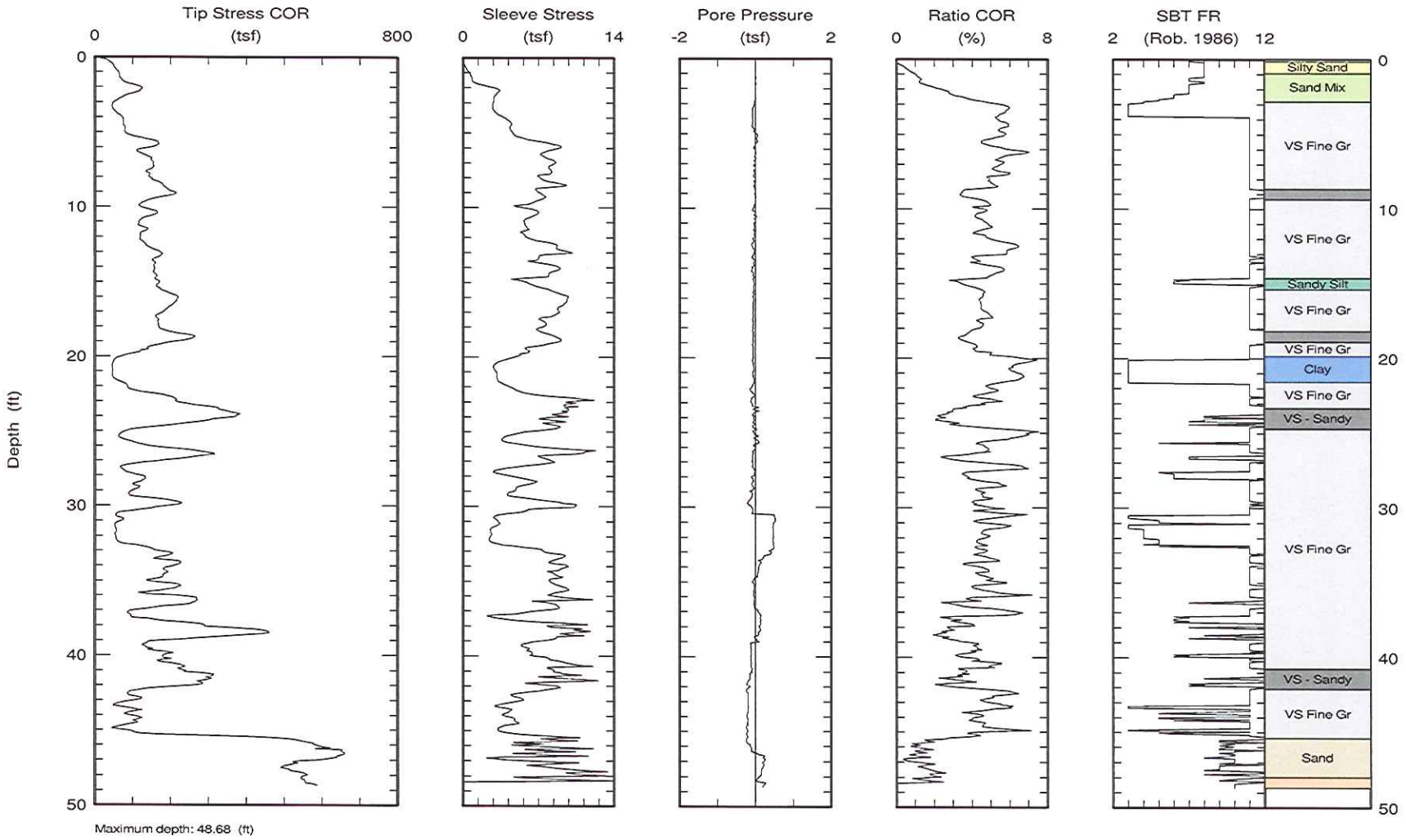
www.kehoetesting.com

CPT Data
30 ton rig

Date: 15/Jun/2011
Test ID: CPT-3
Project: Goleta

Customer: GMU Geotechnical, Inc.
Job Site: Hollister Ave & Glenn Annie Rd



Maximum depth: 48.68 (ft)

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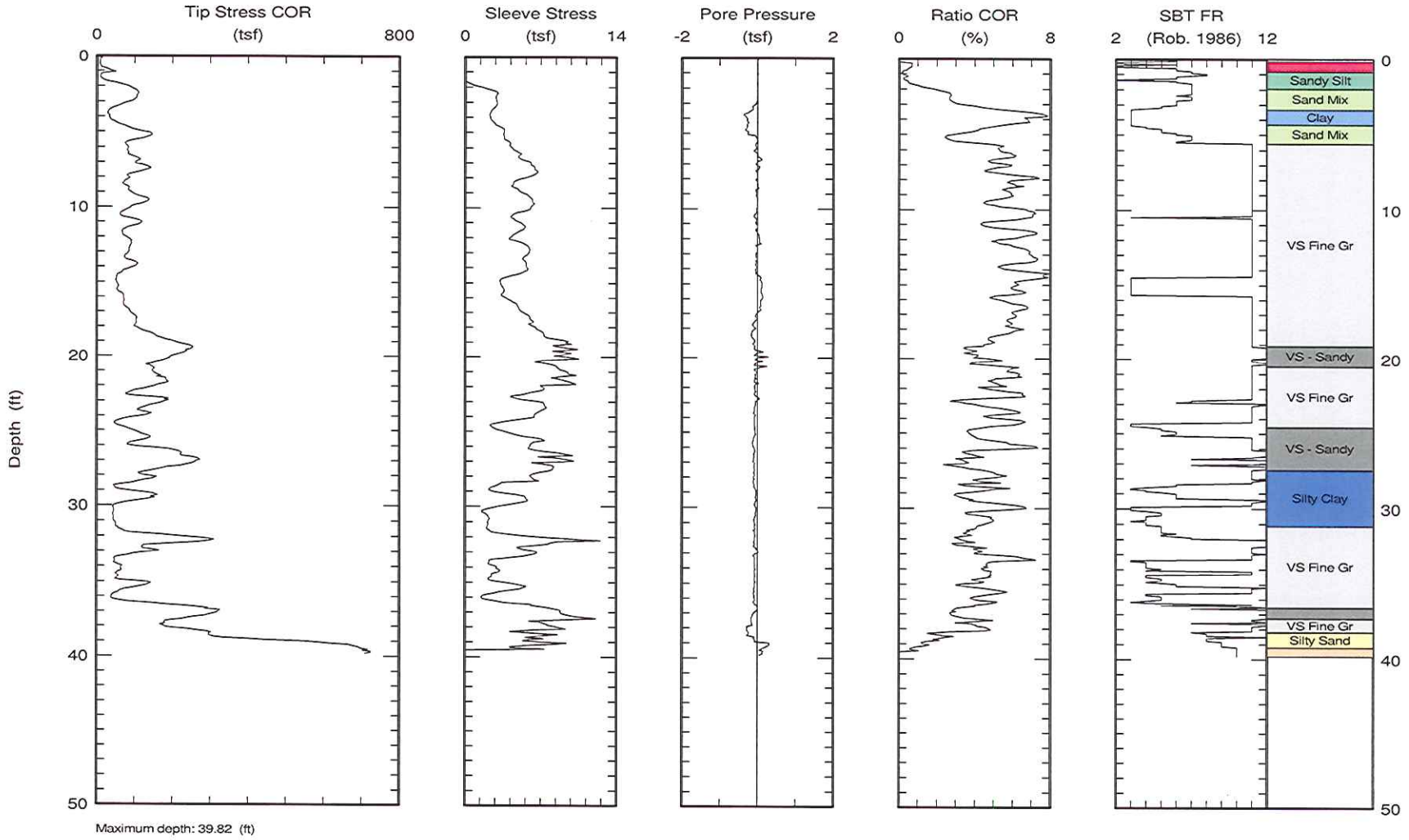
www.kehoetesting.com

CPT Data
30 ton rig

Date: 15/Jun/2011
Test ID: CPT-4
Project: Goleta

Customer: GMU Geotechnical, Inc.
Job Site: Hollister Ave & Glenn Annie Rd



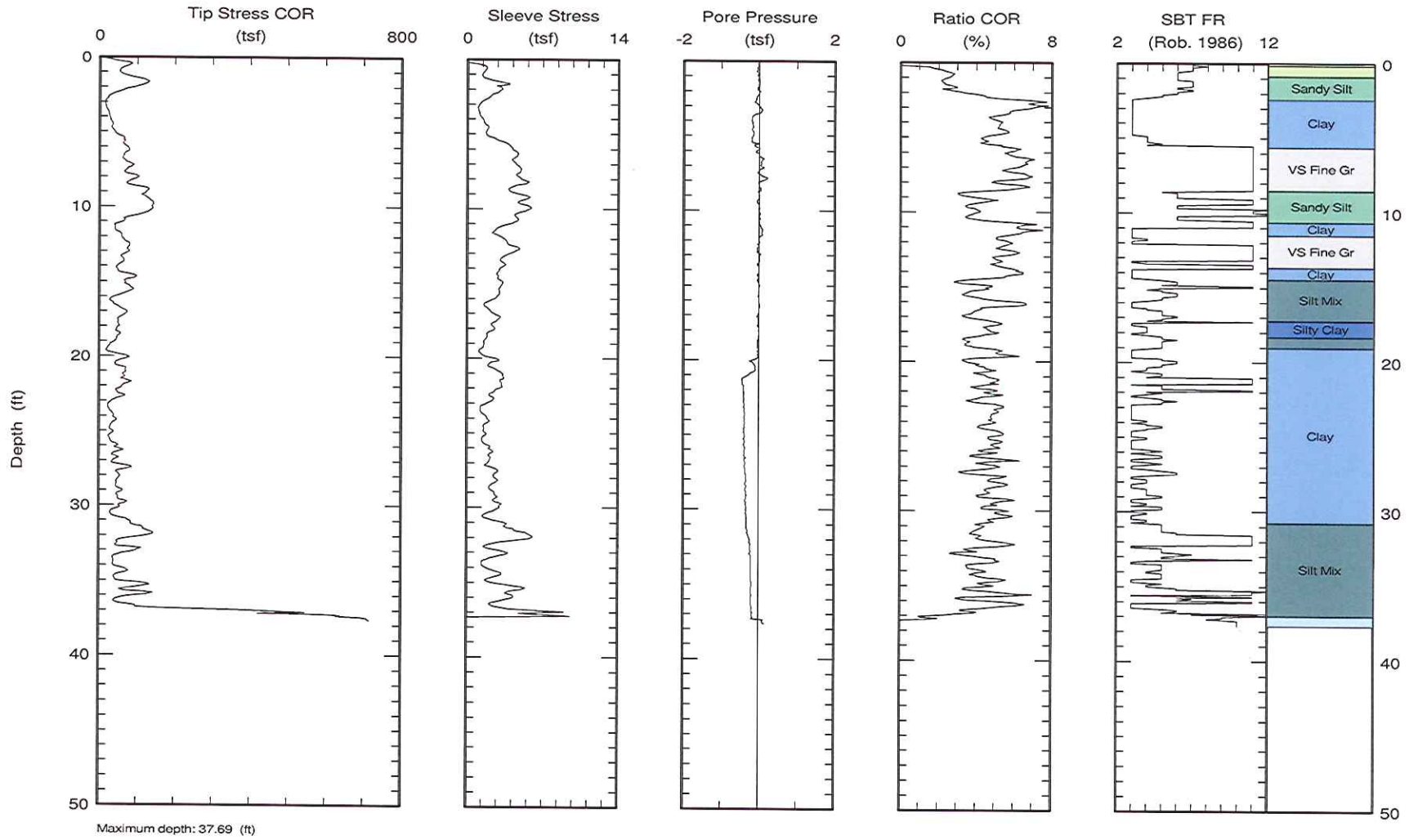
Maximum depth: 39.82 (ft)

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

CPT Data
30 ton rig

Date: 15/Jun/2011
Test ID: CPT-5
Project: Goleta

Customer: GMU Geotechnical, Inc.
Job Site: Hollister Ave & Glenn Annie Rd



Maximum depth: 37.69 (ft)

APPENDIX B

Geotechnical Laboratory Procedures and Test Results

GMU GEOTECHNICAL, INC.

APPENDIX B

GEOTECHNICAL LABORATORY PROCEDURES AND TEST RESULTS

Moisture and Density. Field moisture content and in-place density were determined for each 6-inch sample sleeve of undisturbed soil material obtained from the hollow stem auger borings. The field moisture content was determined in general accordance with ASTM Test Method D 2216 by obtaining one-half the moisture sample from each end of the 6-inch sleeve. The in-place dry density of the sample was determined by using the wet weight of the entire sample.

At the same time the field moisture content and in-place density were determined, the soil material at each end of the sleeve was classified according to the Unified Soil Classification System. The results of the field moisture content and in-place density determinations are summarized on Table B-1. The results of the visual classifications were used for general reference.

Particle Size Distribution. As part of the engineering classification of the materials underlying the site, representative samples were tested to determine the distribution of the particle sizes. The distribution was determined in general accordance with ASTM Test Method D 422 using U.S. Standard Sieve Openings 3", 1.5", 3/4, 3/8, and U.S. Standard Sieve Nos. 4, 10, 20, 40, 60, 100, and 200. In addition, a standard hydrometer test was performed on selected samples to determine the distribution of particle sizes passing the No. 200 sieve (i.e., silt and clay-size particles). The results of the tests are contained in Appendix B. Key distribution categories (% gravel; % sand, etc.) are contained on Table B-1.

Atterberg Limits. As part of the engineering classification of the soil underlying the site, samples of the on-site soil material were tested to determine relative plasticity. This relative plasticity is based on the Atterberg limits determined in general accordance with ASTM Test Method D 4318. The result of these tests are contained in Appendix B and also Table B-1.

Compaction Test. A bulk sample representative of the underlying on-site materials was tested to determine the maximum dry density and optimum moisture content of the soil. These compactive characteristics were determined in general accordance with ASTM Test Method D 1557. The results of this test are contained in Appendix B and also Table B-1.

Consolidation Tests. The one-dimensional consolidation properties of "undisturbed" samples were evaluated in general accordance with ASTM Test Method D 2435. Sample diameter was 2.412 inches and sample height was 1.00 inch. Water was added during the test at various normal loads to evaluate the potential for hydro-collapse and to produce saturation during the remainder of the testing. Consolidation readings were taken regularly during each load increment until the change in

sample height was less than approximately 0.0001 inch over a two-hour period. The graphic presentation of consolidation data is a representation of volume change in change in axial load. As a result, both expansion and consolidation are illustrated. The results of the consolidation load tests are contained in Appendix B -- Consolidation Test Data.

Expansion Tests. To provide a standard definition of one-dimensional expansion, expansion index tests were performed on representative sample in general accordance with ASTM Test Method D 4829. The results from this test procedure are reported as an "expansion index." The results of these tests are contained in Appendix B.

Chemical Tests. The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with California Test Method 417. The minimum resistivity test for potential metal corrosion was performed in general accordance with California Test Method 643. The concentration of soluble chlorides was determined in general accordance with California Test Method 422. The results of these tests are contained in Appendix B and also Table B-1.

Direct Shear Strength Tests. Direct shear tests were performed on a remolded sample of representative soil materials. The general philosophy and procedure of the test were in accordance with ASTM Test Method D 3080 - "Direct Shear Tests for Soils Under Consolidated Drained Conditions".

The tests are single shear tests and are performed using a sample diameter of 2.416 inches and a height of 1.00 inch. The normal load is applied by a vertical dead load system. A constant rate of strain is applied to the upper one-half of the sample until failure occurs. Shear stress is monitored by a strain gauge-type precision load cell and deflection is measured with a digital dial indicator. This data is transferred electronically to data acquisition software which plots shear strength vs. deflection. The shear strength plots are then interpreted to determine either peak or ultimate shear strengths. A strain rate compatible with the grain size distribution of the soils was utilized. The interpreted results of these tests are presented in this Appendix B.

R-value Tests. The resistance value (R-value) of typical on-site soil materials was determined for use on pavement section design. The results are contained in Appendix B – R-Value Test Results and also Table B-1.

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Saturation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH- 1	3	46.5	Qtm	ML	15.8	115	94															
DH- 1	6	43.5	Qtm	ML	12.0	116	74															
DH- 1	9	40.5	Qtm	ML	17.5	113	99															
DH- 1	12	37.5	Qtm	ML	19.1	110	101															
DH- 1	15	34.5	Qtm	ML	18.4	110	97															
DH- 1	18	31.5	Qtm	SM	12.1	117	79															
DH- 1	21	28.5	Qtm	SM	17.3	102	74															
DH- 1	24	25.5	Qtm	SM	9.4	106	44															
DH- 2	5	42.0	Qtm	ML	12.4	110	65															
DH- 2	10	37.0	Qtm	ML	18.7	107	90															
DH- 2	15	32.0	Qtm	ML	13.1	107	63															
DH- 2	20	27.0	Qtm	ML	21.9	109	111															
DH- 5	5	59.0	Qtm	SC	8.9	114	53															
DH- 5	10	54.0	Qtm	SC	9.5	110	50															
DH- 5	15	49.0	Qtm	SC	10.0	118	65															
DH- 7	5	42.0	Qtm	SC-CL	14.0	117	90															
DH- 7	10	37.0	Qtm	ML	17.8	111	97															
DH- 7	15	32.0	Qtm	ML	15.7	111	86															
DH- 7	20	27.0	Qtm	SM	9.6	118	64															
DH- 7	25	22.0	Qtm	SW	8.6	105	40															
DH- 8	4	49.0	Qtm	CL	13.1			0	32	68	31	37	17	20	123.5	12.0			6.9	32	N/D	930
DH- 8	5	48.0	Qtm	SC	11.8	98	46															
DH- 8	10	43.0	Qtm	SM	13.6	113	78															
DH- 8	15	38.0	Qtm	SC	17.0	99	67															
DH- 8	20	33.0	Qtm	SC	8.6	107	42															

Project: Westar Goleta Mixed Use Village
Project No. 07-036-00

GMU GEOTECHNICAL, INC.

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Saturation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH- 8	25	28.0	Qtm	SC	9.2	105	42															
DH- 9	5	49.0	Qtm	SM	10.5	117	67															
DH- 9	10	44.0	Qtm	ML	15.3																	
DH- 9	15	39.0	Qtm	CL	13.9	111	76															
DH- 9	20	34.0	Qtm	CL	18.5																	
DH- 9	25	29.0	Qtm	CL	17.2	115	102															
DH-10	5	46.0	Qtm	SP	10.2																	
DH-10	10	41.0	Qtm	SC	5.2	126	44															
DH-10	15	36.0	Qtm	SC-CL	17.9																	
DH-10	20	31.0	Qtm	CL	18.9	109	97															
DH-10	25	26.0	Qtm	SM	9.8																	
DH-11	5	44.0	Qtm	CL	9.6					63												
DH-11	10	39.0	Qtm	SC	3.8	119	26															
DH-11	15	34.0	Qtm	ML	13.8																	
DH-11	20	29.0	Qtm	CL	15.1	115	91															
DH-11	25	24.0	Qtm	CL-ML	19.2																	
DH-11	30	19.0	Qtm	CL	16.6	110	86															
DH-11	35	14.0	Qtm	SP	20.4																	
DH-11	40	9.0	Qtm	SP	15.1	107	72															
DH-11	45	4.0	Qtm	SP	20.2																	
DH-11	50	-1.0	Qtm	SP	18.7	107	92															
DH-12	5	44.0	Qtm	SC	7.7			0	53	46												
DH-12	10	39.0	Qtm	CL	17.1																	
DH-12	15	34.0	Qtm	CL	16.4	110	87															
DH-12	20	29.0	Qtm	SM	4.6																	

GMU_TABLE_SOIL_LAB_DATA 07-036-00.GPJ FNC AB GWGN01.GDT 7/12/11

Project: Westar Goleta Mixed Use Village
Project No. 07-036-00

GMU GEOTECHNICAL, INC.

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information								Sieve/Hydrometer				Atterberg Limits			Compaction					Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet	Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Saturation, %	Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %	Expansion Index	R-Value	pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-12	25	24.0	Qtm	ML	14.3	111	78																
DH-12	30	19.0	Qtm	CL-ML	17.4																		
DH-12	35	14.0	Qtm	SC	14.5	115	88																
DH-12	40	9.0	Qtm	SP	19.5																		
DH-12	50	-1.0	Qtm	SP	20.9																		
DH-13	5	48.0	Qtm	CL	15.3	116	95																
DH-13	10	43.0	Qtm	SC	7.0	113	40																
DH-13	15	38.0	Qtm	SP	8.4	110	45																
DH-13	20	33.0	Qtm	CL	15.6	116	98																
DH-13	25	28.0	Qtm	CL-ML	19.9	107	98																
DH-13	30	23.0	Qtm	SP	10.5	98	41																
DH-13	35	18.0	Qtm	CL	11.1	116	68																
DH-13	40	13.0	Qtm	SC	20.8	106	99																
DH-13	45	8.0	Qtm	SP	22.1	102	93																
DH-13	50	3.0	Qtm	SP	24.9	95	89																
DH-14	5	55.0	Qtm	SC	12.4	120	87	0	54	46		34	16	18									
DH-14	10	50.0	Qtm	CL	13.8	113	80																
DH-14	15	45.0	Qtm	SM	8.9	107	43																
DH-14	20	40.0	Qtm	SM	9.9	119	67																
DH-14	25	35.0	Qtm	CL	10.2	119	69																
DH-14	30	30.0	Qtm	CL	15.5	117	99																
DH-14	35	25.0	Qtm	CL	13.1	113	75																
DH-14	40	20.0	Qtm	SP	14.3	121	103																
DH-14	45	15.0	Qtm	SP	13.3	93	45																
DH-14	50	10.0	Qtm	SP	24.7	92	82																

Project: Westar Goleta Mixed Use Village
Project No. 07-036-00

TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Saturation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-14	51	9.0	Qtm	SP	24.6																	
DH-15	5	55.0	Qtm	CL	9.1			0	48	52		26	18	8								
DH-15	10	50.0	Qtm	SC	13.8	112	76															
DH-15	15	45.0	Qtm	CL	16.6																	
DH-15	20	40.0	Qtm	CL	13.5	121	99															
DH-15	25	35.0	Qtm	SC	10.6					43												
DH-16	3	52.0	Qtm	CL	16.4			0	39	61	35	33	16	17				12				
DH-16	5	50.0	Qtm	CL	11.7	121	84															
DH-16	10	45.0	Qtm	CL	16.4	113	93															
DH-16	15	40.0	Qtm	ML	21.5	107	103															
DH-16	20	35.0	Qtm	SP-SC	12.2	113	69															
DH-16	25	30.0	Qtm	SP-SC	11.2	120	79															
DH-17	5	51.0	Qtm	ML	9.1	114	53															
DH-17	6	50.0	Qtm	ML															7.7	16	530	1090
DH-17	15	41.0	Qtm	CH	11.0	117	70															
DH-17	25	31.0	Qtm	ML	5.9	119	40															
DH-18	5	59.0	Qtm	SC	16.4	114	98			27		43	16	27								
DH-18	10	54.0	Qtm	SM	6.3					16												
DH-18	15	49.0	Qtm	SP-SC	7.6	108	38															
DH-18	20	44.0	Qtm	SP	6.0																	
DH-18	25	39.0	Qtm	SW	3.9	104	17															
T-1	2	NA	Qtm	SM													100		5.7	ND	700	830
T-1	4	NA	Qtm	CL													53		5.5	ND	620	650
TP- 4	0.5	47.5	Qtm	SM														75				

GMU_TABLE_SOIL_LAB_DATA 07-036-00.GPJ FNC AB GWGN01.GDT 7/12/11

Project: Westar Goleta Mixed Use Village
Project No. 07-036-00

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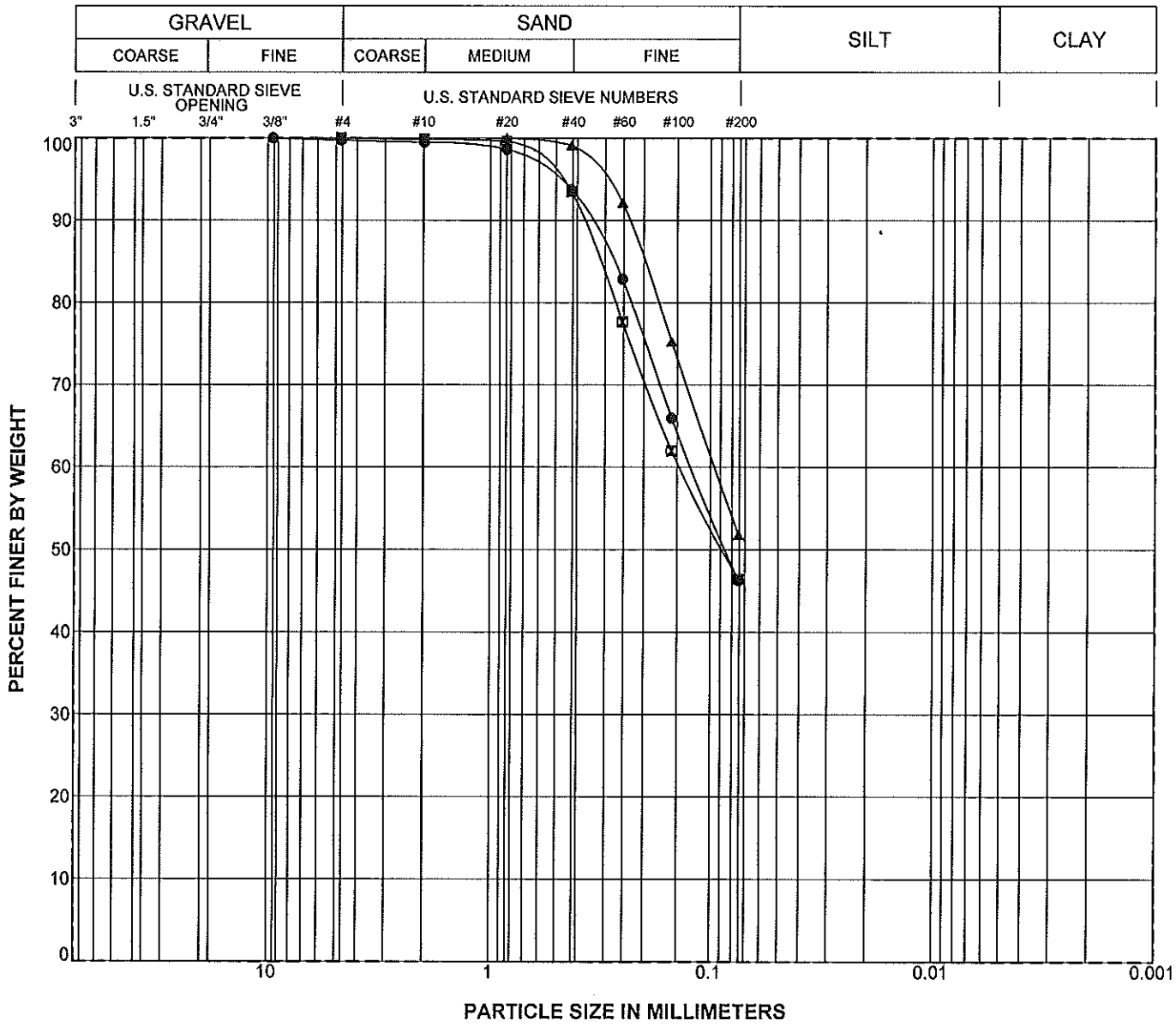


Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-12	5.0	Qtm	●			Clayey sand (SC)
DH-14	5.0	Qtm	⊠	34	18	Clayey sand (SC)
DH-15	5.0	Qtm	▲	26	8	Sandy lean clay (CL)

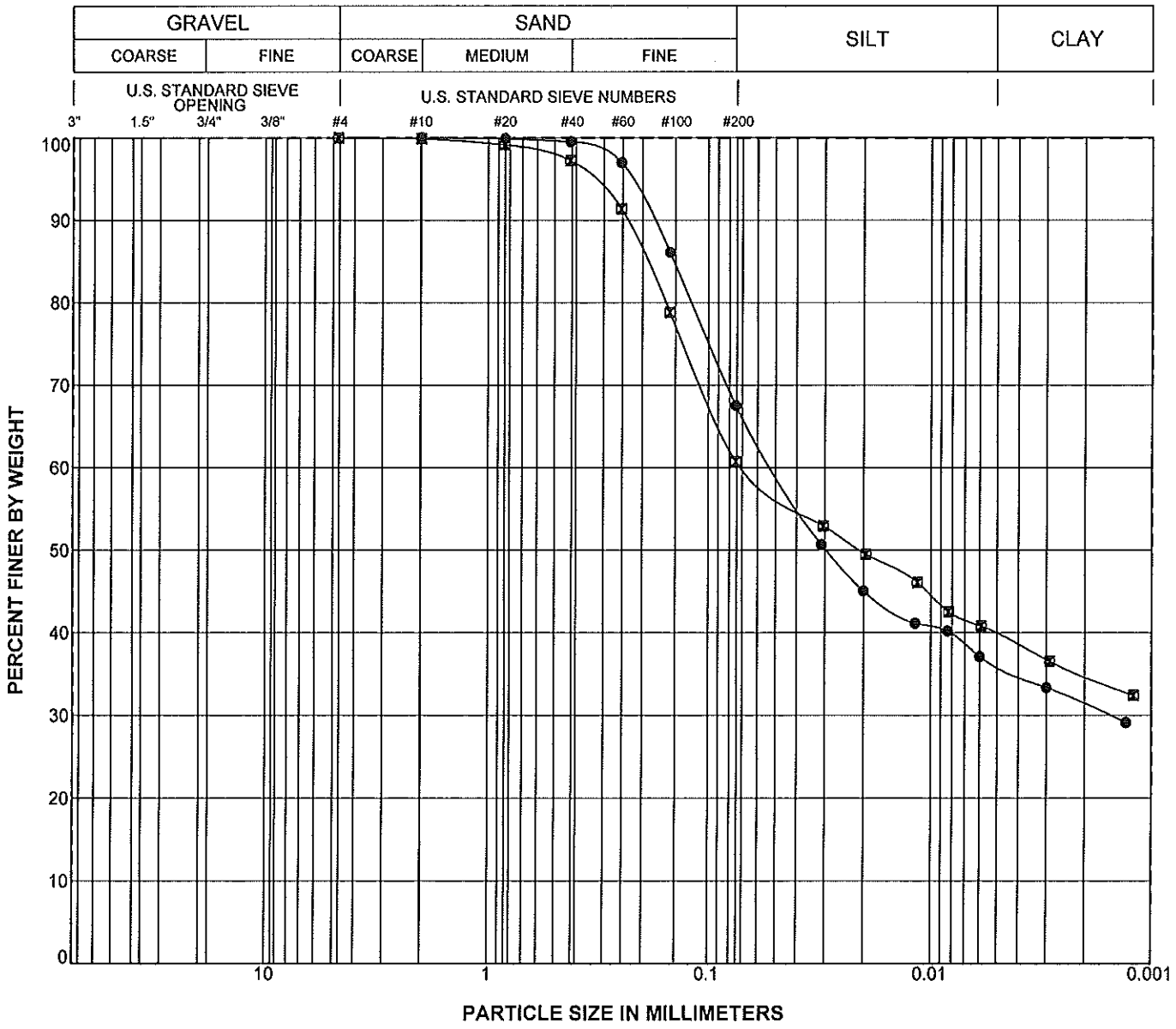
GMU_GRAIN_SIZE 07-036-00.GPJ 7/11/11

PARTICLE SIZE DISTRIBUTION

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.



Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH- 8	4.0	Qtm	●	37	20	Sandy lean clay (CL)
DH-16	3.0	Qtm	⊠	33	17	Sandy lean clay (CL)

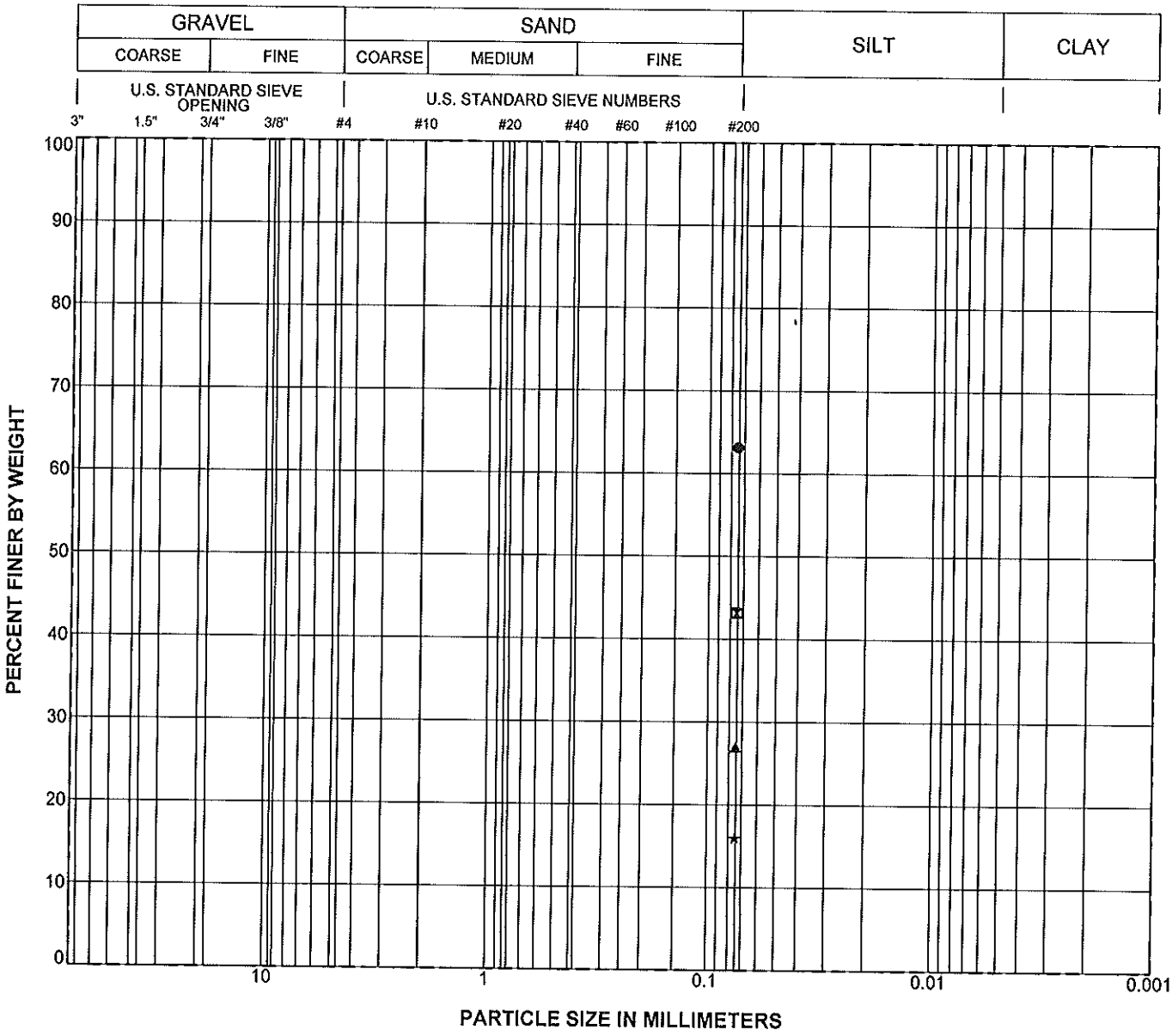
GMU_GRAIN_SIZE 07-036-00.GPJ 7/11/11

PARTICLE SIZE DISTRIBUTION

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.



Boring Number	Depth (feet)	Geologic Unit	Symbol	LL	PI	Classification
DH-11	5.0	Qtm	●			Sandy clay (CL)
DH-15	25.0	Qtm	⊠			Clayey Sand (SC)
DH-18	5.0	Qtm	▲	43	27	Clayey sand (SC)
DH-18	10.0	Qtm	★			Silty sand (SM)

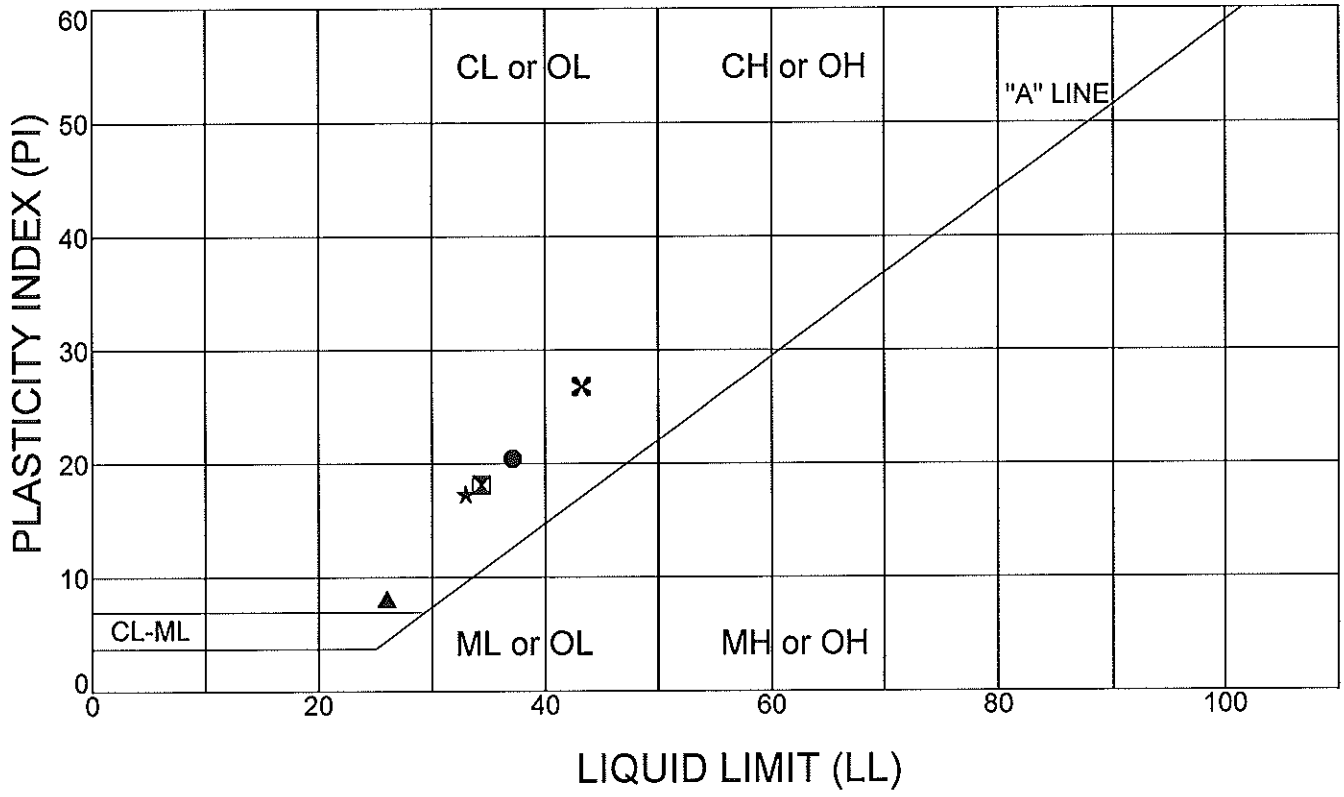
GMU_GRAIN_SIZE 07-036-00.GPJ 7/12/11

PARTICLE SIZE DISTRIBUTION

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.



Boring Number	Depth (feet)	Geologic Unit	Test Symbol	Insitu Water Content (%)	LL	PL	PI	Classification
DH- 8	4.0	Qtm	●	13	37	17	20	Sandy lean clay (CL)
DH-14	5.0	Qtm	⊠	12	34	16	18	Clayey sand (SC)
DH-15	5.0	Qtm	▲	9	26	18	8	Sandy lean clay (CL)
DH-16	3.0	Qtm	★	16	33	16	17	Sandy lean clay (CL)
DH-18	5.0	Qtm	✕	16	43	16	27	Clayey sand (SC)

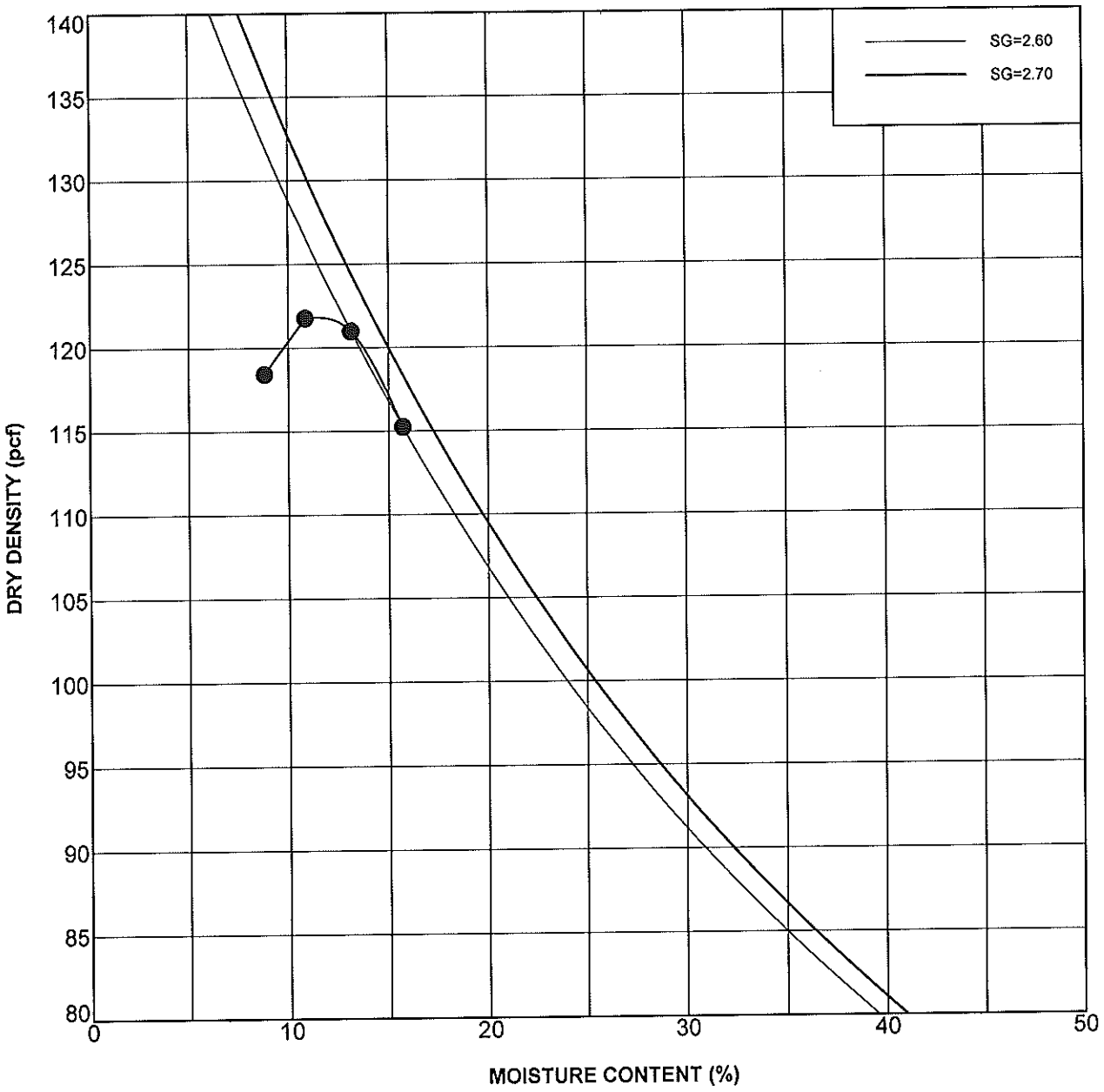
LIMITS 07-036-00.GPJ 7/11/11

ATTERBERG LIMITS

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL INC.



Boring Number	Depth (feet)	Geologic Unit	Symbol	Maximum Dry Density, pcf	Optimum Moisture Content, %	Classification
DH- 8	4.0	Qtm	●	123.5	12	Sandy lean clay (CL)

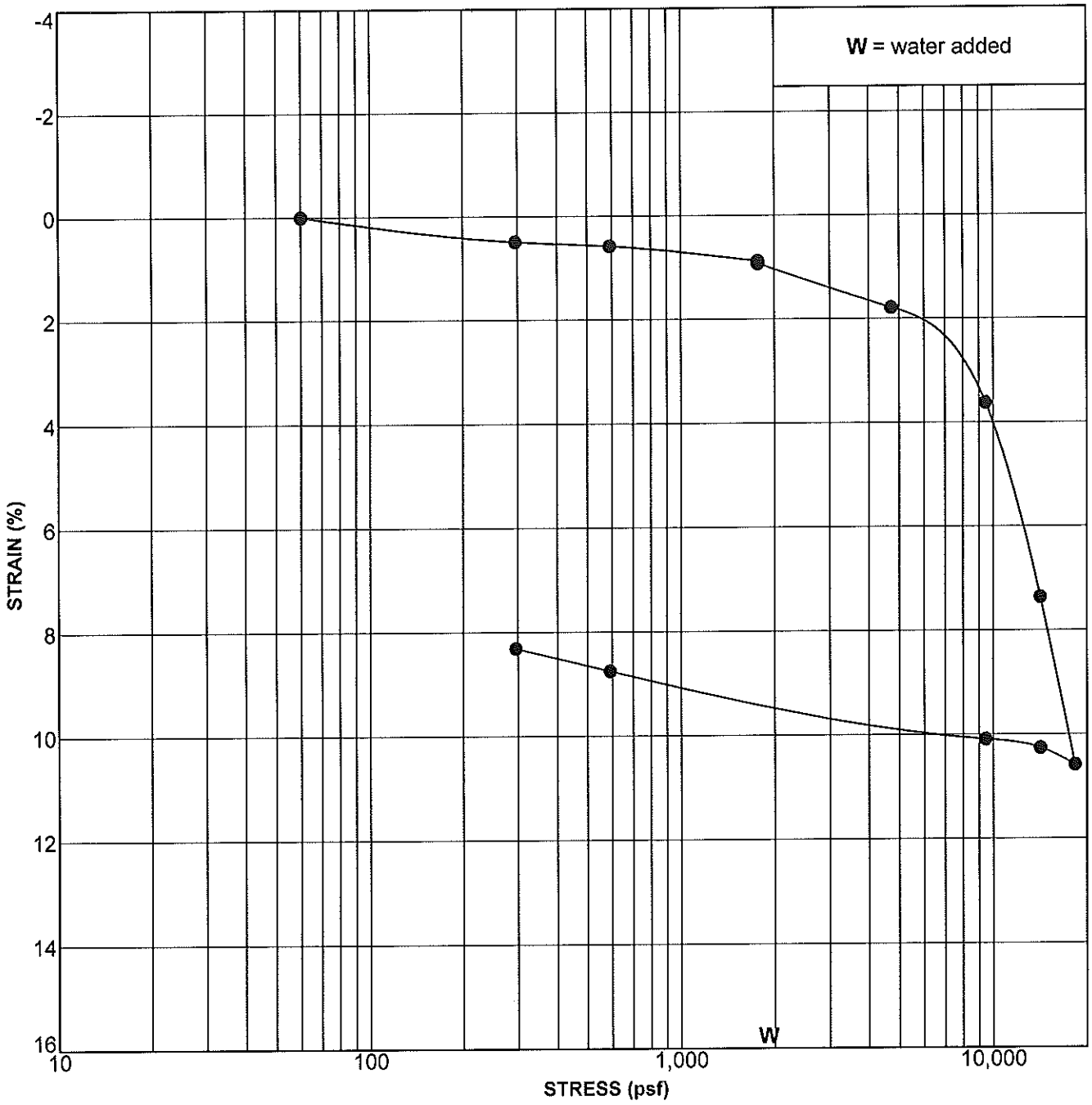
DVTCOMP 07-036-00.GPJ 7/11/11

COMPACTION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH- 8	15.0	Qtm	●	In Situ	0.05	Clayey sand (SC)

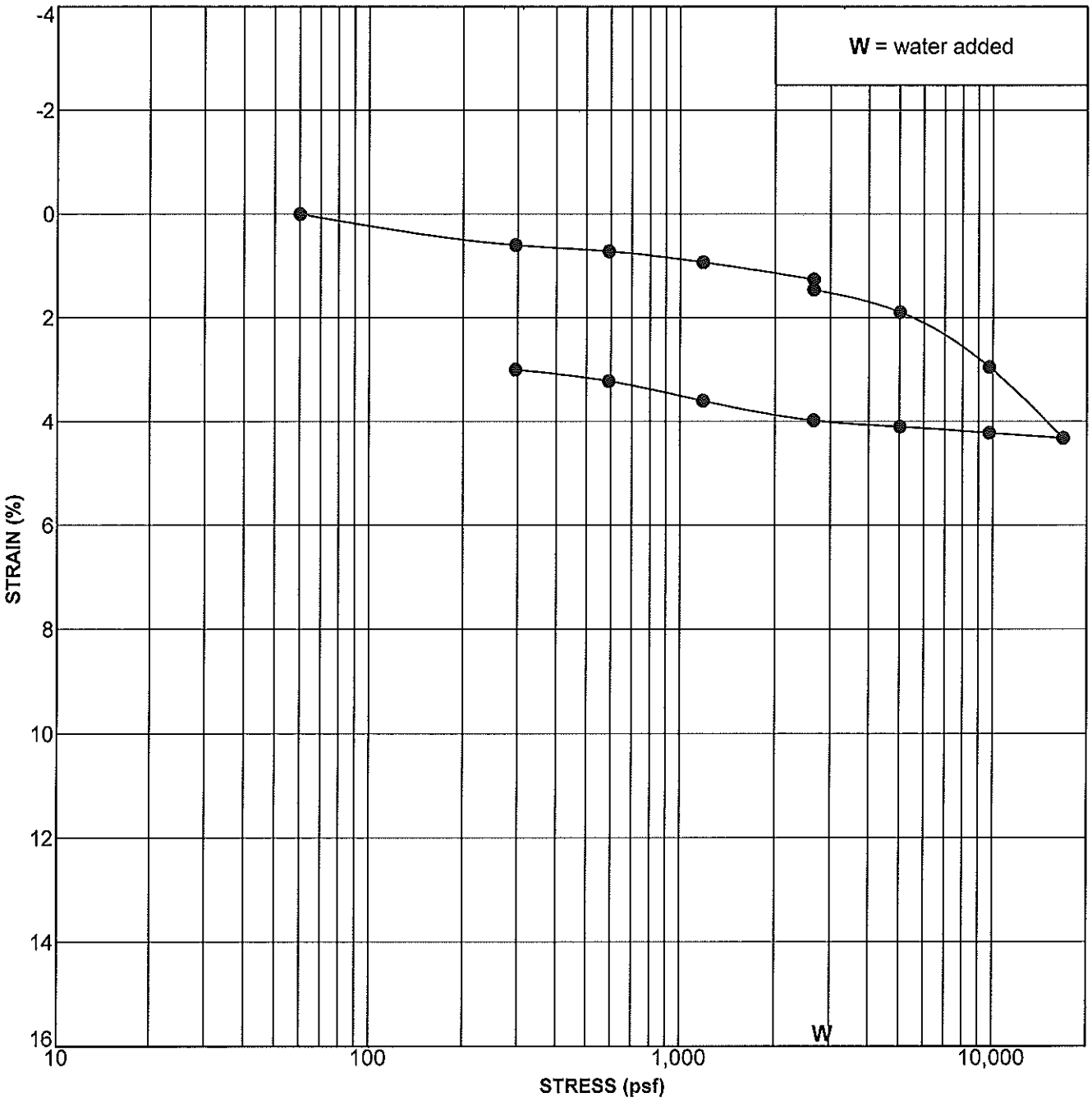
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH- 8	20.0	Qtm	●	In Situ	0.2	Clayey sand (SC)

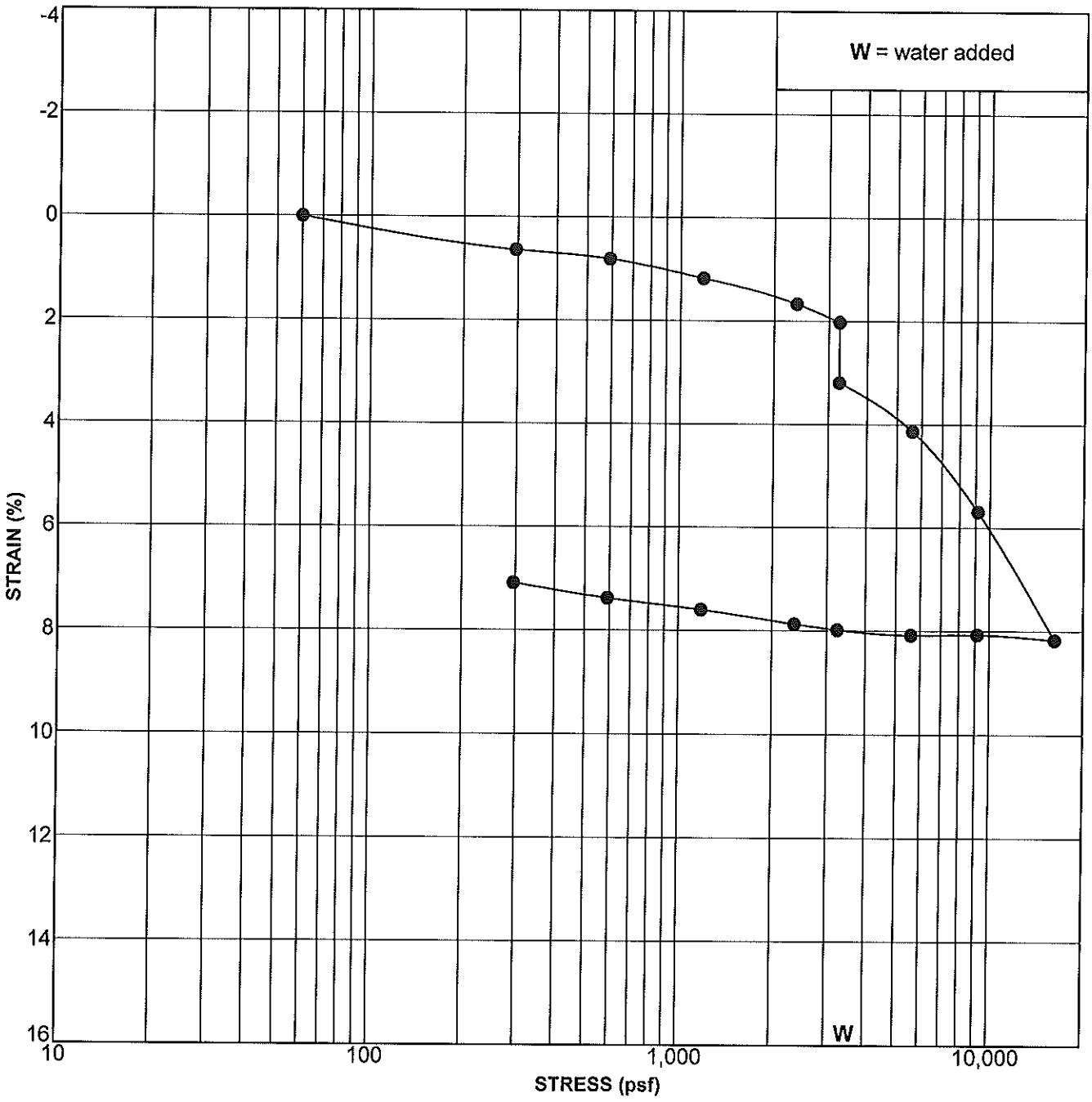
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH- 8	25.0	Qtm	●	In Situ	1.17	Clayey sand (SC)

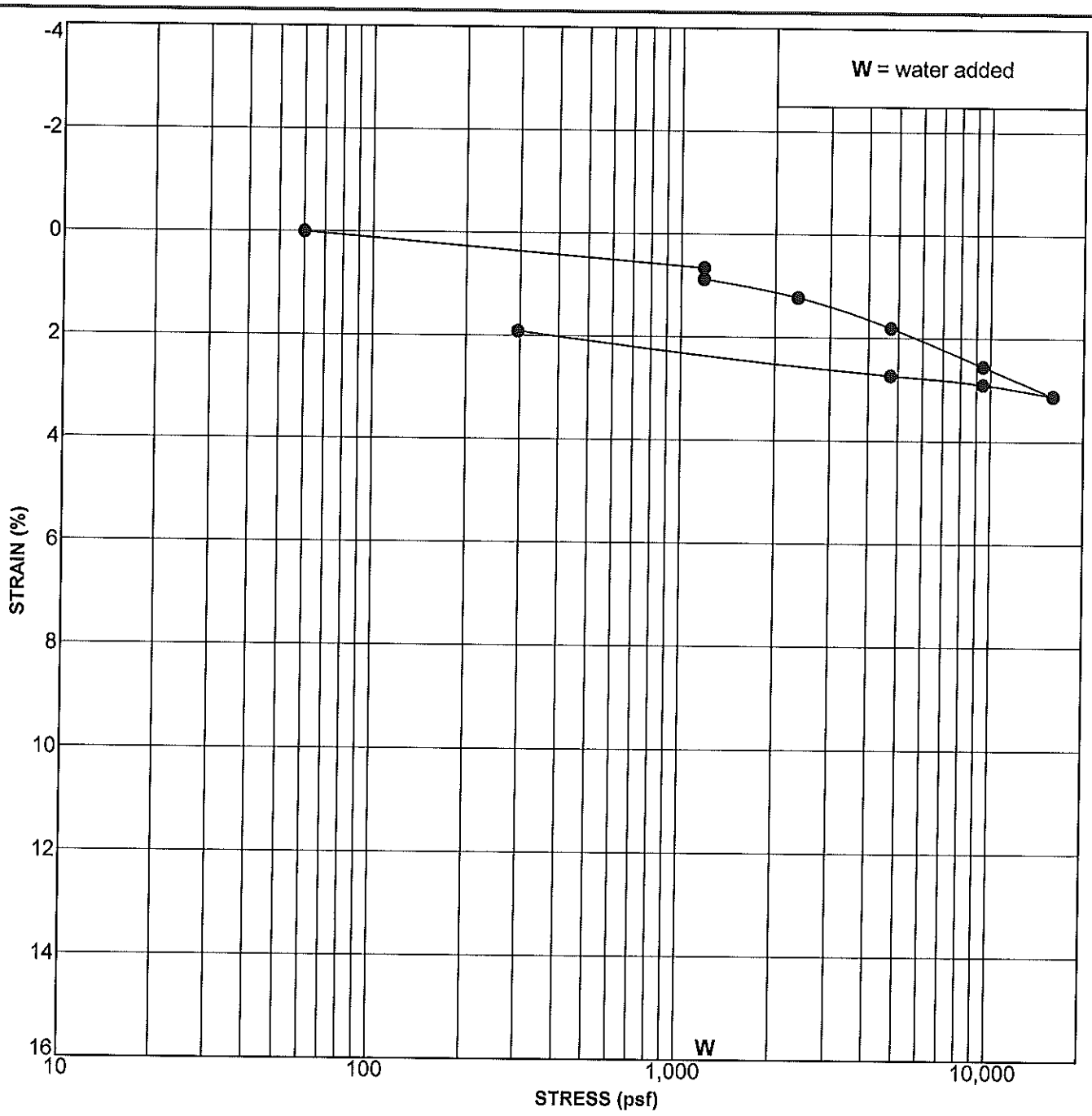
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-11	10.0	Qtm	●	In Situ	0.22	Clayey sand (SC)

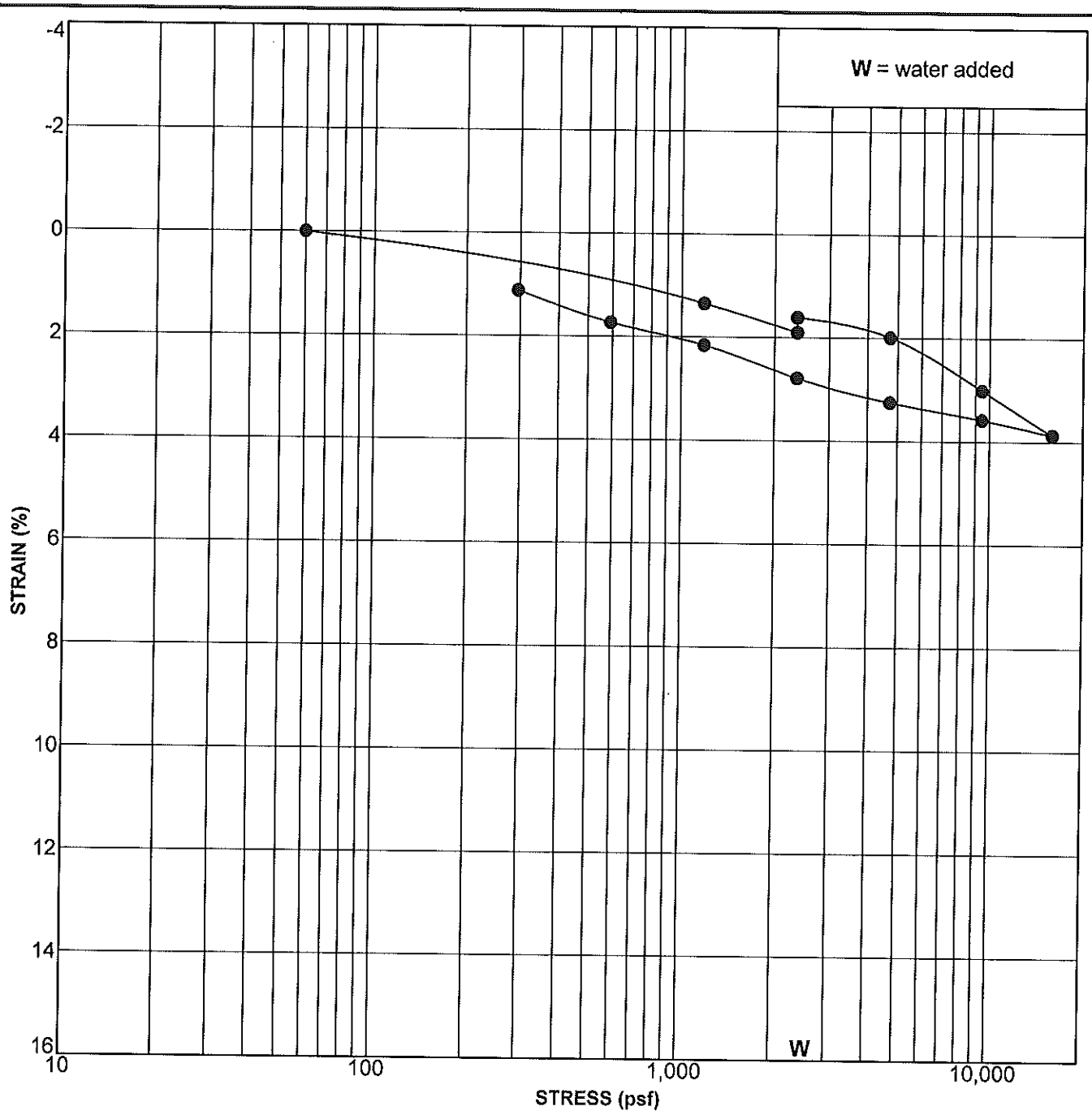
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-11	20.0	Qtm	●	In Situ	-0.29	Sandy clay (CL)

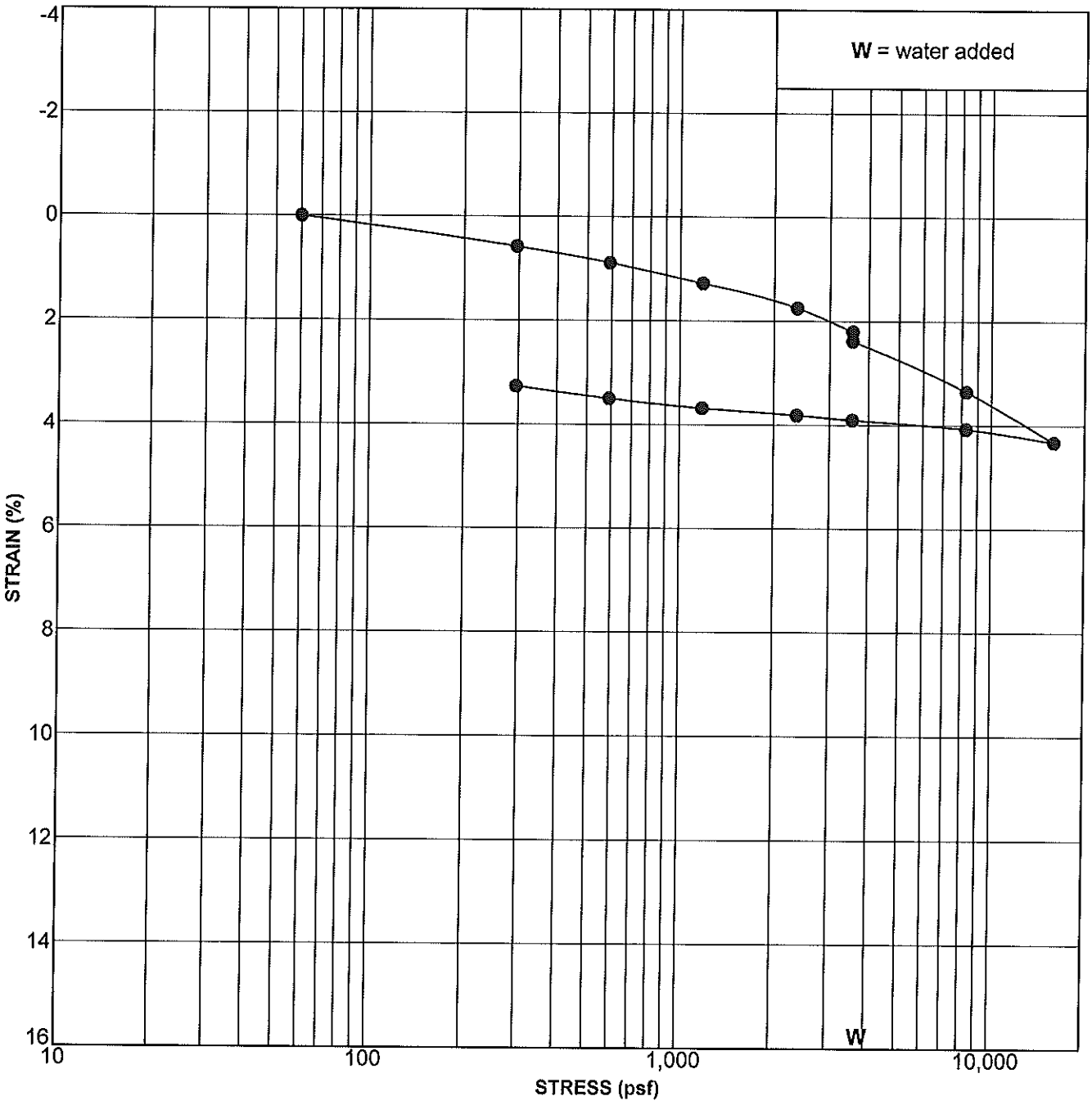
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/12/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-11	30.0	Qtm	●	In Situ	0.18	Sandy silty clay (CL)

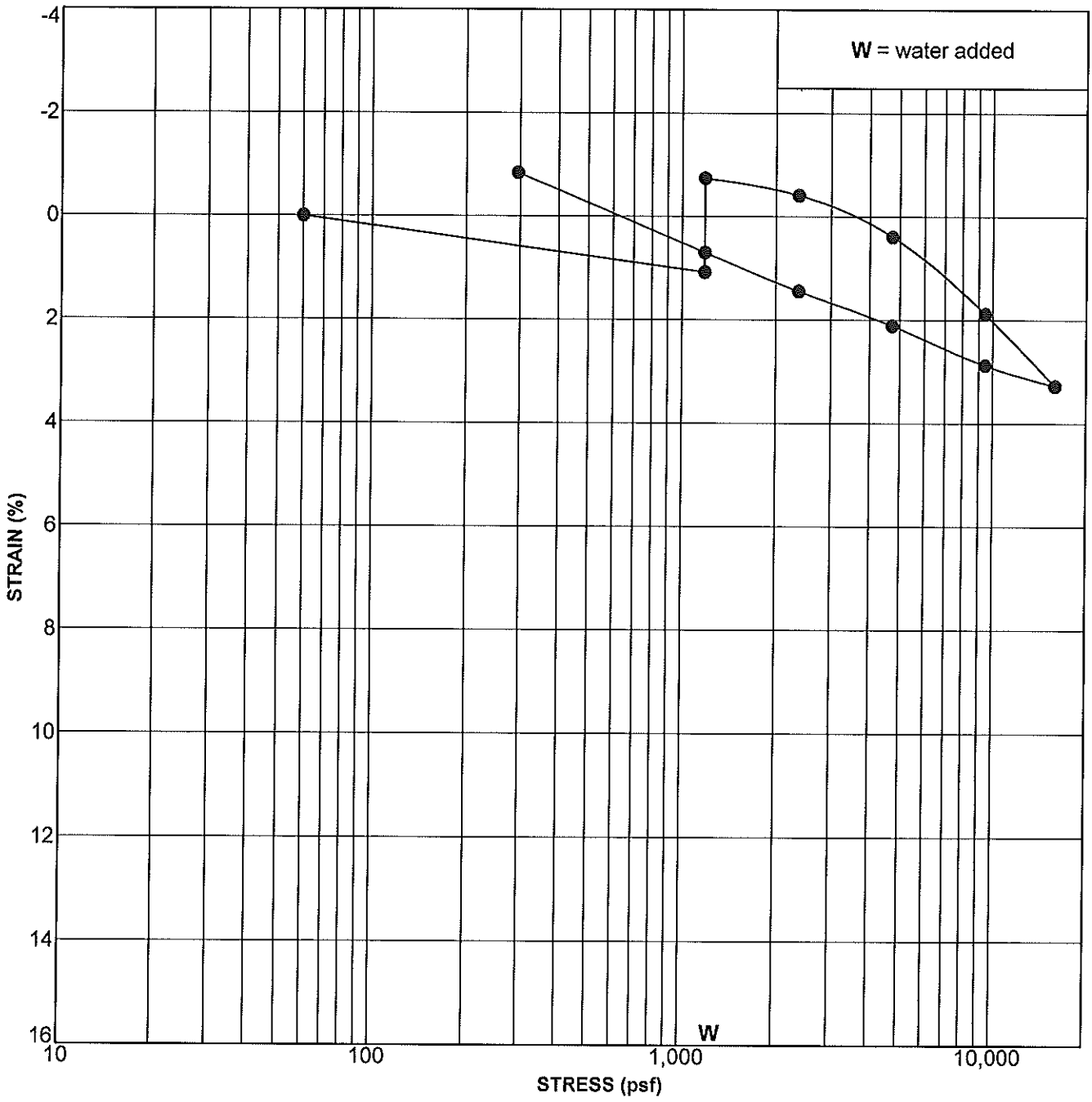
GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11

CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-12	15.0	Qtm	●	In Situ	-0.34	Silty clay (CL)

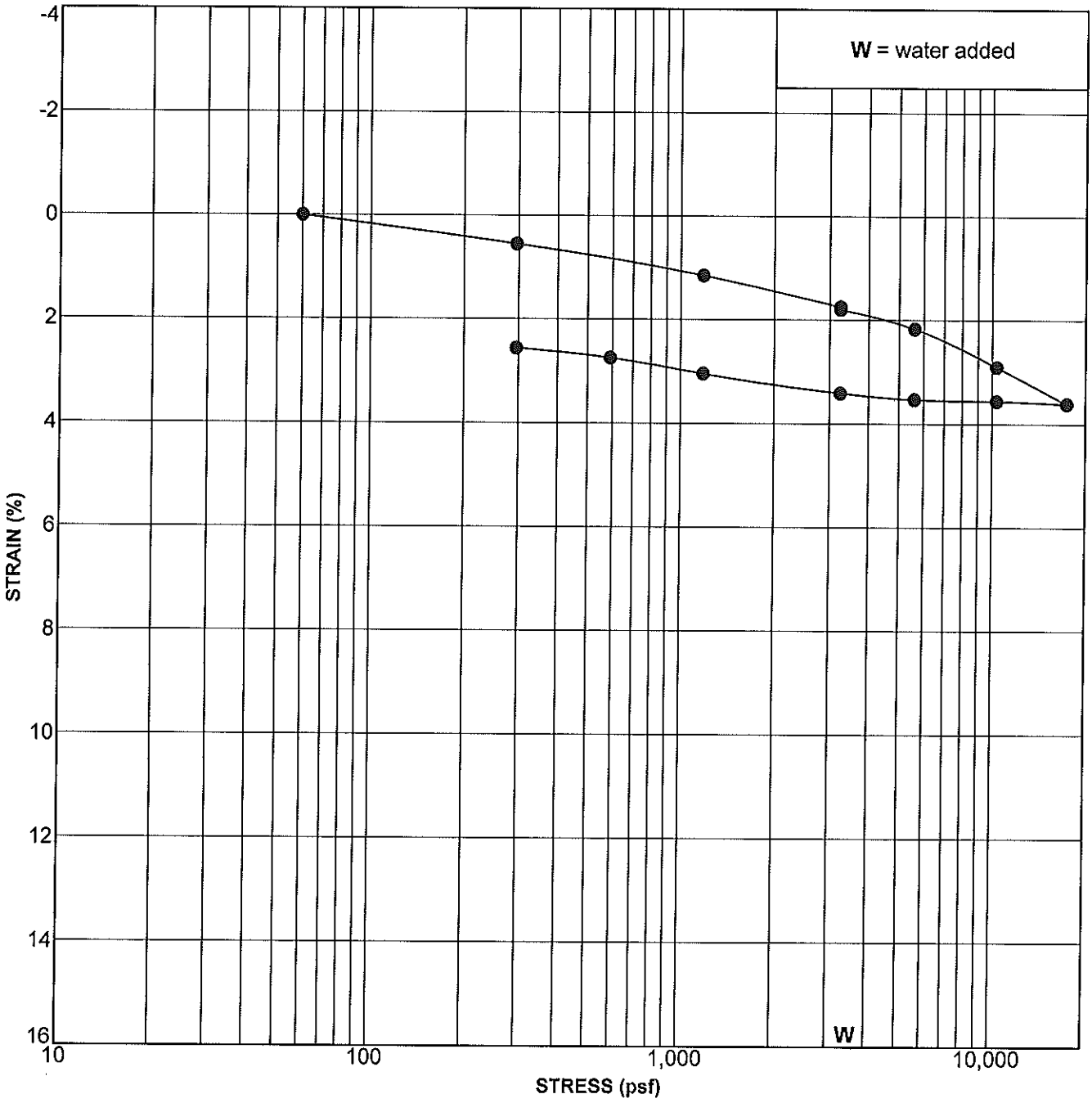
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-12	25.0	Qtm	●	In Situ	0.05	Clayey silt (ML)

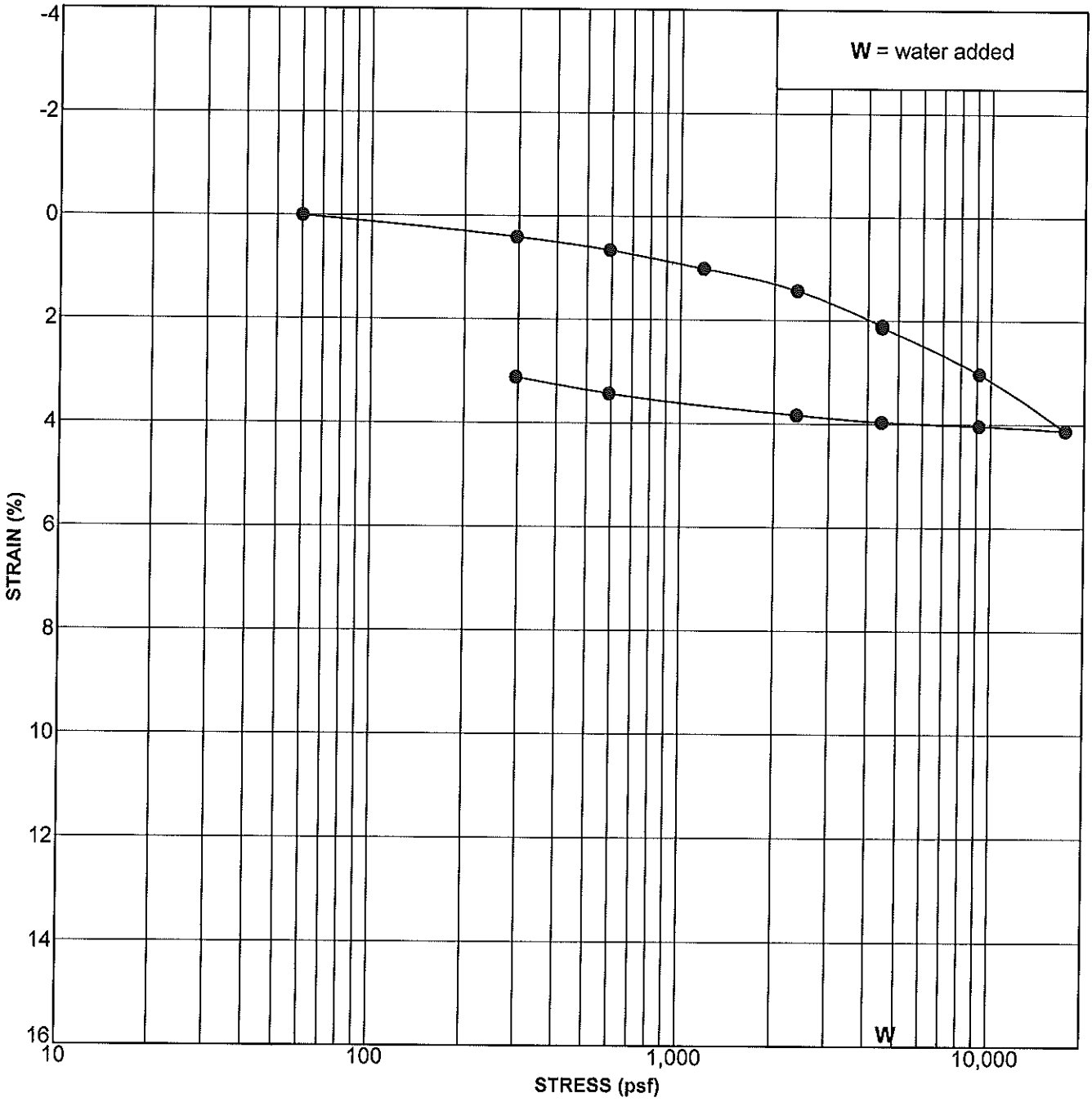
CONSOLIDATION TEST DATA

Project: Westar Goleta

Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11



Boring Number	Depth (feet)	Geologic Unit	Symbol	In Situ or Remolded Sample	% Hydro-Collapse	Classification
DH-12	35.0	Qtm	●	In Situ	0.04	Clayey sand (SC)

CONSOLIDATION TEST DATA

Project: Westar Goleta
Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_CONSOL 07-036-00.GPJ GM&U.GDT 7/11/11

EXPANSION INDEX AND CHEMICAL TEST RESULTS

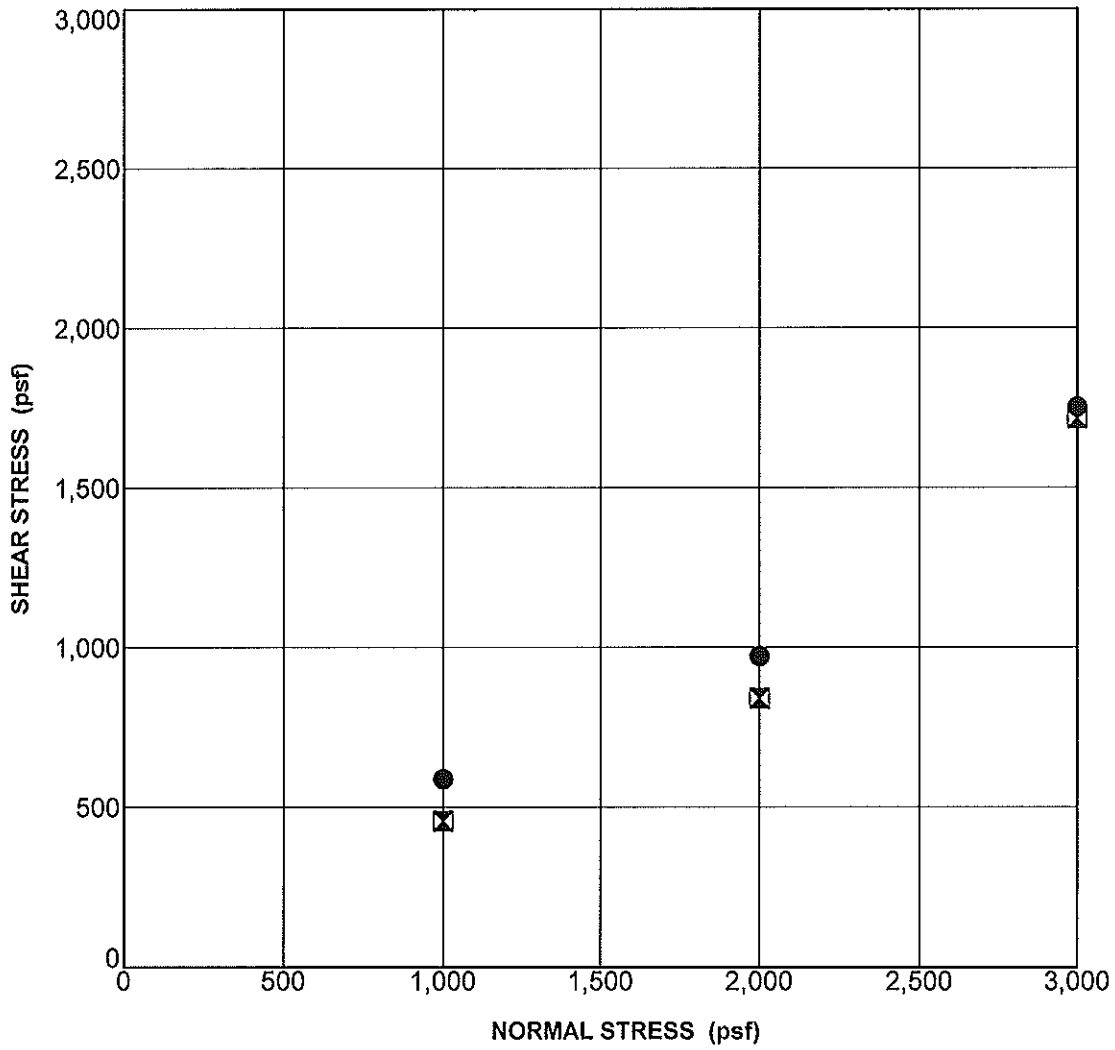
TEST PIT #	DEPTH	pH	SOLUBLE SULFATES (ppm)	SOLUBLE CHLORIDES (ppm)	MINIMUM RESISTIVITY ohm-cm	EXPANSION INDEX	EXPANSION POTENTIAL
DH-8	4'-7'	6.9	32	ND	930		
DH-17	6'-8'	7.6	16	530	1,090		
T-1	2'	5.7	ND	700	830	100	High
T-1	4'	5.5	ND	620	650	53	Medium

PERFORMED IN GENERAL ACCORDANCE WITH CT 417/422/643 AND ASTM D4829

GMU GEOTECHNICAL, INC.

Westar Goleta

07-036-00



SAMPLE AND TEST DESCRIPTION
Sample Location: DH- 8 @ 4.0 ft **Geologic Unit:** Qtm **Classification:** Sandy lean clay (CL) **Strain Rate (in/min):** 0.001 **Sample Preparation:** Remolded **Notes:** 90-% compaction @ optimum moisture

STRENGTH PARAMETERS		
STRENGTH TYPE	COHESION (psf)	FRICTION ANGLE (degrees)
● Peak Strength	150	25.0
⊠ Ultimate Strength	100	25.0

SHEAR TEST DATA

Project: Westar Goleta Mixed Use Village
Project No. 07-036-00

GMU GEOTECHNICAL, INC.

GMU_DIRECT_SHEAR 07-036-00.GPJ GM&U.GDT 7/13/11

GMU GEOTECHNICAL, INC.

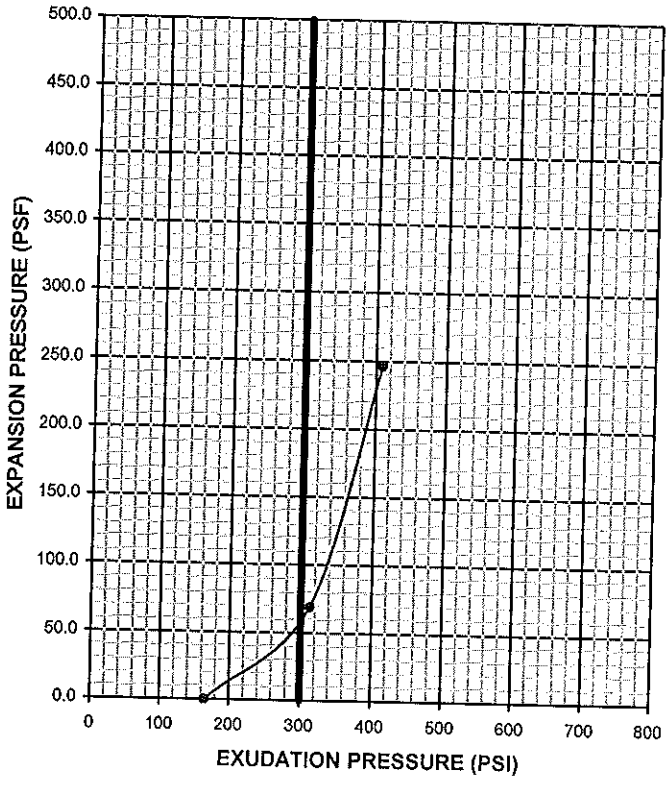
R-VALUE TEST RESULTS

PROJECT NAME: Goleta
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Sandy clay (CL) brown

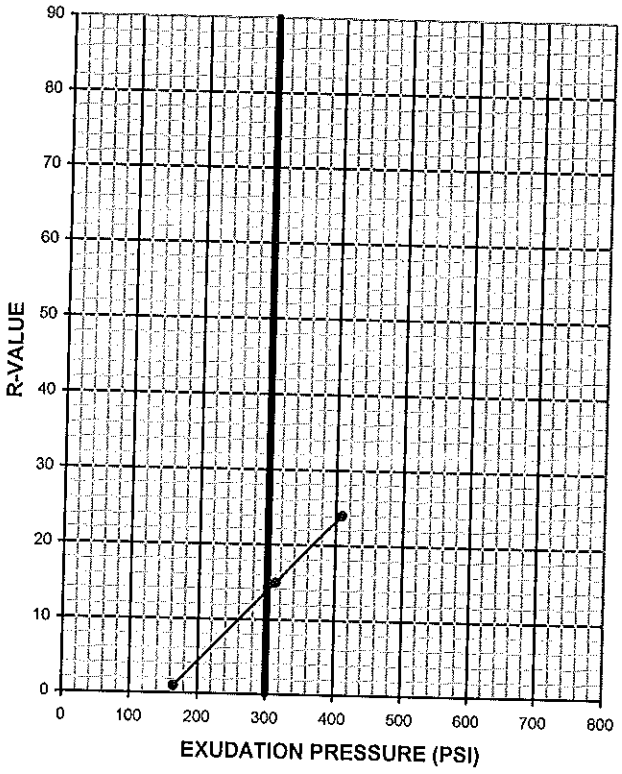
PROJECT NUMBER: 07-036-00
SAMPLE NUMBER: DH-16 @ 3'-5'
TECHNICIAN: JV
DATE TESTED 6/28/2011

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	17.6	15.4	13.9
WEIGHT OF SAMPLE, grams	987	1042	1063
HEIGHT OF SAMPLE, Inches	2.31	2.38	2.38
DRY DENSITY, pcf	110.0	115.0	118.8
COMPACTOR AIR PRESSURE, psi	50	90	140
EXUDATION PRESSURE, psi	165	313	409
EXPANSION, Inches x 10exp-4	0	16	57
STABILITY Ph 2,000 lbs (160 psi)	158	123	104
TURNS DISPLACEMENT	4.61	4.09	3.85
R-VALUE UNCORRECTED	1	16	26
R-VALUE CORRECTED	1	15	24
EXPANSION PRESSURE (psf)	0.0	69.1	246.2

EXPANSION PRESSURE VS. EXUDATION PRESSURE



R-VALUE VS. EXUDATION PRESSURE



R-VALUE AT 300 PSI EXUDATION PRESSURE :	12
EXP. PRESSURE AT 300 PSI EXUDATION PRESSURE (PSF) :	55

GMU GEOTECHNICAL, INC.

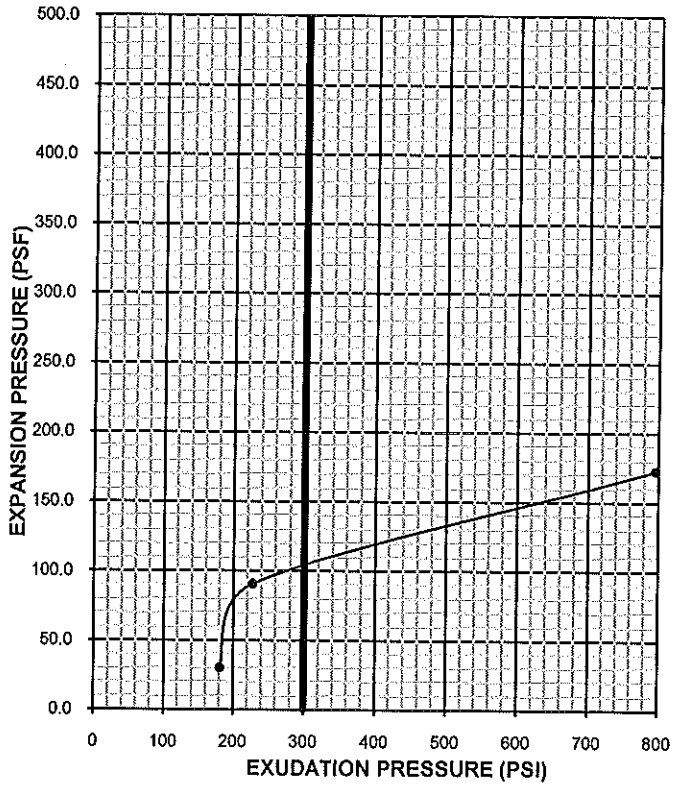
R-VALUE TEST RESULTS

PROJECT NAME: Goleta
SAMPLE LOCATION:
SAMPLE DESCRIPTION: Silty sand w/ some clay (SM)

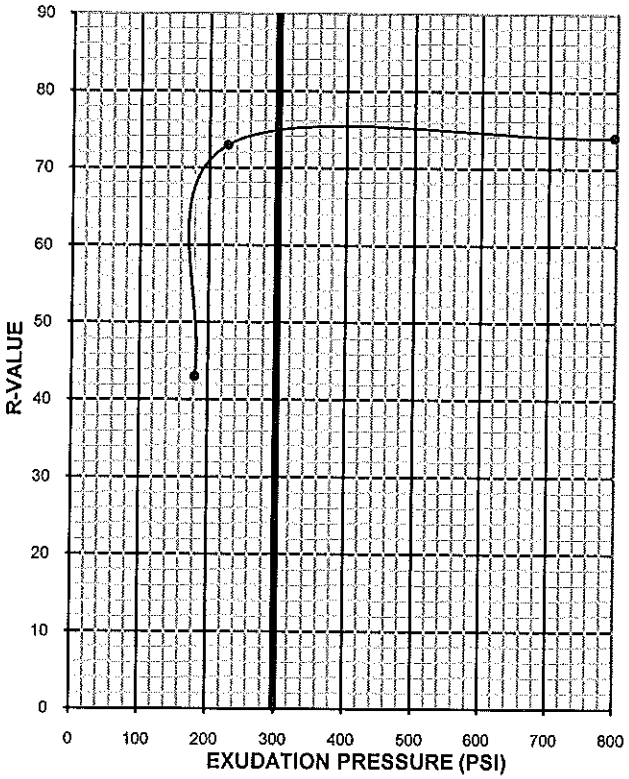
PROJECT NUMBER: 07-036-00
SAMPLE NUMBER: TP-4 @ 0.5'-2'
TECHNICIAN: JV
DATE TESTED 7/5/2011

TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	11.1	11.6	13.4
WEIGHT OF SAMPLE, grams	1054	1059	1089
HEIGHT OF SAMPLE, Inches	2.51	2.51	2.58
DRY DENSITY, pcf	114.5	114.5	112.8
COMPACTOR AIR PRESSURE, psi	300	300	300
EXUDATION PRESSURE, psi	796	227	181
EXPANSION, Inches x 10exp-4	40	21	7
STABILITY Ph 2,000 lbs (160 psi)	25	26	54
TURNS DISPLACEMENT	4.76	4.73	6.52
R-VALUE UNCORRECTED	74	73	43
R-VALUE CORRECTED	74	73	43
EXPANSION PRESSURE (psf)	172.8	90.7	30.2

EXPANSION PRESSURE VS. EXUDATION PRESSURE



R-VALUE VS. EXUDATION PRESSURE



R-VALUE AT 300 PSI EXUDATION PRESSURE :	75
EXP. PRESSURE AT 300 PSI EXUDATION PRESSURE (PSF) :	103