

GEO ENVIRON

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.

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Job No. 12-668P

July 16, 2012

Mr. David Yum
626 S. Plymouth Blvd.
Los Angeles, Ca 90005

Subject: Preliminary Geotechnical Investigation for Foundation Design, Proposed Commercial Development, 9722 Phelan Road @ Baldy Mesa Road, Phelan, APN 3064-41-02-0000, San Bernardino County, California

Reference:

- 1) MK Design, 5/10/12 "Site Plan, EUM's Commercial Development, SE Corner of Phelan Road & Baldy Mesa Road, Phelan, APN 3064-41-02-0000, San Bernardino County California"

Gentlemen:

In accordance with your request and authorization, we have performed a preliminary geotechnical engineering investigation for the subject project. The accompanying report presents the preliminary results of our field exploration work, laboratory tests, our geotechnical experience previously performed in the vicinity of the project site, as well as engineering analysis. The subsurface and foundation conditions are discussed and preliminary recommendations for the geotechnical engineering aspects of the project are presented.

This opportunity to be of service is appreciated. If you have any questions concerning our findings, please call at your convenience.

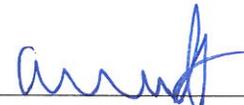
Respectfully submitted,

Geo Environ Eng. Consultants, Inc.



Javed Masud
President/ Project Engineer





Esmail Rastegari
Civil Engineer, RCE 43332

JM/ER/gm

Attachments: Appendix 'A' - Drawings
Appendix 'B' - Boring Logs
Appendix 'C' - Laboratory Test Results
Appendix 'D' - Technical References

SCOPE

The scope of this study was designed to determine and evaluate the surface and subsurface conditions of the subject site and to present preliminary recommendations for the foundation systems and grading requirements as they relate to the planned development

The scope included the following geotechnical functions:

- Review of available literature pertaining to the site and vicinity.
- Evaluation of natural and manmade surface features at the site and contiguous areas.
- Drilling and logging of exploratory borings.
- Securing of bulk and undisturbed samples of earth materials from the borings for laboratory testing.
- Laboratory testing of selected samples.
- Geotechnical engineering analysis of data obtained during the study.
- Preparation of this report and the accompanying illustrations to present the findings, conclusions, and recommendations pertaining to the planned construction.

The scope of work did not include any environmental assessment of the property or opinions relating to possible soil or subsurface contamination by hazardous or toxic substances.

SITE LOCATION, DESCRIPTION, & VICINITY

The subject property upon which the soil exploration has been performed is located at N.E. corner of Phelan Road and Baldy Mesa Road, about 5 miles west of 15 Freeway, Phelan, San Bernardino County, California.

The rectangular shaped site is approximately 2.36 acres sft in size and flat. The site is currently occupied by a abandoned building at north side of the property. Surrounding the property are vacant and commercial properties.

PROPOSED DEVELOPMENT

Preliminary details of the proposed construction and the reference drawing were provided by the project architect and the owner.

The proposed project will consist of the construction of 1) Fast Food Restaurant Building (2850 sft), 2) Retail & General Office Buildings (20, 448 sft) and associated parking pavement.

We anticipate the structures will be one story, reinforced masonry construction. The heights of the buildings will be ranging from approximately 19.5 feet to 26 feet, based upon review of the referenced site plan (Ref. 1). Loads on the foundations are unknown but are expected to be between 2 and 3 kips per linear foot. Column loads are expected to be between 50 and 100 kips.

Appurtenant construction will include asphalt concrete and concrete pavement, and landscaping.

No grading plans were provided to this firm for our use during this study. However, minor cut and fill grading are anticipated within the proposed construction areas. Should details involved in final design vary from those outlined above, this firm should be notified for review and possible revision of our recommendations.

FIELD STUDY

A field study consisting of site observations and subsurface exploration was conducted on June 22, 2012. Five (5) hollow-stem auger (8 inches diameters) borings were advanced for this investigation with a truck mounted drill rig. The borings were drilled to a maximum depth of 50 feet. The soils encountered in the exploratory borings were logged by our field personnel. The boring logs are included in Appendix 'B'. The approximate location of the borings are shown on the plot plan in Appendix 'A'.

Disturbed and undisturbed samples of the soils encountered were obtained at frequent intervals in the borings. Undisturbed samples were obtained by driving a thin walled steel sampler with successive drops of a 140-pound weight having a free fall of 30 inches. The blow count for each one foot of penetration is shown on the boring logs. Undisturbed soils were retained in brass rings with a 1-inch height and 2.413-inch in side diameter. The ring samples were retained in close fitting moisture proof containers and transported to our laboratory for testing.

The exploratory borings used for subsurface exploration were backfilled with reasonable effort to restore the area to their original condition prior to leaving the site.

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LABORATORY TESTS

The results of laboratory tests performed on disturbed, undisturbed, and remolded soil samples are presented in appendix 'C'. Following is a listing and brief explanation of the laboratory tests which were performed as part of this study. The remaining soil samples are stored in our laboratory for future reference. Unless notified to the contrary, all samples will be disposed of 30 days after this report.

Classification

The field classification of the soils were verified in the laboratory in general accordance with the Unified Soil Classification System. The final classification is shown on the boring logs.

Field Moistures and Densities

The field moisture content was determined for each of the disturbed and undisturbed soil samples. The dry density was also determined for each of the undisturbed samples. The dry density is determined in pounds per cubic foot and the field moisture content is determined as a percentage of the dry weight of the soil. Both results are shown on boring logs.

Consolidation Tests

Settlement predictions of the soil's behavior under load were made on the basis of the consolidation tests which are performed in general accordance with ASTM D-2435 procedures. The Consolidation apparatus is designed to receive a one inch high ring.

Expansion Characteristics

Laboratory expansion tests were performed on a near surface soil sample in general accordance with ASTM D-4829 procedures.

Direct Shear Test

Direct Shear test was performed in the Direct Shear Test Machine which is of the strain control type in general with ASTM D-3080 procedure. Each sample was sheared under varying pressures normal to the face of the specimen to determine the shear strength (cohesion and angle of internal friction). Samples were tested in a submerged condition. The result is plotted on the "Direct Shear Test Graph."

GEOTECHNICAL CONDITIONS

Earth Materials

The site is underlain surficial top soil extending to a depth of approximately 12 inches, consist of fine silty sand, slightly moist to dry, and moderately compacted. The top soil overlies native soils (older alluvium) consist of fine sandy silt/ silty sand, slightly moist, dense to very dense to depths of 50 feet, the maximum depth explored. Detailed description of the earth materials encountered are presented on the log borings in Appendix 'A'. The soil strata as the boring logs represents the soil conditions in the actual boring locations other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual.

Groundwater

Groundwater was not encountered in the exploratory boring during our subsurface exploration, and expected to be deep.

SEISMICITY

The frequency of earthquake and intensity of seismic ground shaking to be expected at the site depends upon which fault produces the earthquake, the earthquake magnitude and the distance to the epicenter.

Nearby active fault lines include San Andreas, Cucamonga these have associated postulated, maximum probable earthquake magnitudes of 6.8. In turn, the probabilistic ground motion acceleration range upwards to $\pm 0.56g$. The related California Building Code factors include the type b, San Andreas Fault the near source zone at 12.1 kilometer toward the south and a soil profile type of alluvium or Sd.

Based on the California Building Code acceptance of some structural damage without collapse, the subject development may be designed in accordance with the seismic formulas and requirements presented in the current version of the California Building Code. It is the responsibility of the project structural engineer to utilize the critical seismic factors to be used for building design and to implement the applicable sections of the code.

LIQUEFACTION

Based on the subsurface soils, and the depth of the groundwater the site, in general, is not designated as susceptible to liquefaction.

CONCLUSIONS

- 1) The plan construction and development of the site is considered feasible from a geotechnical engineering point of view provided the engineering recommendations of this report are followed.
- 2) The surface and the subsurface soil on the site will be adequate for the support of the structure and any fill soils proposed for the site.
- 3) The proposed structure, grading, and development of the site will not cause adverse safety hazards or instability to the adjacent properties or their structures.
- 4) conversely, the adjacent properties or their structures will not cause adverse safety hazards or instability to the planned development.
- 5) Laboratory expansion test indicate that the soils on the site have low expansion potential.
- 6) The site, in general, is not susceptible to liquefaction.

RECOMMENDATIONS

Rough Grading Recommendation

The following recommendations may need to be modified and/ or supplemented during rough grading as field conditions necessitate. All earthwork and grading shall be performed in accordance with the recommendations presented herein, and in accordance with all applicable requirements of the Grading Code of the City of Phelan or County of San Bernardino, California.

Prior to general grading operations, the existing structures on the site shall be demolished and the debris hauled off the site. All vegetation, top soil and debris in the building and pavement areas and areas to receive fill shall be stripped from the site. Vegetation and debris shall be exported from the site. Topsoil shall be stripped and stockpiled for use on finish grades in landscape areas or exported from the site.

The proposed building areas shall be overexcavated to a depth of 4.0 feet below the proposed finished grade, or 2 feet below the proposed footing bottoms, whichever is greater and replaced as a certified compacted fill. If fill is to be placed to raise the existing grades, minimum overexcavation may be performed 3.0 feet below existing grades or into competent soils. The limits of overexcavation for building areas shall extend at least 5.0 feet beyond the proposed building limits or to the property line whichever is less.

In the proposed parking/driveway and canopy areas, the existing near surface soils need only be overexcavated to a minimum depth of 1.0 foot below existing site grades or proposed subgrade elevation, whichever is deeper.

The competency of the exposed overexcavation bottoms must be determined by the soil engineer or his representative at the time they are exposed and prior to scarification or placement of fill.

All overexcavation bottoms and any areas to receive fill shall be scarified a minimum of 6 inches, watered or aerated as necessary to achieve optimum moisture content, and properly compacted to at least 90% of maximum dry density prior to filling.

For the purpose of estimating earthwork quantities, a shrinkage factor of 10-15 % may be assumed for the existing near surface on-site soil to be used as fill and compacted to 90% of maximum dry density for clayey soils. Subsidence due to grading is estimated to be 0.1 feet.

Any soil to be placed as fill, whether natural or import, shall be approved by the soil engineer or his representative prior to their placement. The fill material shall be free from vegetation, organic material or debris. Import soil shall be no more expansive than the existing near surface soils on the site. Suitable fill soil shall be placed in horizontal lifts not exceeding 6 inches in thickness after compaction and uniformly watered or aerated to obtain optimum moisture content. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of the soil and optimum moisture in each layer. After each lift has been placed, it shall be thoroughly compacted to not less than 90% of maximum dry density.

The soil engineer or his representative shall observe the placement of fill and should take sufficient tests to verify the moisture content and the uniformity and degree of compaction obtained. In-place density testing should be performed in accordance with ASTM acceptable to the local building authority. The optimum moisture content and the maximum dry density for compacted soils shall be determined in accordance with ASTM D-1557 procedures.

Due to the possibility of imported fill soil in the building areas and / or variable soil strata that may be exposed in the building pad, typical soil samples should be obtained at completion of rough grading for laboratory testing to confirm the expansion characteristics of the graded site.

FOUNDATION DESIGN RECOMMENDATIONS

Conventional Footing Recommendations

- All continuous footings should have a minimum embedment of 24 inches below lowest adjacent final grade, based upon the heights of the buildings. Interior footings may be founded 18 inches below lowest adjacent final grade,
- Continuous footing should be reinforced with at least two (2) # 4 rebars at the top and at the bottom of the footing in order to minimize the effects of any minor variations in the engineering characteristics in the supporting soils.
- All pad footings should be a minimum of 24 inches square by 24 inches in depth.

The project civil/ or structural engineer shall determine actual footing widths, depths and reinforcements necessary to resist design vertical, horizontal and uplift forces.

Allowable Soil Bearing Capacities

Based on the field and laboratory test data, a safe allowable soil bearing value of 2000 psf is recommended for the design of footings. A 1/3 increase in the above bearing value may be used when considering short term loading from wind or seismic sources.

Settlement

Using the recommended bearing value and the maximum assumed wall and column loads, the total settlement is estimated to be 0.5 inch. The differential settlement is estimated to be on the order of 0.25 inch, between similarly loading footing of the same size, over a minimum horizontal distance of 30 feet.

Lateral Bearing Pressure

Additional soil design parameters that may be pertinent to the design and development based on undisturbed natural soil or properly compacted fill are as follows:

- Allowable lateral soil pressures (Equivalent Fluid Pressure) Passive case: 300 psf/ft of depth to maximum 3000 psf.

- Allowable Coefficient of Friction between concrete and soil: .30

The above values are allowable design values and have factors of safety of 2.0 and 1.5 incorporated into them for the lateral soil pressure and coefficient of friction, respectively. If both values are used, then the passive resistance should be reduced by one third.

Seismic Design

The followings are the seismic design parameters, in accordance with the CBC 2007.

Site Longitude:-117.51555

Site Latitude: 34.42656

Site Class: **D**

Mapped Spectral Response Acceleration-Short Period:

(0.2 sec)-Ss: 1.5

Mapped Spectral Response Acceleration-Short Period:

(1 sec)-S1: 0.602

Short Period Site Coefficient-**Fa: 1.0**

Long Period Site Coefficient- **Fv: 1.0**

Adjusted Spectral Response Acceleration-Short Period:

(0.2 sec)-Sms: 1.5

Adjusted Spectral Response Acceleration-Short Period:

(1 sec)-Sm1: 0.602

Design Spectral Response Acceleration-Short Period:

(0.2 sec)-Sds: 1.0

Design Spectral Response Acceleration-Short Period:

(1 sec)-Sd1: 0.402

FLOOR SLAB RECOMMENDATIONS

Concrete slabs should be constructed in accordance with the following section.

Floor slabs should be a minimum of 4 inches thick. Floor slabs should be reinforced with # 3 rebar at 18- inches on centers.

Concrete slabs should be underlain with a minimum 6 mil polyvinyl chloride membrane vapor retarder with a minimum overlap of 12 inches in all directions. This membrane should be sandwiched between two, two-inch layers of sand.

The concrete section and/or reinforcing should be increased as necessary for excessive design floor loads or anticipated concentrated loads. In areas where moisture sensitive floor covering are anticipated over the slab, The concrete section and/ or reinforcing should be increased as necessary for excessive design floor slabs or anticipated concentrated loads.

The slab subgrade should be moisture conditioned to at least 3 percent over optimum moisture content condition to a depth of 12 inches immediately prior to placement of the moisture barrier or pouring concrete.

CEMENT TYPE

Low exposure to sulfate can be expected for concrete placed in contact with on site soil and native material. Therefore, no special cement will be required for concrete in contact with these materials

RETAINING WALL RECOMMENDATIONS

Retaining walls if planned should be designed to resist the active pressures summarized in the following table. The active pressure is normally calculated from the lowermost portion of the footing to the highest ground surface at the back of the wall, including necessary factors for sloping ground. The active and passive pressures indicated in the table are equivalent fluid densities. Walls that are not free to rotate or that are braced at the top should use active pressures that are 50% greater than those indicated in the table. Retaining wall design for passive resistance should neglect the top foot of earth in front of the wall.

Retaining Wall Design Parameter

Equivalent Fluid Pressures

Slope of adjacent ground	Active Pressure backfill with gravel or low expansive soil.
Level	30 pcf
2:1	45 pcf

The pressures shown on above table are for retaining walls backfilled with non-cohesive granular materials available on the site, and provided with drainage devices such as weep holes or subdrains to prevent the build-up of hydrostatic pressures beyond the design values. Also, it is strongly recommended that all backfill material be compacted to a minimum of 90 percent relative compaction, as this is the density from which the pressure are calculated. This recommendation cannot be overemphasized.

TEMPORARY CONSTRUCTION CUTS

Temporary construction cuts for retaining walls, foundations, utility trenches, etc., in excess of 5 feet in depth or near the existing structures will have to be properly shored or cut back into an inclination not steeper than 1: 1 (horizontal to vertical).

Where more restrictive, the safety requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety (CAL-OSHA) and / or the safety codes of the local agency having jurisdiction over the project shall apply.

All excavations shall be initially observed by the geotechnical engineer or his representative to verify the recommendations presented or to make any additional recommendations necessary to maintain stability.

TRENCH BACKFILL

Trench excavations for utility lines which extend under building and paved areas are within the zone of influence of adjacent foundations shall be properly backfilled and compacted in accordance with the following recommendations.

The pipe should be bedded and backfilled with clean sand or approved granular soil (minimum Sand Equivalent Value of 30) to a depth of at least 1 foot over the pipe. This backfill should be uniformly watered and compacted to a firm condition.

The remainder of the backfill should be on-site soil or very low to low expansive import soil, which should be placed in loose lifts not exceeding 12 inches in thickness, watered or aerated to optimum moisture content, and mechanically compacted to at least 90% of maximum dry density as determined by ASTM D-1557 procedures. Water jetting of the backfill is not allowed.

PAVEMENT RECOMMENDATIONS

For preliminary design purposes, the typical soil anticipated in the subgrade will consist of silty sand. Based on this soil type, an R-Value of 50 was estimated for preliminary design of the pavement section. The actual R- Value of the subgrade soil should be tested and verified at the time of construction. The following are our preliminary recommendations for the structural pavement section calculated in general accordance with Caltrans procedures and based on the R-Value and the Traffic Index (TI).

Preliminary Flexible Pavement Sections on Native Soils

Site Area	Traffic Index	R-value	AC Pavement Section
Automobile Parking	4.5	40	3" A.C. over 4" Class II Base
Vehicle Drive Area	5.5	40	3" A.C. over 6" Class II Base
Heavy Truck Area	6.5	40	4" A.C. over 6" Class II Base

Preliminary Rigid Pavement Sections

Site Area	Traffic Index	Concrete Pavement Section
Automobile Parking	4.5	5" PCC over 4" Class II Base
Vehicle Drive Area	5.5	6" PCC over 4" Class II Base
Heavy Truck Area	6.5	7" PCC over 4" Class II Base

The concrete pavement should have saw cuts or expansion joints every 10 feet or less. The minimum reinforcing should consist with No. 3 bars spaced 24 inches on centers, both ways. The concrete should have a 28-day concrete strength of at least 2,500 psi. To reduce the potential of unsightly cracking concrete pavement for sidewalk and hardscape should be at least 4 inches thick and provided with saw cuts or expansion joints every 6 feet or less.

Subgrade soils shall be overexcavated, scarified and compacted to at least 90% + of laboratory maximum dry density as recommended in the previous section of rough grading. Base course shall be compacted to at least 95% + of laboratory maximum dry.

PLAN REVIEW

Subsequent to formulation of final development plans and specifications but prior to construction, grading and foundation plans should be reviewed by Geo Environ to verify compatibility with site geotechnical conditions and conformance with recommendations contained herein.

CONSTRUCTION OBSERVATIONS

All rough grading of the property shall be performed under engineering observation of Geo Environ.

Geo Environ shall observe all foundation excavations. Observations should be made prior to installation of concrete forms and reinforcing steel in order to verify or modify, if necessary, conclusions and recommendations in this report.

CLOSURE & LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

Due to the possible variability of soil and subsurface conditions within the site, conditions may be encountered during grading and development that may differ from those presented herein. Should any variation or unusual condition become apparent during grading and development, this office should be contacted to evaluate these conditions prior to continuation of work and necessary revisions to the recommendations.

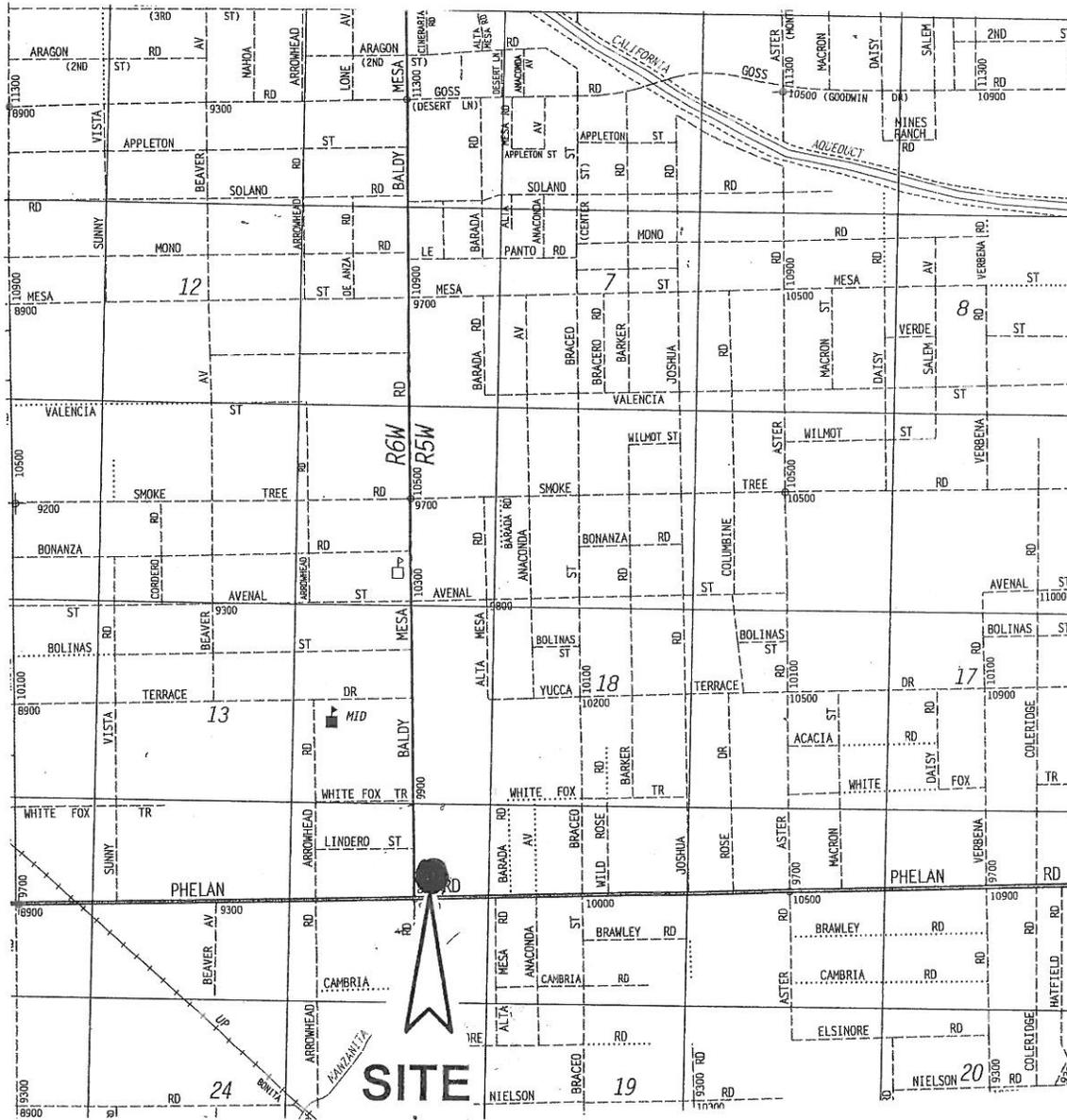
This office should be notified if changes of ownership occur or if the final plans for the site development indicate structures areas, type of structures, or structural loading conditions differing from those presented in this report.

If the site is not developed or grading does not begin within 12 months following the date of this report, further studies may be required to ensure that the surface or subsurface conditions have not changed.

Any charges for necessary review or updates will be at the prevailing rate at the time the review work is performed.

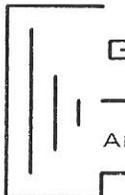
APPENDIX A

DRAWINGS



THOMAS BROS. MAP
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APPROXIMATE SCALE: 1" = 4800'



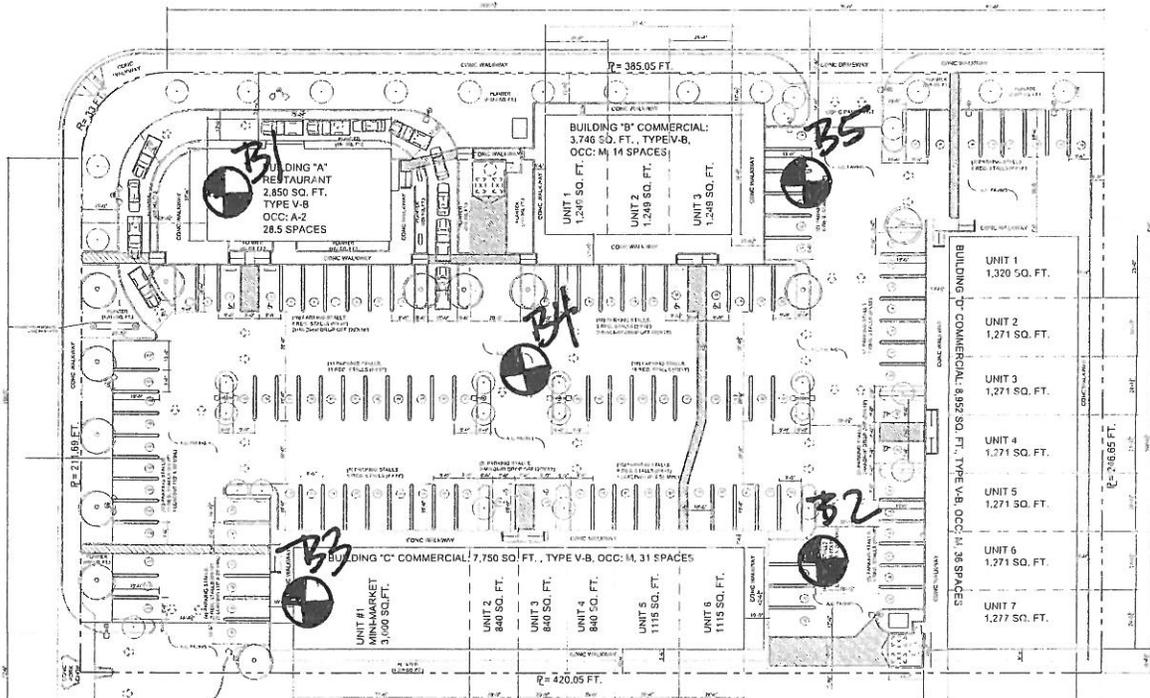
GEO ENVIRON
 ANAHEIM, CALIFORNIA

9722 PHELAN ROAD
 PHELAN, CA

FIG. 1
 SITE LOCATION MAP
 PROJ. NO. 12-668P

BALDY MESA ROAD

PHELAN ROAD



AREA TABULATIONS:		PARKING TABULATIONS:	
BUILDING "A" 2,850 SQ. FT.	BUILDING "C" 7,750 SQ. FT.	109.5 TOTAL SPACES REQUIRED	113.0 TOTAL SPACES PROVIDED
BUILDING "B" 3,746 SQ. FT.	BUILDING "D" 8,952 SQ. FT.		
TOTAL: 23,298 SQ. FT.			

B1
SOIL BORING



GEO ENVIRON

ANAHEIM, CALIFORNIA

9722 PHELAN ROAD
PHELAN, CA

FIG.2
PLOT PLAN
PROJ. NO. 12-668P

APPENDIX B
BORING LOGS

GEO ENVIRON

BORING LOG B-1

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30"Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
0							Top Soil: Lt. orange fine silty sand, sl. moist, mod. compacted.
2							Natural: Lt. reddish, fine sandy silt, sl. moist, stiff.
5		19	2.2	118.8	ML		--- fine sandy silt, sl. moist, very stiff.
10		35	3.9	126.2	ML		
15		35	2.7	130.8	SM		Lt. brown, F-M silty sand, sl. moist, very dense.
20		25	4.2		ML		Lt. tan, F-M sandy silt, sl. moist, stiff.
25		27	1.5		SM		Lt. orange, F-M silty sand, sl. moist, very dense.
		33					Lt. reddish, fine silty sand, sl moist, very dense
		2.3					

CONTD. P/2



Std. Penetration Test



California Ring



Bulk Sample

GEO ENVIRON

BORING LOG B-1 (continued)

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30"Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
30							
		19	2.1		SM-ML		Olive, fine silty sand, sl. moist, mod. dense.
35							
		20	2.7		SM-ML		----- very silty sand, sl. moist, mod. dense.
40							
		22	9.8		SM-ML		----- fine silty sand, sl. moist, mod. dense.
45							
		34	2.7		SM-ML		----- fine silty sand, sl. moist, dense.
50							
		38			SP		Lt. brown, f-m sand, w/ some gravel, sl. moist, dense
			2.2				
							END OF BORING @ 51.5' NO GROUNDWATER

 Std. Penetration Test

 California Ring

 Bulk Sample

GEO ENVIRON

BORING LOG B-2

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30" Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
0							Top Soil: Reddish, fine silty sand, sl. moist.
2							Natural: Reddish, fine silty sand, sl. moist, mod. dense.
5		22	2.9	109.1	SM		
10		21	3.1	107.3	SM		--- fine silty sand, sl. moist, mod. dense.
15		33	3.6	116.9	ML		Lt. reddish, fine sandy silt, sl. moist, very stiff.
20		41	6.8	114.5	ML		----- fine sandy, mod. moist, stiff.
25							END OF BORING @ 15'. NO GROUNDWATER.



Std. Penetration Test



California Ring



Bulk Sample

GEO ENVIRON

BORING LOG B-3

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30"Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
0							Top Soil: Reddish, fine silty sand, sl. moist.
2							Natural: Reddish, fine silty sand, sl. moist, mod. dense.
5		21	3.3	111.1	SM		--- fine silty sand, sl. moist, mod. dense.
10		16	2.7	105.2	SM		
15		64	2.8	120.6	ML		Lt. reddish, fine sandy silt, sl. moist, very stiff.
20		68	7.3	111.5	ML		----- fine sandy, mod. moist, stiff.
25							END OF BORING @ 15'. NO GROUNDWATER.



Std. Penetration Test



California Ring



Bulk Sample

GEO ENVIRON

BORING LOG B-4

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30"Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
0							Top Soil: Reddish, fine silty sand, sl. moist.
2							Natural: Reddish, fine sandy silt, sl. moist, stiff
5		32	3.5	112.8	SM		--- fine sandy silt, sl. moist, stiff.
10		33	2.9	110.6	SM		
15		41	2.8		ML		Lt. tan, fine sity sand, sl. moist, very dense.
20		39	4.9		ML		----- fine silty sand, mod. moist, dense.
25							END OF BORING @ 15'. NO GROUNDWATER.



Std. Penetration Test



California Ring



Bulk Sample

GEO ENVIRON

BORING LOG B-5

PROJECT NAME: David Eum
 PROJECT ADDRESS: 9722 Phelan Road, Phelan
 DRILLING COMPANY: 2R Drilling
 DRILLING METHOD: H.S.A BORING DIA: 8"
 SAMPLING METHOD: 140 LB 30"Drop
 W/Automatic Trip Hammer

PROJECT NO: 12-668P
 DATE: 7/10/12
 LOGGED BY: JM

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
0							Top Soil: Reddish, fine silty sand, sl. moist.
2							Natural: Reddish, fine silty sand, sl. moist, mod. dense.
5		15	1.9	107.3	SM		--- fine silty sand, sl. moist, mod. dense.
10		12	2.1	120.7	SM		
15		22	6.6		ML		Lt. reddish, fine sandy silt, sl. moist, very stiff.
20		16	5.5		ML		----- fine sandy, mod. moist, stiff.
25							END OF BORING @ 15'. NO GROUNDWATER.



Std. Penetration Test



California Ring



Bulk Sample

APPENDIX C
LABORATORY TEST RESULTS

EXPANSION CHARACTERISTICS
(ASTM D-2435)

0-21 Very Low
21-50 Low
51-90 Medium
91-130 High
131+ Very High

Sample	Soil Type	Expansion Index	Expansion Classification
Composite (0-5')	Silty Sand	10	Very Low

MAXIMUM DRY DENSITY
(ASTM 1557)

Sample	Soil Classification	Max. Density (pcf)	Opt. Mois.(%)
Composite (0-5')	Silty Sand	126.5	10.5

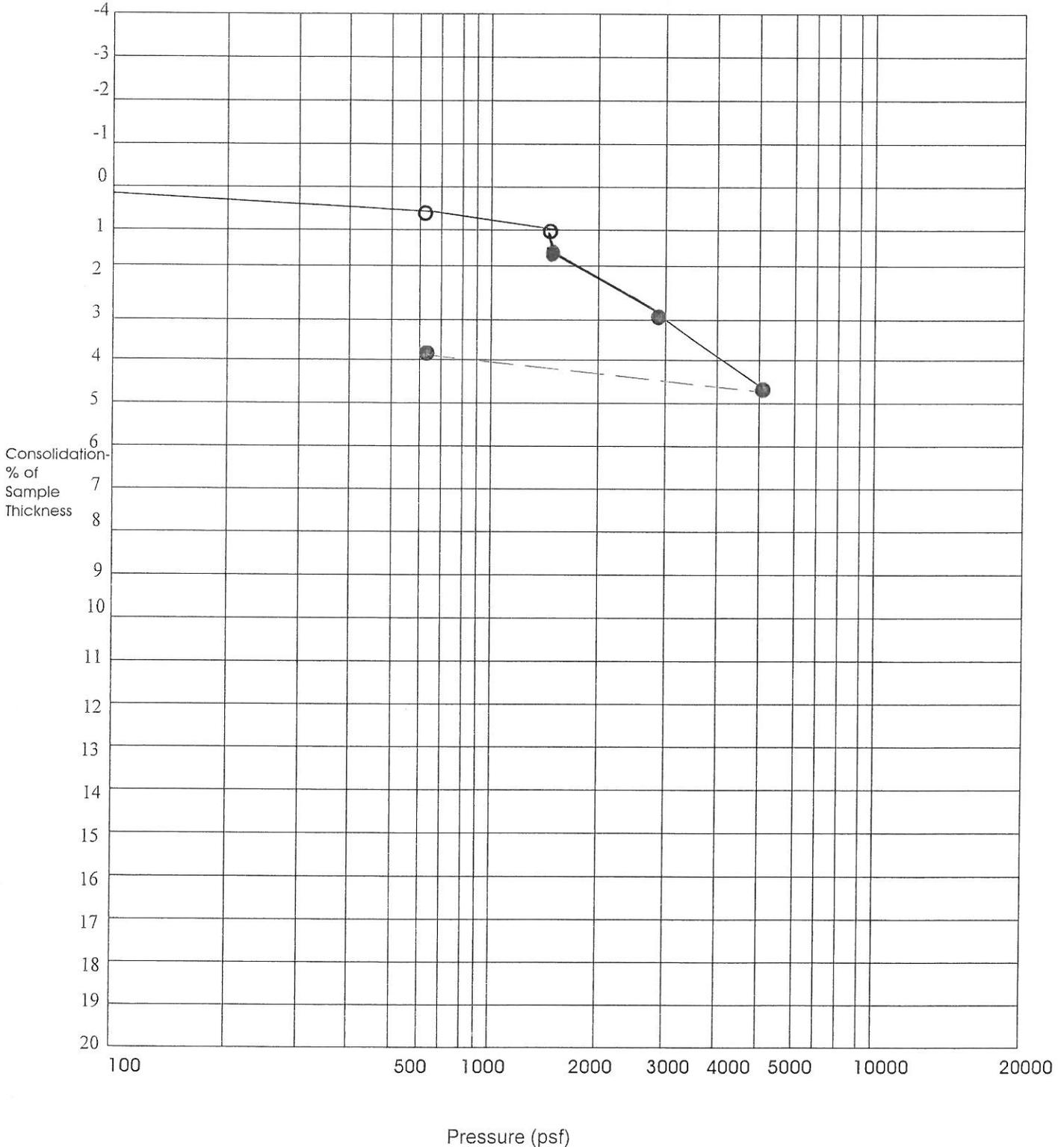
CONSOLIDATION CURVE (ASTM D-2435)

CLIENT: David Eum PROJECT NO: 11-668P DATE: 7/11/12

PROJECT ADDRESS: 9722 Phelan Road, Phelan

SAMPLE ID: B-1 @ 2.5' SOIL CLASS: Sandy Silt TECH: G.M.

Sample at: ○ Field Moisture ● Saturated Condition



CONSOLIDATION CURVE

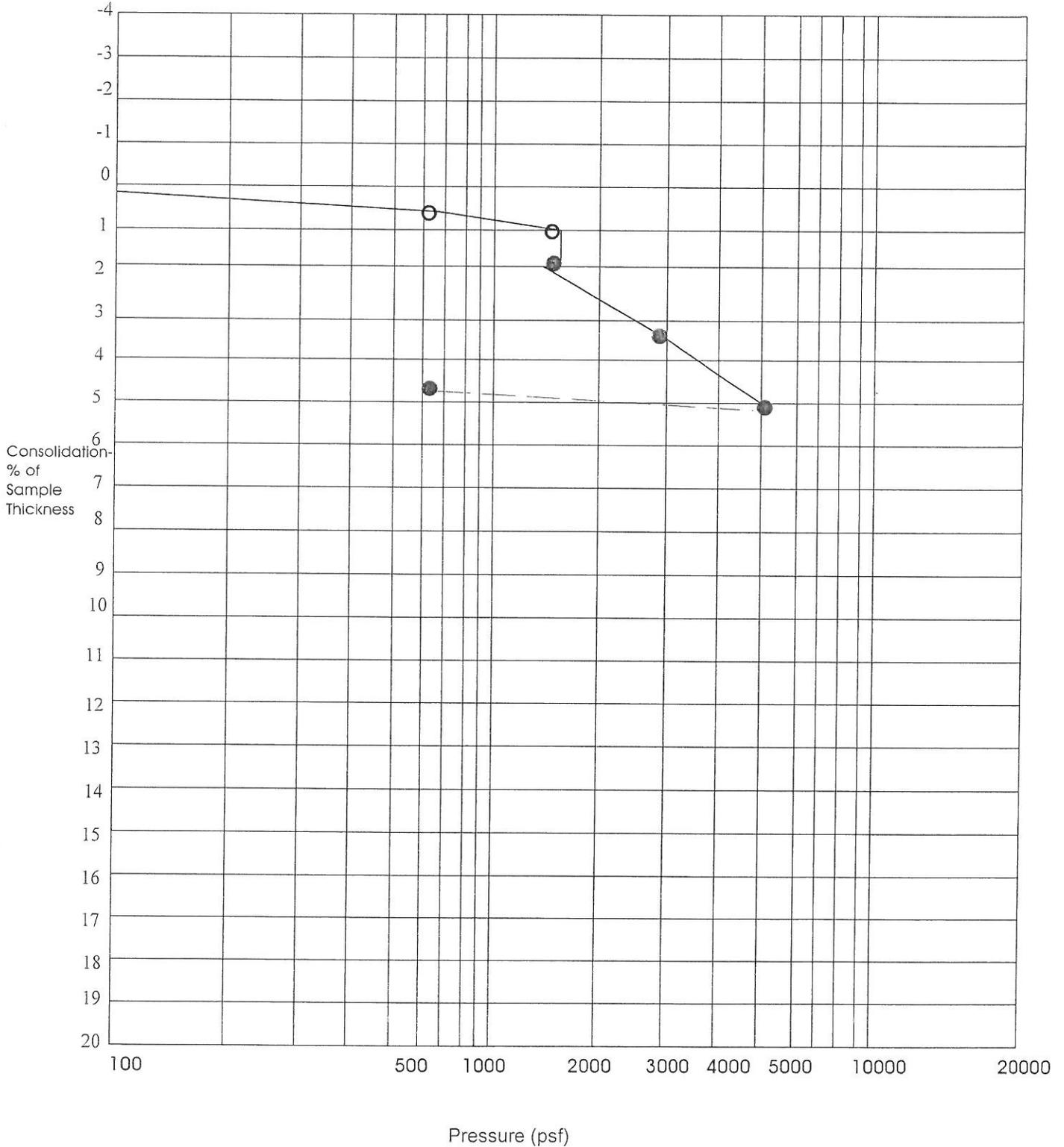
(ASTM D-2435)

CLIENT: David Eum PROJECT NO: 11-668P DATE: 7/12/12

PROJECT ADDRESS: 9722 Phelan Road, Phelan

SAMPLE ID: B-3 @ 5' SOIL CLASS: Silty Sand TECH: G.M.

Sample at: ○ Field Moisture ● Saturated Condition



CONSOLIDATION CURVE

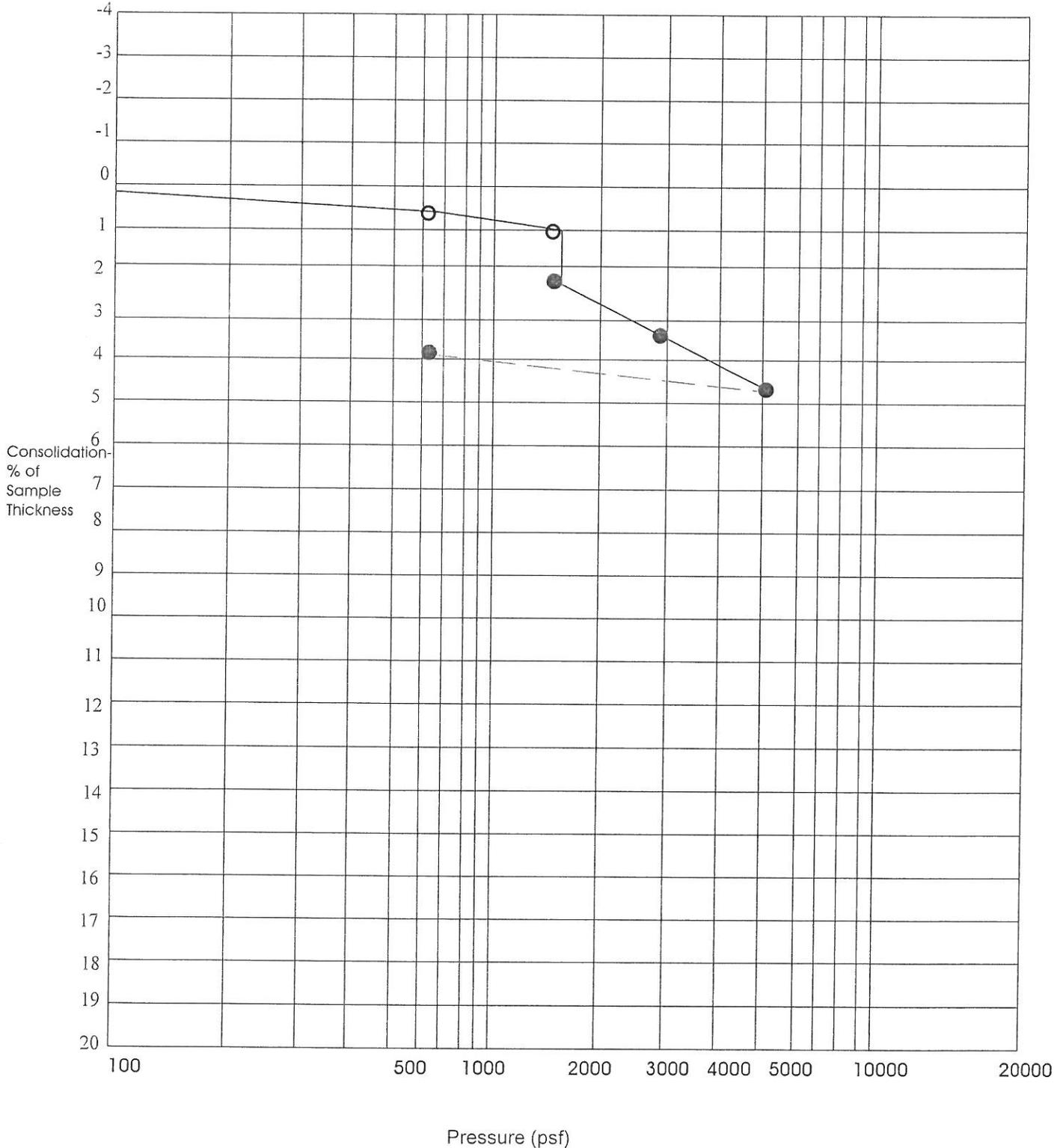
(ASTM D-2435)

CLIENT: David eum PROJECT NO: 11-668P DATE: 7/13/12

PROJECT ADDRESS: 9722 Phelan Road, Phelan

SAMPLE ID: B-5 @ 2.5' SOIL CLASS: Silty Sand TECH: G.M.

Sample at: ○ Field Moisture ● Saturated Condition



DIRECT SHEAR TEST

CLIENT: David Eum PROJECT NO: 12-668P DATE: 7/12/12

PROJECT ADDRESS: 9722 Phelan Road, Phelan SAMPLE ID: Top Soil (0-5')

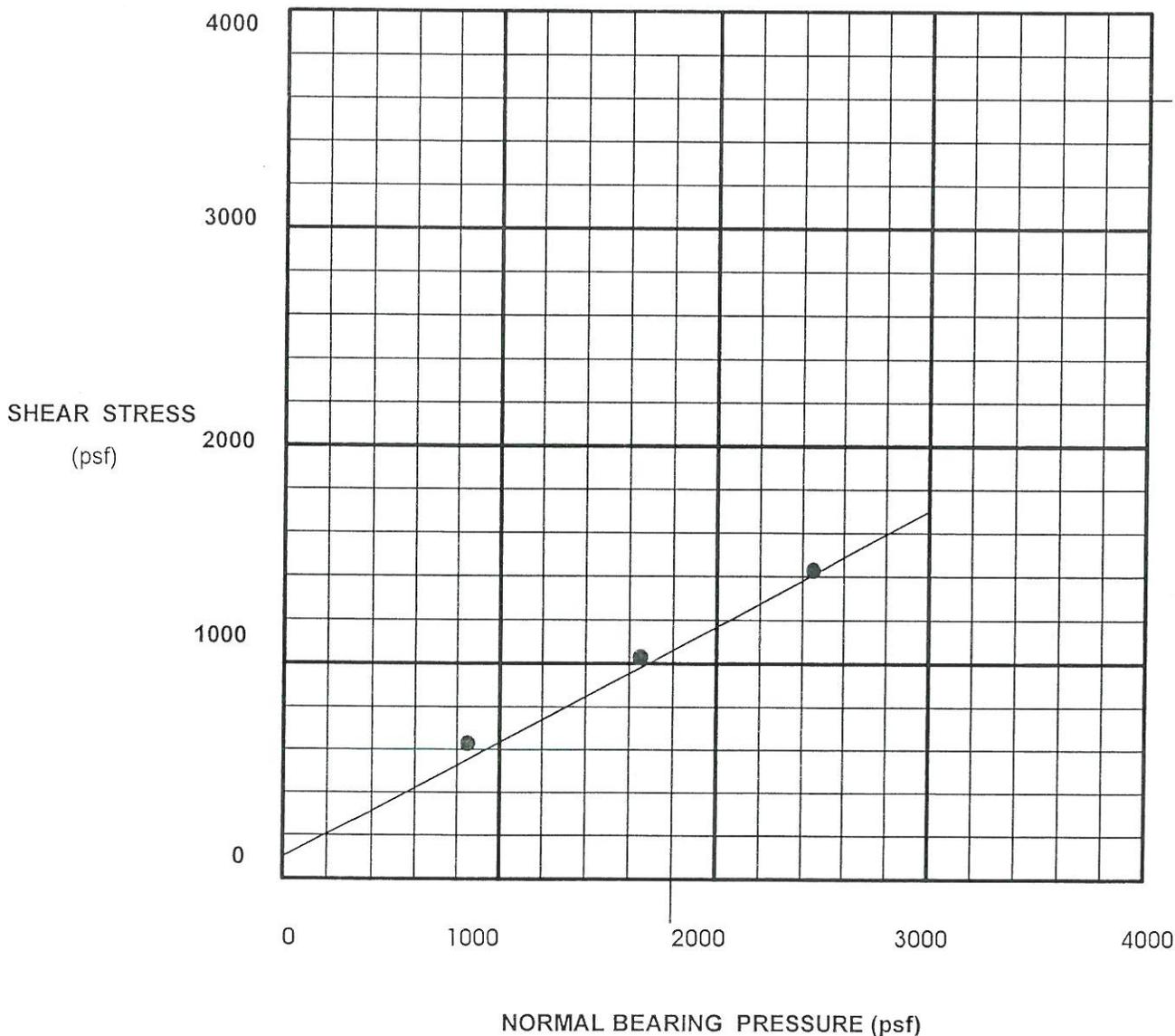
SOIL CLASS: Silty Sand DRY DENSITY: 114.2 MOIS. (Initial): 11.5 (final): 24.2

UNDISTURBED: _____ RE MOLDED: X (90% Rel Comp) STRAIN RATE: 0.004 in/min

SHEAR STRENGTH: ULTIMATE RESIDUAL

PHI: 31 deg C: 100 PHI: _____ C: _____

SAMPLE TESTED IN SUBMERGED CONDITION



APPENDIX D
TECHNICAL REFERENCES

REFERENCES

1. California Building Code 2010 *foundation design parameters*
2. USGS, *Ground Acceleration from Earthquakes*
3. USGS, *Seismic Design Values for Buildings*
4. California Division of Mines and Geology (CDMG), *Seismic Hazard Evaluation*
5. California Division of Mines and Geology (CDMG), *Historic Groundwater Elevations*
6. DMG Special Publication SP117A, *Guideline For Analyzing and Mitigating Liquefaction in California.*