



GEOTECHNICAL & ENVIRONMENTAL ENGINEERING - CONSTRUCTION TESTING & INSPECTION

May 15, 2018 TES No. 180204.001

Mr. John Kashian KKAL, California Limited Partnership

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Project: Proposed Industrial Development

Highway 41 and Idaho Avenue

Lemoore, California

Subject: Geotechnical Investigation Report

Dear Mr. Kashian:

The attached report presents the results of a geotechnical investigation for the construction of a proposed industrial development to be located north of Highway 41 and Idaho Avenue in Lemoore, California. This report describes the study, findings, conclusions, and recommendations for use in project design and construction.

TECHNICON Engineering Services, Inc. (TECHNICON) appreciates the opportunity to provide geotechnical engineering services to KKAL, California Limited Partnership during the design phase of this project. We trust this information meets your current needs. If there are any questions concerning the information presented in this report, please contact this office at your convenience.

Respectfully submitted,

TECHNICON Engineering Services, Inc.

Kyle Weatherford Project Engineer

KW:SA:vm

Salvador Alvarez, PE

Geotechnical Engineering Manager





GEOTECHNICAL INVESTIGATION REPORT PROPOSED INDUSTRIAL DEVELOPMENT HIGHWAY 41 AND IDAHO AVENUE LEMOORE, CALIFORNIA

Prepared for:

KKAL, California Limited Partnership 265 E. River Park Circle #270 Fresno, California 93720

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PROPOSED INDUSTRIAL DEVELOPMENT HIGHWAY 41 AND IDAHO AVENUE LEMOORE, CALIFORNIA

1 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation for the proposed industrial development to be located Northeast of Highway 41 and Idaho Avenue in Lemoore, California. The Vicinity Map, presented on Figure 1, shows the location of the project and the Site Map, presented on Figure 2, shows the proposed development and the approximate boring locations.

1.2 PROPOSED CONSTRUCTION

According to the site plan provided, the project involves the design and construction of seventeen (17) industrial buildings, interior roadways and parking lot improvements to be located near Highway 41 and Idaho Avenue, in Lemoore, California. The buildings are anticipated to be 10,000, 15,000, 20,000, and 100,000 square foot single-story structures utilizing conventional spread footings and concrete-slab-on-grade floors. Maximum wall and column loads are anticipated to be less than 5 kips/ft and 50 kips, respectively. Cuts and fills are anticipated to be less than 2 feet in order to achieve level building pad and positive site drainage. Appurtenant improvements are anticipated to include asphalt concrete pavements, underground utilities, hardscape, and landscaping.

1.3 PURPOSE AND SCOPE OF SERVICES

The purpose of this investigation was to explore the site subsurface conditions to allow for development of recommendations and opinions regarding design and preparation of construction plans and specifications. The report includes the following:

A description of the proposed project including a Vicinity Map showing the location of the site and a Site Map showing the proposed improvements and the exploration points for this investigation
A description of the site surface and subsurface conditions encountered during the field investigation, including boring logs
A summary of the field exploration and laboratory testing program



The scope of services consisted of a field exploration program, laboratory testing, design analysis, and preparation of this written report as outlined in **TECHNICON**'s proposal dated March 27, 2018 (TES No. GP18-055A).

Comments on the corrosion potential of on-site soils to buried metal and

Recommended asphalt concrete pavement sections for various traffic levels

pier foundations

Comments on general site drainage

concrete



2 FIELD EXPLORATION AND LABORATORY TESTING

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2.1 FIELD EXPLORATION

The field exploration, conducted on April 2, 3, and 6, 2018 consisted of drilling sixteen (16) exploratory test borings, and a site reconnaissance by a staff engineer. The test borings were drilled with a CME 45 and CME 55 truck-mounted drill rig using hollow stem auger and mud rotary drilling techniques. The borings extended to depths of 11.5, 16.5, 21.5 and 51.5 feet below existing ground surface (bgs). Additionally, six (6) locations were excavated within proposed pavement areas to obtain bulk soil samples for R-value testing. The approximate locations of the test borings and R-Value locations are indicated on the Site Map, Figure 2.

The soils encountered in the borings were visually classified in the field and a continuous log was recorded. Relatively undisturbed samples were collected from the test borings at selected depths by driving a 2.5-inch I.D. split barrel sampler containing brass liners into the undisturbed soil with a 140-pound automatic hammer free falling a distance of 30 inches. In addition, samples of the subsurface soils were obtained using a 1.4-inch I.D. standard penetrometer, driven 18 inches in accordance with ASTM D1586 test procedures. The sampler was used without liners. Resistance to sampler penetration was noted as the number of blows per foot over the last 12 inches of sampler penetration on the boring logs. The blow counts listed in the boring logs have not been corrected for the effects of overburden pressure, rod length, sampler size, boring diameter, or hammer efficiency. Bulk samples were also retained from auger cuttings of the near surface soils at selected test boring locations.

2.2 FIELD AND LABORATORY TESTING

Penetration rates, determined in general accordance with ASTM D1586, were used to aid in evaluating the consistency, compression, and strength characteristics of the foundation soils.

Laboratory tests were performed on selected near surface samples to evaluate their physical characteristics. The following laboratory tests were used to develop the design geotechnical parameters:

Unit weight (ASTM D2937)
Moisture Content (ASTM D2216)
Sieve Analysis (ASTM C136)



Collapse Potential (ASTM D5333)
Expansion Index (ASTM D4829)
Direct Shear (ASTM D3080)
Soluble Sulfate and Soluble Chloride Contents (California Test Method No's 417 & 422)
pH and Minimum Resistivity (California Test Method No. 643)

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The dry density and moisture content test results are shown on the boring logs in Appendix A. The soluble sulfate, soluble chloride, pH, and minimum resistivity are discussed in the "Corrosion Potential" section (Section 6.6). The remaining test results are provided in Appendix B.

Resistance Value (California Test Method No. 301)



3 SITE CONDITIONS

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3.1 SURFACE CONDITIONS

The subject site, located northeast of Highway 41 and Idaho Avenue in Lemoore, California consists of several vacant shallow basins. The site is generally bounded by vacant land to the north, an industrial facility to the east, Idaho Avenue to the south, and Highway 41 to the west. At the time of investigation the project site appeared to have been disked. The overall topography of the site was relatively flat. Raised soil lines approximately 2 feet high divide the basins. The basins are approximately 2 feet below the elevation of Highway 41, and the basin adjacent to Idaho Avenue is approximately 4-5 feet below elevation. A line of trees and an irrigation canal were also observed along Idaho Avenue.

3.2 FEMA FLOOD ZONE

According to the Federal Emergency Management Agency (FEMA), the site is in a Zone X flood designation (Map Number 06031C0170D, dated September 16, 2015), indicating areas determined to be outside the 0.2 percent annual chance floodplain.

3.3 EARTH MATERIALS

According to a geologic map of California the western area of the site consists of recent Pleistocene aged Great Basin deposits while the eastern part of the site consists of Great Valley Fan deposits. The general earth material profile depicted by the subsurface exploration consisted of a variety of surface soils including, sandy clay, silty sand, sandy silt, and clayey sand underlain by laterally discontinuous layers of sandy silt, silty sand, silty clay, sandy clay, poorly graded sand with silt, and poorly graded sand to the depth explored of 51.5 feet bgs. The coarse-grained soils generally had a relative density of loose to dense and the fine grained soils had a relative density of medium stiff to hard.

The above is a general description of the earth material profile. A more detailed representation of the stratigraphy at the specific exploration locations is provided on the boring logs in Appendix A.



3.4 GROUNDWATER CONDITIONS

Groundwater was encountered at varying depths ranging from 5 to 18 feet bgs. The California Department of Water Resources "Water Data Library", most recent data indicates that in 2016 the depth to groundwater in two (2) nearby wells was 19 and 28 feet bgs. It is possible that groundwater conditions at the site could vary between boring locations or could change at some time in the future due to variations in the rainfall, groundwater withdrawal, agricultural irrigation, construction activities, or other factors not apparent at the time of the field reconnaissance. Groundwater is anticipated to affect the project design as well as construction if excavations extend to a depth of 4 feet or greater.

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4 GEOLOGIC CONDITIONS

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4.1 FAULTS LOCAL TO THE PROPOSED SITE

The site is not located in an Alquist-Priolo Earthquake Fault Zone as established by the Alquist-Priolo Fault Zoning Act (Section 2622 of Chapter 7.5, Division 2 of the California Public Resources Code). Based on review of published data and current understanding of the geologic framework and tectonic setting of the project, the primary sources of seismic shaking at this site are anticipated to be the Great Valley 14 faults (Kettleman Hills), the Lost Hills fault, the San Andreas Fault (Parkfield), and the Rinconada 2011 CFM which are located approximately 31, 54, 71, and 108 kilometers, respectively, from the site. The San Andreas Fault (Parkfield) is considered the governing fault.

4.2 SEISMIC DESIGN CRITERIA

There are no geotechnical factors at this site that are unique and would necessitate special seismic consideration for design of the project. Use of 2016 California Building Code (CBC), and ASCE 7-10 design criteria would be appropriate, unless the designer deems more specific data (e.g. elastic response spectra or characteristic site period) necessary. Table 4.2-1 provides the recommended design parameters.

TABLE 4.2-1
2016 CBC ASCE 7-10 SEISMIC DESIGN PARAMETERS

Seismic Item	Design Value	Seismic Item	Design Value
Site Class	D	S_{MS}	1.062
Ss	0.948	S _{M1}	0.587
S ₁	0.342	S _{DS}	0.708
Site Coefficient, F _v	1.715	S _{D1}	0.392
Site Coefficient, Fa	1.121		

4.3 LIQUEFACTION POTENTIAL AND SEISMIC SETTLEMENT

In order for liquefaction, and possible associated effects, of soils due to ground shaking to occur, it is generally accepted that four conditions will exist:

☐ The subsurface soils are in a relatively loose state,



mechanism.

The soils are saturated,
The soils are fine, granular, and uniform,
Ground shaking of sufficient intensity should occur to act as a triggering

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Saturated granular sediments can experience liquefaction if subject to seismically induced ground motion of sufficient intensity and duration. Liquefication analysis used procedures by Youd et. al. (2001) and considered the relative density, fines content of the granular sediments, and the moisture content and plasticity index of the fine grained soils. The analysis indicates that liquefaction may occur between depths of 39 to 43 feet. However, due to the significant depth of non-liquefiable overburden soil, bearing loss is not likely to occur. Seismically induced settlement is calculated to be approximately 1.3 inches. The differential settlement between similarly loaded footings is anticipated to be less than 50 percent of the total settlement. Mitigation due to seismically induced settlement is not recommended.



5 EARTHWORK

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5.1 GENERAL

Based on the laboratory data, field exploration, and geotechnical analyses conducted for this study, it is geotechnically feasible to construct the proposed improvements as currently envisioned. Provided that the recommendations presented in this report are incorporated into the project design and construction, use of conventional spread footings bearing on undisturbed native soil or approved engineered fill are considered appropriate for structure support.

Through Expansion Index (EI) testing, the investigation has revealed some moderately expansive foundation soils. Near surface bulk samples were tested from boring B-11 and R-value RV-4, which had El's equal to 14 and 78, respectively. The threshold for soils to be considered expansive is an EI equal to 20. Therefore, the onsite soils have the potential to be either expansive or non-expansive. These expansive soils are susceptible to volume changes associated with changes in soil moisture content. The potential for future differential movement resulting from these soils can be reduced to normally tolerable levels by following the moisture conditioning and compaction recommendations presented in this report. Expansion characteristics should be determined during grading for each soil type in conjunction with the maximum density determination. Moisture conditioning and compaction mitigation implemented during grading should be consistent with the expansiveness determined. Careful attention must be paid to future maintenance, including site drainage and irrigation practices.

Note that the moisture content attained during grading and building pad preparation should be maintained between the completion of grading and the placement of the vapor retarder membrane, concrete slabs, and footings. If the moisture content is not maintained between the conclusion of grading and the start of building construction, the moisture content will need to be reestablished prior to building construction.

Recommendations regarding site grading are presented in subsequent sections of this report. All reference to relative compaction, maximum density, and optimum moisture is based on ASTM Test Method D1557. Earthwork should extend a minimum of 5 feet beyond the perimeter of the buildings and site hardscape.



5.2 SITE PREPARATION

5.2.1 Demolition of Existing Trees

Within the project area, existing trees should be removed, and the root system thoroughly cleared of root balls and isolated roots greater than ½-inch in diameter as well as concentrated smaller diameter roots and root mats, depending on the volume of smaller roots encountered. The amount of soil lost or disturbed with removal will likely vary with the moisture conditions at the time of removal, soil type and the methods of removal. It is anticipated that much of the cohesive soil will likely remain attached to the root system. The root system removal may disturb a significant quantity of soil. It is suggested that a tree service and demolition contractor be contacted for more detailed information regarding the typical soil loss and disturbance associated with tree removal.

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Following demolition and tree removal, disturbed soils should be mitigated as described in Section 5.2.3.

5.2.2 Stripping

All surface vegetation and any miscellaneous surface obstructions should be removed from the project area, prior to any site grading. It is anticipated that stripping of vegetation could involve the upper 1 to 3 inches of the site. Surface strippings should not be incorporated into fill unless they can be sufficiently blended to result in an organic content less than 3 percent by weight (ASTM D 2974). Stripped topsoil, with an organic content between 3 and 12 percent by weight, may be stockpiled and used as non-structural fill (i.e. landscaped areas). If used in landscape areas soil with an organic content between 3 and 12 percent should be placed within 2 feet of finished grade and at least 5 feet outside of building perimeters. Soil with an organic content greater than 12 percent by weight should be excluded from fill.

5.2.3 Disturbed Soil and Undocumented Fill

Initial site grading should include a reasonable search to locate soil disturbed by previous activity and any undocumented fill soils, or existing utilities that may exist within the area of construction. Any subsurface obstructions should be removed from the project area. Any areas or pockets of soft or loose soils, void spaces made by burrowing animals, undocumented fill, or other disturbed soil that are encountered, should be excavated to expose approved firm



native material. Excavations for removal of any unsuitable conditions should be dish-shaped and backfilled with engineered fill (see Section 5.3).

5.2.4 Over-excavation

The site surface was observed to be disked, contained animal burrows, and generally uneven ground surface which could lead to non-uniform bearing conditions and differential settlement of the proposed structures. As such, after performing the stripping and removals described above, all areas to support improvements that are sensitive to settlement (e.g. buildings, pavements, hardscape, etc.) shall be over-excavated to a depth of 12 inches below existing site grade. Additional over-excavation may be necessary to remove additional loose soil due to demolition of trees or as determined by the Geotechnical Engineer at the time of grading. Over-excavation is not required below non critical improvements, such as landscape areas.

5.2.5 Scarification and Compaction

After stripping the sites, performing the required overexcavation, and elective removals, the exposed subgrade soil to receive fill or areas to support proposed foundations/improvements should be scarified to a minimum depth of 8 inches, uniformly moisture conditioned, and compacted in accordance with Table 5.3-2. The area should also be proof rolled to detect soft or pliant areas. Soft or pliant areas should be excavated to expose firm undisturbed soil approved by the Geotechnical Engineer as described in section 5.2.3.

The expansive soil condition will necessitate moisture conditioning to a depth of 6 inches below footings and 24 inches below slabs (refer to Sections 6.2 and 6.5). Therefore, additional overexcavation and scarification may be necessary to achieve the required moisture content below footings and slabs-on-grade.

5.2.6 Construction Considerations

Should site grading be performed during or subsequent to wet weather, near-surface site soils may be significantly above optimum moisture content. These conditions could hamper equipment maneuverability and efforts to compact site soils to the recommended compaction criteria. Disking to aerate, chemical treatment, replacement with drier material, stabilization with a geotextile fabric or grid, or other methods may be required to mitigate the effects of excessive soil moisture and facilitate earthwork operations. Any consideration of chemical



treatment (e.g. lime) to facilitate construction would require additional soil chemistry evaluation and could affect landscape areas and some construction materials (e.g. aluminum).

5.3 ENGINEERED FILL

5.3.1 Materials

All engineered fill soils should be nearly free of organic or other deleterious debris and less than 3 inches in maximum dimension. The on-site soil exclusive debris may be used as engineered fill, provided it contains less than 3 percent organics by weight (ASTM D2974).

Should any imported material be used for engineered fill, it should be sampled and tested by a representative of the project Geotechnical Engineer prior to being transported to the site. Table 5.3-1 provides general criteria for imported soil.



TABLE 5.3-1
IMPORT FILL CRITERIA

<u>Gradation</u> (ASTM C136)					
	Sieve Size	Percent Passing			
7	76 mm (3-inch)	1	00		
1	9 mm (¾-inch)	80 -	– 100		
	No. 4	60	– 100		
	No. 200	20	- 70		
Expansion Index			sticity M D4318)		
	(ASTM D4829)	Liquid Limit	Plasticity Index		
	< 80	< 50	< 25		
	Organic Content (ASTM D 2974)				
	< 3% by dry weight				
	<u>Cor</u>	<u>rosivity</u>			
Minimum pH Resistivity (ohm-cm)		Soluble Sulfate (ppm)	Soluble Chloride (ppm)		
6 to 8 > 2,000		< 2,000	< 500		
	Resistance Value California Test Method No. 301				
Minimum R-value = 8					

The import criteria for corrosion are typical threshold limits for non-corrosive soil. Should corrosion concentrations of import soils fall outside of the threshold limits indicated above, revised protection measures will be necessary.

5.3.2 Compaction Criteria

Soils used as engineered fill should be uniformly moisture-conditioned to at least the percentages above optimum indicated in Table 5.3-2, placed in horizontal lifts less than 8 inches in loose thickness, and compacted to within the required range of relative compaction indicated in Table 5.3-2. Disking and/or blending may be required to uniformly moisture condition soils used for engineered fill. The actual level of moisture conditioning and compaction will be based on Plasticity Index (PI) or Expansion Index (EI) test and moisture



density relationships determined during grading. The general intent is to bring the expansive material to about 80 to 85 percent saturation at the time of construction. Based on expansion index tests performed for this study, the following moisture and compaction ranges are recommended for on-site soils.

TABLE 5.3-2
MOISTURE CONDITIONING AND COMPACTION

So	ils	Relative	Minimum Moisture	
PI EI		Compaction (min – max)	Conditioning (% Over Optimum)	
< 9	< 20	90%	+ 0%	
9 to 15	21-40	90-95%	+ 3%	
16 to 25	41-80	88-92%	+ 4%	
> 25	> 80	88-92%	+ 5%	

The upper 12 inches of pavement subgrade should be moisture conditioned to between 2 to 4 percent above optimum and compacted to between 90 and 93 percent relative compaction. Relative compaction is to be determined by Caltrans No. 216 (dry weight determination) or ASTM D1557 test procedures.

5.4 TEMPORARY EXCAVATIONS

5.4.1 General

All excavations must comply with applicable local, State, and Federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety generally is the responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. The information provided is a service to the client. Under no circumstances should the information provided be interpreted to mean that **TECHNICON** is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

5.4.2 Excavations and Slopes

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, State, and/or Federal safety regulations (e.g., OSHA Health and Safety Standards for Excavations, 29



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CFR Part 1926, or successor regulations). Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

All excavations should be constructed and maintained in conformance with current OSHA requirements (29 CFR Part 1926) for a Type C soil. If excavations encounter saturated soils or groundwater, temporary excavations will have to be laid back or shored and the trench dewatered to maintain stability.

5.4.3 Construction Considerations

Heavy construction equipment, building materials, excavated soil, and vehicular traffic should be kept sufficiently away from the top of any excavation to prevent any unanticipated surcharging. If it is necessary to encroach upon the top of an excavation, **TECHNICON** can provide comments on slope gradients or loads on shoring to address surcharging, if provided with the geometry. Shoring, bracing, or underpinning required for the project (if any), should be designed by a professional engineer registered in the State of California.

During wet weather, earthen berms or other methods should be used to prevent runoff water from entering all excavations. All runoff should be collected and disposed of outside the construction limits.

5.5 TRENCH BACKFILL

5.5.1 Materials

Pipe zone backfill (i.e., material beneath and in the immediate vicinity of the pipe) should consist of soil compatible with design requirements for the specific types of pipes. It is recommended that the project designer or pipe supplier develop the material specifications based on planned pipe types, bedding conditions, and other factors beyond the scope of this study. Randomly excavated near surface soil will likely be Class III or Class IV material per ASTM D2321.

Trench zone backfill (i.e., material placed between the pipe zone backfill and finished subgrade) may consist of native soil which meets the requirements for engineered fill.



It should be noted that the native sandy clay soils may require significant effort to achieve compaction within narrow trenches. If granular import is used for backfill, a native clay soil or lean concrete slurry dike should be provided in the upper 4 feet where the trenches cross beneath the perimeter of the structures. This dike is intended to minimize the lateral migration of subsurface water into clay soil under the buildings. If granular import material is used for pipe or trench zone backfill, it should have a piping ratio compatible with the adjacent soil, or a geofabric separator should be utilized.

5.5.2 Compaction Criteria

All trench backfill should be placed and compacted in accordance with recommendations provided for engineered fill. Reduced compaction (85 percent minimum) could be specified for trench zone backfill in non-structural areas located a distance equal to the depth of the trench from any structure and appurtenant improvements. Mechanical compaction is recommended; ponding or jetting should not be used.

TABLE 5.5-1
PIPE ZONE BACKFILL PARAMETERS

Soil St	iffness Modulu	Backfill De	ensity (pcf)	
E' _n (Trench Sidewall)	85%	ackfill) 90%	85% 90% Compaction Compac	
Sidewaii)	Compaction	Compaction		
3,000	700	1,000	118	125

E'_n represents the modulus for the undisturbed natural soil and is based on relative density and data by Howard (1996). E'_b is the modulus for backfill derived from random excavation of onsite soil and is based on data by Hartley and Duncan (1982) and Watkins and Anderson (2000). The design E' will be dependent upon the pipe diameter and trench width, which dictates the relative influence of E'_n and E'_b. Methods by Howard (1996) are suggested for evaluating the design E'. **TECHNICON** can furnish a recommended design E', if provided with pipe diameter and specifications for trench construction.



6 DESIGN RECOMMENDATIONS

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6.1 GENERAL

The proposed industrial buildings may be supported by conventional shallow spread footings supported on properly engineered fill. The following recommendations are based on the assumption that the recommendations in Section 5, "Earthwork", have been implemented. Recommendations regarding the geotechnical aspects of building design are presented in subsequent sections.

6.2 SPREAD FOUNDATIONS

The investigation has revealed a varying range of soils from non-expansive to moderately expansive. Based on the potentially expansive nature of the onsite soils, it is recommended, interior and exterior footings be designed in accordance with the specifications in Table 6.2-1 below. It is recommended that expansion potential testing be performed after site grading has been completed in order to determine the expansive potential of the building pads. Foundation depths and reinforcement should also satisfy structural and constructability considerations.

TABLE 6.2-1
FOUNDATION EMBEDMENT AND REINFORCEMENT

So	ils	Minimum Embedment (inches)		Reinforcement
PI EI		Interior	Exterior	
< 9	< 20	12	12	Per 2016 CBC/CRC
9 to 15	20-40	12	18	1-#4 Bar Top & Bottom
16 to 25	41-80	18	18	1-#4 Bar Top & Bottom

These recommendations are based on engineering judgment and experience associated with expansive soil and are not based on any structural analysis. Any additional reinforcement for structural considerations should be provided by the structural engineer.

6.2.1 Allowable Vertical Bearing Pressures and Settlements

Generally two factors determine the design bearing pressure for conventional spread footing foundations; strength of the foundation soil, and tolerable settlement. For lightly loaded



structures, design bearing may be dictated by code-required minimum footing geometry or constructability considerations.

The available bearing capacity, based only on the shear strength of the soil, will be dependent upon the footing geometry. Presented in Table 6.2-2 are the allowable bearing capacity (shear strength considerations only) for static loading (D.L. + L.L.), total combined loading (D.L. + L.L. + transient loading, such as wind or seismic), and unfactored nominal bearing.

TABLE 6.2-2 BEARING CAPACITY

	Bearing Capacity (psf)
Static Loading	1,500
Total Combined Loading	2,250
Unfactored Ultimate Bearing	4,500

The above values are appropriated for design using the Basic and Alternate Load Combinations in Section 1605.3 of the 2016 CBC.

Analysis, based on Schmertmann, determined the following estimated static settlement based on assumed structural loads. The settlement assumes the sustained load on the footings is equal to 80 percent of the total load. Settlement is expected to occur primarily throughout the construction process.

TABLE 6.2-3 ESTIMATED SETTLEMENT

Footing Type	Loading (DL +LL)	Design Bearing (psf)	Estimated Settlement (inch)
Strip	To 5 kips/ft	To 1,500	Less than 0.50
Square	To 50 kips	To 1,500	Less than 0.50

The differential settlement between similarly loaded footings is anticipated to be less than 50 percent of the total settlement. If deemed necessary by the design engineer, **TECHNICON** can provide the estimated settlement for other loading conditions.

If evaluating the foundation as a beam on an elastic foundation, a modulus of subgrade reaction, K_p ($B_p = 1$ foot), of 220 pci can be used for undisturbed on-site soil. The subgrade



Proposed Industrial Development, Highway 41 and Idaho Avenue, Lemoore, California

modulus is most appropriately applicable to consideration of static loads with deformations within an elastic range.

6.2.2 Lateral Resistance

Lateral loads applied to foundations can be resisted by a combination of passive lateral bearing and base friction. The allowable and ultimate passive pressures and frictional coefficients for the footings are presented in Table 6.2-4.

TABLE 6.2-4
PASSIVE PRESSURES AND FRICTIONAL COEFFICIENTS

	Allowable		liltimata	
	Static	Total Combined	Ultimate	
Frictional Coefficient	0.31N + 395 psf	0.37N + 527 psf	0.47N + 790psf	
Passive Pressure (psf/ft)	219 psf/ft + 1,473 psf	292 psf/ft + 1,963 psf	438 psf/ft + 2,945 psf	
Lateral Translation Needed to Develop Passive Pressure	0.005 D	0.005 D	0.007 D	

Note: 1) D is the footing depth (ft), N is the normal load (psf)

Due to the expansive soil conditions, passive resistance should not be used within the top 18 inches of footings unless abutted by hardscape. If the deflection resulting from the strain necessary to develop the passive pressure is beyond structural tolerance, additional passive pressure values could be provided based on tolerable deflection. The passive pressure and frictional resistance can be used in combination. The allowable values already incorporate a factor of safety and, would be compared directly to the driving loads. If analytical approaches require the input of a safety factor, the ultimate values should be used.

6.2.3 Design and Construction Considerations

Prior to placing steel or concrete, footing excavations should be cleaned of all debris, loose or soft soil, and water. All footing excavations should be observed by a representative of the project Geotechnical Engineer immediately prior to placing steel or concrete. The purpose of these observations is to check that the bearing soils actually encountered in the foundation excavations are similar to those assumed in analysis and to verify the recommendations contained herein are implemented during construction.



6.3 EARTH RETAINING STRUCTURES

The lateral earth pressure against retaining structures will be dependent upon the ability of the wall to deflect. Presented in Table 6.3-1 is the active, at-rest and braced lateral earth pressures for level on-site soil. The active pressure is applicable to walls able to translate 0.0005 radians at the top or bottom. The at-rest soil pressure is applicable to retaining structures that are fully fixed against both rotation and translation. Walls restrained from translation at the top and bottom, but able to deflect 0.0005 radian between restrained points should be designed for the braced lateral pressure.

TABLE 6.3-1 LATERAL EARTH PRESSURES

Loading Conditions	Lateral Earth Pressures		
Active Pressure (psf/ft of depth)	55		
Braced Pressure (psf)	36 H		
At-Rest Pressure (psf/ft of depth)	78		

H in the expression represents the retained height in feet (measured from finished grade to bottom of footing). The earth pressures presented above assume saturated conditions. The earth pressures do not include hydrostatic pressures; therefore, walls should be adequately drained to prevent the build-up of hydrostatic pressure.

Retaining wall foundation design can utilize the passive pressures and sliding resistance given in Table 6.2-4 and the allowable bearing capacity given in Section 6.2.1. When utilizing the available allowable bearing capacities of Table 6.2-2, the value for static loading would represent the average bearing for the footing and the value for total combined loading would represent the allowable maximum toe pressure.

6.4 PIER FOUNDATIONS

6.4.1 Allowable Vertical Axial Capacity and Settlement

Structures such as light poles, signs, canopies, etc., can be supported by pier foundations. Should design incorporate the use of pier foundations, Table 6.4-1 provides expressions for the



allowable and ultimate axial capacity using friction to resist axial loads. If the design of the pier foundations includes end bearing to resist axial loads, the design may utilize up to an allowable bearing capacity of 3,000 psf for static loading (D.L. + long term L.L.). The end bearing capacity may be increased 50 percent for total combined loading (D.L. + L.L. + transient loading, such as wind or seismic).

TABLE 6.4-1 ALLOWABLE AXIAL CAPACITY

	Frictional Resistance for Vertical Loads in Compression (lbs)
Static Loading	46 DL ²
Total Combined Loading	61 DL ²
Unfactored Ultimate Capacity	92 DL ²

- Note: 1) D is pier diameter in feet and L is embedment length in feet.
 - 2) The allowable uplift resistance would be 70 percent of the compressional resistance.

The total settlement of friction piers designed in accordance with the above recommendations should be less than 0.002 times the pier diameter in inches. If design incorporates end bearing to resist axial loading, the estimated settlement would increase to approximately 0.018 times the pier diameter in inches. The concrete mix and reinforcement for drilled pier/caisson foundations should be designed by the project structural engineer.

6.4.2 Lateral Resistance

Methods by AASHTO and Caltrans can be used to evaluate the lateral capacity of pier footings using the passive earth pressure and lateral bearing provided in Table 6.4-2. The passive pressure values already consider arching and, as such, should not be increased further.



TABLE 6.4-2
ALLOWABLE LATERAL PASSIVE RESISITANCE

	Allowable Passive Resistance
Allowable Loading	465 psf/ft + 1,635 psf
Total Combined Loading	620 psf/ft + 2,185 psf
Unfactored Ultimate Capacity	930 psf/ft + 3,275 psf

The allowable passive pressure provided above would not be appropriate for use in place of the values given in Table 1806.2 of the 2016 California Building Code (CBC) if pier foundation design utilizes the pole formulas in the CBC. If design uses the pole formulas in the CBC, the appropriate class of material in Table 1806.2 would be No. 5 (Lean Clay). Based on the strength of the on-site soils, a lateral bearing pressure of 155 psf/ft of embedment below the site grade may be used in place of the value given in Table 1806.2.

The passive pressure only considers soil strength. Tolerable pier deflection may govern the design lateral resistance. If provided with pier geometry, lateral load, and loading eccentricity, **TECHNICON** can provide the estimated pier head deflection.

6.5 CONCRETE SLABS-ON-GRADE

6.5.1 Subgrade Preparation

Slabs-on-grade should be supported on recompacted soils or engineered fill placed as described in Sections 5.2 and 5.3 of this report. Subgrade soil within 24 inches of pad grade should have a moisture content of at least optimum, immediately prior to pouring the slab or placing the vapor retarding membrane.

6.5.2 Capillary and Moisture/Vapor Break

Considering the potential for shallow groundwater, a capillary break (i.e. clean sand or gravel layer) is recommended. The capillary break should have a minimum thickness of 4 inches.

In areas to receive moisture-sensitive floor coverings, it is recommended that the subgrade be covered by a vapor retarding membrane meeting the specifications of ASTM E1745, (Class A with minimum puncture resistance of 2,200 grams), such as Fortifiber Building Systems Group 15 Mil, "Moistop Ultra®", Stego Industries 15 mil "Stego Wrap™", W.R. Meadows Sealtight 15



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mil "Perminator®", or equivalent The subgrade surface should be smooth and care should be exercised to avoid tearing, ripping, or otherwise puncturing the vapor retarding membrane. If the vapor retarding membrane becomes torn or disturbed, it should be removed and replaced or properly patched. All laps, splices, and utility penetrations should be properly sealed according to the manufacturer specifications.

The vapor retarding membrane could be covered with approximately 1 to 2 inches of saturated surface dry (SSD) sand to protect it during construction. Concrete should not be placed if sand overlying the membrane has been allowed to attain a moisture content greater than about 5 percent (due to precipitation or excessive moistening). In addition, penetrations through the concrete slab shall be sealed or protected to prevent inadvertently introducing excess water into the sand cushion layer due to curing water, wash-off water, rainfall, etc. Excessive water beneath interior floor slabs could result in future significant vapor transmission through the slab, adversely affecting moisture-sensitive floor coverings and could inhibit proper concrete curing.

According to American Concrete Institute ACI 302.2R-06, concrete could be placed directly on the vapor retarding membrane to minimize the potential for developing a reservoir of moisture in the sand layer that could lead to future moisture entrapment and potential moisture and flooring problems. If concrete is placed directly on the membrane, care shall be taken to not damage the membrane and special concrete curing methods implemented to minimize potential slab curing problems. If the protective sand layer is not used, the building designer should be in agreement. Many slab designers feel the sand cushion is important to proper concrete curing as well as minimizing slab curling issues.

It should be noted that, although the slab support discussed above is currently the industry standard, this system might not be completely effective in preventing floor slab moisture vapor transmission problems. This system will not necessarily assure that floor slab moisture transmission rates will meet floor-covering manufacturer standards and that indoor humidity levels will not inhibit mold growth. A qualified specialist(s) with knowledge of slab moisture protection systems, flooring design and other potential components that may be influenced by moisture, should address these post-construction conditions separately. The purpose of a geotechnical study is to address subgrade conditions only, and consequently, it does not evaluate future potential conditions.



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6.5.3 Conventional Slab Design

Considering the possible variability of the expansive potential of the onsite soils. It is recommended that concrete slabs on grade be designed according to Table 6.3-1 below. It is recommended that the expansive potential be determined once site grading is completed.

TABLE 6.5-1
DEPTH OF REQUIRED MOISTURE AND SLAB REINFORCEMENT

Soils		Required Depth	Minimum Moisture Conditioning	Minimum Slab Reinforcement	
PI	EI	(inches)	(% Over Optimum)	(Both Principle Directions)	
< 9	< 20	12	+ 0%	Per 2016 CBC/CRC	
9 to 15	20-40	18	+ 3%	#3 Bars Spaced 30"	
16 to 25	41-80	24	+ 4%	#3 Bars Spaced 24"	

The reinforcement is based on engineering judgment and experience with expansive soils, not on any structural analysis. The reinforcement assumes a nominal slab thickness of 4 to 5 inches. Slab thickness and reinforcement must also satisfy structural considerations.

Slab concrete should have good density, a low water/cement ratio, and proper curing to promote a low porosity. A water/cement ratio of 0.45 to 0.5 is recommended to minimize vapor transfer.

A modulus of subgrade reaction, Kp (Bp = 1 foot), of 220 pci may be used for elastic analysis of slabs on properly compacted native or similar soil.

6.5.4 Reinforcement of Exterior Slabs on Grade

Consideration should be given to some form of reinforcement of exterior slabs to aid in crack control. Additionally, dowelling of exterior slabs should be considered at building doorways to minimize the potential for problematic differential heave between the exterior slab and door threshold.

6.6 CORROSION POTENTIAL

A soil sample obtained from the near surface site soil was tested to evaluate pH, minimum electrical resistivity, and soluble sulfate and chloride content.



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Proposed Industrial Development, Highway 41 and Idaho Avenue, Lemoore, California

The pH of the soil tested was 8.42 and the minimum electrical resistivity was 415 ohm-cm. These values are generally representative of an environment that would be moderately corrosive to buried unprotected metals. An example of the potential soil corrosion is provided by utilizing methods provided in Caltrans California Test 643, "Method for Estimating the Service Life of Steel Culverts". The method indicates an 18-gauge steel zinc-coated culvert is estimated to have a maintenance-free service life (years to perforation) of 17 years. If project improvements will involve metal that comes into contact with the on-site soil, the design should consider the potential soil corrosiveness described.

Test results suggest that low levels of soluble sulfates (153 ppm) and moderate levels of soluble chlorides (119 ppm) are present in on-site soils. Normal cement (Type II) should be adequate for foundation concrete that comes in contact with the onsite soils. Reinforcement cover need not be increased for concrete that comes in contact with the on-site soil.

Corrosion is dependent upon a complex variety of conditions, which are beyond the geotechnical practice. Consequently, a qualified corrosion engineer should be consulted if the owner desires more specific recommendations.

6.7 PAVEMENT DESIGN

6.7.1 Design R-value and Traffic Assumptions

The subgrade R-value for the on-site soil was evaluated in the laboratory on bulk samples of potential subgrade soil taken at six (6) locations from the upper 2 feet of soils across the site. The tested soil had measured R-values of 8, 8, 8, 14, 18, and 25. The laboratory testing conformed to Caltrans Test Method 301. Considering the range and site variability of the R-value test results, an R-value of 8 is recommended for preliminary design.

The R-value can be affected by subtle variations in silt and clay content. The mass grading may change the distribution of the R-values for the project. Therefore, it is recommended that additional R-values be collected after rough grading and revised pavement recommendations provided, if appropriate.

Detailed vehicular load and frequency information was not provided for this project at the time this report was prepared. Traffic on the site is anticipated to consist of parking and drives for automobiles and regular delivery truck traffic and trash collection traffic. Consequently, a range



of pavement sections have been provided based on Traffic Indexes (T.I.'s) of 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5 and 8.0. These traffic design assumptions should be reviewed for compatibility with the actual development, and revised pavement sections developed, as necessary.

6.7.2 Asphalt Concrete Pavement Design

Flexible pavement design recommendations have been developed fort the given T.I.'s based upon the California Department of Transportation (Caltrans) design procedures and a design R-value of 8. The flexible asphalt concrete pavement sections associated with the assumed T.I.'s for on-site asphalt pavements are summarized in Table 6.7-1.

TABLE 6.7-1
RECOMMENDED MINIMUM PAVEMENT SECTIONS

Traffic Index	Asphalt Concrete (inches)	Aggregate Base – Class 2 (inches)
4.5	2.5	8.5
5.0	2.5	10.5
5.5	3.0	11.0
6.0	3.0	13.0
6.5	3.5	14.0
7.0	4.0	14.5
7.5	4.0	16.5
8.0	4.5	17.5

The design criteria assumes a 20-year design period and that normal maintenance (crack sealing, etc.) is performed. The traffic index is a measure of the volume of truck traffic that will be applied to a pavement section in the design life. The allowable average daily truck traffic (ADTT) for the assumed traffic indexes is presented in Table 6.7-2.



TABLE 6.7-2
AVERAGE DAILY TRUCK TRAFFIC

Traffic Index	2-Axle Vehicle	or	3-Axle Vehicle	or	5-Axle Vehicle
4.5	2.2		0.8		0.2
5.0	5.2		2.0		0.5
5.5	11.6		4.3		1.1
6.0	24.1		9.0		2.4
6.5	47.3		17.7		4.7
7.0	88.1		33.0		8.8
7.5	157.3		59.0		15.8
8.0	270.6		101.5		27.1

The flexible pavement should conform to, and be placed in accordance with the Caltrans Standard Specifications, 2015. The aggregate base (Class 2) should comply with the specifications in Sections 26. The aggregate base and upper 12 inches of subgrade should be compacted to a minimum of 95 percent relative compaction as determined by Caltrans Test Method 216 (Dry determination) or ASTM D 1557 test procedures.

6.7.3 Moisture Considerations

The pavement design should consider both the vehicular loading, as well as the environmental factors. The vehicular loading will depend on the amount and type of traffic anticipated for the pavement design life. Environmental factors include the potential for moisture variations beneath the pavement structural section. It is recommended that all pavement areas conform to the following criteria:

- ☐ All trench backfill, including utility and sprinkler lines, should be properly placed and adequately compacted to provide a stable subgrade.
- ☐ Adequate drainage should be provided to prevent surface water from ponding and saturating the subgrade soil.
- A periodic maintenance program should be incorporated.
- ☐ All concrete curbs separating pavement and landscaped areas should extend to the subgrade.

6.7.4 Construction Considerations

In the event unstable (pumping) subgrades are encountered within planned pavement areas, we recommend a heavy, rubber-tired vehicle (typically a loaded water truck) be used to test the



load/deflection characteristics of the finished subgrade materials. It is recommended this vehicle have a minimum rear axle load (at the time of testing) of 16,000 pounds with tires inflated to at least 65 psi pressure. If the tested surface shows a visible deflection extending more than 6 inches from the wheel track at the time of loading, or a visible crack remains after loading, corrective measures should be implemented. Such measures could include disking to aerate, chemical treatment, replacement with drier material, or other methods. It is recommended **TECHNICON** be retained to assist in developing which method (or methods) would be applicable for this project.

6.8 SITE DRAINAGE

Providing and maintaining adequate site drainage to prevent entrapment and ponding of surface water and excessive moisture migration into the subgrade soil is very important. Poor perimeter or surface drainage could cause reduced subgrade support. The design and construction needs to provide the basis for good drainage. This includes:

- Sufficient pad height to allow for proper drainage
- Defined drainage gradients away from the structure to points of conveyance, such as drainage swales and/or area drains and discharge pipe
- Roof drainage connected to proper areas of discharge

The owners/maintenance personnel must maintain the established drainage by not blocking or obstructing gradients away from structures without providing some alternative drainage means (e.g. area drains and subsurface pipes). If planter areas are established near the structures, it is important to prevent surface run-off from entering the planter. Where planted areas are adjacent to the structures, care must be taken not to over irrigate and to maintain a leak-free sprinkler piping system. Consideration should be given to use of low volume emitter irrigation systems for planters. Well-maintained low-volume emitter irrigation (drip system) is best suited for planters adjacent to structures. Watering practices must strive to promote a uniform moisture condition year around.



7 ADDITIONAL SERVICES

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7.1 DESIGN REVIEW AND CONSULTATION

It is recommended that **TECHNICON** be retained to review those portions of the contract drawings and specifications that pertain to earthwork, foundations, and pavements prior to finalization to determine whether they are consistent with our recommendations.

7.2 CONSTRUCTION OBSERVATION AND TESTING

It is recommended that a representative of **TECHNICON** observe the excavation, earthwork, foundation, and pavement phases of work to determine that the subsurface conditions are compatible with those used in the analysis and design. **TECHNICON** can conduct the necessary field testing and provide results on a timely basis so that action necessary to remedy indicated deficiencies can be taken in accordance with the plans and specifications. Upon completion of the work, a written summary of our observations, field testing, and conclusions regarding the conformance of the completed work to the intent of the plans and specifications will be provided. This additional service is not part of this current contractual agreement. **TECHNICON** firm will not be responsible for establishing or confirming building or foundations depths or locations unless retained to do so.



LIMITATIONS

The conclusions and recommendations presented in this report are based on the information provided regarding the proposed construction, and the results of our field and laboratory investigation, combined with interpolation of the subsurface conditions between boring locations. The nature and extent of the variations between borings may not become evident until construction. If variations or undesirable conditions are encountered during construction, our firm should be notified promptly so that these conditions can be reviewed and our recommendations The unexpected conditions frequently require additional reconsidered where necessary. expenditures for proper construction of the project. TECHNICON Engineering Services, Inc. will not assume any responsibility for errors or omissions if the final extent and depth of earthwork is not determined by our firm at the time of construction due to said variations or undesirable conditions encountered.

If the proposed construction is relocated or redesigned, or if there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes, or construction operations at or adjacent to the site, the conclusions and recommendations contained in this report should be considered invalid unless the changes are reviewed and our conclusions and recommendations modified or approved in writing. Such conditions may require additional field and laboratory investigations to determine if our conclusions and recommendations are applicable considering the changed conditions or time lapse.

It is the responsibility of the contractor to provide safe working conditions with respect to excavation slope stability. This report does not relieve the contractors of responsibility for temporary excavation construction, bracing and shoring in accordance with CAL OSHA requirements.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This report should not be construed as an environmental audit or study.

This report has been prepared for the sole use by KKAL, California Limited Partnership and their designated consultants for the Industrial Development to be located Highway 41 and Idaho Avenue in Lemoore, California. Recommendations presented in this report should not be extrapolated to other areas or used for other projects without prior review. This report has been prepared with the intent that the firm of **TECHNICON** will be performing the construction testing and observation for the complete project. If, however, another firm or individual(s) should be retained or employed to use this geotechnical investigation report for the purpose of construction testing and observation, notice is hereby given that TECHNICON will not assume any responsibility for errors or omissions, if any, which may occur and which could have been avoided, corrected, or mitigated if **TECHNICON**, had performed the work. This notice also applies to the misuse or misinterpretation of the conclusions and recommendations outlined in this report. Furthermore, the other firm or individual(s) performing construction testing and observation should accept transfer of responsibility of the work, as required by the California Building Code, in writing to the project owner and TECHNICON. The firm accepting transfer of responsibility should perform additional investigation(s) as may be necessary to develop their own conclusions, evaluations, and recommendations for design and construction.

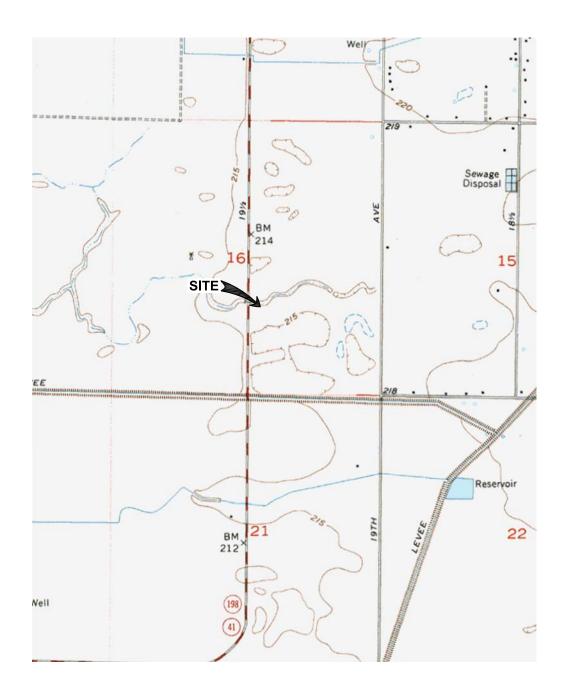


FIGURE 1

&

FIGURE 2





NORTH

LAT.: 36.2735°N, LONG.: 119.8054°W, 16-T19S-R20E, MDB&M, USGS MAP: LEMOORE, DATE: 1954

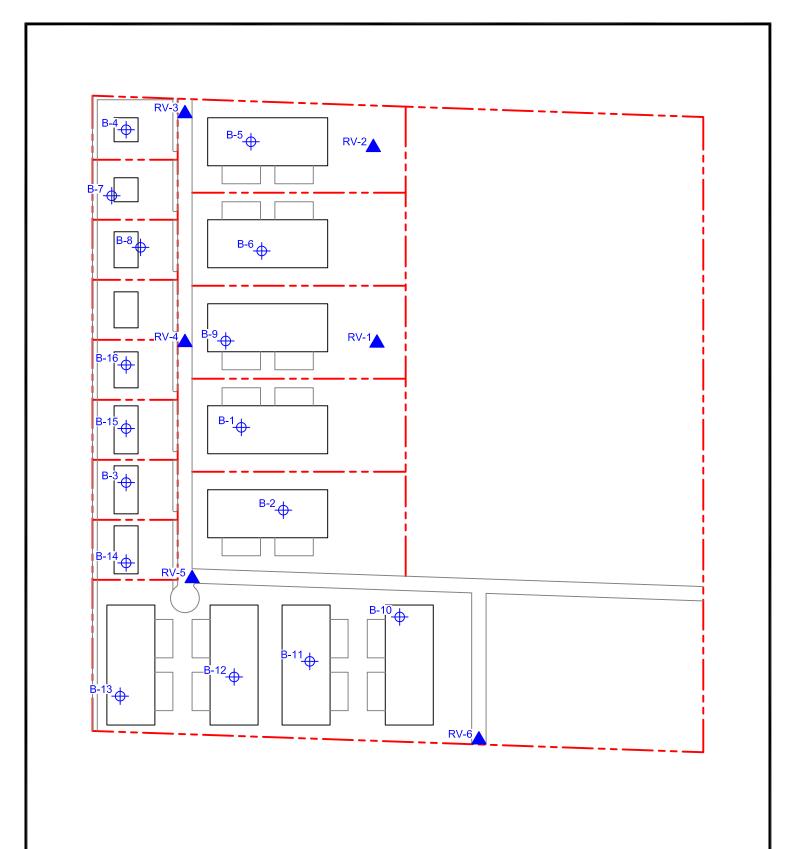


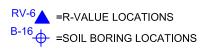
PROJECT: 180204

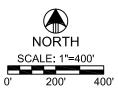
SOURCE: USGS TOPOGRAPHIC MAPS VICINITY MAP
PROPOSED INDUSTRIAL DEVELOPMENT
NEC OF IDAHO AVENUE AND
HIGHWAY 41
LEMOORE, CALIFORNIA

FIGURE

1









PROJECT: 180204

> CAD BY: MH

SITE MAP
PROPOSED INDUSTRIAL DEVELOPMENT
NEC OF IDAHO AVENUE AND
HIGHWAY 41
LEMOORE, CALIFORNIA

FIGURE 2

BORING LOGS AND LOG KEY APPENDIX A







Fresno, CA 93722 Telephone: 559-276-9311

PROJECT NAME Industrial Development

PROJECT LOCATION Highway 41 & Idaho Avenue

DATE OF EXPLORATION 4/2/2018

PROJECT NUMBER 180204

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

FILL

....

SW WELL GRADED SAND

SP POORLY GRADED SAND

SM SILTY SAND

SC CLAYEY SAND

1/ 1/

PT PEAT

OL LOW PLASTICITY ORGANIC SILT

OH HIGH PLASTICITY ORGANIC SILT

ML LOW PLASTICITY SILT

MH HIGH PLASTICITY SILT

GW WELL GRADED GRAVEL

600,

GP POORLY GRADED GRAVEL

GM SILTY GRAVEL

GC CLAYEY GRAVEL

CL LOW PLASTICITY CLAY

CH HIGH PLASTICITY CLAY

SAMPLER SYMBOLS



STANDARD PENETRATION TEST



CALIFORNIA SAMPLER



MODIFIED CALIFORNIA SAMPLER



SHELBY TUBE SAMPLER



ROCK CORE BARREL



BULK SAMPLE

▼ Water Level at End of Drilling

▼ Water Level After 24 Hours

_ _ Assumed stratum line

Observed stratum line

Note 1: The degree of saturation shown on the boring logs is based on an assumed specific gravity of 2.65. The actual degree of saturation may vary.

Note 2: The stratum lines shown on the logs represent the approximate boundary between soil types; the actual in-situ transition may be gradual.

ABBREVIATIONS

LL _LIQUID LIMIT (%)

PI _ PLASTIC INDEX (%)

W _ MOISTURE CONTENT (%)

DD _ DRY DENSITY (PCF)

S _ DEGREE OF SATURATION (%)

NP _ NON PLASTIC

-200 PERCENT PASSING NO. 200 SIEVE PP - POCKET PENETROMETER (TSF)

TV - TORVANE

PID - PHOTOIONIZATION DETECTOR UC - UNCONFINED COMPRESSION

ppm - PARTS PER MILLION

KEY TO SYMBOLS 2 - TECHNICON.GDT - 5/14/18 15:16 - Z:\TESDATA\USERS\KYLE \WLEMOORE\180204 INDUSTRIAL DEVELOPMENT\GINT\180204 BORINGLOGS.GPJ

TECHNICON Eningeering Services, INC. 4539 N Brawley Ave #108 TECHNICON Fresno, CA 93722

Telephone: 559-276-9311

BORING B 1 PAGE 1 OF 2

PROJECT NAME Industrial Development PROJECT NUMBER 180204 SURFACE DESCRIPTION Disked, Flat PROJECT LOCATION Highway 41 & Idaho Avenue **DATE STARTED** 4/2/18 **COMPLETED** 4/2/18 GROUND ELEVATION DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 18 ft

DRIL	DRILL RIG TYPE CME 55 BORING DEPTH 51.5 ft LOCGED BY A Westberford CHECKED BY S. Abraham							
DRIL	LING MET	HOD <u>7.5-</u>	inch H	ollow Stem Auger & Mud Rotary LOGGED BY	K. Weathe	rford	CHECKED BY	S. Alvarez
O DEPTH	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
 	CAL	3-5-10 (15)		Sandy SILT (ML) - stiff, black, moist, low plasticity, with clay, with fine sand	115.8	12.3	S = 76 %	-
5	SPT	3-3-4 (7)		Poorly Graded SAND WITH SILT (SP-SM) - loose, gray, moist, fine to coarse grained				
10				Sandy SILT (ML) - stiff, gray and tannish brown, moist, with fine sand	-			
	CAL	3-9-10 (19)			109.0	20.9	S = 107 %	
 15 	SPT	3-8-10 (18)	-	Very stiff, moderate cementation				
 20 	CAL	10-19-19 (38)	-	∑ Wet	96.2	27.2	S = 100 %	-
 	SPT	6-5-10 (15)		Decreased sand				
	CAL	9-15-22 (37)	-	Gray, increased sand	98.5	26.1	S = 102 %	
35	-			(Continued Next Page)				



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BORING B 1 PAGE 2 OF 2

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/2/18 **COMPLETED** 4/2/18 **GROUND ELEVATION** DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 18 ft DRILL RIG TYPE CME 55 BORING DEPTH 51.5 ft **DRILLING METHOD** 7.5-inch Hollow Stem Auger & Mud Rotary LOGGED BY K. Weatherford **CHECKED BY** S. Alvarez

DIVILL	IIVO IVIL I	110D <u>7.5</u> -		ollow Stelli Auger & Mud Rotary LOGGED BY _r	t. Weather	iloiu	_ CHECKED BT _	5. Alvaiez
DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	SPT	6-11-12 (23)		Silty SAND (SM) - medium dense, gray, wet, fine grained, weak cementation <i>(continued)</i>				
40	CAL	6-7-8 (15)		LEAN CLAY (CL) - stiff, dark gray, wet, medium plasticity, with silt	78.5	42.5	S = 102 %	
45	SPT	4-8-11 (19)	-	Sandy SILT (ML) - very stiff, dark gray, wet, with fine sand				
50	CAL	4-7-10 (17)	-	Stiff				

- 1. Bottom of boring at 51.5 feet.
 2. Groundwater encountered at 18.0 feet.
 3. Boring backfilled with soil cuttings 4/2/18.



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BORING B 2 PAGE 1 OF 1

PROJECT NAME Industrial Development

PROJECT LOCATION Highway 41 & Idaho Avenue

DATE STARTED <u>4/2/18</u> **COMPLETED** <u>4/2/18</u>

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc.

DRILL RIG TYPE CME 55

DRILLING METHOD _7.5-inch Hollow Stem Auger

PROJECT NUMBER 180204

SURFACE DESCRIPTION Disked, Flat

GROUND ELEVATION _

GROUND WATER LEVEL 18 ft

BORING DEPTH 21.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

DRILL	ING ME	HOD _7.5-	Inch H	lollow Stem Auger LOGGED BY I	vveatnerrord		CHECKED BY _S. Alvarez	
O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
				Sandy CLAY (CL) - stiff, black, moist, low plasticity, trace silt, with fine to medium sand				
-	CAL	9-10-11 (21)		,	120.8	11.7	S = 84 %	
-					120.0	11.7	0 - 04 70	
 - 5				Silty SAND (SM) - medium dense, brown, moist, fine to medium grained	-			
19.65.GF	CAL	11-9-8 (17)		to moduli granica	64.7	11.9	S = 20 %	
SINGE L					04.7	11.5	3 - 20 70	
40H –								
10				Sandy SILT (ML) - stiff, gray, moist, with fine sand, iron oxide staining				
<u> </u>	SPT	2-5-6 (11)		, and the second				
OPMEN -								
DEVELO								
15 <u>15</u>			_	New ediff was and to wish has a				
SOON -	CAL	6-11-16 (27)		Very stiff, gray and tannish brown				
80204				$ar{ abla}$				
ORE/1								
20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		2-3-6		Stiff, gray, wet, weak cementation				
K	SPT	(9)		, g-=y,,,,				

- Bottom of boring at 21.5 feet.
 Groundwater encountered at 18.0 feet.
- 3. Boring backfilled with soil cuttings 4/2/18.

Fresno, CA 93722 Telephone: 559-276-9311

BORING B 3 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/2/18 **COMPLETED** 4/2/18 GROUND ELEVATION _ **DRILLING CONTRACTOR** TECHNICON Engineering Services, Inc. **GROUND WATER LEVEL** No groundwater encountered. DRILL RIG TYPE CME 55 BORING DEPTH 11.5 ft DRILLING METHOD _ 7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
				Sandy CLAY (CL) - stiff, black, moist, low plasticity, with fine to medium sand, trace silt				
	CAL	4-6-8 (14)			109.9	18.3	S = 96 %	
5 5	SPT	3-4-4	-	Silty SAND (SM) - loose, brown, moist, fine to medium grained				
		(8)						
10				Sandy SILT (ML) - medium stiff, gray, moist, with				
	CAL	3-6-7 (13)		fine to medium sand	94.8	25.2	S = 90 %	

- 1. Bottom of boring at 11.5 feet.
- 2. No groundwater encountered.
- 3. Boring backfilled with soil cuttings 4/2/18.



Telephone: 559-276-9311

DRILLING METHOD 7.5-inch Hollow Stem Auger

BORING B 4 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/3/18 **COMPLETED** 4/3/18 GROUND ELEVATION ___ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft GROUND WATER LEVEL 10 ft DRILL RIG TYPE CME 45 BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	7-17-17 (34)		Silty SAND (SM) - medium dense, light brown, moist, fine grained, weak cementation	121.1	7.5	S = 54 %	
5		4.4.4		Poorly Graded SAND WITH SILT (SP-SM) - loose, light brown, moist, fine to medium grained				
	SPT	4-4-4 (8)						
10				abla				
	CAL	2-6-7 (13)		Medium dense, gray, saturated, fine to coarse grained	00.0	22.5	S = 04 0/	
-		(/	P-34444		98.2	23.5	S = 91 % <u> </u>	

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/3/18.

Fresno, CA 93722 Telephone: 559-276-9311 **BORING B 5** PAGE 1 OF 1

PROJECT NUMBER 180204 PROJECT NAME Industrial Development PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/3/18 **COMPLETED** 4/3/18 GROUND ELEVATION _ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft GROUND WATER LEVEL 10 ft DRILL RIG TYPE CME 45 BORING DEPTH 16.5 ft DRILLING METHOD 7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

PRIL	LING WIL	1100 _1.5	IIICH FIC	billow Stern Auger LOGGED BY _r	v. vveatrici	ioru	_ CHECKED BY _	O. Alvaiez
O DEPTH	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
				Silty SAND (SM) - medium dense, brown, moist, fine to medium grained, weak cementation				
	CAL	13-16-17 (33)			117.4	7.8	S = 51 %	
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	CAL	4-7-9 (16)		Light brown, increased sand, none cementation	92.9	5.6	S = 19 %	_
7180204_BORINGI	-			Poorly Graded SAND (SP) - loose, light brown, moist, medium to coarse grained	-			
DPMENT/GINT/1	SPT	3-4-5 (9)		Sandy SILT (ML) - stiff, gray, wet, with fine sand, weak cementation	-			
INDUSTRIAL DEVELC	SPT	3-4-8 (12)		Poorly Graded SAND WITH SILT (SP-SM) - medium dense, gray, wet, fine to coarse grained	-			
BOREHOLE - TECHNICON.GDT - 5/14/18 15:16 - Z.\TESDATA\USERS\KYLE W\LEMOORE\180204 INDUSTRIAL DEVELOPMENT\GNT\180204 BORINGLOGS.GPJ				NOTES: 1. Bottom of boring at 16.5 feet. 2. Groundwater encountered at 10.0 feet. 3. Boring backfilled with soil cuttings 4/3/18.				
16 - Z:\TESDATA\USE								
GDT - 5/14/18 15:								
- TECHNICON.(
BOREHOLE								

- 1. Bottom of boring at 16.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/3/18.

Fresno, CA 93722 Telephone: 559-276-9311 **BORING B 6** PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/3/18 **COMPLETED** 4/3/18 GROUND ELEVATION _ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft DRILL RIG TYPE CME 45 BORING DEPTH 16.5 ft DRILLING METHOD 7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

O DEPTH	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	3-8-7 (15)		Silty SAND (SM) - medium dense, brown, moist, fine to medium grained, with clay				
5 5	SPT	3-4-4		Poorly Graded SAND WITH SILT (SP-SM) - loose, light brown, moist, fine to coarse grained	108.2	18.4	S = 92 %	
	351	(8)	_					
10	CAL	4-7-8 (15)		$rac{ abla}{ abla}$ Medium stiff, wet				
10 1 10 1 10 1 10 1 10 1 10 1 10 1 10		(13)		Sandy SILT (ML) - medium stiff, gray, wet, fine to medium grained, with fine to medium sand	92.4	22.2	S = 75 %	
15	CAL	2-5-6 (11)	_	medium grained, with fine to medium sand				

- 1. Bottom of boring at 16.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/3/18.

Telephone: 559-276-9311

BORING B 7 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT LOCATION Highway 41 & Idaho Avenue

DATE STARTED 4/3/18 **COMPLETED** 4/3/18

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft

DRILL RIG TYPE CME 45

DRILLING METHOD 7.5-inch Hollow Stem Auger

PROJECT NUMBER 180204

SURFACE DESCRIPTION _Disked, Flat

GROUND ELEVATION ___

BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
				Silty SAND (SM) - medium stiff, brown, moist, fine to				
- t		6-14-13		medium grained				
	CAL	(27)			106.6	8.2	S = 40 %	
					100.0	0.2	3 40 70	
5 5				Poorly Graded SAND WITH SILT (SP-SM) - loose,				
d GB	ОРТ	3-4-3		gray, moist, fine to coarse grained				
	SPT	(7)						
팅 								
E								
26				Poorly Graded SAND (SP) - medium stiff, gray, moist, fine to coarse grained				
10								
E	CAL	3-7-7		[⊻] Wet				
0	CAL	(14)			104.6	21.7	S = 99 %	

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/3/18.

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BORING B 8 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT LOCATION Highway 41 & Idaho Avenue

DATE STARTED 4/3/18 **COMPLETED** 4/3/18

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 11 ft GROUND WATER LEVEL

DRILL RIG TYPE CME 45

DRILLING METHOD 7.5-inch Hollow Stem Auger

PROJECT NUMBER 180204

SURFACE DESCRIPTION _Disked, Flat

GROUND ELEVATION _

BORING DEPTH 16.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

		1100 _7.0						
O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	2-4-7 (11)	_	Sandy SILT (ML) - medium stiff, dark brown, moist, with fine sand, weak cementation	115.7	14.0	S = 86 %	
RINGLOGS.GPJ	CAL	4-6-9 (15)		Silty SAND (SM) - medium dense, brown and gray, moist, fine to medium grained	103.7	8.2	S = 36 %	
1ENT/GINT/180204_BO	SPT	3-4-6 (10)		Silty CLAY (CL-ML) - stiff, gray, moist, low plasticity, with fine sand, weak cementation				
1 INDUSTRIAL DEVELOPMENT/GINT/180204_BORINGLOGS.GPJ	CAL	4-9-11 (20)	_	Silty SAND (SM) - medium dense, gray, saturated, fine to medium grained				

- 1. Bottom of boring at 16.5 feet.
- Groundwater encountered at 11.0 feet.
 Boring backfilled with soil cuttings 4/3/18.

Telephone: 559-276-9311

DRILLING METHOD 7.5-inch Hollow Stem Auger

BORING B 9 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/6/18 **COMPLETED** 4/6/18 GROUND ELEVATION _ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 8 ft DRILL RIG TYPE CME 45 BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

о ОЕРТН (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	2-5-5 (10)		Silty SAND (SM) - loose, brown, moist, fine grained, trace clay	97.2	10.7	S = 40 %	
	SPT	2-2-3 (5) 2-3-3 (6)		Silty CLAY (CL-ML) - medium stiff, gray, moist, with fine sand, weak cementation	101.0	23.7	S = 98 %	
10	SPT	4-6-4 (10)	-	Sandy SILT (ML) - stiff, gray and brownish, saturated, with fine sand				

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 8.0 feet.
 Boring backfilled with soil cuttings 4/6/18.

BORING B10 PAGE 1 OF 1

Telephone: 559-276-9311

PROJECT NAME Industrial Development PROJECT NUMBER 180204

PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat

DATE STARTED 4/3/18 **COMPLETED** 4/3/18 GROUND ELEVATION _ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 5 ft

DRILL RIG TYPE CME 45 BORING DEPTH 11.5 ft

DRILLING METHOD 7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

O DEPTH	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
-	CAL	6-9-9 (18)		Silty SAND (SM) - medium dense, light brown, moist, fine to medium grained, with roots	117.9	9.4	S = 62 %	
ENT/GINT/180204_BORINGLOGS.GPJ	SPT	2-4-3 (7)		Poorly Graded SAND (SP) - loose, gray, saturated,	-	9.4	S - 02 70	
ND -	CAL	8-7-8 (15)		Medium dense	97.9	22.0	S = 85 %	
Ξ		\ -/	Property Co		<u> </u>		3 - 00 70 _	

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 5.0 feet.
 Boring backfilled with soil cuttings 4/3/18.



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PAGE 1 OF 1

BORING B11

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat

DATE STARTED 4/6/18 **COMPLETED** 4/6/18 **GROUND ELEVATION**

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. **GROUND WATER LEVEL** 6 ft DRILL RIG TYPE CME 45 BORING DEPTH 21.5 ft

DRILLING METHOD _7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

	ILLING METHOD 7.5-inch Hollow Stem Auger				SED BY K. W	Vealifei	ioiu	CHECKED BY	3. Alvaiez
O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION		DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	3-4-4 (8)	_	Sandy SILT (ML) - medium stiff, brown, moist roots, with fine sand		95.8	26.1	S = 96 %	_
 5 - 	CAL	2-3-3 (6)		$_{\!$	1	09.2	19.0	S = 98 %	_
10	SPT	2-2-6 (8)	_						
	CAL	4-9-11 (20)	_	Stiff, iron oxide staining					
20	SPT	4-9-4 (13)		Trace clay					
10				NOTES: 1. Bottom of boring at 21.5 feet. 2. Groundwater encountered at 6.0 feet. 3. Boring backfilled with soil cuttings 4/6/18	3.				

- 1. Bottom of boring at 21.5 feet.
- 2. Groundwater encountered at 6.0 feet.
- 3. Boring backfilled with soil cuttings 4/6/18.



BORING B12 PAGE 1 OF 1

Telephone: 559-276-9311

PROJECT NAME Industrial Development PROJECT LOCATION Highway 41 & Idaho Avenue

DATE STARTED 4/6/18 **COMPLETED** 4/6/18

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 9 ft DRILL RIG TYPE CME 45

DRILLING METHOD 7.5-inch Hollow Stem Auger

PROJECT NUMBER 180204

SURFACE DESCRIPTION _Disked, Flat

GROUND ELEVATION _

BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

	O DEPTH	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
		CAL	3-10-12		Clayey SAND (SC) - medium dense, dark brown,				
	_		(22)		moist, fine to medium grained	116.1	13.2	S = 82 %	
Ы	5								
MENT\GINT\180204_BORINGLOGS.GPJ		SPT	2-2-3 (5)		Silty SAND (SM) - loose, brown, moist, fine to	1			
NGLC			,		medium grained				
BORI		CAL	5-6-6		Medium dense				
3204_		OAL	(12)	-	$ar{ar{\Sigma}}$				
T\18(10								
\GIN		CAL	3-5-5 (10)			100.0	07.0	0 111 0/	
ENT			(10)		Sandy SILT (ML) - medium stiff, gray, wet, with fine	100.6	27.0	S = 111 %	
Σ					\ sand				

- 1. Bottom of boring at 11.5 feet.
- 2. Groundwater encountered at 9.0 feet.
- 3. Boring backfilled with soil cuttings 4/6/18.

DRILL RIG TYPE CME 45

PROJECT NAME Industrial Development

PROJECT LOCATION Highway 41 & Idaho Avenue

TECHNICON Eningeering Services, INC. 4539 N Brawley Ave #108

Fresno, CA 93722

Telephone: 559-276-9311

DATE STARTED 4/6/18 **COMPLETED** 4/6/18

PROJECT NUMBER 180204

SURFACE DESCRIPTION Disked, Flat

BORING B13

PAGE 1 OF 1

GROUND ELEVATION

DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft

BORING DEPTH 11.5 ft

DRILLING METHOD _7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

	O UEP IN	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
3PJ 1 1 1	5	CAL	6-9-10 (19)		Sandy SILT (ML) - stiff, gray, moist, with fine to medium sand	105.1	17.3	S = 80 %	
ENT/GINT/180204_BORINGLOGS.GPJ	- - - 10	CAL	4-6-9 (15)		Silty SAND (SM) - medium dense, brown, moist, fine to medium grained Poorly Graded SAND (SP) - loose, gray, wet, fine to coarse grained	95.3	26.9	S = 97 %	
NT/GINT	_	SPT	4-3-2 (5)		- oodioo granica				

NOTES:

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/6/18.

BOREHOLE - TECHNICON.GDT - 5/14/18 15:17 - Z.\TESDATA\USERS\KYLE WLEMOORE\180204 INDUSTRIAL DEVELOPMENT\GINT\180204 BORINGLOGS.GPU

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DRILLING METHOD 7.5-inch Hollow Stem Auger

BORING B14 PAGE 1 OF 1

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/6/18 **COMPLETED** 4/6/18 GROUND ELEVATION ___ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft DRILL RIG TYPE CME 45 BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

о ОЕРТН (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	2-5-7 (12)		Clayey SAND (SC) - medium dense, black, moist, fine to medium grained	106.6	13.2	S = 63 %	
5	SPT	2-3-4 (7)	- 1	Silty SAND (SM) - loose, gray, moist, fine to coarse grained				
10				Sandy SILT (ML) - medium stiff, gray and tannish brown, wet, with fine to medium sand				
	CAL	2-3-3 (6)		<u>-</u>	107.5	19.6	S = 97 %	

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/6/18.



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BORING B15 PAGE 1 OF 1

PROJECT NAME Industrial Development

PROJECT LOCATION Highway 41 & Idaho Avenue

DATE STARTED 4/6/18 **COMPLETED** 4/6/18 DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 10 ft

DRILL RIG TYPE CME 45

DRILLING METHOD 7.5-inch Hollow Stem Auger

PROJECT NUMBER 180204

SURFACE DESCRIPTION _Disked, Flat

GROUND ELEVATION ___

BORING DEPTH 11.5 ft

LOGGED BY K. Weatherford CHECKED BY S. Alvarez

				-				
O DEPTH (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
-	_			Silty SAND (SM) - loose, brown, moist, fine to medium grained				
-	CAL	4-5-6 (11)			99.0	12.7	S = 50 %	
		, ,			99.0	12.7	3 - 30 %	
5				Increased sand				
-0003.0 -	SPT	3-3-4 (7)		increased sand				
ENT/GINTY/180204_BORINGLOGS.GPJ	-							
204_B(
10		0.5.4	-	<u>∇</u> Wet				
NT/GIV	CAL	2-5-4 (9)		vvet	105.8	19.8	S = 93 %	

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 10.0 feet.
 Boring backfilled with soil cuttings 4/6/18.

BORING B16 PAGE 1 OF 1

Telephone: 559-276-9311

PROJECT NAME Industrial Development PROJECT NUMBER 180204 PROJECT LOCATION Highway 41 & Idaho Avenue SURFACE DESCRIPTION Disked, Flat **DATE STARTED** 4/6/18 **COMPLETED** 4/6/18 GROUND ELEVATION _ DRILLING CONTRACTOR TECHNICON Engineering Services, Inc. GROUND WATER LEVEL 6 ft DRILL RIG TYPE CME 45 BORING DEPTH 11.5 ft DRILLING METHOD 7.5-inch Hollow Stem Auger LOGGED BY K. Weatherford CHECKED BY S. Alvarez

о ОЕРТН (ft)	SAMPLE TYPE	BLOWS/ft	GRAPHIC LOG	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	REMARKS
	CAL	5-7-8 (15)		Silty SAND (SM) - medium dense, brown, moist, fine to medium grained	117.9	13.5	S = 89 %	
5	CAL	3-4-5 (9)		Sandy SILT (ML) - medium stiff, brown, moist, with fine to medium sand Wet	100.1	21.5	S = 87 %	
10	SPT	2-4-5 (9)	-	Stiff, gray and brown, with fine to coarse sand				

- 1. Bottom of boring at 11.5 feet.
- Groundwater encountered at 6.0 feet.
 Boring backfilled with soil cuttings 4/6/18.

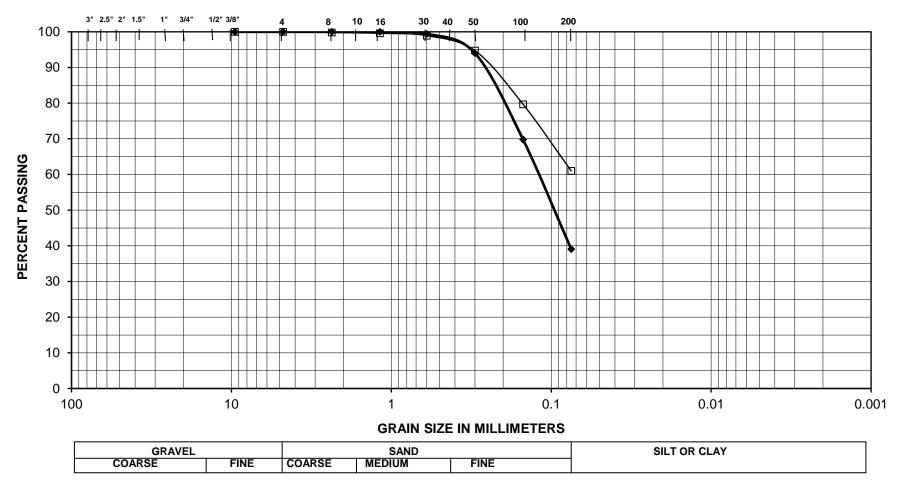
LABORATORY TESTS APPENDIX B





U.S. STANDARD SIEVE OPENING IN INCHES

U.S. STANDARD SIEVE NUMBERS



	② 2'
-------------	------

	$\overline{}$	_
 DE	(ന	-

Sample #	Classification	% Gravel	% Sand	% Fines	% Moist.	LL	PL	PI	Project:	Industrial Development
B2 @ 2'	Sandy CLAY (CL)	0	39.0	61.0	11.7					Lemoore CA
B5 @ 2'	Silty SAND (SM)	0	60.9	39.1	7.8				TES#:	180204
									Date:	4/6/2018



Sieve Analysis for Coarse and Fine Aggregate ASTM C 136

Project:	Industrial Development	Technician:	MJ
	Lemoore CA	Date:	4/6/2018
TES#:	180204	Sample No.:	B2 @ 2'
Lab #:		Remarks:	Sandy CLAY (CL)

	Weight	Maximum	Minimum Weight of
	(lbs. or grams)	Sieve Size	Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	179.0	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	74.0	2"	44.0 (20.0)

	Cumulative	Individual	Cumulative	Cumulative	
Sieve	Weight	%	%	%	
Size	Retained	Retained	Retained	Passing	Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.4	0.2	0.2	99.8	
#16	0.8	0.2	0.4	99.6	
#30	1.9	0.7	1.1	98.9	
#50	9.5	4.2	5.3	94.7	
#100	36.4	15.0	20.3	79.7	
#200	69.8	18.7	39.0	61.0	
Pan					



Sieve Analysis for Coarse and Fine Aggregate ASTM C 136

 Project:
 Industrial Development
 Technician:
 WJ

 Lemoore CA
 Date:
 4/6/2018

 TES#:
 180204
 Sample No.:
 B5 @ 2'

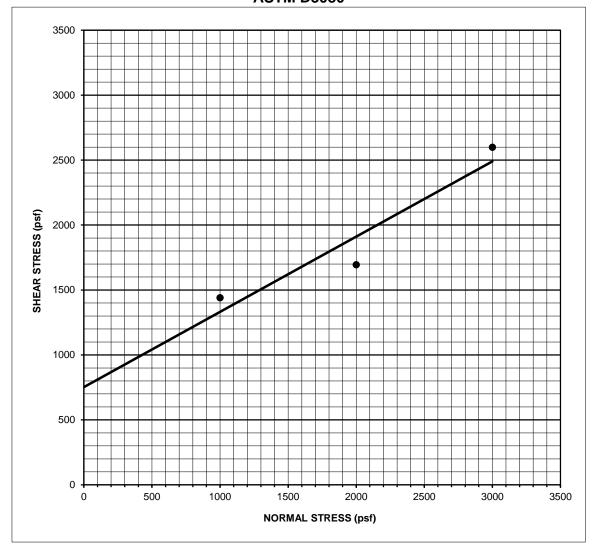
 Lab #:
 Remarks:
 Silty SAND (SM)

	Weight	Maximum	Minimum Weight of
	(lbs. or grams)	Sieve Size	Test Specimen, lbs. (kg)
Total Dry Sample + Tare Wt.		Sand	1.0 (0.5)
Tare Weight		3/8"	2.0 (1.0)
Total Dry Sample Wt.	185.6	1/2"	4.0 (2.0)
Initial Weight Fine		3/4"	11.0 (5.0)
Aggregate Before Wash		1"	22.0 (10.0)
Final Weight Fine		1 1/2"	33.0 (15.0)
Aggregate After Wash	119.4	2"	44.0 (20.0)

	Cumulative	Individual	Cumulative	Cumulative	
Sieve	Weight	%	%	%	
Size	Retained	Retained	Retained	Passing	Specs.
3 in.		0.0	0.0	100.0	
2 1/2 in.		0.0	0.0	100.0	
2 in.		0.0	0.0	100.0	
1 1/2 in.		0.0	0.0	100.0	
1 in.		0.0	0.0	100.0	
3/4 in.		0.0	0.0	100.0	
1/2 in.		0.0	0.0	100.0	
3/8 in.		0.0	0.0	100.0	
#4	0.0	0.0	0.0	100.0	
#8	0.0	0.0	0.0	100.0	
#16	0.0	0.0	0.0	100.0	
#30	1.1	0.6	0.6	99.4	
#50	11.1	5.4	6.0	94.0	
#100	56.1	24.2	30.2	69.8	
#200	113.1	30.7	60.9	39.1	
Pan					



Direct Shear Test ASTM D3080



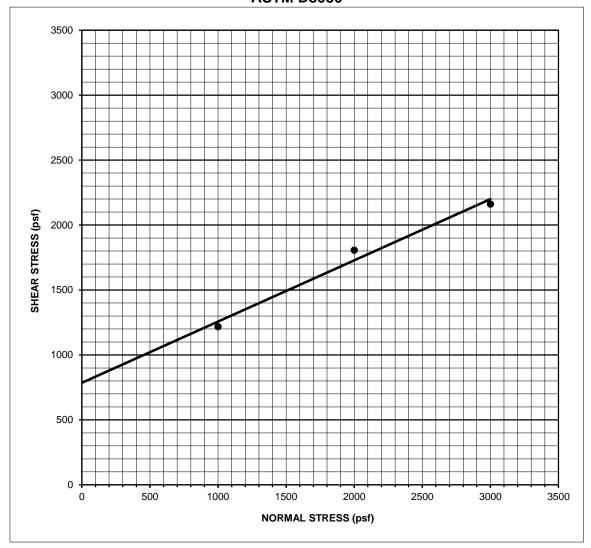
PROJECT:	Industrial Development
TES NO.:	180204
SAMPLE DATE.:	4/2/2018
SAMPLE NO.:	B2 @ 2'
DESCRIPTION:	Sandy CLAY (CL)

Cohesion (psf)	750
Internal Friction Angle (φ)	30

SPECIMEN	А	В	С	D	Е
DRY DENSITY (pcf)	120.8	120.8	120.8		
INITIAL WATER CONTENT (%)	11.2	11.2	11.2		
FINAL WATER CONTENT (%)	17.7	19.2	17.3		
NORMAL STRESS (psf)	1000	2000	3000		
MAXIMUM SHEAR (psf)	1440	1694	2598		



Direct Shear Test ASTM D3080



PROJECT:	Industrial Development
TES NO.:	180204
SAMPLE DATE.:	4/3/2018
SAMPLE NO.:	B5 @ 2'
DESCRIPTION:	Silty SAND (SM)

Cohesion (psf)	790
Internal Friction Angle (φ)	25

SPECIMEN	А	В	С	D	Е
DRY DENSITY (pcf)	117.4	117.4	117.4		
INITIAL WATER CONTENT (%)	7.8	7.8	7.8		
FINAL WATER CONTENT (%)	19.8	19.7	17.4		
NORMAL STRESS (psf)	1000	2000	3000		
MAXIMUM SHEAR (psf)	1218	1806	2160		



Construction Testing & Inspection * Geotechnical & Environmental Engineering

Expansion Index Test UBC Standard 29-2 / ASTM D4829

Project: Industrial Development	Technician: WJ	
	Date: 4/25/2018	
TES#: 180204	Sample No.: RV4 @ 0-2'	
Lab #:	Remarks: Sandy CLAY (CL)	
Water Added (ml)		
Water Added (IIII)	Time Dial	
Wt. Of Soil + Mold (g) 761.3	Reading	
vvt. Of Coll 1 Mola (g)	4/25/18 2:30 0.0000	
Wt. of Mold (g) 364.6	4/25/18 3:30 0.0421	
The or more (g)	4/26/18 2:30 0.0788	
Wt. of Soil (g) 396.7		
Wt. of Soil (lb) 0.874		
Wet Density (pcf) 119.6		
Moisture Sample, wet (g) 200.0		
Moisture Sample, dry (g) 182.0		
Moisture Content (%) 9.9		
Dry Density (pcf) 108.9	FINAL 0.0788	
0 17 0 11 0 7		
Specific Gravity 2.7	Expansion meas. = 0.0	788
Degree of Saturation (%) 48.8	Exp. Index meas. =	78.8
Degree of Saturation (%) 48.8	Exp. Index 50 =	77.8
	Expansion Potential Table	
	Expansion Index Potential Expar	nsion
EXPANSION INDEX = 77.	0-20 Very Low	
	21-50 Low	
	51-90 Medium	
	91-130 High	
	>130 Very High	



Construction Testing & Inspection * Geotechnical & Environmental Engineering

Expansion Index Test UBC Standard 29-2 / ASTM D4829

Project: Industrial Develop	oment		Tech	nician: D. Fagundes			
			Date: 4/24/2018				
TES#: 180204			Samp	ole No.: B11 @ 0-4'			
Lab #:			Re	marks: Sandy SILT (N	/IL)		
Water Added (ml)							
Water Added (IIII)				Time	Dial		
Wt. Of Soil + Mold (g)	767.5				Reading		
	. 00			4/24/18 1:30	0.0000		
Wt. of Mold (g)	368.5			4/24/18 2:30	0.0150		
(9)				4/25/18 1:30	0.0157		
Wt. of Soil (g)	399.0						
Wt. of Soil (lb)	0.880						
Wet Density (pcf)	120.3						
Moisture Sample, wet (g)	200.0						
Moisture Sample, dry (g)	183.6						
Moisture Content (%)	8.9						
Dry Density (pcf)	110.5			FINAL	0.0157		
Specific Gravity	2.7						
Specific Gravity	2.1			Expansion mea	s. = 0.0157		
Degree of Saturation (%)	45.8			Exp. Index mea			
Dogroo or Cataration (70)	10.0			Exp. Index 50 =	13.8		
				Expansion Po	tontial Table		
			ľ		Potential Expansion		
EXPANSION INDEX =		13.8		0-20			
LAFANSION IN	DLX =	13.0		21-50	Very Low Low		
				51-90	Medium		
				91-130	High		
				>130	Very High		



Method for Estimating the Service Life of Steel Culverts Caltrans California Test 643

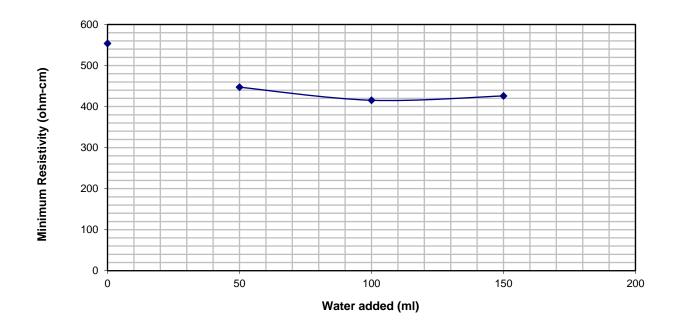
Project Name	Industrial Development	Sample Location	B-1 @ 0'-5'
Project Number	180204	Test Date	8/9/2017
Sample Date	4/9/2018	Tested By	WJ
Sampled By	S. Alvarez	Material Description	Sandy SILT (ML)

Sample Condition	As Received			Minimum	Resistivity	•	
Water Added (ml)	0	50	100	150			
Resistance (ohm)	520	420	390	400			
Resistivity (ohm-cm)	554	447	415	426			

Minimum Resistivity (ohm-cm)	415	Field Resistivity (ohm-cm)
, , , , , , , , , , , , , , , , , , ,		The state of the s

pH = 8.42 EC =

Box Constant=1.065



Years to perforation* 17

^{*} Caltrans California Test 643 - Method for Estimating the Service Life of Steel Culverts

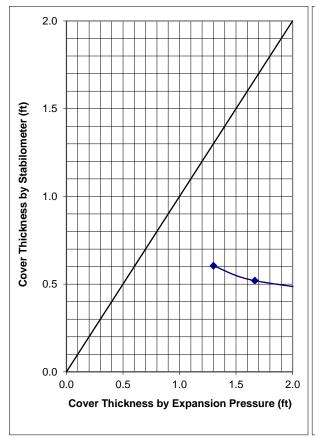


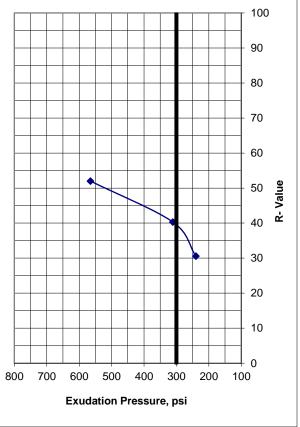
Chemical Analysis SO₄ - Modified Caltrans 417 & CL - Modified Caltrans 417/422

Project:	Industrial	Development			Technician:	WJ	
TEO."	400004				_Date:	4/26/2018	
TES#:	180204				_		
Samp Locati			Soluble Sulfate SO ₄ -S		Soluble Chloride Cl		
B11 @	0-4'		154.4	mg/Kg	119.8	mg/Kg	
B11 @	0-4'		158.4	mg/Kg	120.4	mg/Kg	
B11 @	0-4'		146.5	mg/Kg	116.3	mg/Kg	
		Average	153.10	mg/Kg	118.83	mg/Kg	



Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-1 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/9/2018
Material Description	Silty SAND (SM)		

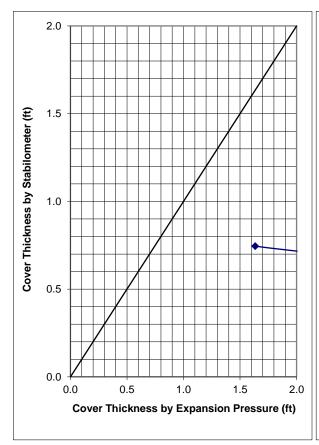


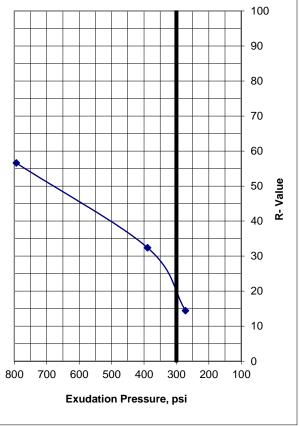


Specimen	1	2	3
Exudation Pressure, psi	240	311	565
Moisture at Test, %	14.1	13.5	12.8
Dry Density, pcf	117.6	118.8	117.9
Expansion Pressure, psf	169	217	368
Thickness by Stabilometer, ft.	0.6	0.5	0.4
Thickness by Expansion Pressure, ft.	1.3	1.7	2.8
R-Value by Stabilometer	31	40	52
R-Value by Expansion Pressure (TI=4.5)		14	
R-Value at 300 psi Exudation Pressure		39	



Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-2 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/13/2018
Material Description	Clayey SAND (SC)		



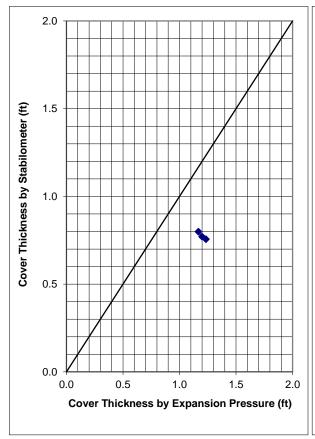


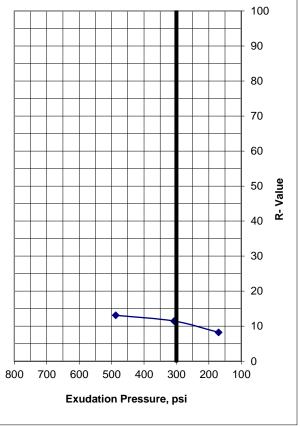
Specimen	1	2	3
Exudation Pressure, psi	794	389	272
Moisture at Test, %	16.0	17.2	18.9
Dry Density, pcf	111.1	108.8	100.0
Expansion Pressure, psf	368	446	212
Thickness by Stabilometer, ft.	0.4	0.6	0.7
Thickness by Expansion Pressure, ft.	2.8	3.4	1.6
R-Value by Stabilometer	57	32	14
R-Value by Expansion Pressure (TI=4.5)		8	
R-Value at 300 psi Exudation Pressure		20	

Controlling R-Value	8
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Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-3 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/18/2018
Material Description	Silty SAND (SM)		



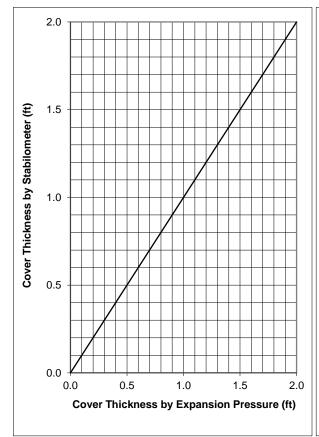


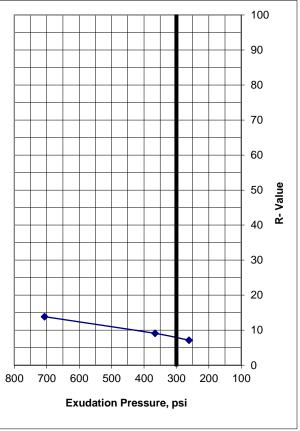
Specimen	1	2	3
Exudation Pressure, psi	170	307	487
Moisture at Test, %	15.9	14.7	13.1
Dry Density, pcf	114.9	111.9	120.1
Expansion Pressure, psf	152	156	160
Thickness by Stabilometer, ft.	0.8	0.8	0.8
Thickness by Expansion Pressure, ft.	1.2	1.2	1.2
R-Value by Stabilometer	8	11	13
R-Value by Expansion Pressure (TI=4.5)		8	
R-Value at 300 psi Exudation Pressure		12	

Controlling R-Value	8
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Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-4 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/9/2018
Material Description	Clayey SAND (SC)	_	



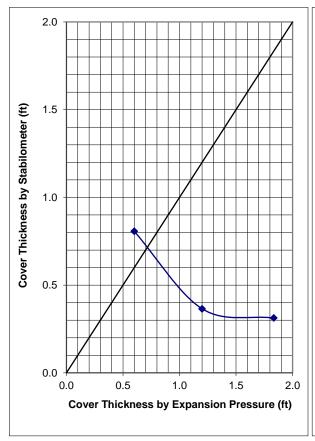


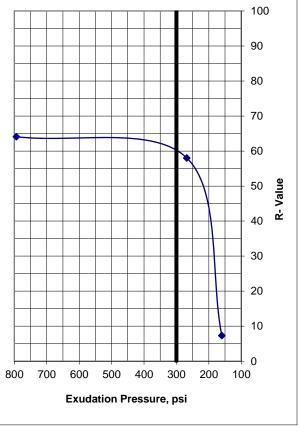
Specimen	1	2	3
Exudation Pressure, psi	707	366	261
Moisture at Test, %	14.5	15.5	16.0
Dry Density, pcf	119.3	116.3	113.5
Expansion Pressure, psf	450	437	437
Thickness by Stabilometer, ft.	0.7	0.8	0.8
Thickness by Expansion Pressure, ft.	3.5	3.4	3.4
R-Value by Stabilometer	14	9	7
R-Value by Expansion Pressure (TI=4.5)		NA	
R-Value at 300 psi Exudation Pressure		8	

Controlling R-Value	8
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Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-5 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/23/2018
Material Description	Silty SAND (SM)		



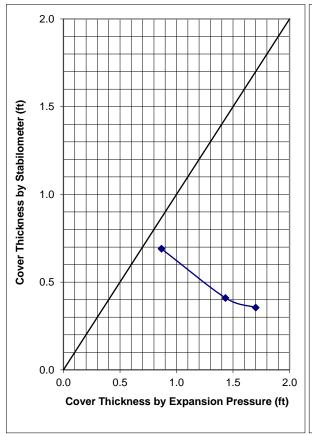


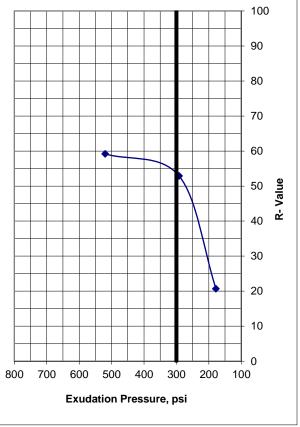
Specimen	1	2	3
Exudation Pressure, psi	160	268	794
Moisture at Test, %	32.5	11.3	10.4
Dry Density, pcf	101.9	122.3	122.0
Expansion Pressure, psf	78	156	238
Thickness by Stabilometer, ft.	0.8	0.4	0.3
Thickness by Expansion Pressure, ft.	0.6	1.2	1.8
R-Value by Stabilometer	7	58	64
R-Value by Expansion Pressure (TI=4.5)	18		
R-Value at 300 psi Exudation Pressure	60		

Controlling R-Value	18
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Project Name	Industrial Development	Lab ID Number	18-142
Project Number	180204	Sample Location	RV-6 0-2'
Sample Date	4/2/18	Tested By	FM
Sampled By	K. Weatherford	Date Tested	4/25/2018
Material Description	Silty SAND (SM)		



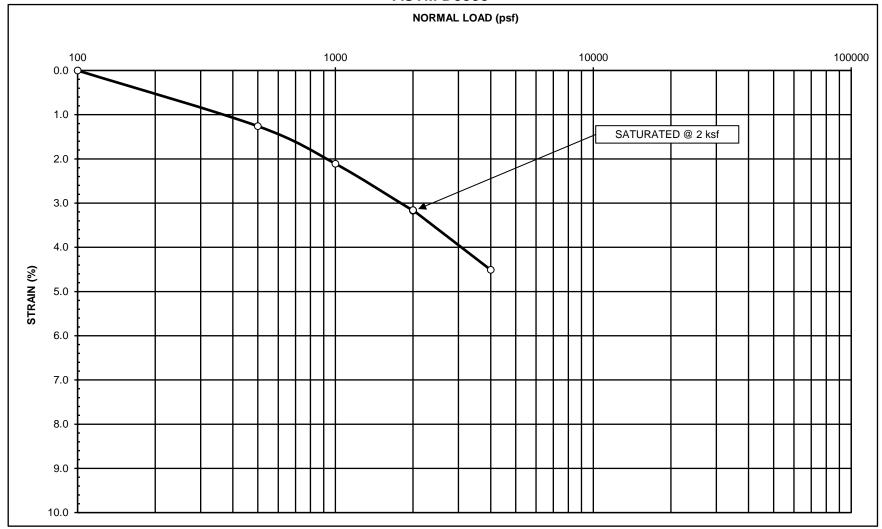


Specimen	1	2	3
Exudation Pressure, psi	178	292	520
Moisture at Test, %	13.3	12.5	11.8
Dry Density, pcf	119.1	119.4	119.5
Expansion Pressure, psf	113	186	221
Thickness by Stabilometer, ft.	0.7	0.4	0.4
Thickness by Expansion Pressure, ft.	0.9	1.4	1.7
R-Value by Stabilometer	21	53	59
R-Value by Expansion Pressure (TI=4.5)	25		
R-Value at 300 psi Exudation Pressure	54		

Controlling R-Value	25
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COLLAPSE POTENTIAL TEST DATA ASTM D5333



BORING	DEPTH	SAMPLE	MOISTURE	DRY DENSITY	PROJECT:	Industrial Development
NO.	(ft)	DESCRIPTION	CONTENT (%)	(pcf)	PROJECT NO.:	180204
		Sandy SILT (ML)	29.9	92.2	TEST DATE:	4/27/2018
B11	2.0	Saturated @ 2 ksf.	FINAL	FINAL	TESTED BY:	M1
			28.4	96.6	CONDITION:	Undisturbed



COLLAPSE POTENTIAL TEST DATA SUMMARY ASTM D5333

 PROJECT:
 Industrial Development
 TES # : 180204

 BORING #:
 B11
 DEPTH (ft)
 2.0
 DATE: 4/27/2018

 DESCRIPTION:
 Sandy SILT (ML)
 TESTED BY: WJ

 REMARKS:
 Saturated @ 2 ksf.

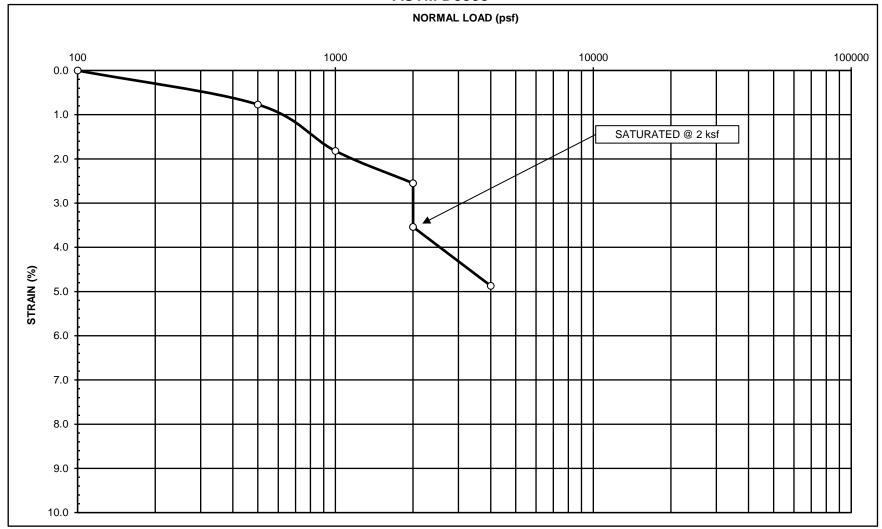
DIAMETER (in) 2.42

THICKNESS (in)	<u>INITIAL</u> 1.0000	<u>FINAL</u> 0.9549
VOLUME (cc)		
GROSS WET	190.1	188.4
GROSS DRY	156.84	156.84
TARE	45.5	45.5
WATER	33.3	31.6
SOIL	111.3	111.3
MOISTURE CONTENT (%)	29.9	28.4
WET DENSITY (pcf)	119.8	124.0
DRY DENSITY (pcf)	92.2	96.6

PRESSURE	DIAL	APPARATUS	t	%	REMARKS
(psf)	READING (in)	CORRECTION	(in)	COMPRESSION	
100	0.0000	FALSE	1.0000	0.00	
500	0.0126	0.0000	0.9874	1.26	
1000	0.0211	0.0000	0.9789	2.11	
2000	0.0317	0.0000	0.9683	3.17	
2000	0.0316	0.0000	0.9684	3.16	SATURATED
4000	0.0451	0.0000	0.9549	4.51	



COLLAPSE POTENTIAL TEST DATA ASTM D5333



BORING	DEPTH	SAMPLE	MOISTURE	DRY DENSITY	PROJECT:	Industrial Development
NO.	(ft)	DESCRIPTION	CONTENT (%)	(pcf)	PROJECT NO.:	180204
		Silty SAND (SM)	11.4	95.3	TEST DATE:	4/27/2018
B9	2.0	Saturated @ 2 ksf.	FINAL	FINAL	TESTED BY:	M1
			24.5	100.1	CONDITION:	Undisturbed



COLLAPSE POTENTIAL TEST DATA SUMMARY ASTM D5333

 PROJECT:
 Industrial Development
 TES # : 180204

 BORING #:
 B9
 DEPTH (ft)
 2.0
 DATE: 4/27/2018

 DESCRIPTION:
 Silty SAND (SM)
 TESTED BY: WJ

 REMARKS:
 Saturated @ 2 ksf.

DIAMETER (in) 2.42

THICKNESS (in)	<u>INITIAL</u> 1.0000	<u>FINAL</u> 0.9513
VOLUME (cc)		
GROSS WET	174.4	189.6
GROSS DRY	161.34	161.34
TARE	46.32	46.32
WATER	13.1	28.2
SOIL	115.0	115.0
MOISTURE CONTENT (%)	11.4	24.5
WET DENSITY (pcf)	106.1	124.7
DRY DENSITY (pcf)	95.3	100.1

PRESSURE	DIAL	APPARATUS	t	%	REMARKS
(psf)	READING (in)	CORRECTION	(in)	COMPRESSION	
100	0.0000	FALSE	1.0000	0.00	
500	0.0077	0.0000	0.9923	0.77	
1000	0.0182	0.0000	0.9818	1.82	
2000	0.0255	0.0000	0.9745	2.55	
2000	0.0354	0.0000	0.9646	3.54	SATURATED
4000	0.0487	0.0000	0.9513	4.87	
					<u> </u>
					<u> </u>
					<u> </u>