GEOTECHNICAL INVESTIGATION

Trackside Center
901-919 Third Street
Davis, California

PREPARED FOR:

TRACKSIDE CENTER, LLC
508 SECOND STREET, SUITE 107
DAVIS, CALIFORNIA 95618

PREPARED BY:

GEOCON CONSULTANTS, INC.
3160 GOLD VALLEY DRIVE, SUITE 800
RANCHO CORDOVA, CALIFORNIA 95742

GEOCON

GEOCON PROJECT NO. S9955-05-01 **JANUARY 2015**

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. S9955-05-01
January 14, 2015

VIA ELECTRONIC MAIL

Kemble K. Pope
Trackside Center, LLC
508 Second Street, Suite 107
Davis, California 95618

Subject: GEOTECHNICAL INVESTIGATION
TRACKSIDE CENTER
901-919 THIRD STREET
DAVIS, CALIFORNIA

Dear Mr. Pope:

In accordance with your authorization, we performed a geotechnical investigation for the proposed Trackside Center located at 901-919 Third Street in Davis, California.

The accompanying report presents our findings, conclusions, and recommendations regarding geotechnical aspects of redeveloping the site as presently proposed. In our opinion, no adverse geotechnical conditions were encountered that would preclude development at the site provided recommendations of this report are incorporated into the design and construction of the project.

Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,

GEOCON CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
JEREMY J. ZORNE
No. 2636
GEOTECHNICAL
STATE OF CALIFORNIA

Jeremy J. Zorne, PE, GE
Senior Engineer

Joshua J Lewis, EIT
Senior Staff Engineer

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GEOTECHNICAL INVESTIGATION

1.0 PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for the proposed Trackside Center located at 901-919 Third Street in Davis, California. The approximate site location is depicted on the Vicinity Map, Figure 1.

The purpose of our investigation was to evaluate subsurface soil and geologic conditions at the site and provide conclusions and recommendations relative to the geotechnical aspects of designing and constructing the project as presently proposed.

To prepare this report, we performed the following scope of services:

- Performed a limited geologic literature review to aid in evaluating the geologic conditions present at the site. A list of referenced material is included in Section 9.0 of this report.
- Performed a site reconnaissance to review project limits, determine exploration equipment access, and mark out exploratory excavation locations.
- Notified subscribing utility companies via Underground Service Alert (USA) a minimum of 48 hours (as required by law) prior to performing exploratory excavations at the site.
- Paid required fees and obtained a subsurface exploration permit from the Yolo County Environmental Health Division (YCEHD).
- Performed seven exploratory borings (B1 through B7) with a track-mounted CME 75 drill rig using hollow-stem augers to depths ranging from approximately 6½ to 51½ feet.
- Obtained representative disturbed and relatively undisturbed soil samples from the exploratory borings.
- Logged the borings in accordance with the Unified Soil Classification System (USCS).
- Upon completion, backfilled the borings with neat cement grout (boring B1) or soil cuttings (borings B2 through B7). Borings in paved areas were capped with cold-patch asphalt concrete.
- Performed laboratory tests to evaluate pertinent geotechnical parameters.
- Prepared this report to summarize our findings, conclusions, and recommendations regarding the geotechnical aspects of developing the site as presently proposed.

Details of our field exploration program including exploratory boring logs are presented in Appendix A. Approximate locations of our borings are shown on the Site Plan, Figure 2. Details of our laboratory testing program and test results are summarized in Appendix B.

2.0 SITE AND PROJECT DESCRIPTION

The site consists of an approximate one-half acre parcel located on the north side of Third Street, adjacent to and east of the Union Pacific Railroad (UPRR) tracks in Downtown Davis. The site is currently developed with two single-story, commercial buildings ranging in size from approximately

6,000 to 7,000 square feet, paved parking/driveway areas, and landscaped areas. The site is bounded by Third Street to the south, an alley on the east, the UPRR tracks on the west, and commercial development (currently a landscape supply yard) to the north. Based on topographic mapping prepared by Frame Surveying and Mapping (October 2014), the site is relatively flat and level with ground surface elevations ranging from approximately 47 to 49 feet North American Vertical Datum 1988 (NAVD88).

The project consists of demolishing the existing commercial buildings on the site and constructing a new three- to five-story, wood-framed mixed-use building with potentially one level of below-grade parking. The proposed building would likely occupy the majority of the site. Structural loading was not provided to us for review. However, we anticipate moderate structural loading consistent with the planned structure type. The building will be supported on a conventional shallow foundation system. Other improvements will likely include onsite underground utility infrastructure, concrete flatwork, and landscaping. Grading plans are not yet available; however, we understand that, if incorporated into the project, the below-grade parking will require mass excavation of approximately 12 to 14 feet below current site grades. Due to the relatively flat site topography, we anticipate that the remainder of grading will be relatively minor with cuts and fills on the order of 3 feet or less.

3.0 SOIL AND GEOLOGIC CONDITIONS

We identified geologic and soil conditions by observing and sampling exploratory borings and reviewing the referenced geologic literature (Section 9.0). Soil descriptions below include the USCS symbol where applicable.

3.1 Site and Regional Geology

Based on our review of published geologic maps of the area, the site is located in the west-central portion of the Great Valley geomorphic province of California. The Great Valley (Sacramento and San Joaquin Valleys) of California is a long structural depression or down-warped trough, with the axis of the trough lying close to the eastern front of the Coast Ranges geomorphic province. In general, the southern portion of the Sacramento Valley is underlain by Quaternary continental deposits (alluvial deposits) and late Tertiary age marine and continental sedimentary rocks, which rest on a basement complex consisting of granitic rocks of the Sierra Nevada. Based on the *Preliminary Geologic Map of the Sacramento 30' x 60' Quadrangle, California,* California Geological Survey (CGS), 2011, the site is underlain by Holocene alluvial fan (map symbol Qhf) deposits described as a mixture of gravel, sand, silt, and clay.

3.2 Existing Pavement Sections

Table 3.2 summarizes the pavement section material thicknesses encountered in our borings.

TABLE 3.2
SUMMARY OF EXISTING PAVEMENT SECTIONS

Boring ID	Location[1]	HMA (inches)	AB (inches)
B1	Central Driveway	3	---
B2	Alley – Southeast	4½	---
B3	Landscaped Area	---	---
B4	Western Parking Area – South	3	---
B5	Western Parking Area – North	3	3
B6	North Driveway – Central	3	---
B7	Alley – Northeast	2	4

Notes:
Approximate locations shown on the Site Plan, Figure 2
HMA = Hot Mix Asphalt
AB = Aggregate Base
--- = Not Encountered

3.3 Fill

Below the existing pavement section, we encountered fill in borings B3 through B6 to depths ranging from approximately 2½ to 5 feet. The fill generally consisted of sandy lean clay (CL) and clayey sand (SC) with variable amounts gravel and occasional debris such as wood fragments (rail tie remnants) glass, metal, and concrete chunks. The fill in boring B5 exhibited a slight petroleum hydrocarbon odor. The approximate fill thickness observed at each boring is shown on the Site Plan, Figure 2. Since we do not know the compaction and placement history of the fill, removal and re-compaction will be required during site grading. Specific recommendations are provided in this report.

3.4 Alluvium

Below the fill, where present, we encountered alluvium in each of our exploratory borings to the maximum depth explored of approximately 51½ feet. The alluvium predominantly consisted of lean clay (CL) with variable amounts of sand interbedded with occasional layers of clayey sand (SC), poorly graded sand (SP), and sandy gravel with clay (GC). The alluvium with the top 13 to 15 feet was relatively soft to medium stiff and is considered marginally compressible under increased loading. Laboratory Plasticity Index and Expansion Index tests on selected near-surface soil samples indicate relatively low plasticity and corresponding low expansion potential.

Soil conditions described in the previous paragraphs are generalized. The exploratory boring logs included in Appendix A detail soil type, color, moisture, consistency, and USCS classification of the soils encountered at specific locations and elevations.

4.0 GROUNDWATER

We did not encounter groundwater in our exploratory borings performed to a maximum depth of approximately 51½ feet on November 6 and 7, 2014.

To supplement our observations, we reviewed available groundwater elevation data on the California State Water Resources Control Board Geotracker website (http://geotracker.swrcb.ca.gov/). The Geotracker website contained depth to groundwater information for a groundwater monitoring well located within the alley adjacent to the site, just north of Third Street. Depth to groundwater in the measured in this well ranged from approximately 28 to 39 feet during the period of 2001 to 2014.

It should be noted that fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, and other factors. Depth to groundwater can also vary significantly due to localized pumping, irrigation practices, and seasonal fluctuations. Therefore, it is possible that groundwater may be higher or lower than the level observed during our investigation.

5.0 SEISMICITY AND GEOLOGIC HAZARDS

5.1 Regional Active Faults

Based on our research, analyses, and observations, the site is not located on any known “active” earthquake fault trace. In addition, the site is not contained within an Alquist-Priolo Earthquake Fault Zone. Therefore, we consider the potential for ground rupture due to onsite active faulting to be low.

In order to determine the distance of known active faults within 50 miles of the site, we used the computer program *EQFAULT*, (Version 3, Blake, 2000). Principal references used within *EQFAULT* are Jennings (1975), Anderson (1984) and Wesnousky (1986). Results are summarized in Table 5.1.

TABLE 5.1
REGIONAL ACTIVE FAULTS

Fault Name	Distance From Site (miles)	Maximum Moment Magnitude (M_W)
Great Valley, Segment 4	13.5	6.6
Great Valley, Segment 3	16.8	6.8
Great Valley, Segment 5	18.8	6.5
Hunting Creek – Berryessa	25.7	6.9
Concord – Green Valley	25.7	6.9
Great Valley, Segment 6	33.4	6.7
West Napa	35.2	6.5
Foothills Fault System	35.7	6.5
Greenville	40.8	6.9
Rodgers Creek	45.2	7.0
Great Valley, Segment 2	48.0	6.4
Hayward	49.6	7.1
Calaveras	50	6.8

5.2 Ground Shaking

We used the United States Geological Survey (USGS) computer program *2008 Interactive Deaggregations* to estimate the peak ground acceleration (PGA) and modal (most probable) magnitude associated with the 2,475-year return period. The USGS estimated PGA is 0.45g and the modal magnitude is 6.6.

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

5.3 Liquefaction

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary loss of shear strength due to pore pressure buildup under the cyclic shear stresses associated with intense earthquakes. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile.

The site is not located in a currently established State of California Seismic Hazard Zone for liquefaction. In addition, we are not aware of any reported historical instances of liquefaction in the greater Davis area. Based on the subsurface conditions encountered at the site, including predominantly cohesive soils, and the anticipated seismic and groundwater conditions, liquefaction potential is expected to be low during seismic events. Mitigation and specific design measures with respect to liquefaction is not necessary.

5.4 Expansive Soil

Laboratory Plasticity Index and Expansion Index tests on selected near-surface soil samples indicate relatively low plasticity and corresponding low expansion potential. Mitigation and specific design measures with respect to expansive soil is not necessary.

5.5 Soil Corrosion Screening

We performed a soil corrosion potential screening by conducting laboratory testing on a representative near-surface soil sample. The laboratory test results and published screening levels are presented in Appendix B.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were encountered during our investigation that would preclude development of the site as planned, provided the recommendations contained in this report are incorporated into the design and construction of the project.

6.1.2 The primary geotechnical constraint identified in our investigation is the presence of relatively loose/soft, compressible soils within the upper 15 feet. If the project incorporates below-grade parking, the required mass excavation would essentially remove the majority of the compressible soil and would allow the use of conventional spread footings for support of the structure. If below-grade parking is not incorporated into the project, remedial grading in the form of removal and re-compaction would be required in order to allow the use of conventional spread footings for support of the structure. Based on our discussions with the design team, we are providing foundation design recommendations for two remedial grading scenarios: (1) 10-foot over-excavation and (2) 15-foot over-excavation. Alternatively, shallow foundations in conjunction with rammed aggregate piers (RAPs, aka Geopiers) may be used for support of the building. Specific remedial grading and foundation recommendations are provided in this report.

6.1.3 Conclusions and recommendations provided in this report are based on our review of referenced literature, analysis of data obtained from our exploratory field exploration program, laboratory testing program, and our understanding of the proposed development at this time.

6.1.4 We should review the project plans as they develop further, provide engineering consultation as needed during final design, and perform geotechnical observation and testing services during construction.

6.2 Seismic Design Criteria

6.2.1 Seismic design of the structure should be performed in accordance with the provisions of the 2013 California Building Code (CBC) which is based on the American Society of Civil Engineers (ASCE) publication: *Minimum Design Loads for Buildings and Other Structures* (ASCE 7-10). We used the United States Geological Survey (USGS) web application *US Seismic Design Maps* (http://geohazards.usgs.gov/designmaps/us/ application.php) to evaluate site-specific seismic design parameters in accordance with the 2013 CBC/ASCE 7-10. Results are summarized in Table 6.2.1. The values presented are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 6.2.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC / ASCE 7-10 Reference
Site Class	D	Section 1613.3.2/ Table 20.3-1
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	0.972g	Figure 1613.3.1(1) / Figure 22-1
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.369g	Figure 1613.3.1(2) / Figure 22-2
Site Coefficient, F_A	1.111	Table 1613.3.3(1) / Table 11.4-1
Site Coefficient, F_V	1.662	Table 1613.3.3(2) / Table 11.4-2
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.080g	Eq. 16-37 / Eq. 11.4-1
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	0.613g	Eq. 16-38 / Eq. 11.4-2
5% Damped Design Spectral Response Acceleration (short), S_{DS}	0.720g	Eq. 16-39 / Eq. 11.4-3
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.409g	Eq. 16-40 / Eq. 11.4-4

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
2013 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.345g	Figure 22-7
Site Coefficient, F_{PGA}	1.155	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.399g	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil and Excavation Characteristics

6.3.1 Grading and excavations at the site may be accomplished with standard effort using heavy-duty grading/excavation equipment. We do not anticipate grading and excavations to generate cobbles or boulders that would require special handling or placement, although some debris (such as railroad ties and concrete chunks) may be encountered in the existing fill.

6.3.2 Temporary excavation slopes must meet Cal-OSHA requirements as appropriate. We anticipate that the majority of excavations in undisturbed alluvial soils will be classified as Cal-OSHA "Type B" soil and "Type C" soil. If active seepage or layers of sandy soil are encountered, the Cal-OSHA classification should be downgraded to "Type C." Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved "competent person" onsite during excavation to evaluate trench conditions and to make appropriate recommendations where necessary. It is the contractor's responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.

6.3.3 The excavation support recommendations provided by Cal-OSHA are generally geared towards protecting human life and not necessarily towards preventing damage to nearby structures or surface improvements. The contractor should be responsible for using the proper active shoring systems or sloping to prevent damage to any structure or improvements near underground excavations.

6.3.4 Permanent cut and fill slopes should be constructed no steeper than 2H:1V (horizontal to vertical). To mitigate potential erosion, slopes should be vegetated as soon as possible and surface drainage should be directed away from the tops of slopes.

6.3.5 If grading occurs during or after the wet season (typically winter and spring), or in periods of precipitation, in-place and excavated soils will likely be wet. Earthwork contractors should be aware of moisture sensitivity of clayey and fine-grained soils and potential compaction/workability difficulties.

6.3.6 Earthwork and pad preparation operations in these conditions will likely be difficult with low productivity. Often, a period of at least one month of warm and dry weather is necessary to allow the site to dry sufficiently so that heavy grading equipment can operate effectively. Conversely, during dry summer and fall months, dry clay soils may require additional grading effort (discing, mixing, or other means) to attain proper moisture conditioning.

6.3.7 Based on laboratory testing, in-situ moisture content of site soils range from about 10% to 25%, which is higher than optimum moisture content for this type of material. Due to the fine-grained nature of the soils and measured in-situ moisture contents well above optimum, additional drying effort to attain moisture contents suitable for compaction should be anticipated regardless of the time of year. Mitigation alternatives may include aerating/drying the exposed soils (assuming favorable weather conditions), overexcavating 12 to 18 inches and placing geotextile fabric/geogrid covered with aggregate, or chemical treatment (e.g. lime treatment). We can provide specific recommendations during construction based on conditions encountered.

6.4 Materials for Fill

6.4.1 Excavated soils generated from cut operations at the site are suitable for use as fill in structural areas provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension. Due to high in-situ moisture content, native soils reused as engineered fill will likely require aerating/drying to attain suitable moisture content for compaction, regardless of the time of year.

6.4.2 Import fill material should be primarily granular with a “very low” expansion potential (Expansion Index less than 20), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock/cementations larger than 6 inches in greatest dimension. Import soil should also contain a sufficient amount of fines (generally more than 10%) to provide “binder” and reduce potential caving when excavated.

6.4.3 Environmental characteristics and corrosion potential of import soil materials should also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

6.5.1 All earthwork operations should be observed and all fills tested for recommended compaction and moisture content by a representative of Geocon.

6.5.2 References to relative compaction and optimum moisture content in this report are based on the latest American Society for Testing and materials (ASTM) D1557 Test Procedure. Structural building pad areas should be considered as areas extending a minimum of 5 feet horizontally beyond the outside dimensions of buildings, including footings and overhangs carrying structural loads.

6.5.3 Prior to commencing grading, a pre-construction conference with representatives of the client, grading contractor, and Geocon should be held at the site. Site preparation, soil handling, and/or the grading plans should be discussed at the pre-construction conference.

6.5.4 Site preparation should begin with removal of existing pavements, surface/subsurface structures, underground utilities, debris, and existing fill. Existing pipelines and overlying trench backfill should be completely removed to expose undisturbed soil. Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.5 Within areas to be developed, any existing trees and associated root systems should be removed. Roots larger than 1 inch in diameter should be completely removed. Smaller roots may be left in-place as conditions warrant and at the discretion of our field representative.

6.5.6 At a minimum, the existing fill (approximately 2 to 5 feet) within the building pad area will require removal and re-compaction in order to provide uniform support for the interior slab-on-grade, if the project does not incorporate below-grade parking. If RAPs are used for support of the building, additional remedial grading (beyond the existing fill removal) is not necessary. Fill removal and re-compaction outside of the building pad area is not necessary provided some post-construction movement is acceptable in these non-building areas.

6.5.7. If the building is constructed at-grade (no below-grade parking) and supported on conventional shallow foundations without RAPs, remedial grading will be necessary in order to achieve the desired allowable bearing capacity and control settlement. Based on our discussions with the design team, two levels of remedial grading (over-excavation and re-compaction) may be performed:

- **Alternative 1** – remove and re-compact the moderately compressible alluvial soil to a minimum elevation of +39 feet NAVD88, which corresponds to approximately 10 feet below existing site grades.
- **Alternative 2 (or Below-Grade Parking)** – remove and re-compact the moderately compressible alluvial soil to a minimum elevation of +34 feet NAVD88, which corresponds to approximately 15 feet below existing site grades.

6.5.8 The bottom of the over-excavation, areas left at grade, and areas to receive fill should be scarified at least 12 inches, uniformly moisture-conditioned at or above optimum moisture content and compacted to at least 90% relative compaction. Scarification and re-compaction operations should be performed in the presence of our representative.

6.5.9 Engineered fill should be compacted in horizontal lifts not exceeding 8 inches (loose thickness) and brought to final design elevations. Each lift should be moisture-conditioned at or above optimum moisture content, and compacted to at least 90% relative compaction.

6.5.10 The top 6 inches of final vehicular pavement (non-pervious) subgrade, whether completed at-grade, by excavation, or by filling, should be uniformly moisture-conditioned at or above optimum moisture content and compacted to at least 95% relative compaction. Final pavement subgrade should be finished to a smooth, unyielding surface. We further recommend proof-rolling the subgrade with a loaded water truck (or similar equipment with high contact pressure) to verify the stability of the subgrade prior to placing aggregate base (AB).

6.5.11 Pipe bedding, shading, and trench backfill should conform to the requirements of the appropriate utility authority. Material excavated from trenches should be adequate for use as general backfill above shading provided it does not contain deleterious matter, vegetation, or cementations larger than 6 inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding 8 inches, moisture-conditioned at or above optimum and compacted to at least 90% relative compaction. Compaction should be performed by mechanical means only; jetting of trench backfill is not recommended.

6.6 Foundations

6.6.1 Provided the remedial grading specified in Section 6.5 is performed, the building may be supported on a conventional shallow foundation system bearing on engineered fill. Foundations should consist of continuous perimeter strip footings with isolated interior spread footings. Strip and spread footings should be embedded at least 18 inches below lowest adjacent pad grade. Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom of the footing.

6.6.2 Shallow foundations may be designed using the allowable bearing capacities provided in Table 6.6.2.

TABLE 6.6.2
SHALLOW FOUNDATION DESIGN PARAMETERS

Remedial Grading Alternative	Allowable Bearing Capacity (psf)*
Alternative 1 (10-foot Over-Excavation)	3,000
Alternative 2 or Below-Grade Parking (15-foot Over-Excavation)	4,000

** Dead plus live loading conditions. A one-third increase is permissible for short-term transient loading such as wind and seismic.*
psf = pounds per square foot

6.6.3 Allowable passive pressure used to resist lateral movement of the footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The coefficient of friction to resist sliding is 0.30 for concrete against soil. Combined passive resistance and friction may be utilized for design provided that the frictional resistance is reduced by 50%.

6.6.4 Foundations designed in accordance with the recommendations above should experience total post-construction settlement of less than one inch and differential settlement of ½ inch or less over a distance of 50 feet. The majority of settlement will be immediate and occur as the building is constructed.

6.6.5 Continuous footings should be reinforced with at least four No. 4 reinforcement bars, two each placed near the top and bottom of the footing to allow footings to span isolated soil irregularities. The reinforcement recommended above is for soil characteristics only and is not intended to replace reinforcement required for structural considerations. The project structural engineer should evaluate the need for additional reinforcement.

6.6.6 A Geocon representative should observe foundation excavations prior to placing reinforcing steel or concrete to observe that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

6.7 Rammed Aggregate Pier (RAP) System

6.7.1 As an alternative to remedial grading, the compressible soil may be improved by installing rammed aggregate piers. RAPs such as Geopier® Foundation Systems are designed and installed by specialty ground improvement contractors. The RAP system is based on soil improvement that consists of installing densified, aggregate columns to depths typically ranging from 10 to 15 feet. The system reportedly increases density and lateral stress in the surrounding soil and claims improvement in bearing capacity and reduction of settlement potential; thus, allowing the use of conventional shallow foundations over the RAP elements. RAP elements are constructed by drilling shafts (commonly 30 inches in diameter), and backfilling the open shaft with specially rammed/compacted, open graded crushed rock and Class 2 AB in 10- to 12-inch lifts. The drill spoils are commonly reused as fill material or disposed of offsite. Conventional shallow foundations are used in conjunction with the RAP reinforced soil with increased allowable bearing pressures on the order of 5,000 to 8,000 psf.

6.7.2 If the RAP system is selected for structural support, the installer should provide a complete design-build submittal with design recommendations, engineered plans, and specifications. A load test program for bearing and uplifts RAPs should also be performed.

6.8 Interior Slabs-on-Grade

6.8.1 Slab thickness and reinforcement should be determined by the structural engineer based on anticipated loading. However, based on our experience, slabs are typically at least 5 inches thick and reinforced with at least No. 4 reinforcing bars placed 18 inches on center, each way. Control joints should be provided at periodic intervals in accordance with American Concrete Institute (ACI) or Portland Cement Association (PCA) recommendations, as appropriate.

6.8.2 If building pad soils become dry, they should be re-moistened prior to concrete slab-on-grade construction. Building pads should be moistened to at least optimum moisture content, at least 48 hours before placing the vapor barrier. Moisture content should be verified by Geocon prior to placing the vapor barrier.

6.9 Concrete Moisture Protection Considerations

6.9.1 Migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner and design team, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.

6.9.2 In areas where floor coverings are planned, a minimum 10-mil-thick vapor barrier meeting ASTM E1745-97 Class C requirements may be placed directly below the slab, without a sand cushion. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) may be used. The vapor barrier, if used, should extend to the edges of the slab, and should be sealed at all seams and penetrations.

6.9.3 At least 4 inches of ½ or ¾ inch crushed rock, with no more than 5 percent passing the No. 200 sieve, may be placed below the vapor barrier to serve as a capillary break.

6.9.4 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.

6.9.5 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.10 Retaining Walls

6.10.1 Design of retaining walls and buried structures may be based on the lateral earth pressures (equivalent fluid pressure) summarized in Table 6.10.

TABLE 6.10
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active (Drained)	45 pcf
Active (Undrained)	85 pcf
At-Rest (Drained)	65 pcf
At-Rest (Undrained)	95 pcf
Passive	300 pcf
Seismic Earth Pressure[1]	15 pcf

1. Applicable for walls that support more than 6 feet of backfill in accordance with Section 1803.5.12 of the 2013 CBC. Conventional triangular distribution. Should be combined with ACTIVE lateral earth pressure for seismic case analysis.

6.10.2 Unrestrained walls should be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.001H (where H is the height of the wall). Walls restrained from movement (such as basement walls) should be designed using the at-rest case. The soil pressures above assume that the backfill material within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall will be composed of the existing onsite soils.

6.10.3 In addition to the recommended earth pressure, the upper 10 feet of subterranean walls adjacent to streets should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the walls due to normal street traffic. If the traffic is kept back at least 10 feet from the subterranean walls, the traffic surcharge may be neglected.

6.10.4 If the walls are designed for drained conditions, retaining walls should be provided with a drainage system and waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material which leads to suitable drainage facilities.

6.10.5 Moisture affecting below-grade walls is a common post-construction complaint. Poorly applied or omitted waterproofing can lead to efflorescence or standing water. Particular care should be taken in the design and installation of waterproofing to avoid moisture problems, or water seepage into the structure through any normal shrinkage cracks which may develop in the concrete walls, floor slab, foundations and/or construction joints. The design and inspection of the waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant should be retained in order to recommend a product or method, which would provide protection to subterranean walls, floor slabs and foundations.

6.11 Concrete Sidewalks and Flatwork

6.11.1 Sidewalk, curb, and gutter within City of Davis right-of-way should be designed and constructed in accordance with the latest City standards and details as applicable.

6.11.2 Onsite exterior concrete flatwork will likely experience seasonal movement. Therefore, some cracking and/or vertical offset should be anticipated. We are providing the following recommendations to reduce distress to concrete flatwork. Recommendations include moisture conditioning subgrade soils, using aggregate underlayment, and providing adequate construction and control joints. It should be noted that even with implementation of these measures, slab movement or cracking could still occur.

- Concrete flatwork and sidewalks should be at least 4 inches thick and underlain by at least 4 inches of Class 2 AB compacted to at least 95% relative compaction. In addition, doweling could be provided at joints to reduce the potential for vertical offset.
- The upper 12 inches of subgrade soil for exterior flatwork and sidewalks should be uniformly moisture-conditioned at or above optimum moisture content and compacted to at least 90% relative compaction prior to placing AB.
- We recommend using construction and control joints in accordance with ACI and/or PCA guidelines. Construction joints that abut building foundations should include a felt strip, or approved equivalent, that extends the full depth of the exterior slab. Exterior slabs should be structurally independent of building foundations except at doorways, where vertical movement could impact doorway operation.

6.12 Hot Mix Asphalt Pavement

6.12.1 We performed Resistance-Value (R-Value) testing on a representative bulk soil sample from proposed at-grade pavement areas. Our testing resulted in an R-Value of 25 (Appendix B). Table 6.12 provides alternative pavement sections based on the design methods of Caltrans' *Highway Design Manual* using a design subgrade R-value of 25.

TABLE 6.12
FLEXIBLE PAVEMENT SECTIONS

	Parking Areas Traffic Index = 5.0	Driveways, Light Truck Traffic, Fire Truck Areas Traffic Index = 6.0
HMA, inches	3.0	3.5
AB, inches	6.0	8.5
Total Section, inches	9.0	12.0

6.12.2 The recommended pavement section is based on the following assumptions:

1. Pavement subgrade soil has an R-Value of at least 25.
2. Class 2 AB has a minimum R-Value of 78 and meets the requirements of Section 26 of Caltrans' *Standard Specifications*.
3. Class 2 AB and the top 6 inches of subgrade are compacted to 95% or higher relative compaction at or near optimum moisture content.

6.12.3 To reduce the potential for water from landscaped areas migrating under pavement into the AB, consideration should be given to using full-depth curbs in areas where pavement abuts irrigated landscaping. The full-depth curbs should extend at least 6 inches or more into the soil subgrade beneath the AB. Alternatively, modified drop-inlets that contain weep-holes may be used to encourage accumulated water to drain from beneath the pavement.

6.12.4 Asphalt pavement section recommendations for driveways and parking areas are based on the design procedures of Caltrans' *Highway Design Manual* (Design Manual), Chapter 600, updated December 20, 2004. It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and, hence, may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The Design Manual indicates that the resulting pavement sections for parking lots are "minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems." It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas, therefore, should be anticipated.

6.13 Rigid Concrete Pavement

6.13.1 If rigid PCC pavement is used in automobile and light-truck traffic areas, we recommend that the concrete be at least 6 inches thick. PCC pavement should be underlain by at least 6 inches of Class 2 AB meeting the requirements of Section 26 of Caltrans' *Standard*

Specifications and compacted to at least 95% relative compaction. Subgrade soils should be prepared and compacted in accordance with the recommendations of this report.

6.13.2 PCC should have a minimum 28-day compressive strength of 3,500 pounds per square inch (psi). Adequate construction and crack control joints should be used to control cracking inherent in concrete construction. It would be advantageous to provide minimal reinforcement, such as No. 3 steel bars placed 18 inches on center in both horizontal directions to help control cracking.

6.13.3 In general, we recommend that concrete pavements be designed, constructed, and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.14 Pervious Pavements

6.14.1 The use of pervious pavements is feasible from a geotechnical viewpoint provided the recommendations contained in this report are incorporated into design and construction of the project.

6.14.2 Subgrade soil within the proposed pavement areas generally consists of low-permeability lean clays and clayey sands. We are providing pervious pavement recommendations for pervious concrete and interlocking concrete pavers. Pervious pavement systems are typically constructed on an open-graded crushed aggregate base supported on prepared soil subgrade. In our experience, interlocking concrete paver systems are more prone to post-construction settlement and distortion and require more diligent subgrade and base preparation and compaction.

6.14.3 For either system, we recommend providing full-depth curbs at the edges to provide restraint and to reduce the potential for adverse seepage into adjacent areas. The full-depth curbs should be at least 4 inches wide and extend at least 4 inches or more into the soil subgrade beneath the AB of the non-pervious pavement section.

6.14.4 Pervious pavement systems must be designed for adequate water storage capacity (within the voids of the pervious concrete and crushed rock base) as well as adequate structural capacity. The recommendations provided in this letter are based on structural loading requirements and the anticipated subgrade soil support conditions only. The project civil engineer should determine if the pervious pavement section provides adequate storage for the volume of water anticipated. Based on our experience with similar soil types and estimates of permeability using correlations developed by Alyamani and Sen, *Determination of Hydraulic Conductivity from Complete Grain-Size Distribution Curves*, Groundwater Journal, July-

August, soil infiltration rates are slow (10^{-6} cm/sec or slower); therefore, we recommend that the design assumes no soil infiltration.

6.14.5 The exposed subgrade soil in pervious pavement areas should be thoroughly scarified at least 6 inches, uniformly moisture-conditioned at or above optimum moisture content, and compacted to at least 90% relative compaction. Final soil subgrade should be finished to a smooth, unyielding surface. We recommend proof-rolling the subgrade with a loaded water truck (or similar equipment with high contact pressure) to verify stability prior to pavement section construction.

6.14.6 **Pervious Concrete Pavement.** Based on the anticipated traffic loading and subgrade soil support conditions, we recommend the following minimum design section (listed in order from top to bottom):

- 5 inches of permeable concrete
- 8 inches of open-graded base aggregate meeting ASTM No. 57 gradation
- Geotextile fabric (Mirafi Filterweave 403, or equal)
- Compacted soil subgrade

Pervious concrete mix design should be determined by the project civil engineer. We recommend using a mix which will develop a minimum 28-day compressive strength of 3,500 psi. Base aggregate should consist of hard, durable, open-graded crushed rock with at least 90% fractured faces and LA abrasion less than 40 meeting the gradation requirements for ASTM No. 57 base (per ASTM C33). Rounded gravel is not acceptable for use as base aggregate. To provide additional stability and to reduce potential for fines migration, we recommend placing a woven geotextile designed to provide separation and filtration, such as Mirafi Filterweave 403 or equal, on the soil subgrade below the base aggregate. Base aggregate should be placed in 4-inch lifts, each lift compacted with a 10-ton smooth drum roller making at least two passes in vibratory mode and two passes in static mode. Compaction should continue until there is no visible movement of the base aggregate.

6.14.7 **Interlocking Concrete Pavers / Pervious Pavers.** The Interlocking Concrete Pavement Institute (ICPI) recommends using a 3-layer aggregate underlayment for interlocking concrete pavers consisting of bedding, base, and subbase. The following recommendations are based on design the methodology recommended by ICPI (*Permeable Interlocking Concrete Pavements, Third Edition,* 2006). Based on the anticipated traffic loading and subgrade soil support conditions, we recommend the following minimum design section (listed in order from top to bottom):

- Concrete pavers (minimum 3-1/8 inches thick)
- 2 inches of bedding aggregate meeting ASTM No. 8 gradation
- 4 inches of base aggregate meeting ASTM No. 57 gradation
- 6 inches of subbase aggregate meeting ASTM No. 2 gradation
- Geotextile fabric (Mirafi Filterweave 403, or equal)
- Compacted soil subgrade

Bedding, base, and subbase aggregate should consist of hard, durable, open-graded crushed rock with at least 90% fractured faces and LA abrasion less than 40. Rounded gravel is not acceptable for use as bedding, base, and subbase. The gradation of proposed bedding and base aggregates should be tested prior to construction by Geocon to verify filter compatibility between the various aggregate layers. ICPI recommends the following filter criteria:

$D_{15\ base} / D_{50\ bedding} < 5$ <u>and</u> $D_{50\ base} / D_{50\ bedding} > 2$

(D_x is the particle size at which x percent of the particles are finer)

If the filter criteria above is not achieved (i.e. the bedding material is smaller or the base aggregate is larger), a geotextile fabric (Mirafi FW 403 or equal) should be placed between the bedding and base aggregate. Subbase and base aggregate should be placed in 4-inch lifts, each lift compacted with a 10-ton smooth drum roller making at least two passes in vibratory mode and two passes in static mode. Compaction should continue until there is no visible movement of the aggregate. Bedding aggregate should be placed and screed per paver manufacturer's recommendations.

6.15 Site Drainage and Moisture Protection

6.15.1 Adequate site drainage is critical to reduce the potential for differential soil movement, soil expansion, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to building foundations. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with the 2013 CBC or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices.

6.15.2 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

6.15.3 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend use of area drains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes. In addition, where landscaping is planned adjacent to the pavement or flatwork, we recommend construction of a cutoff wall (deepened curb) along the edge of the pavement/flatwork that extends at least 4 inches into the soil subgrade below the bottom of the base material.

6.15.4 The soil conditions at the site (low-permeability clays) are not conducive to water infiltration devices such as vegetated swales. However, Low Impact Development (LID) devices can be installed to reduce velocity and the amount of water entering the storm drain system. The LID devices should be properly constructed to prevent water infiltration into the surrounding soil. Water infiltrates the expansive soils, distress may be caused to adjacent pavements, flatwork, or structures. Vegetated swales and basin areas (if used) should be lined with an impermeable liner (e.g. high-density polyethylene, HDPE, with a thickness of about 12 mil or equivalent polyvinyl chloride liner) to reduce infiltration.

6.15.5 We recommend that roof drains be connected to water-tight subdrains that direct the water to the storm drain system. However, we understand that LID and Leadership in Engineering and Environmental Design (LEED) requests disconnecting the roof drains to help obtain certification. The water from the roof drains should be directed away from buildings. Consideration should be given to draining roofs to lined planter boxes or placing liners below the proposed landscape areas to prevent infiltration of the water. Geocon can be contacted for additional recommendations.

6.15.6 We recommend implementing measures to reduce infiltrating irrigation water near buildings, flatwork, or pavements. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 3 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers.
- Using automatic timers for irrigation systems.
- Using appropriately spaced area drains.

The project landscape architect should consider incorporating these measures into the landscaping plans.

6.15.7 Experience has shown that even with these provisions, subsurface seepage may develop in areas where no such water conditions existed prior to site development. This is particularly true where a substantial increase in surface water infiltration has resulted from an increase in landscape irrigation.

7.0 FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

7.1.1 Geocon should review the foundation and grading plans prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

7.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record (GER) throughout the construction phase and provide testing and observation services. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for other's interpretation of our recommendations or the future performance of the project.

8.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, we should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous materials or environmental contamination was not part of our scope of services.

This report is issued with the understanding that it is the responsibility of the owner or their representative to ensure that the information and recommendations contained herein are brought to the attention of the design team for the project and incorporated into the plans and specifications and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The recommendations contained in this report are preliminary until verified during construction by representatives of our firm. Changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. Additionally, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated partially or wholly by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.

9.0 REFERENCES

1. American Society of Civil Engineers. *ASCE 7-10 Minimum Design Loads for Buildings and Other Structures*, Sections 11.4 and 21.4, 2006.

2. American Concrete Institute, ACI 318-05, *Building Code Requirements for Structural Concrete and Commentary*, 2005.

3. Alyamani and Sen, *Determination of Hydraulic Conductivity from Complete Grain-Size Distribution Curves*, Groundwater Journal, July-August 1993.

4. Blake, T. F., *EQFAULT, Version. 3.00*, 2000.

5. California Building Standards Commission, *2013 California Building Code*, based on *2012 International Building Code*, International Code Council.

6. California Department of Transportation, *Highway Design Manual*, July 2009.

7. Department of the Naval Facilities Engineering Command DM-7.1, *Soil Mechanics*, 1986.

8. Hart, Earl W., Bryant, William A. "Alquist-Priolo Earthquake Fault Zone Program." California Division of Mines and Geology, 1999.

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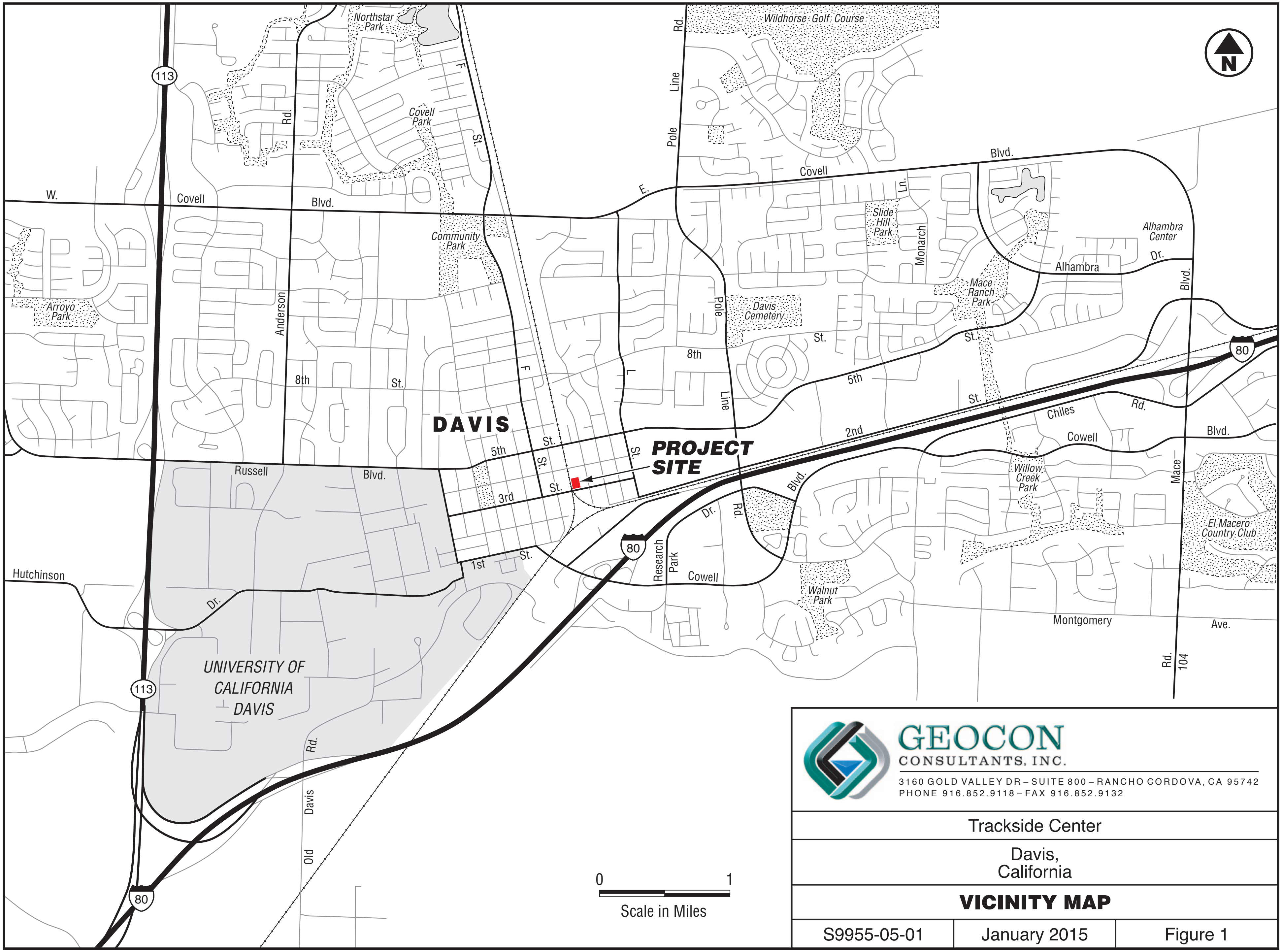
11. Portland Cement Association, *Concrete Floors on Ground*, 2001.

12. United States Geological Survey, *2008 Interactive Deaggregations*, http://eqint.cr.usgs.gov/deaggint/2002/index.php.

13. Unpublished reports, aerial photographs, and maps on file with Geocon.



GEOCON CONSULTANTS, INC.

3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

Trackside Center

Davis,
California

VICINITY MAP

S9955-05-01	January 2015	Figure 1

LEGEND:

B7 ⊗ Approximate Exploratory Boring Location

5' Approximate Existing Fill Thickness

0 30
Scale in Feet

N

Ref: *Underground Utility Location Map for 901 3rd Street*, B & B Locating, October 2014

GEOCON
CONSULTANTS, INC.
3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

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Davis,
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SITE PLAN

S9955-05-01	January 2015	Figure 2

APPENDIX A

APPENDIX A

FIELD EXPLORATION

We performed our geotechnical field exploration on November 6 and 7, 2014. Our field exploration program consisted of drilling seven exploratory borings (B1 through B7) at the approximate locations depicted on the Site Plan, Figure 2.

Borings were performed using a track-mounted CME 75 drill rig equipped with 8-inch outside diameter (OD) hollow stem augers. Soil sampling was performed using an automatic 140-pound hammer with a 30-inch drop. We obtained samples using a 3-inch OD split-spoon (California Modified) sampler. We recorded the number of blows required to drive the sampler the last 12 inches (or portion thereof) of the 18-inch sampling interval on the boring logs. Upon completion, the borings were backfilled with either neat cement grout (boring B1) or soil cuttings generated from the borings (borings B2 through B7).

We visually examined, classified, and logged the subsurface conditions in the exploratory borings in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488-90). This system uses the Unified Soil Classification System (USCS) for soil designations. The logs depict soil and geologic conditions encountered and depths at which we obtained samples. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics, and other factors. The transition between materials may be abrupt or gradual. Where applicable, we revised the field logs based on subsequent laboratory testing.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	**GRAVELS** MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVELS, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	**SILTS AND CLAYS** LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TEST PIT LOG LEGEND

pp	—	Pocket Penetrometer (tsf)
tsf	—	Tons Per Square Foot
LL	—	Liquid Limit
PI	—	Plasticity Index
	—	Shelby Tube Sample
	—	Bulk Sample
	—	SPT Sample
	—	Modified California Sample
▼	—	Groundwater Level (At Completion)
▽	—	Groundwater Level (First Encountered)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 7	VERY SOFT	0 - 2	0 - 2	0 - 0.25
LOOSE	4-10	7 - 17	SOFT	2 - 3	2 - 4	0.25 - 0.50
MEDIUM DENSE	10-30	17 - 48	MEDIUM STIFF	3 - 8	4 - 10	0.50 - 1.0
DENSE	30-50	48 - 85	STIFF	8 - 15	10 - 20	1.0 - 2.0
VERY DENSE	OVER 50	OVER 85	VERY STIFF	15 - 30	20 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

GEOCON

Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
Telephone: 916-852-9118
Fax: 916-852-9132

Key to Logs

Project: Trackside Center
Location: Davis, CA
Number: S9955-05-01
Figure: A1

GEOCON LOG LEGEND S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B1

ELEV. (MSL.) **48** DATE COMPLETED **11/6/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B1-BULK			SC	**ASPHALT:** 3 Inches			
1					**ALLUVIUM** Loose, damp to moist, brown, Clayey fine-grained SAND, trace roots			
2	B1-1.5, B1-2.0					7	89.4	12.3
3-4	B1-3.5, B1-4.0				- becomes very loose	5		
					-38.5% fines			
5-6	B1-6.0			CL	Soft, damp to moist, brown, fine-grained Sandy lean CLAY, low to medium plasticity, slightly cemented	5		
7-8	B1-8.0			CL	Medium stiff, moist, olive and brown, Lean CLAY, medium plasticity	7	92.7	27.6
9-10	B1-10.0				- becomes soft	6		
12-13	B1-12.5, B1-13.0				- becomes stiff, damp	23		
15-16	B1-15.5, B1-16.0				- becomes moist, dark brown	25	92.3	25.9
17-19								
20-21	B1-20.5, B1-21.0			CL	Stiff, moist, olive and brown, Lean CLAY with fine-grained SAND, low to medium plasticity	28		
22-24								
25-26	B1-25.5, B1-26.0			CL	Stiff, damp, brown, Lean CLAY, medium plasticity	24		
27-29								

Figure A2, Log of Boring, page 1 of 2

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B1

ELEV. (MSL.) 48 DATE COMPLETED 11/6/2014
ENG./GEO. Joshua Lewis DRILLER All Well Abandonment
EQUIPMENT Track-Mounted CME75 w/ 8" HSA HAMMER TYPE Automatic

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B1-30.5 B1-31.0			CL	Stiff, moist, olive and brown, Sandy lean CLAY, low to medium plasticity	28		
35	B1-35.5 B1-36.0				- trace calcium carbonate chunks	38	101.2	16.7
40	B1-40.5 B1-41.0			CL	Stiff, damp to moist, olive and brown, Lean CLAY, medium plasticity	28		
45	B1-45.5 B1-46.0					30	95.8	27.7
50	B1-50.5 B1-51.0				- trace fine-grained Sand	28		
					BORING TERMINATED AT 51.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT			

Figure A3, Log of Boring, page 2 of 2

GEOCON

SAMPLE SYMBOLS
... SAMPLING UNSUCCESSFUL
... DISTURBED OR BAG SAMPLE
... STANDARD PENETRATION TEST
... CHUNK SAMPLE
... DIRECT PUSH (UNDISTURBED)
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B2

ELEV. (MSL.) **47** DATE COMPLETED **11/6/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**ASPHALT:** 4.5 Inches			
1	B2-BULK			CL	**ALLUVIUM** Stiff, damp, brown, Sandy lean CLAY, low plasticity, trace roots			
2	B2-2.0					17		
3					- becomes medium stiff			
4	B2-3.5 B2-4.0					10		9.5
5					- becomes stiff, no roots			
6	B2-5.5 B2-6.0					17		

BORING TERMINATED AT 6.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A4, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B3

ELEV. (MSL.) **49** DATE COMPLETED **11/6/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**LAWN**			
1–3	B3-BULK, B3-1.0, B3-1.5				**FILL** Very soft, moist, dark brown, Lean CLAY, Fill contains: Clay, rail tie remnants (creosote treated wood), rocks, broken glass, nails	1		
3–4	B3-3.5, B3-4.0			CL	**ALLUVIUM** Very soft, moist, brown, fine-grained Sandy lean CLAY, medium plasticity	3		
5–6	B3-5.5, B3-6.0				- becomes medium stiff	7	98.6	19.5
7–8	B3-7.5, B3-8.0				- becomes soft, wet	5		
9–10	B3-9.5, B3-10.0			CL	Soft, wet, brown, Lean CLAY, trace fine-grained Sand	6		
12–13	B3-13.0				- becomes medium stiff, miost, olive and brown	8		
15–16	B3-15.5, B3-16.0				- becomes stiff, damp to moist, dark brown	25	103.4	21.9
20–21	B3-20.5, B3-21.0				- becomes brown	20		
25–26	B3-25.5, B3-26.0					32		

BORING TERMINATED AT 26.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A5, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B4

ELEV. (MSL.) **49** DATE COMPLETED **11/6/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B4-BAG			SC	**ASPHALT:** 3 Inches **FILL** Loose, damp, brown, Clayey SAND with gravel, Fill contains: Sand, Gravel, staples, horseshoe, rail tie remnants (creosote treated wood)			
5	B4-5.5 B4-6.0			SP-SC	**ALLUVIUM** Very loose, moist, brown, Poorly-graded SAND with Clay	4		
8	B4-8.5			CL	Very soft, moist, brown, Gravelly CLAY	2		
11	B4-11.0			CL	Medium stiff, moist, brown and olive, Lean CLAY, medium plasticity	7		

BORING TERMINATED AT 11.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A6, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

GEOCON

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B5

ELEV. (MSL.) **49** DATE COMPLETED **11/7/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B5-BULK		**ASPHALT:** 3 Inches			
1	B5-1.0	CL	**AGGREGATE BASE:** 3 Inches			
2			**FILL** Soft, moist, dark brown, Lean CLAY, Petroleum Odor, Fill contains: glass, rail tie remnants (creosote treated wood)			
3	B5-3.0 B5-3.5	SM	**ALLUVIUM** Very loose, moist, brown, medium- to fine-grained Silty SAND	5		
5	B5-5.5		- becomes fine-grained Sand, trace Clay			
6	B5-6.0			6	92.8	22.6
8	B5-8.0 B5-8.5	SP	Loose, damp, dark blue and brown, coarse- to fine-grained Poorly-graded SAND with fine gravel, trace clay	9		
10	B5-10.5 B5-11.0	CL	Soft, moist, olive and brown, Lean CLAY	5		
15	B5-15.5 B5-16.0		- becomes stiff - becomes dark brown	18		
20			- no recovery, blow counts incorrect, metal object fell into hole and pushed by shoe of sampler into soil			
25	B5-25.5 B5-26.0		- becomes olive and brown	27	111.9	18.3

BORING TERMINATED AT 26.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A7, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 12/01/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

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PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B6

ELEV. (MSL.) **49** DATE COMPLETED **11/7/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B6-0.5				**ASPHALT:** 3 Inches			
1					**FILL**			
2					Loose, damp, brown, Sandy GRAVEL, Fill contains: Gravel, Sand, concrete chunks			
3	B6-3.5			SC	Very loose, damp, brown, Clayey fine-grained SAND			
4						5		
5				CL	Soft, damp, brown, fine-grained Sandy CLAY			
6	B6-6.0					6		

BORING TERMINATED AT 6.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A8, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 11/25/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S9955-05-01** PROJECT NAME **Trackside Center**

BORING B7

ELEV. (MSL.) **49** DATE COMPLETED **11/7/2014**

ENG./GEO. **Joshua Lewis** DRILLER **All Well Abandonment**

EQUIPMENT **Track-Mounted CME75 w/ 8" HSA** HAMMER TYPE **Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B7-BULK				**ASPHALT:** 2 Inches			
1				SC	**AGGREGATE BASE:** 4 Inches			
1–5				SC	**ALLUVIUM** Soft, damp, brown, Clayey fine-grained SAND			
5–7.5	B7-5.5, B7-6.0			ML	Medium stiff, damp, brown, Sandy SILT with fine Gravel, slightly cemented, trace roots	11		9.3
7.5–10	B7-8.0, B7-8.5			SM	Loose, damp, dark blue and brown, Silty SAND, few fine gravel	10		
10					~6" gravel lense			
10–26.5	B7-11.0			CL	Stiff, damp to moist, brown and olive, Lean CLAY, trace fine Gravel	17	92.5	20.3
15	B7-15.5, B7-16.0				- becomes damp, dark brown, no gravel	25		
20	B7-20.5, B7-21.0					32	115.7	14.6
25	B7-25.5, B7-26.0					34		

BORING TERMINATED AT 26.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A9, Log of Boring, page 1 of 1

IN PROGRESS S9955-05-01 TRACKSIDE CENTER.GPJ 12/01/14

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DIRECT PUSH (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

APPENDIX B

APPENDIX B

LABORATORY TESTING PROGRAM

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected soil samples were tested for their in-place dry density and moisture content, plasticity characteristics, grain size distribution, corrosion potential, and pavement support characteristics. The results of the laboratory tests are presented on the following pages.

TABLE B1
EXPANSION INDEX TEST RESULTS
ASTM D4829

Sample Number	Depth (feet)	Moisture Content (%)		Expansion Index	Classification*
		Before Test	After Test		
B2-0.5	0.5 - 1	9.7	20.6	35	Low

**Expansion Potential Classification per ASTM D4829.*

TABLE B2
SOIL CORROSION PARAMETER TEST RESULTS
(CALIFORNIA TEST METHODS 643, 417, AND 422)

Sample No.	Sample Depth (ft.)	pH	Minimum Resistivity (ohm-cm)	Chloride (ppm) / (%)	Sulfate (ppm) / (%)
B1-6	6 – 6.5	7.9	1,100	209 / 0.021%	7.0 / 0.007%

*Caltrans considers a site corrosive to foundation elements if one or more of the following conditions exist for the representative soil samples at the site:

- The pH is equal to or less than 5.5.
- The resistivity is equal to or less than 1,000 ohm-cm.
- Chloride concentration is equal to or greater than 500 parts per million (ppm).
- Sulfate concentration is equal to or greater than 2,000 ppm.

According to the 2013 California Building Code Section 1904.1 which refers to the durability requirements of American Concrete Institute (ACI) 318 (Chapter 4), Type II cement may be used where soluble sulfate levels in soil are below 2,000 ppm.

TABLE B3
R-VALUE TEST RESULTS
ASTM D2844

Sample ID	Sample Depth (feet)	Average Dry Density (pcf)	Average Moisture Content (%)	R-Value
B2-Bulk	0 – 5	120	14	25

Sample ID	Depth (feet)	Liquid Limit	Plastic Limit	Plasticity Index	Expansion Index	%<#200 Sieve	Water Content (%)	Dry Density (pcf)
B1-Bulk (0-5)	0-5					75.5		
B1-2	2						12.3	89.4
B1-4	4					38.5		
B1-8	8						27.6	92.7
B1-10	10	32	21	11				
B1-15.5	15.5						25.9	92.3
B1-36	36						16.7	101.2
B1-46	46						27.7	95.8
B2-Bulk (0-5)	0-5				35			
B2-2	2	47	27	20				
B2-4	4						9.5	
B3-5.5	5.5						19.5	98.6
B3-6	6					22.7		
B3-16	16						21.9	103.4
B4-1-5	1-5					21.7		
B5-3.5	3.5					36.0		
B5-6	6						22.6	92.8
B5-8.5	8.5					4.9		
B5-26	26						18.3	111.9
B7-5.5	5.5						9.3	
B7-8.5	8.5					31.1		
B7-11	11						20.3	92.5
B7-21	21						14.6	115.7

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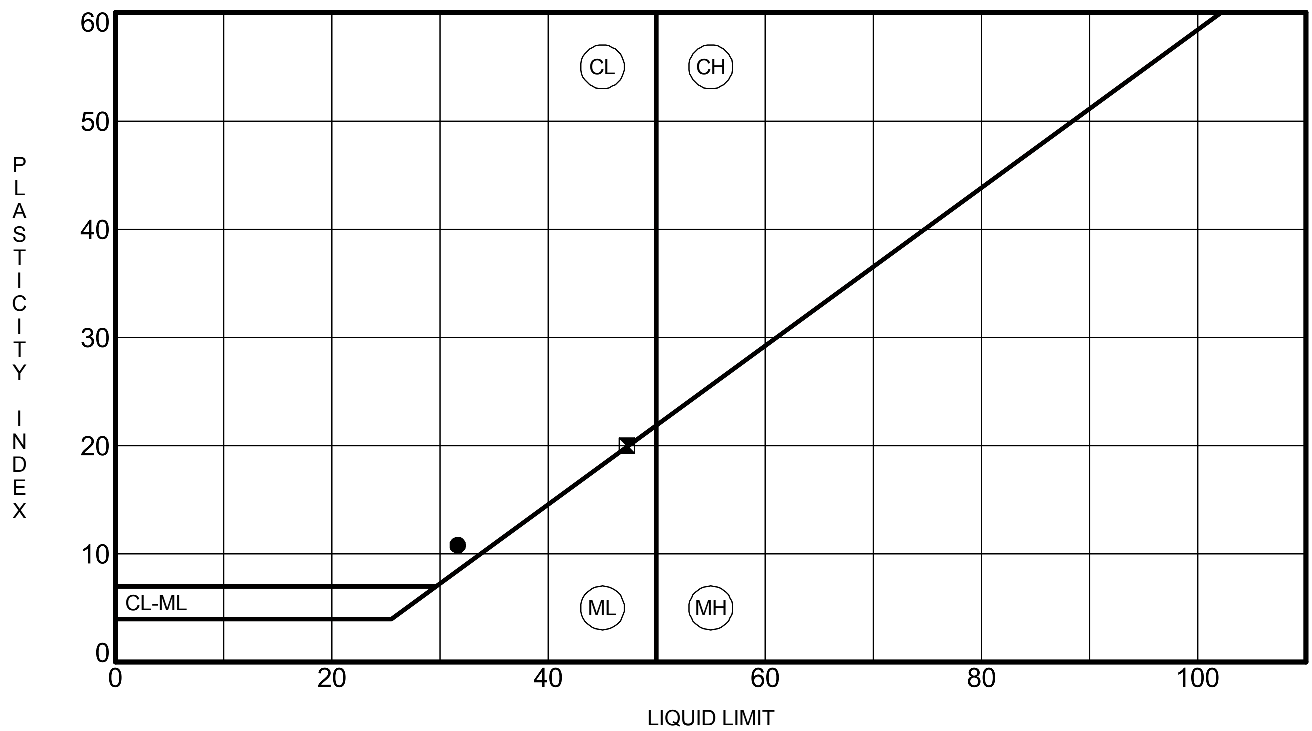
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
Telephone: 916-852-9118
Fax: 916-852-9132

Summary of Laboratory Results

Project: Trackside Center
Location: Davis, CA
Number: S9955-05-01
Figure: B1

US LAB SUMMARY GEOTECH 2 WITH EI COLUMN S9955-05-01 TRACKSIDE CENTER.GPJ US LAB.GDT 11/25/14



	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Unified Soil Classification Description	Preparation Method
●	**B1-10**	**32**	**21**	**11**		**lean CLAY (CL)**	**wet**
⊠	**B2-2**	**47**	**27**	**20**		**lean CLAY (CL)**	**wet**

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Rancho Cordova, CA 95742
Telephone: 916-852-9118
Fax: 916-852-9132

ATTERBERG LIMITS (ASTM D4318)

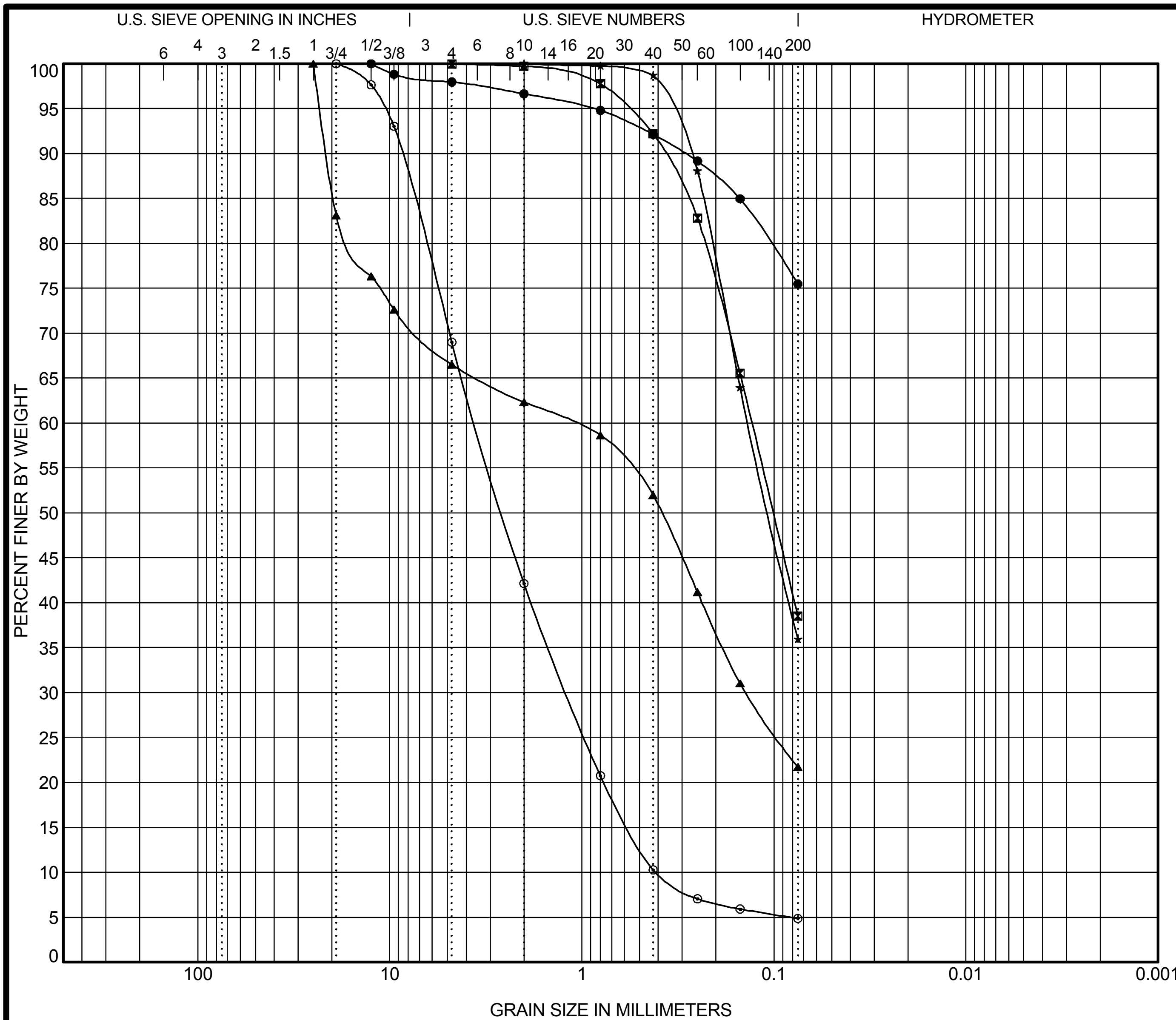
Project: Trackside Center

Location: Davis, CA

Number: S9955-05-01

Figure: B2

PI COPY 2 S9955-05-01 TRACKSIDE CENTER.GPJ US LAB.GDT 11/25/14



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample No.	Classification	LL	PL	PI	Cc	Cu
● **B1-Bulk (0-5)**	**Sandy lean CLAY (CL)**					
⧗ **B1-4**	**Clayey SAND (SC)**					
▲ **B4-1-5**	**Clayey SAND with gravel (SC)**					
★ **B5-3.5**	**Silty SAND (SM)**					
⊙ **B5-8.5**	**Poorly graded SAND with gravel (SP)**				**0.98**	**8.7**

Sample No.	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **B1-Bulk (0-5)**	**12.5**				**2.0**	**22.5**	**75.5**	
⧗ **B1-4**	**4.75**	**0.13**			**0.0**	**61.5**	**38.5**	
▲ **B4-1-5**	**25**	**1.118**	**0.139**		**33.5**	**44.8**	**21.7**	
★ **B5-3.5**	**2**	**0.136**			**0.0**	**64.0**	**36.0**	
⊙ **B5-8.5**	**19**	**3.555**	**1.189**	**0.407**	**31.0**	**64.1**	**4.9**	

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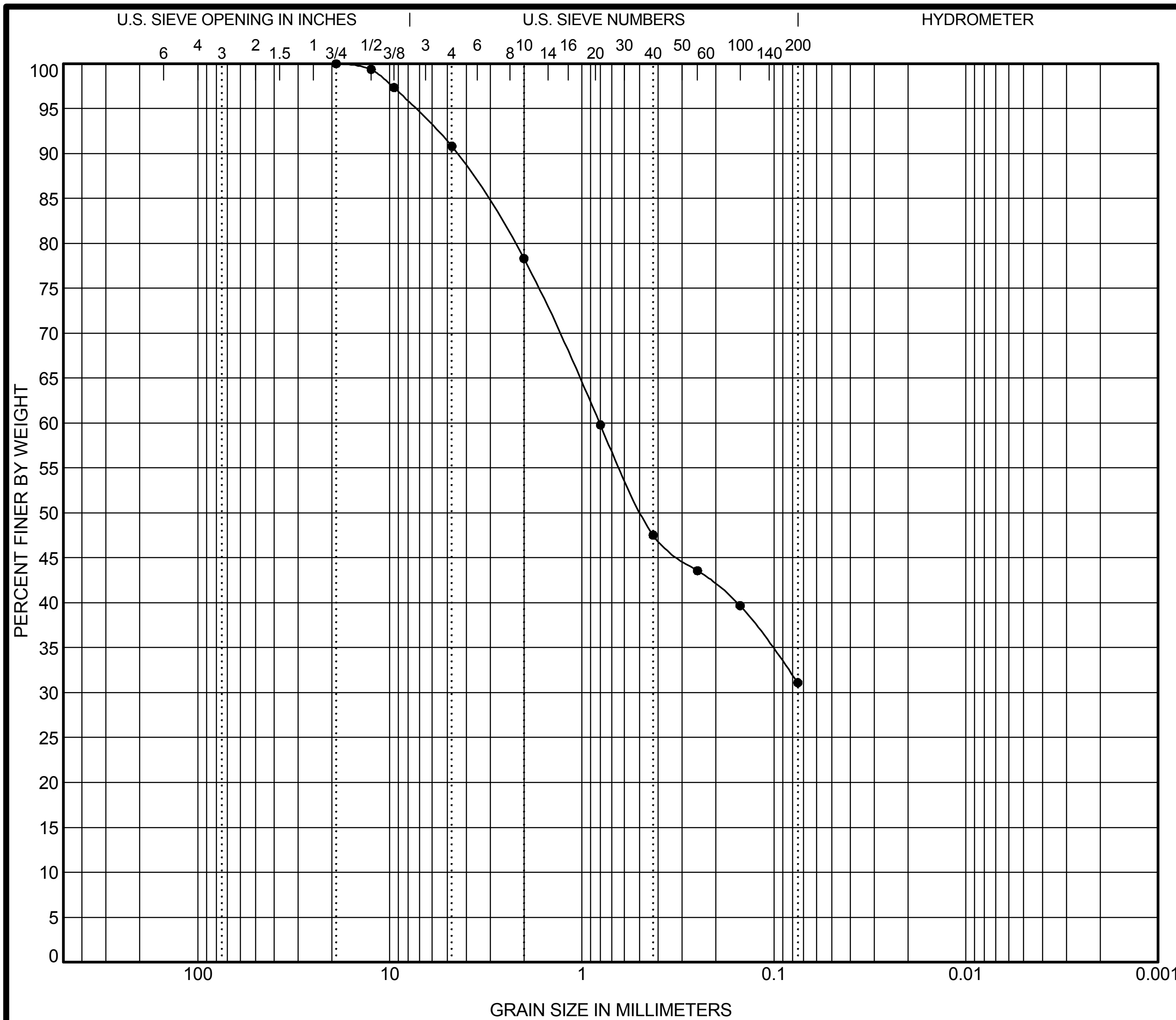
Rancho Cordova, CA 95742
Telephone: 916.852.9118
Fax: 916.852.9132

GRAIN SIZE DISTRIBUTION (ASTM D422, D6913)

Project: Trackside Center
Location: Davis, CA
Number: S9955-05-01
Figure: B3

GRAIN SIZE COPY 2 S9955-05-01 TRACKSIDE CENTER.GPJ US LAB.GDT 11/25/14



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample No.	Classification	LL	PL	PI	Cc	Cu
●	**B7-8.5**	**Silty SAND (SM)**					

	Sample No.	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**B7-8.5**	**19**	**0.808**			**9.2**	**59.7**	**31.1**	

GRAIN SIZE COPY 2 S9955-05-01 TRACKSIDE CENTER.GPJ US LAB.GDT 11/25/14

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Fax: 916.852.9132

GRAIN SIZE DISTRIBUTION (ASTM D422, D6913)

Project: Trackside Center
Location: Davis, CA
Number: S9955-05-01
Figure: B4

CURVE NO. 1

Source of Material	B7-Bulk (0-5)
Description of Material	Dark yellowish brown SILT
Test Method	D1557B

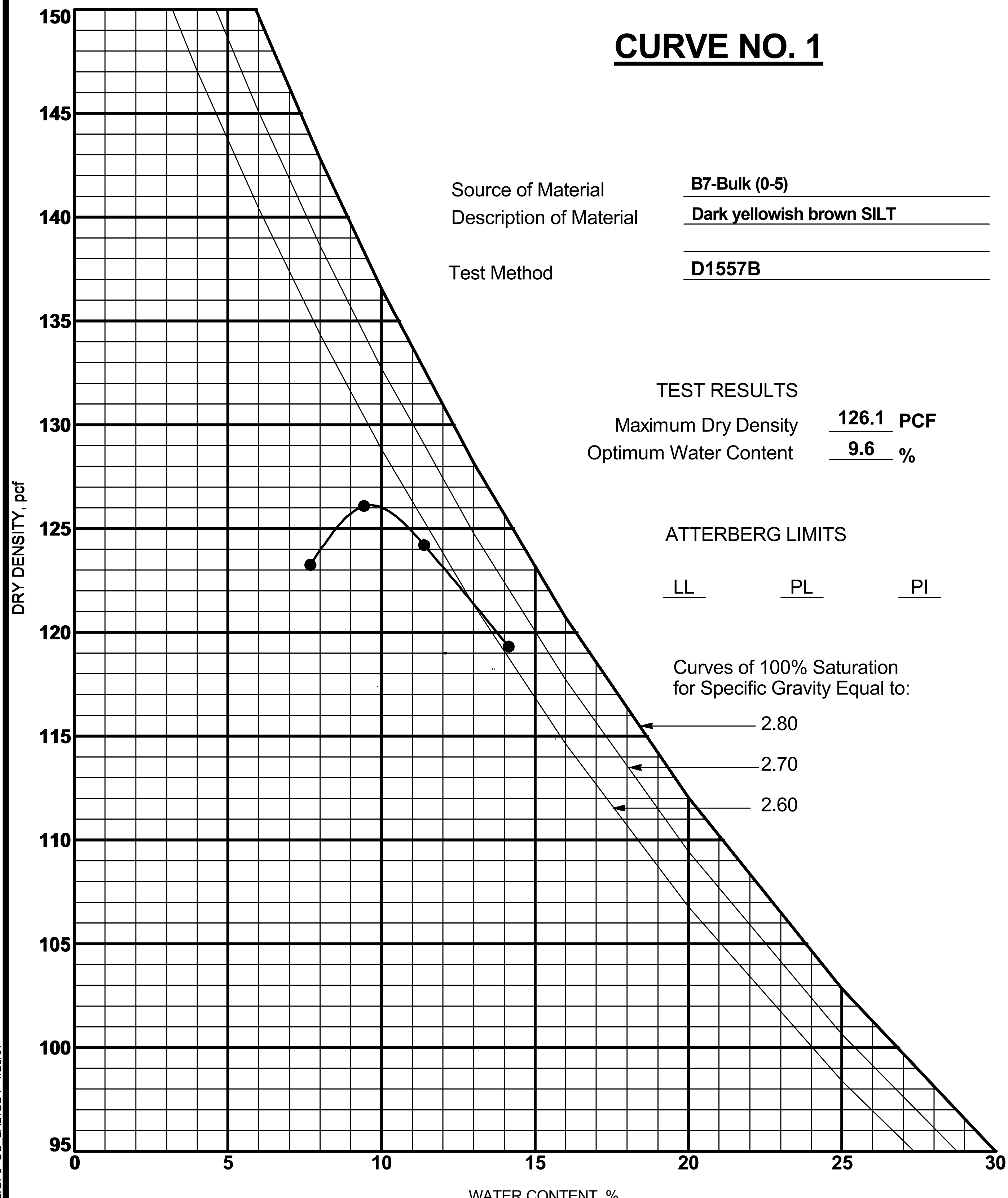
TEST RESULTS

Maximum Dry Density 126.1 PCF

Optimum Water Content 9.6 %

ATTERBERG LIMITS

LL	PL	PI



MOISTURE-DENSITY RELATIONSHIP

Project: Trackside Center

Location: Davis, CA

Number: S9955-05-01

Figure: B5

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3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
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Fax: (916) 852-9132
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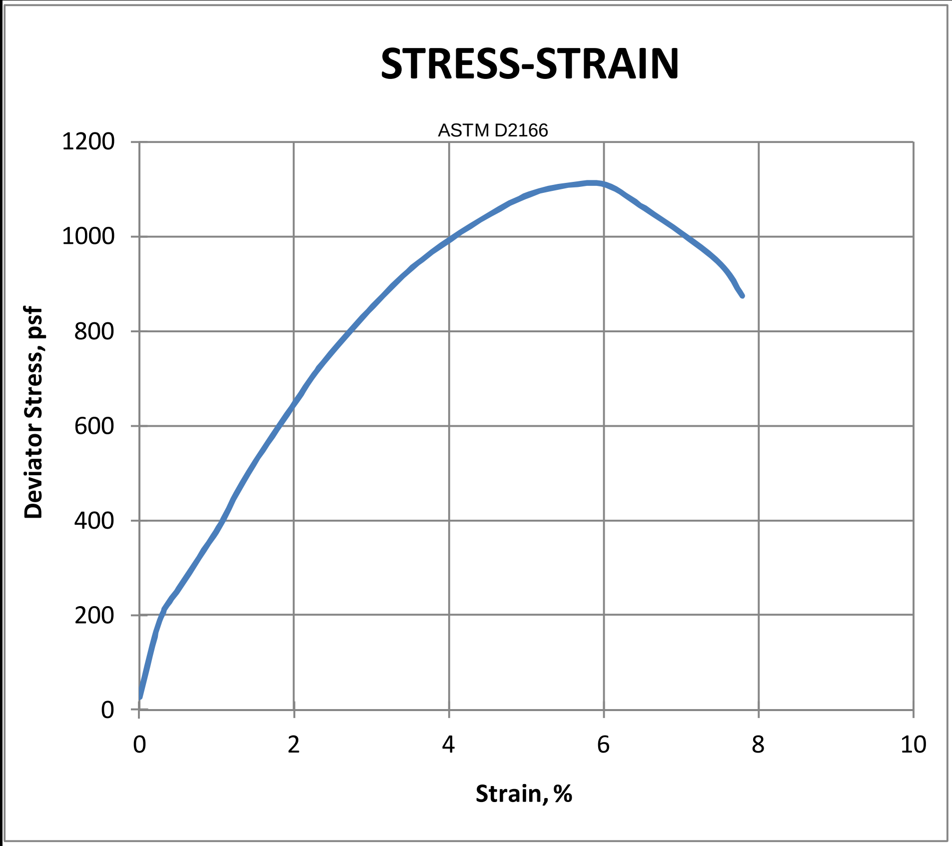

Failure Photo

Sample Description	
Boring Number	B1
Sample Depth (feet)	8.00
Material Description	Dark yellowish brown lean CLAY
Initial Conditions at Start of Test	
Height (inch) average of 3	4.96
Diameter (inch) average of 3	2.39
Moisture Content (%)	27.6
Dry Density (pcf)	92.8
Estimated Specific Gravity	2.7
Saturation (%)	91.3
Shear Test Conditions	
Strain Rate (%/min)	0.9950
Major Principal Stress at Failure (psf)	1110
Strain at Failure (%)	6.0
Test Results	
Unconfined Compressive Strength (tons/ft^2)	0.6
Unconfined Compressive Strength (lbs/ft^2)	1108
Shear Strength (tons/ft^2)	0.3
Shear Strength (lbs/ft^2)	554

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Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, California 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

Unconfined Compressive Strength (ASTM D2166)

Project: Trackside
Location: Davis, CA
Number: S9955-05-01
Figure: B6