IFE **Inland Foundation Engineering, Inc**

January 20, 2023
Project No. C537-001

Corion Enterprises
100 Wilshire Blvd., Suite 700
Santa Monica, California 90401

Attention: Ms. JoAnn Horeni
Director, Client Relations

Subject: Geotechnical Report Update
Proposed Mini Storage Facility
Brookside Avenue, North Side, East of Nancy Avenue
Cherry Valley Area, Riverside County, California

Dear Ms. Horeni:

We are pleased to submit this geotechnical investigation report update for the subject project. The proposed development is to be located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County.

The proposed development is feasible from a geotechnical engineering standpoint. The primary issues that will require mitigation are related to variable near-surface soil conditions.

We appreciate the opportunity of being of service to you on this project. If there are any questions, please contact our office.

Respectfully,
INLAND FOUNDATION ENGINEERING, INC.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The proposed mini-storage development is located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County.

Inland Foundation Engineering, Inc. (IFE) previously conducted a geotechnical investigation at this site in 2009. This report is based on testing and exploration conducted at that time, and our review of existing site conditions. This report provides updated geotechnical design parameters and recommendations for site grading. The following references were used in the preparation of this report:

- Preliminary Geotechnical Report, Proposed Mini Storage Facility, Brookside Avenue, Cherry Valley Area, Riverside County, California, prepared by Inland Foundation Engineering, Inc., dated December 17, 2009, Project No. B464-002

- Response to County Review Comments – County Geologic Report No. 2202, Preliminary Geotechnical Report, Proposed Mini Storage Facility, Brookside Avenue, Cherry Valley Area, Riverside County, California, prepared by Inland Foundation Engineering, Inc., dated June 25, 2010, Project No. B464-002

- Phase I Environmental Site Assessment, Proposed Commercial Development, 38632, 38692 and 38718 Brookside Avenue, Cherry Valley, California, prepared by Inland Foundation Engineering, Inc., dated August 11, 2009, Project No. B464-001

Additional references are appended.

SCOPE OF SERVICE

The purpose of this report is to provide updated geotechnical parameters for design and construction of the proposed improvements on the site. The scope of the geotechnical services included:

- *Review of 2022 California Building Code (CBC) requirements, the general geologic site conditions, and the specific subsurface conditions of the project site.*

- *Evaluation of the engineering and geologic data previously collected for the project site.*

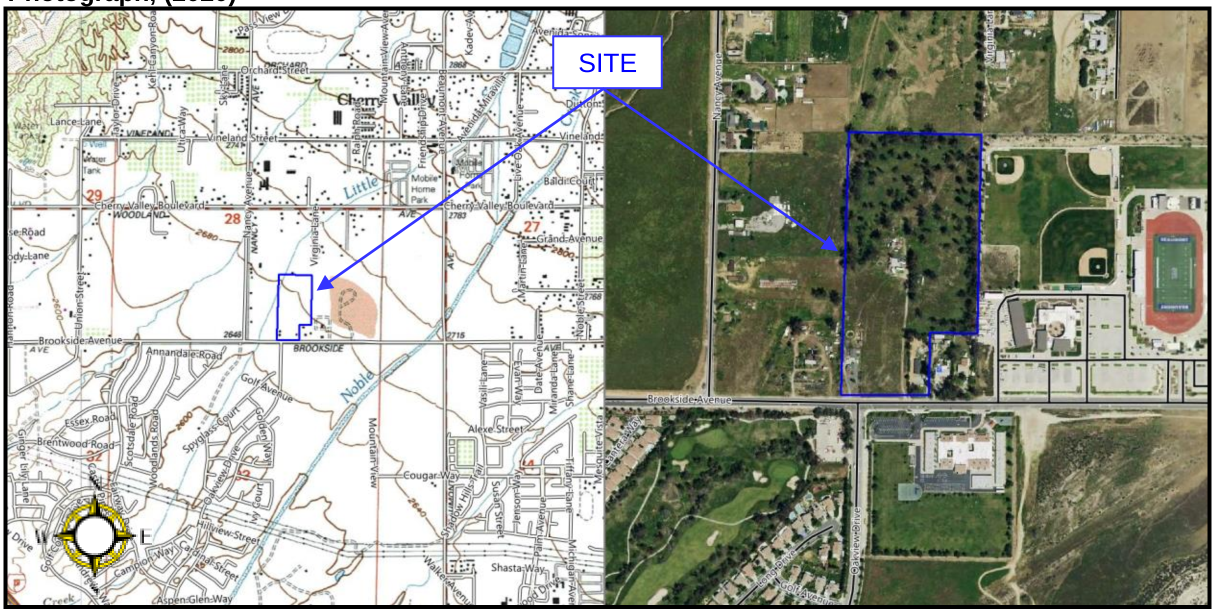
- *Preparation of this report with updated geotechnical conclusions and recommendations for design and construction.*

Evaluation of hazardous waste was not within the scope of service provided by this report. The evaluation of seismic hazards was based on literature review and subsurface exploration previously conducted at the site.

PROJECT AND SITE DESCRIPTION

The project site rests in the southeasterly portion of Section 28, Township 2 South, Range 1 West, SBB&M. The site is located on the north side of Brookside Avenue, east of Nancy Avenue, in the Cherry Valley area of Riverside County. The location of the project site is shown on Figure 1 below.

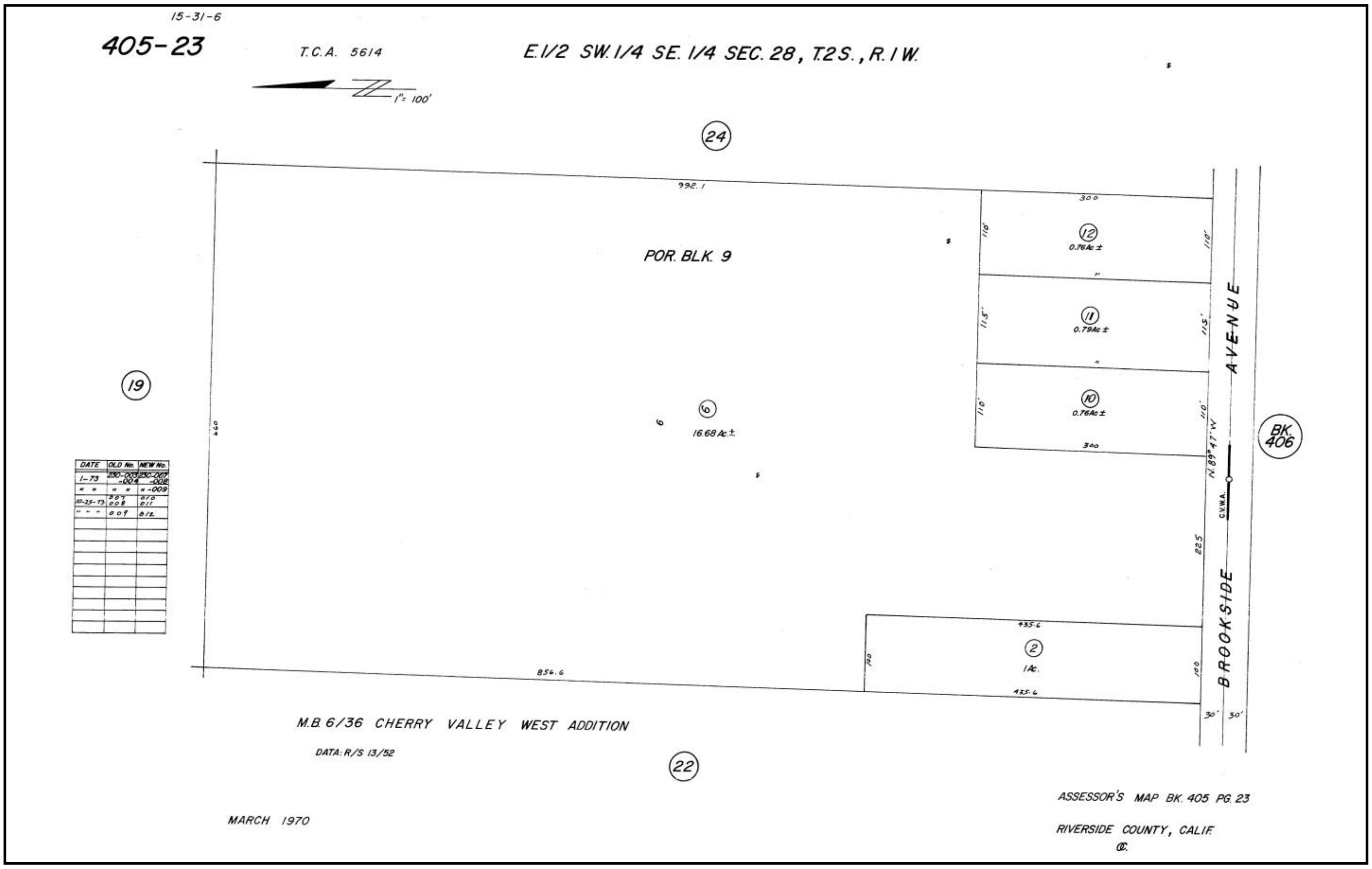
<u>Figure 1</u>: Topographic Map, USGS Topographic Map, Beaumont 7.5' Quadrangle, and Aerial Photograph, (2020)



The project site includes Assessor Parcel Nos. (APN) 405-230-006, 405-230-002, and 405-230-010. All three parcels front along Brookside Avenue. APN 405-230-006 (16.68-acre parcel) is situated between the two smaller parcels and extends along their northern perimeters. APN 405-230-002 (1-acre parcel) is located in the southwest region of the site while APN 405-230-010 (0.76-acre parcel) is located in the south-southeastern region of the site.

Figure 2 below is a portion of the Riverside County assessor parcel map showing the subject parcels.

<u>Figure 2</u>: Riverside County Assessor Parcel Map



APN 405-230-002 (1-acre) is fenced with an occupied residence near the center of the parcel. A detached garage is present on the north side of the residence and an enclosed room is attached on the north side of the garage. A gravel lined driveway extends from Brookside Avenue along the west perimeter of the parcel. A concrete parking area is located between the residence and the garage. The northern portion of the parcel is fenced and contains an empty concrete lined pond, shed and a small barn. The vegetation generally consists of several scattered trees on the parcel.

APN 405-230-006 (16.68-acres) contains a vacant residence near the center of the parcel. A detached carport is present on the north side of the residence. An empty concrete lined swimming pool is present on the west side of the residence. There is a raised terrace from the garage to the north and west of the pond. The flat terrace dips gently to the north and is approximately 3 to 6 feet higher than the adjacent grades. The parcel is vegetated with seasonal weeds, grasses and eucalyptus trees.

APN 405-230-010 (0.76 acre) contains an existing residence with an attached garage near the center of the parcel. A small area behind the residence is a fenced yard. The northern portion of the parcel is undeveloped. Existing dirt bike ramps (up to ±7 feet high) are present in the northwest portion of this parcel.

Two residential properties are located south of APN 405-230-006 (16.68-acre parcel) and east of APN 405-230-010 (0.76-acre parcel). The Beaumont Unified School District office facilities are present on the contiguous property east of the site, east of APN 405-230-006 (16.68-acre parcel). Slopes (2:1 h/v) ranging in height from about 4 to 12 feet extend downward to landscaped areas/infiltration basin at the school district site. A plant nursery is present on the contiguous property to the west of APN 405-230-002 (1-acre parcel) along Brookside Avenue. The other properties surrounding the site are residences and vacant land and/or corrals. Brookside Elementary School is present to the south of the site, across Brookside Avenue. A soil borrow pit is located several hundred feet east of the site and Beaumont High School is located approximately one-quarter mile east of the site. Residences and several small commercial businesses are located north of the site along Cherry Valley Boulevard.

The topography may be described as relatively level (±2,650’ to ±2,690’ msl) with two drainages running through the project site. One drainage extends across the northwest region of the site and another drainage extends from the northeast region to the center of the site. The site was historically vegetated with a dense growth of eucalyptus trees that has been partially removed.

The proposed construction will consist of a mini-storage facility. The storage facility will be developed on the eastern portion of the site. The remaining northern region and western region of the site will be held for future commercial/industrial use. The current plan indicates twenty-two self-storage structures, car parking, driveways, and carports on the site. The plan indicates that the existing house located on APN 405-230-010 (0.76 acre) will remain.

Our geotechnical exploration of the site was performed for the eastern region of the site that will contain the proposed mini storage facility. It is our understanding that the proposed facility will be supported by a combination of isolated square and continuous wall type foundations. We have not been provided with specific foundation loads. We anticipate however, that continuous wall loads will not exceed 3,000 pounds per linear foot. Isolated column loads of up to 60 kips have been considered in the generation of our geotechnical design parameters.

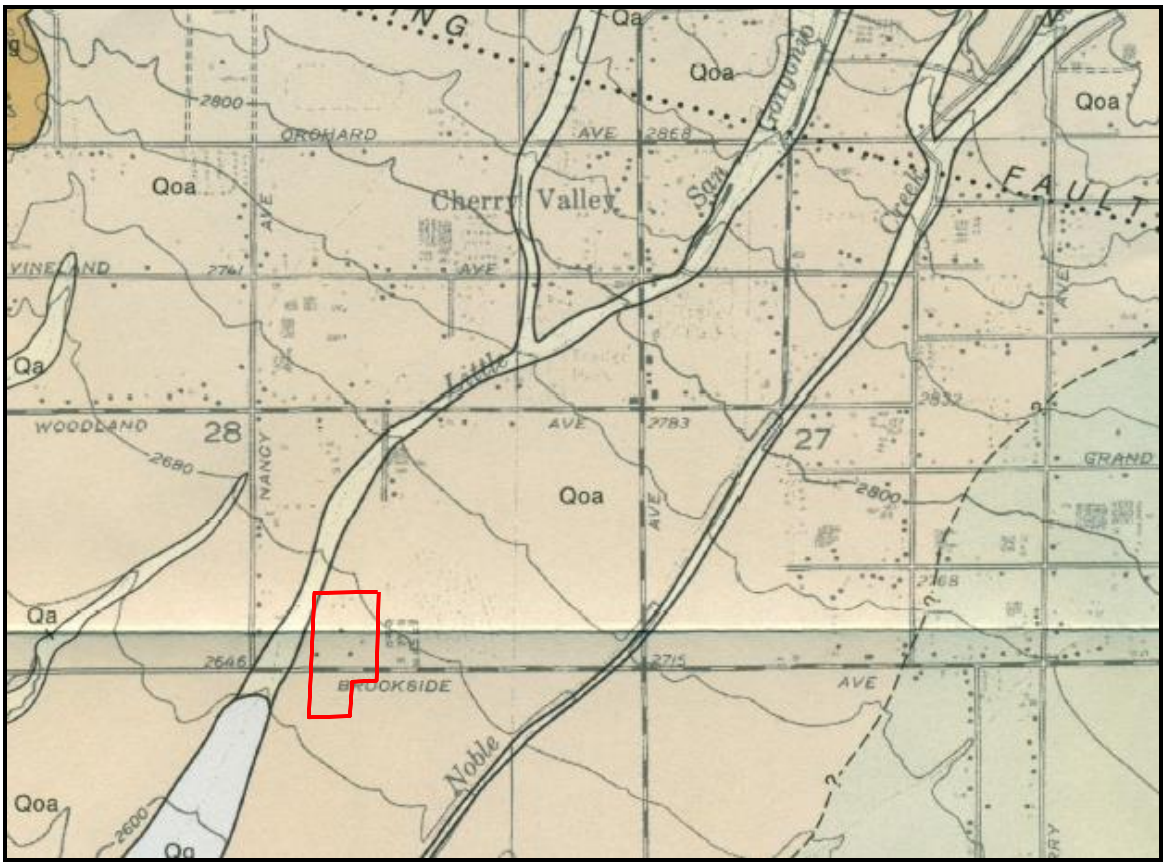
GEOLOGIC SETTING

Regional Geology: The site is regionally situated within a natural geomorphic province in southern California known as the Transverse Ranges. The Transverse Ranges consist of a set of easterly-trending mountains and geologic structures that are distinct from the general northwest-southeast trend of the other provinces of California. More specifically, the site is located within the San Bernardino Mountains, an easterly trending structural block that is roughly 55 miles long and 20 miles wide. This mountain range was formed by intense folding and faulting in very late geologic time (predominantly Tertiary time). The geomorphology of this region of the San Bernardino Mountains indicates that the range is very young, from a geologic standpoint, whereas it was uplifted tectonically predominately during Quaternary time.

Local Geology: Based on local geologic mapping (Dibblee, 2003), the site is shown to be underlain by Quaternary age (late Pleistocene) weakly indurated older alluvial deposits, generally described as being light reddish, dissected alluvial fan sand and gravel, that is crudely bedded (Qoa). A stream channel referred to as the Little San Gorgonio Creek is depicted on the northwesterly portion of the site. Mapping by Dibblee (2003) indicates that these deposits include Holocene-age alluvial sand, gravel and clay (Qa).

Figure 3 below is a portion of the Geologic Map of the Beaumont Quadrangle (Dibblee, 2003) indicating the mapped geologic units in the vicinity of the project site:

Figure 3: Geologic Map of the Beaumont Quadrangle (Dibblee, 2003)

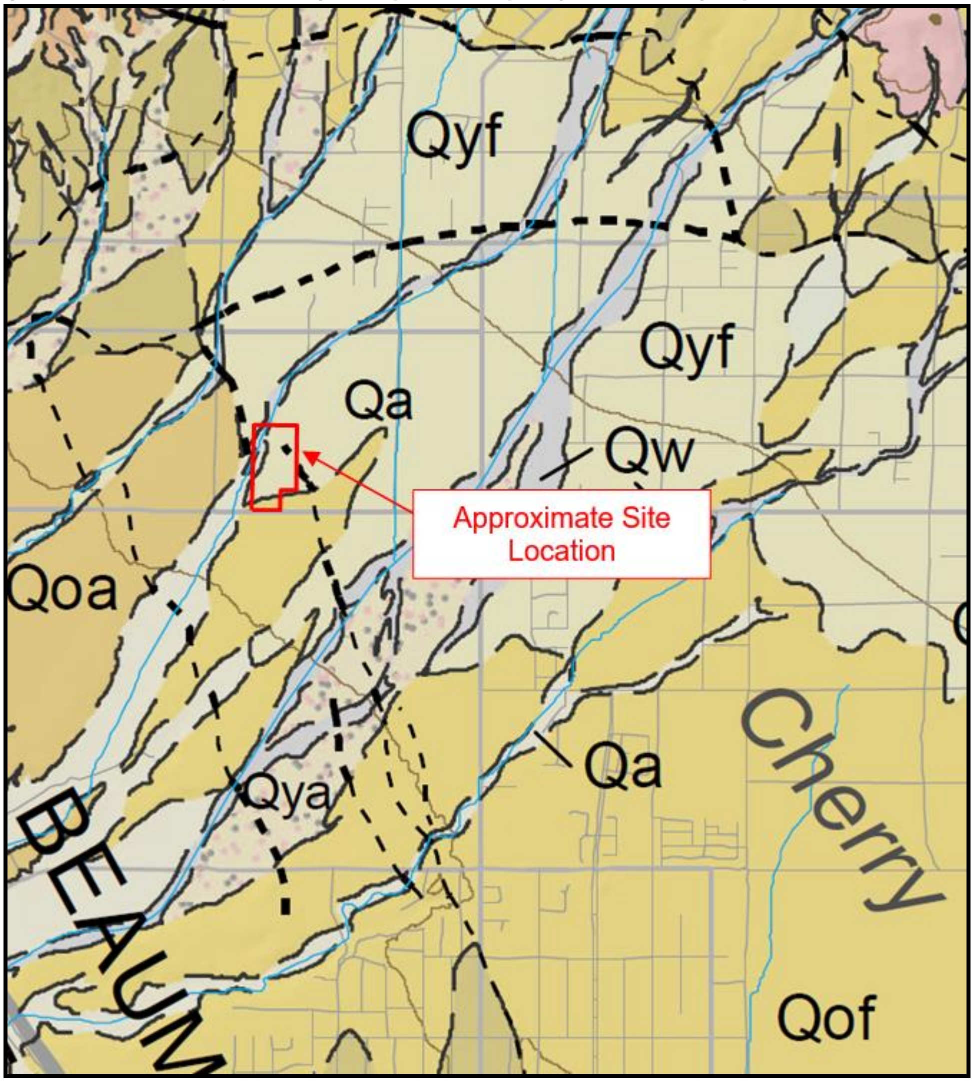


Qoa - Dissected alluvial fan sand and gravel, light reddish, crudely bedded, weakly indurated (late Pleistocene - early Holocene)

Qa - Alluvial sand, gravel and clay of flat flood plains and stream channels, unindurated, undissected (Holocene)

A review of the CGS Preliminary Geologic Map of Quaternary Deposits, Palm Springs 30' x 60' Quadrangle (Lancaster, et al., 2012) indicates the northerly portion of the project site is underlain by young alluvial fan deposits (map symbol Qyf). The southerly portion of the site is mapped as being underlain by old alluvial fan deposits (Qoa). Alluvial wash materials are mapped on the northwesterly portion of the site. Figure 4 below is a portion of the referenced geologic map showing the mapped geologic units in the vicinity of the project.

<u>Figure 4</u>: Preliminary Geologic Map, Palm Springs Quadrangle (Lancaster, et al., 2012)



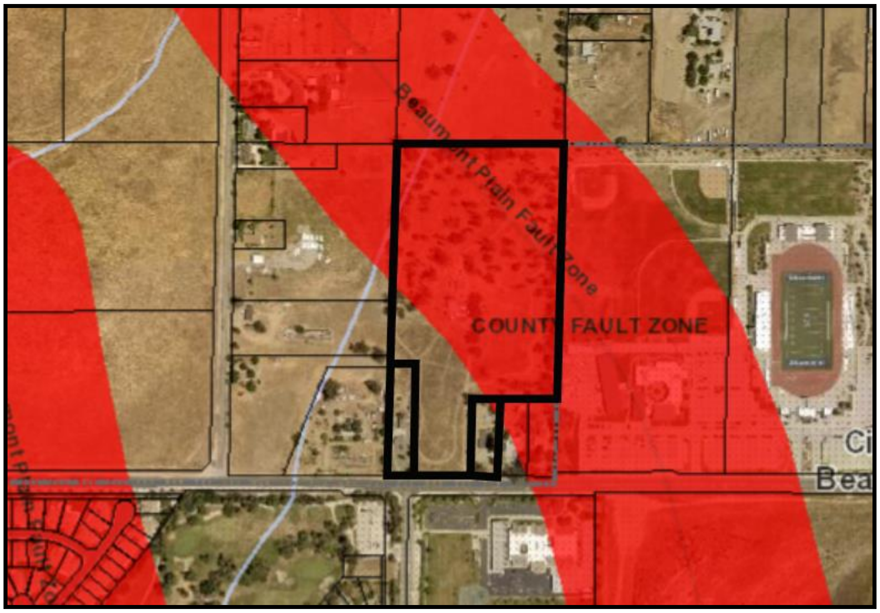
Qyf **Young Alluvial Fan Deposits** - unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Qof **Old Alluvial Fan Deposits** - slightly to moderately consolidated, moderately dissected boulder, cobble, gravel, sand, and silt deposits issued from a confined valley or canyon

Fault -- Includes strike-slip, normal, reverse, oblique, and unspecified slip

Faulting: The site is not located within a State of California "Alquist-Priolo Earthquake Fault Zone" for fault rupture hazard (CGS, 2022). A large portion of the project site lies within a Riverside County fault zone associated with the Beaumont Plain Fault. (Riverside County, 2022). This fault is associated with a zone of northwest-trending parallel faults collectively referred to as the Beaumont Plain Fault Zone (Riverside County, 2022 and Matti, Morton, & Cox, 1992). This fault zone consists of en-echelon fault scarps that traverse through and disrupt late Quaternary alluvial deposits. Figure 5 below is a portion of the County of Riverside TLMA GIS map (2022) indicating the project site in relation to mapped County fault zones in the vicinity of the property.

Figure 5: County of Riverside TLMA GIS Map (2022)



No distinct geomorphic features were observed or mapped on the site (defined scarps, etc.) which suggest the presence of faulting. However, the lack of geomorphic evidence at the site does not alter our conclusion that the presence of faulting at the site is very likely, based on mapping by the County of Riverside and work performed by others.

Our review of the potential for surface fault rupture at this site has included an examination of one non-stereo and five stereo pairs of vertical black and white aerial photographs dating between the years of 1949 and 2020 (see References for a listing) to aid in assessing the geologic and geomorphic characteristics with respect to the site and vicinity. No distinct photolineations or consistent tonal variations were observed on the southerly portion of the property, where the existing residence/proposed office building is located. The northerly portion of the site is largely obscured by trees in the photographs. Very faint tonal variations oriented northwest to southeast of the site were observed in the approximate location of the mapped fault zone northwest of the site near the intersection of Cherry Valley Boulevard and Nancy Avenue, however, these were not consistent in the historical aerial photographs and may not be associated with faulting. Disturbance of adjacent properties, particularly the adjacent property to the east, has obscured viewing evidence of faulting at this location. Based on mapping by others, including, but not limited to Riverside County, Rewis, et al. (2006), Gandhok, et al. (1999), it is our opinion that the faulting within the mapped Riverside County Fault Zone may be present as mapped. Our evaluation did not reveal evidence of the potential for faulting outside of the County of Riverside Fault Zone, where the existing residence/proposed office are located. Although the proposed storage facilities are not "habitable structures", defined as having human occupancy of 2000 manhours or greater per year, based on the information reviewed for this project, it is our opinion there is a potential for surface rupture within the mapped Riverside County fault zone. Damage to the proposed storage structures could occur as a result of surface fault rupture and should be considered by the developer.

A detailed review of surface fault rupture potential at the site was not within the scope of service for this investigation. If habitable structures are planned within the fault zone in the future, a subsurface fault study will be required.

The site and surrounding area have been subjected to strong ground shaking related to active faults that traverse the region. The major faults influencing the site include the San Andreas (Southern Branch and San Bernardino Mountains sections) and the San Jacinto fault (San Jacinto Valley section). The approximate distances to these faults and published maximum earthquake magnitudes are shown in Table 1:

Table 1: Major Fault Parameters

Fault Zone	Approximate Distance (km)	Earthquake Magnitude (M_w)
San Andreas - San Bernardino Mountains Section (Banning Fault)	4.3	7.0*
San Jacinto - San Jacinto Valley (Claremont Fault)	10.3	7.0
San Andreas - Southern Branch	10.4	7.0*
San Jacinto - San Bernardino	23.7	7.0

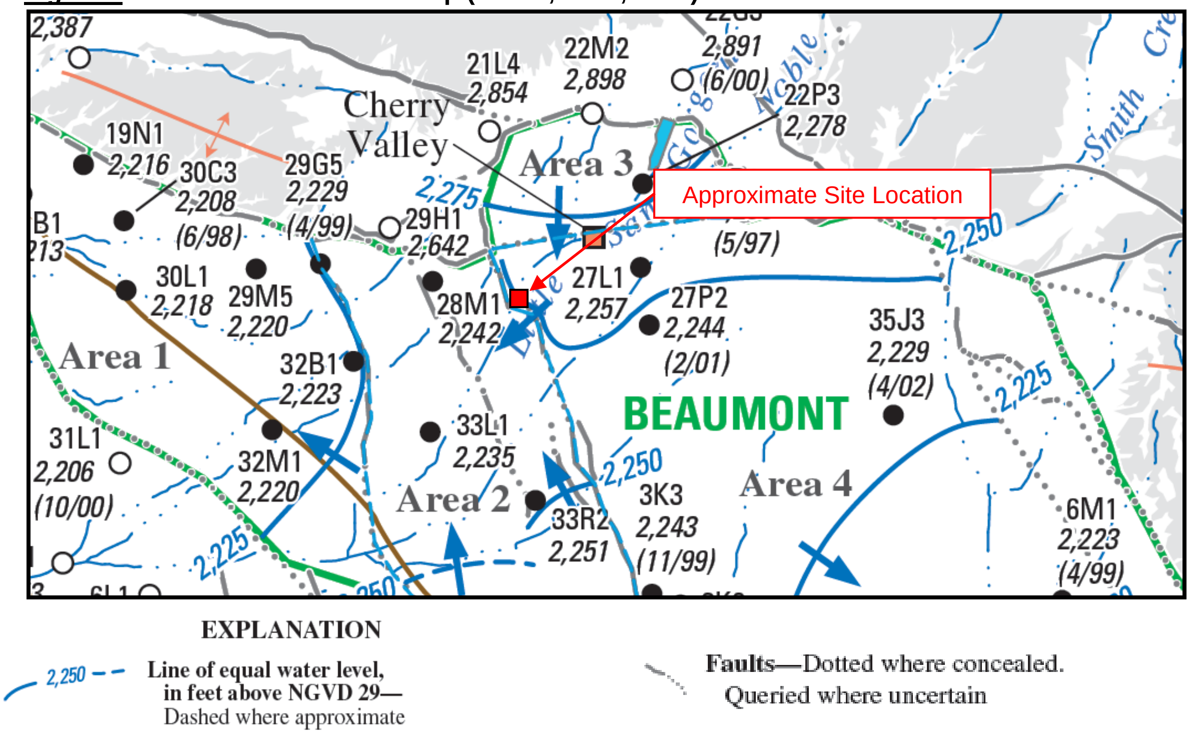
*Published fault parameters indicate an estimated maximum moment magnitude (M_w) earthquake of 7.0 for the San Bernardino Mts. section of the San Andreas fault zone. However, for seismic design purposes, based on published parameters for faults in California from the *Working Group on Earthquake Probabilities* (Field and others, 2008; Willis and others, 2008), we are considering that a cascading effect of rupture will occur along all segments of the San Andreas Fault Zone collectively, rather than just the singular San Bernardino Mts. section. Based on the recently published rupture-model data (Petersen et al., 2008), the total rupture area of these combined faults is 6,847 square kilometers with an associated Maximum Moment Magnitude (M_W) of 8.0.

Groundwater: The site lies within the Cherry Valley Hydrologic Subarea of the Santa Ana River Hydrologic Unit. Groundwater records published by USGS (National Water Information System: Web Interface, 2022) indicate that the depth to groundwater in the vicinity of the project site is greater than 300 feet beneath the existing ground surface. State Well No. 02S/01W-27P003S, located approximately 3,500 feet to the east of the site, was monitored on April 26, 2022. At that time, depth to groundwater was 480.95 feet beneath the existing ground surface. State Well No. 02S/01W-32B003S, located approximately 4,800 feet west of the site, was monitored on April 27, 2022. Depth to groundwater at that time was 437.5 feet beneath the existing ground surface.

Based on a report entitled “Geology, Ground-Water Hydrology, Geochemistry, and Ground-Water Simulation of the Beaumont and Banning Storage Units, San Gorgonio Pass Area, Riverside, California (Rewis, et al., 2006), the mapped elevation of the groundwater in the vicinity of the subject site is on the order of 2,250’ above mean sea level (msl). Based on a low point surface elevation on the site of approximately 2,660’ above msl, this corresponds to a groundwater depth of approximately 410’ below the ground surface.

Figure 6 is a portion of the referenced groundwater contour map.

<u>Figure 6</u>: Groundwater Contour Map (Rewis, et al., 2006)



The groundwater report indicates a continual decline in water levels in the vicinity of the project site between 1927 and the present. In “Area 3”, where the project site is located, water measurements from nearby wells indicate a water-level decline of about 80 feet from the 1960’s to 2004 (Rewis, et al., 2006).

Figure 7 below are maps from the referenced 2006 groundwater report that show ground-water level contours for (A) 1926-1927, (B) 1955, and (C) 1957, which illustrate the decline in groundwater levels. Based on extrapolation of the groundwater contours, historical high groundwater (1927) beneath the project site is on the order of 340 feet beneath the existing ground surface.

Figure 7: Ground-water level contours for (A) 1926-1927, (B) 1955, and (C) 1957

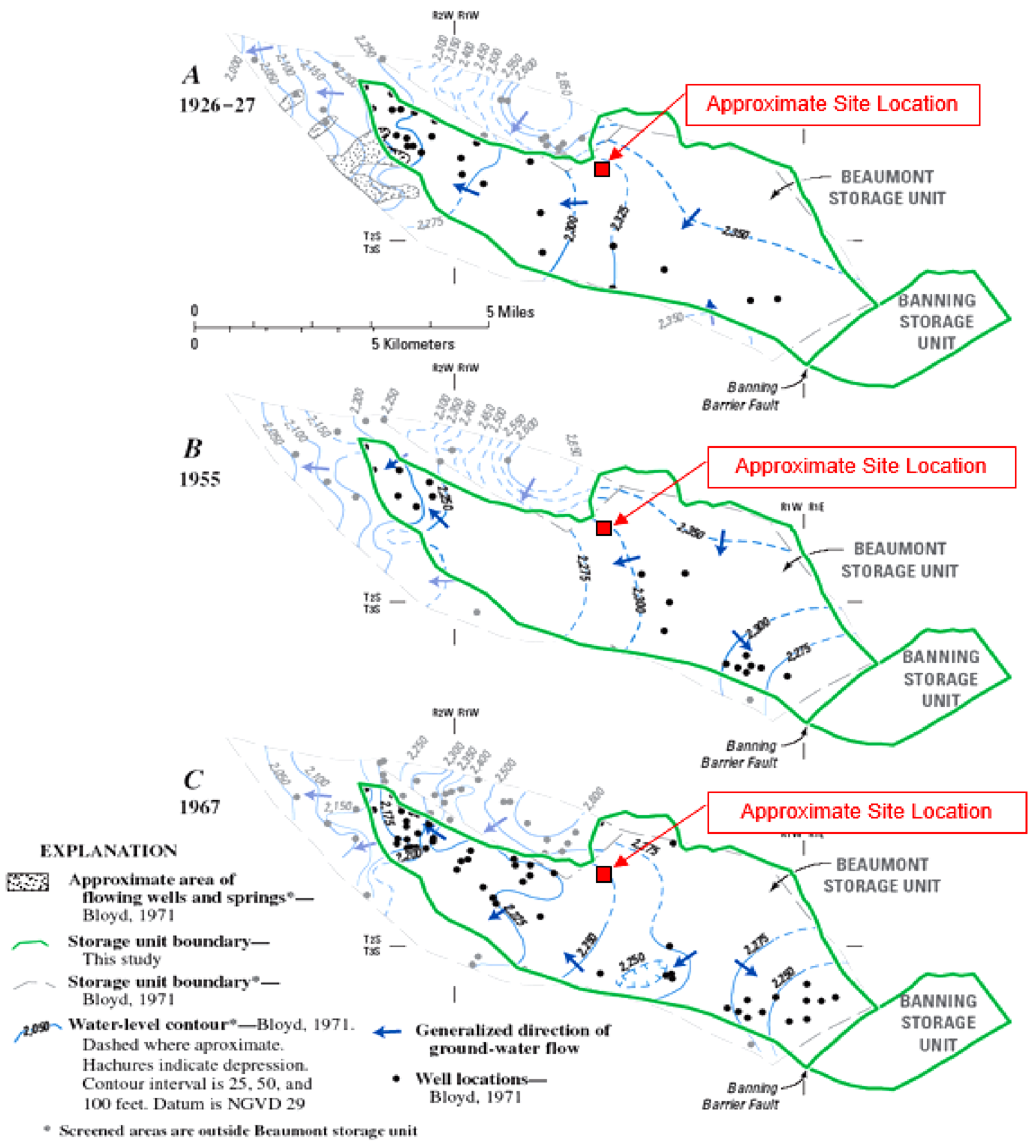


Figure 27. Maps showing ground water-level contours for (*A*) 1926–27, (*B*) 1955, and (*C*) 1967 for the Beaumont storage unit and surrounding area, San Gorgonio Pass area, Riverside County, California.

Seismic Design Parameters: The approximate site coordinates (WGS 84) are 33.9630°N / -116.9869°W. The U.S. Seismic Design Maps website (OSHPD, 2022) was used to evaluate the seismic parameters for this project. Table 3 summarizes design criteria obtained from the 2022 California Building Code (CBC), which is based on ASCE 7-16. The values presented in Table 2 are for the risk-targeted maximum considered earthquake (MCE_R).

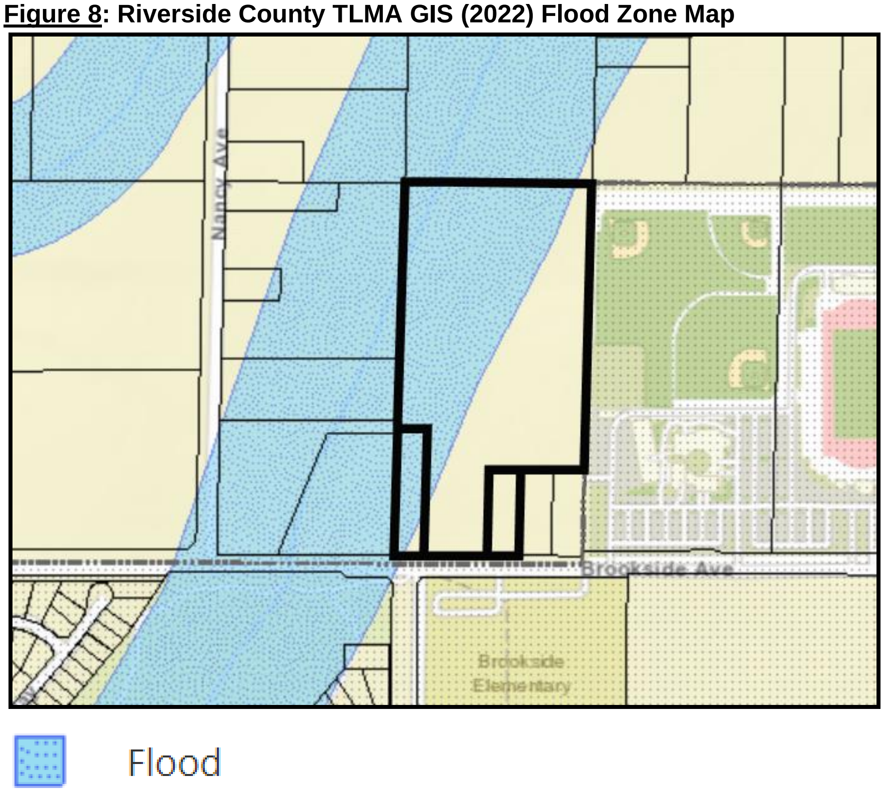
<u>Table 2</u>: 2022 CBC Seismic Design Parameters

Seismic Parameter	Value
S_S - MCE_R Ground Motion for 0.2-sec Period	2.107
S_1 - MCE_R Ground Motion for 1-sec Period	0.724
SD_S - Numeric Seismic Design Value at 0.2-sec period	1.685
PGA - MCE_g Peak Ground Acceleration	0.86
F_{PGA} - Site Amplification Factor at PGA	1.2
PGA_M - Site Modified Peak Ground Acceleration	1.032
SITE CLASS	D (Default)

The seismic design parameters recommended above should be discussed with the project structural engineer, as they may significantly impact the structural design of the project. A site-specific ground motion analysis may result in less conservative seismic design parameters.

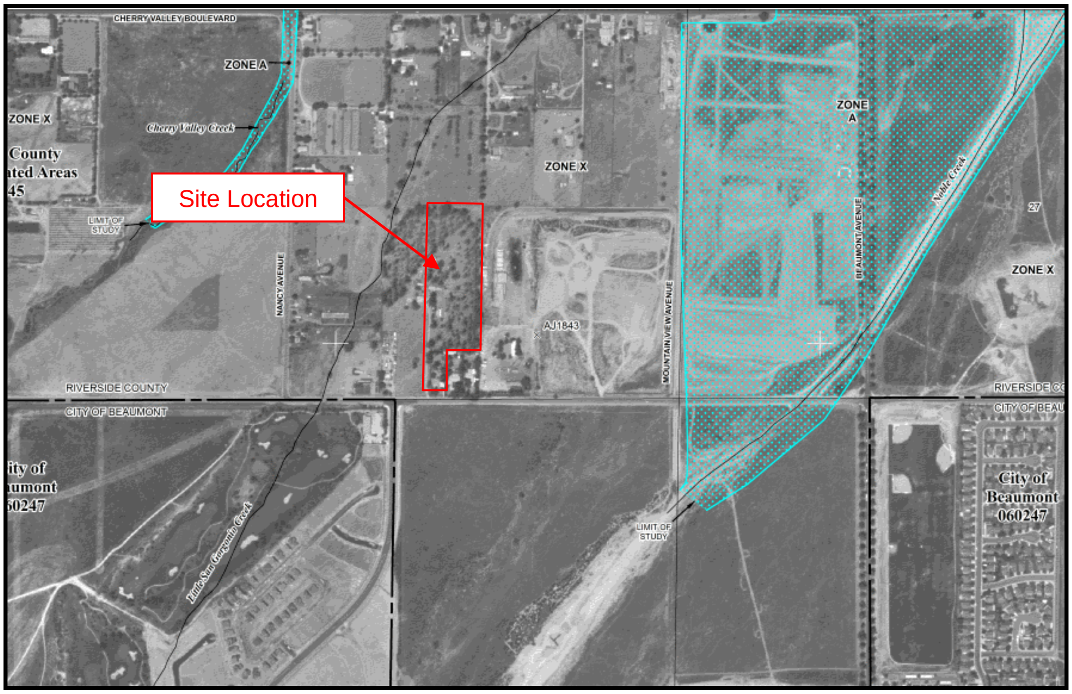
Flooding: A review of flood hazards at the site was not in within our scope of service. For informative purposes, a large portion of the project site is located in a mapped Riverside County Flood Control District Flood Zone. Figure 8 below is a portion of the Riverside County TLMA GIS (2022) map depicting the mapped flood zone.

<u>Figure 8</u>: Riverside County TLMA GIS (2022) Flood Zone Map



A review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Map No. 06065C0803G, dated August 28, 2008, indicates that the site is located in an area designated as “Zone X” (unshaded), described as “Areas determined to be outside the 0.2 percent annual chance flood plain.” Figure 9 below is a portion of the referenced FIRM Map indicating the site and mapped flood hazard zone.

Figure 9: FIRM Map No. 06065C0803G, dated August 28, 2008



OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

SPECIAL FLOOD HAZARD AREAS SUBJET TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazards Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations Determined.

Secondary Seismic Hazards: The primary geologic hazard affecting the project is ground shaking. Secondary permanent or transient seismic hazards generally associated with severe ground shaking during an earthquake include, but are not limited to; ground rupture, liquefaction, seismically-induced settlement, seiches or tsunamis, landsliding, debris flow, and rockfalls. These are discussed below:

Ground Rupture: Ground rupture is generally considered most likely to occur along pre-existing faults. A large portion of the project site lies within a Riverside County fault zone associated with the Beaumont Plain Fault Zone, (Riverside County, 2022). On this basis, the potential for fault rupture at the site is high.

Slope Failure: Based on the relatively planar topography, no slopes will exist to represent a hazard to this project.

Liquefaction: In general, liquefaction is a phenomenon that occurs where there is a loss of strength or stiffness in the soils that can result in the settlement of buildings, ground failure, or other hazards. The main factors contributing to this phenomenon are: 1) cohesionless, granular soil with relatively low density (usually of Holocene age); 2) shallow ground water (generally less than 50 feet); and 3) moderate to high seismic ground shaking.

Groundwater was not encountered within the exploratory borings, which extended up to a maximum depth of approximately 50 feet below the existing ground surface. The regional groundwater table beneath the site is expected to be at a depth greater than 300 feet. On this basis, the potential for liquefaction at the site is very low.

Lurching: Ground lurching is the horizontal movement of soil, sediments, or fill located on relatively steep embankments or scarps as a result of seismic activity, forming irregular ground surface cracks. The potential for lateral spreading or lurching is highest in areas underlain by soft, saturated materials, especially where bordered by steep banks or adjacent hard ground. Due to the flat-lying nature of the site, distance from embankments, the potential for ground lurching and/or lateral spreading is considered very low.

Seismically-Induced Settlement: The site is underlain to a depth of 35 to 40 feet by medium dense to dense alluvial deposits consisting of silty sand and silty sand with gravel (SM), and sandy gravel (GS). Sampler blow count and laboratory unit weight test data indicate these deposits are medium dense to dense, with estimated in-situ relative compaction of 89 to 100. Refer to the Subsurface Conditions section of this report. The potential for seismically-induced settlement is not significant.

Seiches/Tsunamis: A seiche is a standing wave in an enclosed or partially enclosed body of water. In order for a seiche to form, the body of water needs to be at least partially bounded, allowing the formation of the standing wave. Tsunamis are very large ocean waves that are caused by an underwater earth-quake or volcanic eruption, often causing extreme destruction when they strike land.

There are no bodies of water on or adjacent to the project site. Based on the distance to large, open bodies of water and the elevation of the site with respect to sea level, the potential for seiches/tsunamis does not present a hazard to this project.

Landsliding: Due to the relatively low-lying relief of the site and adjacent areas, the potential for landsliding due to seismic shaking is considered very low.

Debris Flow: We understand that historical FEMA maps show a “blue-line” stream traversing the uppermost northwest corner of the site, and that flood control projects northeast of the site have diverted this flow into Noble Creek.

A review of the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Map No. 06065C0803G, dated August 28, 2008, indicates that the site is located in an area designated as “Zone X” (unshaded), described as “Areas determined to be outside the 0.2 percent annual chance flood plain.”

Based on the information reviewed, it is our opinion that the potential for debris flow is low for this project.

Rockfalls: Since no large rock outcrops are present at or adjacent to the site, the possibility of rockfalls during seismic shaking is nil.

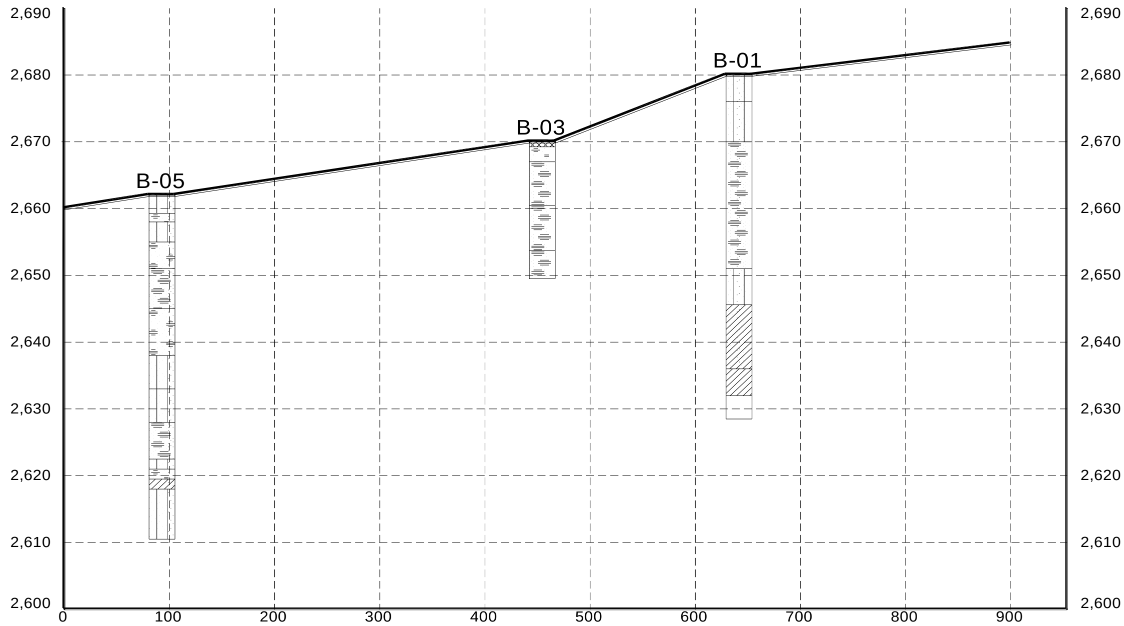
Other Geologic Hazards: There are other geologic hazards not necessarily associated with seismic activity that occur statewide. These hazards include, but are not limited to, methane gas, hydrogen-sulfide gas, tar seeps, Radon-222 gas, and naturally occurring asbestos. Of these hazards, there are none that appear to impact the site.

SUBSURFACE CONDITIONS

Our 2009 field and laboratory exploration and testing indicate that the site is underlain by alluvial deposits. The soil encountered in the upper 35 to 40 feet generally consisted of silty sand and silty sand with gravel (SM), and sandy gravel (GS). Sampler blow count and laboratory unit weight test data indicate these deposits are medium dense to dense, with estimated in-situ relative compaction of 89 to 100 percent. The soil encountered below 35 to 40 feet generally consisted of medium dense silty sand (SM), clayey sand (SC), sandy clay (CL), and sandy silty clay (ML-CL). The soil encountered was slightly moist to moist.

Groundwater was not encountered during the investigation. A typical profile is indicated on Figure 10 below.

Figure 10: **Generalized Subsurface Profile**



Laboratory testing indicates native soils within the zone of influence to the proposed development are non-plastic (PI=0) and can be assumed to be non-expansive.

Consolidation testing indicates that the soil is slightly compressible and over-consolidated. This testing indicated that the soil is not subject to saturation collapse.

Analytical testing indicates the concentration of sulfates in the soil may be approximately 0.001 percent which is considered to be negligible with respect to sulfate attack on concrete. Chloride concentrations are less than 500 parts per million. The soil is neutral to slightly acidic with pH values of 6.0 to 6.9. Saturated resistivity values ranged from 10,000 to 15,000 ohm-cm.

The site is occupied by numerous existing structures and other improvements to be demolished. A review of aerial photographs and historical topographic maps indicates that other structures previously occupied portions of the site. Based on past site use, there are likely buried / abandoned septic tanks, utility lines, undocumented fill, buried debris and other unsuitable conditions within the near-surface soil that should be removed during project grading.

CONCLUSIONS AND RECOMMENDATIONS

Based on our review of current site conditions and current building code requirements, the conclusions and recommendations in the referenced 2009 geotechnical report remain applicable, unless otherwise noted. It is our opinion that the proposed construction will be feasible from a geotechnical engineering standpoint. The site soil is suitable for providing foundation and pavement support with recompaction as recommended herein.

A large portion of the site was historically vegetated by a dense growth of eucalyptus trees. The removal of the root zone and disturbed soils associated with the eucalyptus trees may be a primary concern during the grading. There are also likely buried / abandoned septic tanks, utility lines, undocumented fill, buried debris and other unsuitable conditions within the near-surface soil that should be removed during project grading.

Testing indicates that on-site soils are non-plastic and may be assumed to be non-expansive.

Groundwater was not encountered within the exploratory borings. Historical data suggests that groundwater is on the order of 340± feet below the existing ground surface. It is our opinion that groundwater will not influence the proposed construction.

The following paragraphs present more detailed design criteria which have been developed on the basis of our field and laboratory exploration and testing.

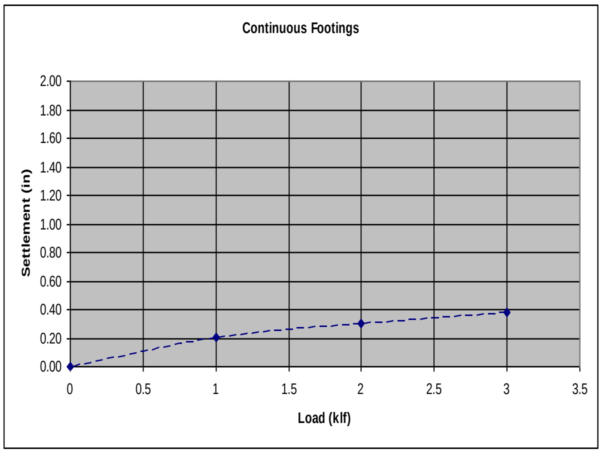
Foundation Design: The results of our exploration and testing indicate that either continuous wall or isolated square footings, which are supported upon dense, undisturbed soils or properly recompacted native material, may be expected to provide satisfactory support for the proposed structures. Footings should not span from cut to fill. Where such a transition occurs, all footings should be underlain by the minimum compacted fill thickness indicated under Item 4 in the General Site Grading section of this report.

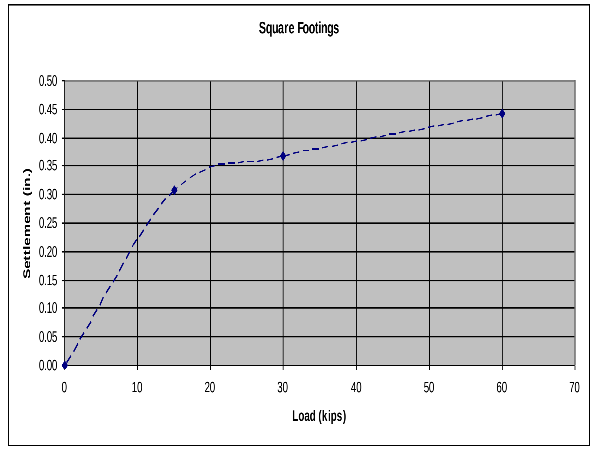
Footings should have a minimum width of twelve inches and should be founded a minimum of twelve inches beneath the lowest adjacent final grade. Foundations supporting two floors should have a minimum width of fifteen inches and should be supported a minimum of eighteen inches beneath the lowest adjacent final grade. For design, we recommend an allowable soil bearing capacity of 1,600 pounds per square foot.

The recommendations made in the preceding paragraph are based on the assumption that all footings will be supported upon dense, undisturbed or properly compacted soil. All grading shall be performed under the testing and inspection of a representative of this firm. Prior to the placement of concrete, we recommend that the footing excavations be inspected in order to verify that they extend into satisfactory soil and are free of loose and disturbed materials. If concrete is to be placed on dry absorptive soil in hot and dry weather, the soil should be dampened but not to a point that there is free-standing water prior to placement. The formwork and reinforcement should also be dampened.

Settlements of properly designed and constructed footings are expected to be within tolerable limits for the proposed structure. Both continuous wall and isolated square footings carrying the design loads within the limits of the allowable bearing capacity are expected to experience a maximum settlement of one inch. Differential settlements due to uniform loads are expected to be less than one-half inch vertical over 20 feet horizontal. Differential settlements between loads of different magnitudes may be estimated on the bases of our settlement analyses which are presented graphically on Figure 11 below:

Figure 11: Differential Settlement





Lateral Design: The allowable bearing capacity provided in the preceding section is for the total of dead and frequently applied live loads. These may be increased by 33 percent to provide for lateral loads of short duration such as those caused by wind or seismic forces.

Resistance to lateral loads will be provided by a combination of friction acting at the base of the slab or foundation and passive earth pressure. A coefficient of friction of 0.4 between soil and concrete may be used with dead load forces only. A passive earth pressure of 260 pounds per square foot, per foot of depth, may be used for the sides of footings poured against recompacted or dense native material. Passive earth pressure should be ignored within the upper one foot except where confined as beneath a floor slab, for example.

Trench Wall Stability: Significant caving did not occur within our 2009 exploratory borings. All excavations should be configured in accordance with the requirements of CalOSHA. We would classify the soils as Type C. The classification of the soil and the shoring and/or slope configuration should be the responsibility of the contractor on the basis of the trench depth and the soil encountered. The contractor should have a "competent person" on-site for the purpose of assuring safety within and about all construction excavations.

Retaining Walls: Retaining walls may be necessary during construction and/or landscaping. The retaining walls may be designed for an active earth pressure equivalent to that exerted by a fluid weighing not less than that shown in the following Table 3:

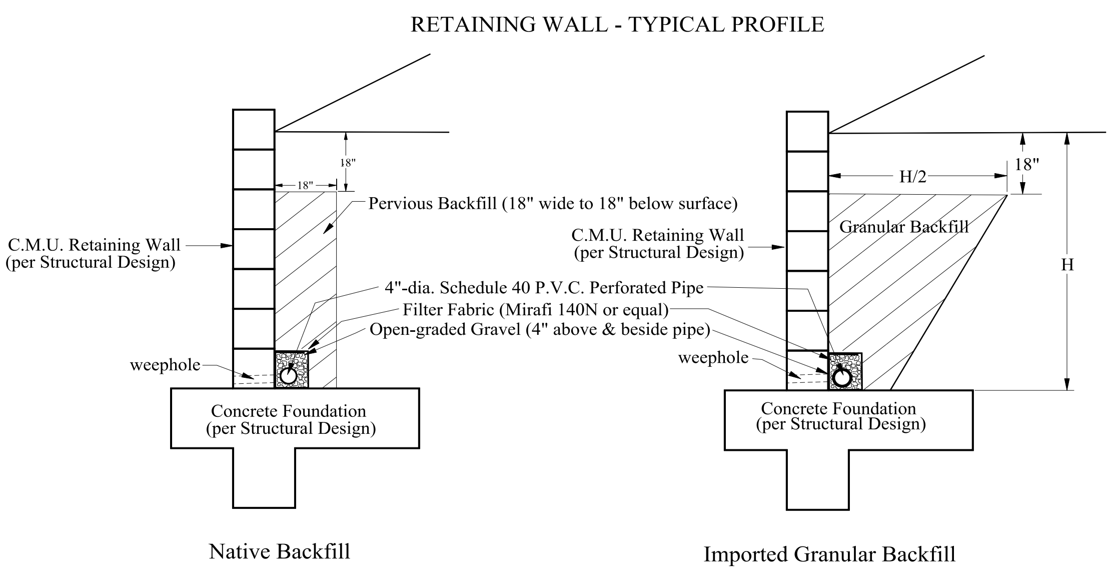
Table 3: Retaining Wall Design Parameters

Surface Slope of Retained Material Horizontal:Vertical	If clean sand and/or gravel with ϕ = 38° is used to backfill	If native soils are used to backfill
Level	30	40
2 to 1	43	60

For walls that are restrained, an "At-Rest" lateral earth pressure should be used. This may be taken as an Equivalent Fluid Pressure of 62 pounds per cubic foot with the resultant applied at mid-height.

Any applicable construction and seismic surcharges should be added to the above pressures. The effects of seismic forces may be characterized as an Equivalent Fluid Pressure of 30 pounds per cubic foot. The resultant of seismic forces should be applied above the base of the wall a distance of 0.6H where H is the total height.

Figure 12: Retaining Wall Typical Profile



At least 12 inches of granular material should be used in the backfill behind the walls and water pressure should not be permitted to build up behind retaining walls. The upper 12 to 18 inches of the backfill should consist of soil having a low permeability (less than 10^{-6} cm/sec). All backfill shall be non-expansive. A subdrain should be constructed along the base of the backfill.

Concrete Slabs-on-Grade: Concrete slabs-on-grade shall have a minimum thickness of four inches. During final grading and prior to the placement of concrete, all surfaces to receive concrete slabs-on-grade shall be compacted in order to maintain a minimum compacted fill thickness of 12 inches. Regardless of the extent of compaction, all concrete will crack due to shrinkage. The soils are not significantly expansive and there are no geotechnical engineering factors that would be used to develop recommendations for the design (ie. thickness, reinforcement, joint spacing, etc.) of non-structural slabs. However, these are important elements of the design of concrete slabs-on-grade that should not be overlooked. Non-reinforced slabs with no control joints, poorly placed control joints and/or poorly constructed control joints will crack at random locations and could result in unsightly appearance regardless of the soil condition.

Load bearing slabs may be designed using a Modulus of Subgrade Reaction not exceeding 125 pounds per square inch per inch.

Slabs that are designed and constructed in accordance with the provisions of the American Concrete Institute (ACI) as a minimum will perform much better and will be more pleasing in appearance. Shrinkage of concrete should be anticipated. This will result in cracks in all concrete slabs-on-grade. Shrinkage cracks may be directed to saw-cut "control joints" spaced on the basis of slab thickness and reinforcement. ACI typically recommend control joint spacings in unreinforced concrete at maximum intervals equal to the slab thickness times 24. A level subgrade is also an important element in achieving some “control” in the locations of shrinkage cracks. Control joints should be cut immediately following the finishing process and prior to the placement of the curing cover or membrane. Control joints that are cut on the day following the concrete placement are generally ineffective. The placement of reinforcing steel will help in reducing crack width and propagation as-well-as providing for an increase in the control joint spacing. The use of welded wire mesh has typically been observed to be of limited value due to difficulties and lack of care in maintaining the level of the steel in the concrete during placement. The addition of water to the mix to enhance placement and workability frequently results in an excessive water-cement ratio that weakens the concrete, increases drying times and results more cracking due to concrete shrinkage during the initial cure.

It should be assumed that the soils under the slab will likely become saturated during the life of the structure. Moisture will also be emitted from the concrete mixture as it cures. Flooring manufacturers may have specific requirements related to emission rates from concrete that should be achieved prior to the placement of flooring. Typically, these range from 3 to 5 pounds of water per 1000 square feet per 24-hour period. The emission rates are measured using an approximate 72-hour test procedure that we are able to conduct upon request. The drying time of the concrete may be reduced using a lower water-cement ratio such as 0.5 or 0.45. The use of fly ash may enhance workability of the mix and reduce the alkali content within the slab. The use of a chemical membrane or curing compound may increase the drying time. Other suitable curing methods are available. The curing method is important in reducing plastic shrinkage cracking and should not be eliminated to reduce dry times.

Where slabs are to receive moisture sensitive floor coverings, we recommend the use of a vapor retarder. There are various products manufactured for this purpose. ASTM currently provides a standard water vapor permeance of 0.3 perms. Such materials would allow up to 18 gallons of water per week in a 50,000 square foot area. Therefore, it should be understood that these materials are not vapor “barriers”. Some flooring applications may require more effective retarders. Therefore, the selection of the vapor retarder should be based upon the type of flooring material and is not considered to be a Geotechnical Engineering design parameter.

Vapor retarders should have a minimum thickness of 10-mil unless otherwise specified. It is possible that the retarders will be exposed to equipment loads such as ready-mix trucks, buggies, laser screeds, etc. In such cases, the thickness shall be increased to at least 15-mil. Vapor retarders should be placed between two 2-inch thick layers of sand in order to reduce the potential of punctures and to aid in the curing process. In lieu of this, the concrete may be placed directly upon the vapor retarder but should be designed with reinforcement to offset additional curling stresses. Seams and holes made for underground utilities should be properly sealed per the recommendations of the manufacturer.

The vapor retarder recommended in the preceding paragraphs is a common method of reducing the migration of moisture through the slab. It will not prevent all moisture migration through the slab nor will it prohibit the formation of mold or other moisture related problems. For moisture sensitive floor coverings, an expert in that field should be consulted to properly design a vapor retarder suitable for the specific application.

If concrete is to be placed on a dry absorptive subgrade in hot and dry weather, the subgrade should be dampened but not to a point that there is freestanding water prior to placement. The formwork and reinforcement should also be dampened.

Expansive Soils: On-site soils are not considered to be significantly expansive. Laboratory testing indicates a Plasticity Index (PI) of 0. On this basis, special design criteria for expansive soils will not be necessary. Specifically, reinforcement and thickening of foundations and slabs-on-grade in order to resist expansive soil pressures will not be necessary. Reinforcement may be required for other purposes related to structural properties. Nominal reinforcement is recommended for all foundations and concrete slabs-on-grade.

Tentative Pavement Design: All surfaces to receive asphalt concrete paving should be underlain by a minimum compacted fill thickness of 12 inches (excluding aggregate base). This may be performed as described in the Site Grading Section of this report. Due to changes expected within the soils due to the effects of blending during site grading, actual R-Value testing was not performed during this study. On the basis of an estimated R-Value of 40, we make the following tentative recommendations for structural pavement section design:

Table 4: Tentative Pavement Design

Service	Asphalt Concrete Thickness (ft.)	Base Course Thickness (ft.)
Brookside Avenue (Assumed TI=7.0)	0.33	0.58
Interior Parking and Driveways (Assumed TI=4.5)	0.25	0.50

These recommendations are provided for estimating purposes only. At the completion of rough grading, when the actual soils are more accurately defined, samples may be obtained for actual R-Value testing which will serve as a basis for the actual structural street section design. The final testing and design will be completed by the geotechnical engineer. All work within the roadway area should be done in accordance with the applicable codes, ordinances and requirements of Riverside County and will be performed under the inspection of that agency.

General Site Grading: All grading should be performed in accordance with the applicable provisions of the 2022 California Building Code. The following specifications have been developed on the basis of our field and laboratory testing:

1. **Clearing and Grubbing:** All building, slab and pavement areas and all surfaces to receive compacted fill should be cleared of existing loose soil, artificial fill, vegetation, debris, septic systems, and other unsuitable materials. All below-grade structures, including abandoned swimming pools and building foundations, should be removed. We recommend a minimum overexcavation of at least 24 inches to provide assurance of removing unsuitable materials and processing of roots and loose and disturbed soils. Abandoned underground utility lines should be traced out and completely removed from the site. Each end of the abandoned utility line should be securely capped at the entrance and exit to the site to prevent any water from entering the site. Soils loosened due to the removal of trees should be removed and replaced as controlled compacted fill under the direction of the geotechnical engineer.

2. **Preparation of Surfaces to Receive Compacted Fill:** All surfaces to receive compacted fill should be subjected to compaction testing prior to

processing. Testing should indicate a relative compaction of at least 85 percent within the unprocessed native soils. If roots or other deleterious materials are encountered or if the relative compaction fails to meet the acceptance criterion, additional overexcavation will be required until satisfactory conditions are encountered. Upon approval, surfaces to receive fill shall be scarified, brought to near optimum moisture content, and compacted to a minimum of 90 percent relative compaction.

3. **Placement of Compacted Fill:** Fill materials consisting of on-site soils or approved imported granular soils, should be spread in shallow lifts, and compacted at near optimum moisture content to a minimum of 90 percent relative compaction. Our observations of the material encountered during our exploration and testing indicate that compaction will be most readily obtained by means of heavy rubber-wheeled or vibratory compactors. This should be determined by the grading contractor prior to the commencement of site grading.

4. **Preparation of Building Areas:** Support for buildings should not transition from cut to fill. All building areas should be underlain entirely by dense, undisturbed soil or a uniform compacted fill thickness based upon the footing type and configuration. This assumes that the footing width is directly proportional to the applied load on the basis of the allowable soil bearing capacity provided in this report. Table 5 presents the recommended depth and extent of recompaction for continuous and isolated square footings:

Table 5: Recommended Building Area Preparation

Foundation Type	Depth of Recompaction below Footing	Extent of Recompaction beyond Footing Edges
Isolated Square	12 Inches	5 Feet
Continuous	12 Inches	5 Feet

Footing areas should be overexcavated to the depths and extents indicated in the preceding table. This zone of recompaction should also extend a minimum of 24 inches below the existing ground surface. The surface of the overexcavation should then be reviewed for compliance with the criteria of Item 2 under this section. Upon approval the surface should be scarified, brought to near optimum moisture content and compacted to a minimum of 90 percent relative compaction. An inspection should then be made by a representative of this firm, in order to verify the depth of the overexcavation and the relative compaction obtained. The excavated material may then be replaced as controlled compacted fill.

5. **Preparation of Slab and Paving Areas:** During final grading and immediately prior to the placement of concrete or a base course, all surfaces to receive asphalt concrete paving or concrete slabs-on-grade should be processed and tested to assure compaction for a depth of at least of 12 inches. This may be accomplished by a combination of overexcavation, scarification and recompaction of the surface, and replacement of the excavated material as controlled compacted fill. Compaction of the slab areas should be to a minimum of 90 percent relative compaction. Compaction within the proposed pavement areas should be to a minimum of 95 percent relative compaction for both the subgrade and base course.

6. **Utility Trench Backfill:** It is our opinion that utility trench backfill consisting of the on-site soil types should be placed by mechanical compaction to a minimum of 90 percent relative compaction. This is with the exception of the upper 12 inches under pavement areas where the minimum relative compaction should be 95 percent. Jetting of the native soils is not recommended.

7. **Testing and Inspection:** During grading tests and observations should be performed by a representative of this firm to verify that the grading is performed per the project specifications. Field density testing should be performed per the current ASTM D1556 or ASTM D6938 test methods. The minimum acceptable degree of compaction should be 90 percent of the maximum dry density, based on ASTM D1557, except where superseded by more stringent requirements, such as beneath pavement. Where testing indicates insufficient density, additional compactive effort should be applied until retesting indicates satisfactory compaction.

LIMITATIONS

The findings and recommendations of this report are based upon a review of previous exploration and testing on the site. Should conditions be encountered during construction that are different than indicated herein, our office should be notified in order to determine if revisions or retesting are warranted. This report was prepared prior to the preparation of a grading plan for the project. We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

Evaluation of hazardous waste was not within the scope of services provided. The evaluation of seismic hazards was based upon a literature review.
This update report was prepared for Corion Enterprises for use in the design and construction of the proposed mini storage facility. This report may only be used by Corion Enterprises for this purpose. The use of this report by parties or for other purposes is not

authorized without written permission by Inland Foundation Engineering, Inc. Inland Foundation Engineering, Inc. will not be liable for any projects connected with the unauthorized use of this report.

The recommendations of this report are considered to be preliminary. The final design parameters may only be determined or confirmed at the completion of site grading on the basis of observations made during the site grading operation. To this extent, this report is not considered to be complete until the completion of both the design process and the site preparation.

The information in this report represents professional opinions that have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, either expressed or implied, is made as to the professional advice included in this report.

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APPENDIX A – Site Exploration

APPENDIX A

SITE EXPLORATION

For the 2009 site investigation for this project, five exploratory borings were drilled with a truck-mounted hollow-stem auger drill rig at the approximate locations shown on Figure No. A-8. The materials encountered during drilling were logged by a staff geologist. Boring logs are included with this report as Figures Nos. A-3 through A-7.

Representative soil samples were obtained within the borings by driving a thin-walled steel penetration sampler with successive 30-inch drops of a 140-pound hammer. The numbers of blows required to achieve each six inches of penetration were recorded on the boring logs. Two different samplers were used; a Standard Penetration Test (SPT) sampler and a modified California sampler with brass sample rings. Representative bulk soil samples were also obtained from the auger cuttings. Samples were placed in moisture sealed containers and transported to our laboratory for further testing and evaluation. Laboratory tests results are discussed and included in Appendix B.

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487-06)

PRIMARY DIVISIONS			GROUP SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN) 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVEL WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN) 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF OF MATERIALS IS SMALLER THAN #200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT IS LESS THAN 50	ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT IS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	HIGHLY ORGANIC SOILS		PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS
TYPICAL FORMATIONAL MATERIALS	SANDSTONES		SS	
	SILTSTONES		SH	
	CLAYSTONES		CS	
	LIMESTONES		LS	
	SHALE		SL	

CONSISTENCY CRITERIA BASES ON FIELD TESTS

RELATIVE DENSITY – COARSE – GRAIN SOIL

RELATIVE DENSITY	SPT * (# BLOWS/FT)	RELATIVE DENSITY (%)
VERY LOOSE	<4	0-15
LOOSE	4-10	15-35
MEDIUM DENSE	10-30	35-65
DENSE	30-50	65-85
VERY DENSE	>50	85-100

CONSISTENCY – FINE-GRAIN SOIL

CONSISTENCY	SPT* (# BLOWS/FT)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET ** PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)
Very Soft	<2	<0.13	<0.25
Soft	2-4	0.13-0.25	0.25-0.5
Medium Stiff	4-8	0.25-0.5	0.5-1.0
Stiff	8-15	0.5-1.0	1.0-2.0
Very Stiff	15-30	1.0-2.0	2.0-4.0
Hard	>30	>2.0	>4.0

* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM -1586 STANDARD PENETRATION TEST)

** UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ.FT. READ FROM POCKET PENETROMETER

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	Absence of moisture, dusty, dry to the touch
MOIST	Damp but no visible water
WET	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbled or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

EXPLANATION OF LOGS

Figure A-2

LOG OF BORING B-01

Elevation:	2680.0	Date(s) Drilled:	11/19/09
Drilling Method:	Rotary Auger	Logged by:	FWC
Drilling Rig:	Mobile B-53	Hammer Type:	Auto-Trip
Boring Diameter:	8-inches	Hammer Weight:	140 lb.
		Hammer Drop:	30-inches

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	USCS	Description	SAMPLE TYPE	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	RELATIVE COMPACTION (%)
0	SM	**SILTY SAND**, fine to coarse grained with gravel, gray brown, slightly moist, medium dense, interbedded with thin layers gravel throughout.	BULK				
			SS	13, 10	2	122	
5	SM	**SILTY SAND with GRAVEL**, fine to coarse grained, dark red brown, dry to slightly moist, medium dense, interbedded with thin layers sand throughout.	BULK				
			SS	8, 12	2	119	
			SS	12, 15	2	119	
10	GS	**SANDY GRAVEL**, fine to coarse grained, olive brown, dry to slightly moist, medium dense.	BULK				
			SS	13, 17	1	126	
15			SS	19, 37	1	132	
			SS	28, 26	1	136	
20			SS	15, 23	2	124	
25			SPT	17, 11	3		
30	SM	**SILTY SAND with GRAVEL**, fine to medium grained, red brown, moist, medium dense, weakly to moderately cemented.	SS	20, 25	4	122	
			SPT	14, 16	5		
35	SC	**CLAYEY SAND**, very fine to fine grained, red brown, slightly moist, medium dense	SPT	17, 17	3		
40			SS	14, 26	9	113	
			SPT	13, 14	7		
45	CL	**SANDY CLAY**, very fine to fine grained, dark red brown, slightly moist, stiff to hard.	SPT	15, 15	8		
50	ML CL	**SANDY SILTY CLAY**, very fine to fine grained, dark red brown, moist, hard.	SPT	16, 22	0		
		End of boring at 51.5 feet. No groundwater or mottling encountered.					

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Geotechnical Exploration
Brookside Avenue
Cherry Valley Area, CA
Project No. B464-002

Figure No. **A-3**

LOG OF BORING B-02

Elevation:	2676.0	Date(s) Drilled:	11/19/09	Logged by:	FWC
Drilling Method:	Rotary Auger			Hammer Type:	Auto-Trip
Drilling Rig:	Mobile B-53			Hammer Weight:	140 lb.
Boring Diameter:	8-inches			Hammer Drop:	30-inches

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	GRAPHIC	USCS	SUMMARY OF SUBSURFACE CONDITIONS	DRIVE SAMPLE	BULK SAMPLE	SAMPLE TYPE	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	RELATIVE COMPACTION (%)
		SM	**SILTY SAND**, fine to coarse grained with gravel, gray brown, slightly moist, loose, interbedded with thin layers sand throughout.			BULK				
						SS	6 10	2	119	
5						SS	5 8	2	120	
		GS	**SANDY GRAVEL**, fine to coarse grained, light brown, dry, medium dense.			SS	19 28	1	137	
10						SS	14 16	1	143	
15		SM	**SILTY SAND with GRAVEL**, fine to coarse grained, olive brown, slightly moist, dense, weakly cemented.			SS	17 30	1	131	
			End of boring at 15.5 feet. No groundwater or mottling encountered.							

INLAND FOUNDATION ENGINEERING, INC.

Geotechnical Exploration
Brookside Avenue
Cherry Valley Area, CA
Project No. B464-002

Figure No. **A-4**

LOG OF BORING B-03

Elevation:	2670.0	Date(s) Drilled:	11/19/09
Logged by:	FWC		
Drilling Method:	Rotary Auger	Hammer Type:	Auto-Trip
Drilling Rig:	Mobile B-53	Hammer Weight:	140 lb.
Boring Diameter:	8-inches	Hammer Drop:	30-inches

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	GRAPHIC	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: DRIVE SAMPLE	SAMPLES: BULK SAMPLE	SAMPLES: SAMPLE TYPE	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	RELATIVE COMPACTION (%)
		SW	**ARTIFICIAL FILL**, SILTY SAND, fine to coarse grained with gravel, gray brown, slightly moist, loose to medium dense.	X		SS	6	1	124	
		GS	**SAND**, fine to coarse grained with trace gravel, olive brown, dry, medium dense.		X	BULK	9			
5			**SANDY GRAVEL**, fine to coarse grained, olive brown, dry to slightly moist, medium dense.	X		SS	12 13	1	133	
				X		SS	8 21 NR			
10		GS	**SANDY GRAVEL**, fine to coarse grained with silt, olive brown, dry to slightly moist, medium dense.		X	BULK				
			- cobble -	X		SS	18 20	2	126	
15				X		SS	20 20	1	135	
			- rocky layers from 15.5 to 17.5 feet -							
		GS	**SANDY GRAVEL**, fine to coarse grained, brown, dry to slightly moist, dense, weakly cemented.	X		SS	37 37	2	135	
20				X		SS	23 27	1	123	
			End of boring at 20.5 feet. No groundwater or mottling encountered.							

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Geotechnical Exploration
Brookside Avenue
Cherry Valley Area, CA
Project No. B464-002

Figure No. **A-5**

LOG OF BORING B-04

Elevation:	2672.0	Date(s) Drilled:	11/19/09
Drilling Method:	Rotary Auger	Logged by:	FWC
Drilling Rig:	Mobile B-53	Hammer Type:	Auto-Trip
Boring Diameter:	8-inches	Hammer Weight:	140 lb.
		Hammer Drop:	30-inches

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	USCS	Description	SAMPLE TYPE	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	RELATIVE COMPACTION (%)
0	SM	**SILTY SAND**, fine to medium grained, olive brown, slightly moist to moist, loose.	BULK		18	114	
5	SW-SM	**SAND**, fine to coarse grained with gravel, olive brown, slightly moist, medium dense.	SS	6	6	120	
			BULK	10			
	SP-SM	**SILTY SAND**, fine to medium grained, olive brown, moist, medium dense.	BULK	13	3	128	
			SS	17			
10		**SAND with SILT and GRAVEL**, fine to coarse grained, olive brown, dry to slightly moist, medium dense.	SS	11 16	3	124	
	GS	**SANDY GRAVEL**, fine to medium grained, olive brown, dry to slightly moist, medium dense.	SS	22 28	3	130	
15			SS	35 24	1	128	
20			SS	26 30	2	132	

End of boring at 20.5 feet. No groundwater or mottling encountered.

LOG OF BORING B-05

Elevation:	2662.0	Date(s) Drilled:	11/19/09
Drilling Method:	Rotary Auger	Logged by:	FWC
Drilling Rig:	Mobile B-53	Hammer Type:	Auto-Trip
Boring Diameter:	8-inches	Hammer Weight:	140 lb.
		Hammer Drop:	30-inches

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	GRAPHIC	USCS	SUMMARY OF SUBSURFACE CONDITIONS	DRIVE SAMPLE	BULK SAMPLE	SAMPLE TYPE	BLOWS/6"	MOISTURE (%)	DRY UNIT WT. (pcf)	RELATIVE COMPACTION (%)
		SM	**SILTY SAND**, fine to coarse grained, olive brown, dry to slightly moist, loose.							
			SAND with GRAVEL, fine to coarse grained, red brown, slightly moist, medium dense.	X		SS	7 7	2	118	
5		SM	**SILTY SAND**, fine to medium grained with gravel, olive brown, slightly moist, medium dense.	X		SS	4 10	5	122	
10		SG	**GRAVELLY SAND**, fine to coarse grained, olive brown, slightly moist, medium dense.	X		SS	10 13	5	121	
		GS	**SANDY GRAVEL**, fine to coarse grained, olive brown, dry to slightly moist, medium dense. - rocky layer -	X	X	BULK SS	16 23	4	124	
15				X	X	SS	9 11	3	120	
		SG	**GRAVELLY SAND**, fine to coarse grained with silt, olive brown, slightly moist, medium dense.	X		SS	9 12	6	124	
20				X		SS	9 11	6	119	
25		SM	**SILTY SAND**, fine to medium grained with trace gravel, red brown, slightly moist, medium dense.	X	X	BULK SPT	8 10	9		
30		SM	**SILTY SAND**, fine to medium grained with gravel and trace clay, red brown, moist, medium dense.	X		SS	13 18	10	119	
				X		SPT	12 24	8		
35		GS	**SANDY GRAVEL**, fine to coarse grained with cobbles, olive brown, slightly moist, medium dense. - rocky layer 35 to 37 feet -	X		SPT	35 35	3		
			- rocky layer -							
40		SM	**SILTY SAND**, fine to medium grained with trace gravel, orange brown, moist, medium dense.	X		SS	23 41	9	120	
		SW	**SAND**, fine to coarse grained, olive, slightly moist, medium dense.	X		SPT	21 15	4		
45		SC	**CLAYEY SAND**, very fine to fine grained, red brown, moist, medium dense.	X		SPT	13 15	9		
50		SM	**SILTY SAND**, very fine to fine grained, red brown, moist, medium dense.	X		SPT	13 13	6		
			End of boring at 51.5 feet. No groundwater or mottling encountered.							

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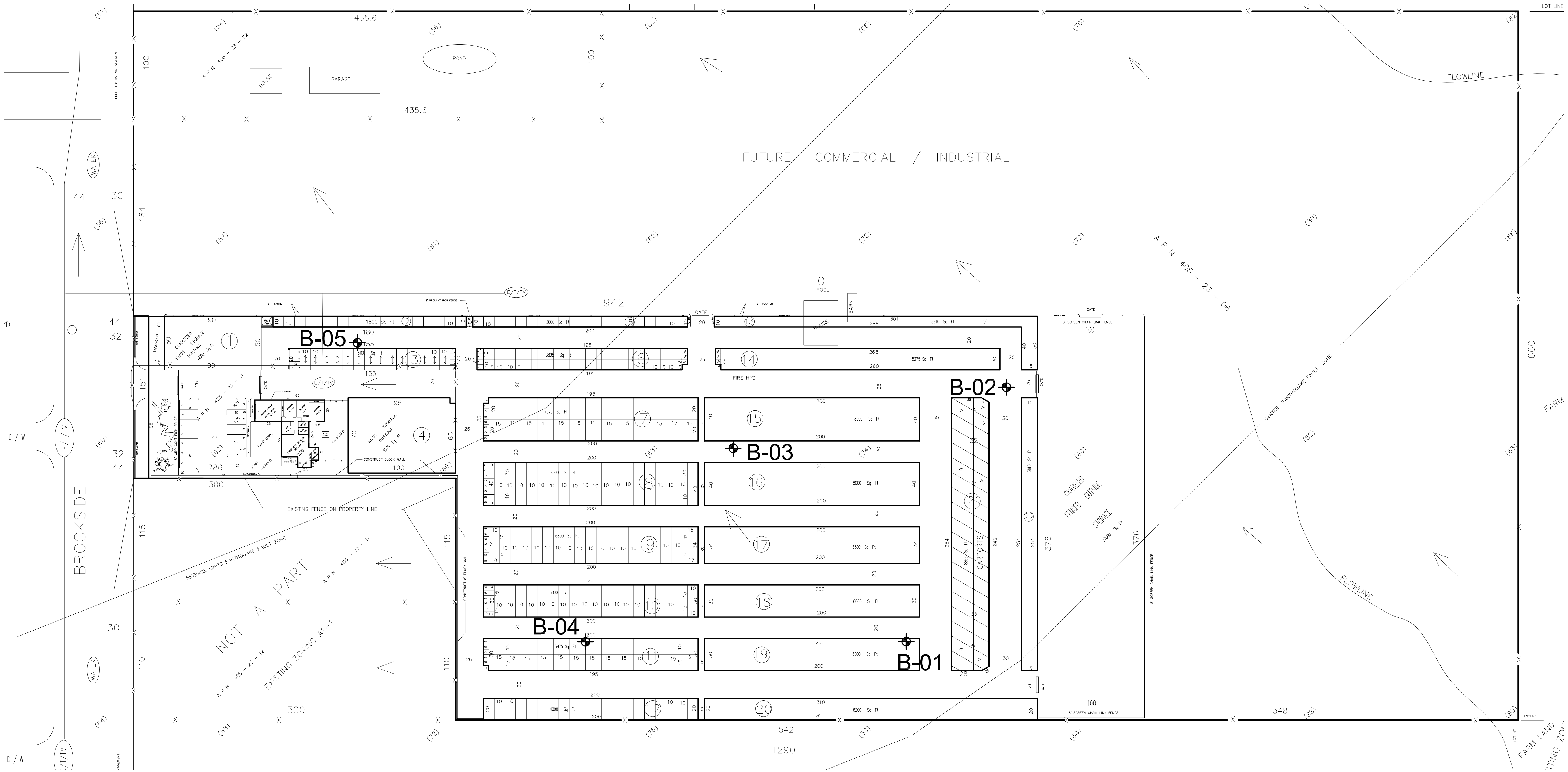
Geotechnical Exploration
Brookside Avenue
Cherry Valley Area, CA
Project No. B464-002

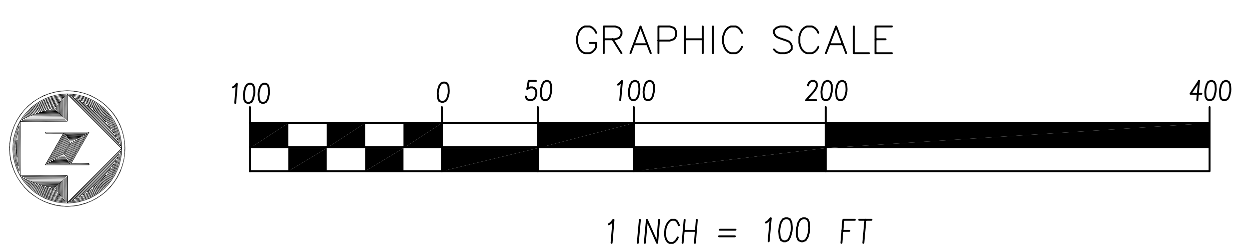
Figure No. **A-7**

SITE PLAN

Proposed Mini Storage Facility

Brookside Avenue, Cherry Valley Area, Riverside County, California





LEGEND

⌖ = Approximate Location of Exploratory Boring

INLAND FOUNDATION ENGINEERING, INC. 1310 South Santa Fe Avenue San Jacinto, California (951) 654-1555 FAX (951) 654-0551	
JOB NO.: B464-002	
DATE: December 2009	Fig. A-8

APPENDIX B –

Laboratory Testing

APPENDIX B

LABORATORY TESTING

Representative soil samples obtained from our borings were returned to our laboratory for additional observation and testing. Descriptions of the tests performed are provided below.

Unit Weight and Moisture Content: Ring samples were weighed and measured to evaluate their unit weight. A small portion of each sample was then tested for moisture content. The testing was performed per ASTM D2937 and D2216. The results of the testing are shown on the boring logs (Figure Nos. A-3 through A-7).

Maximum Density-Optimum Moisture Content: Three samples were selected for maximum density testing in accordance with ASTM D1557. The test results are presented graphically on Figure B-3.

Sieve Analysis: Three soil samples were selected for sieve analysis testing in accordance with ASTM D422. These tests provide information for classifying the soil in accordance with the Unified Classification System. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing are shown on Figure B-4.

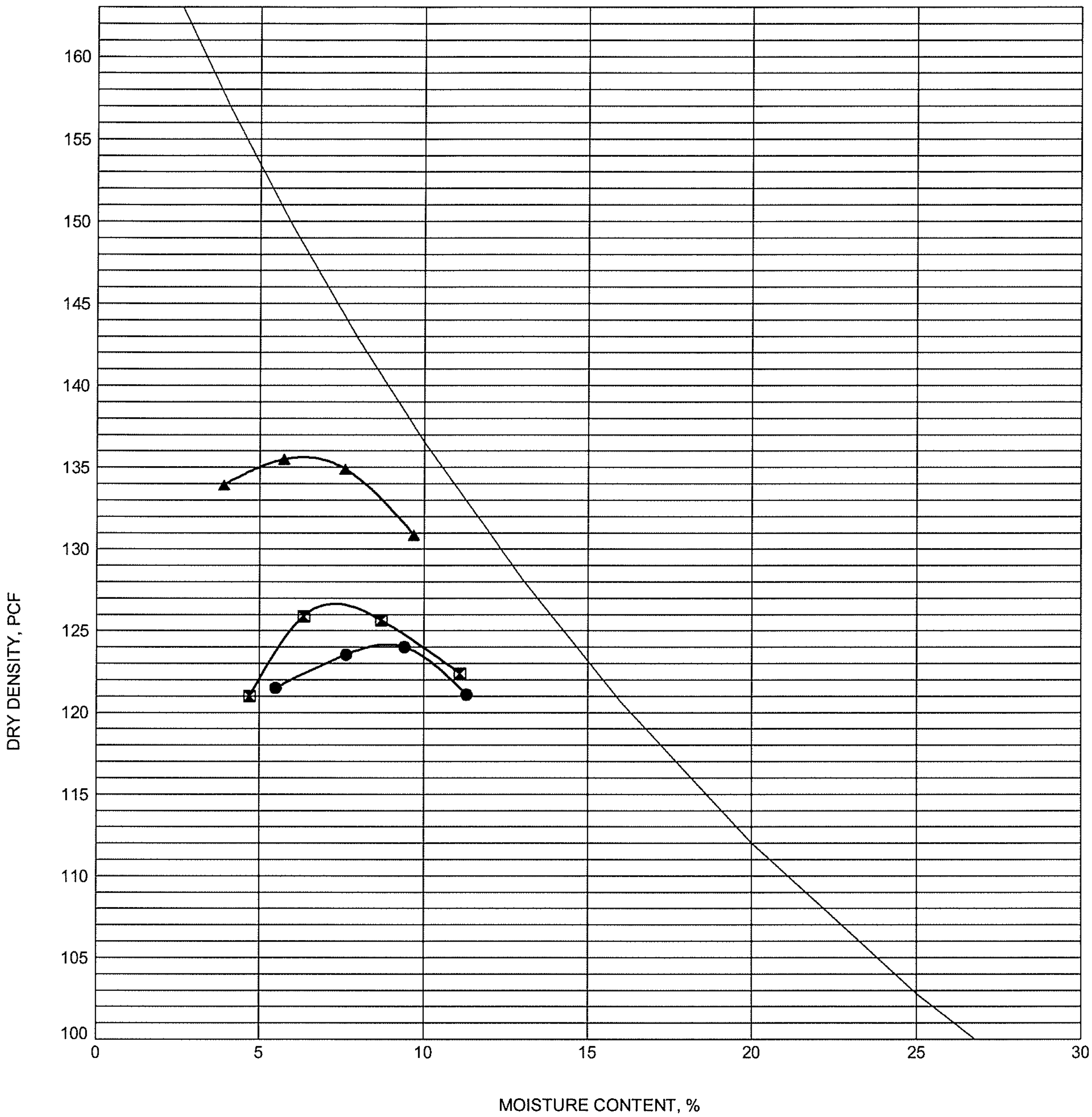
Plastic Index: Three samples were selected for plastic index testing in accordance with ASTM D4318. These tests provide information regarding soil plasticity and are also used for developing classifications for the soil in accordance with the Unified Classification System. The results are shown on Figure B-4.

Direct Shear Testing: One sample was selected for direct shear strength testing in accordance with ASTM D3080. This testing measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation bearing capacity and lateral earth pressure. Test results are shown on Figure B-5.

Consolidation Testing: One sample was selected for consolidation testing in accordance with ASTM D2435. This test is used to evaluate the magnitude and rate of settlement of a structure or earth fill. The results of this testing are presented graphically on Figure B-6.

Analytical Testing: Two samples were selected to evaluate the concentration of soluble sulfates and chlorides, pH level, and resistivity of and within the on-site soils. The results are shown in the following table.

Sample Location	Sample Depth (ft.)	Water-Soluble Sulfates (%)	Chlorides (ppm)	Minimum Resistivity (ohm-cm)	pH
B-02	0.0 – 6.0	0.001	108	10,000	6.0
B-04	0.0 – 4.0	0.001	60	15,000	6.9



Specimen Identification			Classification	Max.Density	MC%
●	B-02	0.0	POORLY GRADED SAND with SILT SP-SM	124.5	9.0
⊠	B-04	0.0	SILTY SAND SM	127.0	7.5
▲	B-04	6.3	POORLY GRADED SAND with SILT and GRAVEL SP-SM	136.0	7.0

PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

MAXIMUM DENSITY-OPTIMUM MOISTURE CURVES

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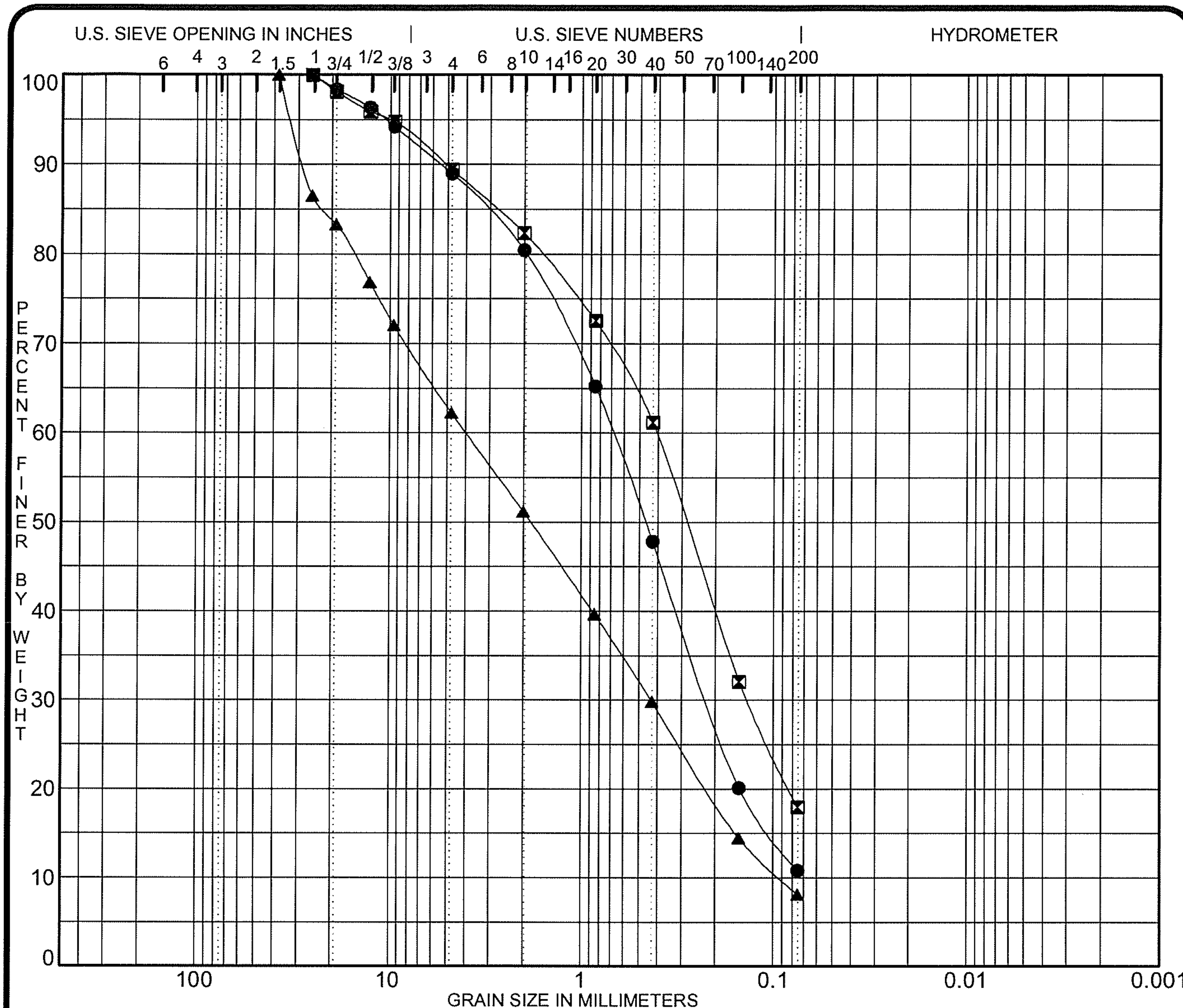
Figure No. B-3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	S.G.	LL	PL	PI	Cc	Cu
●	**B-02**	**0.0**	**POORLY GRADED SAND with SILT SP-SM**		**NP**	**NP**	**NP**	**0.97**	**9.8**
⊠	**B-04**	**0.0**	**SILTY SAND SM**		**NP**	**NP**	**NP**		
▲	**B-04**	**6.3**	**POORLY GRADED SAND with SILT and GRAVEL SP-SM**		**NP**	**NP**	**NP**	**0.51**	**43.3**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt / %Clay
●	**B-02**	**0.0**	**25.40**	**0.69**	**0.217**		**11.0**	**78.2**	**10.8**
⊠	**B-04**	**0.0**	**25.40**	**0.41**	**0.135**		**10.6**	**71.5**	**18.0**
▲	**B-04**	**6.3**	**38.00**	**3.98**	**0.430**	**0.0919**	**37.7**	**54.1**	**8.1**

PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

GRADATION CURVES

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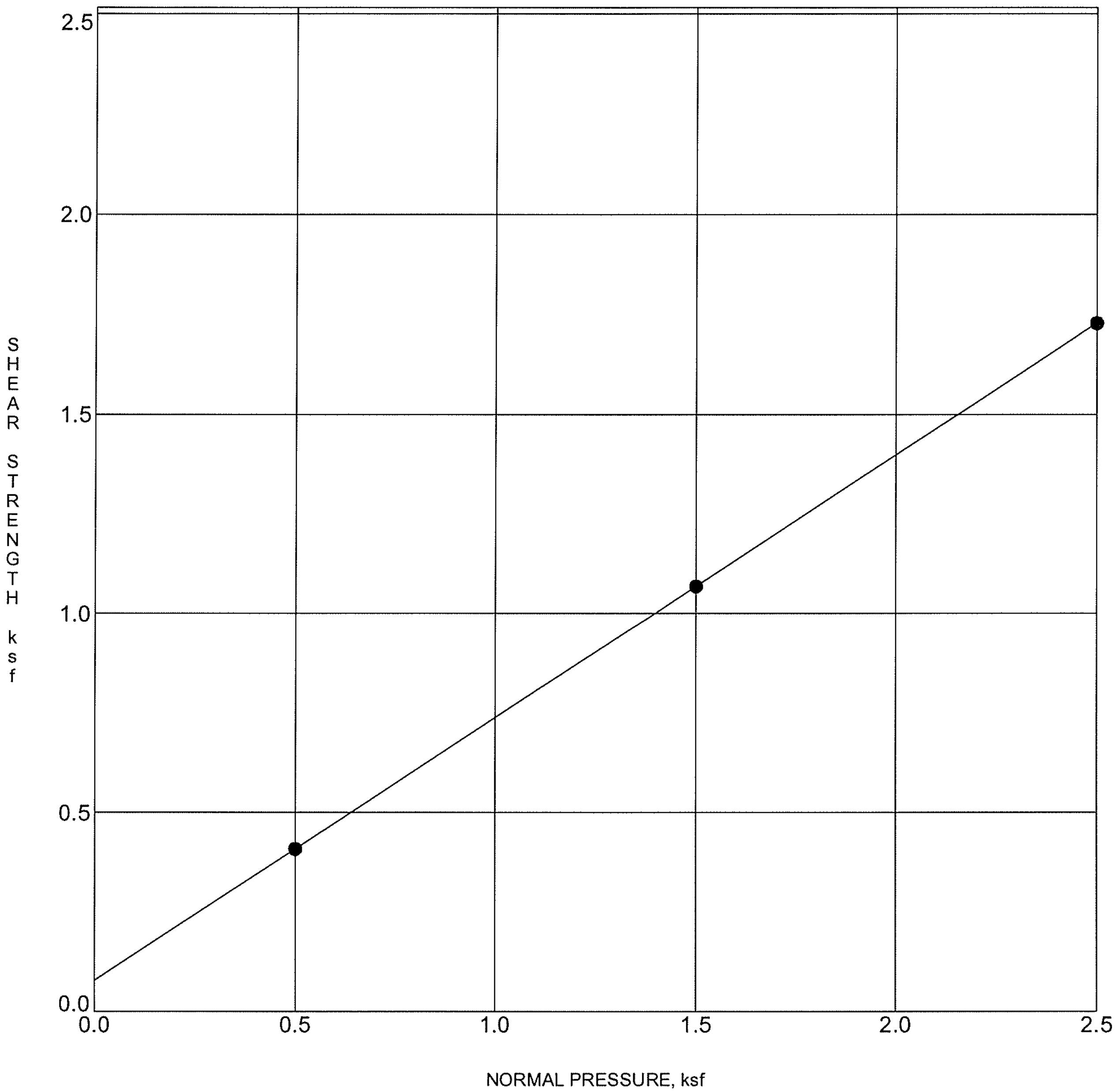
Figure No. B-4



Specimen Identification		Classification	Phi	Cohesion	DD	MC%
● B-04	0.0	**SILTY SAND SM**	**33**	**0.078**	**114**	**18**

PROJECT Geotechnical Exploration
Brookside Avenue

PROJECT NO. B464-002
DATE December 17, 2009

SHEAR TEST DIAGRAM

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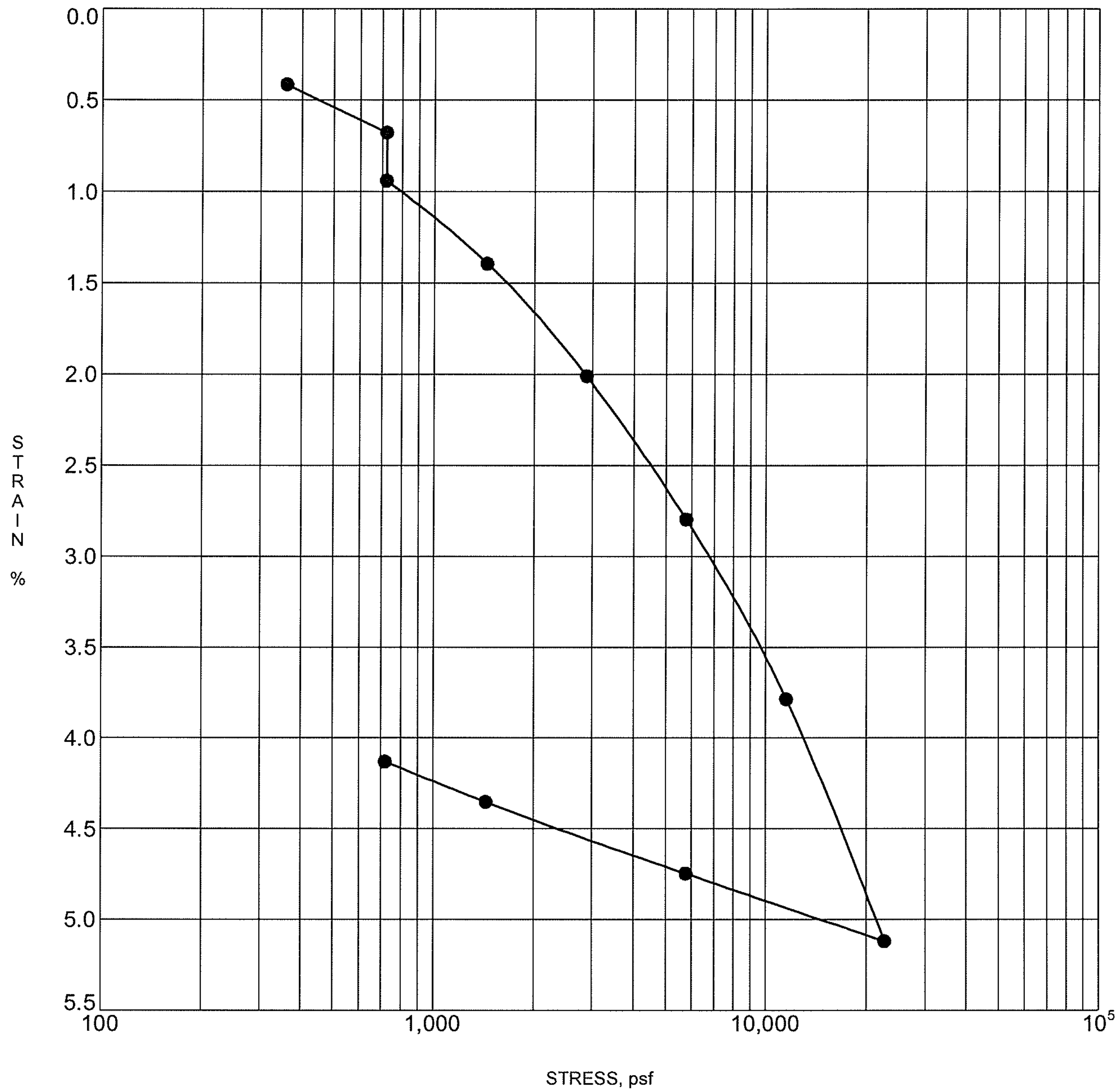
Figure No. B-5



	Specimen Identification		Classification	DD	MC%
●	**B-05**	**2.5**	**SAND with GRAVEL**	**118**	**2**
⊠					
▲					
★					
✕					
✪					

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PROJECT NO. B464-002
DATE December 17, 2009

CONSOLIDATION TEST

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Figure No. B-6