Appendix F-2

Report of Geotechnical Investigation - Evolve Student Housing

REPORT OF GEOTECHNICAL INVESTIGATION
EVOLVE STUDENT HOUSING
SAN DIEGO STATE UNIVERSITY
SAN DIEGO, CALIFORNIA

Prepared for

San Diego State University
Facilities Planning, Design and Construction
5500 Campanile Drive
San Diego, California 92182-1624

Prepared by

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San Diego State University
Facilities Planning, Design and Construction
5500 Campanile Drive
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Attention: Ms. Amanda Scheidlinger, AIA, DBIA, LEED AP BD+C
Direction of Construction

SUBJECT: REPORT OF GEOTECHNICAL INVESTIGATION
Evolve Student Housing
San Diego State University
San Diego, California

Ms. Scheidlinger:

Group Delta Consultants, Inc. (Group Delta) is submitting this geotechnical investigation report to support the design and construction of two sites planned for student housing. Group Delta prepared this report per the referenced proposal (Group Delta, 2024a). This issue of the report is a progress draft for internal review by the development team. We expect to revise the report following receipt of the site topography and the selection of the type of retention that may be used to access portions of the site. This report is for the first phase of the project that consists of the University Towers East site and the Amenity Building and Building Nos. 1 through 3 at the Peninsula site.

We appreciate the opportunity to support this project. Please contact us with questions or comments, or if you need anything else.

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1.0 INTRODUCTION

This report presents the results from a geotechnical investigation by Group Delta Consultants, Inc. (Group Delta) of the two Sites proposed by San Diego State University (SDSU) for new student housing. The purposes of this report are to inform the development and design team about subsurface conditions, geologic hazards, and geotechnical engineering characteristics, and to provide geotechnical recommendations for design and construction.

SDSU plans to redevelop the surface parking for the University Towers building near the intersection of 55th Street and Montezuma Road (University Towers East, or UTE) and the residential area surrounding the northerly terminus of 55th Street (Peninsula) for student housing. Figures 1A and 1B show the locations of the Sites on regional aerial and topographic maps.

1.1 Scope of Services

Group Delta prepared this report per the referenced proposal (Group Delta, 2024a) and request for additional services (2024b). We completed the following services.

- Desk study review of the referenced previous geotechnical studies. Appendix A provides relevant information.
- A site reconnaissance and field investigation consisting of 24 exploratory borings. Figure 4A and 4B show the approximate locations of these explorations in relation to existing site conditions and the proposed site development. Appendix B provides exploration logs.
- Geotechnical laboratory testing of soil samples collected from the borings. Appendix C provides the test results.
- A geophysical survey consisting of four 1-D shear-wave velocity surveys. Figures 4A and 4B show the location of the survey lines in relation to the existing site conditions and the proposed site development. Appendix D provides the geophysical survey report.
- Engineering analysis of the field and laboratory data to develop geotechnical parameters and preliminary recommendations for design and construction.
- Preparation of this report with our findings, conclusions, and recommendations.

1.2 Site Description

The University Towers site is the existing surface parking for the 8-story University Towers student housing. The parking lot occupies about three-quarters of an acre of level ground east of the existing housing structure. The elevation of the site ranges from about 464 to 466 feet above mean sea level (msl, Google Earth, accessed September 2024).

The Peninsula site is several existing apartment complexes that occupy about 2.5 acres of an elevated natural terrace with elevations ranging from about 380 to 420 feet above mean sea level (msl, Google Earth, accessed May 2024) over a horizontal distance of about 1,100 feet. The site slopes downward to the north. Relatively steep slopes descend from the western, northern, and eastern perimeters of the site at approximate inclinations of 2: 1 to 2.5:1 (horizontal to vertical units).

1.3 Project Description

We understand the Swinerton Gensler team is planning nine to 11-story reinforced concrete residential buildings. They plan for six buildings at the Peninsula site along with a two-story amenity building. We understand they are planning a nine-story residential building at the University Towers site. The buildings are on grade and rectangular in plan.

We expect exterior surface improvements to include hardscaped walkway and drive areas, and landscaping. We understand fire lane access may require a retained embankment along the southeastern slope of the Peninsula site. We do not expect major cut and fill grading.

We have based our understanding of the project on information in the referenced Swinerton Gensler technical proposal (Swinerton Gensler, 2024) and meetings with this team.

1.4 Previous Studies

Group Delta prepared a preliminary geotechnical evaluation (Group Delta, 2024b) of the two sites using desktop study information. This report describes pertinent information. Appendix A provides copies of pertinent information.

2.0 FIELD AND LABORATORY INVESTIGATION

The field investigation included site reconnaissance and geologic mapping of the surface conditions of the slope by Group Delta geologists and engineers, and having subcontractors advance 24 exploratory borings, and conduct four 1-D shear-wave velocity surveys. We completed the field work between August 12th and 20th, 2024. The depth of exploration ranged from less than 5 feet to about 50 feet below the existing ground surface. Figure 4A and 4B show the approximate locations of these explorations in relation to existing site conditions and the proposed site development. This figure also shows the total depth of the explorations and an estimate of the depth of fill. Appendix B provides the logs for the exploratory borings along with a discussion of methods used to complete the borings. Appendix D provides a discussion of the methods used and the results of the shear wave velocity soundings.

The geotechnical laboratory program tested selected samples from the borings for particle size analysis and Plasticity Index to aid in material classification per the Unified Soil Classification System (USCS). The logs for the borings provide the test results. The program also included: 1) index tests to evaluate the soil expansion potential and corrosivity potential; 2) insitu and remolded direct shear strength tests to evaluate the soil shear strength; 3) a maximum dry density and optimum moisture content test to evaluate the relationship between dry density and moisture content for compaction of on-site material excavated and processed for fill; and 4) an R-value test to evaluate the soil subgrade strength for pavement design. Appendix C provides descriptions of the laboratory test methods and the test results.

3.0 GEOLOGY AND SUBSURFACE CONDITIONS

The Sites are located within the Coastal Plain of the Peninsular Ranges geomorphic province of southern California. This province stretches from the Los Angeles basin to the tip of Baja California. The province is a series of northwest trending mountain ranges consisting of metamorphic and plutonic rock that are separated by subparallel fault zones. The Coastal Plain is terraces consisting of marine and nonmarine sedimentary rock. Ancient ocean wave action cut flat, marine terraces into the sedimentary rocks along the shorelines. Sediments were subsequently deposited onto these marine terraces. Regional uplift has raised the marine terraces that are locally preserved as the elevated flat "mesas" in the San Diego region. Erosion of these terraces by rivers and creeks created canyons that expose the underlying sedimentary rock.

Eocene age sedimentary bedrock underlies the University Towers East and Peninsula sites at depth. As shown in Figure 2, Kennedy and Tan (2008) map the Stadium Conglomerate and the Mission Valley Formation sedimentary bedrock unit (map symbols Tst and Tmv) at these Sites. The Stadium Conglomerate is a massive cobble conglomerate that can be hard and moderately to strongly cemented. The Mission Valley Formation is interbedded soft and friable sandstone interbedded with conglomerate. This report does not distinguish between these units and refers to them as "Eocene Deposits."

Local areas of undocumented fill[1] overlies the Eocene Deposits at both Sites. This fill mainly occurs at the sloped margins at the Peninsular site. It occurs over the entire surface of the University Towers East site. This report refers to this material as "Fill."

The following sections describes these materials as observed during our field investigation.

3.1 Eocene Deposits

At both sites, Group Delta observed these deposits to consist of massive, cemented cobble conglomerate with a fine to coarse grained sandstone matrix, and occasional beds of fine to medium grained sandstone. We observed the conglomerate in outcrops along the perimeter slopes of the Peninsula site to contain gravel, cobble, and boulder sized clasts up to 14 inches in diameter. The clasts are generally rounded, hard, fresh, and comprised predominately of igneous rock (e.g., rhyolite and andesite). We were not able to make similar observations of the mass characteristics of these deposits at the University Towers East site.

3.2 Fill

3.2.1 Peninsula Site

The fill at the Peninsula site appears to have been placed over the natural canyon rim in several locations during the original development in the late 1950s and early 1960s. Figure 6A shows the natural condition of the Peninsula site from a 1953 aerial image. The original canyon rim is traced

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1. **Undocumented** fill is soil that has been placed and compacted with no documentation of observation and compaction testing by a Geotechnical Engineer.

with a dark blue line. Figure 6B shows the Peninsula site shortly after original development from a 1964 aerial image. This figure identifies the extent of the fill slopes interpreted from the aerial images.

Figure 7 presents a map with estimated subgrade conditions for the Peninsula site interpreted from analysis of the historic aerial images and topographic maps, direct observation from slope mapping, and data from the borings. Wedges of fill now exist at the top of the existing canyon slope in the areas highlighted red on Figure 7. The fill wedges range from about 10- to 40-feet thick from the top of the slope. The thickest fill wedge is found along the southwestern portion near borings B-21 and B-19.

Group Delta observed the fill soils to consist predominately of clayey sand (SC) with varying amounts of gravel and cobble. We also observed occasional layers of silty sand (SM) and sandy lean clay (CL). We interpreted the apparent density of the fill to be medium dense to dense based on corrected drive sampler blow counts. Some blow counts encountered refusal on cobbles, and others may have been artificially inflated due to the presence of gravel and cobbles.

Asphalt concrete paved parking covers several areas of the Peninsula site. We measured the thickness of the asphalt concrete in the borings to range from 2- to 7-inches, averaging approximately 4-inches. We did not observe aggregate base below the pavement.

3.2.2 University Towers East Site

Fill should cover the entire University Towers East site. Observations in the current and prior borings indicate fill depths ranging from 5- to 7-feet. Group Delta observed these soils in the borings to consist of clayey sand (SC) and clay (Cl and CH). The apparent density and consistency cannot be interpreted because Group Delta could only obtain large bulk samples.

Asphalt concrete paved parking covers the entire University Towers East site. We measured the thickness of the asphalt concrete in the borings to range from 4- to 6-inches, averaging approximately 5-inches. We measured the thickness of the aggregate base below the asphalt concrete to range from 0- to 4-inches.

3.3 Groundwater

Groundwater and/or seepage was not encountered in any of our current or prior borings at the Sites. However, it has been our experience that a light to moderate volume of seepage is often encountered at or near the geologic contact between the fill and the conglomerate beds within the Eocene Deposits throughout the SDSU Main Campus. The Eocene Deposits may contain permeable zones that collect perched groundwater from nearby irrigation, leaking utilities, or other water sources. Accordingly, zones of seepage may be encountered in excavations at both Sites, particularly around the contact between the fill and Eocene Deposits materials.

Regional groundwater is expected to occur at depths that should not influence design and construction of this project.

4.0 GEOLOGIC HAZARDS

The Sites are not located within an area previously known for significant geologic hazards. As shown in Figure 3 the Sites are located within the City of San Diego Seismic Safety Study (City of San Diego, 2008), Geologic Hazard Category 53, which is characterized as "level or sloping terrain, unfavorable geologic structure, low to moderate risk." Evidence of past landslides, liquefaction, or active faulting at the Sites was not encountered in our geotechnical investigation or literature review. We anticipate the primary geologic hazard at the Sites should be the potential for strong ground motion from an earthquake due to a seismic event on any of several faults in Southern California. The potential geologic hazards are described below.

4.1 Strong Ground Motion

The Sites could be subject to moderate to strong ground motion from nearby or more distant, large magnitude earthquakes occurring during the expected lifespan of the buildings. Numerous regional and local faults can produce large earthquakes with magnitudes (M) 7.0 or greater. This hazard is managed by structural design of the structures per the latest edition of the California Building Code (CBSC, 2022) and the California State University Seismic Requirements (CSU, 2024). Seismic design parameters are provided in the *Structural Design Recommendations* section of this report.

4.2 Earthquake Surface Fault Rupture Hazard

Surface fault rupture is not considered to be a substantial geologic hazard at the Sites. Surface fault rupture occurs when movement on a fault reaches the ground surface during an earthquake. The Sites are not located within a State of California and/or City of San Diego Earthquake Fault Hazard Zone. The closest known Holocene-active fault[2] is the Rose Canyon Fault Zone that is located approximately 6 miles west of the Sites. As shown in Figure 3, a potentially active fault zone is mapped about 0.5 miles southwest of the Sites. The State and City generally do not consider this type of fault to be a surface fault rupture hazard.

4.3 Soil Liquefaction and Seismic Compaction

The potential for soil liquefaction and its secondary effects at the Sites should be very low considering groundwater was not encountered, most of existing fills under new structures will be removed and replaced with compacted fill, and the sedimentary bedrock underlying the Sites consist of consolidated, very dense, cemented materials. Liquefaction is a phenomenon where loose, saturated coarse-grained soils lose their strength and acquire some mobility from strong ground motion induced by earthquakes. The secondary effects of liquefaction include sand boils, settlement, reduced soil shear strength, lateral spreading, and global instability (flow slides) in areas with sloping ground.

4.4 Seismic Compaction

The potential for seismic compaction should also be very low since loose, unsaturated coarse-grained soils were not substantially encountered in our subsurface explorations. Site preparation

2 **Holocene-active faults** are defined as, "a fault that has had surface displacement within the Holocene time (the last 11,700 years)" by the State of California.

for the project will remove most of the fill. Seismic compaction is the settlement of loose unsaturated granular soils from strong ground shaking.

4.5 Landslides and Overall Slope Instability

The potential for landslides and overall deep-seated slope instability should be low. The slopes descending from the Peninsula site may be susceptible to slope creep or slow downward movement of fill, colluvial and/or residual soils that occur at the ground surface. As shown on Figure 7, most of the buildings proposed at the Peninsula site will not be located within the existing fill slopes that border the perimeter of the site. We understand the foundations for these buildings will not use the existing fill to the support the foundations.

We did not observe evidence of deep-seated landslides or overall slope instabilities, such as scarps and tension cracks, in our review of historic aerial images and during our geologic mapping of the slope surface. We did not observe in the borings located near the top of existing slopes a thick and/or continuous zone of topsoil, colluvial, or residual soils between the fill and the underlying Eocene Deposits that could create a potential for overall slope instability. The Eocene deposits mapped at the site are not known regionally to be unstable or particularly prone to landslides or overall slope instability.

4.6 Seiches and Tsunamis

The potential for earthquake induced flooding (seiches) at either Site is nil because the Sites are not located below any lakes or confined bodies of water. The potential for damage due to earthquake induced waves (tsunamis) is nil considering the distance between the Sites and the coast and their elevation above mean sea level.

5.0 GEOTECHNICAL ENGINEERING CHARACTERISTICS

The Eocene Deposits possess a very high soil shear strength, a very low compressibility and a low potential expansion. These materials should possess similar geotechnical engineering characteristics when they are excavated and properly processed and placed as compacted fill. These materials should provide very good subgrades for slabs-on-grade and exterior surface improvements. These materials should not be corrosive to concrete and buried metals.

The fill at the Sites possesses a highly variable soil shear strength, a highly variable compressibility and a high potential for expansion. These materials can be corrosive to concrete and buried metals. These materials insitu or recompacted may not provide satisfactory subgrades for slabs-on-grade and exterior surface improvements where there are local deposits of soils with a high potential expansion.

The following sections discuss specific laboratory test results. Appendix C provides the test results.

5.1 Peninsula Site

The results of Expansive Index tests conducted on existing fill soil samples obtained at depths ranging from 0 to 5 feet below the existing ground surface indicate a “very low” potential expansion when tested per ASTM D4829. Observations in the borings and the results of Plasticity Index testing indicates that clayey soils that could be prone to expansion occur at this Site. Clayey soils may also be present in areas not explored.

The results of screening-level corrosion suite tests (pH, resistivity, soluble sulfate, and chloride) conducted on existing fill soil samples obtained at depths ranging from 0 to 5 feet below the existing ground surface indicate these soils should have a negligible potential for sulfate attack to buried concrete and may be "moderately corrosive" to "corrosive" to buried metals. A Corrosion Consultant should be contacted to review the test results and provide specific recommendations.

The results of a direct shear test on a sample of the Eocene deposit matrix material from boring B-3 at a depth of 15 feet produced a drained friction angle of 38 degrees and a drained cohesion of 350 pounds per square foot. The shear strength of the overall deposit insitu should be higher considering the gravel and cobble content.

The results of a R-Value test on a sample of existing fill obtained from boring B-3 at a depth of 0 to 5 feet resulted in an R-Value of 6. This test result indicates the existing fill soil reused as compacted fill may not provide very good subgrades for slabs-on-grade and exterior surface improvements.

5.2 University Towers East Site

The results of Expansive Index tests conducted on existing fill soil samples obtained at depths ranging from 0 to 5 feet below the existing ground surface indicate a "very low" to "high" potential expansion when tested per ASTM D4829. Observations in the borings and the results of Plasticity Index testing indicates that clayey soils that could be prone to expansion occur at this Site. Clayey soils may also be present in areas not explored.

The results of screening-level corrosion suite tests (pH, resistivity, soluble sulfate, and chloride) conducted on existing fill soil samples obtained at depths ranging from 5 to 10 feet below the existing ground surface indicate these soils should have a negligible potential for sulfate attack to buried concrete and may be "moderately corrosive" to buried metals. A Corrosion Consultant should be contacted to review the test results and provide specific recommendations, as needed.

6.0 CONCLUSIONS

In our opinion the Sites are geotechnically suitable for the proposed redevelopment. Shallow foundations may support the proposed buildings provided they are: 1) embedded entirely in the Eocene age sedimentary bedrock that underlies both Sites and 2) horizontally setback from the face of existing slopes at the Peninsula site. Provided below are the primary findings and conclusions.

1. Eocene age sedimentary bedrock (Eocene Deposits) underlies the University Towers East and Peninsula sites (Sites) at depth. Local areas of existing undocumented fill (Fill) overlies the Eocene Deposits at both Sites. This Fill mainly occurs at the western and northern sloped margins at the Peninsular site. It occurs over the entire surface of the University Towers East site.
2. The Fill in-place at the Sites is not suitable for support of the proposed buildings. The Fill possesses a highly variable soil shear strength, a highly variable compressibility and a high potential for expansion.
3. The Eocene Deposits at the Sites are suitable for support of the proposed buildings. The Eocene Deposits possess a very high soil shear strength, a very low compressibility and a low potential expansion.
4. The primary geologic hazard at the Sites should be the potential for strong ground motion from an earthquake. Structural design of the buildings per the latest edition of the California Building Code (CBSC, 2022) and CSU Seismic Requirements (CSU, 2024) manages this hazard.
5. The contractor should plan for:
    a. Selective reuse and placement of the Fill as compacted fill because of potential expansion.
    b. Resistant mass and trench excavation in the Eocene Deposits.
    c. Processing of gravel and cobble in the excavated Eocene Deposits for reuse as compacted fill.
    d. Localized offsite disposal of existing Fill with a High potential expansion.
    e. Light to moderate volume of seepage at or near the contact between the Fill and the conglomerate beds within the Eocene Deposits

The following sections of this report present geotechnical recommendations for earthwork and design of the proposed structures and associated improvements. Group Delta developed these recommendations using empirical and analytical methods that are typical of the standards of practice in southern California. If these recommendations do not to appear to cover a specific feature of the project, please contact our office for additions or revisions. This report concludes with a discussions of construction considerations known at this time.

7.0 EARTHWORK RECOMMENDATIONS

Earthwork should consist of demolishing and removing the existing structures and associated civil infrastructure; the minor earthwork needed to form the site; remedial grading for the buildings; preparing paving and hardscaped subgrades; and installing underground utilities.

Earthwork should be completed in general accordance with the current California Building Code and project specifications (to be prepared). Group Delta is providing the following recommendations for specific aspects of the earthwork. It may be necessary to revise these recommendations due to changes in design and/or conditions observed by the Geotechnical Engineer during earthwork.

7.1 Site Preparation

General site preparation should begin with the removal of deleterious materials, such as landscaping and topsoil; demolition debris, such as existing structures, foundations, concrete; and soil that does not meet the criteria for reuse provided in Table 1. Areas disturbed by demolition should be restored with a subgrade that is stabilized to the satisfaction of the Geotechnical Engineer.

Existing subsurface utilities that will be abandoned should be removed and the excavations backfilled and compacted as described in the *Fill Compaction* section of this report. Alternatively, abandoned pipes may be grouted using a controlled low strength material, such as a "two-sack sand-cement slurry" under the observation of the Geotechnical Engineer.

Areas to receive fill should be scarified 12 inches and recompacted to 90 percent or more of the maximum dry density based on ASTM D1557. In areas of saturated or "pumping" subgrade, a geogrid such as Tensar TX7 or an approved similar product may be placed directly on the excavation bottom, and then covered with at least 12 inches of ¾-inch aggregate base. Once the subgrade is firm enough to attain compaction in the aggregate base, the remainder of the excavation may be backfilled. It may be necessary to place additional aggregate base to stabilize the subgrade sufficiently to place fill. The placement of the geogrid and aggregate base should also follow the specific installation guidelines from the manufacturer of the geogrid.

7.2 Remedial Grading

The recommendations for remedial grading for the buildings anticipate the slab-on-grade subgrade conditions listed below. Remedial grading is required to provide relatively uniform subgrade support where excavation exposes existing Fill and Eocene Deposits. The recommendations assume the building foundations are entirely embedded in the Eocene Deposits. Remedial grading is also required below exterior surface improvements and where new structural fill will be placed.

Table 2 provides estimates of the depths and elevations of the top surface of Eocene Deposits at each building. We expect Condition 1 or 3 below to occur following site preparation at the Amenity Building and Building Nos. 2 and 3. We expect Condition 2 to occur following site preparation at

Buildings 3 through 6. We recommend removing and replacing the existing fill entirely under the building at the University Towers East site.

7.2.1 Condition 1 - Eocene Deposits and Shallow Existing Fill (≤ 5 feet thick)

The portion of the subgrade that exposes existing Fill should remove the fill soils entirely to expose Eocene Deposits. The excavation should be replaced with compacted soil that meets the recommendations shown in Table 1.

The portion of the subgrade exposing Eocene Deposits should be over-excavated by 2 vertical feet below the finished subgrade elevation of the slab-on-grade. The excavation should be replaced with compacted soil that meets the recommendations shown in Table 1.

Remedial grading should be completed at least 5-feet horizontally outside of the perimeter of the slab-on-grade.

7.2.2 Condition 2 - Eocene Deposits and Deep Existing Fill (> 5 feet thick)

The portion of the subgrade that exposes existing Fill should remove the fill soils uniformly to a depth of 5 feet below the finished subgrade elevation of the slab-on-grade. The contractor should conduct local excavation and probing at the bottom of the removal excavation to determine the depth of Fill. Where further excavation and Fill removal is practical (e.g., shoring not required), the existing fill soils that are thicker than 5 feet should be removed entirely to the surface of the Eocene Deposits and replaced with compacted soil that meets the recommendations shown in Table 1. Where further excavation and Fill removal is not practical and the existing Fill that is left in place probes firm in the excavations conducted by the contractor, the bottom of the excavation where existing Fill remains should be prepared as recommended in the Site Preparation section of this report.

The portion of the subgrade that exposes Eocene Deposits should be over-excavated by 5 vertical feet below the finished subgrade elevation of the slab-on-grade. The excavation should be replaced with compacted soil that meets the recommendations shown in Table 1.

We recommend establishing an allowance for benched over-excavations where there is an abrupt and a large thickness of existing fill where it meets the Eocene Deposits at the elevation of finished subgrade. The thickness of the benched transition could be the estimated thickness of the existing Fill divided by 2 (H/2) depending on the subgrade conditions exposed. The Geotechnical Engineer will evaluate the need for and extent of benched excavation considering the conditions exposed following excavation. We anticipate these conditions could occur at Building Nos. 4 and 6.

Remedial grading should be completed at least 5-feet horizontally outside of the perimeter of the slab-on-grade.

7.2.3 Condition 3 - Eocene Deposits

Prepare, level, and clean the subgrade as customary to slab-on-grade construction. Restore any areas disturbed by excavation to the satisfaction of the Geotechnical Engineer. If the subgrade is over-excavated to facilitate the installation of underground utilities and/or shallow foundations, the excavation should be replaced with compacted soil that meets the recommendations shown in Table 1.

7.2.4 Exterior Surface Improvements

The subgrade for exterior surface improvements, such as new pavements, sidewalks, flatwork, curbs, and gutters should be over-excavated 2 vertical feet below finished subgrade elevation. We recommend this remedial grading where the subgrade exposes existing Fill and/or existing Fill and Eocene Deposits. The bottom of the excavation should be prepared as recommended in the Site Preparation section of this report. The excavation should be replaced with compacted soil that meets the recommendations shown in Table 1, or as recommended elsewhere in this report for the specific improvement.

Remedial grading should be completed at least 3-feet horizontally outside of the perimeter of the improvement.

7.2.5 New Structural Fill

The subgrade for new structural fill should be excavated to expose Eocene Deposits. The bottom of the excavation should be prepared as recommended in the Site Preparation section of this report. Where fill is placed over a surface that has an inclination of 5h:1v or steeper, level benches should be cut into the Eocene Deposits with a height of four feet or more and a width that provides complete coverage by the compaction equipment during fill placement. The excavation should be replaced with compacted soil that meets the recommendations shown in Table 1. The depth of removal to expose Eocene Deposits may be reduced where the existing Fill is substantially thick. The Geotechnical Engineer can provide specific recommendations depending on the area and new improvements that will derive support from the structural fill.

7.3 Fill Compaction

Fill and backfill soils should be placed at slightly above optimum moisture content using equipment that can produce a uniformly compacted product. The loose lift thickness should be 8 inches, unless performance observed and testing during earthwork indicates a thinner loose lift is needed, or a thicker loose lift is possible, up to a loose lift thickness of 12 inches. The minimum recommended relative compaction ranges from 90 to 95 percent of the maximum dry density based on the latest version of ASTM D1557 as shown in Table 1.

Controlled low strength material consisting of a two-sack sand and cement slurry may also be used for structural fill as an alternative to compacted soil. Slurry is often useful in confined areas that may be difficult to access with typical compaction equipment. Samples of the slurry should be fabricated and tested for compressive strength during construction. A 28-day compressive strength of 100 pounds per square inch (psi) or more is recommended for the sand and cement slurry. Crushed rock (¾-inch) completely wrapped in filter fabric (Mirafi 140N, or approved equivalent) may also be used as backfill in confined areas.

7.4 On-Site Soil Reuse

Most of the existing soils should be suitable for reuse, except for locally occurring existing Fill soils with a high potential expansion. Soils with a High potential expansion (EI > 50) should be disposed offsite. It will be necessary to process gravel and cobble in the excavated Eocene Deposits for reuse as compacted fill. Table 1 provides requirements for reuse as fill.

7.5 Import Soil

The Geotechnical Engineer should observe and test samples of all proposed import soils prior to hauling onto the site. Import fill should meet the soil specifications in Table 1.

For each proposed fill source, the Contractor should provide a submittal to the Geotechnical Engineer demonstrating that the proposed site and materials meet the geotechnical and environmental guidelines for import. Prior to import of the proposed materials, the Geotechnical Engineer should obtain samples of the proposed import for laboratory testing to evaluate the suitability of these soils for their proposed use. The following screening tests should be performed for every 1,000 cubic yards of import, with a minimum of two sets of screening tests for each import site:

- Particle Size Distribution (ASTM D6913)
- Maximum Density (ASTM D1557)
- Expansion Index (ASTM D4829)
- Sulfate Content (ASTM D516)
- Chloride Content (ASTM D512)
- pH & Resistivity (CT 643)

If a long-term, steady source of import material is utilized that consistently meets the import soil recommendations described above, the import material testing frequency may be reduced at the discretion of the Geotechnical Engineering and SDSU.

Additional testing per the guidelines provided by the Department of Toxic Substances Control (DTSC, 2001) is required by the Owner prior to accepting soil for import. The test results should meet the most stringent State and Federal residential screening levels including the most up to date DTSC Modified Screening Levels (DTSC-SLs) and United States Environmental Protection Agency Regional Screening Level (RSL).

7.6 Demolition Materials

The project is not expected to generate significant sources of asphalt concrete or Portland Cement concrete that could be recycled for use as fill.

8.0 STRUCTURAL DESIGN RECOMMENDATIONS

8.1 Seismic Design

Structures should be designed in accordance with the governing seismic provisions of the 2022 California Building Code, as well as the minimum seismic design requirements of the California State University (CSU, 2024). The following sections provide separate recommendations for the Peninsula Site and the University Towers East site.

8.1.1 Peninsula Site

Appendix E provides a technical memorandum with a recommended site-specific acceleration response spectra and seismic design parameters for the east portion of the Peninsula site. We will provide recommendations for the other areas of the Peninsula site in the future.

8.1.2 University Towers East Site

The table below presents seismic design parameters recommended by the California State University Seismic Requirements (CSU, 2024) for Site Class C. A geophysical survey line using the Refraction Microtremor (ReMi) method resulted in an interpreted average shear wave velocity in the upper 30 meters ($V_{S,30}$), or 100 feet, of approximately or 425 meters/second (1,394 feet/second). The Site Classification using Chapter 20 of ASCE 7-16 is Site Class C.

CSU – SAN DIEGO SEISMIC DESIGN PARAMETERS

Hazard Level	Parameter	Site Class C
BSE-1N [Design]	PGA_D	0.32
	S_{D0}	0.29
	S_{DS}	0.73
	S_{D1}	0.32
BSE-2N [MCE$_R$]	PGA_M	0.48
	S_{M0}	0.44
	S_{MS}	1.10
	S_{M1}	0.48

8.2 Shallow Foundations

Shallow foundations comprise continuous footings for walls, isolated spread footings for columns, and larger isolated pad footings that would support elevator cores or shear walls. We expect these foundations to support nine to 11-story reinforced concrete buildings.

The following recommendations assume the shallow foundations for individual buildings bear entirely upon Eocene Deposits. This embedment may be achieved using taller stem walls or trenching as shown in Figure 8, Details C and D. The trench should be cleaned of all excavation debris and filled with Controlled Low Strength Material with a 28-day compressive strength of 500 pounds per square inch (psi) or more. The unconfined compressive strength of local sedimentary formations that range from 200 to 500 psi. Table 2 and Figures 7 and 8 provides information to develop foundation embedment into the Eocene Deposits. Piled foundations may be needed for Building No. 6 at the Peninsula site.

Shallow foundations may be designed using the parameters provided below.

- Allowable vertical bearing capacity may be estimated using an allowable net vertical bearing pressure of 6,000 pounds per square foot (psf) for a minimum footing width and embedment (below lowest adjacent surface elevation) of 2 feet. The allowable bearing pressure may be increased by 500 psf per foot increase in width or depth up to a maximum value of 10,000 psf.
- Allowable lateral bearing resistance for footings embedded entirely in Eocene Deposits (Detail C in Figure 8) may be estimated using an allowable soil passive pressure of 400 psf per foot of vertical embedment combined with a sliding resistance estimated using an allowable coefficient of friction of 0.4. The allowable soil passive pressure should be reduced to 250 psf/per foot of vertical embedment, where the footings are embedded in fill and the bottom of the footing is supported by CLSM-filled trench that extends into the Eocene Deposits (Detail D in Figure 8). The upper 12 inches of passive pressure should be neglected where permanent hardscape surfaces will not be present.
- Allowable vertical bearing pressure and allowable passive pressure may be increased by one-third for short term seismic and wind loads.
- Allowable vertical bearing pressure and allowable passive pressure assume infinite level ground in front of the footing, or a minimum horizontal distance of 10 feet from the face of descending slopes and the face of the footing that is closest to the slope.
- Estimated total and differential settlement from static and seismic loading between adjacent footings of 1½ inch and ¾ inch.
- Minimum dimensions, embedment, and setback distances as shown in Figure 8. Note that foundations will need to be setback from the face of existing slopes as shown in Figure 8.
- Reinforcement per the Structural Engineer.

Pad footings may be designed using a modulus of vertical subgrade reaction (k_s) of 250 pounds per cubic inch for one-foot square footings. This modulus below should be adjusted using the following equations for square footings with widths greater than one foot and rectangular footings.

For square footings of width 'B' (in feet):

$$k_{[BXB]} = k_s\ [(B + 1) / 2B]^2$$

For rectangular footings of width 'B' and length 'L' (in feet), where 'L' is greater than 'B', the above equation should be used to calculate $k_{[BXB]}$, and this value should then be factored into the equation below:

$$k_{[LXB]} = k_{[BXB]}\ [(1 + 0.5B / L) / 1.5]$$

8.3 Reinforced Concrete Slabs-On-Grade

The project plans to use reinforced concrete slabs-on-grade for the buildings.

8.3.1 Subgrade Preparation

The subgrade should be prepared as recommended in the *Remedial Earthwork* section of this report. Subgrade soils should be placed to meet the specifications in Table 1.

8.3.2 Slab Thickness and Reinforcement

Conventional concrete building slabs should be at least 5 inches thick. The Structural Engineer should design the slab thickness, control joints, and reinforcement per the current version of the California Building Code and the slab loading.

8.3.3 Moisture Protection for Interior Slabs

Moisture protection should comply with the requirements of the current CBC, American Concrete Institute (ACI 302.1R-15) and the desired functionality of the interior ground level spaces. The Architect typically specifies an appropriate level of moisture protection considering allowable moisture transmission rates for the flooring or other functionality considerations.

Moisture protection may be a “Vapor Retarder” or “Vapor Barrier” that use membranes with a thickness of 10 and 15 mil or more, respectively. The membrane may be placed between the concrete slab and the aggregate base (where used) or finished subgrade immediately below the slab, provided it is protected from puncture and repaired per the manufacturer’s recommendations if damaged. Note the CBC specifies a Capillary Break, as defined, and installed per the California Green Building Standards, with a Vapor Retarder.

9.0 CIVIL DESIGN RECOMMENDATIONS

Civil design requirements are expected to involve relatively minor formation of the site with low volumes of cut and fill, shallow wet and dry utilities, asphalt and concrete exterior surface improvements, and storm water Best Management Practices.

9.1 Surface Drainage

Foundation and slab performance depend on how well surface runoff drains from the Project Site. The ground surface should be graded so that water flows rapidly away from the structures and tops of slopes without ponding. The surface gradient needed to achieve this may depend on the planned landscaping. Permeable pavements (e.g., interlocking concrete paver blocks), planters, and landscaped areas should be built so that water will not seep into the foundation, slab, or pavement areas. Permeable pavements, planters, and landscaped areas above retaining walls should be lined with impermeable membranes and have dedicated drainage systems to channel the water by pipe to a suitable drainage outlet. If roof drains are used, the drainage should be channeled by pipe to storm drains or discharge 10 feet or more from buildings into suitable non-erodible drainage structures. There should be no surface runoff or storm drain outlets that discharge water near to on or on slopes. Irrigation should be limited to that needed to sustain landscaping to avoid developing perched water in the subsurface soils.

9.2 Exterior Surface Improvements

Exterior surface improvements consist of the following types of paving surfaces:

1. Asphalt Concrete (AC) paving subject to vehicular traffic.
2. Portland Cement Concrete (PCC) pedestrian paving.

The recommendations below apply to the above exterior surface improvements, which is followed by recommendations that are specific to each type of improvement.

- The subgrade should meet the specifications in Table 1.
- Aggregate Base, where specified, should be brought to slightly above optimum moisture content and compacted to 95 percent of the maximum dry density per ASTM D1557.
- Imported aggregate base should conform to Section 200-2.2, Crushed Aggregate Base (Public Works Standards, Inc., 2021).
- The design subgrade R-Value should be confirmed by R-Value testing of the actual paving subgrade soils during precise grading. The preliminary pavement sections below assume R-Values of 5 and 15 considering our prior experience at the SDSU Main Campus and the subgrade conditions that may occur at the Sites.

9.2.1 Asphalt Concrete Pavements

The table below summarizes preliminary pavement sections designed per the Caltrans Highway Design Manual, Topic 633.1 (Caltrans, 2018) using a 20-year pavement design life.

PRELIMINARY ASPHALT CONCRETE STRUCTURAL PAVEMENTS SECTIONS

Pavement Type	Traffic Index	Asphalt Concrete Section	Aggregate Base Section (R~5)	Aggregate Base Section (R~15)
Passenger Car Parking	5.0	4 Inches	8 Inches	6 Inches
Truck Traffic Areas	6.0	4 Inches	12 Inches	10 Inches
Heavy Traffic Areas	7.0	4 Inches	16 Inches	14 Inches

Asphalt concrete should conform to Section 203-6 and should be compacted to 91 and 97 percent of the Rice density per ASTM D2041 (Public Works Standards, Inc., 2021).

9.2.2 Pedestrian Portland Cement Concrete Pavements

Exterior Portland Cement concrete slabs and sidewalks subjected to pedestrian and small maintenance vehicle traffic should be at least 4 inches thick and reinforced with 6x6-W2.9/W2.9 Welded Wire Fabric placed securely at mid-height of the slab. Crack control joints should be provided per the latest American Concrete Institute guidelines (e.g., ACI 302.1R).Permanent Stormwater Infiltration Best Management Practices

We do not recommend on-site infiltration from a geotechnical perspective. Stormwater Best Management Practices, such as bio-retention basins and pervious pavements should be lined with an impermeable 20-mil (minimum) HDPE or PVC membrane. The basins and pavements should have suitable subdrains that outlet via solid PVC pipe to the storm drain system.

We evaluated the geotechnical aspects of storm water management per the latest version of the City of San Diego BMP Design Manual. The assessment included a screening evaluation of the feasibility for on-site storm water infiltration. Full or partial infiltration does not appear to be feasible at the Sites due to the presence of fill and the impermeable characteristics of the Eocene Deposits.

10.0 CONSTRUCTION CONSIDERATIONS

Construction of the new structures and improvements will need to adapt to the geotechnical conditions at the site. Summarized below are the primary geotechnical-related construction considerations known at this time.

10.1 Temporary Excavations

We expect temporary excavations for the deeper portions of the recommended remedial grading and the installation of deeper underground utilities. Excavations should conform to the latest version of the Cal-OSHA guidelines.

The design and construction of temporary slopes and excavations, as well their maintenance and monitoring during construction, is the responsibility of the contractor. The contractor should have a competent person evaluate the soil or rock conditions encountered during excavation to determine permissible temporary slope inclinations and other measures as required by California OSHA (OSHA). Based on the existing data interpreted from site reconnaissance and subsurface exploration, the following OSHA Soil Types may be assumed for planning purposes. Note that slopes that exceed 20 feet in height require specific analysis by a registered Civil Engineer.

PRELIMINARY CAL/OSHA SOIL TYPES

Geologic Unit	Cal/OSHA Soil Type
Existing Fill	Type C
Residual Soils and New Compacted Fill	Type B
Eocene Deposits	Type A [1, 2]

1. Not subject to vibration, no fracturing, fissuring of dip into face of excavation.
2. Limited to 12-feet in height

The contractor should note the materials encountered in construction excavations could vary significantly across the Project Site. The above assessment of OSHA Soil Types for temporary slopes is based on preliminary engineering classifications of material encountered in widely spaced explorations. The contractor's competent person should observe temporary slopes at regular intervals to assess their need for maintenance and stability.

10.2 Excavation Characteristics

The contractor should expect resistant mass and trench excavation in the cobble conglomerate portions of the Eocene Deposits. Conglomerates cause resistant excavation due to hard rock clasts that are more difficult to excavate than the surrounding sedimentary matrix. Where encountered, these zones may require mechanical or chemical breaking prior to excavation. Excavations are also anticipated to result in an irregular surface due to the presence of cobbles and boulders, which could lead to additional soil export and concrete overbreak.

10.3 Groundwater Control

The contractor should expect a light to moderate volume of seepage at or near the contact between the fill and the conglomerate beds within the Eocene Deposits. These conditions are difficult to predict. They are typically mitigated if and where they occur.

11.0 ADDITIONAL GEOTECHNICAL SERVICES

11.1 Geotechnical Design Support Services

Development of the project will require further geotechnical services. We anticipate these services to consist of the following tasks:

- Providing geotechnical consulting and design development support through final design.
- Preparing or supporting the preparation of geotechnical-specific construction specifications (e.g., earthwork).
- Reviewing the civil, structural, landscape, and architecture (waterproofing only) plans for compatibility with the recommendations provided in the geotechnical report.
- Responding to comments by the reviewing agencies.
- Revising this geotechnical report or providing addenda as needed to address changes in design, to obtain permits, and/or address comments from reviewing agencies.

11.2 Construction Geotechnical Observation and Testing

We anticipate geotechnical observation and testing services during construction to consist of the following tasks:

- Continuous on-site observation and compaction testing by a geotechnical field technician during earthwork with associated laboratory testing (e.g., compaction curves, physical and engineering properties of import soils, R-Value tests, Expansion Index tests).

- Part-time on-site observation and compaction testing by a geotechnical field technician during subgrade preparation and pavement construction.
- Observation by a geotechnical field technician to observe that shallow foundation extend to the recommended width, depth, and bearing strata.
- Preparation of an As-Built Geotechnical Report.

12.0 LIMITATIONS

The recommendations in this report are preliminary and subject to revision from changes that occur during design development or from the results of field testing or actual subsurface conditions encountered during construction. Group Delta needs to continue to be part of the project design and construction for these recommendations to remain valid. If another geotechnical consultant provides these services, they should prepare a letter indicating their intent to assume the responsibilities of the project Geotechnical Engineer-of-Record. This letter should also indicate their concurrence with the recommendations in the report or revise them as needed to assume the role of the project Geotechnical Engineer-of-Record.

Group Delta prepared this report using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in similar localities. No warranty, express or implied, is made as to the conclusions and professional opinions included in this report.

The findings of this report are valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the work of humans on this or adjacent properties. In addition, changes in applicable or appropriate standards of practice may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

13.0 REFERENCES

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Swinerton Gensler (2024). *SDSU Evolve Student Housing Technical Proposal – RFP 7023 San Diego State University*, dated July 25.

TABLE 1 - SUMMARY OF MATERIAL AND COMPACTION RECOMMENDATIONS FOR COMPACTED FILL

<table>
<tr><th>Fill Type</th><th>Location(s) [a]</th><th>Material Recommendations [b]
[Test Standard]</th><th>Minimum Compaction Recommendations
[Test Standard]</th></tr>
<tr><td>General Compacted Fill</td><td>General Fill and Utility Trench Backfill (Outside of Pipe Zone)</td><td>EI ≤ 50 [ASTM D4829]
Passing 6" Sieve = 100% [ASTM D6913] [c]
Passing ¾" Sieve ≥ 70% [ASTM D6913]</td><td>90% RC at or slightly above OMC [ASTM D1557]</td></tr>
<tr><td rowspan="3">Structural Fill</td><td>Remedial Earthwork Zone Behind Soil Nail Wall</td><td>EI ≤ 50 [ASTM D4829]
Passing 3" Sieve = 100% [ASTM D6913] [c]
Passing ¾" Sieve ≥ 70% [ASTM D6913]
20% ≤ Passing #200 Sieve ≤ 40% [ASTM D6913]
PI < 15; LL < 50 [ASTM D4318]
Shear Strength: Friction Angle ≥ 32°; Cohesion ≥ 200 psf</td><td>90% RC at or slightly above OMC [ASTM D1557]</td></tr>
<tr><td>Select Granular Compacted Backfill Zone (See Figure 8C)</td><td rowspan="2">EI ≤ 20 [ASTM D4829]
Passing 3" Sieve = 100% [ASTM D6913] [c]
Passing ¾" Sieve ≥ 70% [ASTM D6913]
Passing #200 Sieve ≤ 35% [ASTM D6913]</td><td>90% RC at or slightly above OMC [ASTM D1557]</td></tr>
<tr><td>Upper 24" below FSG for sidewalks, slabs on grade, pavements, curbs, gutters, and other flatwork</td><td><u>Upper 12" Below FSG:</u> 95% RC at or slightly above OMC [ASTM D1557]
<u>12" to 24" Below FSG:</u> 90% RC at or slightly above OMC [ASTM D1557]</td></tr>
</table>

<u>Notes</u>:

a = If multiple zones overlap, the most stringent of the compaction and material recommendations should apply to that zone.

b = Additional Minimum Criteria that Apply to Material Recommendations:
- Satisfactory USCS Soil Types: GW, GP, GM, GC, SW, SP, SM, and SC, or combinations of these groups [ASTM D2487]
- Unsatisfactory USCS Soil Types: CH, MH, CL, ML, OH, OL and PT, or combinations of these groups [ASTM D2487]
- Corrosion Recommendations: Sulfate Content < 0.10%; Chloride Content < 0.03%; Minimum Soil Resistivity > 1,000 ohm-cm; 5.5 < pH < 10.0

c = Fill material should be placed and processed to avoid "nesting" or concentrations of rock without sufficient fines for compaction.

ASTM = ASTM International; CTM = Caltrans Test Method; EI = Expansion Index; FG = Finished Grade; FSG = Finished Subgrade; LL = Liquid Limit; PI = Plasticity Index; OMC = Optimum Moisture Content; RC = Relative Compaction; USCS = Unified Soil Classification System.

TABLE 2: ESTIMATED ELEVATION OF THE TOP SURFACE OF EOCENE DEPOSITS

Location [1]	Representative Borings	Depth to Bedrock (Feet)	Estimated Elevation (Feet) [2]
Amenity Building	B-1 [4]	2	NA [3]
	B-2	1	421
	B-3	1	417
Building 1	B-4	< 1	414
	B-5	3	412
	B-6	1	412
Building 2	B-7	1	407
	B-8	3	410
	B-9	< 1	405
Building 3	B-10	2	399
	B-11	4	396
	B-12	29	NA
	B-13	8	384
Building 4	B-14	14	NA
	B-15	8	396
Building 5	B-16	2	404
	B-17	25	NA
Building 6	B-18	3	408
	B-19	29	NA
	B-20	6	411
	B-21	42	NA
University Tower	B-22	7	465
	B-23	5	465
	B-24	5	466

Notes:

1. Long Term Site Plan from Swinerton Gensler Technical Proposal – RFP 7023 San Diego State University, July 25, 2024
2. Estimated using Google Earth Pro, accessed September 2024
3. NA – Boring not located within plan area of building. Data provided for information only.
4. Hand auger. Data provided for information only

FIGURES

REFERENCE: GOOGLE, INC (2024) GOOGLE EARTH PRO, AERIAL IMAGERY DATED: DECEMBER 1, 2022

0 750'

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

SDSU EVOLVE STUDENT HOUSING

SITE LOCATION MAP

GROUP DELTA

PROJECT NUMBER	FIGURE NUMBER
SD814A	1A

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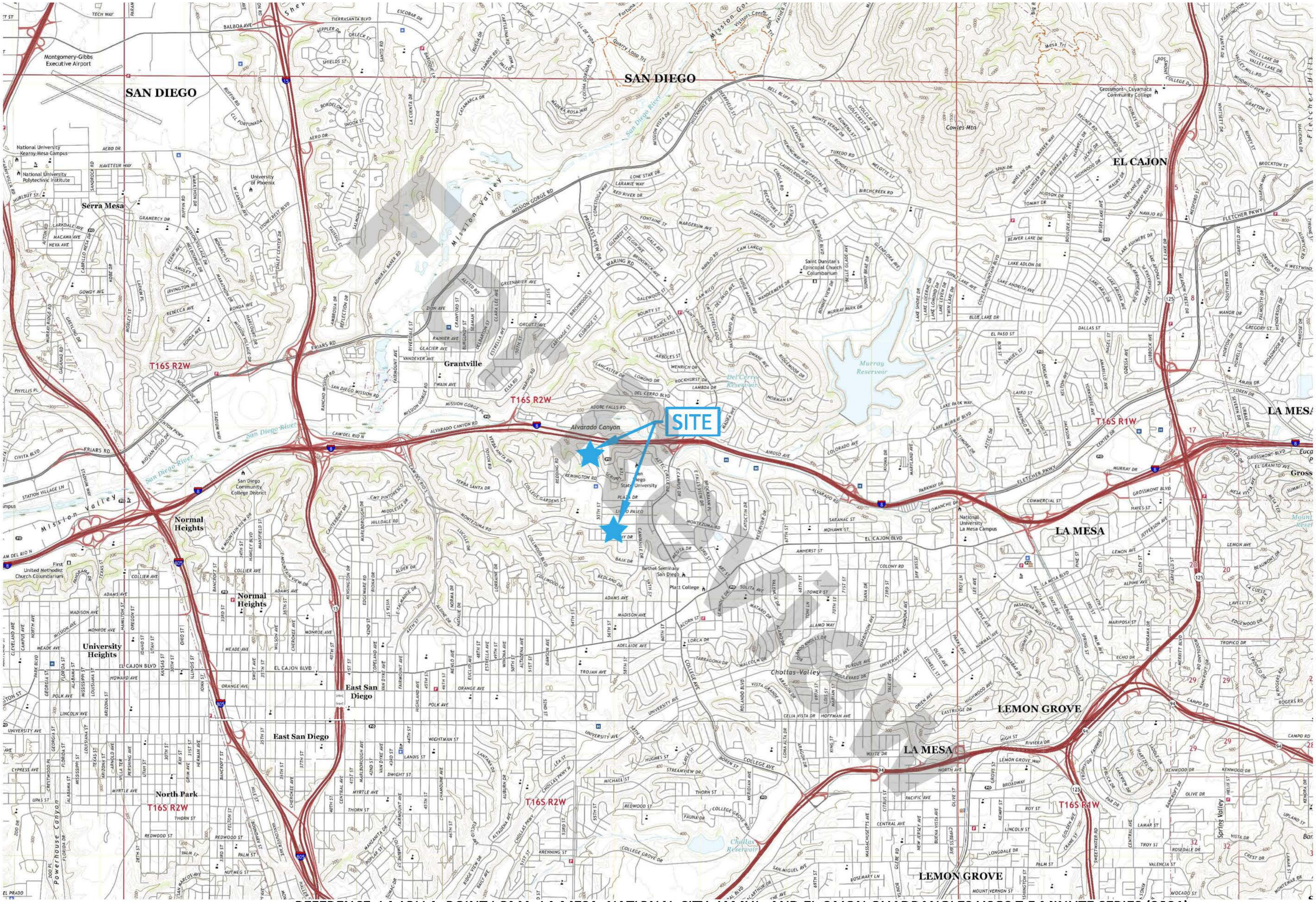

REFERENCE: LA JOLLA, POINT LOMA, LA MESA, NATIONAL CITY, JAMUL, AND EL CAJON QUADRANGLES USGS 7.5 MINUTE SERIES (2021)

0 1 MILE

1"

N

NOTE: SCALE, LOCATIONS, AND DIRECTIONS ARE PPROXIMATE.

SDSU EVOLVE STUDENT HOUSING

SITE LOCATION ON TOPOGRAPHIC MAP

GROUP DELTA

PROJECT NUMBER	FIGURE NUMBER
SD814A	1B

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EXPLANATION

CONTACT

FAULT

ANTICLINE FOLD

SYNCLINE FOLD

LANDSLIDE

STRIKE AND DIP OF BEDS INCLINED

STRIKE AND DIP OF IGNEOUS JOINTS INCLINED

STRIKE AND DIP OF IGNEOUS JOINTS VERTICAL

STRIKE AND DIP OF METAMORPHIC FOLIATION INCLINED

MAP UNITS

MODERN SURFICIAL DEPOSITS

Qls — LANDSLIDE DEPOSITS, UNDIVIDED (HOLOCENE AND PLEISTOCENE)

YOUNG SURFICIAL DEPOSITS

Qyc — YOUNG COLLUVIAL DEPOSITS (HOLOCENE AND LATE PLEISTOCENE)

OLD SURFICIAL DEPOSITS

Qoa — OLD ALLUVIAL FLOOD-PLAIN DEPOSITS, UNDIVIDED (LATE TO MIDDLE PLEISTOCENE)

VERY OLD SURFICIAL UNITS

Qvop — VERY OLD PARALIC DEPOSITS, UNDIVIDED (MIDDLE TO EARLY PLEISTOCENE)

$Qvop_7$ — UNIT 7 $Qvop_8$ — UNIT 8

SEDIMENTARY AND VOLCANIC BEDROCK UNITS

Tsdcg / Tsdss / Tsd — SAN DIEGO FORMATION (EARLY PLEISTOCENE AND LATE PLIOCENE)
Tsd - UNDIVIDED
Tsdcg - TRANSITIONAL MARINE AND NON MARINE
Tsdss - MARINE SANDSTONE

Tp / Tpm — POMERADO CONGLOMERATE (MIDDLE EOCENE)
Tpm - MIRAMAR SANDSTONE MEMBER

Tmv — MISSION VALLEY FORMATION (MIDDLE EOCENE)

Tst — STADIUM CONGLOMERATE (MIDDLE EOCENE)

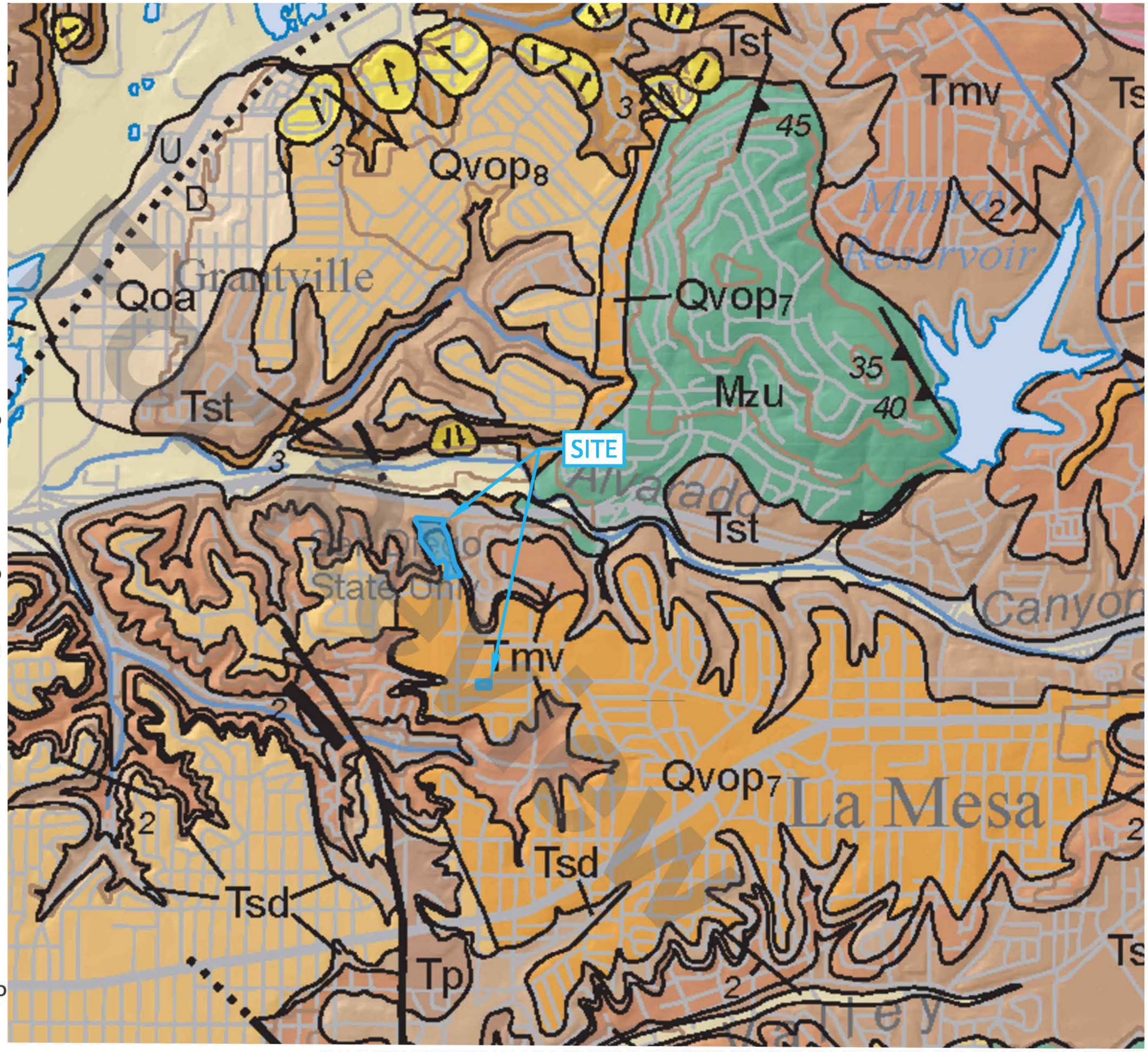
JURASSIC AND CREATACEOUS METAMORPHOSED AND UNMETAMORPHOSED VOLCANIC AND SEDIMENTARY ROCKS

M_zu — METAMORPHOSED AND UNMETAMORPHOSED VOLCANIC AND SEDIMENTARY ROCKS, UNDIVIDED (MESOZOIC)

0 3000'

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.



REFERENCE: GEOLOGIC MAP OF THE SAN DIEGO 30'X60' QUADRANGLE, CALIFORNIA BY KENNEDY AND TAN (2008)

SDSU EVOLVE STUDENT HOUSING	REGIONAL GEOLOGIC MAP	GROUP DELTA
		PROJECT NUMBER SD814A — FIGURE NUMBER 2

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_San Diego Geologic Map.dwg
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LEGEND

Geologic Hazard Categories

FAULT ZONES

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

LANDSLIDES

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

SLIDE-PRONE FORMATIONS

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

LIQUEFACTION

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

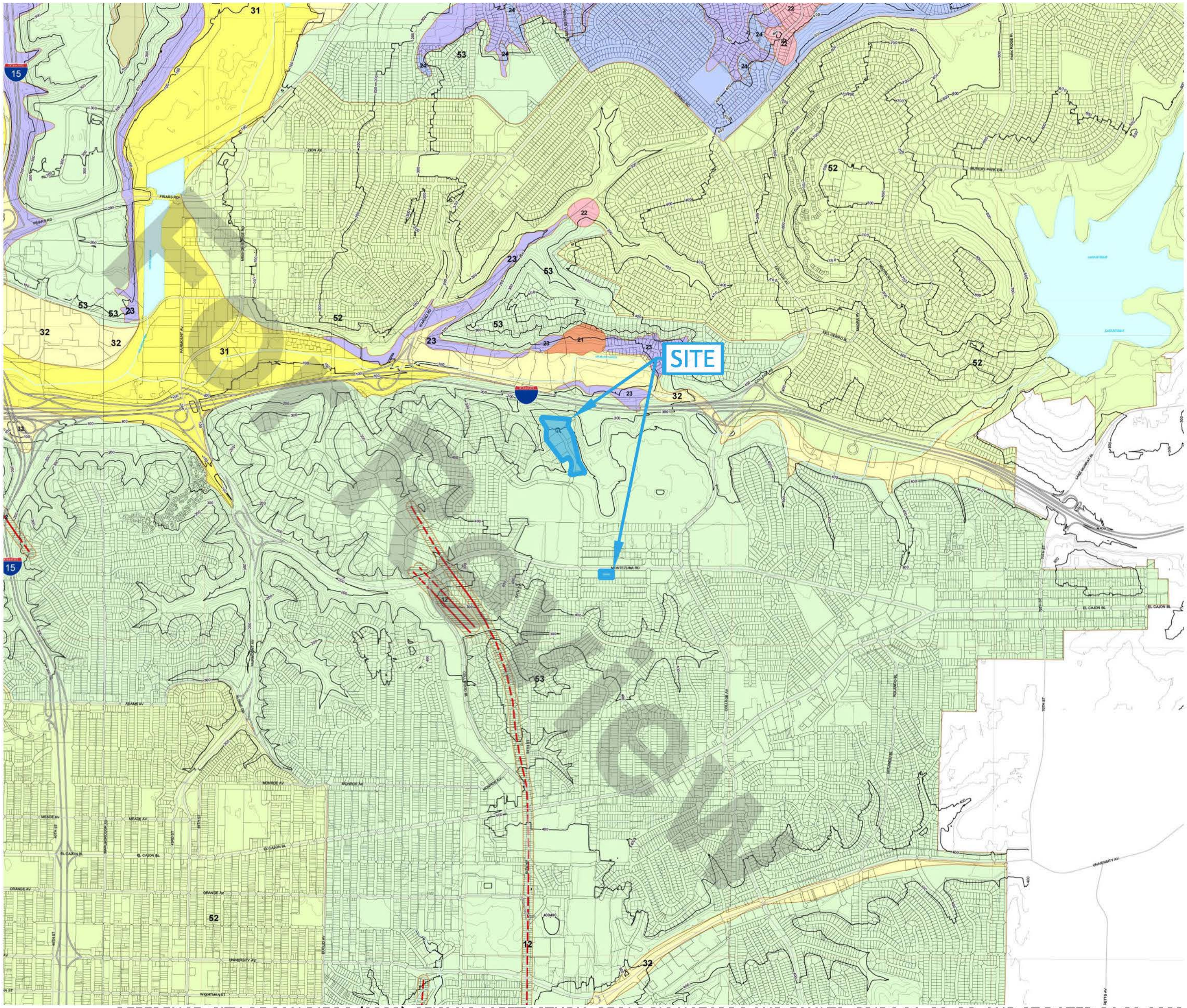
OTHER TERRAIN

- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone



REFERENCE: CITY OF SAN DIEGO (2008). SEISMIC SAFETY STUDY, GEOLOGIC HAZARDS AND FAULTS, GRIDS 21, 22, 26, AND 27 DATED 04-03-2008

0 3000'

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

SDSU EVOLVE STUDENT HOUSING	SAN DIEGO SEISMIC SAFETY STUDY MAP	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	3

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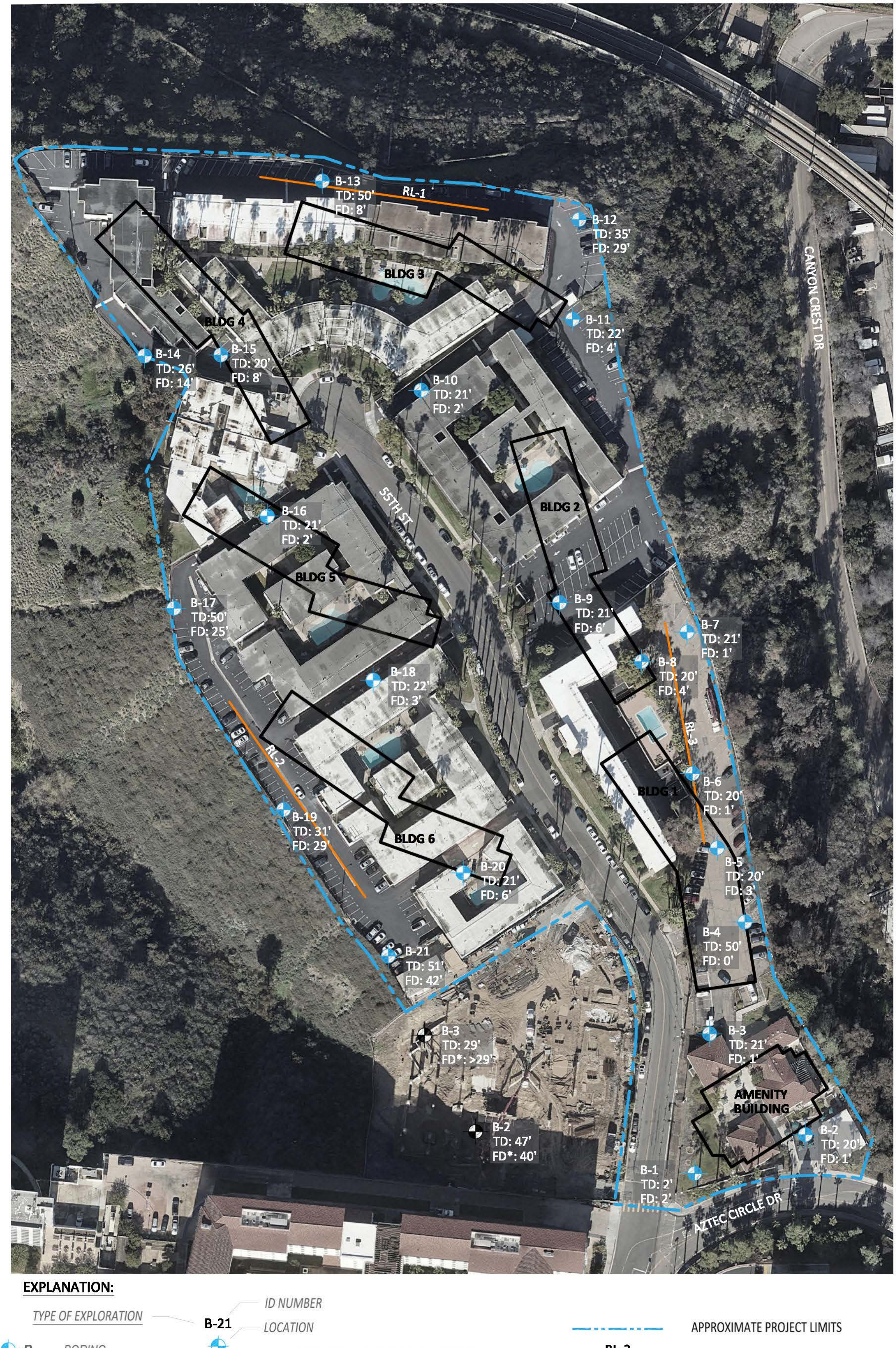

EXPLANATION:

TYPE OF EXPLORATION — B-21 — ID NUMBER

LOCATION

B- BORING

B- HISTORIC BORINGS FROM GEOCON (2019)

TD: 51' — MAXIMUM DEPTH OF EXPLORATION (BELOW EXISTING SURFACE)

FD*: 10' — FILL DEPTH

*FILL DEPTH AS INTERPRETED BY GROUP DELTA

APPROXIMATE PROJECT LIMITS

RL-3 — GEOPHYSICAL SURVEY LINE

PROPOSED BUILDING LIMITS

N

0 100' 200'

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH 2024 AERIAL IMAGERY DATED: DECEMBER 1, 2022

SDSU EVOLVE STUDENT HOUSING	EXPLORATION LOCATION MAP - PENINSULA SITE	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	4A

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EXPLANATION:

EXPLANATION:

TYPE OF EXPLORATION — B-24 — ID NUMBER

LOCATION

B- BORING

B- PREVIOUS EXPLORATIONS (GROUP DELTA, 2012)

TD: 21' — MAXIMUM DEPTH OF EXPLORATION (BELOW EXISTING SURFACE)

FD: 4' — FILL DEPTH

APPROXIMATE PROJECT LIMITS

RL-4 — GEOPHYSICAL SURVEY LINE

PROPOSED BUILDING LIMITS

0 30' 60'

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH 2024 AERIAL IMAGERY DATED: DECEMBER 1, 2022

SDSU EVOLVE STUDENT HOUSING	EXPLORATION LOCATION MAP - UNIVERSITY TOWER SITE	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	4B

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_Site Location Map.dwg
PLOTTED DATE: 9/26/2024 2:52:18 PM SAVED BY: brendaa

EXPLANATION:

HISTORICAL SEISMICITY
- >M6 EQ
- >M6-M5
- >M5-M4

SEISMIC FAULTS
- HISTORICAL <150 YRS
- < 15,000 YRS
- < 130,000 YRS
- UNDIFFERENTIATED QUATERNARY

NOTE: * THE STATE OF CALIFORNIA DEFINES "ACTIVE FAULTS" AS A FAULT THAT HAS HAD SURFACE DISPLACEMENT WITHIN THE LAST 11,700 YEARS

REFERENCE: GOOGLE EARTH, IMAGERY DATE, 05/2022
USGS, EARTHQUAKE CATALOG, ACCESSED 07/13/2022
USGS & CGS, QUATERNARY FAULT AND FOLD DATABASE, ACCESSED 7/13/2022

0 10 20 MILES

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

SDSU EVOLVE STUDENT HOUSING	REGIONAL FAULT AND SEISMICITY MAP	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	5

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_San Diego Fault Map.dwg
PLOTTED DATE: 10/7/2024 4:06:17 PM SAVED BY: brendaa

EXPLANATION:

APPROXIMATE 1953 CANYON RIM

APPROXIMATE PROJECT LIMITS

REFERENCE: (1953) AERIAL IMAGE, OBTAINED FROM WWW.HISTORICAERIALS.COM

0 600'

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

N

SDSU EVOLVE STUDENT HOUSING

PENINSULA SITE LOCATION ON 1953 AERIAL IMAGE

GROUP DELTA

PROJECT NUMBER	FIGURE NUMBER
SD814A	6A

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_Site Location Map.dwg
PLOTTED DATE: 10/7/2024 4:02:39 PM SAVED BY: brendaa

EXPLANATION:

APPROXIMATE PROJECT LIMITS

REFERENCE: (1964) AERIAL IMAGE, OBTAINED FROM WWW.HISTORICAERIALS.COM

0 600'

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

SDSU EVOLVE STUDENT HOUSING	PENINSULA SITE LOCATION ON 1964 AERIAL IMAGE	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	6B

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_Site Location Map.dwg
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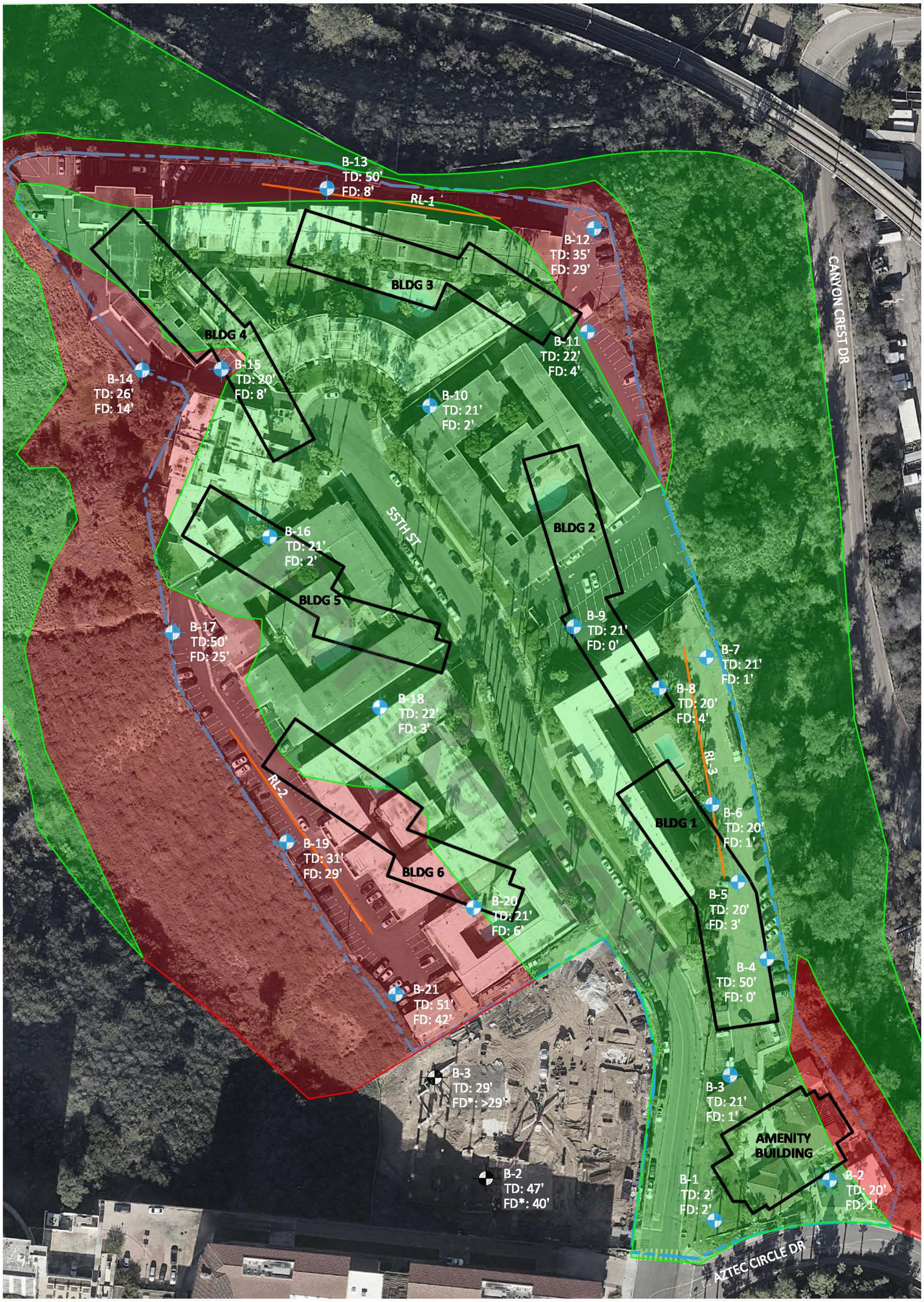

EXPLANATION:

TYPE OF EXPLORATION	
B-	BORING
B-	HISTORIC BORINGS FROM GEOCON (2019)

B-21 — ID NUMBER
LOCATION
TD: 51' — MAXIMUM DEPTH OF EXPLORATION (BELOW EXISTING SURFACE)
FD: 10' — FILL DEPTH

*FILL DEPTH AS INTERPRETED BY GROUP DELTA

- APPROXIMATE PROJECT LIMITS
- RL-3 — GEOPHYSICAL SURVEY LINE
- PROPOSED BUILDING LIMITS
- ESTIMATED AREA OF SHALLOW EOCENE DEPOSITS
- ESTIMATED AREA OF FILL

N

0 100' 200'

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH 2024 AERIAL IMAGERY DATED: DECEMBER 1, 2022

SDSU EVOLVE STUDENT HOUSING	PENINSULA SITE ESTIMATED SUBGRADE CONDITIONS	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	7

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_Site Location Map.dwg
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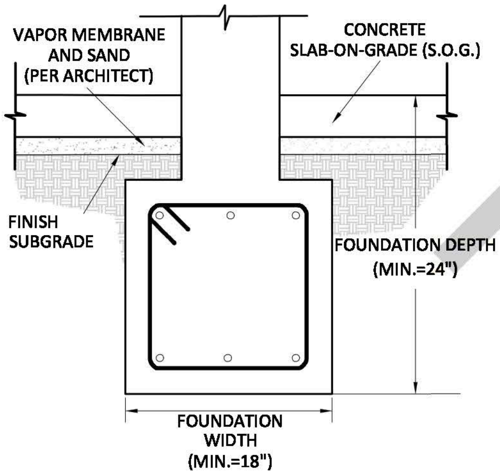
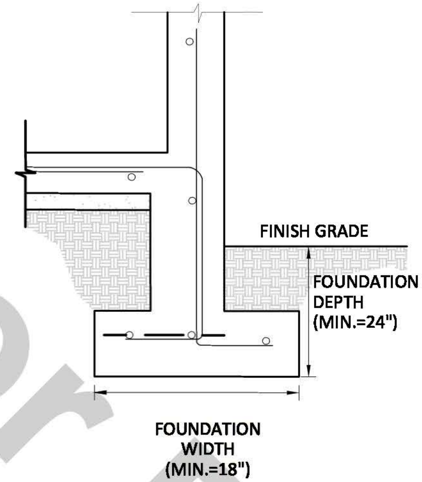
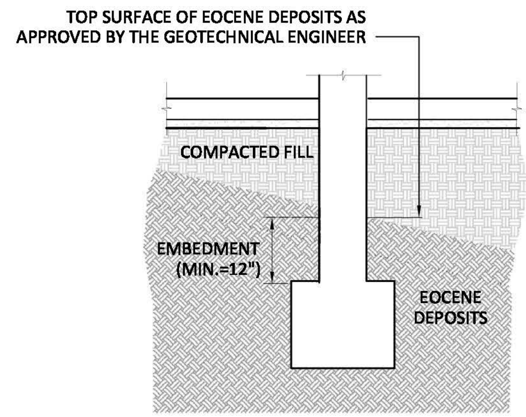


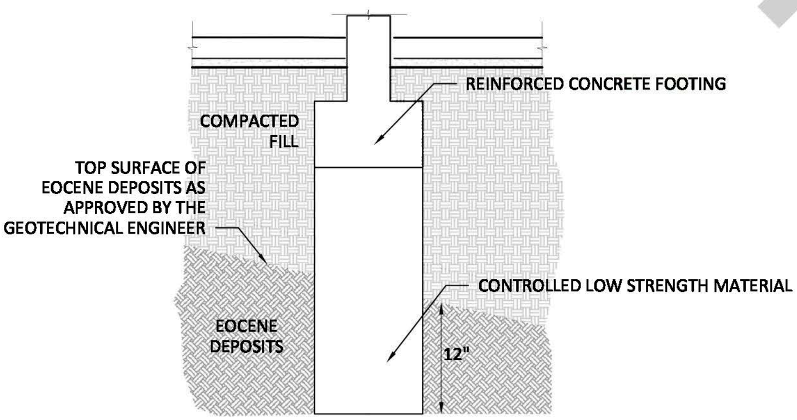
INTERIOR FOUNDATIONS (A)



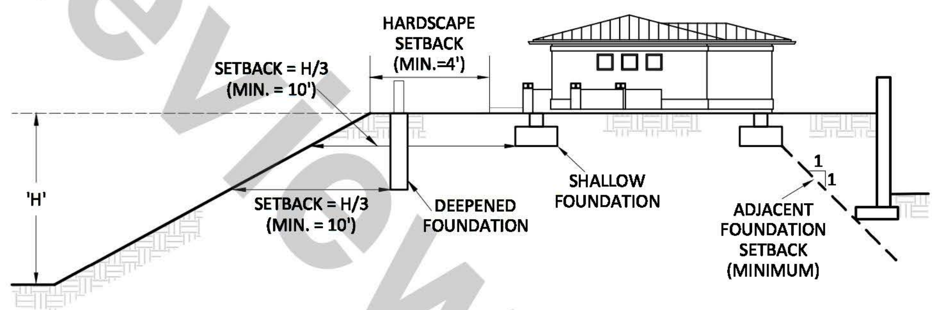
PERIMETER /EXTERIOR FOUNDATIONS (B)



MINIMUM EMBEDMENT IN EOCENE DEPOSITS (STEM WALL) (C)



MINIMUM EMBEDMENT IN EOCENE DEPOSITS (CLSM TRENCH) (D)



SETBACKS (E)

NOTES:
1) FOUNDATION REINFORCING AND SIZING PER STRUCTURAL ENGINEER (SHOWN FOR ILLUSTRATION PURPOSES ONLY).
2) VAPOR MEMBRANE AND SAND PER ARCHITECT (SHOWN FOR ILLUSTRATION PURPOSES ONLY).
3) CONCRETE IN CONTACT WITH SUBGRADE SHOULD USE CEMENT AS RECOMMENDED IN REFERENCED REPORT.

NOT TO SCALE	SDSU EVOLVE STUDENT HOUSING	SHALLOW FOUNDATIONS	GROUP DELTA PROJECT NUMBER: SD814A FIGURE NUMBER: 8

FILE PATH: N:\Projects\SD\SD800\SD814A SDSU Evolve Campus Housing Geo Inv\11. Drafting\CAD\SD814A_Shallow Foundations.dwg
PLOTTED DATE: 10/8/2024 6:22:51 PM SAVED BY: brendaa

APPENDIX A
PRIOR GEOTECHNICAL INVESTIGATIONS

APPENDIX A

PRIOR GEOTEHCNICAL INVESTIGATIONS

Prior geotechnical investigations were conducted in the past at the University Towers site and the property adjacent to the Peninsula Site (the "College View Apartments"). Relevant boring logs and laboratory testing data from these investigations are provided below.

Geocon Incorporated performed a geotechnical investigation for the recently constructed College View apartments at 5420 55th Street, adjacent to the Peninsula Site. Logs describing the subsurface conditions encountered in two of their explorations are presented in the following pages of this appendix. The maximum exploration depth was about 46 ½ feet below existing grades Approximate locations of these two borings are shown on Figure 4A.

Note, some of the materials shown on the logs as “very old paralic deposits/Mission Valley formation” and “Stadium Conglomerate” are assumed in this report to be undocumented fill based on our understanding of the site history, interpretation of blow count data, correlation with our near-by borings, and informal personal communication with construction personnel from the College View Apartments project.

BORING B 2

ELEV. (MSL.) **411'** DATE COMPLETED **08-08-2019**

EQUIPMENT **CME 75** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**5" ASPHALT**			
	B2-1			SM	**VERY OLD PARALIC DEPOSITS/MISSION VALLEY FORMATION-Undifferentiated ($Qvop_7$/Tmv)** *			
2					Dense to very dense, light brown to brown, Silty, fine- to medium-grained, Sandy CONGLOMERATE			
4								
	B2-2				-No recovery	55		
6								
8								
10	B2-3				-No recovery	33		
12								
14								
	B2-4					22		
16								
18								
20								
22								

Figure A-2,
Log of Boring B 2, Page 1 of 2

G2432-52-01.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... 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.

GEOCON

*Assumed to be Undocumented Fill based on interpretation of blow count data, our understanding of the site history, and personal communication with the College View Apartment construction personnel.

PROJECT NO. G2432-52-01

BORING B 2

ELEV. (MSL.) **411'** DATE COMPLETED **08-08-2019**

EQUIPMENT **CME 75** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
24								
25	B2-5			SC	Dense to very dense, light brown to brown, Clayey, fine- to medium-grained, Sandy CONGLOMERATE	31		
26								
28								
30	B2-6				-No recovery	29		
32								
34								
35	B2-7			SC	**STADIUM CONGLOMERATE (Tst)*** Very dense, moist, reddish brown, Clayey, fine- to coarse-grained, Sandy CONGLOMERATE (Approximate Depth)	31		
36								
38								
40	B2-8				-No recovery	50/1"		
42								
44								
46								
					BORING REFUSAL AT 46.5 FEET Groundwater not encountered Backfilled with 16 cu. ft. cement grout			

Figure A-2,
Log of Boring B 2, Page 2 of 2

G2432-52-01.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... 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.

GEOCON

*Assumed to be Undocumented Fill based on interpretation of blow count data, our understanding of the site history, and personal communication with the College View Apartment construction personnel.

BORING B 3

ELEV. (MSL.) **409'** DATE COMPLETED **08-08-2019**

EQUIPMENT **CME 75** BY: **K. HAASE**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					**4" ASPHALT**			
	B3-1			SM	**VERY OLD PARALIC DEPOSITS/MISSION VALLEY FORMATION-Undivided ($Qvop_7$/Tmv)** *			
2					Dense to very dense, damp to moist, brown, Silty, fine- to coarse-grained, Sandy CONGLOMERATE			
4								
	B3-2				-No recovery	50/6"		
6								
8								
10	B3-3				-Becomes light reddish brown	40		
12								
14								
	B3-4			SC	Dense to very dense, damp to moist, brown, Clayey, fine- to coarse-grained, Sandy CONGLOMERATE	24		
16								
18								
20	B3-5					14		
22								

Figure A-3,
Log of Boring B 3, Page 1 of 2

G2432-52-01.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... 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.

GEOCON

*Assumed to be Undocumented Fill based on interpretation of blow count data, our understanding of the site history, and personal communication with the College View Apartment construction personnel.

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING B 3** ELEV. (MSL.) **409'** DATE COMPLETED **08-08-2019** EQUIPMENT **CME 75** BY: **K. HAASE**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
24								
	B3-6				-No recovery	19		
26								
28								
					BORING TERMINATED AT 29 FEET Groundwater not encountered Backfilled with 10 cu. ft. cement grout			

Figure A-3,
Log of Boring B 3, Page 2 of 2

G2432-52-01.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... 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.

GEOCON

*Assumed to be Undocumented Fill based on interpretation of blow count data, our understanding of the site history, and personal communication with the College View Apartment construction personnel.

We previously performed a limited geotechnical investigation for San Diego State University at the University Towers Site. The investigation consisted of advancing six shallow geotechnical borings, four of which are located in the vicinity of the proposed structure. The maximum exploration depth was about 6 ½ feet below existing grades. The approximate locations of the borings are shown on Figure 4B. Logs describing the subsurface conditions encountered in the explorations are presented in the following pages of this appendix.

APPENDIX A

SUBSURFACE EXPLORATION

Field exploration consisted of a visual and geologic reconnaissance of the site, and the drilling of six exploratory borings on April 6th, 2012. The borings were advanced using a truck mounted drill rig with a 6-inch diameter solid flight auger. Bulk, disturbed and relatively undisturbed samples were collected from the borings for laboratory testing. The maximum depth of exploration was 6½ feet. The approximate locations of the borings are shown on the Exploration Plan, Figure 2. Logs showing the subsurface conditions encountered in the borings are presented in Figures A-1 through A-6.

Disturbed soil samples were collected from the borings using a Standard Penetration Test (SPT) sampler (2-inch outside diameter). Relatively undisturbed samples were also collected from the borings using a 3-inch outside diameter, ring lined sampler (modified CALifornia sampler). The SPT and CAL samples were sealed in plastic bags, labeled, and returned to the laboratory for testing. For each sample, the number of blows needed to drive the sampler 12 inches was recorded on the attached log under "blows per ft." Bulk soil samples were also collected from auger cuttings at selected intervals. Bulk samples are indicated on the boring logs with shading, whereas Standard Pen samples are indicated with "SPT", and modified California samples with "CAL".

The boring locations were determined by visually estimating, pacing and taping distances from landmarks shown on the Exploration Plans. The locations shown should not be considered more accurate than is implied by the method of measurement used and the scale of the map. The lines designating the interface between differing soil materials on the logs may be abrupt or gradational. Further, soil conditions at locations between the explorations may be substantially different from those at the specific locations we explored. It should also be noted that the passage of time can result in changes to the soil conditions reported in our logs.

LOG OF EXPLORATION BORING NO. 3

Logged by: TSL **Date:** 4/6/2012

Method of Drilling: 6-inch diameter solid-stem auger **Elevation:** 464 Feet (MSL)

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
0						**PAVEMENT:** 4 inches of asphalt concrete on 4 inches of base.	
1						**FILL/RESIDUAL SOIL:** Clayey sand (SC), dark yellowish brown, fine to medium grained sands, moist,medium dense.	Gradation R-Value
2							
2.5	21	SPT					
3						Clayey sand (SC), dark yellowish brown, fine to coarse sand, moist, medium dense.	
4							
5						*Sampler bouncing on rock.	
5	100*	CAL		113	10	**VERY OLD PARALIC DEPOSITS (UNIT 7):** Silty sand with gravel (SM), reddish brown, fine to coarse sand, moist, moderately cemented.	
6						TOTAL DEPTH = 5½ FEET NO GROUNDWATER OBSERVED BACKFILLED 4/6/12	
7							
8							
9							
10							

LOG OF EXPLORATION BORING NO. 4

Logged by: TSL | **Date:** 4/6/2012

Method of Drilling: 6-inch diameter solid-stem auger | **Elevation:** 464 Feet (MSL)

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
0 – 0.75						**PAVEMENT:** 5 inches of asphalt concrete on 4 inches of base.	
0.75 – 2			Bulk (1–3)			**FILL/RESIDUAL SOIL:** Sandy clay (CL), grayish brown, fine sands, low plasticity, moist, hard.	
2 – 5	28	CAL		111	17	Sandy clay/clayey sand (CL/SC), yellowish brown, fine sands, low plasticity, moist, medium dense.	
5 – 6.5	56	SPT				Clayey sand with gravel (SC), light brown, gravel up to 1 inch, moist, medium dense to dense.	

TOTAL DEPTH = 6½ FEET
NO GROUNDWATER OBSERVED
BACKFILLED 4/6/12

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

LOG OF EXPLORATION BORING NO. 5

Logged by: TSL **Date:** 4/6/2012

Method of Drilling: 6-inch diameter solid-stem auger **Elevation:** 463 Feet (MSL)

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
0			BULK (0–2)			**PAVEMENT:** 6 inches of asphalt concrete on 3 inches of base.	
1						**FILL/RESIDUAL SOIL:** Sandy clay (CL), dark yellowish brown, fine sands, low plasticity, moist, hard.	
2–3.5	76*	SPT				*Sampler bouncing on rock.	
3						Sandy clay with gravel (CL), light brown, fine sands, low plasticity, moist, hard.	
4							
5–6	24	CAL		---	13	**VERY OLD PARALIC DEPOSITS (UNIT 7):** Silty sand with gravel (SM), reddish brown, fine to coarse sand, moist, moderately cemented. Contains gravel up to 2-inches in maximum dimension.	
6						TOTAL DEPTH = 6 FEET NO GROUNDWATER OBSERVED BACKFILLED 4/6/12	
7							
8							
9							
10							

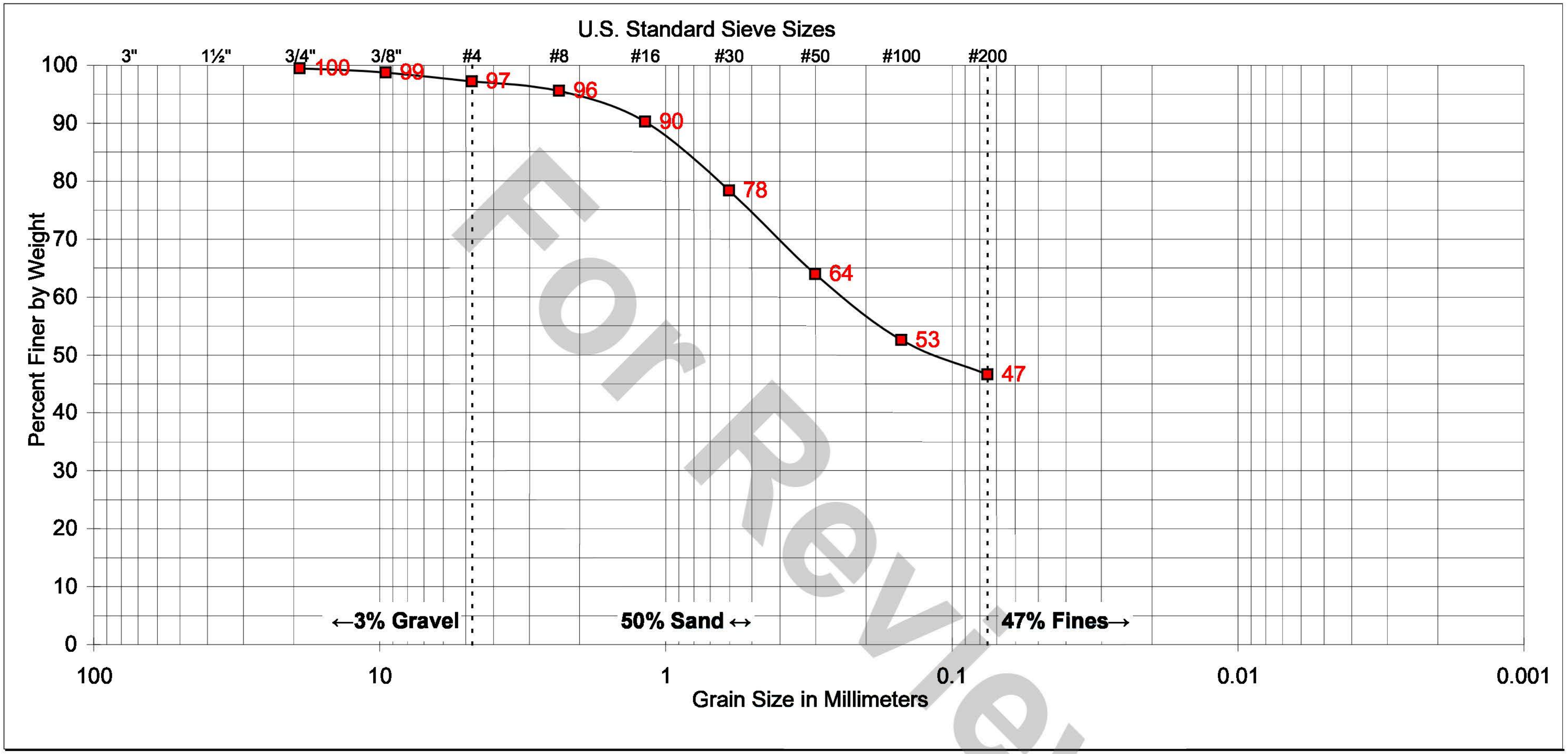
LOG OF EXPLORATION BORING NO. 6

Logged by: TSL **Date:** 4/6/2012
Method of Drilling: 6-inch diameter solid-stem auger **Elevation:** 464 Feet (MSL)

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
0 – ~0.75						**PAVEMENT:** 4 inches of asphalt concrete on 3 inches of base.	
~0.75 – 2.5			1 – 4			**FILL/RESIDUAL SOIL:** Sandy lean clay (CL), grayish brown, fine sands, low plasticity, moist, hard. PP~2½ TSF	Gradation Soluble Sulfate R-Value Lime Mix Design
2.5 – 6	28	CAL (2 – 3)		101	24	Clay (CH), pale yellowish brown, high plasticity, moist, hard. PP~2½ TSF	
6 – 6.5	21	SPT (5 – 6.5)				**VERY OLD PARALIC DEPOSITS (UNIT 7):** Cobble conglomerate (GM), silty sand matrix, fine to coarse grained sand, low plasticity, light brown, moist, very dense.	

TOTAL DEPTH = 6½ FEET
NO GROUNDWATER OBSERVED
BACKFILLED 4/6/12

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
BORING NUMBER:	B-3
SAMPLE DEPTH:	0' - 3'

UNIFIED SOIL CLASSIFICATION: SC

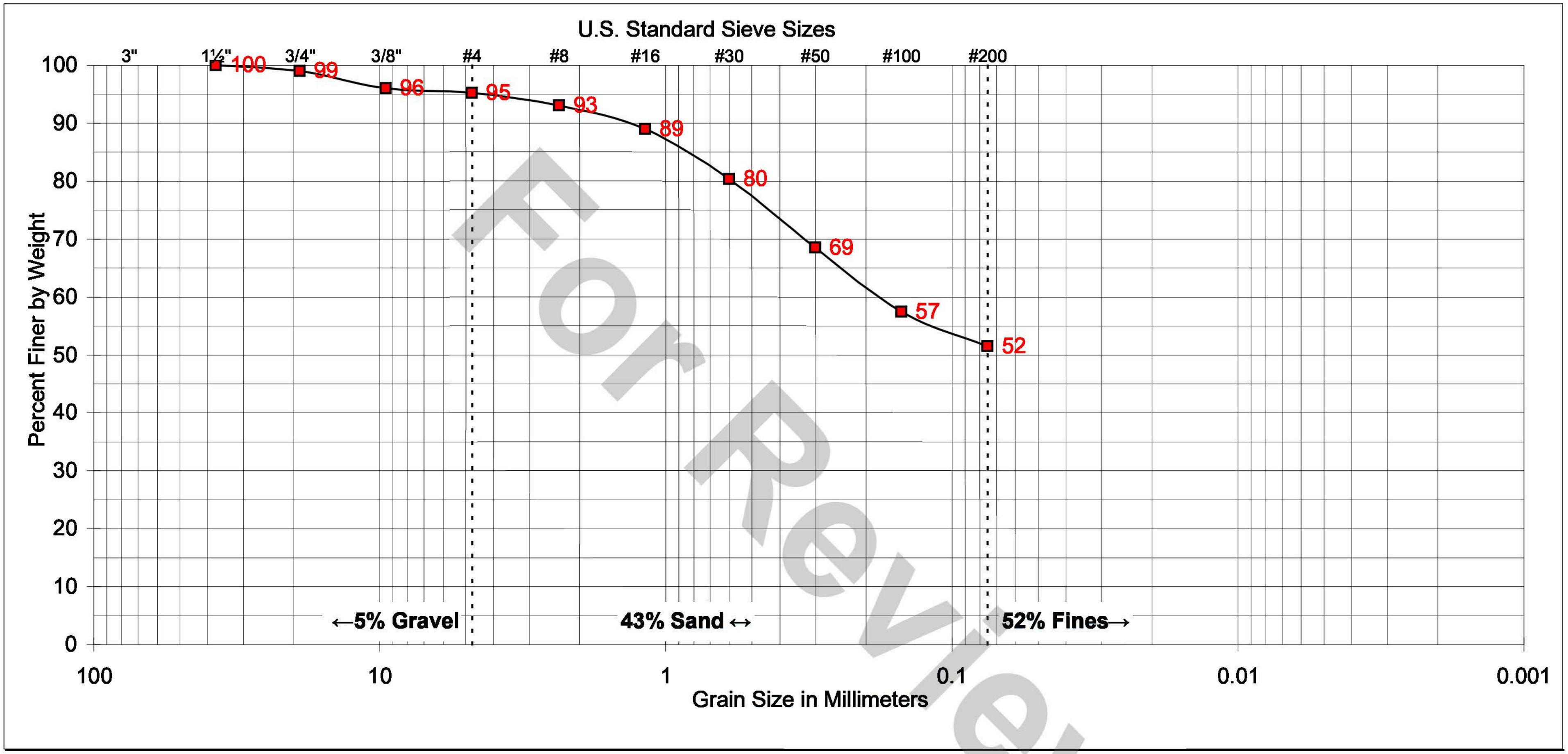
DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	---
PLASTIC LIMIT:	---
PLASTICITY INDEX:	---

GROUP DELTA CONSULTANTS
370 Amapola Avenue, Suite 212, Torrance, CA 90501
32 Mauchly, Suite B, Irvine, CA 92618
4201 Santa Ana St., Suite F, Ontario, CA 91761
9245 Activity Road, Suite 103, San Diego, CA 92126

SOIL CLASSIFICATION

Document No. 12-0123
Project No. SD273
FIGURE B-1.2



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
BORING NUMBER:	B-6
SAMPLE DEPTH:	1' - 4'

UNIFIED SOIL CLASSIFICATION: CL

DESCRIPTION: SANDY LEAN CLAY

ATTERBERG LIMITS	
LIQUID LIMIT:	---
PLASTIC LIMIT:	---
PLASTICITY INDEX:	---

GROUP DELTA CONSULTANTS
370 Amapola Avenue, Suite 212, Torrance, CA 90501
32 Mauchly, Suite B, Irvine, CA 92618
4201 Santa Ana St., Suite F, Ontario, CA 91761
9245 Activity Road, Suite 103, San Diego, CA 92126

SOIL CLASSIFICATION

Document No. 12-0123
Project No. SD273
FIGURE B-1.3

SAMPLE NO.: B-3 **SAMPLE DATE:** 4/6/12

SAMPLE LOCATION: 0' - 3' **TEST DATE:** 4/13/12

SAMPLE DESCRIPTION: Yellow brown clayey sand (SC)

LABORATORY TEST DATA

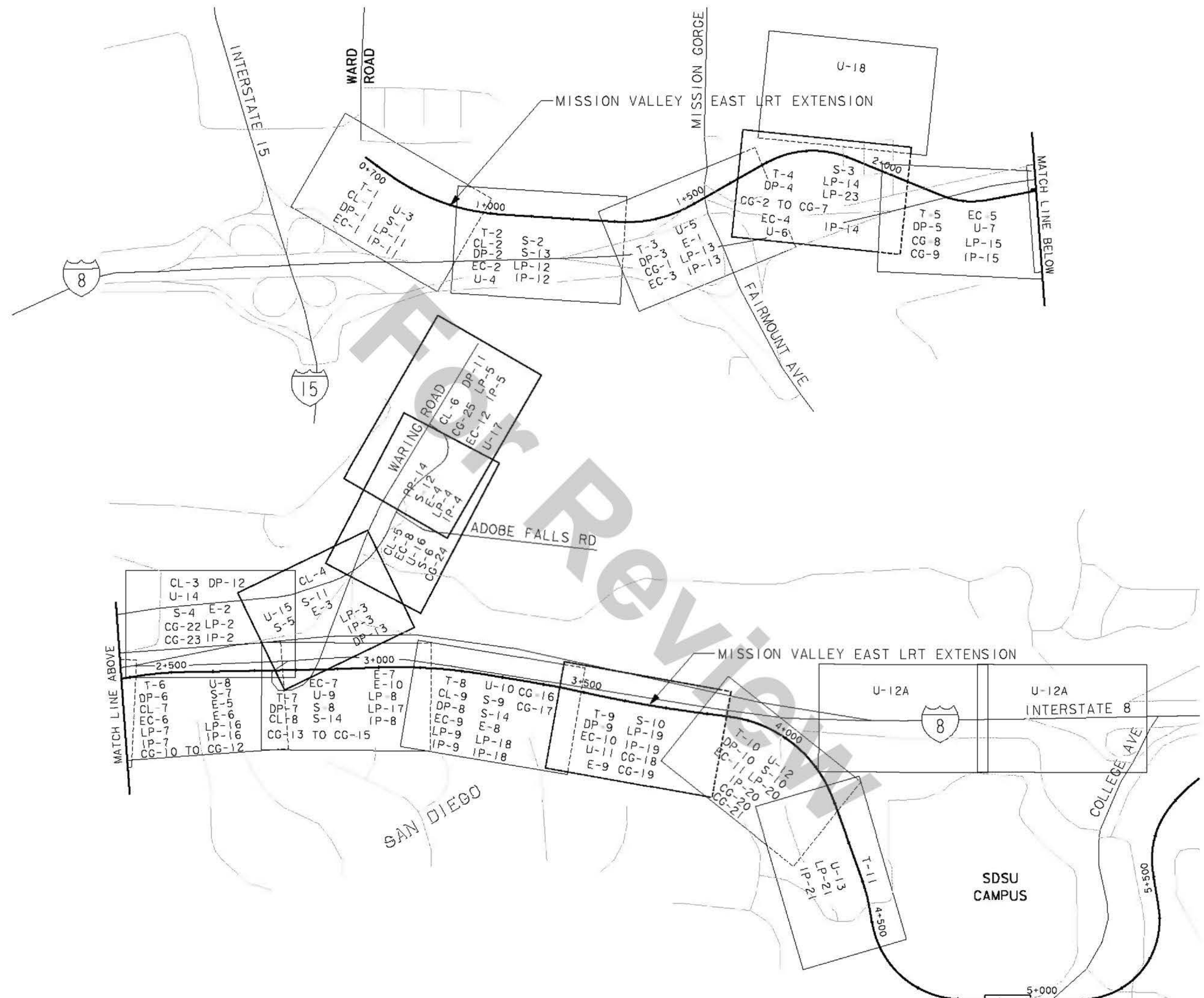
	TEST SPECIMEN	**1**	**2**	**3**	**4**	**5**	
A	COMPACTOR PRESSURE	70					[PSI]
B	INITIAL MOISTURE	15.6					[%]
C	BATCH SOIL WEIGHT	1200					[G]
D	WATER ADDED	60					[ML]
E	WATER ADDED (D*(100+B)/C)	5.8					[%]
F	COMPACTION MOISTURE (B+E)	21.4					[%]
G	MOLD WEIGHT	2000.5					[G]
H	TOTAL BRIQUETTE WEIGHT						[G]
I	NET BRIQUETTE WEIGHT (H-G)						[G]
J	BRIQUETTE HEIGHT						[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))						[PCF]
L	EXUDATION LOAD						[LB]
M	EXUDATION PRESSURE (L/12.54)						[PSI]
N	STABILOMETER AT 1000 LBS						[PSI]
O	STABILOMETER AT 2000 LBS						[PSI]
P	DISPLACEMENT FOR 100 PSI						[Turns]
Q	R VALUE BY STABILOMETER						
R	CORRECTED R-VALUE (See Fig. 14)						
S	EXPANSION DIAL READING						[IN]
T	EXPANSION PRESSURE (S*43,300)						[PSF]
U	COVER BY STABILOMETER						[FT]
V	COVER BY EXPANSION						[FT]

TRAFFIC INDEX:	5.0
GRAVEL FACTOR:	1.43
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	< 5
R-VALUE BY EXPANSION:	< 5
R-VALUE AT EQUILIBRIUM:	< 5

NOTE:
Section B.4k of CTM 301 states that: "Occasionally, material from exceptionally heavy clay test specimens will extrude from under the mold and around the follower ram during the loading operation. If this occurs when the 5520 kPa point is reached and less than 5 lights are lit, this should be noted and the soil should be reported as R-Value < 5."

*Note: Gravel factor estimated from pavement section using CTM 301, Section C, Part b.

We previously performed Log of Test Borings (LOTB) for the Green Line Trolley Extension that runs adjacent to the Peninsula Site to the north. Relevant logs and data are included in the following pages of this appendix. Note that all measurements on the LOTBs are shown in meters.



CONTRACT NUMBER: LRT-426.3
CITY PROJECT NUMBER: 990542
CALTRANS CONTRACT NUMBER: 11-054204
CALTRANS PERMIT NUMBER: 11-02-6DP0018
DATE ACCEPTED: 02 / 22 / 2006

AS-BUILT DRAWING

RESIDENT ENGINEER: THOMAS RATH
WASHINGTON GROUP INTERNATIONAL

☐ NO CHANGES
☒ CHANGES AS NOTED
REVISIONS BY: MCE (INITIALS)

CITY OF SAN DIEGO, CALIFORNIA
ENGINEERING DEPARTMENT SHEET OF SHEETS
W.O. NO. 990542
1864-6297
224-1737
31059- -D

NO.	DATE	REVISIONS	BY	CHK	APRV
APR	2006	ADD DP SHEETS	MCE		
FEB	2004	AS-BUILT	SCB		
	10/01	CONFORMED			

MVD Mission Valley Designers
A joint venture of
Parsons Brinckerhoff Quade & Douglas, Inc.
Parsons Transportation Group, Inc.
707 Broadway, Suite 1620 San Diego, California 92101 619-744-0954

REGISTERED PROFESSIONAL ENGINEER
HADI R. SAMII
No. C46173
Exp. 12/31/02
CIVIL
STATE OF CALIFORNIA

DESIGNED BY GMG	07/01
DRAWN BY GMG	07/01
CHECKED BY HRS	07/01
MTDB PRJ.ENG. JRH	

MTDB
Metropolitan Transit Development Board
1255 Imperial Avenue, Suite 1000, San Diego, CA. 92101-7490 (619)231-1466

MISSION VALLEY EAST LRT PROJECT
GRANTVILLE SEGMENT

GENERAL DRAWINGS
INDEX KEY MAP

SCALE: NO SCALE
MTDB CONTRACT NO. LRT-426.3
DRAWING NO. G-2B
SHEET NO. 3

$FILENAME$
$DATE$ $TIME$ $$$$$$USER$$$$$$

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT
11	SD	8	10.615/17.613

GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Barry Bevier No. G.E. 143 Exp. 12/31/04 GEOTECHNICAL STATE OF CALIFORNIA

Group Delta Consultants
11545 W. Bernardo Court, Suite 200
San Diego, Ca 92127
Job Number I-178

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Caltrans Metric

CONTRACT NUMBER: LRT-426.3
CITY PROJECT NUMBER: 990542
CALTRANS CONTRACT NUMBER: 11-054204
CALTRANS PERMIT NUMBER: 11-02-6DP0018
DATE ACCEPTED: 2 / 22 / 2006
AS-BUILT DRAWING
RESIDENT ENGINEER: THOMAS RATH
WASHINGTON GROUP INTERNATIONAL
☒ NO CHANGES REVISIONS BY: SCB (INITIALS)
☐ CHANGES AS NOTED

BENCHMARK:
USC&GS Brass Disk Stamped A-896 Reset-set in the south end of headwall on concrete box culvert at east of Mission Gorge Road just North of the Interstate 8 westbound offramp, Elevation 21.675m (City MSL Datum)

SUMMARY OF DRILLING EQUIPMENT

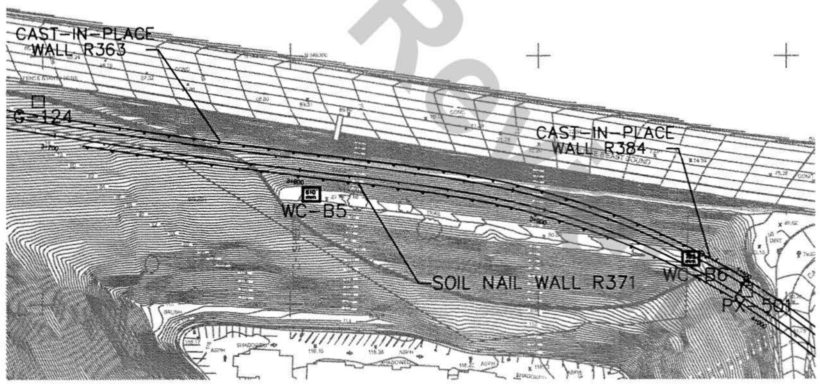
Equipment	Diameter (mm)	Drive Hammer Weight (kN)	Height of Drop (mm)
Dual Wall Percussion (a.k.a. "Becker Rig")	229	0.623	762
Air Rotary Casing Hammer	178	0.623	762
Hollow-Stem Auger	203	0.623	762
Bucket Auger	762	Varies with Depth 0 - 8.2m ..... 15.57 kN 8.2 - 16.8m ..... 10.68 kN 16.8 - 25.9m ..... 5.78 kN	305

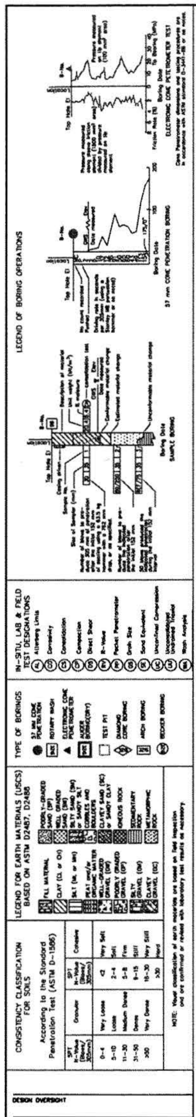
SUMMARY OF DRIVE SAMPLER DIMENSIONS

Sampler Type	Outside Diameter (mm)	Inside Diameter (mm)
SPT	51	35
California	76	61
Modified California (WC Borings)	64	48

Note: California Sampler blowcounts may be approximately converted to equivalent SPT blowcounts by using an end-area correction multiplier of 0.67

PLAN
SCALE: 1:1000





BRIDGE NO.

KILOMETER POST

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

NO.	DATE	REVISIONS	BY	CHK	APRV
MAR	2004	AS-BUILT	SCB		
	10/01	CONFORMED			

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707 Broadway, Suite 1620 San Diego, California 92101 619-744-0954

		DATE
FIELD INVESTIGATION J. BROWN, GEOLOGIST	CHECKED BY C. SCHEYHING	01/01
DRAWN BY K. FERNANDES	CHECKED BY C. SCHEYHING	01/01
MTDB PROJECT ENGINEER: JIM HECHT		01/01

MTDB
Metropolitan Transit Development Board
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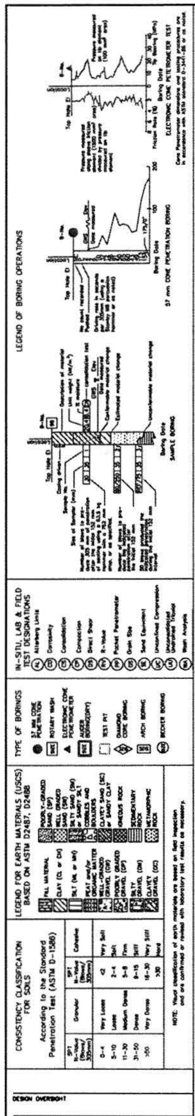
MISSION VALLEY EAST LRT PROJECT
GRANTVILLE SEGMENT

RETAINING WALLS
WALL R371 LOG OF TEST BORINGS NO. 1 OF 3

SCALE: AS SHOWN
MTDB CONTRACT NO. LRT-426.3
DRAWING NO. R-439
SHEET NO. 452

0 20 40 60 80 100
ORIGINAL SCALE (MILLIMETERS)



BENCHMARK:

USC&GS Brass Disk Stamped A-896 Reset-set in the south end of headwall on concrete box culvert at east of Mission Gorge Road just North of the Interstate 8 westbound offramp, Elevation 21.675m (City MSL Datum)

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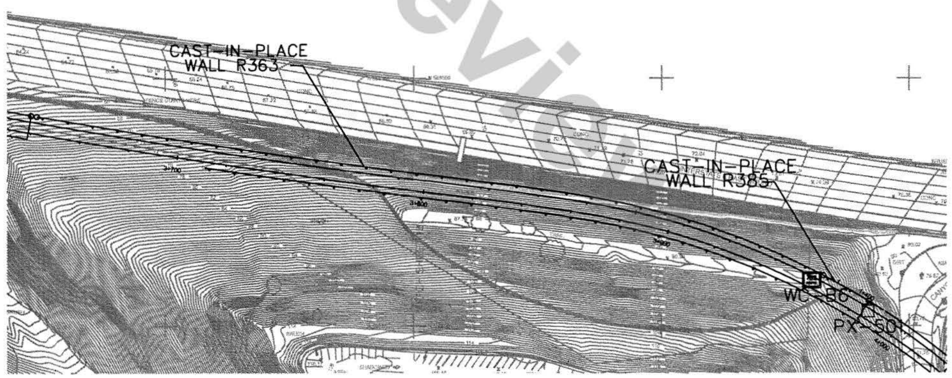
PLAN
SCALE: 1:1000



Caltrans Metric

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT
11	SD	8	10.615/17.613

Barry Bevier
GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Barry Bevier No. G.E. 143 Exp. 12/31/04 GEOTECHNICAL STATE OF CALIFORNIA

Group Delta Consultants
11545 W. Bernardo Court, Suite 200
San Diego, Ca 92127
Job Number I-178

CONTRACT NUMBER: LRT-426.3
CITY PROJECT NUMBER: 990542
CALTRANS CONTRACT NUMBER: 11-054204
CALTRANS PERMIT NUMBER: 11-02-6DP0018
DATE ACCEPTED: 2 / 22 / 2006
AS-BUILT DRAWING
RESIDENT ENGINEER: THOMAS RATH
WASHINGTON GROUP INTERNATIONAL
☒ NO CHANGES REVISIONS BY: SCB
☐ CHANGES AS NOTED (INITIALS)

BRIDGE NO.

KILOMETER POST

DESIGN OVERSIGHT

SIGNOFF DATE EA: 11-054201

NO.	DATE	REVISIONS	BY	CHK	APRV
MAR	2004	AS-BUILT	SCB		
	10/01	CONFORMED			

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707 Broadway, Suite 1620 San Diego, California 92101 619-744-0954

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DRAWN BY K. FERNANDES	CHECKED BY C. SCHEYHING	01/01
MTDB PROJECT ENGINEER: JIM HECHT		01/01

MTDB
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MISSION VALLEY EAST LRT PROJECT
GRANTVILLE SEGMENT

RETAINING WALLS
WALL R385 LOG OF TEST BORINGS NO. 1 OF 2

SCALE AS SHOWN
MTDB CONTRACT NO. LRT-426.3
DRAWING NO. R-442
SHEET NO. 455

0 20 40 60 80 100
ORIGINAL SCALE (MILLIMETERS)

BENCHMARK:
USC&GS Bross Disk Stomped A-896 Reset-set in the south end of heodwoll on concrete box culvert ot eost of Mission Gorge Rood just North of the Interstote 8 westbound offromp, Elevotion 21.675m (City MSL Ootum)

Caltrans Metric

CONTRACT NUMBER: LRT-426.3
CITY PROJECT NUMBER: 990542
CALTRANS CONTRACT NUMBER: 11-054204
CALTRANS PERMIT NUMBER: 11-02-6DP0018
DATE ACCEPTED: 2 / 22 / 2006
AS-BUILT DRAWING
RESIDENT ENGINEER: THOMAS RATH
WASHINGTON GROUP INTERNATIONAL
☒ NO CHANGES
☐ CHANGES AS NOTED
REVISIONS BY: SCB (INITIALS)

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT
11	SD	8	10.615/17.613

GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Barry Bevier — No. G.E. 143 — Exp. 12/31/04 — GEOTECHNICAL — STATE OF CALIFORNIA

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San Diego, Ca 92127
Job Number I-17B

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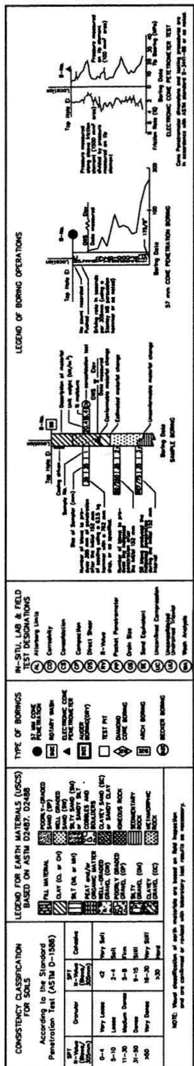

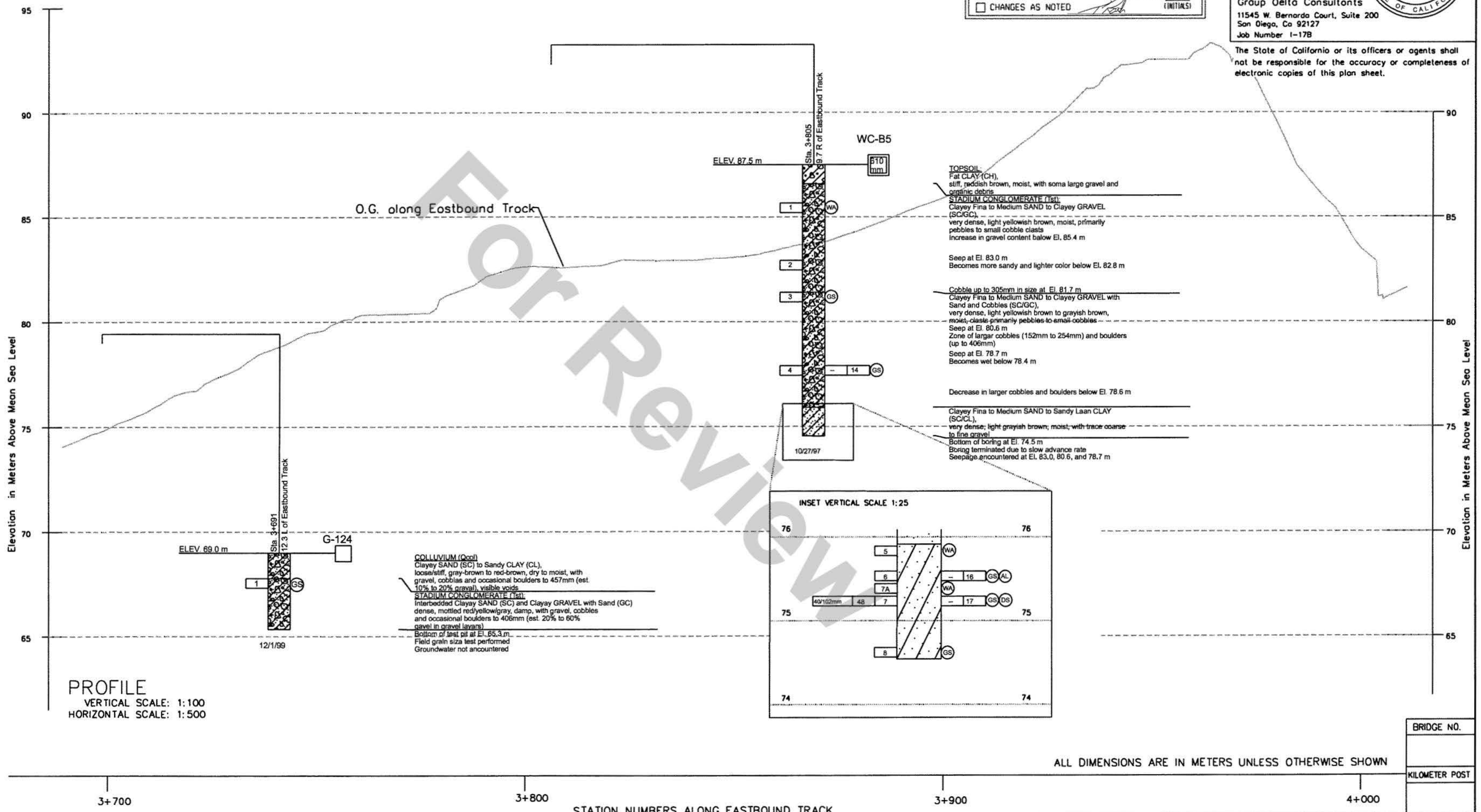

For Review

BRIDGE NO.

KILOMETER POST

DESIGN OVERSIGHT

SIGNOFF DATE — EA 11-054301

NO.	DATE	REVISIONS	BY	CHK	APRV
MAR	2004	AS-BUILT	SCB		
	10/01	CONFORMED			

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707 Broadway, Suite 1620 San Diego, California 92101 619-744-0954

FIELD INVESTIGATION	CHECKED BY	DATE
J. BROWN, GEOLOGIST	C. SCHEYHING	01/01
DRAWN BY K. FERNANDES	CHECKED BY C. SCHEYHING	01/01
MTDB PROJECT ENGINEER: JIM HECHT		01/01

MTDB
Metropolitan Transit Development Board
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MISSION VALLEY EAST LRT PROJECT
GRANTVILLE SEGMENT

RETAINING WALLS
WALL R371 LOG OF TEST BORINGS NO. 2 OF 3

SCALE: AS SHOWN
MTDB CONTRACT NO. LRT-426.3
DRAWING NO. R-440
SHEET NO. 453

0 20 40 60 80 100
ORIGINAL SCALE (MILLIMETERS)

BENCHMARK:
USC&GS Bross Oisk Stomped A-B96 Reset-set in the south end of headwall on concrete box culvert ot east of Mission Gorge Rood just North of the Interstote B westbound offromp, Elevation 21.675m (City MSL Ootum)

Caltrans Metric

DIST.	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT
11	SD	8	10.615/17.613

CONTRACT NUMBER: LRT-426.3
CITY PROJECT NUMBER: 990542
CALTRANS CONTRACT NUMBER: 11-054204
CALTRANS PERMIT NUMBER: 11-02-6DP0018
DATE ACCEPTED: 2 / 22 / 2006
AS-BUILT DRAWING
RESIDENT ENGINEER: THOMAS RATH
WASHINGTON GROUP INTERNATIONAL
☒ NO CHANGES
☐ CHANGES AS NOTED
REVISIONS BY: SCB (INITIALS)

Barry Bevier
GEOTECHNICAL PROFESSIONAL
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Barry Bevier
No. G.E. 143
Exp. 12/31/04
GEOTECHNICAL
STATE OF CALIFORNIA

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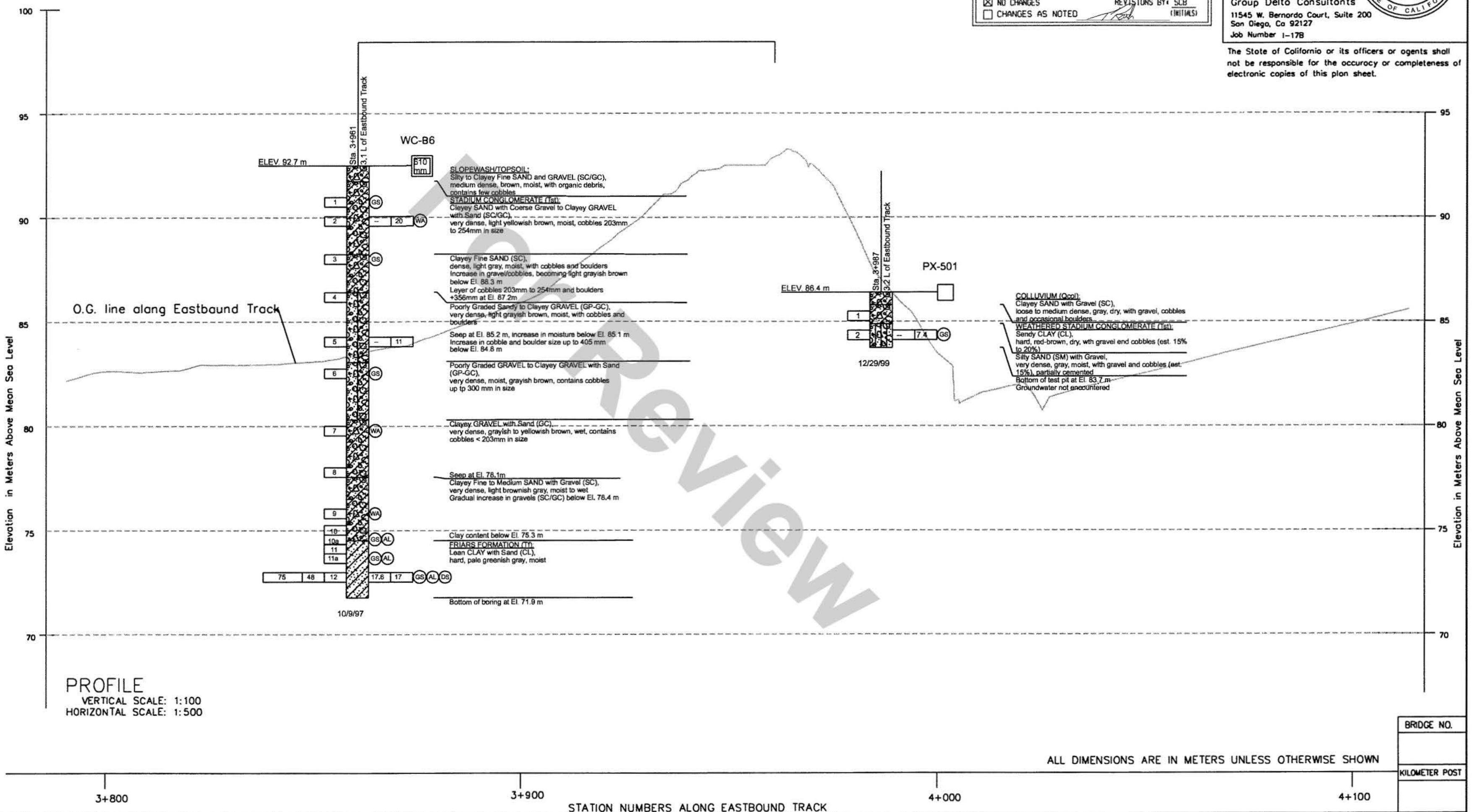

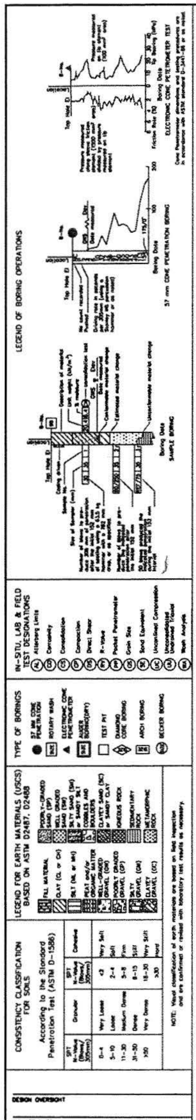

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

BRIDGE NO.

KILOMETER POST

DESIGN OVERSIGHT

SIGNOFF DATE EA: 11-054201

NO.	DATE	REVISIONS	BY	CHK	APRV
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FIELD INVESTIGATION J. BROWN, GEOLOGIST	CHECKED BY C. SCHEYHING	DATE 01/01
DRAWN BY K. FERNANDES	CHECKED BY C. SCHEYHING	01/01
MTDB PROJECT ENGINEER: JIM HECHT		01/01

MTDB
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MISSION VALLEY EAST LRT PROJECT
GRANTVILLE SEGMENT

RETAINING WALLS
WALL R371 LOG OF TEST BORINGS NO. 3 OF 3

SCALE AS SHOWN
MTOB CONTRACT NO. LRT-426.3
DRAWING NO. R-441
SHEET NO. 454

0 20 40 60 80 100
ORIGINAL SCALE (MILLIMETERS)

APPENDIX B
EXPLORATION RECORDS

APPENDIX B

EXPLORATION RECORDS

Field exploration included a visual reconnaissance of the site, detailed mapping of the slopes surrounding the "Peninsula Site", and the drilling of twenty-four (24) geotechnical between August 12th and 20th, 2024. The maximum depth of exploration was 51.5 feet below surrounding grades. A summary of the explorations is included in Table A-1. The approximate exploration locations are shown in Figures 4A and 4B. Logs of the explorations are provided in Figures A-1 through A-24, immediately after the Boring Record Legends of this Appendix A. The exploratory borings using the Caltrans Soil and Rock Logging, Classification and Presentation Manual (2010) as a guideline.

GEOTECHNICAL BORINGS

The geotechnical borings were advanced using hollow stem auger and/or air percussion drilling methods. The borings were advanced by Tri-County Drilling using a Diedrich D-120 drill rig. Disturbed samples were collected from the borings using a 2-inch outside diameter unlined Standard Penetration Test (SPT) sampler. Less disturbed samples were collected using a 3-inch outside diameter ring lined sampler (a modified California sampler). Bulk samples were collected throughout the borings. The samples were sealed in plastic, labeled, and returned to our San Diego laboratory for testing.

The drive samples were collected from the exploratory borings using an automatic hammer with an average Energy Transfer Ratio (ETR) of approximately 80 percent. For each sample, the 6-inch incremental blow counts were recorded on the logs. The field blow counts (N) were normalized to approximate the standard 60 percent ETR, as shown on the logs (N_{60}). The modified California ring samples were also corrected for the 3-inch sampler diameter using Burmister's correction factor.

SLOPE MAPPING

Detailed mapping of the slopes surrounding the "Peninsula Site" was performed by a licensed Professional Geologist on August 16th, 2024. The mapping effort was intended to differentiate cut slopes from fill slopes and identified cut-fill transitions at the site. Figure 7 shows results of this mapping effort.

Table B-1 – Explorations Summary (see Figure 2, Exploration Locations)						
Exploration ID	Latitude[1] [°]	Longitude[1] [°]	Top Elevation[2] [FT]	Exploration Depth[3] [FT]	Bottom Elevation[3] [FT]	Figure No.
B-1	32.775918	-117.076520	423	2	421	A-1
B-2	32.776028	-117.076153	421	20	401	A-2
B-3	32.776310	-117.076473	417	21	396	A-3
B-4	32.776624	-117.076357	414	50	364	A-4
B-5	32.776832	-117.076451	412	20	392	A-5
B-6	32.777041	-117.076532	412	20	392	A-6
B-7	32.777441	-117.076549°	407	21	386	A-7
B-8	32.777355	-117.076703	410	20	390	A-8
B-9	32.777520	-117.076980	405	21	384	A-9
B-10	32.778119	-117.077439	399	21	378	A-10
B-11	32.778319	-117.076930	396	22	374	A-11
B-12	32.778594	-117.076908	393	35	358	A-12
B-13	32.778710	-117.077769	384	50	334	A-13
B-14	32.778221	-117.078366	386	26	360	A-14
B-15	32.778222	-117.078113	396	20	376	A-15
B-16	32.777777	-117.077954	404	21	383	A-16
B-17	32.777507	-117.078266	405	50	355	A-17
B-18	32.777304	-117.077603	408	22	386	A-18
B-19	32.776940	-117.077902	408	31	377	A-19
B-20	32.776761	-117.077297	411	21	390	A-20
B-21	32.776531	-117.077551	411	51	360	A-21
B-22	32.770536	-117.074338	465	20	445	A-22
B-23	32.770517	-117.074574	465	52	413	A-23
B-24	32.770331	-117.074735	466	21	445	A-24

[1] Coordinates were recorded in the field using a Garmin GPSMAP 64st by waypoint averaging with American GPS and Russian GLONASS satellites

[2] GoogleEarth Pro was used to estimate the top elevation of each exploration.

[3] Rounded to the nearest foot.

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	○
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
	Percent of Proportion of Soil	2.5.7	3.2.4	●	●
7	Particle Size	2.5.8	2.5.8	●	●
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
14	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent of Proportion of Soil; Particle Size; Plasticity (optional).

● = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders;
Description of cobbles & boulders;
Consistency field test result

EXPLORATION IDENTIFICATION

Explorations are identified using the following convention

H-YY-NNN

Where:

H: Exploration type code

YY: 2-digit year (where utilized)

NNN: Exploration number

Hole Type Code and Description

Hole Type Code	Description
A	Auger Boring (Hollow or solid stem bucket)
BA	Bucket Auger
CPT	Cone Penetration Test
D	Driven (dynamic cone penetrometer)
HA	Hand Auger
HD	Hand driven (1-inch soil tube)
O	Other (note on LOTB)
P	Rotary Percussion Boring (AIr)
R	Rotary drilled boring (Conventional)
RC	Rotary core (self-cased wire-line, continuosly sampled)
RW	Rotary cored (self cased wire-line, not continuosly sampled)
TP	Test Pit

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2,75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard, subrounded.

Clayey SAND (SC) medium dense, light brown; wet; mostly fine sand; little fines; low plasticity.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

EXPLORATION RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names	Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES AND BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 4546)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643; CTM 417; CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 6913, ASTM D 7928)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 2937)
WA	Percent passing the No. 200 Sieve (ASTM D 1140)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Modified California Sampler (2.4" ID, 3" OD)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sampler
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- Static Water Level Reading

Term	Definition	Symbol
Unit Change	Change in geologic unit	————
Material Change Within Unit	Change of soil classification within geologic unit	— — — — — —

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

EXPLORATION RECORD LEGEND #2

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CONSISTENCY OF COHESIVE SOILS

Description	Shear Strength (tsf)	Pocket Penetrometer , PP Measurement (tsf)	Torvane, TV, Measurement (tsf)	Vane Shear, VS, Measurement (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (blows / 12 inches)
Very Loose	0 - 4
Loose	5 - 9
Medium Dense	10 - 29
Dense	30 -50
Very Dense	Greater than 50

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present but no free water
Wet	Visible free water

CONSISTENCY OF COHESIVE SOILS*

Description	SPT N_{60} (blows / 12 inches)
Very Soft	0 - 1
Soft	2 - 3
Medium Stiff	4 - 7
Stiff	8 - 14
Very Stiff	15 - 30
Hard	Greater than 30

* Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

PARTICLE SIZE

Description		Size (in)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 -1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

PLASTICITY

Description	Criteria
Nonplastic	A 1/8-in. thread cannot be rolled at any water content
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

GROUP DELTA

EXPLORATION RECORD
LEGEND #3

LEGEND OF ROCK MATERIALS

Igneous Rock

Sedimentary Rock

Metamorphic Rock

BEDDING SPACING

Description	Thickness / Spacing
Massive	Greater than 10ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in - 1 ft
Thinly Bedded	1 in - 4 in
Very Thinly Bedded	1/4 in - 1 in
Laminated	Less than 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

Description	Diagnostic Features					General Characteristics
	Chemical Weathering - Discoloration - Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Leaching		
	Body of Rock	Fracture Surfaces		Texture	Leaching	
Fresh	No discoloration, no oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No leaching	Hammer rings when crystalline rocks are struck
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals	Hammer does not ring when rock is struck. Body of rock not weakened
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally Preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, grain boundary conditions	All fracture surfaces are discolored or oxidized; surfaces friable	Partial separation, rock is friablr; in semi-arid conditions, granitics are disaggregated	Texture altered by chemical disintegration (hydration, argillation)	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures of veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes"

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ LENGTH OF THE RECOVERED CORE PIECES (IN.)}}{\text{TOTAL LENGTH OF CORE RUN (IN.)}} \times 100$$

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ LENGTH OF THE INTACT CORE PIECES} \geq 4 \text{ IN.}}{\text{TOTAL LENGTH OF CORE RUN (IN.)}} \times 100$$

RQD* INDICATES SOUNDNESS CRITERIA NOT MET

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows,
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft
Slightly Fractured	Core lengths mostly from 1 to 3 ft
Moderately Fractured	Core lengths mostly 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

EXPLORATION RECORD
LEGEND #4

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BORING RECORD

PROJECT NAME: SDSU Evolve Student Housing	PROJECT NUMBER: SD814A	BORING: B-1	
SITE LOCATION: San Diego State University, San Diego, California	START: 8/20/2024	FINISH: 8/20/2024	SHEET NO.: 1 of 1
DRILLING COMPANY: Group Delta	DRILLING METHOD: Hand Auger	LOGGED BY: S. Narveson	CHECKED BY: E. Mehlhorn
DRILLING EQUIPMENT: Hand Auger	BORING DIA. (in): 4	TOTAL DEPTH (ft): 2	GROUND ELEV (ft): 422
DEPTH/*ELEV.* GROUNDWATER (ft): N.E. / *na*	SAMPLING METHOD: Bulk	NOTES:	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		Bulk	B1							Hand Auger		Approximately 4 inches of sod and organic topsoil.
	420											**FILL:** SILTY SAND with GRAVEL (SM); medium dense; grayish brown (10YR 5/2); moist; mostly fine to coarse SAND; little fine to coarse GRAVEL; little fines; nonplastic.
												Total Depth = 2 feet (hand auger refusal on Eocene Deposits). This Boring Record is part of a geotechnical report which must be considered in its entirety. The ground elevation reported on this Boring Record was estimated using Google Earth.
5												
	415											
10												
	410											
15												
	405											
20												
	400											

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, California 92126

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS 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 THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE B-1

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-2

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/12/2024	8/12/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-2')/Air Percussion (2'-20.9')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	20.4	421	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	421											**PAVEMENT:** Approximately 2 inches of ASPHALT CONCRETE; no BASE.
	420											**FILL:** SILTY SAND (SM); dark yellowish brown (10YR 3/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL and COBBLES; nonpastic.
			B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (2.5Y 6/3) soft sandstone matrix; variably colored, hard, rounded igneous clasts; (poorly graded GRAVEL with SILT and SAND (GP-GM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broekn rock fragments; little fines; nonplastic).
5			S2	50/5"	REF	REF						@4.5' - 5': SANDSTONE bed.
	415											
			B3									
10			R4	50/5"	REF	REF						
	410											
			B5									Estimated 60% to 70% GRAVEL and COBBLES by volume.
15			S6	47 50/5"	100+	100+						
	405											
			B7									@17' - 18': SANDSTONE bed.
20			R8	50/5"	REF	REF						
	400											Total Depth = 20.4 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/12/2024	8/12/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-8')/Air Percussion (1.5'-20.6')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	20.6	417	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS
	415	B1						R
5		R2	33 50/6"	100+	100+			
	410	B3						
10		S4	32 50/5"	100+	100+			
	405	B5						
15		R6	12 31 47	78	72	10.2	113	PA DS
	400	B7						
20		S8	43 50/5"	100+	100+			
	395							

DRILLING METHOD · GRAPHIC LOG

DESCRIPTION AND CLASSIFICATION

PAVEMENT: Approximately 2 inches of ASPHALT CONCRETE; no BASE.

FILL: CLAYEY SAND with GRAVEL (SC); dark yellowish brown (10YR 3/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.

EOCENE DEPOSITS*: POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (2.5Y 6/3) soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; medium plasticity).

@11'-15': SANDSTONE bed.

27% Gravel, 56% Sand, 17% Fines.

Estimated 30% to 40% GRAVEL and COBBLES by volume.

Total Depth = 20.6 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

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San Diego, California 92126

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FIGURE
B-3

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-4

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/2024	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-5.5')/Air Percussion (5.5'-50.4')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	50.4	414	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 2 inches of ASPHALT CONCRETE; no BASE.
			B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
	410											
5			R2	50/5"	REF	REF						
			B3									@7' - 9': SANDSTONE bed.
	405											
10			S4	35 50/6"	100+	100+	6.0		PA			17% Gravel, 62% Sand, 21% Fines.
												@11' - 13': SANDSTONE bed.
			B5									
	400											
15			R6	50/3"	REF	REF						No sample recovery; refusal on COBBLE.
												Estimated 40% GRAVEL and COBBLES by volume.
			B7									
	395											
20			R8	50/3"	REF	REF						
			B9									
	390											

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FIGURE B-4 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-4

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/2024	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-5.5')/Air Percussion (5.5'-50.4')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	50.4	414	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	50/3"	REF	REF						
												EOCENE DEPOSITS* (continued):POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
			B11									
	385											
30												Estimated 60% GRAVEL and COBBLES by volume.
			R12	37 50/3"	100+	100+						
												Light yellowish brown (2.5Y 6/3) matrix.
			B13									
	380											
35												
			S14	33 50/5"	100+	100+						
												Estimated 40% GRAVEL and COBBLES by volume.
			B15									
	375											
40			R16	50/5"	REF	REF						No sample recovery; refusal on COBBLE.
												Estimated 60% GRAVEL and COBBLES by volume.
			B17									
	370											
45			S18	50/6"	REF	REF						No sample recovery; refusal on COBBLE.
			B19									
	365											

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-4**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/2024	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-5.5')/Air Percussion (5.5'-50.4')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	50.4	414	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		⊠	S20	50/5"								**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light yellowish brown (2.5Y 6/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
	360											
55												Total Depth = 50.4 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
	355											
60												
	350											
65												
	345											
70												
	340											

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-5**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-0.5')/Air Percussion (0.5'-20.4')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	20.4	412	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	412											**PAVEMENT:** Approximately 2 inches of ASPHALT CONCRETE; no BASE.
	410											**FILL:** CLAYEY SAND with GRAVEL (SC); pale brown (2.5Y 7/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity. 30% Fines
			B1						EI PI WA			
												EOCENE DEPOSITS*: POORLY INDURATED COBBLE CONGLOMERATE (description below).
5												@4.5' - 6.5': SANDSTONE bed.
			S2	29 32 36	68	93			CR			
	405											POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); moist; mostly fine to coarse SAND; some fines; few GRAVEL and freshly broken rock fragments; low plasticity).
			B3									
10			R4	50/5"	REF	REF						
	400											
			B5									
15			S6	50/5"	REF	REF						
	395											
			B7									
20			R8	50/5"	REF	REF						
	390											

Total Depth = 20.4 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE

B-5

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-6

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/12/2024	8/12/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-5')/Air Percussion (5'-20.4')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	20.4	412	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	412											**PAVEMENT:** Approximately 2 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); pale brown (2.5Y 7/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
	410		B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broekn rock fragments; little fines; low plasticity).
5			S2	22 50/4"	100+	100+	4.5		WA			46% Gravel, 41% Sand, 13% Fines.
	405		B3									
10			R4	50/4"	REF	REF						
	400		B5									
15			S6	50/5"	REF	REF						
	395		B7									Estimated 50% GRAVEL and COBBLES by volume.
20			R8	50/5"	REF	REF						
	390											

Total Depth = 20.4 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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BORING RECORD

PROJECT NAME	SDSU Evolve Student Housing
PROJECT NUMBER	SD814A
BORING	B-7
SITE LOCATION	San Diego State University, San Diego, California
START	8/12/2024
FINISH	8/12/2024
SHEET NO.	1 of 1
DRILLING COMPANY	Tri-County Drilling
DRILLING METHOD	HSA (0'-1')/Air Percussion (1'-20.6')
LOGGED BY	E. Mehlhorn
CHECKED BY	S. Narveson
DRILLING EQUIPMENT	Diedrich D-120
BORING DIA. (in)	4/8
TOTAL DEPTH (ft)	20.6
GROUND ELEV (ft)	408
DEPTH/*ELEV.* GROUNDWATER (ft)	N.E. / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in.
NOTES	ETR ~ 80%, $N_{60} = 1.34{*}N_{SPT} = 1.08{*}N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	408											**PAVEMENT:** Approximately 2 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); dark yellowish brown (10YR 3/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
	405		B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; dark yellowish brown (10YR 3/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
5			S2	28 34 33	67	92	5.0		WA			42% Gravel, 44% Sand, 17% Gravel
	400		B3									Estimated 70% GRAVEL and COBBLES by volume.
10			R4	50/6"	REF	REF						
	395		B5									Estimated 50% GRAVEL and COBBLES by volume.
15			S6	35 50/5"	100+	100+						@14.5' - 15.5': SANDSTONE bed.
												Estimated 30% to 40% GRAVEL and COBBLES by volume.
	390		B7									
20			R8	35 50/1"	100+	100+						
	385											Total Depth = 20.6 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.

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BORING RECORD

PROJECT NAME	SDSU Evolve Student Housing	**PROJECT NUMBER**	SD814A	**BORING**	**B-8**
SITE LOCATION	San Diego State University, San Diego, California	**START**	8/12/2024	**FINISH**	8/12/2024
SHEET NO.	1 of 1				
DRILLING COMPANY	Tri-County Drilling	**DRILLING METHOD**	HSA (0'-11')/Air Percussion (11'-20.4')	**LOGGED BY**	E. Mehlhorn
CHECKED BY	S. Narveson				
DRILLING EQUIPMENT	Diedrich D-120	**BORING DIA. (in)**	4/8	**TOTAL DEPTH (ft)**	20.4
GROUND ELEV (ft)	410	**DEPTH/*ELEV.* GROUNDWATER (ft)**	▼ N.E. / *na*		
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in.	**NOTES**	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 2 inches of ASPHALT CONCRETE; no BASE.
			B1									**FILL:** CLAYEY SAND with GRAVEL (SC); brown (10YR 4/3); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
5	405		S2	10 46 50/3"	100+	100+			WA			**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; brown (10YR 4/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
			B3									49% Gravel, 24% Sand, 27% Fines
10	400		R4	50/5"	REF	REF						
			B5									Estimated 30% GRAVEL and COBBLES by volume.
15	395		S6	50/5"	REF	REF						
			B7									Estimated 50% GRAVEL and COBBLES by volume.
20	390		R8	50/5"	REF	REF						

Total Depth = 20.4 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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BORING RECORD

PROJECT NAME SDSU Evolve Student Housing		**PROJECT NUMBER** SD814A		**BORING** B-9	
SITE LOCATION San Diego State University, San Diego, California	**START** 8/13/2024	**FINISH** 8/13/2024		**SHEET NO.** 1 of 1	
DRILLING COMPANY Tri-County Drilling	**DRILLING METHOD** Air Percussion	**LOGGED BY** E. Mehlhorn		**CHECKED BY** S. Narveson	
DRILLING EQUIPMENT Diedrich D-120	**BORING DIA. (in)** 4	**TOTAL DEPTH (ft)** 20.9	**GROUND ELEV (ft)** 405	**DEPTH/*ELEV.* GROUNDWATER (ft)** N.E. / *na*	
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$				

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	405											**PAVEMENT:** Approximately 3 inches of ASPHALT CONCRETE; no BASE.
			B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
5	400		S2	32 43 44	87	100+	4.8		CR			
			B3									Olive brown (2.5Y 4/3) matrix.
												Estimated 40% GRAVEL and COBBLES by volume.
10	395		R4	50/5"	REF	REF						
			B5									Estimated 30% GRAVEL and COBBLES by volume.
15	390		S6	24 50/5"	100+	100+						
			B7									Estimated 10% to 20% GRAVEL and COBBLES by volume.
20	385		S8	42 50/11"	100+	100+						

Total Depth = 20.9 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE B-9

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-10

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.9	399	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 6 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); olive brown (2.5Y 5/3); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
			B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light grayish brown (2.5Y 6/2), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY GRAVEL (GC); very dense; moist; mostly GRAVEL and freshly broken rock fragments; little fines; few SAND; nonplastic).
	395											
5			S2	50/6"	REF	REF						
			B3									
	390											
10			R4	40 50/5"	100+	100+			WA			70% Gravel, 12% Sand, 18% Fines.
												@11' - 12': SANDSTONE bed.
			B5									Estimated 60% GRAVEL and COBBLES by volume.
	385											
15			S6	50/4"	REF	REF						No sample recovery; refusal on COBBLE.
			B7									Estimated 50% GRAVEL and COBBLES by volume.
	380											
20			R8	25 50/5"								
												Total Depth = 20.9 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
	375											

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FIGURE

B-10

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-11

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/13/2024	8/13/224	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	21.5	396	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 6 inches of ASPHALT CONCRETE; no BASE.
	395											**FILL:** SILTY SAND with GRAVEL (SM); yellowish brown (10YR 5/4); moist; mostly fine to coarse SAND; some GRAVEL; few fines; nonplastic.
			B1									
5												**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (2.5Y 6/3) soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY GRAVEL with SAND (GM); very dense; moist; mostly GRAVEL and freshly broken rock fragments; some fine to coarse SAND; little fines; nonplastic).
	390		R2	18 39 50/4"	89/10"	98						
			B3									
10												45% Gravel, 41% Sand, 14% Fines.
	385		S4	29 27 50/4"	77/10"	100+	5.9		PA			
												@11' - 12': SANDSTONE bed.
			B5									Estimated 50% GRAVEL and COBBLES by volume.
15			R6	50/4"	REF	REF						
	380											
			B7									Estimated 40% GRAVEL and COBBLES by volume.
20												@19' - 21.5': SANDSTONE bed.
	375		S8	17 22 26	48	66	12.1					

Total Depth = 21.5 feet (Target depth reached).
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*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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BORING RECORD

PROJECT NAME	SDSU Evolve Student Housing
PROJECT NUMBER	SD814A
BORING	B-12
SITE LOCATION	San Diego State University, San Diego, California
START	8/14/2024
FINISH	8/14/2024
SHEET NO.	1 of 2
DRILLING COMPANY	Tri-County Drilling
DRILLING METHOD	Air Percussion
LOGGED BY	E. Mehlhorn
CHECKED BY	S. Narveson
DRILLING EQUIPMENT	Diedrich D-120
BORING DIA. (in)	4
TOTAL DEPTH (ft)	35.4
GROUND ELEV (ft)	393
DEPTH/*ELEV.* GROUNDWATER (ft)	▼ N.E. / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in.
NOTES	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
0									**PAVEMENT:** Approximately 6 inches of ASPHALT CONCRETE; no BASE.
									FILL: CLAYEY SAND with GRAVEL (SC); olive brown (2.5Y 5/3); moist; mostly fine to coarse SAND; some fines; little GRAVEL; medium plasticity.
	390	B1						EI	
5		R2	33 18 24	42	39	11.7		WA PI	Dense; olive brown (2.5Y 4/4) 36% Fines.
	385	B3							
10		S4	11 13 13	26	36				Mostly fine to coarse SAND; some GRAVEL; few fines.
	380	B5							
									CLAYEY GRAVEL (GC); dense; olive brown (2.5Y 5/6); moist; mostly GRAVEL; some fines; few SAND; low plasticity.
15		R6	13 20 17	37	34	9.6		WA	38% Gravel, 13% Sand, 49% Fines
									CLAYEY SAND with GRAVEL (SC); medium dense; olive brown (2.5Y 5/3); moist; mostly fine to coarse SAND; some fines; some GRAVEL; medium plasticity.
	375	B7							
20		S8	5 6 11	17	23	14.1			
	370	B9							

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-12

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	35.4	393	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	12 17 44	61	56			WA			**FILL (continued):** CLAYEY GRAVEL (GC); very dense; olive brown (2.5Y 5/6); moist; mostly Gravel; some fines; few SAND; low plasticity. 60% Gravel, 6% Sand, 34% Fines.
	365		B11									
30			S12	39 46 50/3"	96/9"	100+	4.7					**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; olive brown (2.5Y 5/6), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; few fines; low plasticity). @32' - 33.5' SANDSTONE bed.
	360		B13									
35			S14	50/5"			8.4					
												Total Depth = 35.4 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
	355											
40												
	350											
45												
	345											

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-13

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.4	384	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	384											**PAVEMENT:** Approximately 4.5 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); medium dense; olive brown (2.5Y 4/3); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low to medium plasticity.
			B1									
	380											
5												44% Fines
			S2	4 6 8	14	19	12.7		PI WA			
			B3									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (2.5Y 7/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low to medium plasticity).
	375											
10			R4	50/5"	REF	REF						
												Pale brown (2.5Y 7/5) matrix.
			B5									Estimated 50% GRAVEL and COBBLES by volume.
	370											
15			S6	40 50/3"	100+	100+						
												Light yellow brown (10YR 6/4) matrix.
			B7									Estimated 40% GRAVEL and COBBLES by volume.
	365											
20			R8	50/5"	REF	REF						No sample recovery; refusal on COBBLE.
												Estimated 50% GRAVEL and COBBLES by volume.
			B9									
	360											

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS 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 THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE
B-13 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-13

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.4	384	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34 * N_{SPT} = 1.08 * N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	50/3"	REF	REF						**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; brown (10YR 5/3) soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low to medium plasticity).
			B11									
	355											
30			R12	42 50/9"	100+	100+						Estimated 80% GRAVEL and COBBLES by volume.
												Olive brown (2.5Y 4/4) matrix.
			B13									
	350											@33' -35': SANDSTONE bed.
35			S14	35 50/5"	100+	100+						
			B15									Estimated 50% GRAVEL and COBBLES by volume.
	345											
40			R16	50/4"	REF	REF						
			B17									Estimated 40% GRAVEL and COBBLES by volume.
	340											
45			S18	30 50/2"	100+	100+						
			B19									Estimated 20% GRAVEL and COBBLES by volume.
	335											

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-13

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.4	384	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S20	50/5"	REF	REF						**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; brown (10YR 5/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low to medium plasticity).
	330											Total Depth = 50.4 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
55												
	325											
60												
	320											
65												
	315											
70												
	310											

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-14**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	25.9	386	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 7 inches of ASPHALT CONCRETE; no BASE.
	385		B1									**FILL:** CLAYEY GRAVEL with SAND (GC); dense; dark yellowish brown (10YR 4/4); moist; mostly GRAVEL; some fines; litte fine to coarse SAND; low plasticity.
5	380		R2	21 19 30	49	45	6.1		PI WA			50% Gravel, 13% Sand, 37% Fines.
			B3									CLAYEY SAND with GRAVEL (SC); dense; dark yellowish brown (10YR 4/4); moist; mostly fine-medium SAND; some fines; litte GRAVEL; low plasticity.
10	375		S4	44 21 17	39	42	9.4					
			B5									
15	370		R6	38 50/5"	100+	100+						**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (10YR 4/6), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
			B7									@14' - 16.5': difficult drilling on potential BOULDER.
20	365		S8	50 50/3"	100+	100+						
			B9									Estimated 60% GRAVEL and COBBLES by volume.

BORING RECORD

PROJECT NAME	SDSU Evolve Student Housing
PROJECT NUMBER	SD814A
BORING	B-14
SITE LOCATION	San Diego State University, San Diego, California
START	8/14/2024
FINISH	8/14/2024
SHEET NO.	2 of 2
DRILLING COMPANY	Tri-County Drilling
DRILLING METHOD	Air Percussion
LOGGED BY	E. Mehlhorn
CHECKED BY	S. Narveson
DRILLING EQUIPMENT	Diedrich D-120
BORING DIA. (in)	4
TOTAL DEPTH (ft)	25.9
GROUND ELEV (ft)	386
DEPTH/*ELEV.* GROUNDWATER (ft)	▼ N.E. / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in.
NOTES	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	360		S10	36 50/5"	100+	100+						**EOCENE DEPOSITS (continued)*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (10YR 4/6), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
30	355											Total Depth = 25.9 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
35	350											
40	345											
45	340											

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-15

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.4	396	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 5.5 inches of ASPHALT CONCRETE; no BASE.
	395		B1									**FILL:** CLAYEY SAND (SC); dense; light yellowish brown (2.5Y 6/3); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
5	390		S2	11 16 20	36	49	12.7		PA			0% Gravel, 79% Sand, 21% Fines.
			B3									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light yellowish brown (10YR 6/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
10	385		R4	37 50/2"	100+	100+						
			B5									Estimated 30% to 40% GRAVEL and COBBLES by volume.
15	380		S6	47 50/2"	100+	100+						
			B7									Estimated 50% GRAVEL and COBBLES by volume.
20	375		S8	50/5"	REF	REF						

Total Depth = 20.4 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE B-15

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-16

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/14/2024	8/14/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.9	404	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 6 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); light yellowish brown (2.5Y 6/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
			B1									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light yellowish brown (2.5Y 6/4), soft, sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC; very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
	400											
5			R2	50/3"	REF	REF						
			B3									@ 6.5' - 10': SANDSTONE bed.
	395											
10			R4	50/5.5"	REF	REF	11.1	113				
			B5									Matrix: light olive brown (2.5Y 5/4).
	390											Estimated 50% GRAVEL and COBBLES by volume.
15			S6	40 50/11"	100+	100+						
			B7									Estimated 80% GRAVEL and COBBLES by volume.
	385											
20			S8	39 50/5"	100+	100+						
	380											Total Depth = 20.9 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE B-16

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-17

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.3	405	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	405											**PAVEMENT:** Approximately 6.5 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); very dense; light yellowish brown (2.5Y 6/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
			B1									
5	400		R2	24 32 35	67	62						
			B3									
10	395		S4	10 9 7	16	22						Medium dense.
			B5									
15	390		R6	13 11 10	21	19	10.8	110	PI WA			Light olive brown (2.5Y 5/3). 39% Fines.
			B7									
20	385		S8	8 8 8	16	22	13.6		PA			3% Gravel, 52% Sand, 45% Fines.
			B9									

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-17

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.3	405	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R10	21 50/5"	100+	100+						**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light olive brown (2.5Y 5/3), soft, sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
			B11									
30	375		R12	50/5"	REF	REF						No sample recovery; refusal on COBBLE.
			B13									@ 32' - 35': SANDSTONE bed; light yellowish brown (10YR 6/4).
35	370		S14	50/5"	REF	REF						
			B15									Estimated 50% GRAVEL and COBBLES by volume.
40	365		S16	50/3"	REF	REF						No sample recovery; refusal on COBBLE.
			B17									@ 43' - 44.5': SANDSTONE bed; dark yellowish brown (10YR 4/4).
45	360		S18	50/4"	REF	REF						
			B19									Estimated 50% GRAVEL and COBBLES by volume.

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-17

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	50.3	405	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S20	50/4"	REF	REF						**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; dark yellowish brown (10YR 4/4), soft, sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some subangular to angular GRAVEL and COBBLES up to 12 inches in diameter; little fines; nonplastic).
												Total Depth = 50.3 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
55	350											
60	345											
65	340											
70	335											

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FIGURE

B-17 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-18

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/16/2024	8/16/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	21.5	408	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	408											**PAVEMENT:** Approximately 5 inches of ASPHALT CONCRETE; no BASE.
												FILL: CLAYEY SAND with GRAVEL (SC); light olive brown (2.5Y 5/3; moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
	405		B1									
												EOCENE DEPOSITS*: POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light olive brown (2.5Y 5/3), soft, sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some subangular to angular GRAVEL and COBBLES up to 12 inches in diameter; little fines; low plasticity).
5			R2	50/5"	REF	REF						
	400		B3									
10			S4	29 50/3"	100+	100+						
	395		B5									Estimated 60% to 70% GRAVEL and COBBLES by volume.
15			S6	32 43 20	63	86						
												@ 16' - 18': SANDSTONE bed; light yellowish brown (2.5Y 6/3).
	390		B7									
20			S8	34 24 36	60	82						
	385											Total Depth = 21.5 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE

B-18

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-19**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	30.75	408	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
									<u>PAVEMENT:</u> Approximately 5 inches of ASPHALT CONCRETE; no BASE.
	405	B1				8.2		DS MD PA	**<u>FILL:</u>** CLAYEY SAND with GRAVEL (SC); light olive brown (2.5Y 5/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity. 26% Gravel, 62% Sand, 12% Fines
5		S2	11 10 11	21	29				Medium dense; light yellowish brown (2.5Y 6/3).
	400	B3							
10		R4	21 23 38	61	56				Very dense; light brownish gray (2.5Y 6/2); little fines.
	395	B5							
15		S6	8 7 6	13	18	12.7		PA PI	SANDY lean CLAY (CL); very stiff; light brownish gray (2.5Y 6/2); moist; mostly fines; some SAND; medium plasticity. 0% Gravel, 49% Sand, 51% Fines.
	390	B7							
20		R8	21 21 17	38	35			PA	CLAYEY SAND with GRAVEL (SC); dense; light olive brown (2.5Y 5/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity. 22% Gravel, 34% Sand, 44% Fines
	385	B9							

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-19

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/15/2024	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	30.75	408	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S10	8 9 8	17	23	11.0		PA			**FILL (continued):** CLAYEY SAND with GRAVEL (SC); medium dense; yellowish brown (10YR 5/4); medium dense; moist; mostly fine to coarse SAND; some fines; some GRAVEL; medium plasticity. 26% Gravel, 37% Sand, 37% Fines.
	380		B11									
30			S12	17 50/3"	100+	100+						**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (10YR 5/4), soft, sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some subangular to angular GRAVEL and COBBLES up to 12 inches in diameter; little fines; low plasticity).
	375											Total Depth = 30.8 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
35												
	370											
40												
	365											
45												
	360											

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-20

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/16/2024	8/16/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.9	411	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34 * N_{SPT} = 1.08 * N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	410											**PAVEMENT:** Approximately 5 inches of ASPHALT CONCRETE; no BASE.
			B1						CR			**FILL:** CLAYEY GRAVEL with SAND (SC); yellowish brown (10YR 5/4); moist; mostly GRAVEL and freshly broken rock fragments; little fines; little fine to coarse SAND; low plasticity.
5	405		R2	16 35 50/5"	85/11"	85			WA			Very dense; mottled brown (10YR 5/3) and brownish yellow (10YR 6/8); medium plasticity. 66% Gravel, 16% Sand, 18% Fines.
			B3									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (2.5Y 6/3) soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; medium plasticity).
10	400		S4	29 50/1"	100+	100+						
			B5									Estimated 50% GRAVEL and COBBLES by volume.
15	395		S6	39 50/3"	100+	100+						
			B7									Pale brown (10YR 6/3) matrix. Estimated 50% to 60% GRAVEL and COBBLES by volume.
20	390		S8	42 50/5"	100+	100+						

Total Depth = 20.9 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE
B-20

BORING RECORD

PROJECT NAME SDSU Evolve Student Housing		**PROJECT NUMBER** SD814A		**BORING** B-21	
SITE LOCATION San Diego State University, San Diego, California		**START** 8/15/2024	**FINISH** 8/16/2024	**SHEET NO.** 1 of 3	
DRILLING COMPANY Tri-County Drilling	**DRILLING METHOD** Air Percussion		**LOGGED BY** E. Mehlhorn	**CHECKED BY** S. Narveson	
DRILLING EQUIPMENT Diedrich D-120	**BORING DIA. (in)** 4	**TOTAL DEPTH (ft)** 20.7	**GROUND ELEV (ft)** 411	**DEPTH/*ELEV.* GROUNDWATER (ft)** ▼ N.E. / *na*	
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.	**NOTES** ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$				

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 2 inches of ASPHALT CONCRETE; no BASE.
	410											**FILL:** CLAYEY SAND with GRAVEL (SC); olive brown (2.5Y 4/3); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
			B1									
5	405		R2	7 25 20	45	41						Dense.
			B3									
10	400		S4	9 9 13	22	30						Light yellowish brown (2.5Y 6/4).
			B5									
15	395		S6	14 13 14	27	37						Pale brown (2.5Y 7/4).
			B7									
20	390		S8	16 18 18	36	49	3.9		WA PI			CLAYEY GRAVEL with SAND (SC); desne; olive brown (2.5Y 4/3); moist; mostly GRAVEL and freshly broken rock fragments; little fines; little SAND; low plasticity. 49% Gravel, 22% Sand, 29% Fines.
			B9									

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-21

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/16/2024	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.7	411	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	385		S10	20 21 15	36	49						**FILL (continued):** CLAYEY SAND with GRAVEL (SC); dense; pale brown (2.5Y 7/4); moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
			B11									
30	380											Light olive brown (2.5Y 5/3).
			B12									
35	375		S13	15 15 16	31	42						
			B14									
40	370											
			B15									**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; olive brown (2.5Y 4/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
45	365		S16	50/5"	REF	REF						
			B17									

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-21

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/15/2024	8/16/2024	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.7	411	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34{*}N_{SPT} = 1.08{*}N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S18	48 50/2"	100+	100+						**<u>EOCENE DEPOSITS (continued)*:</u>** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; olive brown (2.5Y 4/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; low plasticity).
	360											
55												Total Depth = 50.7 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
	355											
60												
	350											
65												
	345											
70												
	340											

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-22

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/17/2024	8/17/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	Air Percussion	J. Joksch	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4	20.3	465	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	465											**PAVEMENT:** Approximately 4 inches of ASPHALT CONCRETE; no BASE.
												Fill: CLAYEY SAND with GRAVEL (SC); medium dense; very dark grayish brown (10YR 3/2); moist; mostly fine to medium SAND; little fines, little GRAVEL; medium plasticity.
			B1				5.6		PA PI EI			15% Gravel, 63% Sand, 22% Fines.
5	460		S2	11 11 9	20	27						
			B3									**EOCENE DEPOSITS***: POORLY INDURATED CONGLOMERATE; massive; moderately weathered; grayish brown (10YR 5/2), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND (SM); very dense; moist; mostly medium to coarse SAND; some fines; little GRAVEL and freshly broken rock fragments; nonplastic).
10	455		R4 S5	27 50/5"	100+	100+						
			B6									Estimated 20% GRAVEL and COBBLES by volume.
15	450		S7	50/5"	REF	REF						Very pale brown (10YR 7/3); (Well Graded GRAVEL with SAND (GW); very dense; moist; mostly fine to coarse GRAVEL and freshly broken rock fragments; little fine to medium SAND; trace fines; nonplastic).
			B8									Estimated 40% GRAVEL and COBBLES by volume.
20	445		R9	50/4"	REF	REF						

Total Depth = 20.3 feet (Target depth reached).
This Boring Record is part of a geotechnical report which must be considered in its entirety.
*Geologic description; (disturbed soil description).
The ground elevation reported on this Boring Record was estimated using Google Earth.

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FIGURE

B-22

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-23

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/16/2024	8/17/2024	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-4')/Air Percussion (4'-51.5')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	51.5	465	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: Approximately 5 inches of ASPHALT CONCRETE; no BASE.
												FIll: SANDY fat CLAY (CH); moist; dark brown (10YR 3/3); mostly fines; some medium to coarse SAND; trace GRAVEL; high plasticity.
			B1				16.6		PA PI EI			1% Gravel, 41% Sand, 58% Fines.
5	460		R2	50/4"	REF	REF						**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; olive brown (2.5Y 4/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; little GRAVEL and freshly broken rock fragments; little fines; nonplastic).
			B3						CR			Estimated 15% GRAVEL and COBBLES by volume.
10	455		S4	35 21 28	49	67						Light olive brown (2.5Y 4/3).
												@12'-15': Difficult drilling; estimated 60% GRAVEL and COBBLES by volume.
			B5									
15	450		S6	21 27 24	51	70						Estimated 15% GRAVEL and COBBLES by volume.
			B7									
20	445		S8	17 28 34	62	85						
												@21.5' - 23': SANDSTONE bed.

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FIGURE

B-23 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-23

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/16/2024	8/17/2024	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-4')/Air Percussion (4'-51.5')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	51.5	465	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}

DEPTH (feet)	ELEVATION (feet)	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
		S9	23 34 41	75	100+	5.6		PA	**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; pale brown (10YR 6/3), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; some fines; nonplastic).
		B10							26% Gravel, 37% Sand, 37% Fines.
30	435	S11	50/4"	REF	REF				
		B12							@31.5' - 37': SANDSTONE bed.
35	430								
		B13							
40	425	R14	24 50/5"	100+	100+				
		B15							Very pale brown (10YR 7/3).
45	420								
		B16							Light brownish gray (10YR 6/2).

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	**B-23**

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/16/2024	8/17/2024	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-4')/Air Percussion (4'-51.5')	E. Mehlhorn	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	51.5	465	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S17	19 30 39	69	95						**EOCENE DEPOSITS* (continued):** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; light brownish gray (10YR 6/2), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragments; little fines; nonplastic).
												Total Depth = 51.5 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.
55	410											
60	405											
65	400											
70	395											

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FIGURE

B-23 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
SDSU Evolve Student Housing	SD814A	B-24

SITE LOCATION	START	FINISH	SHEET NO.
San Diego State University, San Diego, California	8/17/2024	8/17/2024	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Tri-County Drilling	HSA (0'-7')/Air Percussion (7'-20.4')	J. Joksch	S. Narveson

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUNDWATER (ft)
Diedrich D-120	4/8	20.8	466	▼ N.E. / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in.	ETR ~ 80%, $N_{60} = 1.34*N_{SPT} = 1.08*N_{MC}$

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	465											**PAVEMENT:** Approximately 6 inches of ASPHALT CONCRETE; no BASE.
			B1									**FILL:** SANDY fat CLAY (CH); moist; dark brown (10YR 3/3) mostly fines; few fine to medium SAND; trace GRAVEL and COBBLE; medium to high plasticity.
5	460		R2	3 33 50/2"	83/8"	100+	15.9	102	PA DS			**EOCENE DEPOSITS*:** POORLY INDURATED COBBLE CONGLOMERATE; massive; moderately weathered; yellowish brown (10YR 5/4), soft sandstone matrix; variably colored, hard, rounded igneous clasts; (CLAYEY SAND (SC); very dense; moist; mostly medium to coarse SAND; some fines; trace GRAVEL; low to medium plasticity; micaceous). 3% Gravel, 67% Sand, 30% Fines.
			B3									
10	455		S4	19 21 25	46	63						Brown (10YR 5/3); (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to coarse SAND; some GRAVEL and freshly broken rock fragmetns; nonplastic; slighlty micaceous). Estimated 40% GRAVEL and COBBLES by volume.
			B5									Pale brown (10YR 6/3); (well-graded GRAVEL with SAND (GW); moist; mostly GRAVEL and freshly broken rock fragments; some fine to coarse SAND; trace fines). Estimated 60% GRAVEL and COBBLES by volume.
15	450		S6	43 50/5"	100+	100+						
			B7									Light yellowish brown (10YR 6/4); (SILTY SAND with GRAVEL (SM); moist; mostly fine to coarse SAND; little to some GRAVEL and freshly broken rock fragments; few fines; nonplastic; slightly micaceous). Estimated 20% GRAVEL and COBBLES by volume.
20	445		S8	49 50/4"	100+	100+						Total Depth = 20.4 feet (Target depth reached). This Boring Record is part of a geotechnical report which must be considered in its entirety. *Geologic description; (disturbed soil description). The ground elevation reported on this Boring Record was estimated using Google Earth.

For Review

GDC_LOG_BORING_MMX_SOIL_SD SD814A SDSU EVOLVE CAMPUS HOUSING.GPJ GDCLOG.GDT 9/26/24

APPENDIX C
GEOTECHNICAL LABORATORY TESTING

APPENDIX C

GEOTEHCNICAL LABORATORY TESTING

Laboratory testing was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions and in the same locality. No warranty, express or implied, is made as to the correctness or serviceability of the test results, or the conclusions derived from these tests. Where a specific laboratory test method has been referenced, such as ASTM or Caltrans, the reference only applies to the specified laboratory test method, which has been used only as a guidance document for the general performance of the test and not as a "Test Standard". A brief description of the tests follows.

Classification: Soils were visually classified according to the Unified Soil Classification System as established by the American Society of Civil Engineers per ASTM D2487. The soil classifications are shown on the boring logs in Appendix A.

Particle Size Analysis: Particle size analyses were performed in general accordance with ASTM D6913, D7928, and D1140 and were used to supplement visual classifications. The test results are summarized on the Boring Records in Appendix B and are presented in detail in Figures C-1.1 through C-1.14.

Expansion Index: The expansion potential of a selected soil sample was estimated in general accordance with ASTM D4829. The test result is summarized in Figure C-2. Figure C-2 also presents common criteria for evaluating the expansion potential based on the expansion index.

Maximum Density/Optimum Moisture: The maximum density and optimum moisture of a selected soil sample was evaluated using ASTM test method D1557. The test results are summarized in Figure C-2.

pH and Resistivity: To assess the potential for reactivity with buried metals, selected soil samples were tested for pH and minimum resistivity using Caltrans test method 643. The corrosivity test results are summarized in Figure C-3.

Sulfate Content: To assess the potential for reactivity with concrete, selected soil samples were tested for water soluble sulfate. The sulfate was extracted from the soil under vacuum using a 10:1 (water to dry soil) dilution ratio. The extracted solution was tested for water soluble sulfate in general accordance with ASTM D516. The test results are also presented in Figure C-3, along with common criteria for evaluating soluble sulfate content.

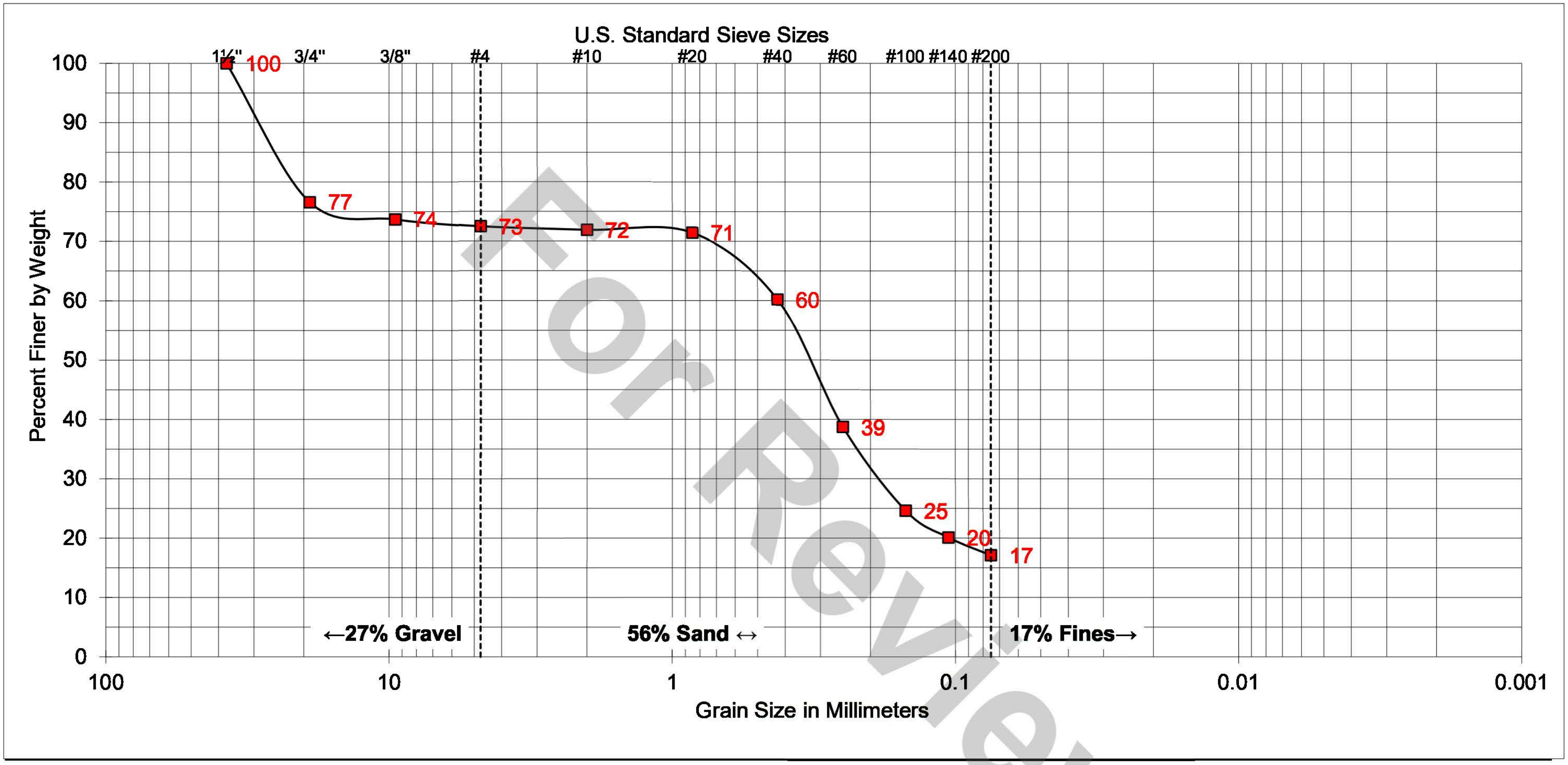
Chloride Content: Soil samples were also tested for water soluble chloride. The chloride was extracted from the soil under vacuum using a 10:1 (water to dry soil) dilution ratio. The extracted solution was then tested for water soluble chloride using a calibrated ion specific electronic probe in general accordance with ASTM D512. The test results are also shown in Figure C-3.

Moisture Content: The in-situ moisture contents were estimated in general accordance with ASTM D2216. The test results are shown in in Figure C-4.

Atterberg Limits: ASTM D4318 was used to determine the liquid and plastic limits, and plasticity index of selected soil samples. The test results are summarized in Figure C-5.

Direct Shear: The drained sear strength of selected samples of the on-site soil were assessed using direct shear testing performed in general accordance with ASTM D3080. The sample was first remolded to approximate 90 percent of the maximum dry unit weight at near optimum moisture content, then saturated prior to shear testing. The remolded direct shear test results are shown in Figure C-6.

R-Value: R-Value tests were conducted in general accordance with CTM 301. The test results are presented on Figure C-7



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
EXPLORATION ID:	B-3
SAMPLE DEPTH:	15'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND WITH GRAVEL

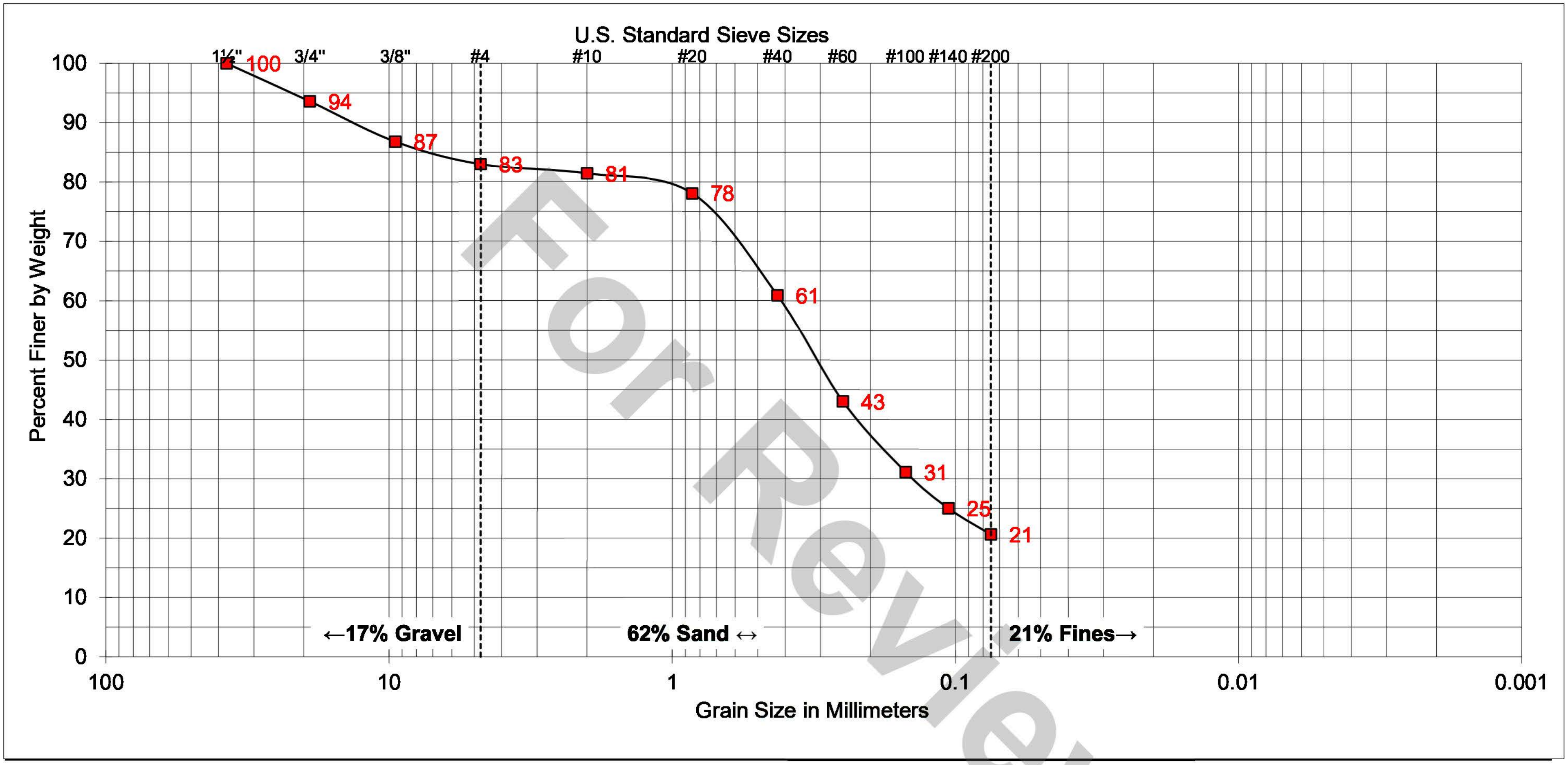
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.1



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
EXPLORATION ID:	B-4
SAMPLE DEPTH:	10'

UNIFIED SOIL CLASSIFICATION: SM

DESCRIPTION: SILTY SAND WITH GRAVEL

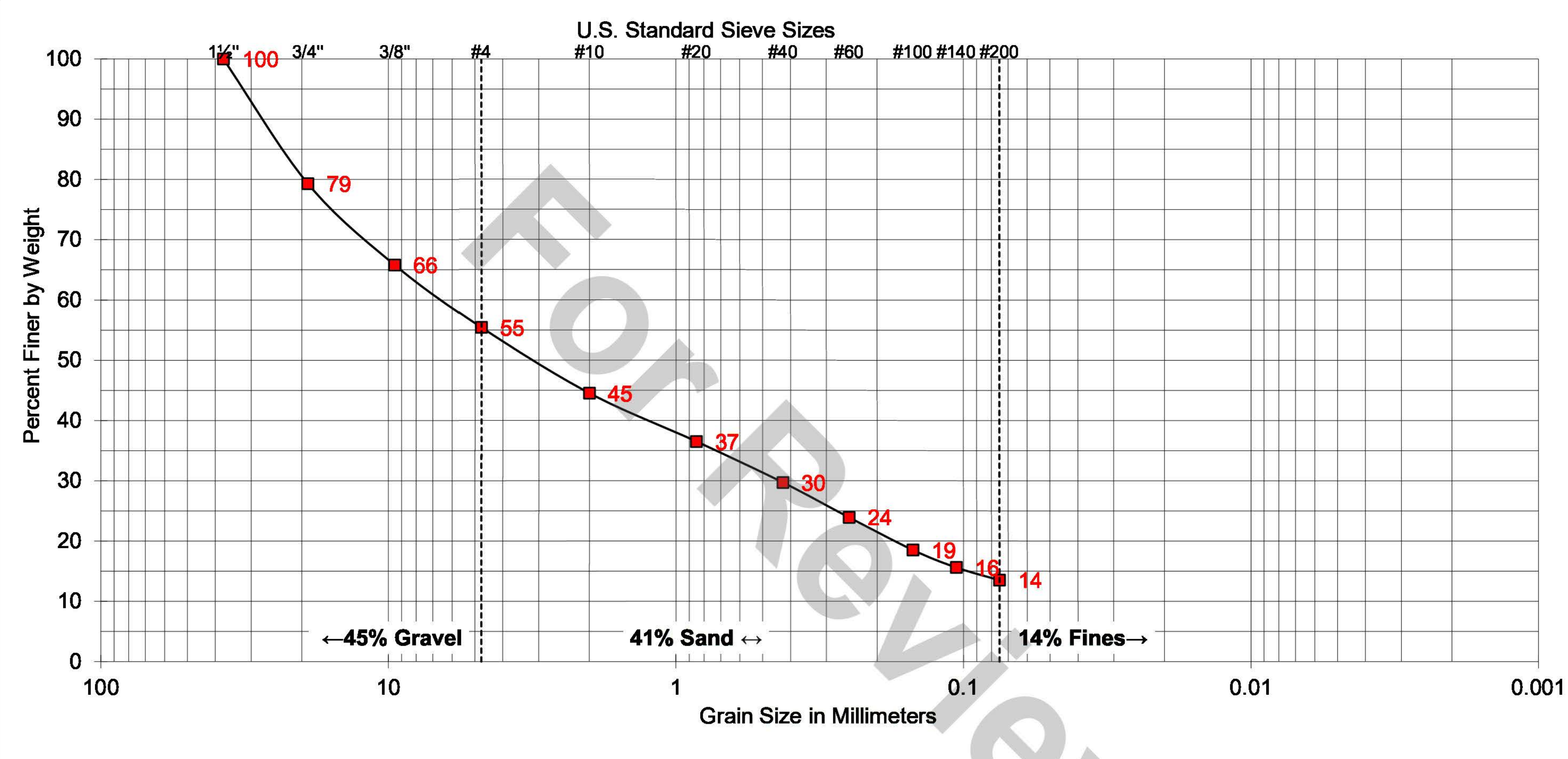
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.2



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
EXPLORATION ID:	B-11
SAMPLE DEPTH:	10'

UNIFIED SOIL CLASSIFICATION: GM

DESCRIPTION: SILTY GRAVEL WITH SAND

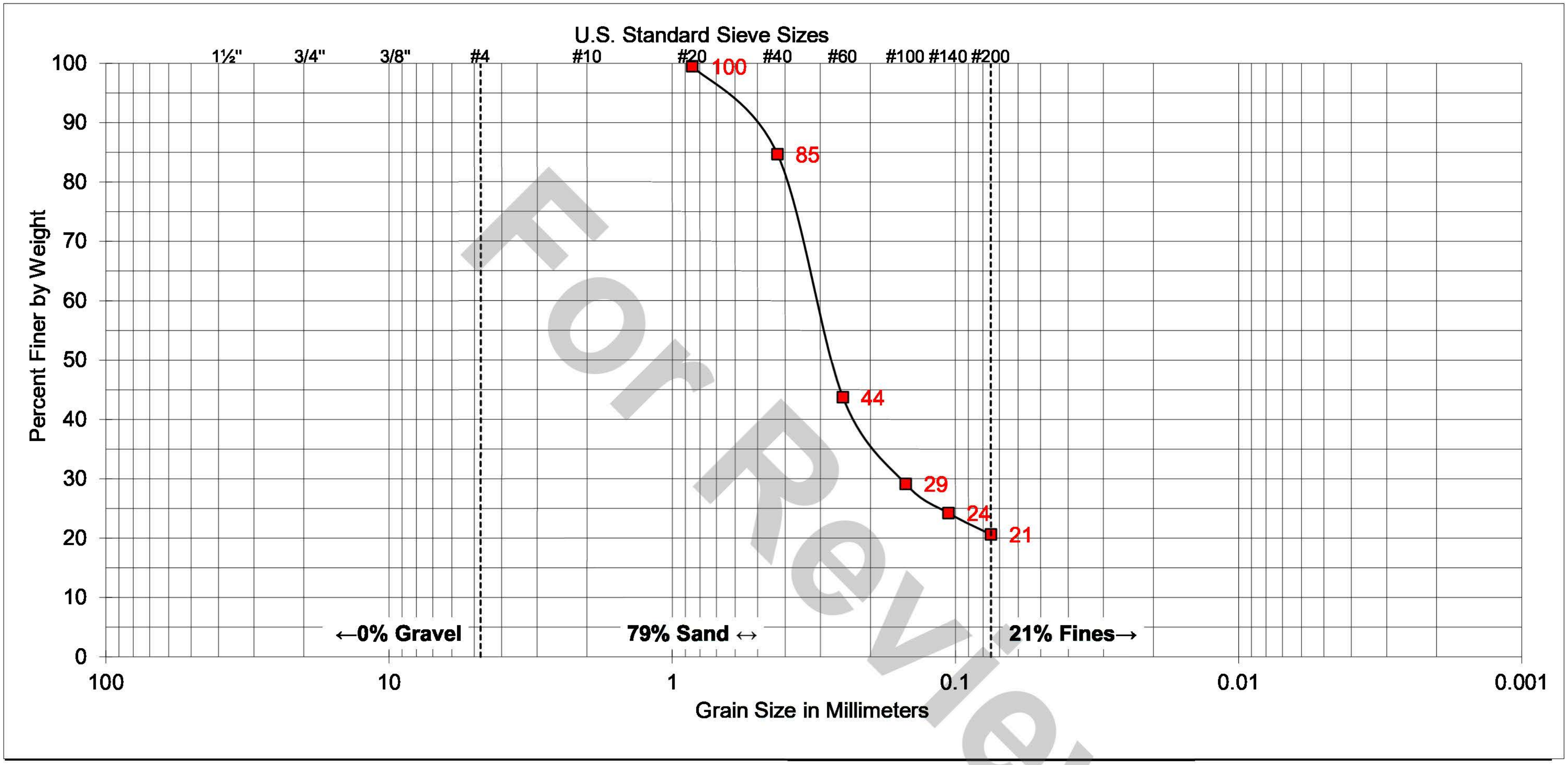
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.3



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
EXPLORATION ID:	B-15
SAMPLE DEPTH:	5'

UNIFIED SOIL CLASSIFICATION: SM

DESCRIPTION: CLAYEY SAND

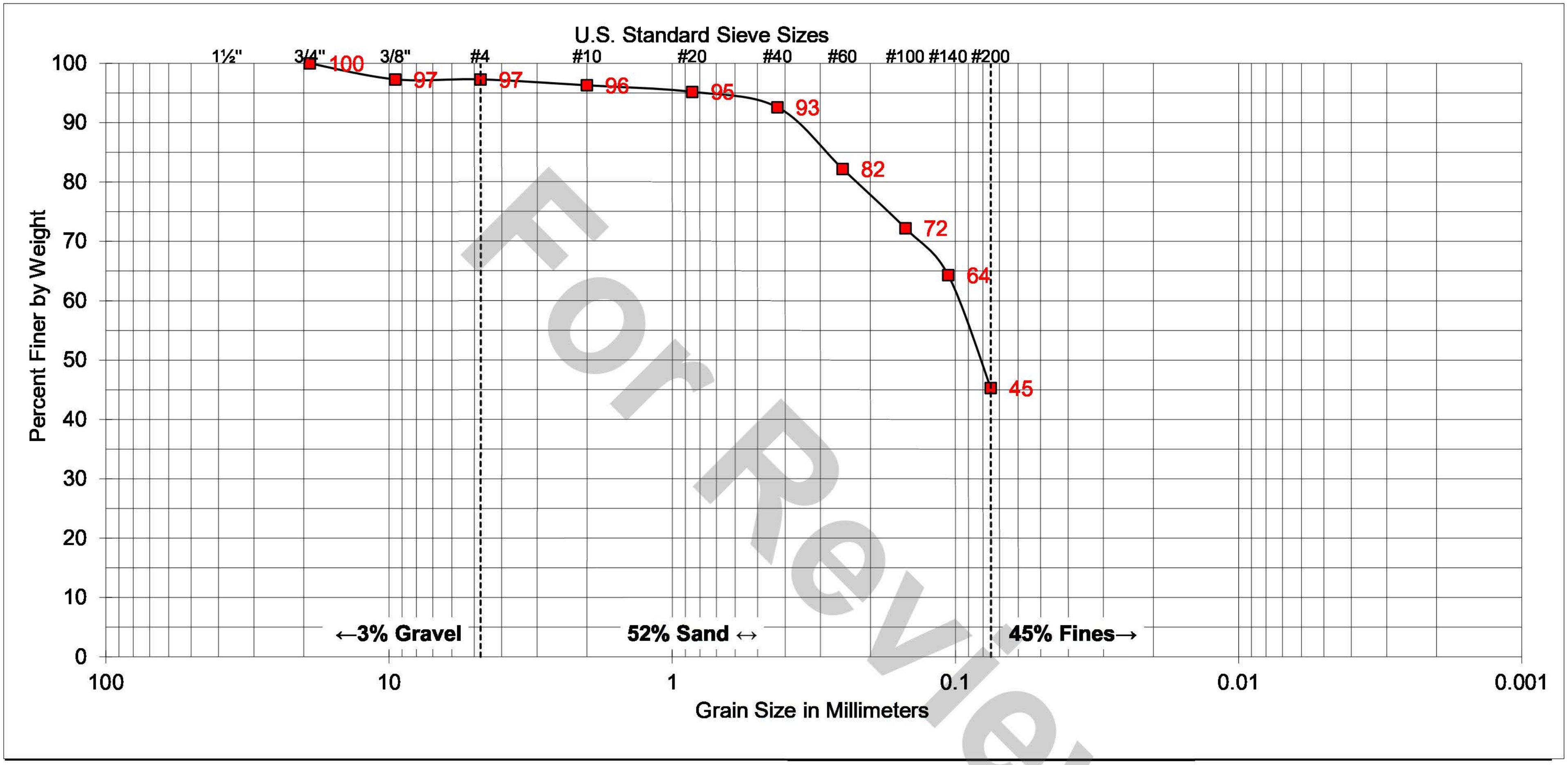
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.4



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
EXPLORATION ID:	B-17
SAMPLE DEPTH:	20'

UNIFIED SOIL CLASSIFICATION: SM

DESCRIPTION: CLAYEY SAND

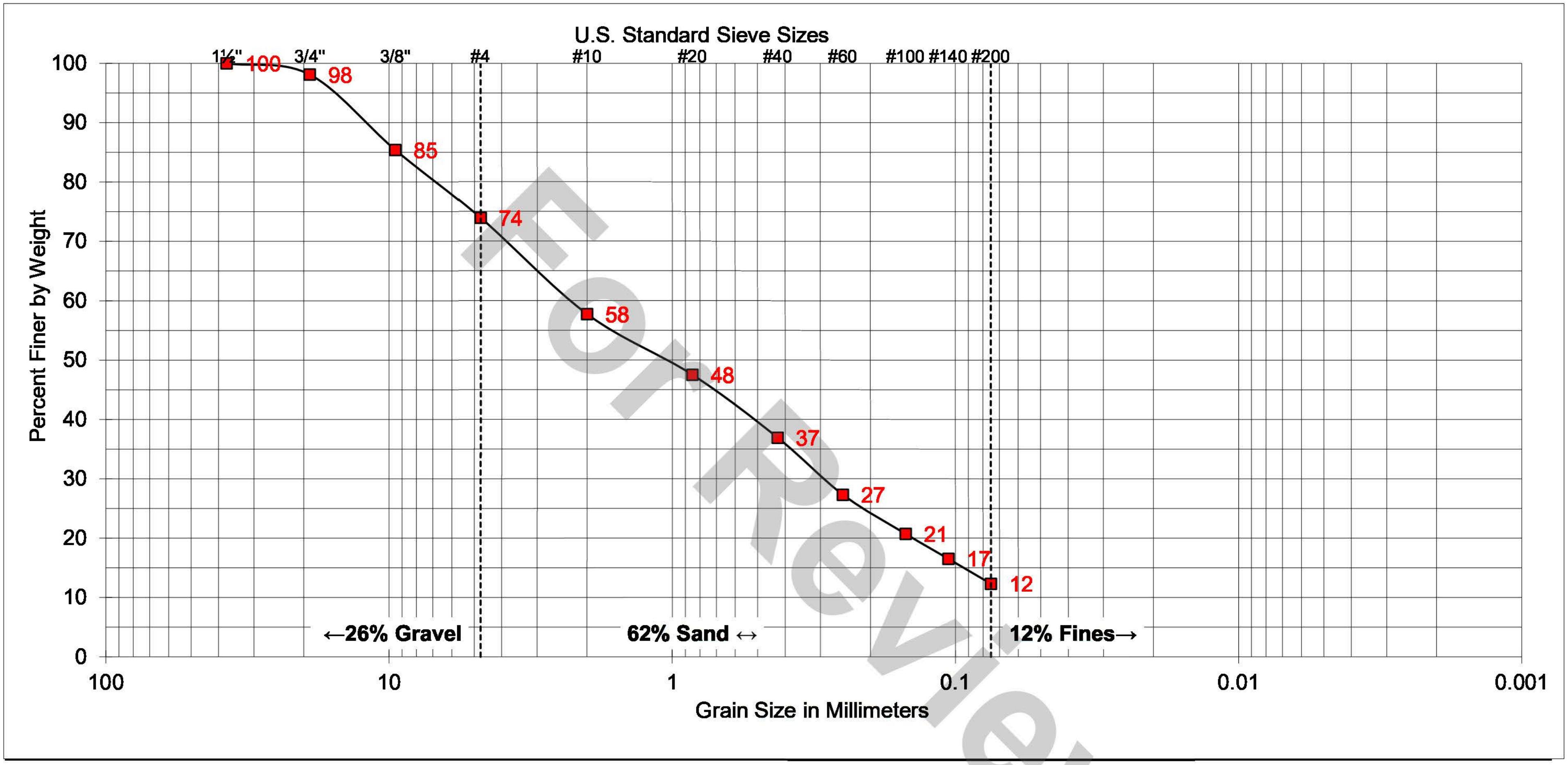
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.5



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	
EXPLORATION ID:	B-19
SAMPLE DEPTH:	0 - 5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND WITH GRAVEL

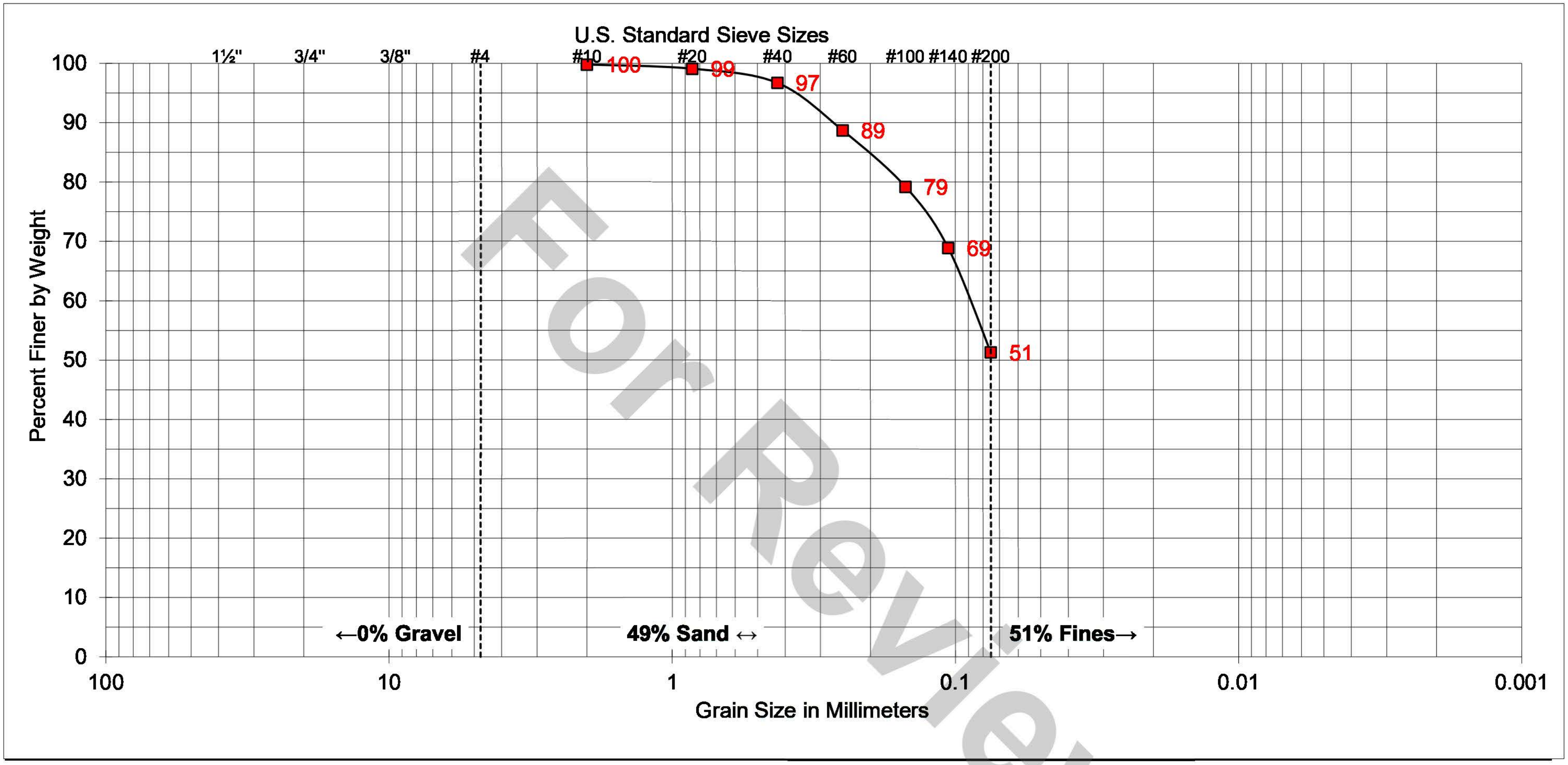
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.6



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	
EXPLORATION ID:	B-19
SAMPLE DEPTH:	15'

UNIFIED SOIL CLASSIFICATION: CL

DESCRIPTION: SANDY LEAN CLAY

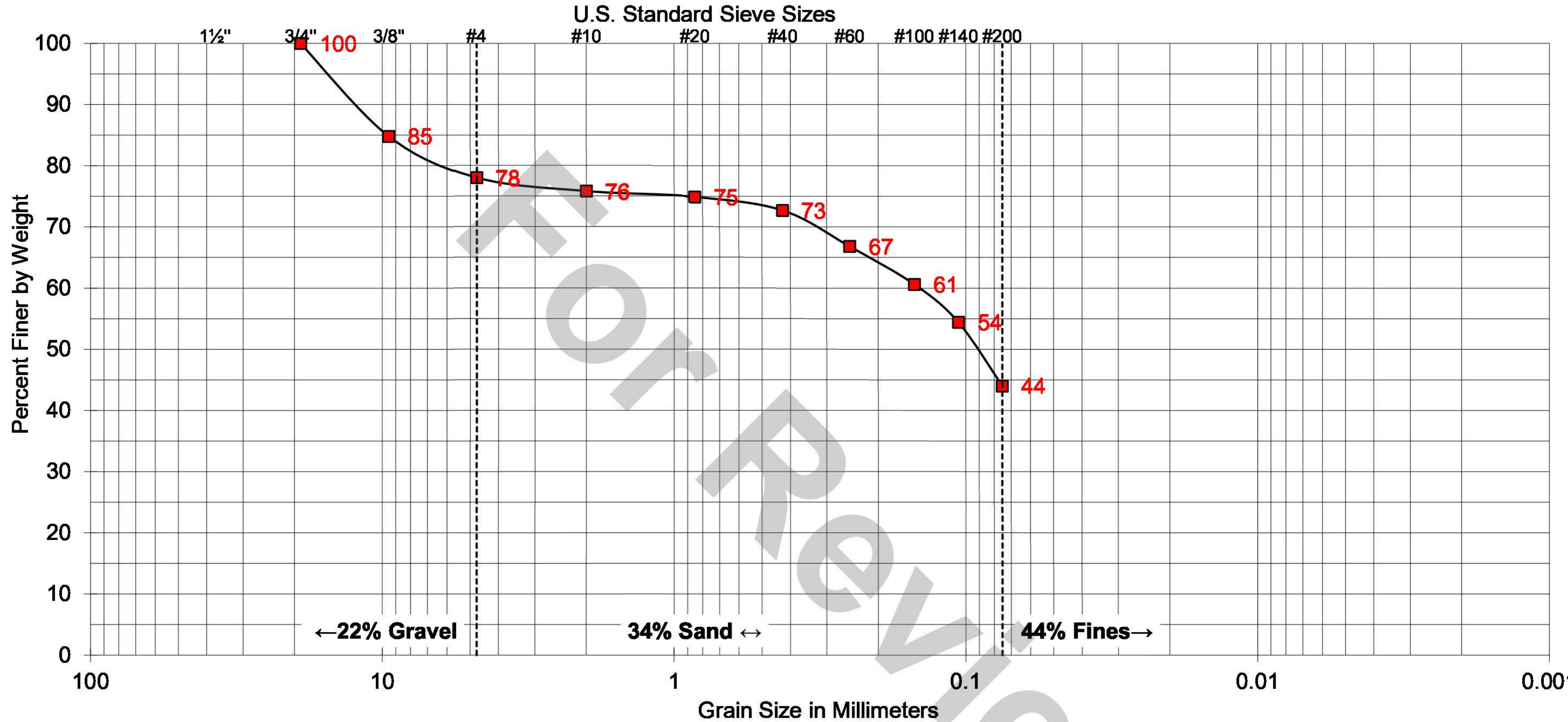
ATTERBERG LIMITS	
LIQUID LIMIT:	47
PLASTIC LIMIT:	20
PLASTICITY INDEX:	27

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.7



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
EXPLORATION ID:	B-19
SAMPLE DEPTH:	20'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND WITH GRAVEL

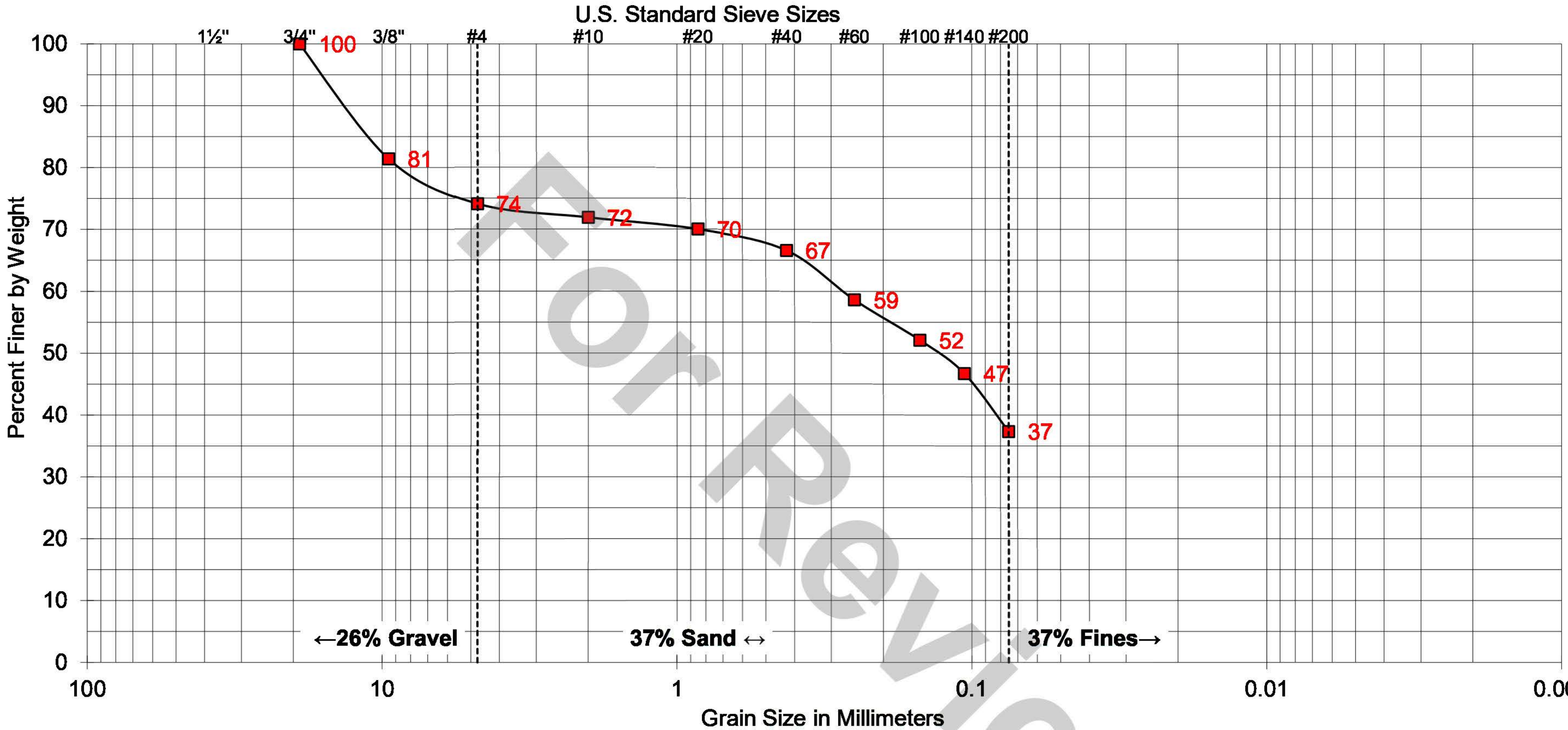
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.8



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	
EXPLORATION ID:	B-19
SAMPLE DEPTH:	25'

UNIFIED SOIL CLASSIFICATION: SM

DESCRIPTION: SILTY SAND WITH GRAVEL

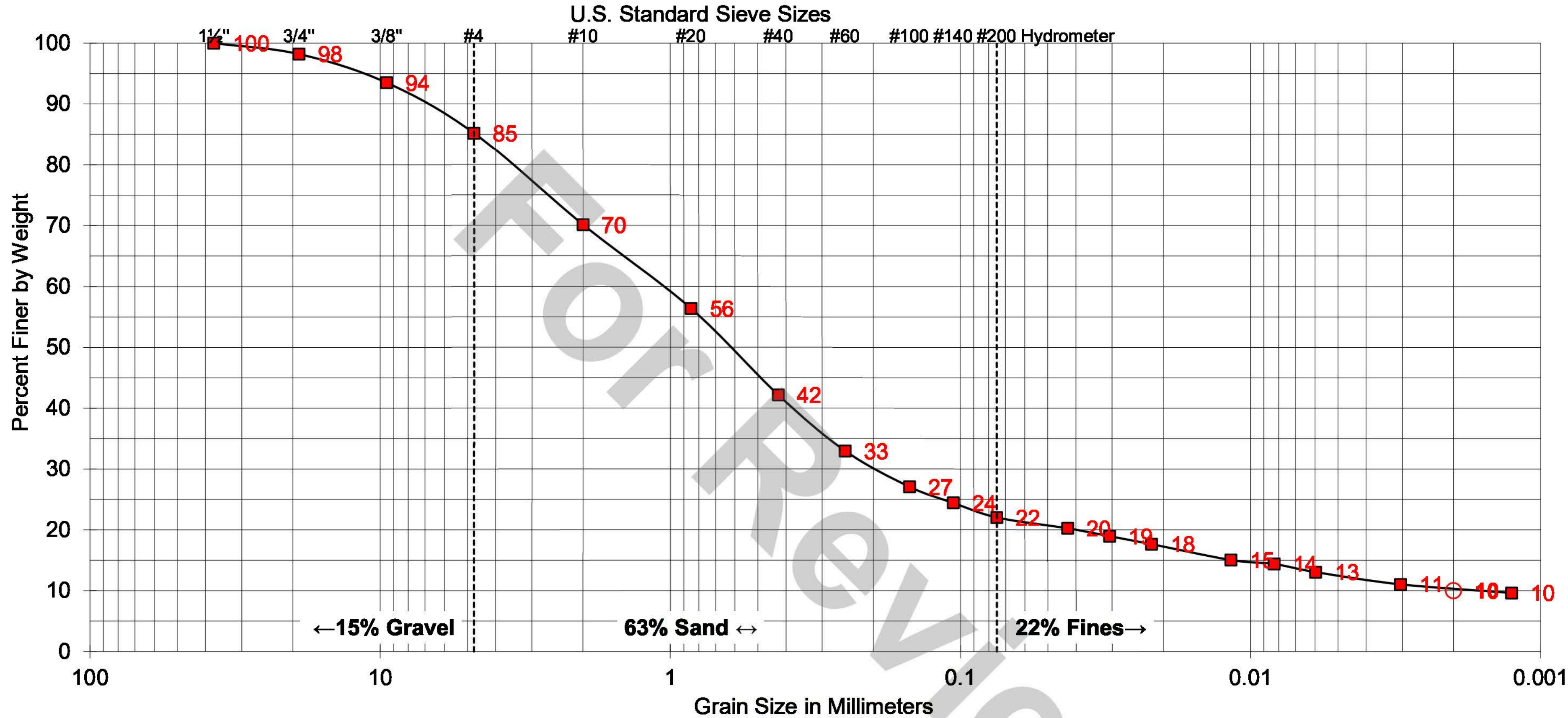
ATTERBERG LIMITS	
LIQUID LIMIT:	0
PLASTIC LIMIT:	0
PLASTICITY INDEX:	0

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.9



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
EXPLORATION ID:	B-22
SAMPLE DEPTH:	0 - 5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND WITH GRAVEL

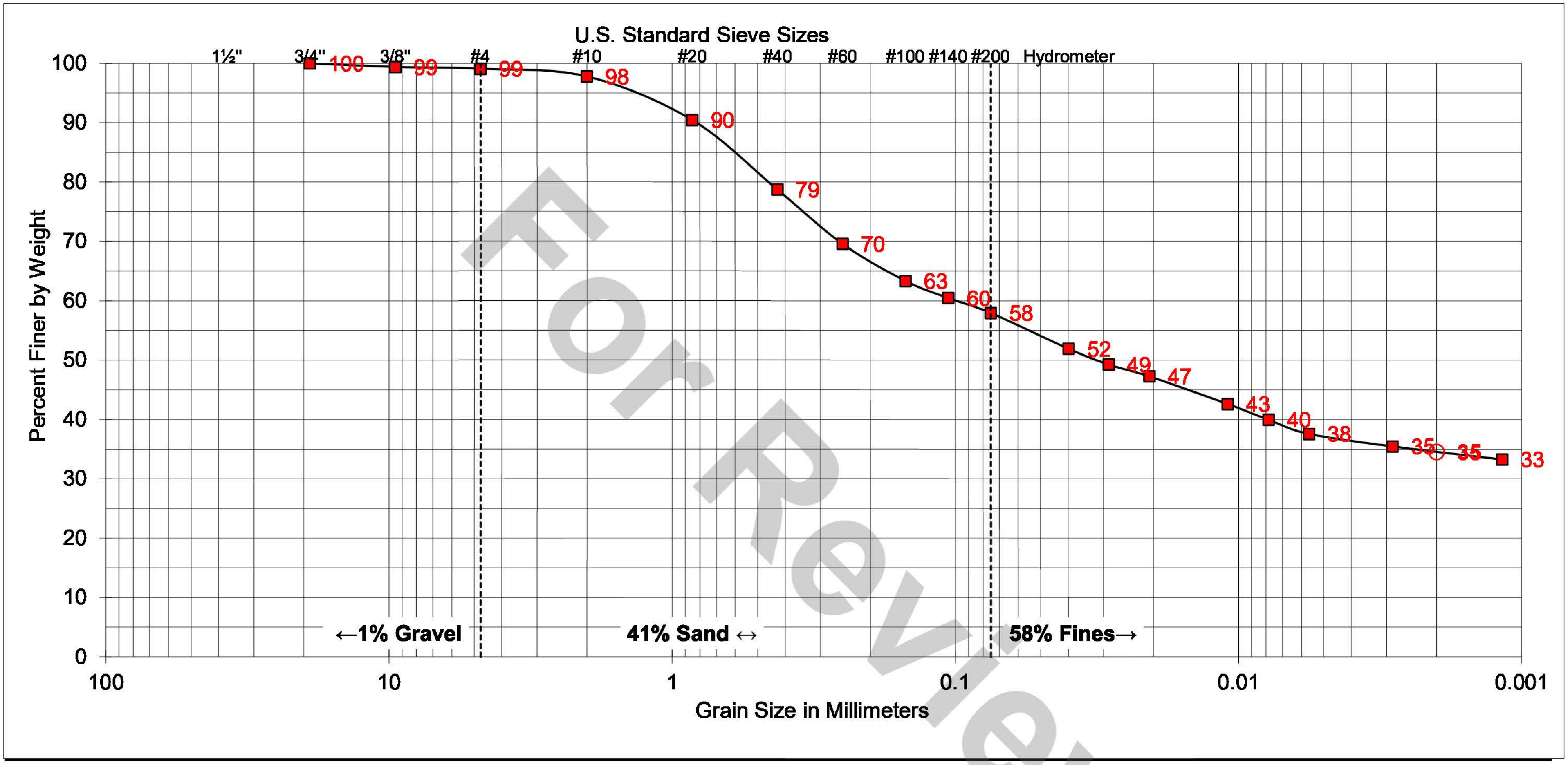
ATTERBERG LIMITS	
LIQUID LIMIT:	27
PLASTIC LIMIT:	15
PLASTICITY INDEX:	12

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.10



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	
EXPLORATION ID:	B-23
SAMPLE DEPTH:	0 - 5'

UNIFIED SOIL CLASSIFICATION: CH

DESCRIPTION: SANDY FAT CLAY

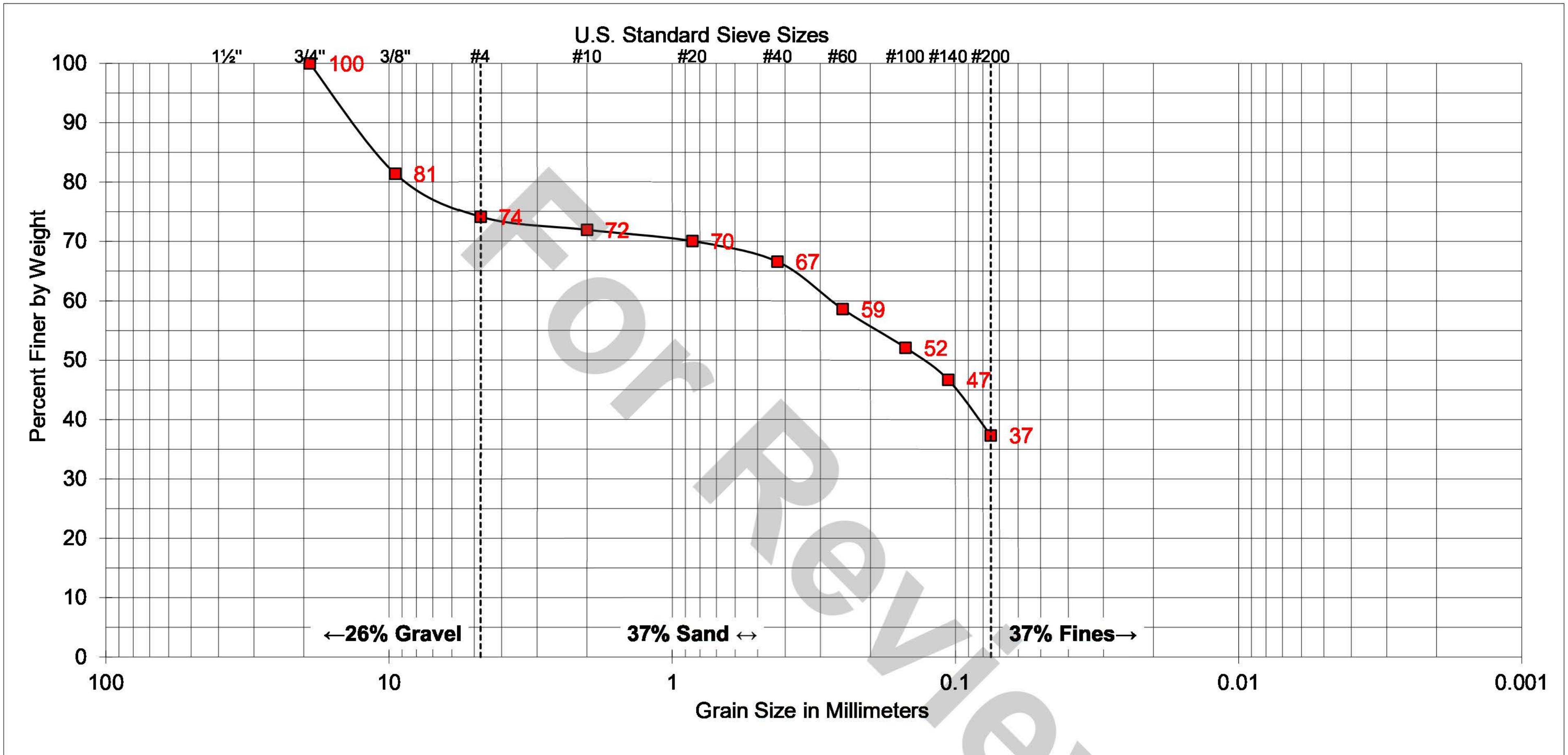
ATTERBERG LIMITS	
LIQUID LIMIT:	51
PLASTIC LIMIT:	17
PLASTICITY INDEX:	34

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.11



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE	
EXPLORATION ID:	B-23
SAMPLE DEPTH:	25'

UNIFIED SOIL CLASSIFICATION: SM

DESCRIPTION: SILTY SAND WITH GRAVEL

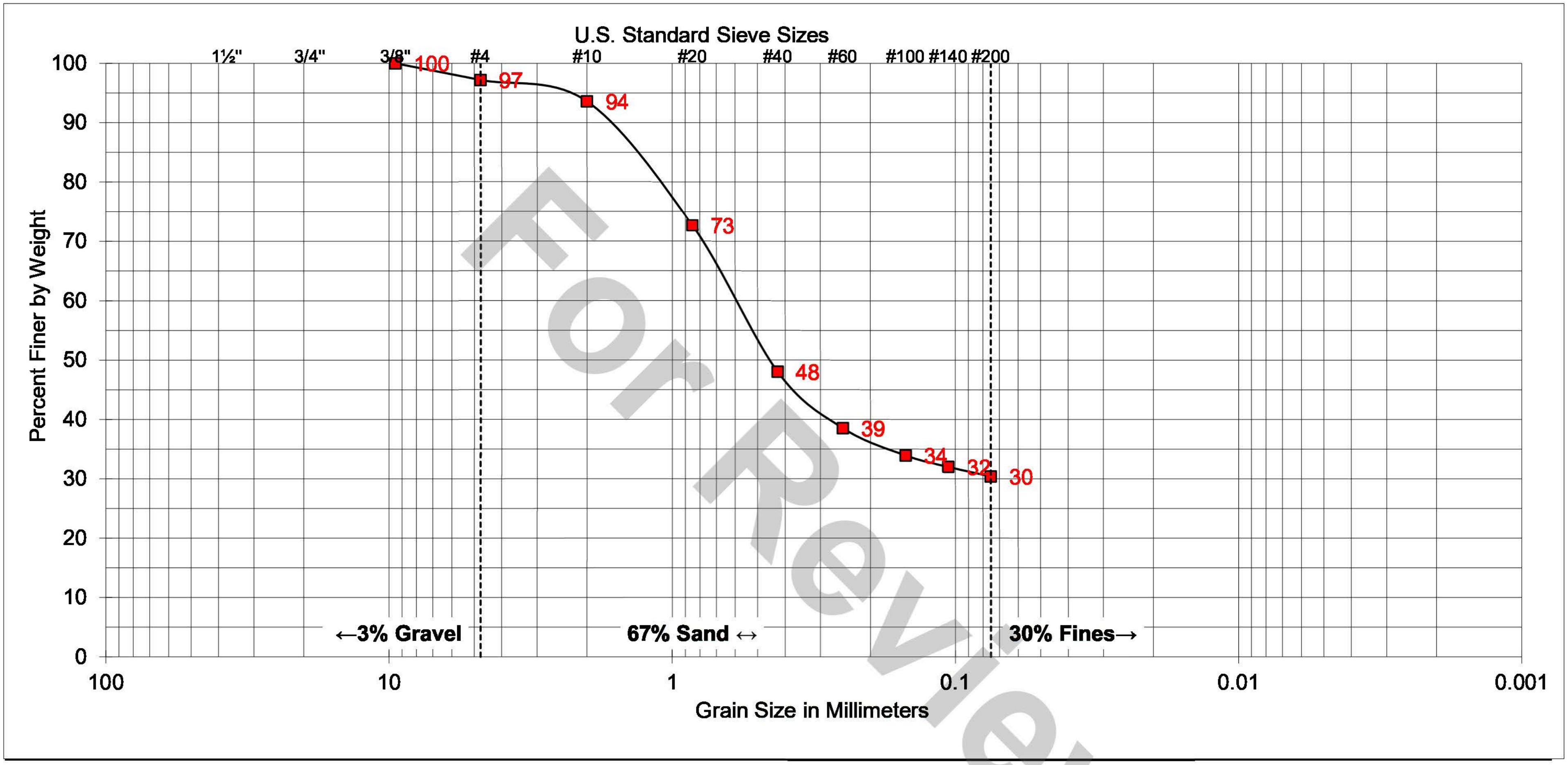
ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.12



GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE	
EXPLORATION ID:	B-24
SAMPLE DEPTH:	5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS	
LIQUID LIMIT:	--
PLASTIC LIMIT:	--
PLASTICITY INDEX:	--

GROUP DELTA

SOIL CLASSIFICATION

Project No. SD814A

FIGURE C-1.13

PERCENT PASSING THE NO. 200 SIEVE
(ASTM D1140)

SAMPLE ID	SOIL DESCRIPTION	RETAINED ON THE #4 SIEVE (%)	PASSING THE #200 SIEVE (%)
B-5 @ 0 – 5'	Clayey Sand with Gravel (SC)	--	30
B-6 @ 5'	Clayey Sand with Gravel (SC)	45	13
B-7 @ 5'	Silty Sand with Gravel (SM)	42	17
B-8 @ 5'	Clayey Sand with Gravel (SC)	49	27
B-10 @ 10'	Clayey Gravel (GC)	70	18
B-12 @ 5'	Clayey Sand with Gravel (SC)	--	36
B-12 @ 15'	Clayey Gravel (GC)	38	49
B-12 @ 25'	Clayey Gravel (GC)	60	34
B-13 @ 5'	Clayey Sand with Gravel (SC)	--	44
B-14 @ 5'	Clayey Gravel with Sand (GC)	50	37
B-17 @ 15'	Clayey Sand with Gravel (SC)	--	39
B-20 @ 5'	Clayey Gravel with Sand (GC)	66	18
B-21 @ 20'	Clayey Gravel with Sand (GC)	49	29

EXPANSION TEST RESULTS
(ASTM D4829)

SAMPLE ID	SOIL DESCRIPTION	EXPANSION INDEX
B-5 @ 0' – 5'	Clayey Sand with Gravel (SC)	1
B-12 @ 0' – 5'	Clayey Sand with Gravel (SC)	13
B-22 @ 0' – 5'	Clayey Sand with Gravel (SC)	0
B-23 @ 0' – 5'	Sandy Fat Clay (CH)	92

EXPANSION INDEX	POTENTIAL EXPANSION
0 to 20	Very Low
21 to 50	Low
51 to 90	Medium
91 to 130	High
Above 130	Very High

MAXIMUM DENSITY & OPTIMUM MOISTURE
(ASTM D1557)

SAMPLE ID	DESCRIPTION	MAXIMUM DENSITY (lb/ft^3)	OPTIMUM MOISTURE (%)
B-19 @ 0 – 5'	Clayey Sand with Gravel (SC)	134.5	6.3

CORROSIVITY TEST RESULTS
(ASTM D516, CTM 643)

SAMPLE ID	pH	RESISTIVITY [OHM-CM]	SULFATE CONTENT [%]	CHLORIDE CONTENT [%]
B-5 @ 5'	5.03	1,314	0.01	0.01
B-9 @ 5'	8.02	2,331	0.01	<0.01
B-20 @ 0 – 5'	8.11	3,358	<0.01	< 0.01
B-23 @ 5-10'	7.96	2,721	<0.01	<0.01

SULFATE CONTENT [%]	SULFATE EXPOSURE	CEMENT TYPE
0.00 to 0.10	Negligible	-
0.10 to 0.20	Moderate	II, IP(MS), IS(MS)
0.20 to 2.00	Severe	V
Above 2.00	Very Severe	V plus pozzolan

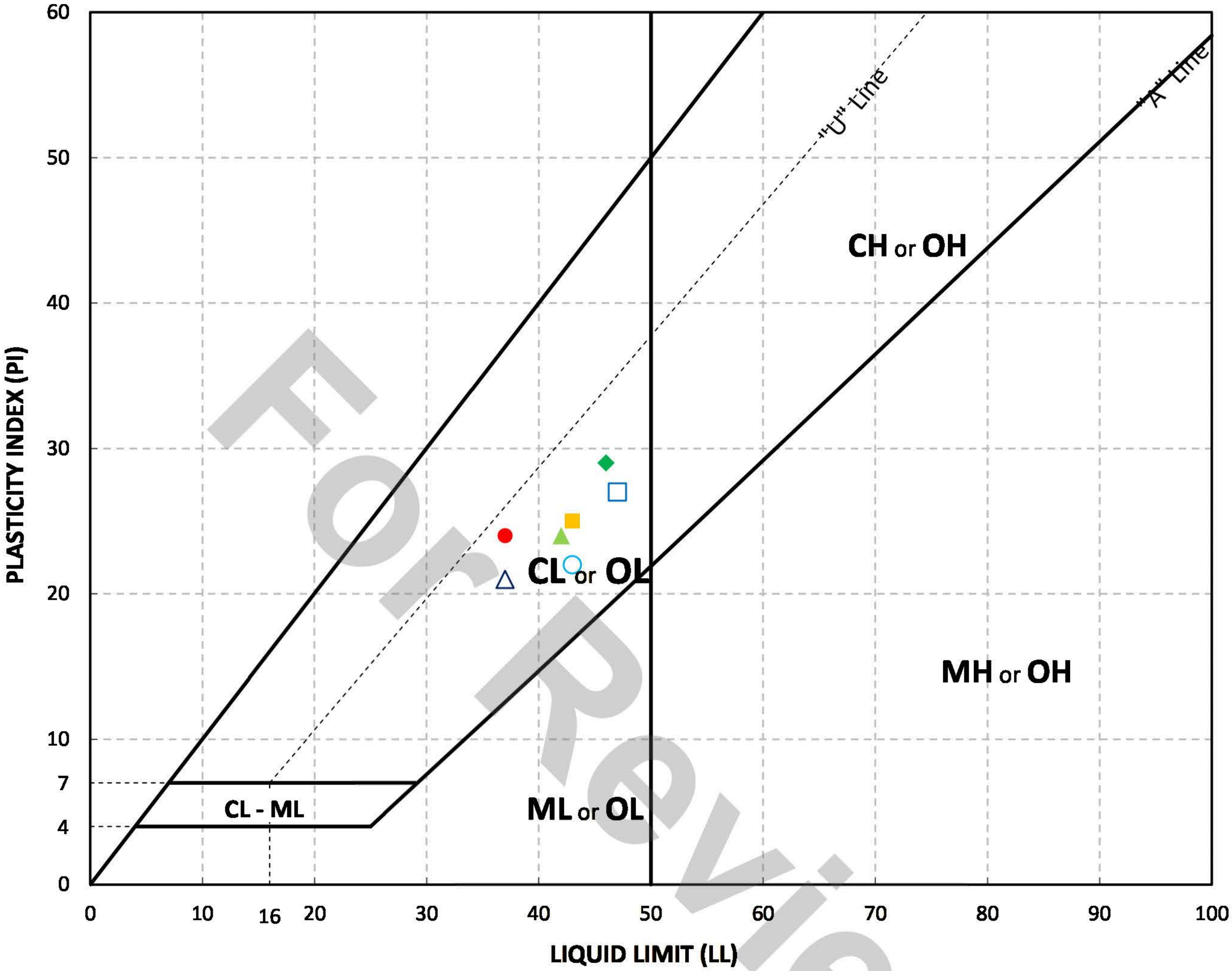
SOIL RESISTIVITY [OHM-CM]	GENERAL DEGREE OF CORROSIVITY TO FERROUS METALS
0 to 1,000	Very Corrosive
1,000 to 2,000	Corrosive
2,000 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
Above 10,000	Slightly Corrosive

CHLORIDE (Cl) CONTENT [%]	GENERAL DEGREE OF CORROSIVITY TO METALS
0.00 to 0.03	Negligible
0.03 to 0.15	Corrosive
Above 0.15	Severely Corrosive

MOISURE CONTENT
(ASTM D2216)

SAMPLE ID	GEOLOGIC UNIT	MOISURE CONTENT (%)
B-3 @ 15’	Eocene Deposits	10.2
B-4 @ 10’	Eocene Deposits	6.0
B-6 @ 5’	Eocene Deposits	4.5
B-7 @ 5’	Eocene Deposits	5.0
B-9 @ 5’	Eocene Deposits	4.8
B-11 @ 10’	Eocene Deposits	5.9
B-11 @ 20’	Eocene Deposits	12.1
B-12 @ 5’	Fill	11.7
B-12 @ 15’	Fill	9.6
B-12 @ 20’	Fill	14.4
B-12 @ 30’	Eocene Deposits	4.7
B-12 @ 35’	Eocene Deposits	8.4
B-13 @ 5’	Fill	12.7
B-14 @ 5’	Fill	6.1
B-14 @ 10’	Fill	9.4
B-15 @ 5’	Fill	12.7
B-16 @ 10’	Eocene Deposits	11.1
B-17 @ 15’	Fill	10.8
B-17 @ 20’	Fill	13.6
B-19 @ 0’ - 5’	Fill	8.2
B-19 @ 15’	Fill	12.7
B-19 @ 25’	Fill	11.0
B-21 @ 20’	Fill	3.9
B-22 @ 0 – 5’	Fill	5.6
B-23 @ 0 – 5’	Fill	16.6
B-23 @ 25’	Eocene Deposits	5.6
B-24 @ 5’	Fill	15.9

ATTERBERG LIMITS
(ASTM D4318)



SYMBOL	BORING NO.	SAMPLE NO.	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL DESCRIPTION (USCS)
●	B-5	0' - 5'	37	13	24	Clayey Sand (SC)
■	B-12	5'	43	18	25	Clayey Sand with Gravel (SC)
▲	B-13	5'	42	18	24	Clayey Sand with Gravel (SC)
◆	B-14	5'	46	17	29	Clayey Gravel with Sand (GC)
○	B-17	15'	43	21	22	Clayey Sand with Gravel (SC)
□	B-19	15'	47	20	27	Sandy Lean Clay (CL)
△	B-21	20'	37	16	21	Clayey Gravel with Sand (GC)

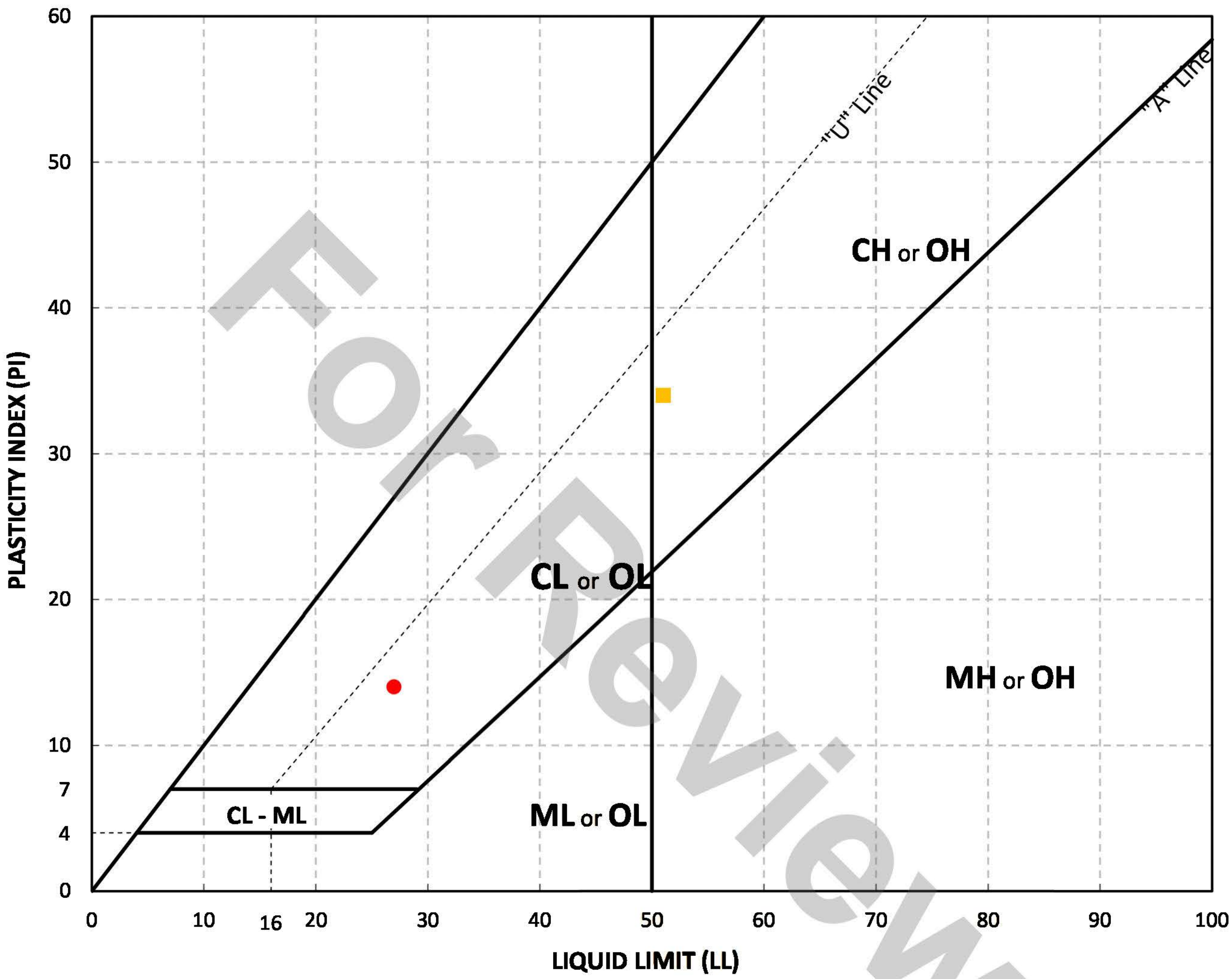
Notes: (1) Unified Soil Classification System (USCS) per ASTM D2487
(2) NP = Non-Plastic per ASTM D4318

GROUP DELTA

LABORATORY TEST RESULTS

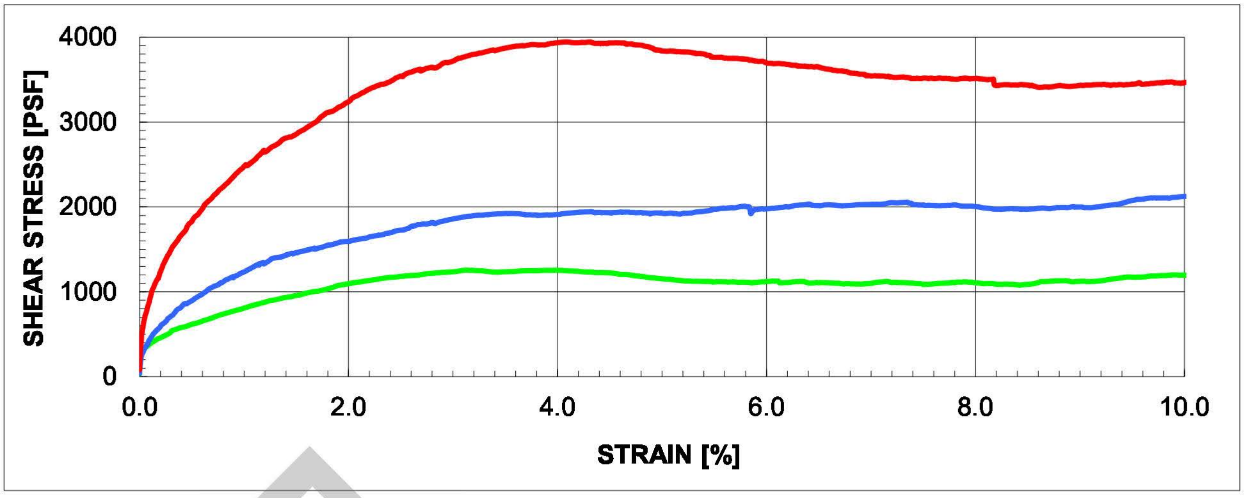
Project No. SD814A
FIGURE C-5.1

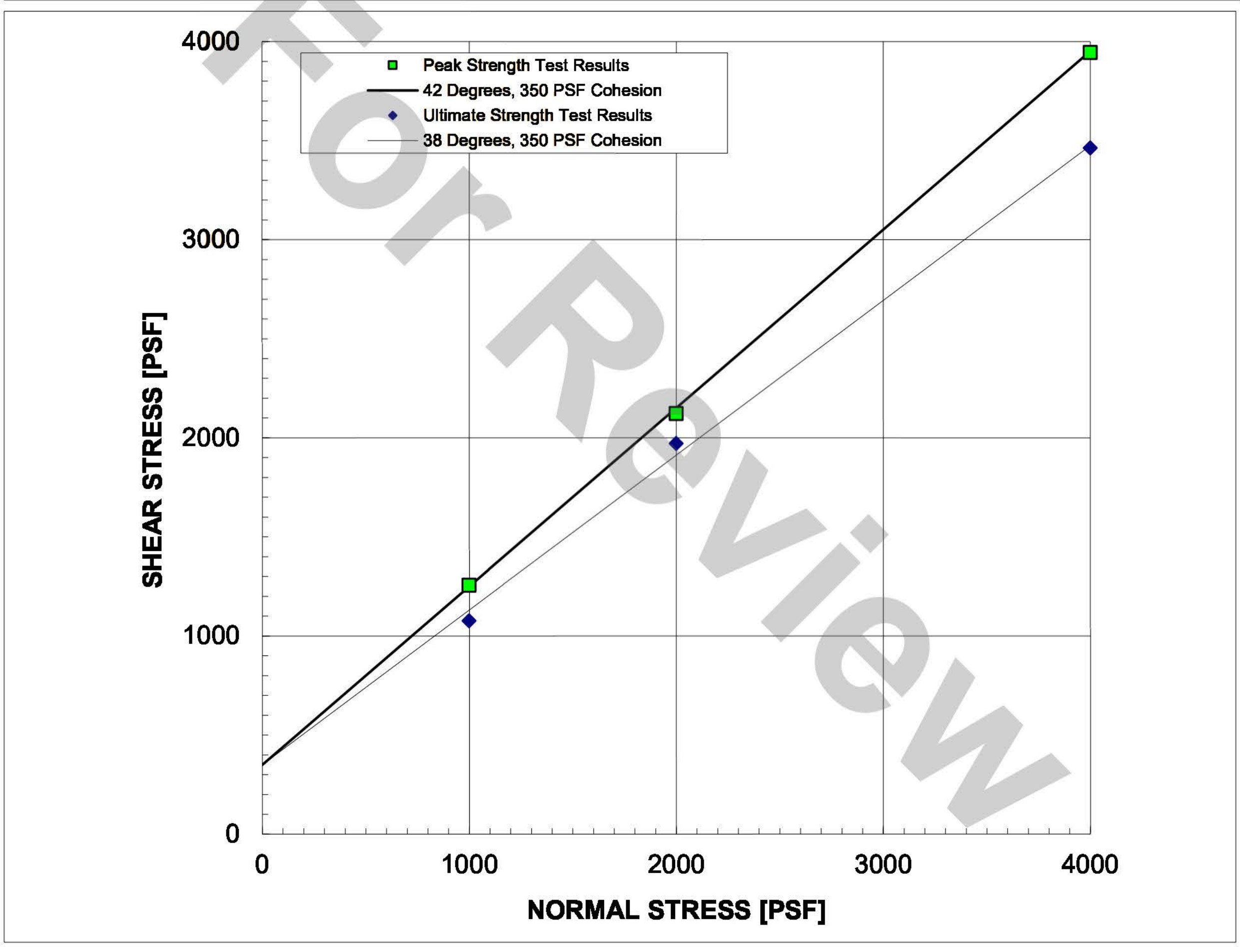
ATTERBERG LIMITS
(ASTM D4318)



SYMBOL	BORING NO.	SAMPLE NO.	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL DESCRIPTION (USCS)
●	B-22	0' - 5'	27	13	14	Clayey Sand with Gravel (SC)
■	B-23	0' - 5'	51	17	34	Sandy Fat Clay (CH)

<u>Notes:</u> (1) Unified Soil Classification System (USCS) per ASTM D2487
(2) NP = Non-Plastic per ASTM D4318





SAMPLE: B-3 @ 15 - 16.5'

Description:
Light Gray Clayey Sand (SC)

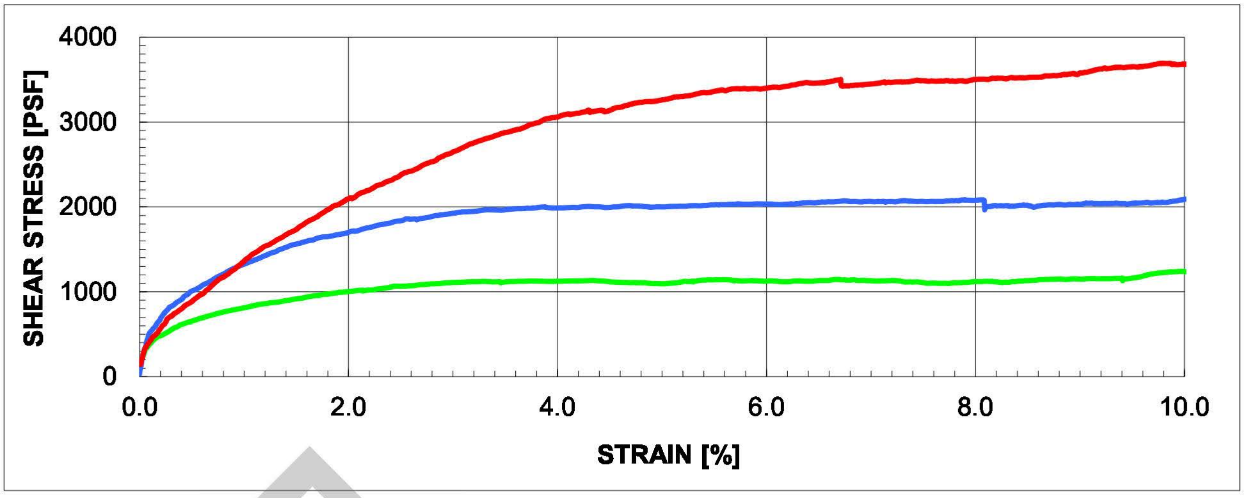
	PEAK	ULTIMATE
ϕ'	42 °	38 °
C'	350 PSF	350 PSF

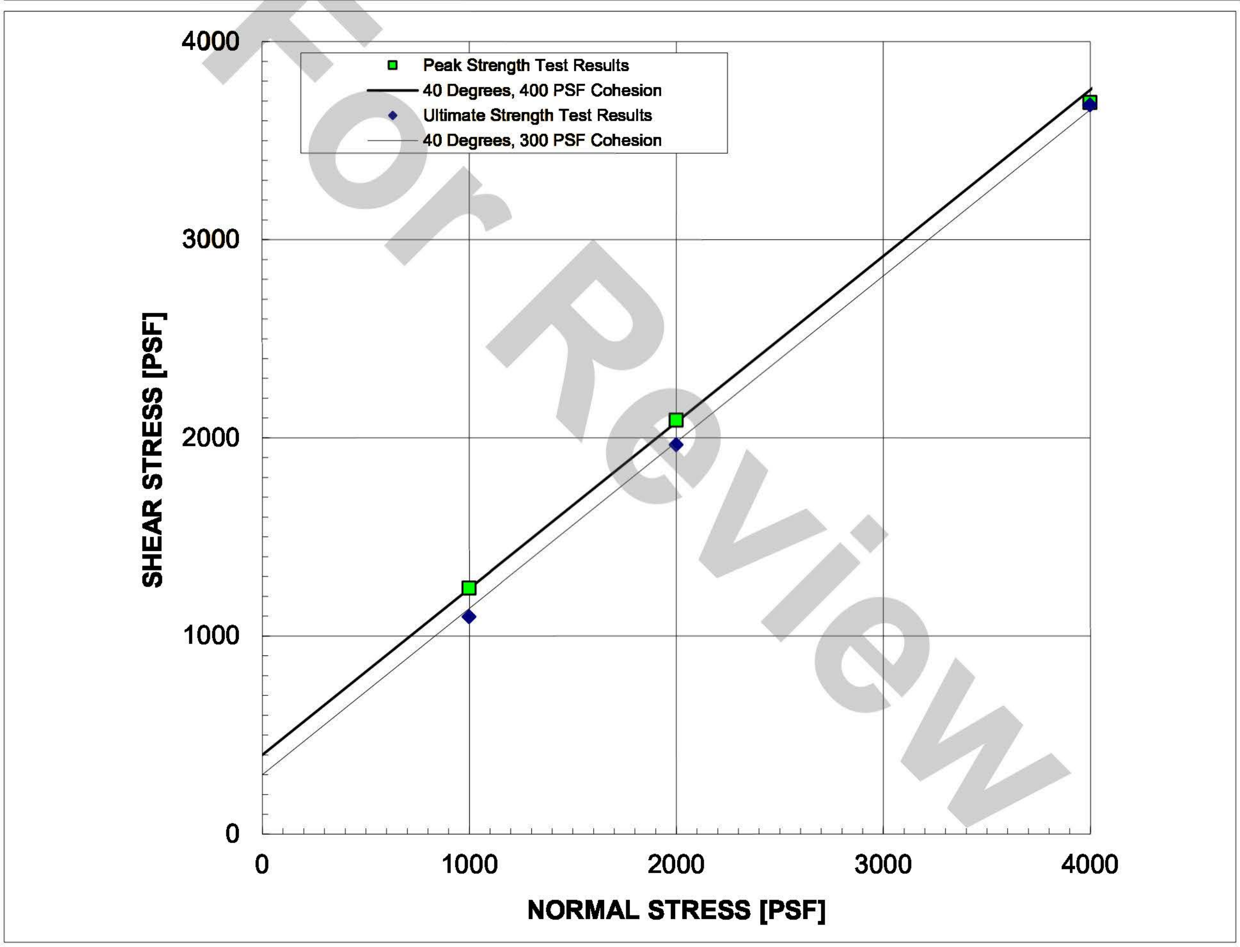
STRAIN RATE: 0.0008 IN/MIN
(Sample was consolidated and drained)

	IN-SITU	AS-TESTED
γ_d	112.7 PCF	112.7 PCF
w_c	10.2 %	18.3 %

GROUP DELTA **DIRECT SHEAR TEST RESULTS**

Project No. SD814A
FIGURE C-6.1





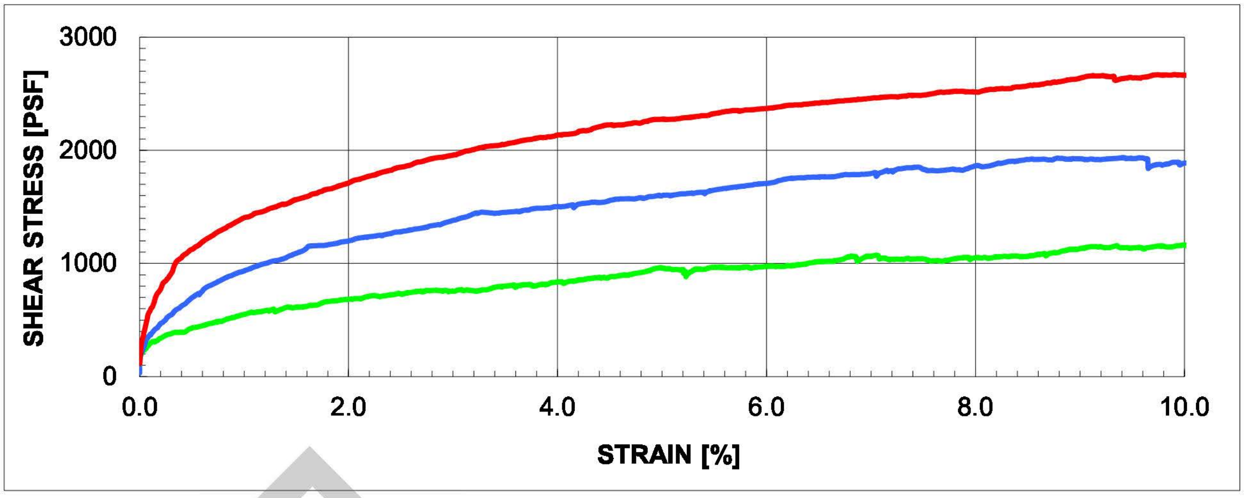
SAMPLE: B-19 @ 0 - 5'

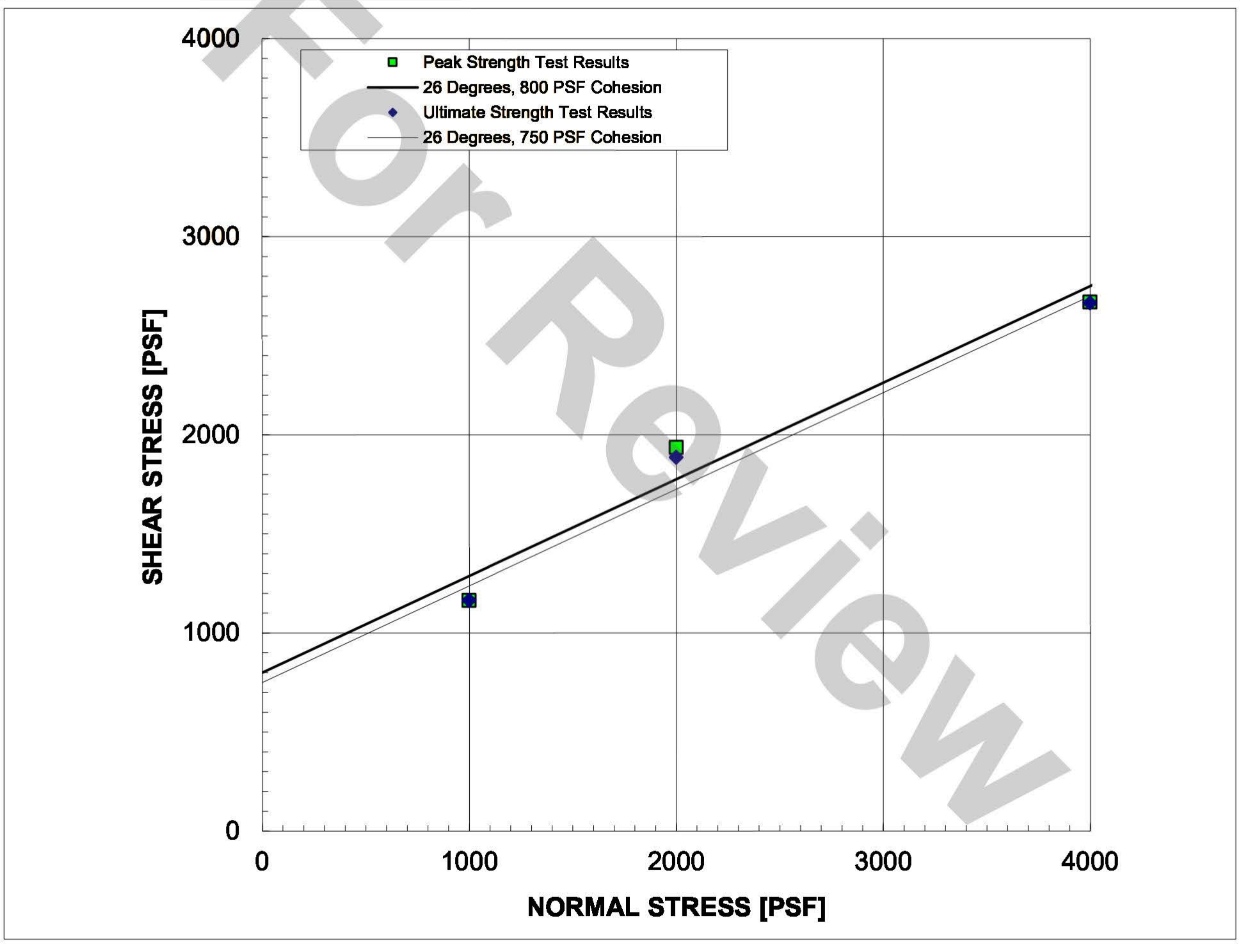
Description: Remolded to 90% of MD
Light Olive Brown Clayey Sand (SC)

	PEAK	ULTIMATE
ϕ'	40 °	40 °
C'	400 PSF	300 PSF

STRAIN RATE: 0.0008 IN/MIN
(Sample was consolidated and drained)

	IN-SITU	AS-TESTED
γ_d	114.1 PCF	114.1 PCF
w_c	8.2 %	17.5 %





SAMPLE: B-24 @ 5'

Description:
Dark Brown Sandy Fat Clay (CH)

	PEAK	ULTIMATE
φ'	26 °	26 °
C'	800 PSF	750 PSF

STRAIN RATE: 0.0002 IN/MIN
(Sample was consolidated and drained)

	IN-SITU	AS-TESTED
γ_d	102.1 PCF	102.1 PCF
w_c	15.9 %	21.0 %

GROUP DELTA **DIRECT SHEAR TEST RESULTS**

Project No. SD814A
FIGURE C-6.3

SAMPLE NO.: B-3 **SAMPLE DATE:** 8/12/24

SAMPLE LOCATION: 0 - 5' **TEST DATE:** 8/27/24

SAMPLE DESCRIPTION: Yellowish brown Clayey Sand (SC) w/ gravel

LABORATORY TEST DATA

	TEST SPECIMEN	1	2	3	4	5	
A	COMPACTOR PRESSURE	120	70	40			[PSI]
B	INITIAL MOISTURE	3.0	3.0	3.0			[%]
C	BATCH SOIL WEIGHT	1200	1200	1200			[G]
D	WATER ADDED	80	100	115			[ML]
E	WATER ADDED (D*(100+B)/C)	6.9	8.6	9.9			[%]
F	COMPACTION MOISTURE (B+E)	9.9	11.6	12.9			[%]
G	MOLD WEIGHT	2015.5	2008.1	2007.1			[G]
H	TOTAL BRIQUETTE WEIGHT	3142.9	3131.7	3036.5			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1127.4	1123.6	1029.4			[G]
J	BRIQUETTE HEIGHT	2.43	2.48	2.39			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	128.0	123.0	115.6			[PCF]
L	EXUDATION LOAD	7516	4243	2940			[LB]
M	EXUDATION PRESSURE (L/12.54)	599	338	234			[PSI]
N	STABILOMETER AT 1000 LBS	46	62	68			[PSI]
O	STABILOMETER AT 2000 LBS	116	138	144			[PSI]
P	DISPLACEMENT FOR 100 PSI	4.74	5.46	6.16			[Turns]
Q	R VALUE BY STABILOMETER	17	7	4			
R	CORRECTED R-VALUE (See Fig. 14)	16	7	4			
S	EXPANSION DIAL READING	0.0007	0.0004	0.0000			[IN]
T	EXPANSION PRESSURE (S*43,300)	30	17	0			[PSF]
U	COVER BY STABILOMETER	0.94	1.04	1.07			[FT]
V	COVER BY EXPANSION	0.23	0.13	0.00			[FT]

TRAFFIC INDEX:	5.0
GRAVEL FACTOR:	1.43
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	6
R-VALUE BY EXPANSION:	53
R-VALUE AT EQUILIBRIUM:	6

*Note: Gravel factor estimated from pavement section using CTM 301, Section C, Part b.

REV. 2, DATED 1/31/15

GROUP DELTA
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
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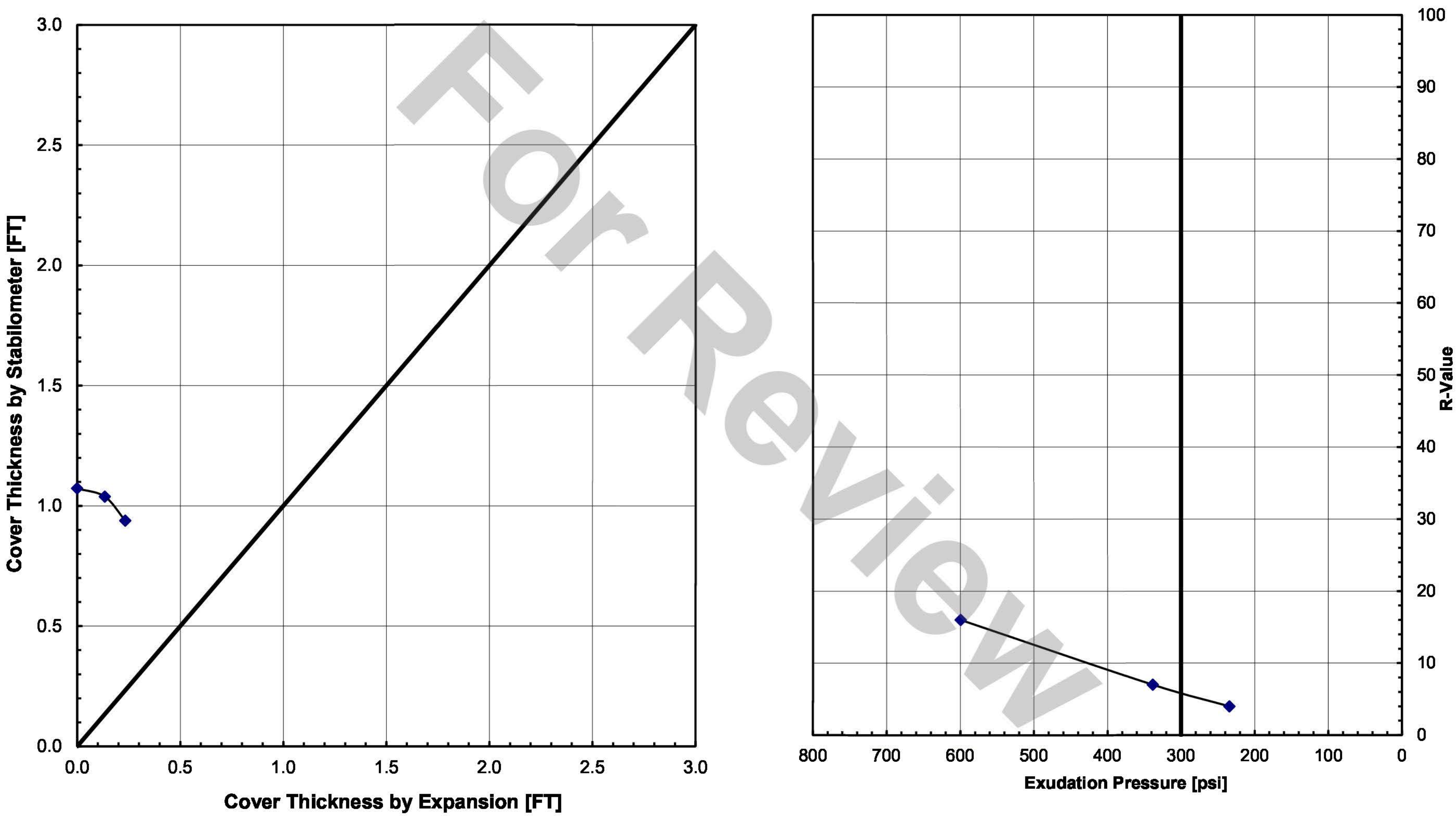
R-VALUE TEST RESULTS
CT301

Project No. SD814A
FIGURE C-7.1

Sample: B-3, 0 - 5'

R-Value at Equilibrium: 6



GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CALIFORNIA 92126

COVER AND EXUDATION CHARTS

Project No. SD814A

FIGURE C-7.2

APPENDIX D
GEOPHYSICIAL INVESTIGATION

APPENDIX D

GEOPHYSICAL INVESTIGAITON

Geophysical surveys were conducted at both the Peninsula and University Towers sites to help characterize subsurface conditions and develop appropriate seismic design. The geophysical survey included a total of four 1-D refraction microtremor (ReMi) profiles. The geophysical survey report is presented in its entirety below.

Advantage Geophysics, Inc.
Gilbert, Arizona
San Diego, California
Portland, Oregon
***.advantagegeophysics.com

August 25, 2024

Mr. Samuel Narveson
Group Delta Consultants, Inc.
9245 Activity Road
San Diego, CA 92126

Subject: **Seismic Evaluation**
SDSU Evolve Housing
San Diego, California
Project No. SD814A

Dear Mr. Narveson:

Advantage Geophysics, Inc. (Advantage) has performed a geophysical evaluation pertaining to the SDSU Evolve Housing project located on 55th Street north of Remington Road and west of Canyon Crest Drive, and in a parking lot located east of 55th Street and south of Montezuma Road in San Diego, California (Figure 1). The purpose of our evaluation was to develop four one-dimensional refraction microtremor (1-D ReMi) shear-wave velocity soundings to be used for design and construction at the project site. This letter presents our methodology, equipment used, analysis, and findings from our study. Our field services were conducted on August 13, 2024.

Our scope of services included:

- Performance of four 1-D ReMi profiles (RL-1 through RL-4) at your designed locations.
- Compilation and geophysical analysis of the collected data.
- Preparation of this letter reporting on our methodology and findings.

The project area located north of the intersection between 55th Street and Aztec Circle Way generally consists of multi-dwelling housing buildings surrounded by native vegetation. The project area east of 55th Street south of Montezuma Avenue is developed with both multi-dwelling housing and single-family housing (Figures 2a and 2b). Specifically, RL-1 was conducted in a parking lot north of the Zacatepec SDSU Housing building, RL-2 was conducted in a parking lot west of the Toltec and Zapotec SDSU Housing building, RL-3 was conducted in a parking lot east of the Tecs Apartment building, and RL-4 was conducted in a parking lot southeast of the University Towers SDSU Housing building. RL-1 through RL-4 were collected in a northwest-southeast orientation. The general locations of the seismic lines were selected by a representative of your office and adjusted when necessary to account for surface conditions. Figures 2a, 2b, and 3 depict the general line locations and the site conditions in the vicinity of the traverses.

The 1-D ReMi technique uses recorded surface waves (specifically Rayleigh waves) that are contained in background noise to develop four 1-D shear-wave velocity soundings of the study area down to a depth, in this case, of approximately 100 feet below ground surface (bgs). The depth of exploration is dependent on the length of the line and the frequency content of the background noise. The results of the ReMi method are displayed as one dimensional soundings which represent the average condition across the length of the line. The ReMi method does not require an increase of material velocity with depth; therefore, low velocity zones (velocity inversions) are detectable with the ReMi method.

Our ReMi evaluation included the use of a 24-channel geode exploration seismograph and 24, 4.5-Hz vertical component geophones. The geophones were spaced 10 feet apart for a total line length of 230 feet at RL-1 through RL-4. A total of 25 records, each 32 seconds in duration, were recorded with 15 of the files utilizing passive data collection of ambient ground vibration noise and 10 files utilizing an active source generated by a sledgehammer and a plastic strike plate. The active source data records included conducting hammer blows at locations off end of the seismic spreads at approximately 30 feet off the west and east ends of the geophone array for RL-1 through RL-4. The active source files collected at each end of the line were conducted to supplement the passive data collection. Using off-end active source supplemental data reduces the chances for indeterminant dominant phase angle of energy arriving at the seismic spread, which typically increases the accuracy of the recorded dispersion curve and 1-D ReMi model results. The recorded data was then downloaded to a field computer. The data were later processed at the office using Surface Plus 9.1 - Advanced Surface Wave Processing Software (Geogiga Technology Corp., 2020), which uses the refraction microtremor method (Louie, 2001), and other surface wave analysis methods. The program generates phase-velocity dispersion curves for each record and provides an interactive dispersion modeling tool where the users determine the best fitting model. The result is a 1-D seismic surface-wave velocity model of the site at the location we evaluated which, based on published studies, is typically 85 to 95 percent of the velocity of shear waves. Therefore, using the ReMi surface wave data and analysis method results in a relatively conservative estimate of shear wave velocity. For situations in which the shear wave velocity values are close to the limit between site class boundary values, consideration should be given to the site's subsurface geologic stratigraphy and structure, soil mechanics, and ReMi evaluation results when assessing seismic site classification. Figures 2a, 2b, and 3 depict the general site conditions in the study area.

Table 1 and Figures 4a through 4d present the results from our evaluation. It should be noted that the ReMi results represent the average condition across the length of the line. When the 1-D ReMi surface wave velocity results (analogous to shear wave) show an IBC Vs100 velocity value that is close to the "border line" boundary between IBC Site Classes, the project geotechnical consultant of record should be consulted. The geotechnical consultant of record should also consider other existing available site information and whether obtaining additional new geotechnical evaluation data such as boreholes, surface to downhole seismic (ASTM D7400), crosshole seismic (ASTM D4428), and/or additional 1-D ReMi data collections would be needed concerning the site’s subsurface geologic stratigraphy and structure, soil mechanics and soil modulus, along with the initial 1-D ReMi evaluation results when assessing the "borderline" IBC Vs100 Seismic Site Class.

Line No.	Depth (feet)	Shear Wave Velocity (feet/second)	Average Shear-Wave Velocity (Vs100)	Site Class (ICC, 2021)
RL-1 (NW-SE)	0-5	1017	Vs = 1,944 ft/s	C
	5-14	1250		
	14-23	1562		
	23-60	2011		
	60-100	2651		
RL-2 (NW-SE)	0-9	456	Vs = 1,371 ft/s	C
	9-14	565		
	14-32	1208		
	32-59	2041		
	59-100	2526		
RL-3 (NW-SE)	0-4	761	Vs = 2,026 ft/s	C
	4-9	1746		
	9-34	2014		
	34-64	2018		
	64-100	2587		
RL-4 (NW-SE)	0-6	534	Vs = 1,394 ft/s	C
	6-10	1184		
	10-33	1376		
	33-70	1379		
	70-88	2088		
	88-100	2595		

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practices, methods, and techniques, and the standard of care exercised by consultants performing similar tasks in the project area. The services will be performed in accordance with generally accepted professional geophysical standards and practices prevailing at the time and location of the services. No warranty, express or implied, is made regarding the conclusions and opinions presented in this document. The results of geophysical analyses are based on the interpretation of collected data, which may be subject to varying degrees of accuracy. No guaranty is made regarding the exactness of the analysis results and no warranty, express or implied, regarding the findings is made by the provider. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this document may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluations will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Should the reader require additional information or have questions regarding the content, interpretations presented, or completeness of this document please contact the undersigned for clarification. This document is intended exclusively for use

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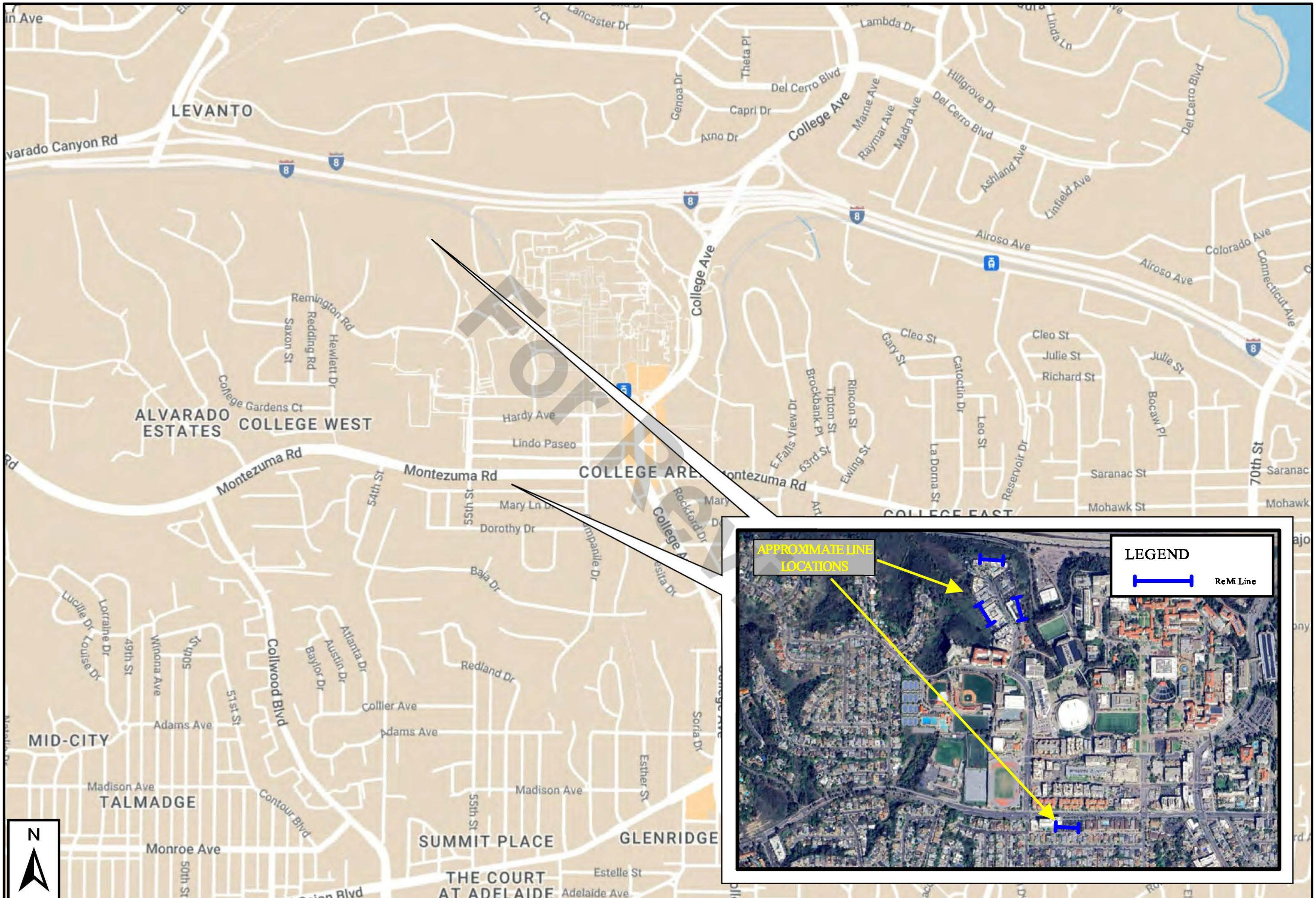


Site Location Map	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 1 Date: 08/24	Advantage GEOPHYSICS

Seismic Line Location Map
RL-1 through RL-3

SDSU Evolve Housing
San Diego, California

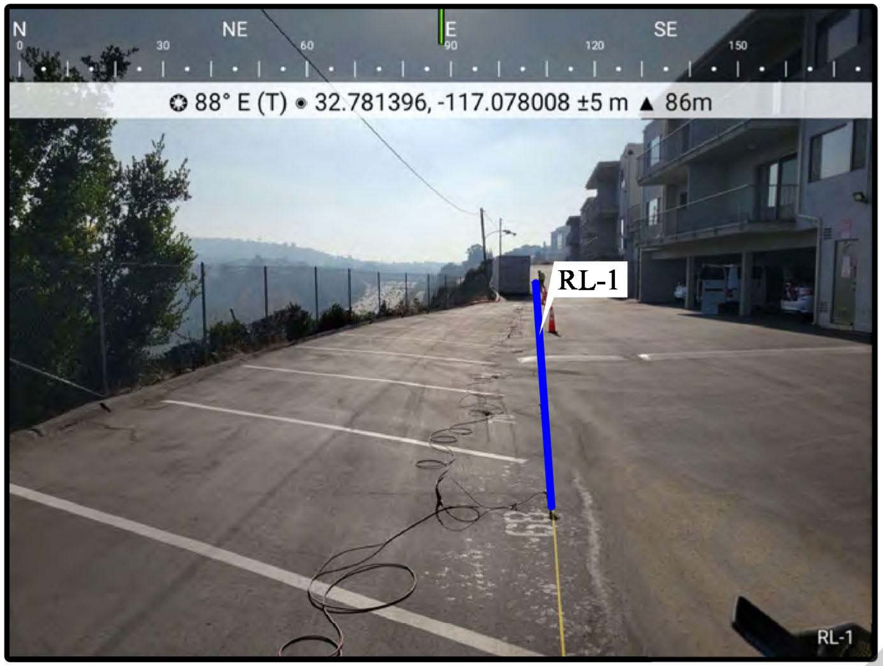
Project No.: 2024053

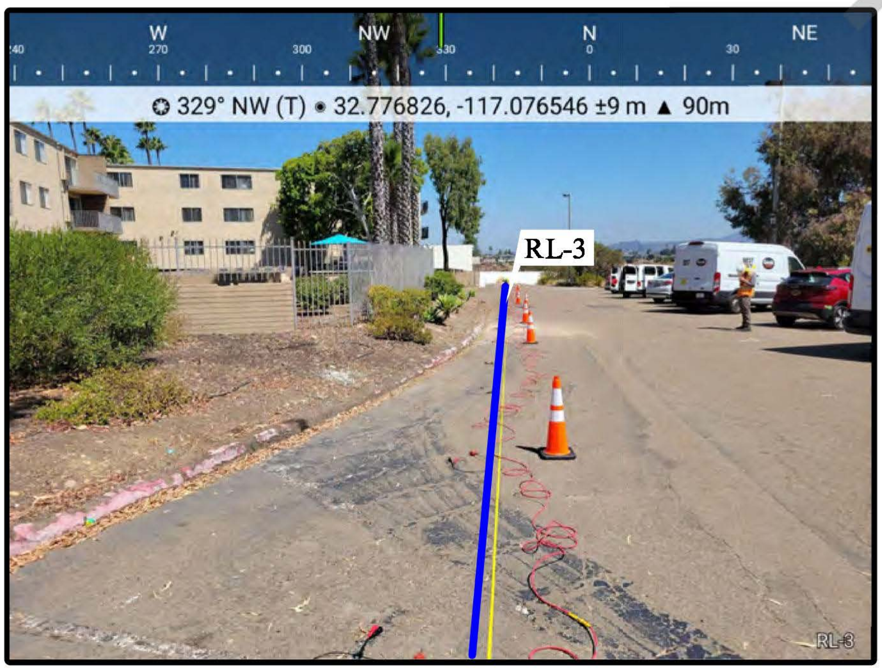
Figure
2a

Date: 08/24

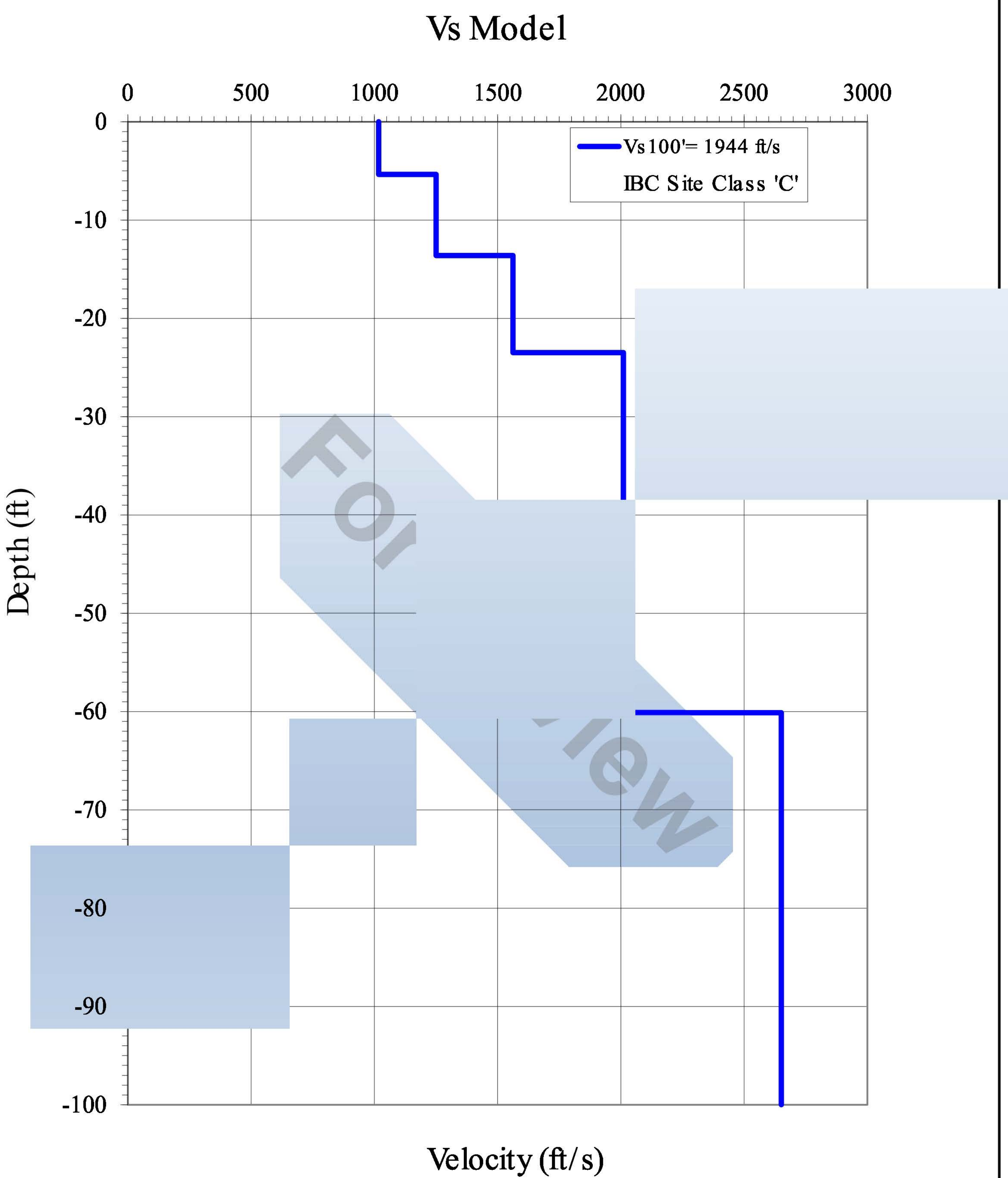
Advantage GEOPHYSICS

Seismic Line Location Map RL-4	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 2b Date: 08/24	Advantage GEOPHYSICS

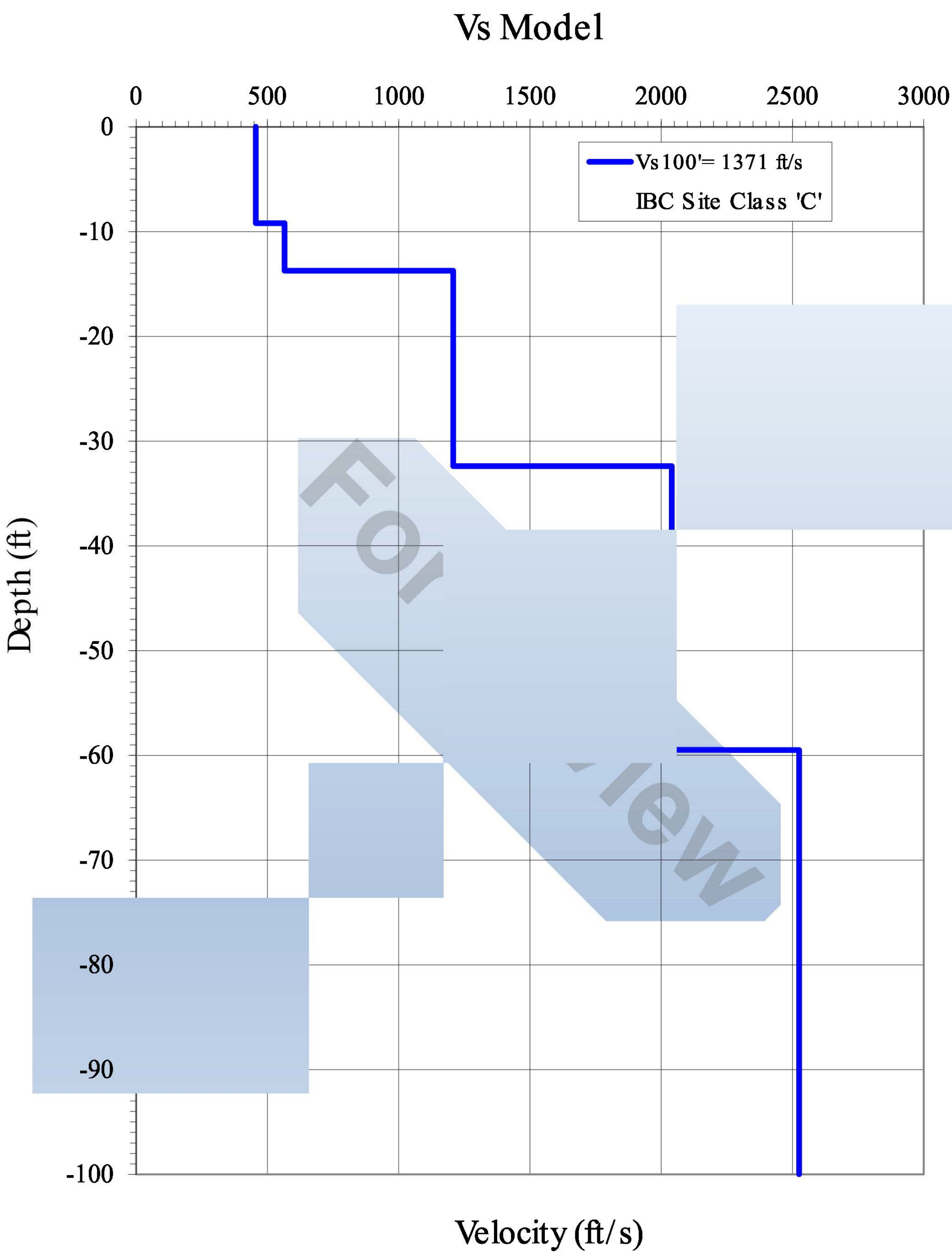




Site Photographs	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 3 Date: 08/24	Advantage GEOPHYSICS

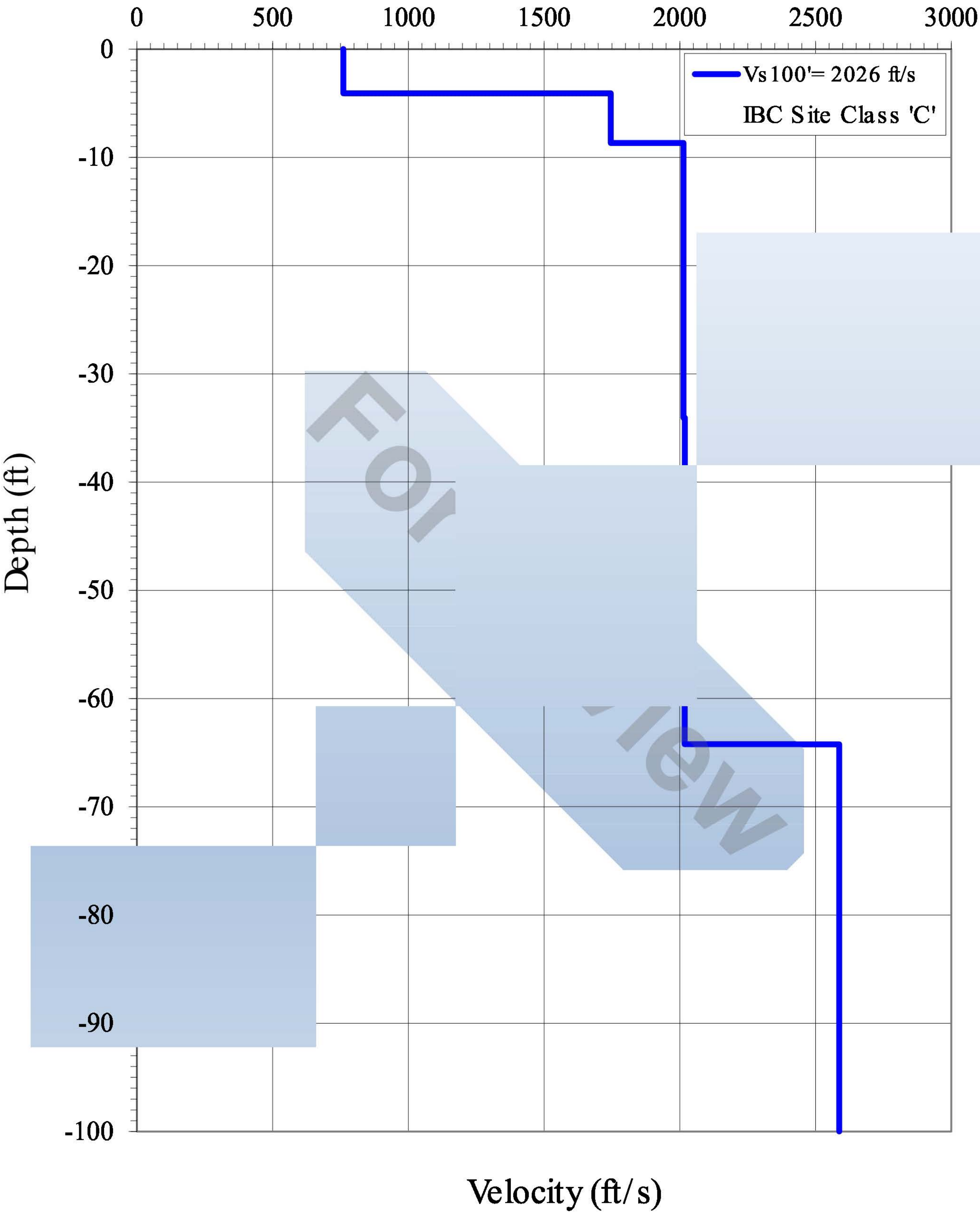


ReMi Results RL-1	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 4a Date: 08/24	Advantage GEOPHYSICS



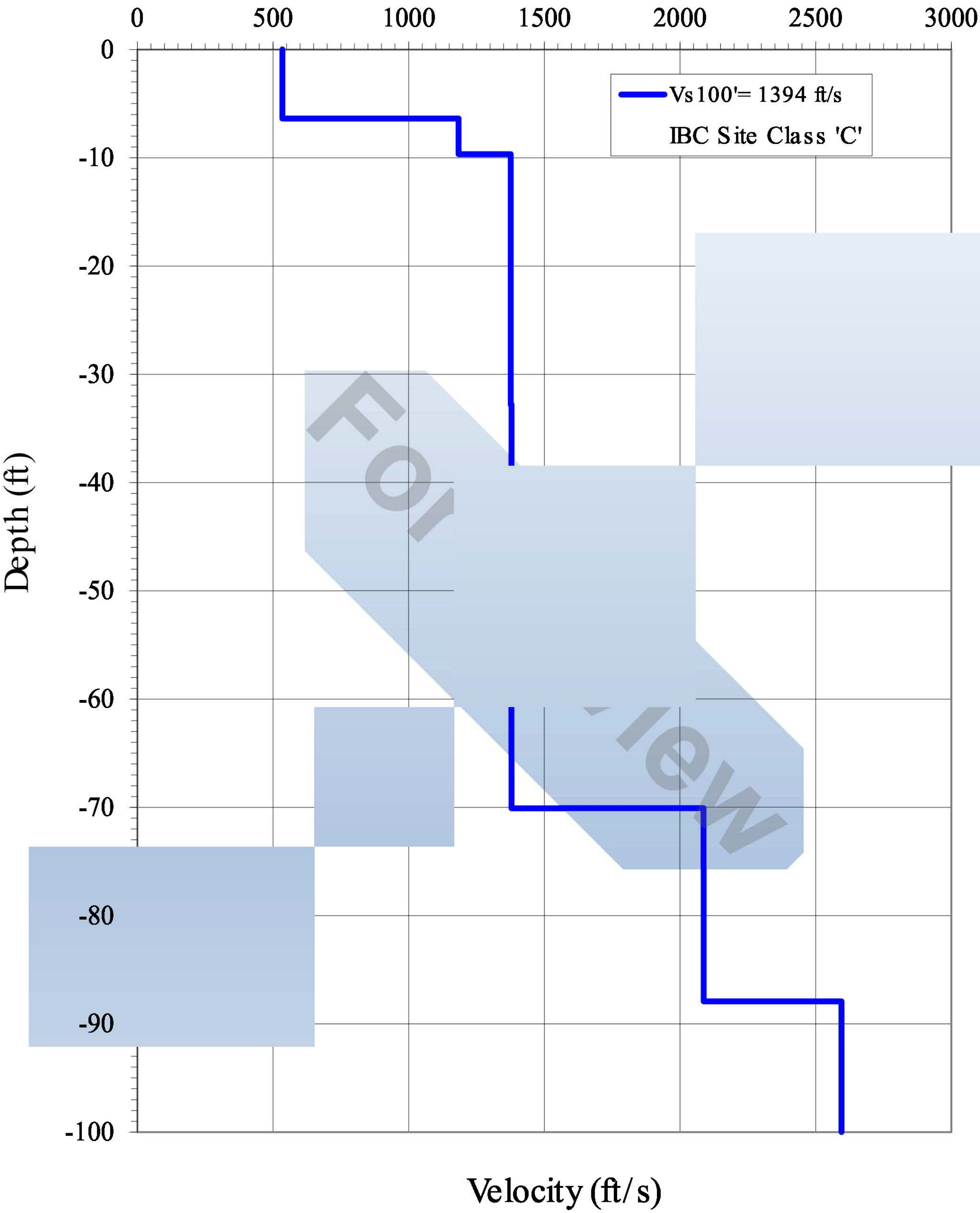
ReMi Results RL-2	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 4b Date: 08/24	Advantage GEOPHYSICS

Vs Model



ReMi Results RL-3	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 4c Date: 08/24	Advantage Geophysics

Vs Model



ReMi Results RL-4	SDSU Evolve Housing San Diego, California Project No.: 2024053	Figure 4d Date: 08/24	Advantage GEOPHYSICS

APPENDIX E

SITE-SPECIFIC ACCELERATION RESPONSE SPECTRA, PENINSULA SITE-EAST

GROUP DELTA

TECHNICAL MEMORANDUM

Project No. / Name:	SD814A / SDSU Evolve Student Housing
Prepared for:	Amanda Scheidlinger, AIA, DBIA, LEED AP BD+C; Director of Construction; San Diego State University (SDSU)
	Justin Dorsey, CCM, PMP, Director of Construction Management, OCMI
Prepared by:	Maxwell Wilder, P.E., Kristen Chang, G.E., and Charles Robin (Rob) Stroop, G.E.
Date:	September 23, 2024
Subject:	Site-Specific Acceleration Response Spectra

As requested by the Swinerton Gensler team, Group Delta Consultants, Inc. (Group Delta) is submitting this technical memorandum (TM) to provide site-specific acceleration response spectra and seismic design parameters for the east portion of the Peninsula site for the SDSU Evolve Student Housing project, which includes the Dining Hall (2-story) and Building 1 (11-story) and Building 2 (11-story).

Results of our analyses indicate that the site-specific design acceleration parameters are reduced for both short and long spectral periods. The short-period design acceleration parameter (S_{DS}) is about 5-percent lower than the mapped value, and the 1-second design acceleration parameter (S_{D1}) is about 20-percent lower than the mapped value.

Introduction

This technical memorandum presents the results of the site-specific seismic hazard analyses performed in accordance with the current 2022 California Building Code (CBC) and ASCE 7-16 (ASCE/SEI 7-16) for the project site. Horizontal Acceleration Response Spectra (ARS) for 5-percent damping were developed for the Risk-Targeted Maximum Considered Earthquake (MCE_R), as defined by ASCE 7-16, following Section 21.2, and performing site-specific seismic hazard analyses. Site-specific probabilistic seismic hazard analyses were performed using the computer tool OpenSHA (Field, 2003), and the seismic source model used is the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3). Development of the horizontal ARS was also performed using the ground motion models developed as part of the Next Generation Attenuation (NGA) – West 2 research project.

The site coordinates used for the analyses described herein are:

Latitude:	32.77680
Longitude:	-117.07651

Seismic Setting

The project site is located in an area with very high seismic activity. Figure 3 presents a Regional Fault Map showing the nearby active faults. Table 1 below lists the active faults with significant contribution to the hazard based on disaggregation, along with their Fault Type, Maximum Magnitude (Mw) and Site-To-Source Rupture Distance (R_{rup}). Disaggregation of the hazard was determined using the USGS Unified Hazard Tool (https://earthquake.usgs.gov/hazards/interactive/). The Fault Type, Mw, and R_{rup} are obtained primarily from the Version 3 of the Uniform California Earthquake Rupture Forecast (UCERF3) (Field et al., 2013), which is the seismic source model developed by the Working Group on California

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Earthquake Probabilities (WGCEP) in 2013. The UCERF3 model was subsequently adopted by the 2014 U.S. National Seismic Hazard Mapping Program (NSHM) (Petersen et al., 2014) to develop probabilistic seismic hazard maps.

Table 1: Active Faults with Significant Contribution to the Hazard

Fault	Fault Type	Maximum Magnitude, M_W	Site-to-Source Distance, R_{rup} (km)
Rose Canyon	Strike-slip	7.0	10.3
Coronado Bank alt 2	Strike-slip	7.4	11.3
Oceanside alt 1	Reverse	7.2	35.4
San Diego Trough north alt1	Strike-slip	7.3	48.2
Elsinore (Coyote Mountains + Julian + Temecula + Stepovers Combined + Glen Ivy + Whittier alt 2)	Strike-slip	7.8	56.7
San Jacinto (San Bernadino + San Jacinto Valley + Stepovers Combined + Anza + Coyote Creek + Borrego + Superstition Mtn)	Strike-slip	7.8	90.5
San Andreas (Parkfield + Cholame + Carrizo + Big Bend + North Mojave + South Mojave + North San Bernardino + South San Bernardino + San Gorgonio Pass + Garnet Hill + Coachella)	Strike-slip	8.2	133.3

The maximum magnitudes and scenarios adopted are consistent with the published Building Seismic Safety Council 2014 Event Set (the adopted deterministic ruptures used for the 2014 USGS NSHM (BSSC, 2015). For very active, multi-segment faults (such as Elsinore, San Jacinto, and San Andreas), where different earthquake scenarios are considered, the one producing the largest magnitude was reported in the table along with its combined segments.

As shown in Table 1, the closest known and most significant contributor active seismic source to the site is the Rose Canyon fault zone, which is located about 10.3 kilometers (km) west of the project site. As shown in Figure 3, the Rose Canyon is a strike-slip fault zone that extends about 75 km from off the coast of Carlsbad down through La Jolla, and then through downtown San Diego to near the border between California and Mexico.

The Elsinore fault zone, located to the northeast of the site, is a right-lateral strike slip fault with a total length of about 238 km, extending from Whittler to the Coyote Mountains. At the northern end of the fault, the Elsinore fault connects with the Whittier alt 2 fault, which is included in the combined segments listed in Table 1. It is estimated to be capable of producing earthquakes with a maximum magnitude (M_W) of 7.8 when all of the segments rupture in combination from Whittier to the Coyote Mountains.

The San Jacinto fault zone, located northeast of the site, is a right-lateral strike slip fault with a total length of about 210 km, extending from San Bernardino down to Superstition Mountain. At the northern end of the fault, it connects with the San Andreas fault zone. It is estimated to be capable of producing earthquakes with a maximum magnitude (M_W) of 7.8 when all of the segments rupture in combination from San Bernardino to Superstition Mountain.

The San Andreas fault zone, located to the northeast of the site, is a right-lateral strike slip fault system that extends a total length of about 315 miles (1,200 km) through California. This fault system forms the boundary between the Pacific Plate and the North American Plate. The Southern San Andreas section of the fault system extends from Parkfield down to its termination at the Salton Sea, with a length of 550 km. The Southern San Andreas section is estimated to be capable of producing earthquakes with a maximum magnitude (M_W) of 8.2.

Site Characterization

In developing site-specific ground motions, the characteristics of the soils underlying the site are an important input to evaluate the site response. Based on our current investigations and review of the geologic map, the site is generally underlain by Eocene-age deposits mapped by Kennedy and Tan (2008) as the Mission Valley Formation and the Stadium Conglomerate. These deposits have thick beds of cobble conglomerate commonly associated with the Stadium Conglomerate interbedded with sandstone and siltstone commonly associated with the Mission Valley Formation.

As part of the investigation, a geophysical study consisting of four seismic lines was performed with one-dimensional refraction microtremor shear wave velocity soundings. Three lines were performed at the Peninsula site, however, while two lines were performed in the cut area/shallow formation, one line was performed along the fill slope. Therefore, for the eastern portion of the Peninsula site covered in this memorandum, the average shear wave velocity in the upper 30 meters ($V_{S,30}$) used in analyses is the average of the two seismic lines performed in shallow formation (RL-1 and RL-3). The adopted $V_{S,30}$ of 605 meters per second (m/s) (1,985 feet/second) classifies the site as Site Class C, as presented in Table 20.3.1 of ASCE 7-16.

Seismic Hazard Analyses

Ground Motion Models

Site-specific ground motions are influenced by type of faulting, magnitude of characteristic earthquakes, and local soil conditions. Many ground motion models, also referred to as Ground Motion Prediction Equations (GMPEs) have been developed to estimate the variation of spectral acceleration with earthquake magnitude and source-to-site distance, among other parameters. The Pacific Earthquake Engineering Research (PEER) coordinated a large multidisciplinary project entitled "NGA (Next Generation Attenuation)-West 2 Research Project" (Bozorgnia et al., 2014), referred to as NGA-West2. In NGA-West2, five teams have developed and presented horizontal ground motion models for shallow crustal earthquakes in active tectonic regions including Western North America. These teams are Abrahamson et al. (2014), Boore et al. (2014), Campbell and Bozorgnia (2014), Choiu and Youngs (2014), and Idriss (2014).

All five models were considered in developing the ARS at the site. Since the site-specific measured $V_{S,30}$=605 m/s, we included the Idriss model as this GMPE is applicable when $V_{S,30}$ > 450 m/s. Idriss was assigned a weight of 0.12, while the four other GMPEs were assigned an equal weight of 0.22, consistent with the weighting adopted for the NSHM program.

The NGA-West2 relationships use measured values of shear wave velocity ($V_{S,30}$) as input. As previously discussed, we have adopted an average $V_{S,30}$ of 605 m/s to represent the site underlying soil conditions. In addition, some of the ground motion models require input for $Z_{1.0}$ (defined as the depth in meters to a shear wave velocity of V_s = 1 km/s) and $Z_{2.5}$ (defined as the depth in km to a shear wave velocity of V_s = 2.5 km/s). These two parameters are used to capture the basin effect on site response. The SCEC/Harvard Community Velocity Model Version 11.9 was reviewed for selection of $Z_{1.0}$ and $Z_{2.5}$ values, which were consistent with our local experience. $Z_{1.0}$ value of 50 m and $Z_{2.5}$ of 0.22 km were used in the analyses

Probabilistic Seismic Hazard Analyses

Site-specific Probabilistic Seismic Hazard Analyses (PSHA) were performed using the computer tool OpenSHA (Fields, 2003), using the UCERF3 seismic source model and the updated NGA-West2 ground motion models. Uniform hazard horizontal ARS were developed up to a period of 10 seconds. The hazard spectrum, developed for 5-percent damping, is presented in Figure 4.

Note that supplementary probabilistic seismic hazard analyses were performed using the USGS Unified Hazard Tool (https://earthquake.usgs.gov/hazards/interactive/) for comparison to the OpenSHA analyses. These analyses were performed using the dynamic version of the Conterminous U.S. 2014 (v4.2.0) at available spectral periods, using the Site Class C ($V_{S,30}$ = 537 m/s). Results of this supplementary analyses show good agreement with our OpenSHA analyses.

The site-specific probabilistic MCE_R was developed in accordance with ASCE 7-16 Section 21.2.1, for the maximum horizontal component and adjusted for targeted risk (1-percent probability of collapse in 50 years). The median (RotD50) ground motion was adjusted to the maximum rotated component of ground motion (RotD100) using maximum direction factors recommended by Shahi and Baker (2014). The second adjustment modifies the spectra from a 2-percent probability of exceedance in 50 years to a targeted risk of 1-percent probability of collapse in 50 years, which is performed using Method 1 of ASCE 7-16 (Section 21.2.1), using the risk coefficients C_{RS} and C_{R1}. The risk coefficients (per ASCE 7-16) were obtained using the Structural Engineers Association of California (SEAOC) / Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps website application (SEAOC/OSHPD, 2019). The risk coefficients of C_{RS} = 0.891 and C_{R1} = 0.907 were used in the analyses. The resulting probabilistic MCE_R ARS for the project site is shown in Figure 4.

Deterministic Seismic Hazard Analyses

In accordance with Section 21.2.2 in Supplement 1 of ASCE 7-16, deterministic ground motions do not need to be calculated if the largest spectral response acceleration of the probabilistic MCE_R is less than 1.2Fa. For this site, the resulting 1.2Fa equals 1.44g. Since the peak probabilistic ground motion is less than 1.44g (1.18g), then per the exception, deterministic ground motion need not be calculated.

Determination of Site-Specific Acceleration Response Spectra

In accordance with ASCE 7-16 Section 21.2.3, the site-specific MCE_R acceleration response spectra are taken as the lesser of the probabilistic and deterministic MCE_R spectra. The only exception (Section 21.2.3 of Supplement 1 of ASCE 7-16) is that the site-specific MCE_R ARS may be taken directly as the probabilistic MCE_R when the peak probabilistic spectrum is less than 1.2Fa. In addition, the site-specific MCE_R cannot be less than 150-percent of the site-specific Design Earthquake spectrum in Section 21.3. Figure 5 presents the 5-percent damped horizontal MCE_R ARS. The site-specific Design Earthquake is equal to two-thirds of the site-specific MCE_R spectrum, although not less than 80 percent of the design spectrum developed per Section 21.3. Figure 6 presents both the MCE_R and the Design Earthquake spectra along with the tabulated values.

Site-Specific Design Acceleration Parameters

The short period design spectral acceleration (S_{DS}) and 1-second period design spectral acceleration (S_{D1}) parameters were determined in accordance with ASCE 7-16 Section 21.4. The parameter S_{DS} is taken as 90-percent of the maximum spectral acceleration from the site-specific spectrum at periods between 0.2 and 5 seconds. The parameter S_{D1} is taken as the maximum of the product between period and spectral acceleration for periods from 1 to 2 seconds for sites with a $V_{S,30}$ greater than 365 m/s. The parameters S_{MS} and S_{M1} are 1.5 times S_{DS} and S_{D1} respectively. The values obtained cannot be less than 80-percent of the values determined in accordance with ASCE 7-16, Section 11.4.3 for S_{MS} and S_{M1} and Section 11.4.5 for S_{DS} and S_{D1}. Table 2 presents the site-specific design acceleration parameters.

Table 2: Site-Specific Seismic Design Acceleration Parameters

Hazard Level	Parameter	Site-Specific
MCE_R (BSE-2N)	PGA_M	0.461
	S_{MS}	1.056
	S_{M1}	0.393
Design Earthquake (BSE-1N)	S_{DS}	0.704
	S_{D1}	0.262

In addition to checking against the mapped values per ASCE 7-16, the site-specific parameters cannot be less than 80% of the values for Site Class C provided in Appendix B of the CSU Seismic Requirements (2024). The seismic response acceleration parameters for the main SDSU campus are provided in Table 3 below for reference. The recommended site-specific parameters in Table 2 are not less than 80 percent of those values.

Table 3: CSU Seismic Requirements – SDSU Campus Site Class C

Hazard Level	Parameter	Seismic Response Acceleration Parameter
MCE_R (BSE-2N)	PGA_M	0.48
	S_{MS}	1.10
	S_{M1}	0.48
Design Earthquake (BSE-1N)	S_{DS}	0.73
	S_{D1}	0.32

Closure

We appreciate this opportunity to be of continued professional service. Please feel free to contact the office with any questions or comments, or if you need anything else.

References

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Attachments

Figure 1 – Site Location Map

Figure 2 – Exploration Location Map – Peninsula Site

Figure 3 – Regional Fault and Seismicity Map

Figure 4 – Probabilistic MCE_R Acceleration Response Spectrum

Figure 5 – ASCE 7-16 Site-Specific MCE_R Acceleration Response Spectra

Figure 6 – ASCE 7-16 Site-Specific Design Earthquake and Site-Specific Design Acceleration Parameters

REFERENCE: GOOGLE, INC (2024) GOOGLE EARTH PRO, AERIAL IMAGERY DATED: DECEMBER 1, 2022

0 750'

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

SDSU EVOLVE STUDENT HOUSING

SITE LOCATION MAP

GROUP DELTA

PROJECT NUMBER	FIGURE NUMBER
SD814A	1

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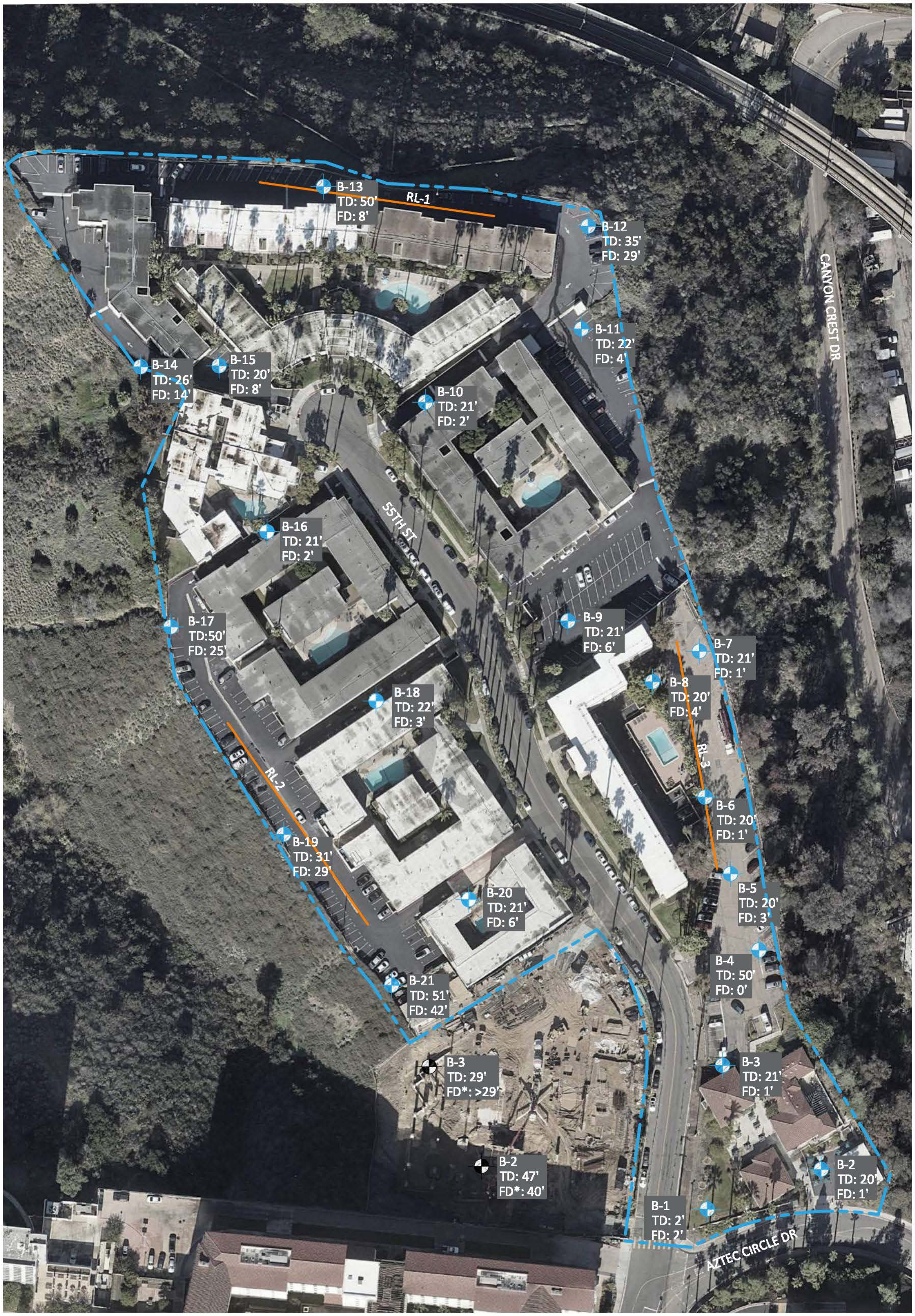

EXPLANATION:

TYPE OF EXPLORATION — B-21 — ID NUMBER

LOCATION

B- BORING

B- HISTORIC BORINGS FROM GEOCON (2019)

TD: 51' — MAXIMUM DEPTH OF EXPLORATION (BELOW EXISTING SURFACE)

FD*: 10' — FILL DEPTH

*FILL DEPTH AS INTERPRETED BY GROUP DELTA

APPROXIMATE PROJECT LIMITS

RL-3 — GEOPHYSICAL SURVEY LINE

N

0 100' 200'

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH 2024 AERIAL IMAGERY DATED: DECEMBER 1, 2022

SDSU EVOLVE STUDENT HOUSING	EXPLORATION LOCATION MAP - PENINSULA SITE	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	2

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EXPLANATION:

HISTORICAL SEISMICITY

>M6 EQ

>M6-M5

>M5-M4

SEISMIC FAULTS

HISTORICAL <150 YRS

< 15,000 YRS

< 130,000 YRS

UNDIFFERENTIATED QUATERNARY

0 10 20 MILES

N

SCALE, LOCATIONS, AND DIRECTIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH, IMAGERY DATE, 05/2022
USGS, EARTHQUAKE CATALOG, ACCESSED 07/13/2022
USGS & CGS, QUATERNARY FAULT AND FOLD DATABASE, ACCESSED 7/13/2022

SDSU EVOLVE STUDENT HOUSING	REGIONAL FAULT AND SEISMICITY MAP	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD814A	3

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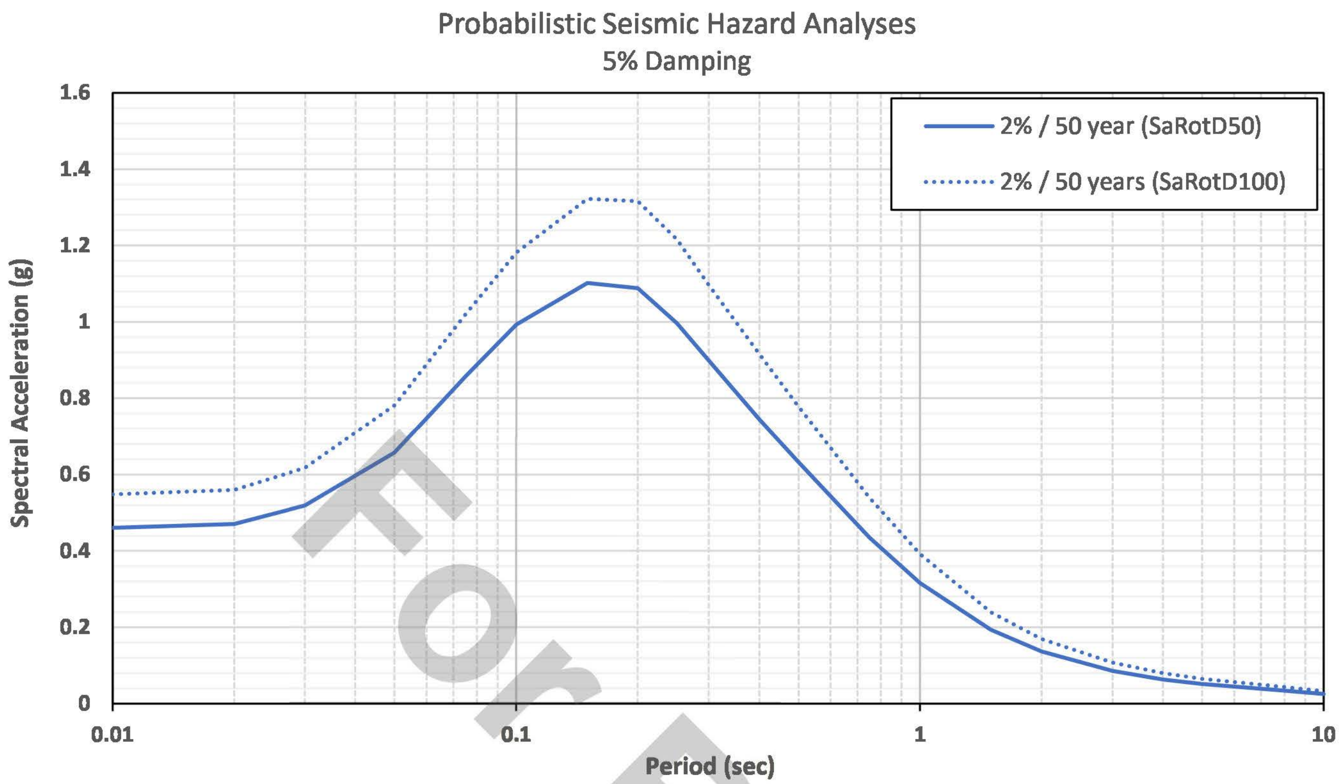
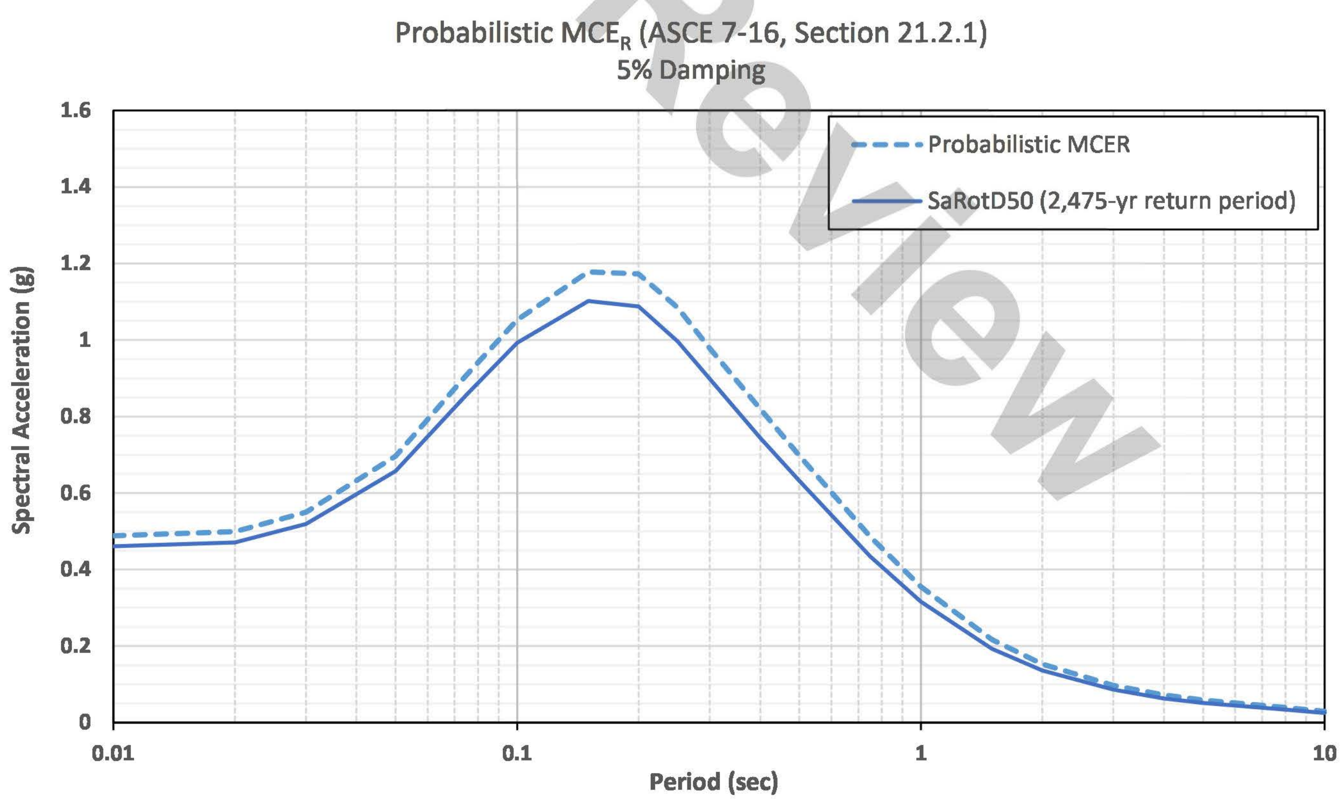
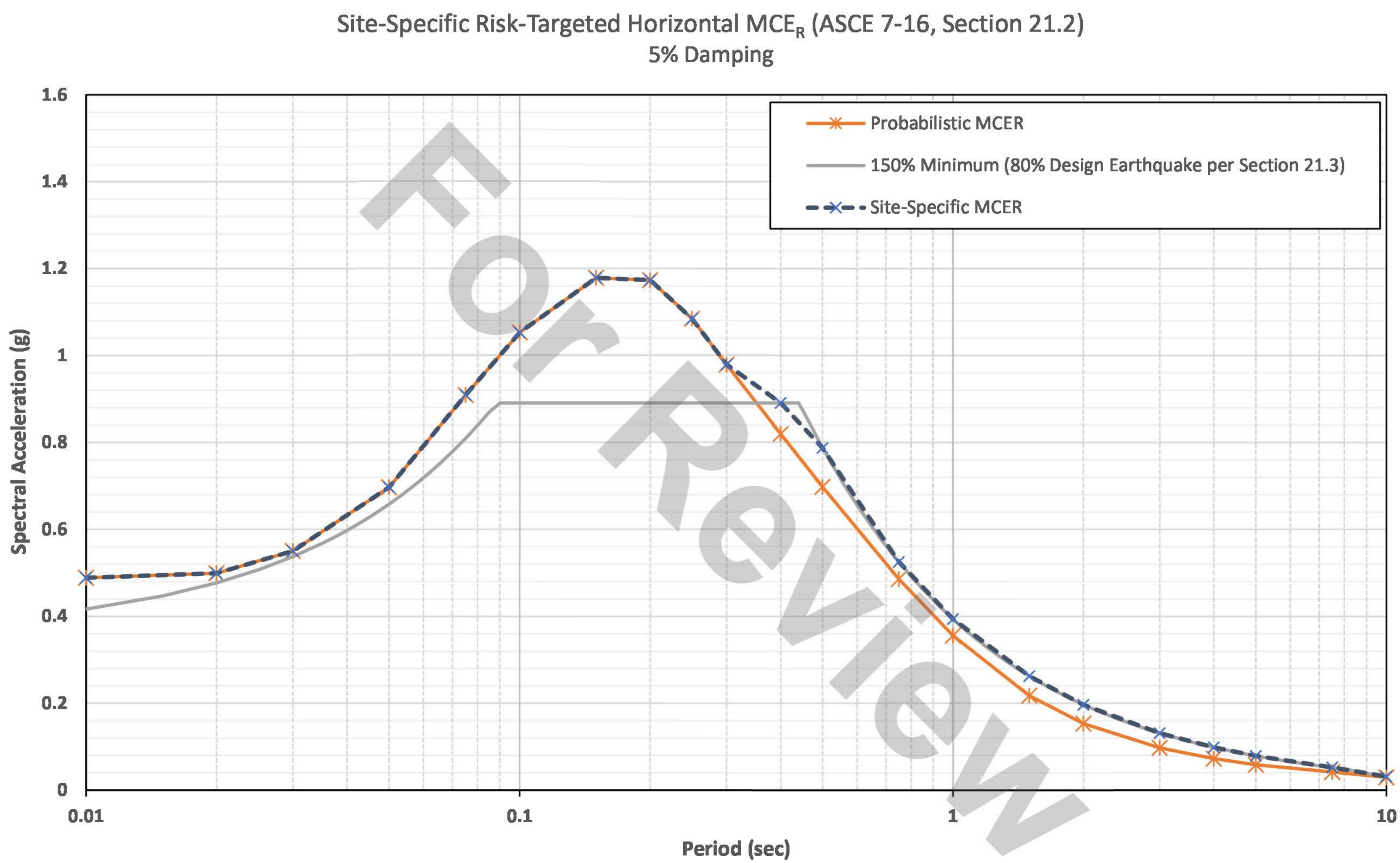


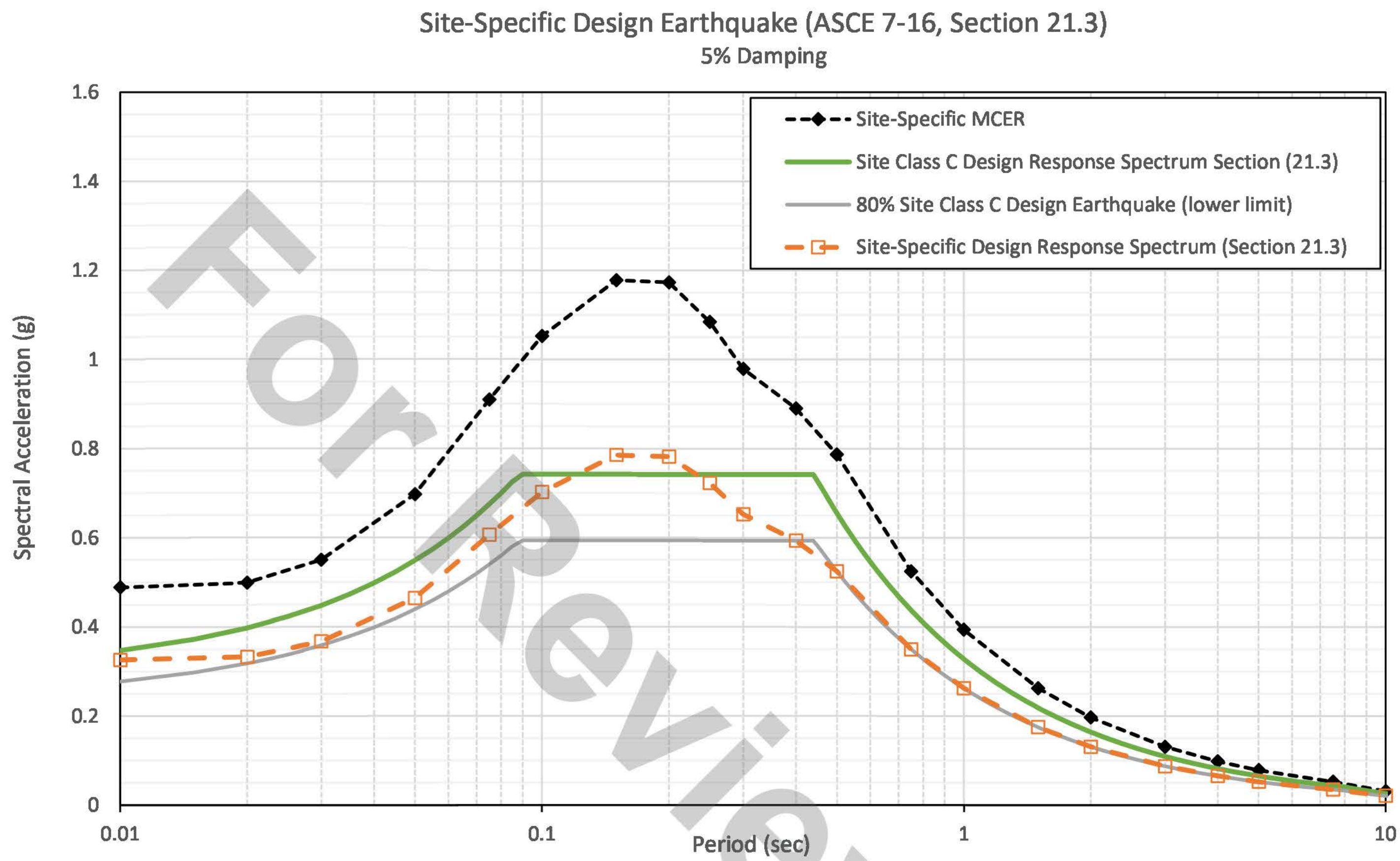


PROJECT NAME	FIGURE NAME	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
SDSU Evolve Campus Housing **SDSU, San Diego, CA 92115**	**Probabilistic Acceleration** **Response Spectra**	SD814A	4



PROJECT NAME	FIGURE NAME	GROUP DELTA	
SDSU Evolve Campus Housing **SDSU, San Diego, CA 92115**	**ASCE 7-16 Site-Specific MCE$_R$** **Acceleration Response Spectra**	PROJECT NUMBER SD814A	FIGURE NUMBER 5

ASCE 7-16 MCE_R and Design Earthquake		
Period	Design	MCE_R
(sec)	Sa (g)	Sa (g)
0.01	0.326	0.489
0.02	0.333	0.500
0.03	0.367	0.551
0.05	0.465	0.698
0.075	0.606	0.909
0.1	0.702	1.053
0.15	0.785	1.178
0.2	0.782	1.173
0.25	0.723	1.085
0.3	0.653	0.980
0.4	0.594	0.891
0.5	0.525	0.788
0.75	0.350	0.525
1	0.262	0.393
1.5	0.175	0.263
2	0.131	0.197
3	0.087	0.131
4	0.066	0.099
5	0.052	0.078
7.5	0.035	0.053
10	0.021	0.032



Site-Specific Design Acceleration Parameters (ASCE 7-16 Section 21.4)

S_{DS} = 90% of the peak S_a from T =0.2 to 5 s (not less than 80% of mapped S_{DS})

S_{D1} = Peak T*S_a between periods of 1 second and 2 seconds (not less than 80% of mapped S_{D1})

S_{DS} = 0.704 **S_{D1} =** 0.263

PROJECT NAME	FIGURE NAME	GROUP DELTA	
SDSU Evolve Campus Housing **SDSU, San Diego, CA 92115**	**ASCE 7-16 Site-Specific Design Earthquake and Site-Specific Design Acceleration Parameters**	PROJECT NUMBER SD814A	FIGURE NUMBER 6