GEOTECHNICAL INVESTIGATION
RADY CHILDREN'S HOSPITAL
MAIN CAMPUS MASTER PLAN
SAN DIEGO, CALIFORNIA

Prepared for

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Attention: Mr. Charles Smith

SUBJECT: GEOTECHNICAL INVESTIGATION
Rady Children's Hospital, Main Campus Master Plan
San Diego, California

Mr. Smith:

We are pleased to submit this geotechnical investigation report for the Rady Children's Hospital (RCH) Main Campus Master Plan renovations. This report is based on our subsurface explorations, laboratory testing and geotechnical analyses within the area of the proposed development. Specific conclusions regarding the geologic conditions at the site, and geotechnical recommendations for grading, foundation, slab, retaining wall, and pavement section design are provided in the following report. This report also provides the results of field infiltration tests we conducted to help evaluate the feasibility of various storm water drainage improvements at the site.

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

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

PLATES

1.0 INTRODUCTION

The following report presents our geotechnical investigation for the Main Campus Master Plan improvements at Rady Children's Hospital. The site location is shown in Figure 1A. The site vicinity is shown in more detail in Figure 1B. Schematic plans showing the proposed development are provided in Figures 2A through 2F. The approximate locations of the 20 exploratory borings and 4 infiltration test holes that we drilled at the site are shown in Figures 3A to 3C. The geologic conditions in the site vicinity are depicted in Figure 4A. Geologic Cross Sections through key portions of the site are provided in Figures 4B to 4D. Topographic maps showing the site vicinity in 2018 and 1953 are provided in Figures 4E and 4F, respectively. Regional and local fault maps for the site are provided in Figures 5A and 5B.

1.1 Scope of Services

This report was prepared per the referenced proposal (GDC, 2021a). The purpose of this investigation was to characterize the geotechnical conditions at the site and provide geotechnical recommendations for grading and the design of the proposed foundations, slabs, pavements, utilities, retaining walls and surface improvements. The recommendations provided herein are based on the findings of the subsurface explorations, laboratory tests and engineering analyses, as well as our previous experience with similar geologic conditions in the site vicinity. In summary, we provided the following scope of services.

- A geologic reconnaissance of the surface characteristics of the site, and a review of the relevant reports referenced in Section 8.0.

- A subsurface exploration of the site including 20 exploratory borings and 4 infiltration test holes within the areas of planned redevelopment. The approximate boring and infiltration test locations are shown on the Exploration Plans, Figures 3A through 3C. Boring Records are provided in Appendix A.

- Laboratory testing of selected soil samples collected from the exploratory borings. Laboratory tests included sieve and hydrometer analyses, Plastic Limit, Liquids Limit and Plasticity Index, Expansion Index, in-situ moisture content and dry density, soil corrosion, direct shear and R-Value. The test results are presented in Appendix B.

- Engineering analysis of the field and laboratory data to help develop geotechnical recommendations for site preparation, remedial earthwork, foundation, pavement and retaining wall design, soil reactivity, and site drainage and moisture protection. Our infiltration feasibility condition assessment is provided in Appendix C.

- Preparation of this geotechnical report summarizing our findings, conclusions and geotechnical recommendations for site development.

1.2 Site Description

The Main Campus of Rady Children's Hospital (RCH) is located at 3020 Children's Way in the City of San Diego. The Main Campus of RCH is located immediately southwest of the intersection between Children's Way and Frost Street as shown on the Site Location Map, Figure 1A. The subject site includes the three portions of the Main Campus shown on the Site Vicinity Plan, Figure 1B.

Much of the site is surfaced with asphalt concrete pavements (see Figures 3A to 3C). The pavement areas are surrounded by a heavy growth of grass, shrubs and trees. Numerous subsurface utilities also exist on site, including both reclaimed and domestic water, sanitary sewer, storm drain, gas, oxygen, electric and communication conduits. Portions of the existing buildings, retaining walls and many of the subsurface utilities will need to be demolished prior to redevelopment of the site.

The paved parking areas at the site are relatively flat, with gentle sheet grades that typically slope down to the southeast. Existing surface elevations in the parking areas typically range from a low of about 395 feet above mean sea level (MSL) in the southeast portion of the property, to a high of about 425 feet MSL near the northwest corner of the site (see Figures 3A and 3B). A 10 to 15-foot high fill slope (including a retaining wall) descends to the existing Sharp Parking Structure near the northwest corner of the site. Variable 5 to 15-foot-high cut and fill slopes accommodate the grade changes on Frost Street along the northern property boundary.

Another slope descends approximately 15 to 20-feet from the eastern edge of the parking lot and Nelson-Hahn Pavilion down to Children's Way and the Medical Office Building. This eastern slope is entirely composed of fill in the northern portion of the site near the intersection between Children's Way and Frost Street. However, east of the Nelson-Hahn Pavilion and proposed Campus Connector in the southern portion of the site, the bottom of the slope appears to have been cut back to provide room for the Medical Office Building pad.

Available drawings indicate that the Nelson-Hahn Pavilion is founded on a combination of spread footings and drilled pier foundations tied together with grade beams (NBBJ, 1992). The footings vary from 2½ to 9-feet in width, and 3 to 6-feet in depth. The piers are typically 2½-feet in diameter with 5-foot diameter bells, and bottom elevations which vary from 375 to 393 feet per plan.

1.3 Proposed Development

We understand that Rady Children's Hospital is planning to develop five improvement areas as part of the Main Campus Master Plan as shown on the Proposed Development, Figures 2A through 2F (Jacobs, 2021). We anticipate that most of the new building foundations, retaining walls and slabs will be constructed of reinforced concrete. The foundations should typically bear directly on dense formational materials (Very Old Paralic Deposits), or on a relatively shallow depth of structural compacted fill (less than 6 feet). Note that the five improvement areas are delineated as Areas ① through ⑤ on the Proposed Development, Figures 2A through 2F.

①*Beacon Building and Campus Lobby*: The Beacon Building and Campus Lobby will be located in the northeast corner of the site as shown on the Proposed Development, Figures 2A to 2E. The southern edge of the new Beacon Building will adjoin the Nelson-Hahn Pavilion (parts of which will need to be demolished). The southern edge of the Campus Lobby will be situated next to the existing Medical Office Building and will include a new stairway structure. The existing ground surface elevations in the area of these proposed structures ranges from about 400 to 425 feet.

The Beacon Building and Campus Lobby (a.k.a. Tower) will consist of an eight-level structure with two partially subterranean levels. The two-level portion of the basement (Level 1) will be situated about 34-feet below grade and will include portions of both the Beacon Building and Campus Lobby (see Figure 2B). A single 17-foot deep basement level (Level 2) is also proposed over a larger portion of the Beacon Building, as shown in Figure 2C. The Beacon Building and Campus Lobby plan area at ground level (Level 3) will be about 94,000 square feet, as shown in Figure 2D. Level 6 of the Beacon Building Tower is shown in Figure 2E.

Due to the proximity to the Nelson-Hahn Pavilion and Medical Office Building, the subterranean excavations will require temporary shoring such as soil nails or soldier piles and lagging with ground anchors (tie-backs). Permanent shoring may be used where it is desired to avoid lateral earth pressures on new subterranean walls (stress-relief). Permanent shoring and/or underpinning may be required where it is necessary to support nearby structures.

②*Campus Connector:* The proposed Campus Connector will be a thin corridor-like structure that will provide pedestrian access from the Nelson-Hahn Pavilion to the new Campus Lobby. The Campus Connector will have three above-grade levels as well as one partially subterranean level (see Figure 2C). Construction of the basement level of the Campus Connector will require permanent shoring next to the Nelson-Hahn Pavilion. Due to a variety of structural and construction staging considerations, we understand that the entire Campus Connector will be founded on cast-in-drilled-hole (CIDH) pile foundations. The existing column foundations for the Nelson-Hahn Pavilion may also need to be underpinned.

③*Central Utility Plant:* A new Central Utility Plant (CUP) is also proposed in the southwest corner of the RCH campus. We understand that the CUP will have three above ground levels and one partial subterranean level, as shown in Figure 2F. The CUP footprint at ground level will be about 12,600 square feet. The existing ground surface elevation in the CUP area is about 400 feet MSL. We anticipate that the partial basement excavation for the CUP may be accomplished using cantilever shoring alone (such as soldier piles and lagging). Additional portions of the existing Nelson-Hahn Pavilion will need to be demolished to accommodate the new CUP construction.

④*Stairs and Miscellaneous Structures*: A new staircase is proposed near the northwest corner of the existing Medical Office Building to provide access to the new Campus Lobby (see Figure 2D). A variety of other miscellaneous improvements such as new parking and driveway areas, exterior flatwork, underground utilities and retaining walls are also proposed, as shown in Figure 2D.

⑤*Bulk Oxygen Tank*: Details of the Bulk Oxygen tank are not yet available. The oxygen tank will be situated above ground near the south end of the RCH campus (see Figure 3C). The bulk oxygen tank is anticipated to consist of a prefabricated steel pressure vessel. We anticipate that the bulk oxygen tank will be supported by a two-way structural slab or mat foundation bearing at-grade. Various walls may also be needed to match surrounding surface grades which slope down to the south.

We anticipate that site development will begin by demolishing the existing asphalt concrete and Portland cement concrete surface improvements and removing the landscaping vegetation and topsoil from throughout the areas of proposed addition. Existing subsurface utilities that will be abandoned or that may otherwise interfere with the planned excavations and proposed development will be removed and/or relocated. Remedial earthwork will then be conducted to prepare the new building pad areas. Provided that our remedial grading recommendations are properly implemented during construction, we anticipate that the new at-grade additions will typically be underlain by between 3 and 6 feet of compacted granular fill. Based on the existing depth of fill we encountered throughout the site, we anticipate that most of the basement level foundations for the new structures will bear directly on very dense Very Old Paralic Deposits.

2.0 FIELD AND LABORATORY INVESTIGATION

The field investigation included a geologic reconnaissance of the site, the drilling of 20 exploratory borings, and the completion of 4 field infiltration tests between June 5th and June 29th, 2021. The maximum depth of exploration was about 35 feet below grade. The approximate boring and infiltration test locations are shown on the Exploration Plans, Figure 3A to 3C. Detailed Boring Records are provided in Appendix A. The infiltration test results are presented in Appendix C.

Soil samples were collected from all of the borings for laboratory testing. The geotechnical testing program included gradation and hydrometer analysis and Atterberg Limits to aid in material classification using the Unified Soil Classification System (USCS). Tests were conducted on relatively intact ring samples to help estimate the in-situ dry density and moisture content of the various soils we encountered at the site. Index tests were conducted on the bulk samples to help evaluate the soil expansion potential and corrosivity. Direct shear tests were conducted on the ring samples to aid in soil strength characterization. R-Value tests were conducted to aid in preliminary pavement section design. The laboratory test results are presented in Appendix B.

2.1 Infiltration Testing

Four field infiltration tests were conducted as part of this geotechnical investigation within Borings I-1 to I-4. The approximate infiltration test locations shown on the Exploration Plans, Figures 3A and 3B. The borehole percolation test method was used. The infiltration test results are described in detail in Appendix C. The field infiltration tests indicated factored vertical infiltration rates that varied from about 0.00 to 0.03 inches per hour and averaged 0.01 inches per hour (with a Safety Factor of 2.0). A factored infiltration rate of less than 0.05 inches per hour is indicative of a "No Infiltration" condition per the City of San Diego 2018 BMP Design guidelines. Worksheet C.4-1 from the 2018 City of San Diego BMP Design Manual is provided in Appendix C.

3.0 GEOLOGY AND SUBSURFACE CONDITIONS

The site is located within the coastal plain section of the Peninsular Ranges geomorphic province of southern California. The coastal plain generally consists of subdued landforms underlain by marine sedimentary formations. As observed in our borings, most of the site is underlain by Very Old Paralic Deposits. The proposed Bulk Oxygen Tank is located at a substantially lower elevation in the southern portion of the site. This area of the campus is underlain by Mission Valley Formation. The entire site is covered with a variable depth of undocumented fill.

The geologic conditions in the site vicinity are depicted on the Local Geologic Map, Figure 4A. Geologic Cross Sections are presented in Figures 4B to 4D. The cross-section locations are shown in Figures 2A to 2F. The locations of the 24 explorations we conducted at the site are shown on the Exploration Plans, Figures 3A to 3C. Logs describing the conditions we encountered are provided in Appendix A. The geologic materials are described below in order of decreasing geologic age.

3.1 Mission Valley Formation

The Eocene-age Mission Valley Formation (map symbol - Tmv) was encountered in Boring B-20 (only) at the Bulk Oxygen Tank site. The Mission Valley Formation underlies the Very Old Paralic Deposits across the entire campus, below an elevation of approximately 375 feet MSL based on published geologic maps and prior subsurface data. As observed in Boring B-20, the Mission Valley Formation locally consists of poorly indurated cobble conglomerate and poorly-graded gravel with clay. The cobble conglomerate is medium to coarse grained, and moderately weathered. Well-rounded gravel and cobble typically comprise between 30 and 60 percent of the conglomerate by mass (see Figure B-1.12). The cobbles we observed ranged from 3 to 6 inches in dimension. However, the Mission Valley Formation may contain boulders up to 24 inches in diameter. The poorly graded gravel with clay was very dense, yellow brown, moist, and contained few fines.

In our experience, the Mission Valley Formation has a very low compressibility and relatively high shear strength. The Corrected Standard Penetration (SPT) blow counts collected in the formation all exceeded 50 (indicating a very dense condition on average). However, it should be noted that the field SPT data was inflated by the presence of gravel and cobble. Our previous experience indicates that the Mission Valley Formation conglomerate typically has a low expansion potential and negligible soluble sulfate content based on common criteria. Previous remolded direct shear tests that we have conducted on similar samples of the matrix material from these conglomerate deposits suggest that the in-situ shear strength will typically exceed 39° with 200 lb/ft^2 cohesion.

3.2 Very Old Paralic Deposits

Middle to early Pleistocene-age Very Old Paralic Deposits (map symbol – Qvop) were encountered in all of the borings to the maximum depth we explored, with the exception of Boring B-20 as described above. The Very Old Paralic Deposits overlie the Mission Valley Formation throughout the Main Campus portion of the site.

Based on the conditions shown on the Local Geologic Map, the available topographic data, and our previous experience in the site vicinity, we estimate that the geologic contact between the Very Old Paralic Deposits and the underlying Mission Valley Formation should be at or below an elevation of 375 feet MSL throughout the site. Note that the excavations for the planned basement areas are not expected to extend that deep.

As observed in our borings, the Very Old Paralic Deposits at the site typically consist of reddish to yellowish brown sandstone. The fines content typically ranged from 12 to 32 percent, and were generally nonplastic or low in plasticity. Disturbed samples and excavated spoils from this formation typically generated silty sand (SM), poorly-graded sand with silt (SP-SM), and poorly graded sand (SP). Occasional beds of moderately to strongly cemented silty gravel and cobble were also encountered in the deeper paralic deposits, generally below an elevation of 400 feet MSL. The corrected SPT blow counts (N_{60}) we collected within the paralic deposits all exceeded 50, indicating that these deposits are very dense in relative density.

Our previous experience and laboratory tests indicate that the Very Old Paralic Deposits should typically have a very low expansion potential and negligible soluble sulfate content based on common criteria. The moisture content in the samples we tested typically varied from about 3.1 to 8.4 percent and averaged 6.6 percent. The dry density varied from about 102 to 123 lb/ft^3 and averaged 110 lb/ft^3. Direct shear testing suggests that the drained shear strength of the Very Old Paralic Deposits typically exceeds 34° with 200 lb/ft^2 cohesion.

3.3 Undocumented Fill

Undocumented Fill (map symbol - Afu) was encountered in all of our borings. Undocumented Fill is material that has no record of geotechnical testing and observation during placement and compaction. Undocumented Fill is considered potentially compressible, and is not considered suitable for the support of new fill or foundation loads. The fill ranged from less than one foot up to a maximum of 16 feet in thickness in the areas we explored. Deeper fill may exist in areas not explored. The approximate fill depth (D_f) at each boring location is shown on the Exploration Plans.

The fill appears to have been derived from excavations within the underlying paralic deposits and is similar in composition. As observed in the borings, the fill typically consisted of silty or clayey sand (SM or SC), with lesser amounts of poorly-graded sand with silt (SP-SM). The sandy fill was typically fine to medium grained, and the fines were predominantly nonplastic silt or low in plasticity. In some of the borings, the fill contained a variable amount of gravel and cobbles.

Corrected SPT blow counts within the fill (N_{60}) varied from 7 to 38 and averaged 22, indicating that the fill is loose to medium dense in relative density. Loose fill (N_{60}<10) was observed in Borings B-5, B-8 and B-15 at depths of between about 5 and 12 feet below grade. Loose sandy fills are prone to caving in vertical excavations.

Laboratory tests indicate that the fill should have a very low to low expansion potential and negligible soluble sulfate content (see Figures B-2 and B-3). The moisture content in the fill samples we tested typically varied from about 2.9 to 7.9 percent and averaged 6.2 percent. The dry density of the fill varied from about 97 to 116 lb/ft^3 and averaged 105 lb/ft^3.

In a few of the borings, the lower portion of the fill near the contact with the underlying Very Old Paralic Deposits consisted of sandy lean clay or lean clay with sand (CL). This fill material appears to have been derived from the pre-existing residual soil (soil that develops in place on exposed surfaces due to weathering). However, it is also possible that the residual soil was not excavated and replaced as compacted fill during initial site development, and remains in place in some areas.

Many of the borings were situated within paved parking areas. The pavement sections varied from about 3 to 6 inches of asphalt concrete, over zero to 5 inches of aggregate base. The most common pavement section consisted of approximately 4½ inches of asphalt concrete with no base. In Boring B-17, 4-inches of Portland cement concrete was encountered below the asphalt concrete.

3.4 Groundwater

No seepage or groundwater was encountered in any of our exploratory borings. The entire site is situated more than 380 feet above sea level, and the regional groundwater table is anticipated to be located well below the planned subterranean excavations. Therefore, groundwater should not be a significant geotechnical design and construction consideration, and there should be no need to design underground storage tanks for groundwater uplift forces.

It should be noted that changes in rainfall, irrigation or site drainage may produce seepage or locally perched groundwater at any location within the fill or formational units underlying the site. It has been our experience that light to moderate seepage is often encountered at or near the geologic contact between fill and underlying formational material. Accordingly, future excavations may encounter zones of wet soil and seepage. Due to the difficulty in predicting the location of perched groundwater, such conditions are typically mitigated if and where they occur.

4.0 GEOLOGIC HAZARDS

The subject site is not located within an area previously known for significant geologic hazards. Evidence of past landslides, liquefaction or active faulting was not encountered in our geotechnical investigation or literature review. The main geologic hazards at the site will be associated with the potential for strong ground motion due to a seismic event on the Rose Canyon fault zone. Known active faults located within 100 kilometers (62 miles) of the subject site are shown in the Regional Fault Map, Figure 5A. The City of San Diego Seismic Safety Study indicates that the entire site is situated within an area of low geologic risk (Zone 52) as shown on the Local Fault Map, Figure 5B. Each of the potential geologic hazards at the site is described in more detail below.

4.1 Ground Rupture

Ground rupture is the result of movement on an active fault reaching the ground surface. The site is not located within an Alquist-Priolo Earthquake Fault Zone. No indications of Holocene active or potentially active faulting were found during our investigation or literature review. The nearest known active faults are located within the Rose Canyon fault zone along the eastern edge of Mission Bay, roughly 2.8 miles (4.5 kilometers) southwest of the site (see Figure 5A). The potential for ground rupture to adversely impact the site should be low.

4.2 Strong Ground Motion

The site could be subject to moderate to strong ground shaking from nearby or more distant, large magnitude earthquakes occurring during the expected life span of the project. This hazard is managed by structural design per the latest edition of the California Building Code. Seismic design parameters are provided in the recommendations section of this report.

4.3 Liquefaction and Dynamic Settlement

Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil (sand and non-plastic silts) caused by the build-up of pore water pressure during cyclic loading, such as that produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in sand boils, settlement and lateral ground deformations. Typically, liquefaction occurs in areas where there are loose to medium dense sands and silts, and where the depth to groundwater is less than 50 feet from the ground surface. In summary, three simultaneous conditions are required for liquefaction:

- Historic high groundwater within 50 feet of the ground surface
- Liquefiable soils such as loose to medium dense sands
- Strong shaking, such as that caused by an earthquake

The regional groundwater table is located more than 50 feet below the existing site grades. The entire site is underlain by very dense formational materials with shallow fill. Given the absence of shallow groundwater and the high density of the underlying formations, the potential for liquefaction to adversely affect the site should be negligible.

Seismic compaction is not a hazard to the planned improvements because the undocumented fill will be excavated and replaced as uniformly compacted fill throughout the areas of redevelopment, and the underlying Very Old Paralic Deposits are too dense to experience seismic compaction.

4.4 Landslides and Slope Instability

Evidence of ancient landslides or slope instabilities was not observed during our literature review or site reconnaissance. The site is essentially flat with a few minor slopes around the perimeter. Provided that our geotechnical recommendations are properly implemented during construction, and that shoring is used for vertical basement excavations, it is our opinion that slope instability should not adversely impact the proposed development.

4.5 Tsunamis, Seiches and Flooding

The site is located about 6 miles east of the Pacific Ocean. Available topographic data indicates that most of the subject site is located more than 380 feet above mean sea level. Given the large distance from the coast, and the relatively high elevation of the site, the potential for damage due to a tsunami in the Pacific Ocean or seiche in Mission Bay is considered negligible.

The site is not located below any lakes or confined bodies of water, and is not located within a FEMA 100-year flood zone or dam inundation zone. Consequently, the potential for earthquake induced flooding at the site is also considered negligible.

5.0 CONCLUSIONS

The proposed improvements to the campus should be feasible from a geotechnical perspective, provided that appropriate measures are implemented during design development and earthwork construction. Several geotechnical conditions will need to be addressed.

- We anticipate that the proposed foundations for the new structures will typically bear directly on Very Old Paralic Deposits or a relatively shallow depth of structurally compacted fill (less than 5 feet). The Very Old Paralic Deposits are typically very dense and possess high shear strength, with a low expansion potential and low compressibility. The Very Old Paralic Deposits are considered suitable for direct support of the new building foundations.

- The existing undocumented fill is considered potentially compressible and unsuitable for the direct support of new fill or foundation loads. In all new building areas (except the Campus Connector), the existing undocumented fill soil that remains beneath the planned slab subgrade elevations should be excavated and replaced as structural compacted fill. We understand that the Campus Connector and Stairway additions will be entirely pile supported, and remedial grading may therefore not be needed in those areas.

- The on-site soils are generally considered suitable for reuse in compacted fills, with the exception of any soils deemed to be contaminated based on environmental studies completed by others (Group Delta did not provide environmental services for this project). The existing asphalt concrete pavements do contain hydrocarbons, and may therefore not be suitable for reuse on site depending on the preferences of the property owner. However, any concrete debris generated by the planned demolition operations may be crushed on site and reused as Crushed Miscellaneous Base within the new pavements.

- Laboratory tests indicate that the near surface soils at the site primarily consist of silty and clayey sand (SM and SC) with a very low to low expansion potential. However, it should be noted that some expansive clay (CL) was observed in 5 of the 20 borings. Additional testing should be conducted by the geotechnical consultant during fine grading to confirm that any fill placed within the new building areas consists of very low expansion soil (EI<20).

- Laboratory tests indicate that the on-site soils typically present a negligible potential for sulfate attack to concrete structures. However, the soils do appear to be *corrosive* to buried metals. Typical corrosion control measures should also be incorporated into the design. A corrosion consultant may be contacted for specific recommendations.

- The potential for active faults, seismic settlement or floods to adversely impact the site is considered remote. Other hazards that may impact site development include strong ground shaking from an earthquake on a nearby active fault. This hazard may be managed by structural design in accordance with the applicable building code.

6.0 RECOMMENDATIONS

The remainder of this report presents recommendations for earthwork construction and the design of the proposed improvements. These recommendations are based on empirical and analytical methods typical of the standards of practice in southern California. If these recommendations do not cover a specific feature of the project, please contact our office for revisions or amendments.

6.1 Design Development and Plan Review

We recommend that the demolition, shoring, underpinning, grading and foundation plans be reviewed by Group Delta during the design development phase. We anticipate that substantial changes in the development may occur from the preliminary design concepts used for this investigation, such as the areas where temporary and permanent shoring will be used, and how the foundations that support the existing structures will be underpinned. Such changes typically will require additional geotechnical evaluation and modifications to the geotechnical recommendations provided in this report.

6.2 Excavation and Grading Observation

Foundation and grading excavations should be observed by the project geotechnical consultant. During grading, the geotechnical engineer's representative should provide observation and testing services continuously. Such observations are considered essential to identify field conditions that differ from those anticipated by this investigation, to adjust designs to the actual field conditions, and to determine that the remedial grading is accomplished in general accordance with the recommendations presented in this report. The recommendations provided in this report are contingent upon Group Delta Consultants providing these services. Our personnel should perform sufficient testing of fill and backfill during grading and improvement operations to support our professional opinion as to compliance with the compaction recommendations.

6.3 Earthwork

Grading and earthwork should be conducted in accordance with the requirements of the current California Building Code. The following recommendations are provided regarding specific aspects of the proposed earthwork. These recommendations should be considered subject to revision based on the conditions observed by the geotechnical consultant during grading.

6.3.1 Site Preparation

General site preparation should begin with the removal of deleterious materials from the site. Deleterious materials include existing structures, retaining walls, foundations, slabs, asphalt concrete pavements, vegetation, demolition debris and contaminated soil (if encountered). Existing subsurface utilities that will be abandoned should be removed and the excavations backfilled and compacted as described in Section 6.3.4. Alternatively, abandoned pipes may be grouted with a two-sack sand-cement slurry under the observation of the geotechnical consultant.

We suggest that the general contractor establish a crushing operation to help dispose of the bulk of Portland cement concrete debris generated by demolition of any existing foundations, concrete sidewalks and pavements. All concrete debris may be crushed down to less than 1-inch in maximum dimension, and then placed as a structural compacted fill. Efforts should be made to remove the reinforcing steel prior to crushing the concrete. It has been our experience that properly crushed concrete will often meet the gradation and quality criteria from Section 200-2.4 of the Standard Specifications for Public Works Construction for use as Crushed Miscellaneous Base (CMB), and may be used within new pavement sections. The CMB may also be suitable for use as wall backfill, or very low expansion fill for placement beneath new concrete slabs-on-grade.

6.3.2 Improvement Areas

At least two feet of compacted fill with an Expansion Index of 20 or less is recommended beneath all new concrete sidewalks and exterior flatwork areas. To accomplish this objective, the upper 12-inches of soil immediately below slab subgrade should be excavated, and the exposed subgrade observed by Group Delta. If fill soil with an Expansion Index above 20 is encountered, the expansive soil should be excavated and replaced with a very low expansion material. The exposed subgrade should then be scarified 12 inches, brought to optimum moisture, and compacted as described in Section 6.3.4. Compaction should be conducted immediately prior to placing concrete or base.

6.3.3 Building Areas

There are two geotechnical constraints within the proposed building areas, including the presence of potentially compressible Undocumented Fill soil, and transitions between cut and fill beneath the new building slabs. The planned basement excavations for the Tower and CUP sites will likely remove most of the existing fill in those new building areas. We anticipate that the new foundations will therefore be supported directly by Very Old Paralic Deposits. For the new Campus Connector and Staircase, we understand that cast-in-drilled-hole (CIDH) piles will be used to extend the foundations into the Very Old Paralic Deposits, and no remedial earthwork may be needed.

For those buildings constructed at or near existing grades without a basement (such as the western portion of the CUP building), or those areas where the planned single-level basement excavations may not be deep enough to remove all of the existing Undocumented Fill (such as the northeast corner of the Tower site) remedial excavations are recommended to excavate and compact all existing undocumented fill within 5-feet of the building foundation perimeters (where possible). In addition, a minimum of 3 feet of non-expansive fill soil (with an Expansion Index of 20 or less) is recommended beneath any new building slabs-on-grade. To accomplish this objective, the at-grade building pad areas should be over-excavated to a depth of H/2, where H is the maximum fill depth beneath each building area as determined by the geotechnical consultant during grading. The over-excavation should be at least 3 feet deep, and need not extend more than 10 feet below slab subgrade elevations. These over-excavation recommendations are shown graphically on the Transition Details, Figure 6. The stockpiled soil from the over-excavations that is free of deleterious materials may be replaced as uniformly compacted fill to the planned finish pad grades.

6.3.4 Fill Compaction

All fill and backfill should be placed at slightly above optimum moisture content using equipment that is capable of producing a uniformly compacted product. The loose fill lift thickness should typically be 8 inches or less. The minimum recommended relative compaction is 90 percent of the maximum dry density at slightly above optimum moisture content per ASTM D1557. Sufficient observation and testing should be performed by the geotechnical consultant during grading so that an opinion can be rendered as to the compaction achieved. Rocks or concrete fragments greater than 6 inches in maximum dimension should not be used in structural compacted fill.

Imported fill sources should be observed prior to hauling onto the site to determine the suitability for use. In general, imported fill materials should consist of granular soil with less than 35 percent passing the No. 200 sieve based on ASTM C136 and an Expansion Index less than 20 based on ASTM D4829. Samples of the import should be tested by the geotechnical consultant in order to evaluate the suitability of these soils for their proposed use. During grading operations, soil types may be encountered by the contractor that do not appear to conform to those discussed within this report. The geotechnical consultant should be notified to evaluate the suitability of these soils.

A two-sack sand and cement slurry may be used as an alternative to compacted fill soil. It has been our experience that slurry is often useful in confined areas which may be difficult to access with typical compaction equipment. A minimum 28-day compressive strength of 100 psi is recommended for the two-sack sand and cement slurry. Note that a 3-sack slurry with a minimum 28-day strength of 300 psi may be placed below new foundations. Samples of the slurry should be fabricated and tested for compressive strength during construction.

6.3.5 Subgrade Stabilization

All excavation bottoms should be firm and unyielding prior to placing fill. In areas of saturated or "pumping" subgrade, a geogrid such as Tensar BX-1200 or Terragrid RX1200 may be placed directly on the excavation bottom, and then covered with at least 12 inches of minus ¾-inch aggregate base. Once the excavation is firm enough to attain the required compaction within the base, the remainder of the excavation may be backfilled using either compacted soil or aggregate base.

6.3.6 Surface Drainage

Foundation and slab performance depends greatly on how well surface runoff drains from the site. The ground surface should be graded so that water flows rapidly away from the structure and top of slope without ponding. The surface gradient needed to achieve this may depend on the prevailing landscaping. Planters should be built so that water will not seep into the foundation, slab, or pavement areas. If roof drains are used, the drainage should be channeled by pipe to storm drains, or discharge at least 10 feet from buildings. Irrigation should be limited to the minimum needed to sustain landscaping. Excessive irrigation, surface water, water line breaks, or rainfall may cause perched groundwater to develop within the underlying soil.

6.3.7 Storm Water Management

We anticipate that various bioretention basins, swales or dry wells may be used to promote on-site infiltration for storm water Best Management Practice (BMP) at the site. Details of the planned storm water BMPs are not yet available. In order to help determine the feasibility of on-site infiltration, the infiltration rate of the on-site soil was estimated at the four locations shown in Figures 3A and 3B. The infiltration tests indicated an average factored infiltration rate of 0.01 inches per hour, which is indicative of a "No Infiltration" design condition per the 2018 City of San Diego BMP Design Manual. The infiltration test results are described in detail in Appendix C.

6.3.8 Temporary Excavations

Temporary excavations may be needed to construct the planned improvements. All excavations should conform to Cal-OSHA guidelines. The design, construction, maintenance and monitoring of all temporary slopes is the responsibility of the contractor. The contractor should have a competent person evaluate the geologic conditions encountered during excavation to determine permissible temporary slope inclinations and other measures as required by Cal-OSHA. The following OSHA Soil Types may be assumed for preliminary planning assessments of temporary excavations.

Geologic Unit	Cal/OSHA Soil Type
Undocumented Fill	Type C
New Compacted Fill	Type B
Very Old Paralic Deposits	Type A[1]

1. Not subject to vibration, with no fracturing, fissuring or dip into the excavation.

6.3.9 Shored Excavations

We anticipate that shored excavations will be used to construct the subterranean portions of the planned additions. Cantilever shoring may be applicable for excavations up to about 15 feet deep, provided that about 1-inch of lateral deflection at the top of the shoring is acceptable to the design team. However, the proposed subterranean excavation will be deeper than 15 feet in some areas. For deeper excavations, or where lateral movements must be limited to protect existing structures or improvements, temporary ground anchors (tie-backs) or internal braces will be needed.

The contractor should be responsible for the design of the temporary shoring measures. The permanent shoring system will be designed by the design build team. Both cantilever and tied-back shoring would include steel soldier piles and wood lagging (or shotcrete). Typically, steel I-beams are installed in pre-drilled 2 or 3-foot diameter holes spaced at 6-to-8-foot centers. The space between the hole and soldier beam would be filled with structural concrete, up to about 6-inches below the bottom of the planned basement foundations. A 1½ sack sand-cement slurry would then be used to backfill the remainder of the pile excavations to facilitate construction. Wood lagging or shotcrete would be placed between the I-beams as the excavation proceeds.

Permanent shoring should be designed for a higher global Safety Factor (1.5 or more), whereas temporary shoring is typically deemed adequate with a Safety Factor of 1.2 or more. This will typically result in longer tiebacks for permanent walls. Note that for any tiebacks that extend off-site, the City of San Diego may require both an encroachment permit, and that the tiebacks be de-tensioned after construction. This may prohibit the use of permanent tiebacks in some areas.

For design of cantilever shoring up to 15 feet deep with level backfill, we recommend assuming a triangular active pressure distribution approximated by a fluid with an equivalent unit weight of 35 lb/ft^3 (see Figure 8A). Any additional surcharge loads located within ten feet of the top of the shored excavation should also be accounted for by the shoring design engineer. For a typical vertical traffic surcharge of 300 lb/ft^2, a uniform lateral surcharge of about 100 lb/ft^2 may be assumed. For the design of soldier piles spaced at least two pile diameters on center, the allowable passive pressure for the Very Old Paralic Deposits below the bottom of the excavation may be approximated by a fluid with an equivalent unit weight of 350 lb/ft^3.

For excavations deeper than about 15 feet below grade, it is common locally to use one or more levels of temporary ground anchors (tiebacks), or soil-nails, walers or braces. Shoring should be designed to limit deflections to values that are generally tolerable for the existing structures or improvements located within the retained zones. Where tie-backs are used, a rectangular active pressure distribution would typically be assumed for shoring design with a recommended value of 21H for level backfill, where H is the height of the shored excavation (see Figure 8B). Any tiebacks which extend off-site may require encroachment permits from the City of San Diego or adjoining neighbors. The shoring designer should verify locations of existing foundations and utilities to avoid anchor conflicts and should select appropriate tieback depths and inclinations.

Tiebacks should have a minimum unbonded length of 20 feet, or as needed to extend beyond the active failure wedge. The shoring designer and contractor should select the bond length, design bond stress, and hole diameter in order to provide the design capacity specified by the structural engineer. All tiebacks should be load tested in accordance with the applicable PTI or FHWA requirements. After the subterranean retaining walls and floor diaphragms are constructed, tiebacks which extend off-site should be de-stressed as required by the encroachment permits.

The resistance developed along the soil-anchor interface may vary due to the soil type, as well as the contractor's chosen method of installation. For example, a single stage pressure grouted ground anchor may have an ultimate bond stress of 15 psi in the Very Old Paralic Deposits. However, a multi-stage pressure grouted anchor in the same soils may have an ultimate bond stress twice this magnitude. Consequently, the selection of the anchor type, bond stress, and bonded length is the responsibility of the contractor. For a preliminary assessment, we suggest an ultimate bond stress of 20 psi for the Very Old Paralic Deposits (assuming post-grouted anchors).

Poorly graded sand with silt (SP-SM) was observed on site within both the fill and the Very Old Paralic Deposits. Such soils may be susceptible to caving in open pile, soil-nail or tie-back excavations, or in the vertical temporary cuts needed to install wood lagging or shotcrete. To reduce the potential for sloughing, vertical excavations should not be left unsupported for more than 72 hours. If caving does occur during pile excavations, it may be necessary to stabilize the boreholes by over-drilling and backfilling with slurry, or by mixing the clean sands in-place with cement and water to produce the equivalent of a 2-sack sand-cement slurry prior to re-drilling the soldier pile excavations. The presence of cobbles may also create difficult drilling conditions.

For any existing settlement sensitive structures located near planned basement excavations (e.g. the Nelson-Hahn Pavilion), a survey and monitoring program may need to be established in order to document deflections resulting from the excavations. The existing condition of the settlement sensitive structures and improvements would be surveyed and documented prior to commencing with the excavations. The tops of the shored wall and nearby foundations would be surveyed periodically during the excavation. The design team would review the survey data to verify that the displacements are tolerable. If displacements exceed one inch, the excavations would be halted until further review by the project design team.

6.3.10 Slope Stability

Detailed grading plans are not yet available. We anticipate that various minor cut and fill slopes may be needed at the site. All permanent cut and fill slopes should be inclined no steeper than 2:1 (horizontal to vertical). Our analyses indicate that 2:1 slopes composed of the on-site soils will possess an adequate Factor of Safety (FS) against deep-seated static failure (FS>1.5) for heights of 20-feet or more. Higher slopes should be evaluated on a case-by case basis.

All slopes may be susceptible to surficial slope instability and erosion given substantial wetting of the slope face. Surficial slope stability may be enhanced by providing proper drainage. The site should be graded so that water is not able to flow over the top of slopes. Diversion structures should be provided where necessary. Slopes should be planted with vegetation that will increase the surficial stability. Ice plant is generally not recommended. Vegetation should include woody plants, along with ground cover. Irrigation should be limited to the minimum needed to support the landscaping. Plants may be adapted for growth in semi-arid climates with little or no irrigation. A landscape architect should be consulted to develop a planting palate suitable for stabilization.

6.4 Foundation Recommendations

The foundations for the new buildings should be designed by the project structural engineer using the following geotechnical parameters. Recommendations are provided below for conventional shallow foundations, mat foundations, and cast-in-drilled-hole (CIDH) pile foundations. These recommendations only provide minimum geotechnical criteria, and should not be considered a structural design, or to preclude more restrictive criteria of governing agencies or the structural engineer. The following recommendations should be considered preliminary, and subject to revision based on the conditions observed by the geotechnical consultant during grading.

6.4.1 Shallow Foundations

Assuming that the site is graded per our recommendations, we anticipate that new foundations will bear directly on Very Old Paralic Deposits, or a relatively shallow depth of compacted fill that should not exceed 5 feet beneath the bottom of the footings (this should be field verified). Shallow foundations should be at least 18 inches wide, and 24 inches deep, as shown in Figure 7A. The following parameters may be used for design purposes.

Allowable Bearing:	3,000 lbs/ft^2. The allowable bearing pressure may be increased by 500 lbs/ft^2 per foot increase in width, and by 1,000 lbs/ft^2 for each additional foot of depth, up to a maximum value of 7,000 lbs/ft^2. A ⅓ increase in the allowable bearing is permitted for short-term wind or seismic loads. The allowable bearing capacity incorporates a Safety Factor of 3.0 or more.
Minimum Footing Width:	18 inches (see Figure 7A)
Minimum Footing Depth:	24 inches below lowest adjacent soil grade
Minimum Reinforcement:	Per structural engineer

6.4.2 Mat Foundations

We understand that some new additional may be supported by mat foundations that will be designed using the modulus of subgrade reaction (k_s) concept. The modulus of subgrade reaction is an idealized soil parameter that may be used to model soil-structure interaction for a specific foundation configuration. The subgrade modulus (k_s) is defined as:

$$k_s \equiv q_o / \Delta H$$

where: q_o ~ the applied bearing pressure [psi]
ΔH ~ the associated soil displacement [in]

It should be noted that the displacement associated with a given bearing pressure will vary depending on the foundation dimensions and the total applied load, as well as the underlying soil conditions. Consequently, the subgrade modulus is not a constant and will vary with changes in the foundation dimensions. For preliminary mat foundation design purposes, a unit coefficient of vertical subgrade reaction of 120 pci may be assumed for an idealized 1 ft^2 loaded area (k_1).

The approximate modulus of subgrade reaction (k_B) for larger foundations bearing either on formation or a shallow depth of compacted fill may be estimated using the following equation:

$$k_B = k_1 [(B + 1)/2B]^2$$

where: k_B = the modulus of subgrade reaction for a foundation of width 'B' [pci]
k_1 = the unit modulus of subgrade reaction for a 1 ft^2 area [120 pci]
B = minimum foundation dimension [feet]

For example, the subgrade moduli for 6 and 10-foot square mat foundations would be estimated at about 41 and 36 pci, respectively. These subgrade moduli estimates may be refined in coordination with the structural engineer, once the actual mat dimensions and service loads are known.

6.4.3 Deep Foundations

Cast-in-drilled-hole (CIDH) pile foundations will be used to support the Campus Connector, the new Staircase, and to underpin the nearby Nelson-Hahn Pavilion building foundations. We anticipate that 2 to 4-foot diameter CIDH piles may be used, with no more than 5-feet of Undocumented Fill beneath the caps. For the analyses, each pile was assumed to be spaced at least 4 pile diameters such that group effects could be neglected. Axial capacity charts are shown in Figures 7B to 7E.

Note that the axial capacities include both end bearing and skin friction. Since the axial pile capacities do include end bearing, clean excavation bottoms will be essential. Provisions will need to be made by the contractor to use a cleaning plate or other suitable method to clean the pile excavation bottoms. The bearing conditions should be observed by Group Delta prior to placing concrete. Concrete should be tremied into the excavations with a maximum drop height of 5 feet.

6.4.4 Settlement

Total and differential settlement of the shallow foundations is not expected to exceed one inch and ¾-inch in 40 feet, respectively. We estimate that CIDH piles loaded to the allowable axial capacities presented in Figures 7B through 7E will experience less than ½ inch total settlement.

6.4.5 Lateral Resistance

Lateral loads against the structures may be resisted by friction between the bottoms of footings, pile caps and slabs and the surrounding soil, as well as passive pressure from the portion of vertical foundation members embedded into compacted fill or formational materials. A coefficient of friction of 0.35 and a passive pressure of 350 psf per foot of depth may be used. The allowable friction and passive pressure values incorporate Safety Factors of 1.5 and 2.0 or more, respectively.

Preliminary LPILE analyses for single 2, 2½, 3 and 4-foot diameter CIDH piles are provided in Figures 7F to 7I. The piles were assumed to be 30-feet long, with no more than 5-feet of fill beneath the pile caps. Both free and fixed-head conditions are shown for ½, ¾ and 1-inch lateral displacement.

6.4.6 Slope Setback

As a minimum, all foundations should be setback from any descending slope at least 8 feet. The setback should be measured horizontally from the outside bottom edge of the footing to the slope face. The horizontal setback may be reduced by deepening the foundation to achieve the recommended setback distance projected from the footing bottom to the face of the slope.

In general, all slopes are susceptible to creep, whether the slopes are natural or man-made. Slope creep is the very slow, down-slope movement of the near surface soil along the slope face. The degree and depth of the movement is influenced by soil type and the moisture conditions. This movement is typical in slopes and is not considered a hazard. However, it may affect improvements built on or near the slope top. We recommend that settlement-sensitive improvements such as concrete slabs not be located within 5 feet of tops of any slopes at the site.

6.4.7 Seismic Design

The site is located at latitude 32.7996° north and longitude 117.1518° west as shown on the Site Location Map, Figure 1A. Structures should be designed in general accordance with the seismic provisions of the 2019 California Building Code (CBC) for Seismic Design Category D. Based on the conditions we encountered in the subsurface explorations throughout the site, the site classifies as Site Class C in accordance with ASCE 7-16 and the 2019 CBC. The parameters tabulated below were developed using the referenced OSHPD online Seismic Design Maps Tool (OSHPD, 2021). The recommended 2019 CBC Design and MCE_G spectra for a Site Class C are also shown in Table 1.

Seismic Design Parameter	General Procedure Value (Section 11.4 of ASCE 7-16)
Site Latitude	33.7996
Site Longitude	-117.1518
S_s (g)	1.157
S_1 (g)	0.402
Site Class	C
F_a	1.200
F_v	1.500
T_S (sec)	0.434
T_L (sec)	8.000
S_{MS} (g)	1.388
S_{M1} (g)	0.603
S_{DS} (g)	0.926
S_{D1} (g)	0.402
PGA_M	0.623

6.5 On-Grade Slabs

Building slabs should be at least 5 inches thick. The final slab thickness, control joints, and reinforcement should be designed by the structural engineer and should conform to the requirements of the current CBC. The surficial soils at the completion of the fine grading operations are anticipated to be predominately granular silty and clayey sand (SM and SC) with a very low expansion potential, as described in Section 6.3.2.

6.5.1 Moisture Protection for Slabs

Moisture protection should comply with 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. ACI 302.1R-15 provides a flow chart to determine when and where these membranes should be used. Note the CBC specifies a Capillary Break, as defined and installed per the California Green Building Standards, with a Vapor Retarder.

6.5.2 Exterior Slabs

Exterior slabs and sidewalks should be at least 4 inches thick. Crack control joints should be placed on a maximum spacing of 10-foot centers, each way, for slabs, and on 5-foot centers for sidewalks. The potential for differential movements across the control joints may be reduced by using steel reinforcement. Typical reinforcement for exterior slabs would consist of 6x6 W2.9/W2.9 welded wire fabric placed securely at mid-height of the slab.

6.5.3 Expansive Soils

The near surface soils we observed in the subsurface investigation primarily consisted of silty and clayey sand (SM and SC). Laboratory tests and our previous experience suggests that these materials typically have a very low to low expansion potential (EI<50), based on commonly accepted criteria. The Expansion Index test results are presented in Figure B-2.

6.5.4 Reactive Soils

In order to assess the sulfate exposure of concrete in contact with the site soils, samples were tested for water-soluble sulfate content, as shown in Figure B-3. The test results indicate that the on-site soils typically have a *negligible* potential for sulfate attack based on commonly accepted criteria. The sulfate content of the finish grade soils should be confirmed during fine grading. In order to assess the reactivity of the site soils with buried metals, the pH, resistivity and chloride content were also determined (see Figure B-3). These tests suggest that the on-site soils may be *corrosive* to buried metals. Typical corrosion control measures should be incorporated into design, such as providing minimum clearances between reinforcing steel and soil, or sacrificial anodes for buried metal structures. It is the responsibility of the design build team to confirm that proper corrosion control measures are incorporated into the design and implemented during construction. A corrosion consultant may be contacted for specific recommendations.

6.6 Earth-Retaining Structures

Backfilling retaining walls with expansive soil can increase lateral pressures well beyond normal active or at-rest pressures. We recommend that retaining walls be backfilled with granular soil that has an Expansion Index of 20 or less (EI<20). The select backfill zone should include all fill placed within a 1:1 plane extending back and up from the base of the wall. Retaining wall backfill should be compacted to at least 90 percent relative compaction based on ASTM D1557. Backfill should not be placed until the retaining walls have achieved adequate strength. Heavy compaction equipment, which could cause distress to the walls, should not be used.

For general design of retaining walls on less than 5 feet of compacted fill or bearing directly on dense formation, an allowable bearing capacity of 3,000 lbs/ft^2, a coefficient of friction of 0.35, and a passive pressure of 350 psf per foot of depth is recommended (see also Section 6.4.1).

6.6.1 Yielding and Braced Walls

Yielding retaining walls with level granular backfill may be designed using an active earth pressure approximated by an equivalent fluid pressure of 35 lbs/ft^3 (see Figure 8C). The active pressure should be used for walls free to yield at the top at least ½ percent of the wall height. Subterranean walls with level backfill that are restrained so that such movement is not permitted (braced walls) should be designed for an at-rest equivalent fluid pressure of 55 lbs/ft^3 (see Figure 8D). These pressures do not include groundwater forces. All retaining walls should contain adequate backdrains to relieve hydrostatic pressures. Typical wall drainage details are provided in Figure 8E.

Any surcharges located within a 1:1 plane extending back and up from the base of the retaining wall should also be accounted for in the design. Vertical surcharge from adjacent foundations should be evaluated on a case-by-case basis. Note that new footings may be deepened, or CIDH piles may be used to avoid surcharging the basement retaining walls with nearby foundations. Retaining walls situated adjacent to vehicular traffic areas may be designed to resist a uniform lateral surcharge pressure of 100 lb/ft^2 resulting from a typical 300 lb/ft^2 traffic surcharge acting behind the wall. The surcharge (Ps) should be applied to the upper 20-feet of the basement wall.

6.6.2 Soil Nail Walls

For preliminary design of permanent soil nail walls, an ultimate bond strength of 2,200 lb/ft^2 may be assumed. The actual ultimate bond strength of the soil nails should be confirmed by standard load testing of at least three sacrificial test nails prior to proceeding with the construction of the production nails. Additional sacrificial test nails should be installed to provide proof and verification for about 5 percent of the total number of soil nails used on all levels of the shored excavation.

Soil-nail excavations are incrementally constructed from the top down, typically using 5-foot depth increments. During construction, each soil nail should be drilled with an auger at a 10 to 15 degree battered angle down into the temporary backcut, installed per plan, and then grouted. Once the neat-cement grout has achieved the required compressive strength, the sacrificial soil nails should be load tested to confirm the estimated soil to grout bond strength. Once the bond strength has been confirmed, wire mesh and shotcrete may be placed over each of the 5-foot temporary excavation levels, and the process repeated for the entire depth of the excavation (ten levels of soil nails may be required). Often, a second layer of shotcrete or cast-in-place concrete may be placed directly over the temporary soil nail wall to provide the uniform finish for the final basement wall.

Note that the soil nail wall should contain an adequate drainage system to prevent build-up of hydrostatic pressure behind the excavation. Continuous vertical composite panel drains (such as Mirafi G100N or the equivalent) should be placed over the face of the temporary vertical excavations between each column of soil nails. The composite panel drains should outlet to a permanent gravity outlet (or weep holes) at the base of the temporary excavation. The composite panel drains will need to be connected to a permanent gravity outlet at the base of the excavation. This may require the use of dry-wells, sumps and pumps beneath the basement slabs-on-grade.

We recommend that the soil nail excavations, the soil nail load Proof and Verification tests, and the composite panel drain installation be continuously observed during construction by Group Delta Consultants in order to confirm the anticipated geologic conditions and soil nail capacities, the actual soil nail lengths, and to observe that the wall drains are properly installed.

6.6.3 Seismic Wall Loads

Per the provisions of the 2016 California Building Code (CBC), seismic design is required for all earth retaining structures over 6 feet in height. Basement walls may also require seismic design. The site modified MCE_G level peak ground acceleration (PGA_M) for the site is 0.623g, as shown in the attached Table 1. Design level loads are traditionally used for seismic design of retaining walls (PGA_M/1.5~0.415g), as described in Section 1803A.5.12 of the 2019 CBC. A fraction of the Design level peak ground acceleration is typically used for pseudo-static seismic wall design to account for yielding of the walls. We have provided seismic retaining wall design parameters based on a pseudo-static seismic load of 0.26g, corresponding to 1 to 2 inches of seismic deformation. The recommended seismic increment of 25 lb/ft^3 for yielding walls is shown in the attached Figure 8C.

6.7 Pavement Design

For all pavement areas, upper 12 inches of subgrade soil should be scarified immediately prior to constructing the pavements, brought to optimum moisture, and compacted to at least 95 percent of the maximum density per ASTM D1557. Aggregate base should also be compacted to 95 percent relative compaction. Aggregate base should conform to the Standard Specifications for Public Works Construction (*SSPWC),* Section 200-2. Asphalt concrete should conform to Section 400-4 of the *SSPWC* and should be compacted to 91 and 97 percent of the Rice density per ASTM D2041.

6.7.1 Asphalt Concrete

To aid in preliminary design, two R-Value tests were conducted on soil samples collected from the proposed pavement areas during the field investigation. The R-Value testing was conducted in general accordance with CTM 301. The results are presented in Figures B-5.1 and B-5.2. The R-Values of the samples we tested varied from 10 to 16. The final pavement section designs should be based on R-Value testing of the actual pavement subgrade soils collected during fine grading.

Asphalt concrete pavement design was conducted in general accordance with the Caltrans Design Method. We anticipate that a Traffic Index ranging from 5.0 to 9.5 may apply to new pavement areas. The project civil engineer should review the assumed Traffic Indices to determine if and where they apply to the various new pavements proposed on site. Based on the minimum R-Value of 10, and an assumed range of Traffic Indices, the following pavement sections would apply.

PAVEMENT TYPE	TRAFFIC INDEX	ASPHALT SECTION	BASE SECTION
Passenger Car Parking	5.0	3 Inches	9 Inches
Light Truck Traffic Areas	6.0	4 Inches	11 Inches
Heavy Truck Traffic Areas	7.0	4 Inches	14 Inches
Heavy Bus Traffic Areas	8.0	5 Inches	16 Inches
Fire Truck Access Areas	9.5	6 Inches	20 Inches

6.7.2 Portland Cement Concrete

Concrete pavement design was conducted in general accordance with the simplified design procedure of the Portland Cement Association. This methodology is based on a 20-year design life. For design, it was assumed that aggregate interlock would be used for load transfer across control joints. The concrete was assumed to have a minimum flexural strength of 600 psi. The flexural strength of the concrete should be confirmed during construction by testing per ASTM C78.

For design, the subgrade materials were assumed to provide "low" support, based on the results of the R-Value tests. Using these assumptions and the same traffic indices presented previously, we recommend that the PCC pavement sections at the site consist of at least 6 inches of concrete placed over 6 inches of compacted aggregate base. For heavy truck traffic areas (Traffic Index of 7.0), 7 inches of concrete over 6 inches of aggregate base is recommended. Additional concrete pavement section alternatives for higher Traffic Indices may be provided upon request.

Crack control joints should be constructed for all PCC pavements on a maximum spacing of 10 feet, each way. Concentrated truck traffic areas, such as trash truck aprons and loading docks, should be reinforced with number 4 bars on 18-inch centers, each way.

6.8 Pipelines

The planned addition may include various pipelines such as water, storm drain and sewer systems. Geotechnical aspects of pipeline design include lateral earth pressures for thrust blocks, modulus of soil reaction, and pipe bedding. Each of these parameters is discussed separately below.

6.8.1 Thrust Blocks

Lateral resistance for thrust blocks may be determined by a passive pressure value of 350 lbs/ft^2 per foot of embedment, assuming a triangular distribution. This value may be used for thrust blocks embedded into compacted fill soils as well as the formational materials.

6.8.2 Modulus of Soil Reaction

The modulus of soil reaction (E') is used to characterize the stiffness of soil backfill placed along the sides of buried flexible pipelines. For the purpose of evaluating deflection due to the load associated with trench backfill over the pipe, a value of 2,000 lbs/in^2 is recommended for the general conditions, assuming granular bedding material is placed around the pipe (USBR, 1977).

6.8.3 Pipe Bedding

Typical pipe bedding as specified in the *Standard Specifications for Public Works Construction* may be used. As a minimum, we recommend that pipes be supported on at least 4 inches of granular bedding material such as minus ¾-inch crushed rock or disintegrated granite. Where pipeline excavations exceed a 15 percent gradient, we do not recommend that open graded rock be used for bedding or backfill because of the potential for piping and internal erosion. For sloping utilities, we recommend that coarse sand or sand-cement slurry be used for the bedding and pipe zone. The slurry should consist of a 2-sack mix having a slump no greater than 5 inches.

6.8.4 Filter Fabric Separator

It has been our experience that soil may migrate into void spaces within an open graded gravel over time. A ¾-inch Minus Crushed Rock may have 50 percent void space or more, creating the potential for migration of a large volume of soil into the gravel voids. This migration of soil may take several years to occur, and is generally recognized only when surface manifestations develop, such as settlement of the pavement around a manhole or over a utility trench.

In order to reduce the potential for distress to settlement sensitive improvements at the site, we recommend that a filter fabric separator (such as Mirafi 140N or an approved similar product) be placed between the soil and any open graded gravel used around storm drain pipes and manholes that are constructed within roadways, or beneath areas finished with concrete flatwork or pavers.

7.0 LIMITATIONS

This report was prepared 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 man 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.

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Southern California Earthquake Center (2002). *Recommended Procedures for Implementation of DMG SP117, Guidelines for Analyzing and Mitigating Landslide Hazards in California*, University of Southern California, 110 p.

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TABLES

TABLE 1 - 2019 CBC ACCELERATION RESPONSE SPECTRA

INPUT

S_S=	1.157	g = short period (0.2 sec) mapped spectral response acceleration MCE Site Class B (**ASCE 7-16 Section 11.4.2 and Figure 22-1**)
S_1=	0.402	g = 1.0 sec period mapped spectral response acceleration MCE Site Class B (**ASCE 7-16 Section 11.4-2 and Figure 22-2**)
Site Class=	C	= Site Class definition based on **2019 California Bulding Code**
F_a=	1.200	= Site Coefficient applied to S_s to account for soil type (**ASCE 7-16 Table 11.4-1**)
F_v=	1.500	= Site Coefficient applied to S_1 to account for soil type (**ASCE 7-16 Table 11.4-2**)
T_L=	8.00	sec = Long Period Transition Period (**ASCE 7-16 Figure 11.4-1**)

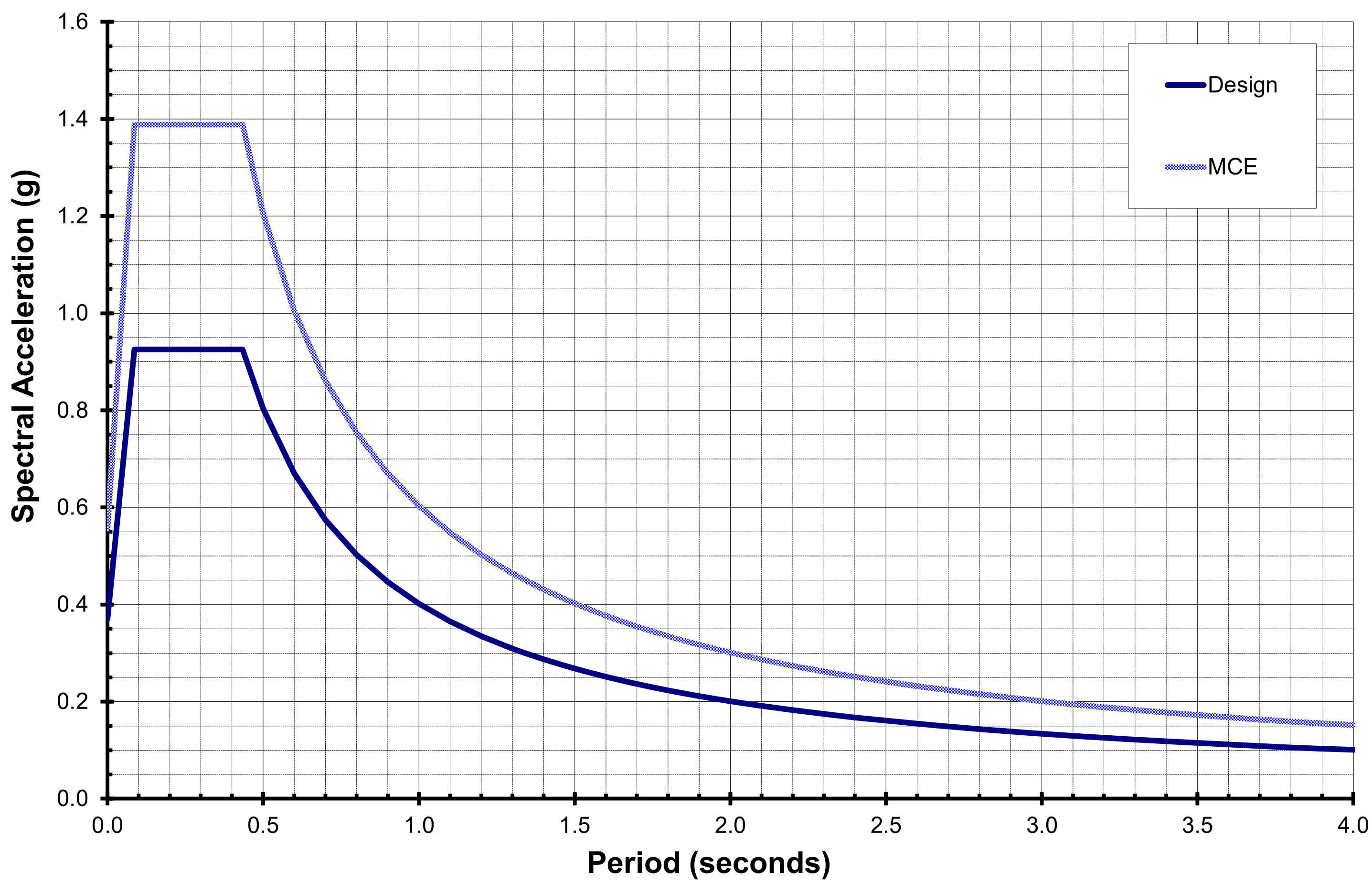
OUTPUT

S_{MS}=	1.388	= site class modified short period (0.2 sec) MCE spectral response acceleration = F_a x S_s (**ASCE 7-16 Equation 11.4-1**)
S_{M1}=	0.603	= site class modified 1.0 sec period MCE spectral response acceleration = F_v x S_1 (**ASCE 7-16 Equation 11.4-2**)
S_{DS}=	0.926	= site class modified short period (0.2 sec) Design spectral response acceleration = 2/3 x S_{MS} (**ASCE 7-16 Equation 11.4-3**)
S_{D1}=	0.402	= site class modified 1.0 sec period Design spectral response acceleration = 2/3 x S_{M1} (**ASCE 7-16 Equation 11.4-4**)
T_0=	0.087	sec = 0.2 S_{D1}/S_{DS} = Control Period (left end of peak) for ARS Curve (**ASCE 7-16 Section 11.4.6**)
T_S=	0.434	sec = S_{D1}/S_{DS} = Control Period (right end of peak) for ARS Curve (**ASCE 7-16 Section 11.4.6**)

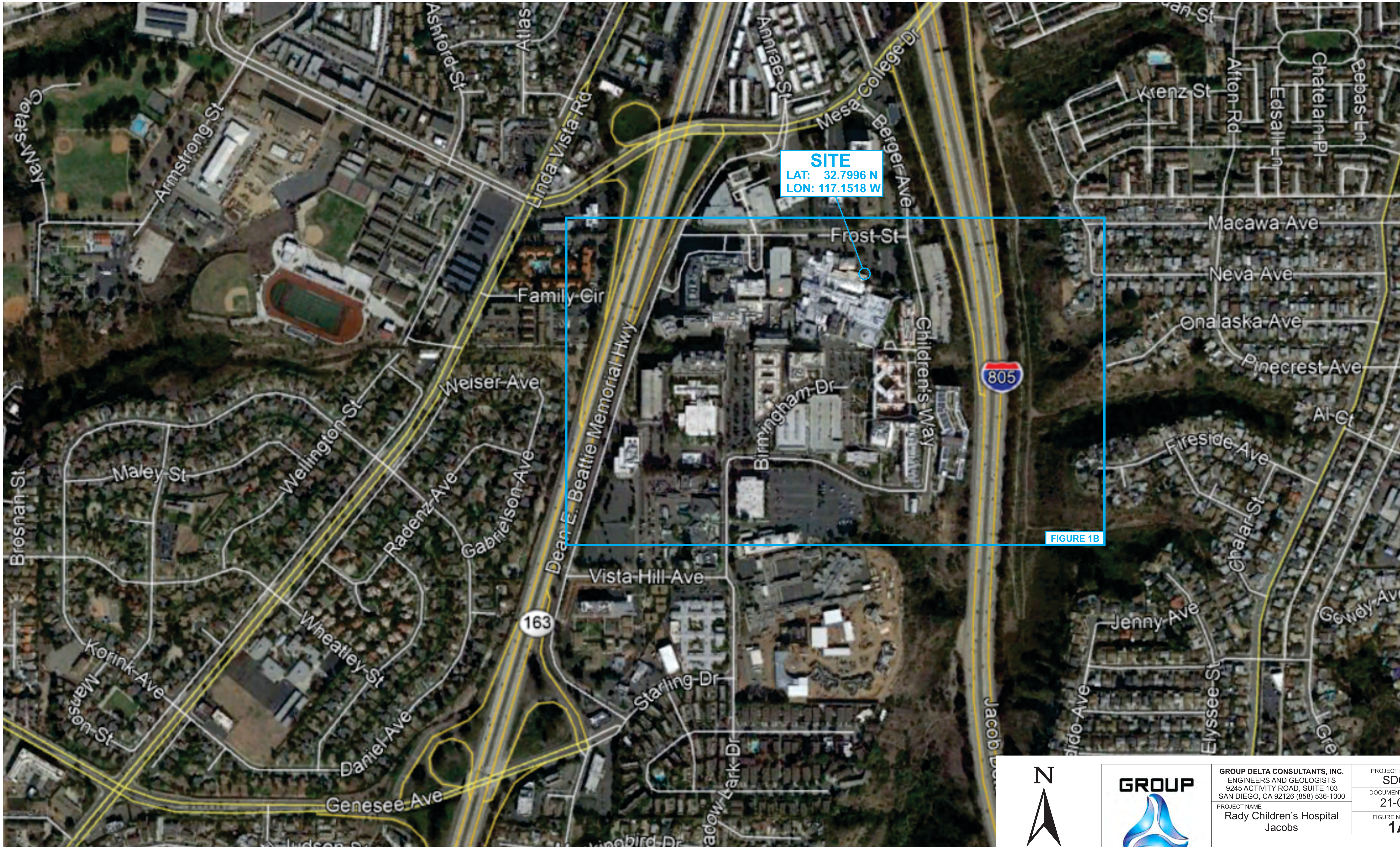
Site Latitude:	32.7996
Site Longitude:	-117.1518
Seismic Design Category:	D
Site Modified Peak Ground Acceleration (PGA_M):	0.623

SPECTRUM CALCULATION

T	Design	MCE
(seconds)	Sa (g)	Sa (g)
0.000	0.370	0.555
0.087	0.926	1.388
0.434	0.926	1.388
0.500	0.804	1.206
0.600	0.670	1.005
0.700	0.574	0.861
0.800	0.503	0.754
0.900	0.447	0.670
1.000	0.402	0.603
1.100	0.365	0.548
1.200	0.335	0.503
1.300	0.309	0.464
1.400	0.287	0.431
1.500	0.268	0.402
1.600	0.251	0.377
1.700	0.236	0.355
1.800	0.223	0.335
1.900	0.212	0.317
2.000	0.201	0.302
2.100	0.191	0.287
2.200	0.183	0.274
2.300	0.175	0.262
2.400	0.168	0.251
2.500	0.161	0.241
2.600	0.155	0.232
2.700	0.149	0.223
2.800	0.144	0.215
2.900	0.139	0.208
3.000	0.134	0.201
3.100	0.130	0.195
3.200	0.126	0.188
3.300	0.122	0.183
3.400	0.118	0.177
3.500	0.115	0.172
3.600	0.112	0.168
3.700	0.109	0.163
3.800	0.106	0.159
3.900	0.103	0.155
5.000	0.080	0.121



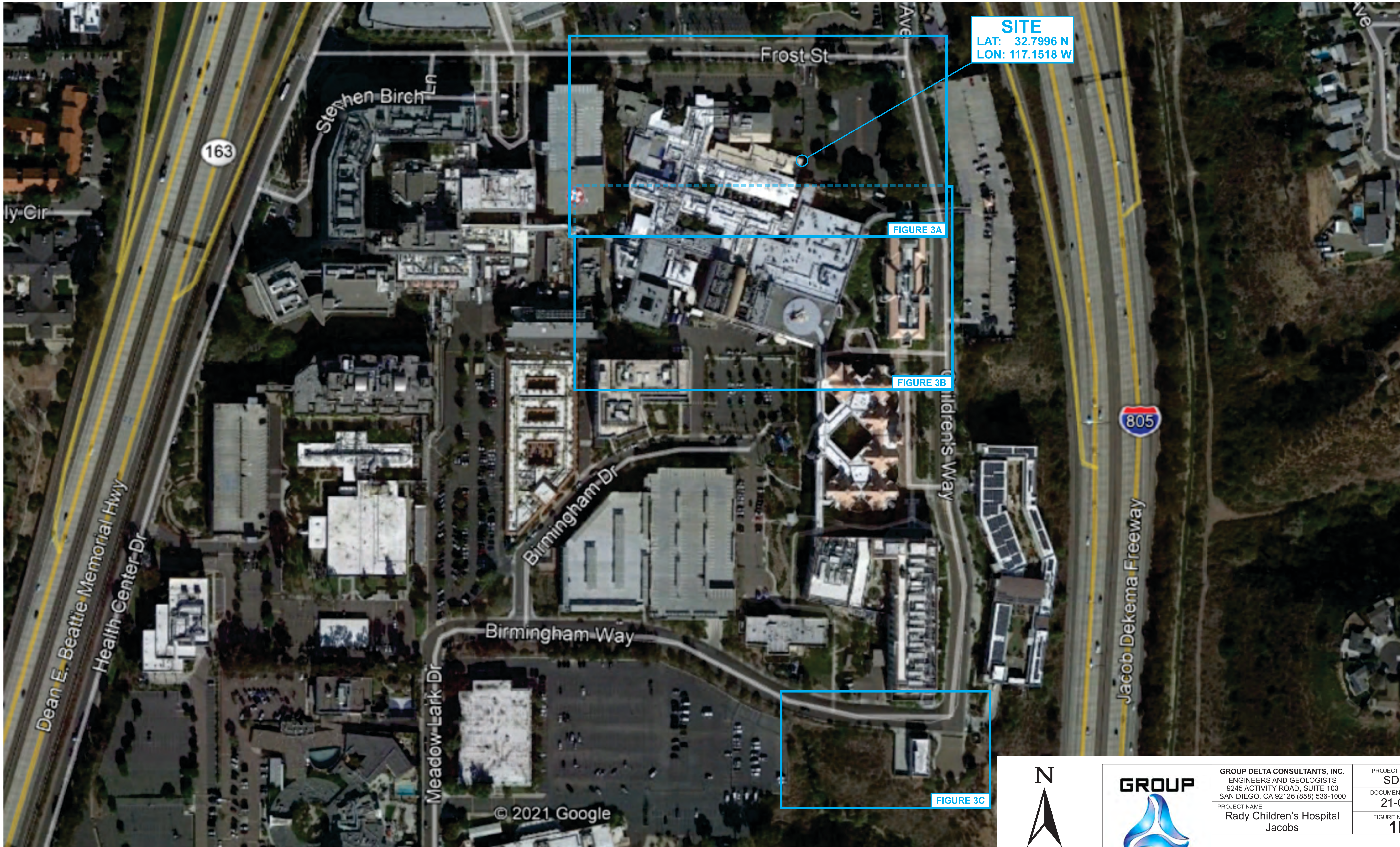
FIGURES



GROUP DELTA

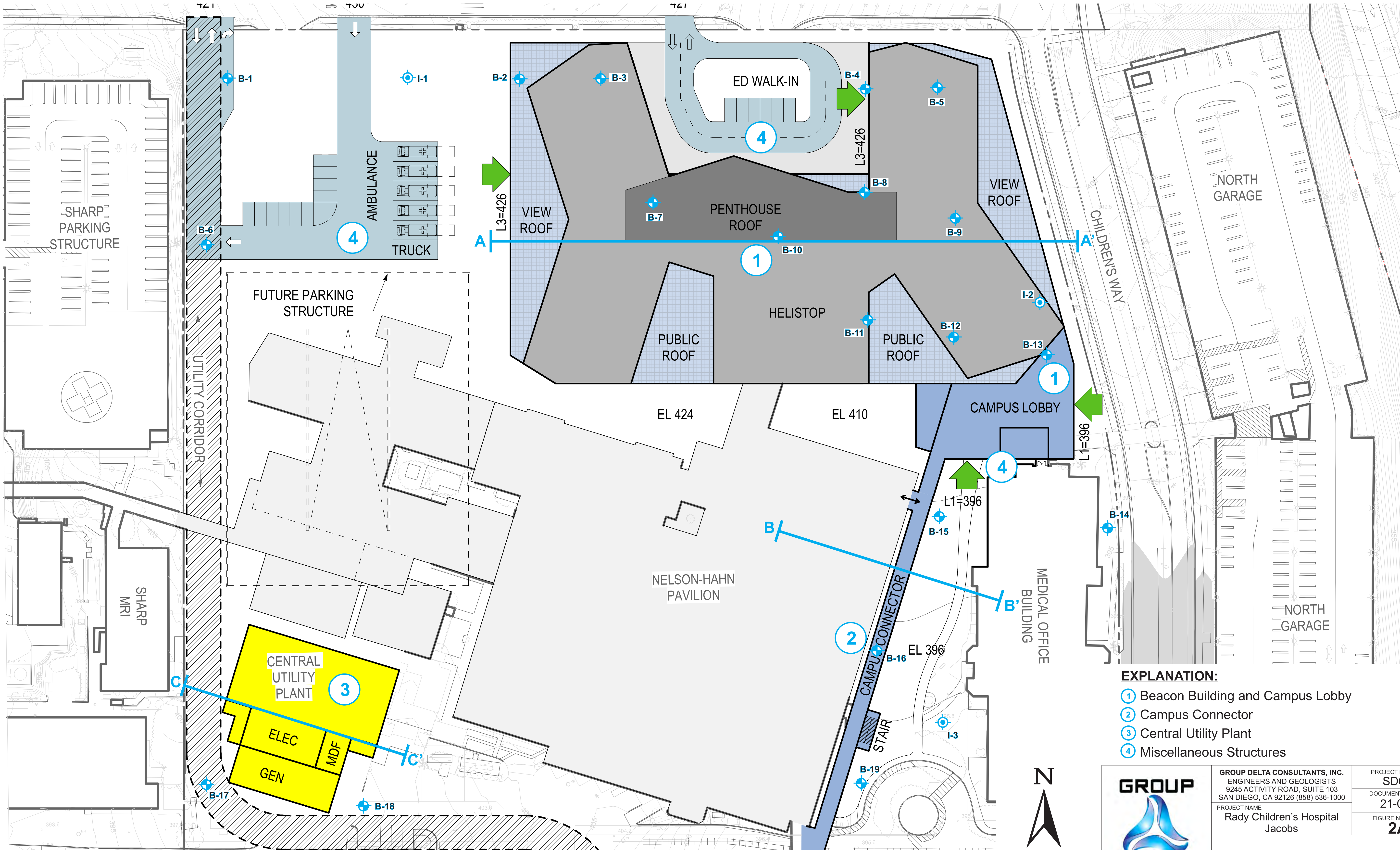
GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689	DOCUMENT NUMBER 21-0065
PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 1A	

SITE LOCATION MAP



GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689	DOCUMENT NUMBER 21-0065
PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 1B	

SITE VICINITY PLAN



EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME
Rady Children's Hospital
Jacobs

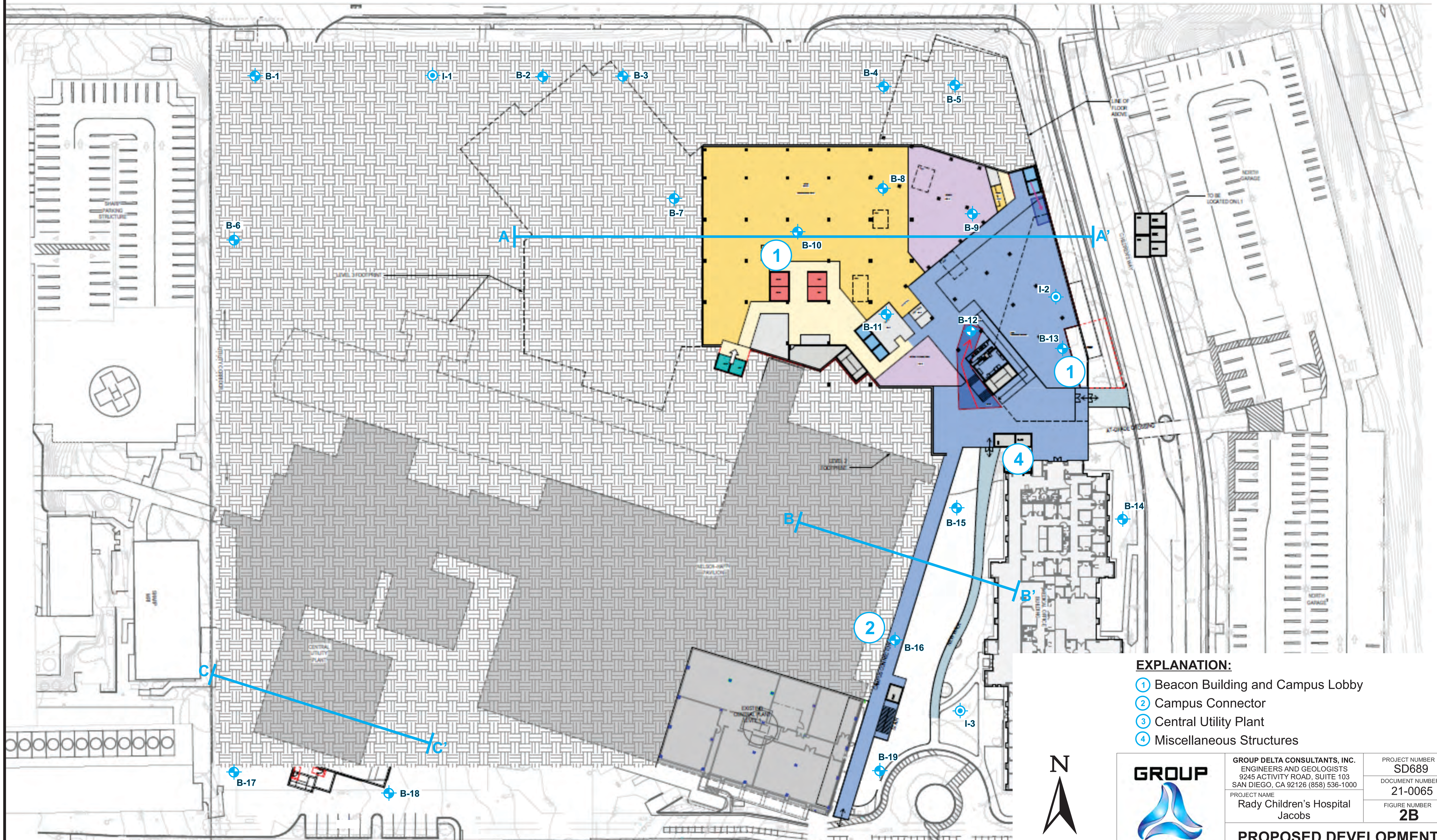
PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
2A

PROPOSED DEVELOPMENT

REFERENCE: Jacobs (2021). *RCH Campus Master Plan (for Reference Only)*, February 16.



EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

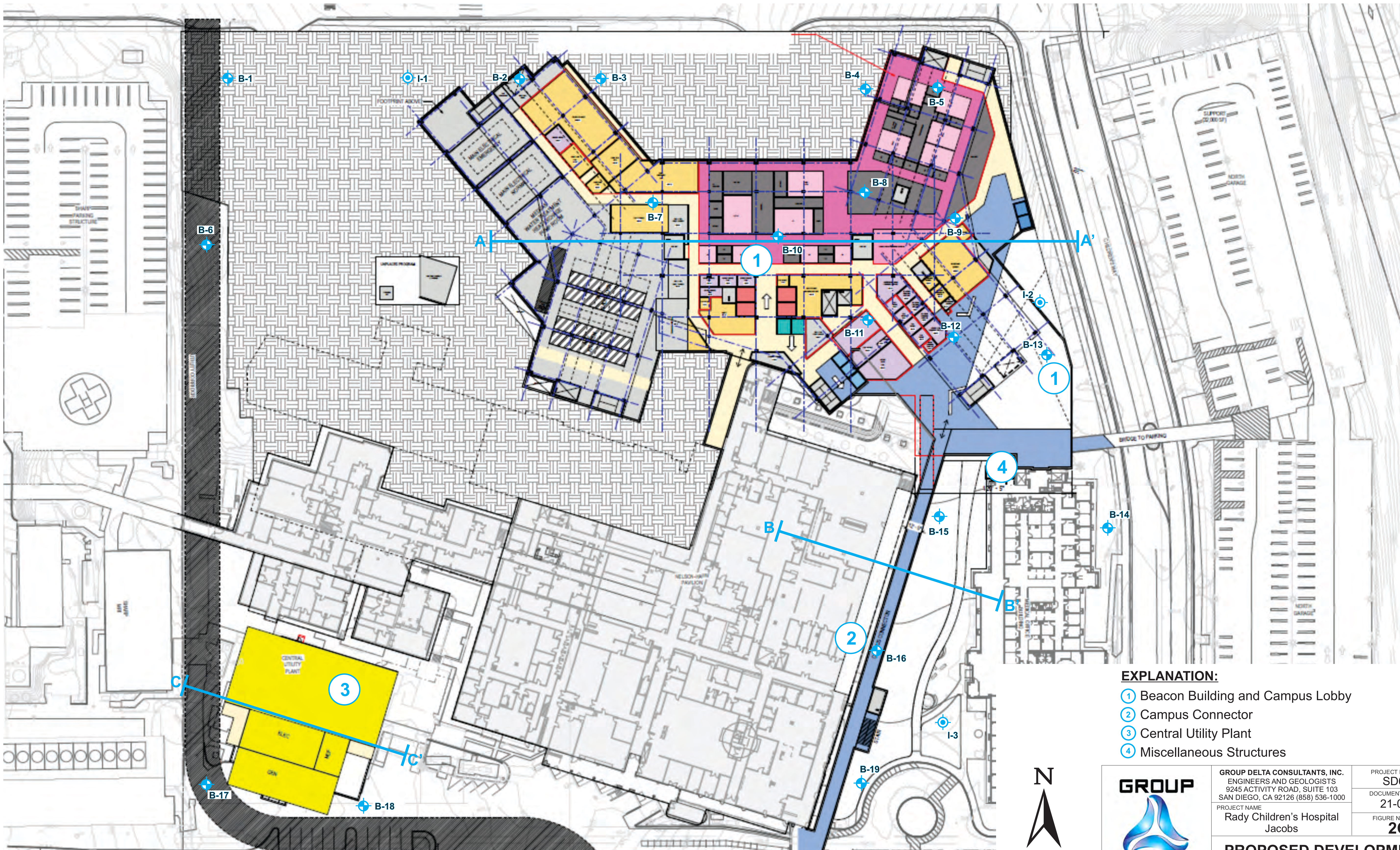
GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME	Rady Children's Hospital Jacobs
PROJECT NUMBER	SD689
DOCUMENT NUMBER	21-0065
FIGURE NUMBER	2B

PROPOSED DEVELOPMENT (BASEMENT LEVEL 1)

REFERENCE: Jacobs (2021). *RCH Campus - San Diego, 2020 Master Plan Phase 1*, April 23.



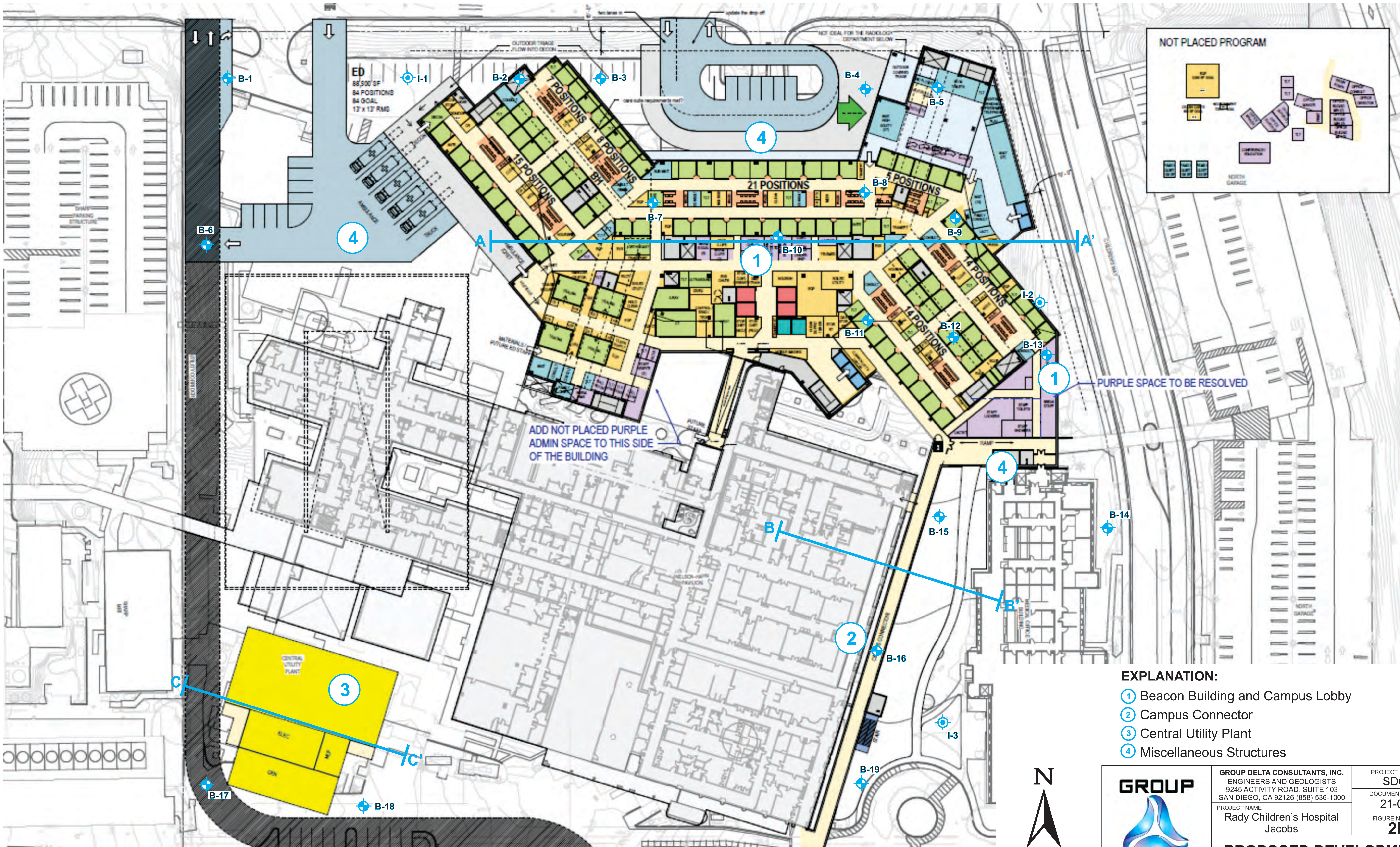
EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

REFERENCE: Jacobs (2021). *RCH Campus - San Diego, 2020 Master Plan Phase 1,* April 23.

GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689 DOCUMENT NUMBER 21-0065
PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 2C

PROPOSED DEVELOPMENT (BASEMENT LEVEL 2)



EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

REFERENCE: Jacobs (2021). *RCH Campus - San Diego, 2020 Master Plan Phase 1*, April 23.

GROUP DELTA

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SAN DIEGO, CA 92126 (858) 536-1000

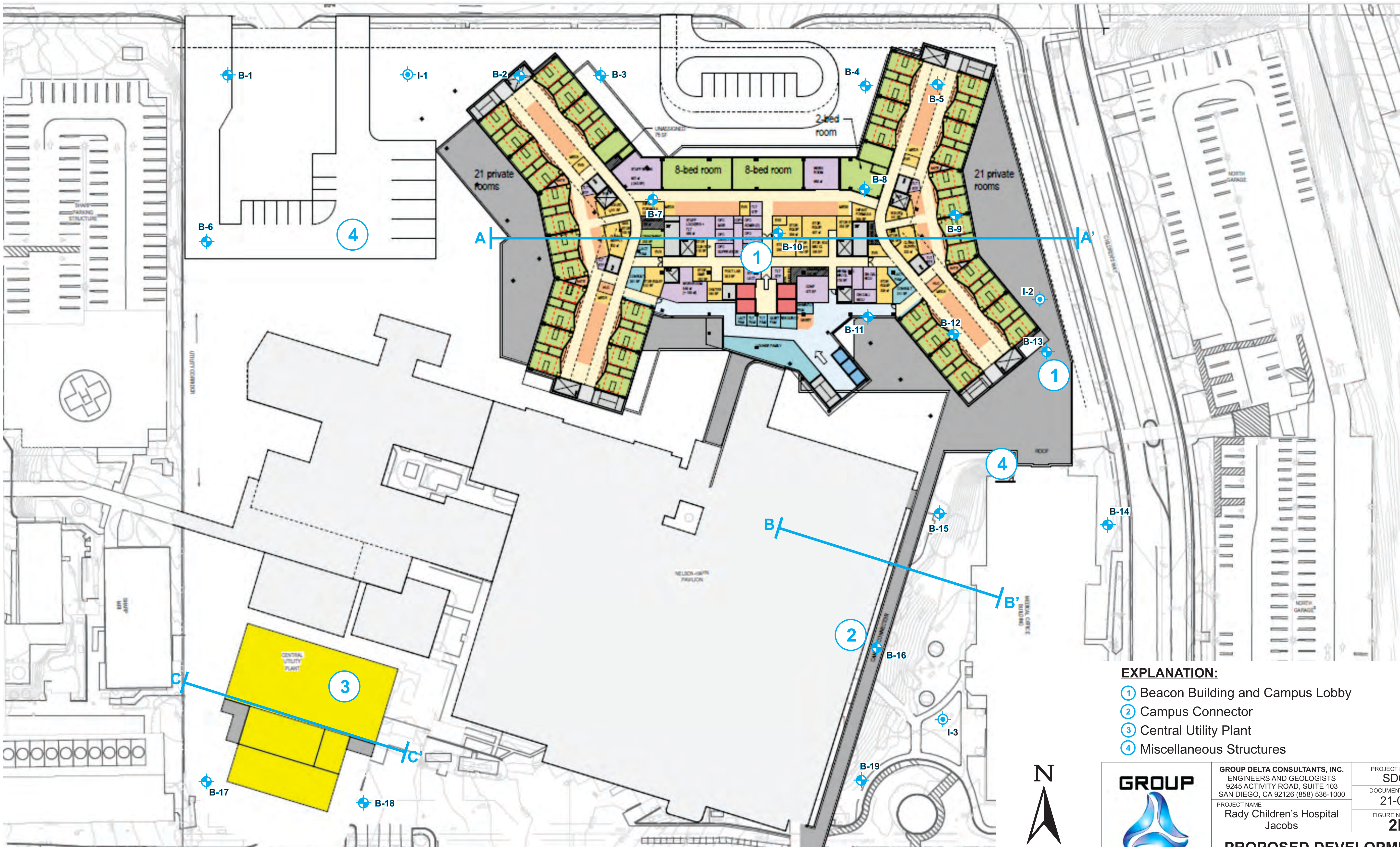
PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
2D

PROPOSED DEVELOPMENT (GROUND LEVEL 3)



EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

REFERENCE: Jacobs (2021). *RCH Campus - San Diego, 2020 Master Plan Phase 1*, April 23.

GROUP DELTA

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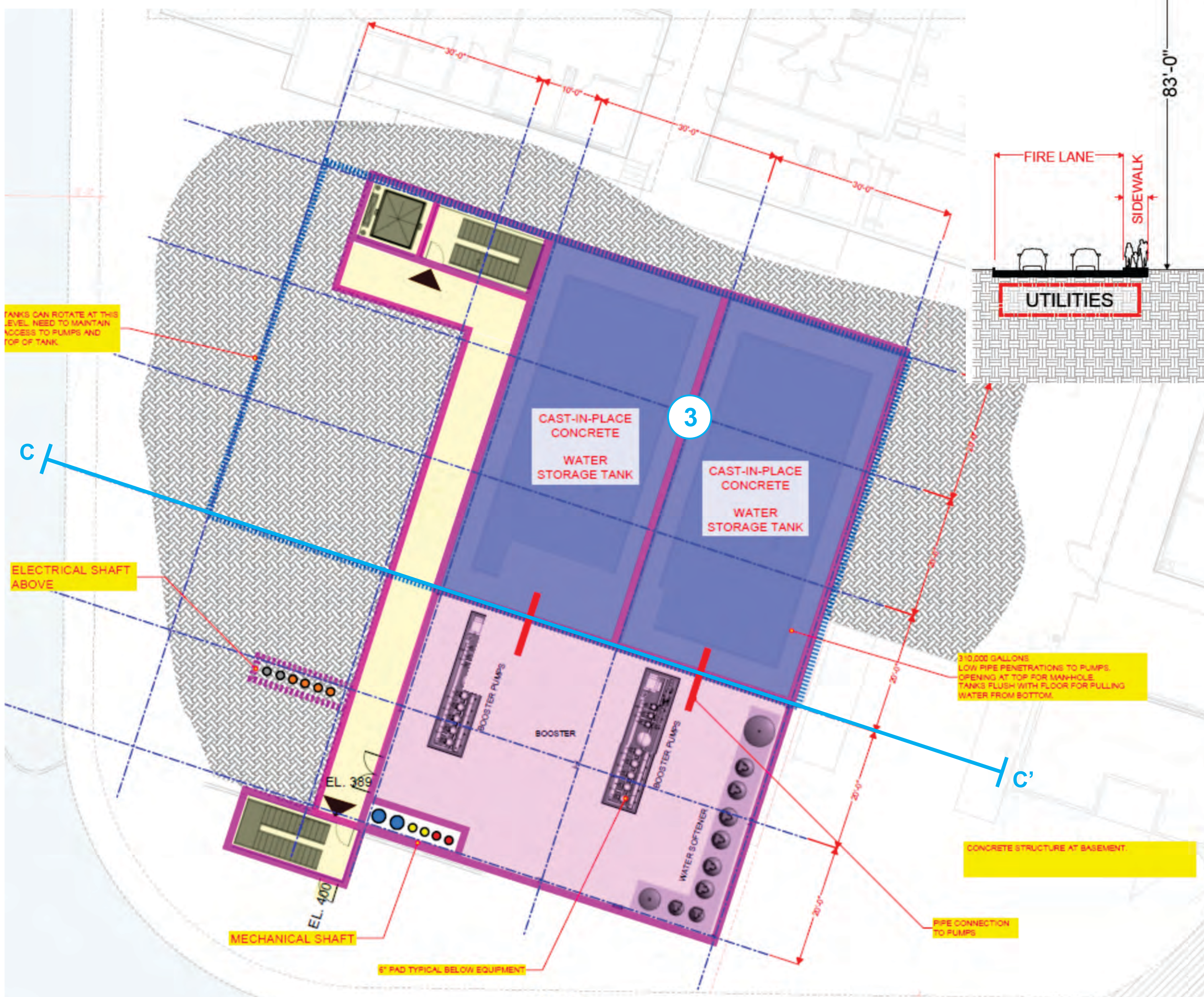
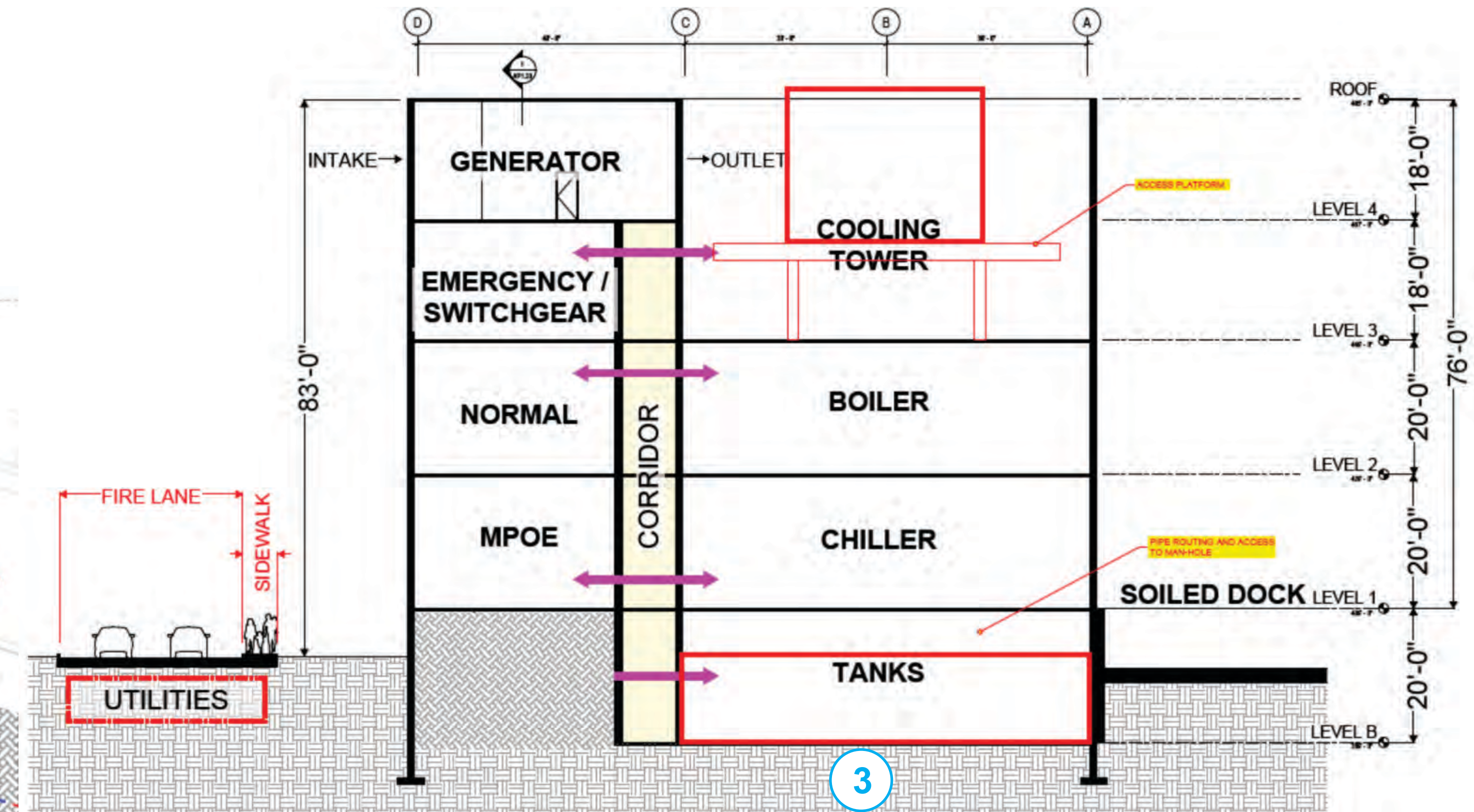
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME: Rady Children's Hospital Jacobs	PROJECT NUMBER: SD689
	DOCUMENT NUMBER: 21-0065
	FIGURE NUMBER: 2E

PROPOSED DEVELOPMENT (TOWER LEVEL 6)



REFERENCE: ZGF Architects (2021). *CUP Site, Master Plan Phase 1*, April 23.



EXPLANATION:

1. Beacon Building and Campus Lobby
2. Campus Connector
3. Central Utility Plant
4. Miscellaneous Structures

N

NO SCALE

GROUP DELTA

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SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
2F

PROPOSED DEVELOPMENT (CENTRAL UTILITY PLANT)

EXPLANATION:

B-20 — Approximate locations of the 20 exploratory borings completed for this investigation, with Depth of Fill (Df) shown (Group Delta, 2021).

I-4 — Approximate locations of the 4 borehole percolation tests completed for this investigation, with infiltration rates shown (Group Delta, 2021).

N

NO SCALE

GROUP DELTA

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SAN DIEGO, CA 92126 (858) 536-1000

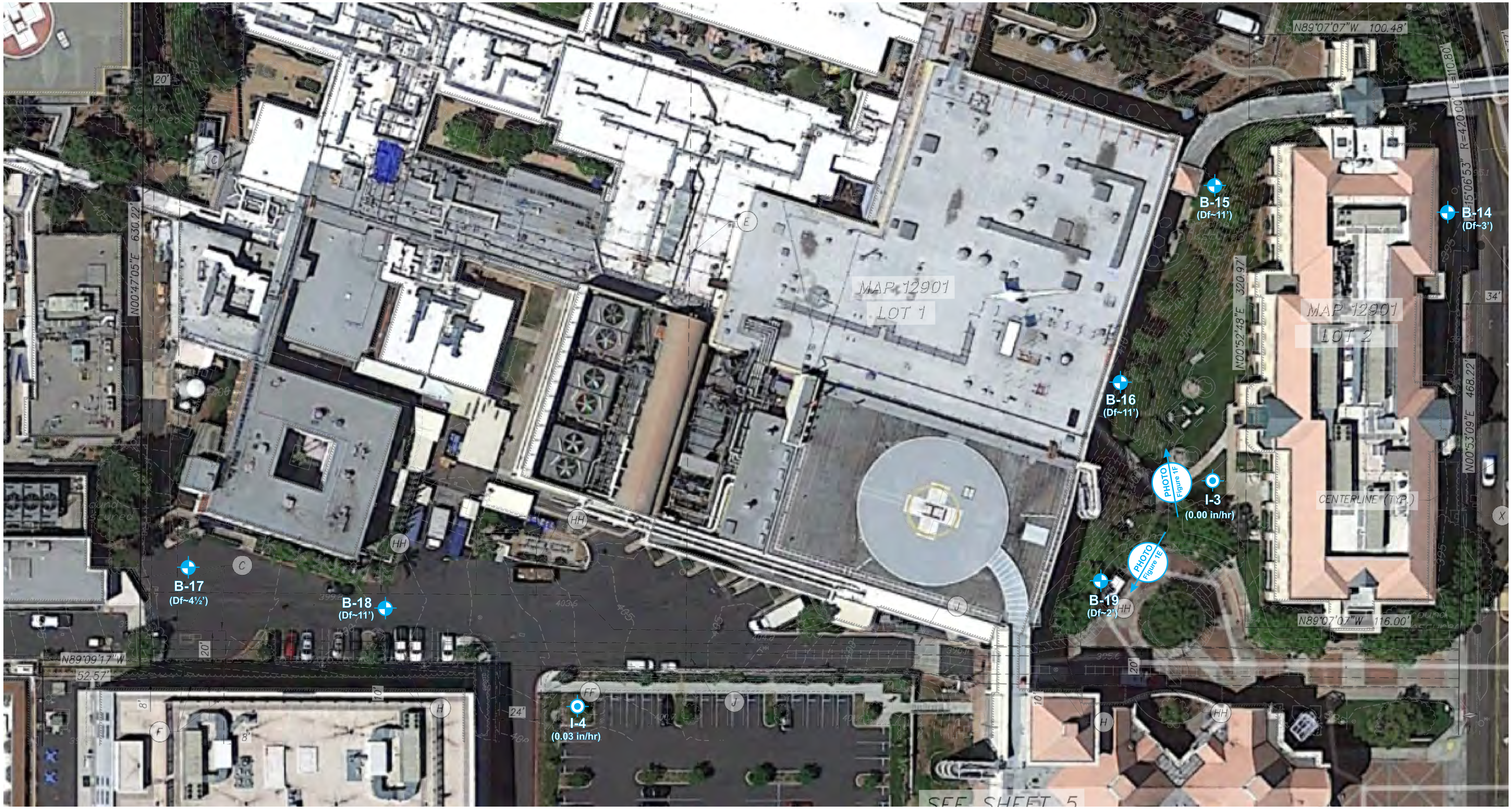
PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
3A

EXPLORATION PLAN (NORTH)



EXPLANATION:

B-20 ⌖ Approximate locations of the 20 exploratory borings completed for this investigation, with Depth of Fill (Df) shown (Group Delta, 2021).

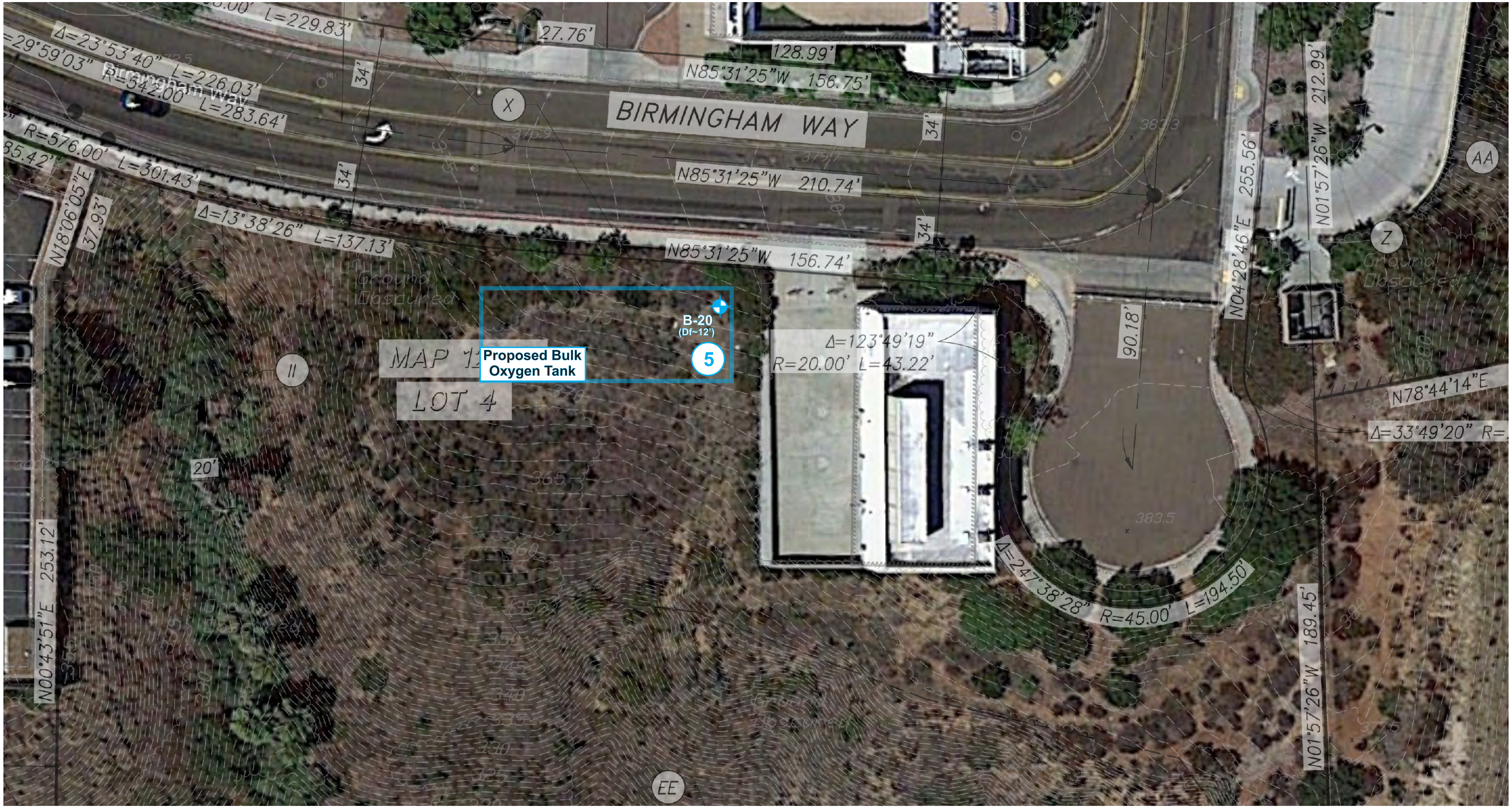
I-4 ◉ Approximate locations of the 4 borehole percolation tests completed for this investigation, with infiltration rates shown (Group Delta, 2021).

N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689
PROJECT NAME Rady Children's Hospital Jacobs	DOCUMENT NUMBER 21-0065
	FIGURE NUMBER 3B
EXPLORATION PLAN (SOUTH)	



EXPLANATION:

- B-20 Approximate locations of the 20 exploratory borings completed for this investigation, with Depth of Fill (Df) shown (Group Delta, 2021).
- I-4 Approximate locations of the 4 borehole percolation tests completed for this investigation, with infiltration rates shown (Group Delta, 2021).

GROUP DELTA

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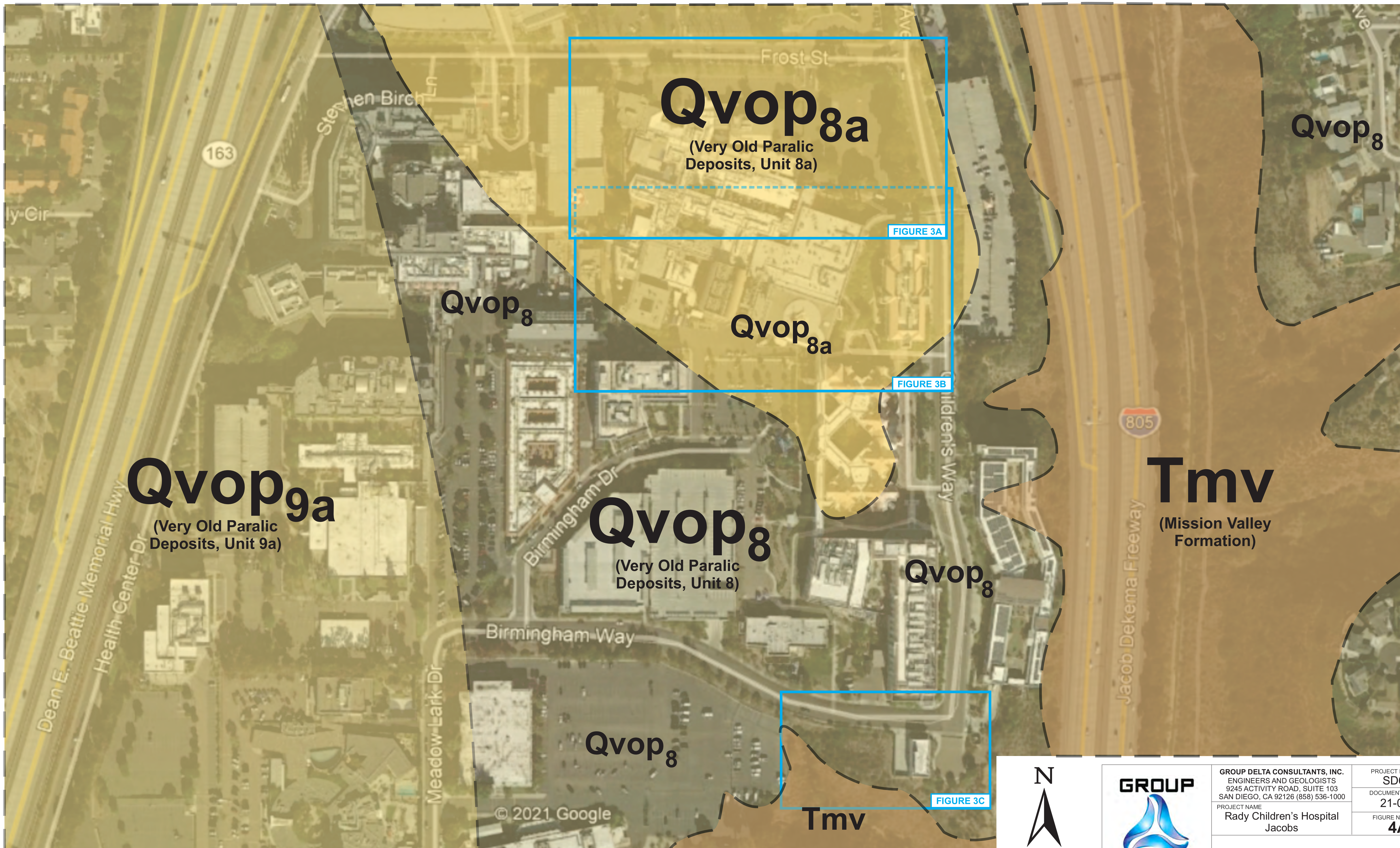
PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 3C

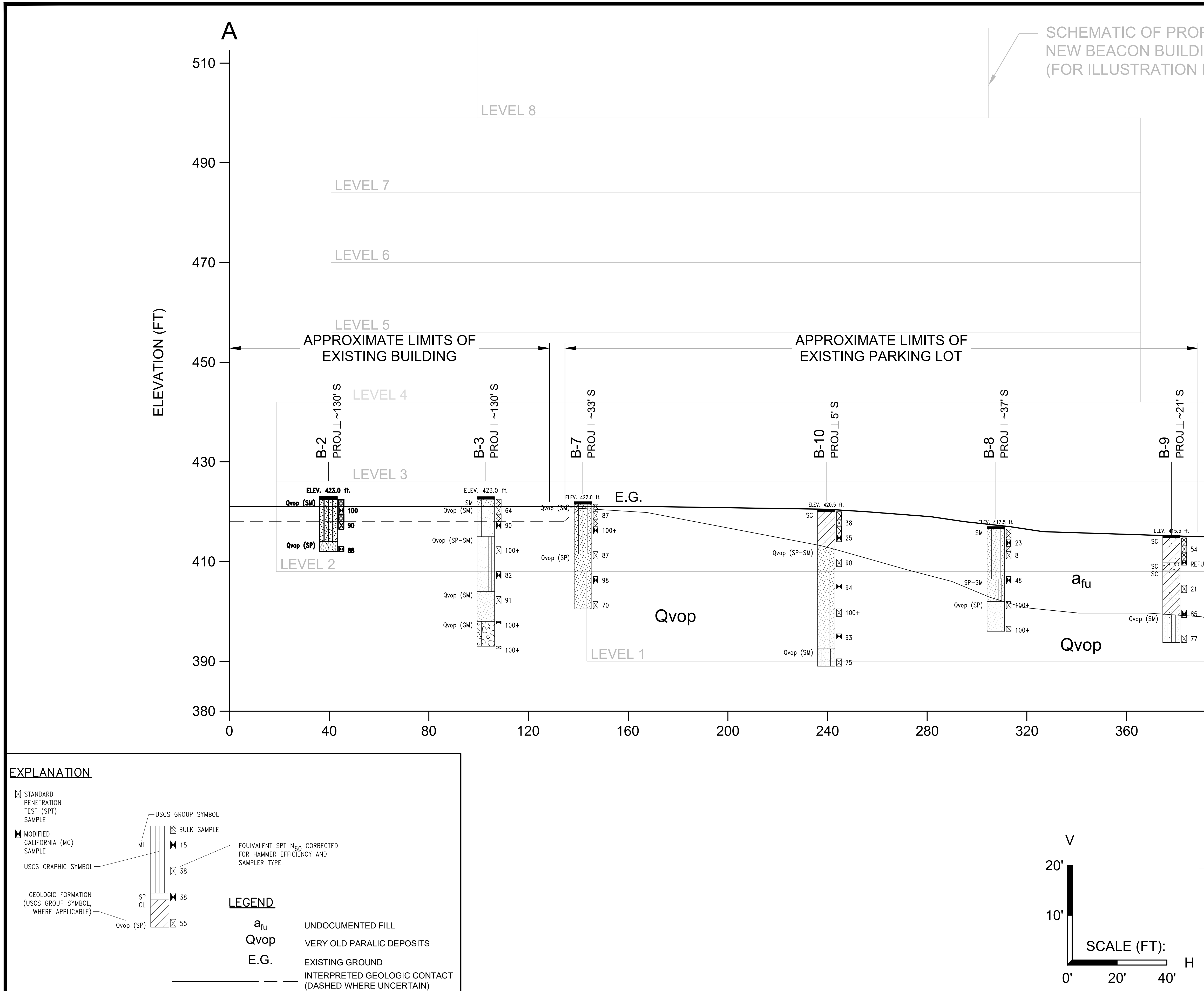
EXPLORATION PLAN (TANK)



N
NO SCALE

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689
		DOCUMENT NUMBER 21-0065
	PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 4A
	LOCAL GEOLOGIC MAP	

REFERENCE: Kennedy, M. P. and Tan, S. S. (2005). *Geologic Map of the San Diego 30'x60' Quadrangle, California,* Scale 1:100,000.



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SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689

DOCUMENT NUMBER: 21-0065

FIGURE NUMBER: 4B

CROSS SECTION A-A'

FILE PATH: \\192.168.10.3\files$\Projects\SD\SD600\SD689 RCH Campus Master Plan Geotechnical Investigation\11. Drafting\Cross Sections\SD689-CS A-A'_B-B'_C-C'.dwg
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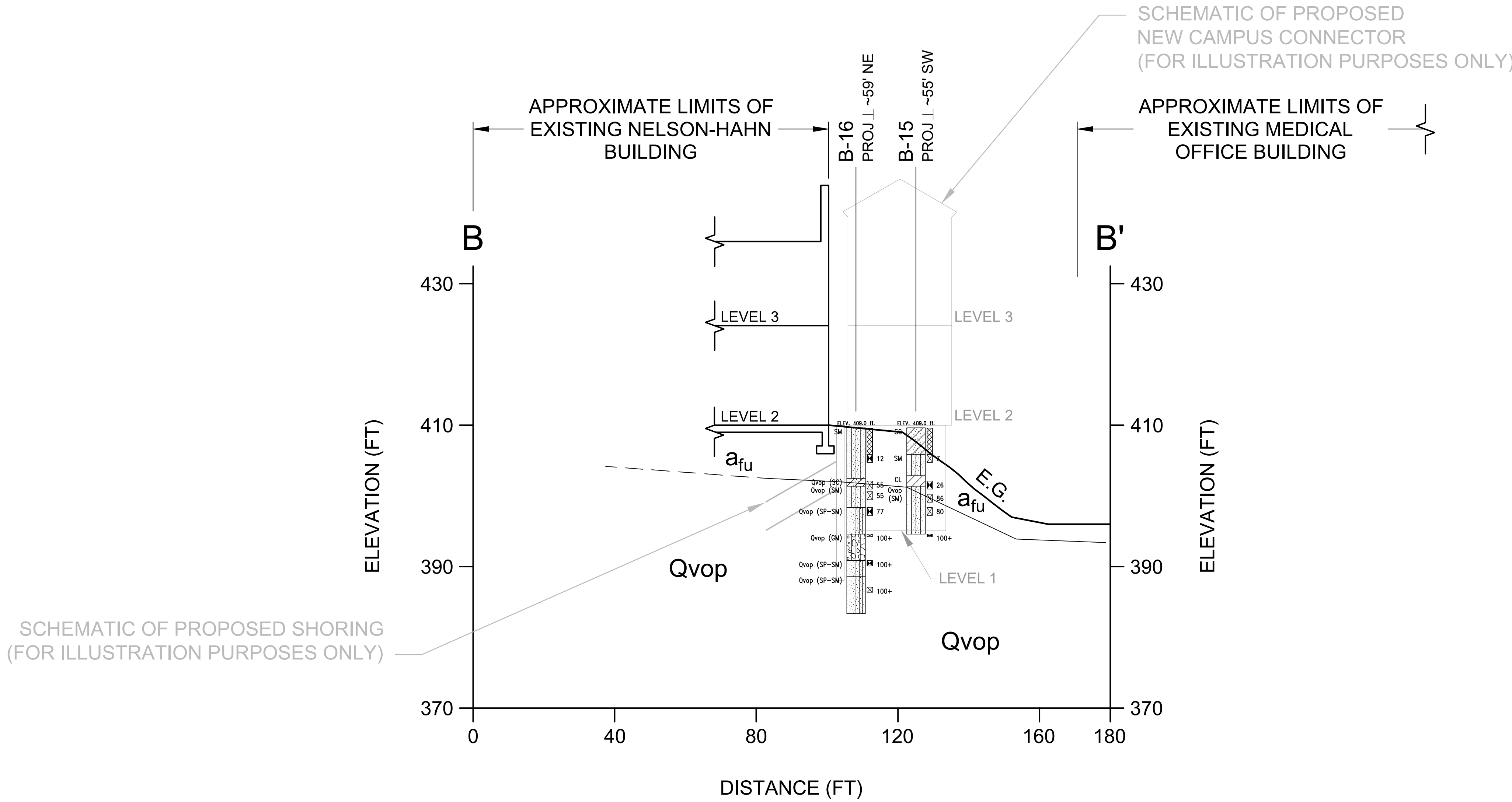

EXPLANATION

- STANDARD PENETRATION TEST (SPT) SAMPLE
- MODIFIED CALIFORNIA (MC) SAMPLE
- USCS GRAPHIC SYMBOL
- GEOLOGIC FORMATION (USCS GROUP SYMBOL, WHERE APPLICABLE)
- USCS GROUP SYMBOL
- BULK SAMPLE
- EQUIVALENT SPT N_{60} CORRECTED FOR HAMMER EFFICIENCY AND SAMPLER TYPE

ML, SP, CL, Qvop (SP), 15, 38, 38, 55

LEGEND

a_{fu}	UNDOCUMENTED FILL
Qvop	VERY OLD PARALIC DEPOSITS
E.G.	EXISTING GROUND
——— — —	INTERPRETED GEOLOGIC CONTACT (DASHED WHERE UNCERTAIN)

SCALE (FT): V 0' 10' 20'; H 0' 20' 40'

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SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689
DOCUMENT NUMBER: 21-0065
FIGURE NUMBER: 4C

CROSS SECTION B-B'

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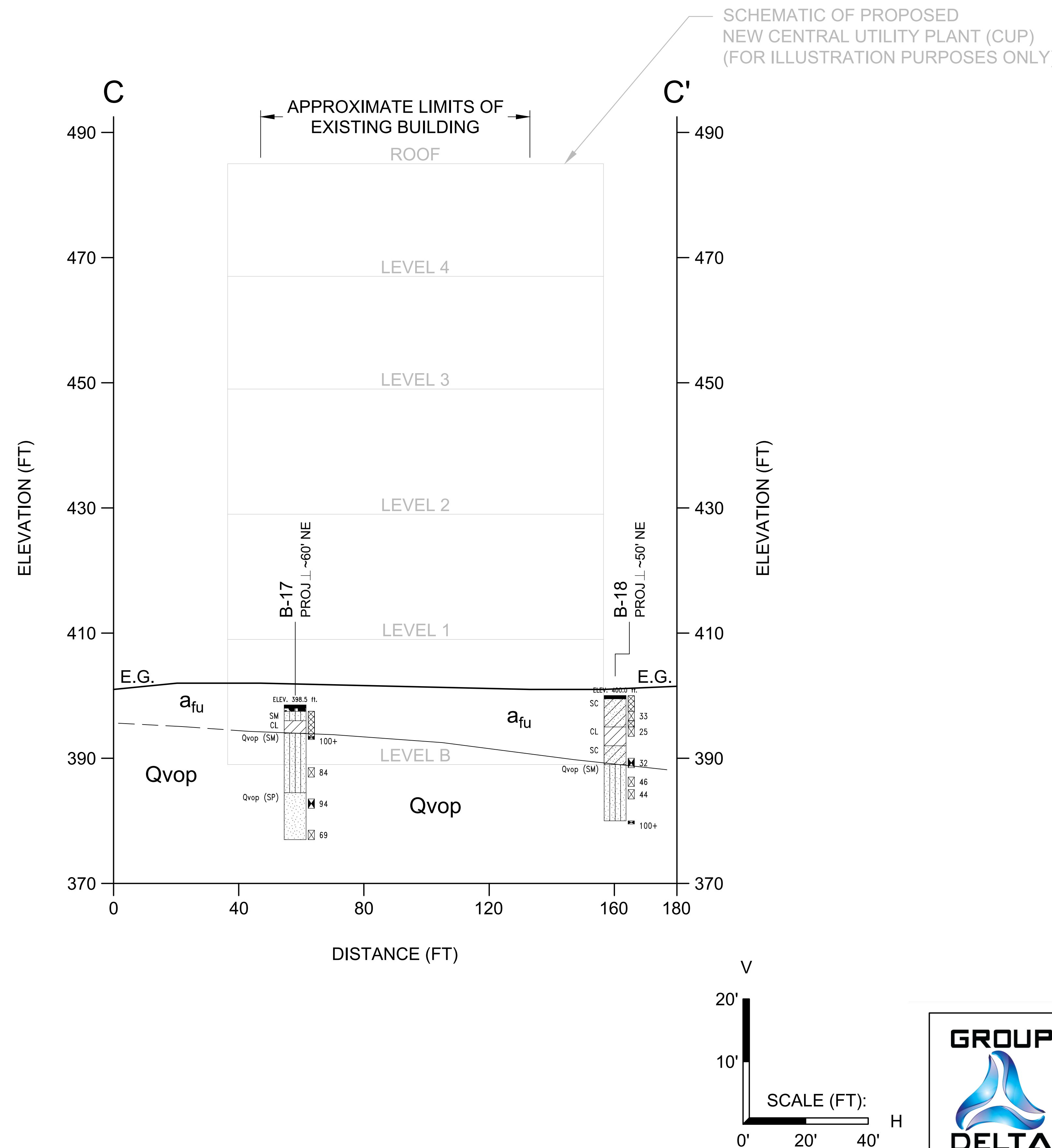

EXPLANATION

- ☒ STANDARD PENETRATION TEST (SPT) SAMPLE
- MODIFIED CALIFORNIA (MC) SAMPLE
- USCS GROUP SYMBOL
- BULK SAMPLE
- USCS GRAPHIC SYMBOL
- EQUIVALENT SPT N_{60} CORRECTED FOR HAMMER EFFICIENCY AND SAMPLER TYPE
- GEOLOGIC FORMATION (USCS GROUP SYMBOL, WHERE APPLICABLE)

ML 15, 38; SP CL 38, 55; Qvop (SP)

LEGEND

a_{fu}	UNDOCUMENTED FILL
Qvop	VERY OLD PARALIC DEPOSITS
E.G.	EXISTING GROUND
——— — —	INTERPRETED GEOLOGIC CONTACT (DASHED WHERE UNCERTAIN)

GROUP DELTA

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9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
4D

CROSS SECTION C-C'

FILE PATH: \\192.168.10.3\files$\Projects\SD\SD600\SD689 RCH Campus Master Plan Geotechnical Investigation\11. Drafting\Cross Sections\SD689-CS A-A'_B-B'_C-C'.dwg
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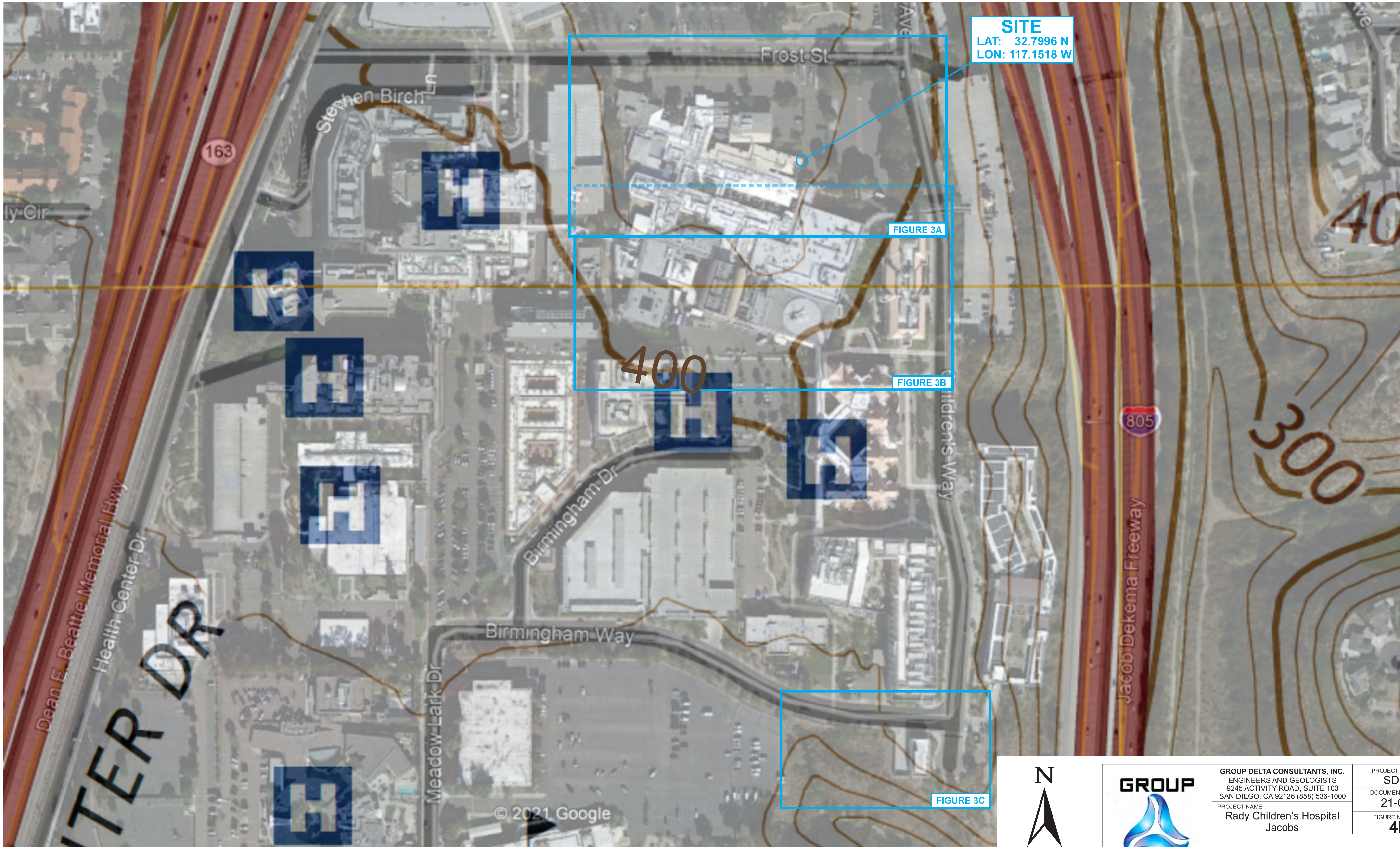

REFERENCE: U.S. Geologic Survey (2018). *Topographic Map of theLa Jolla Quadrangle, 7½ Minute Series,* Scale 1:24,000.

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PROJECT NAME
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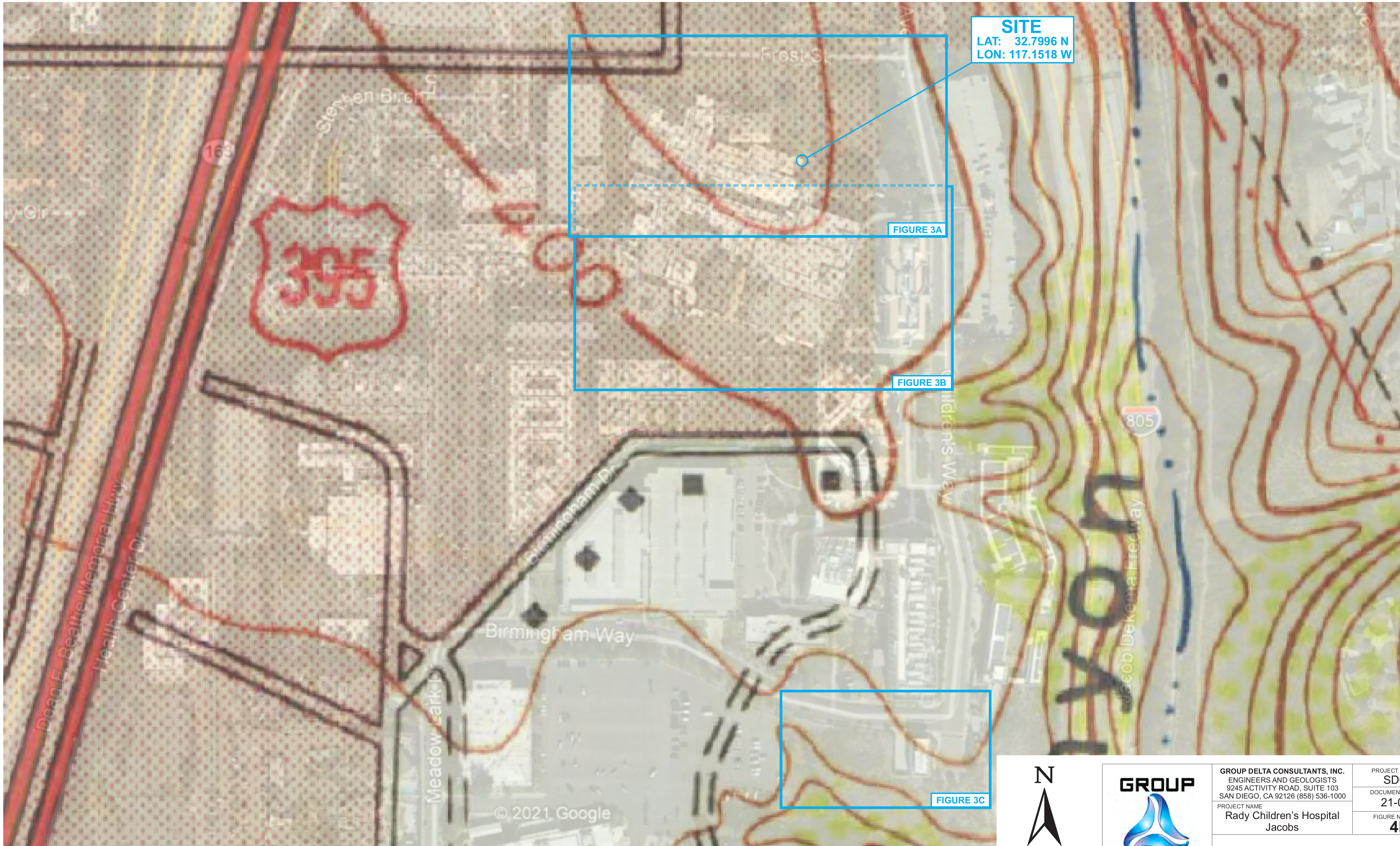
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
4E

TOPOGRAPHIC MAP (2018)



N
NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
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9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME
Rady Children's Hospital
Jacobs

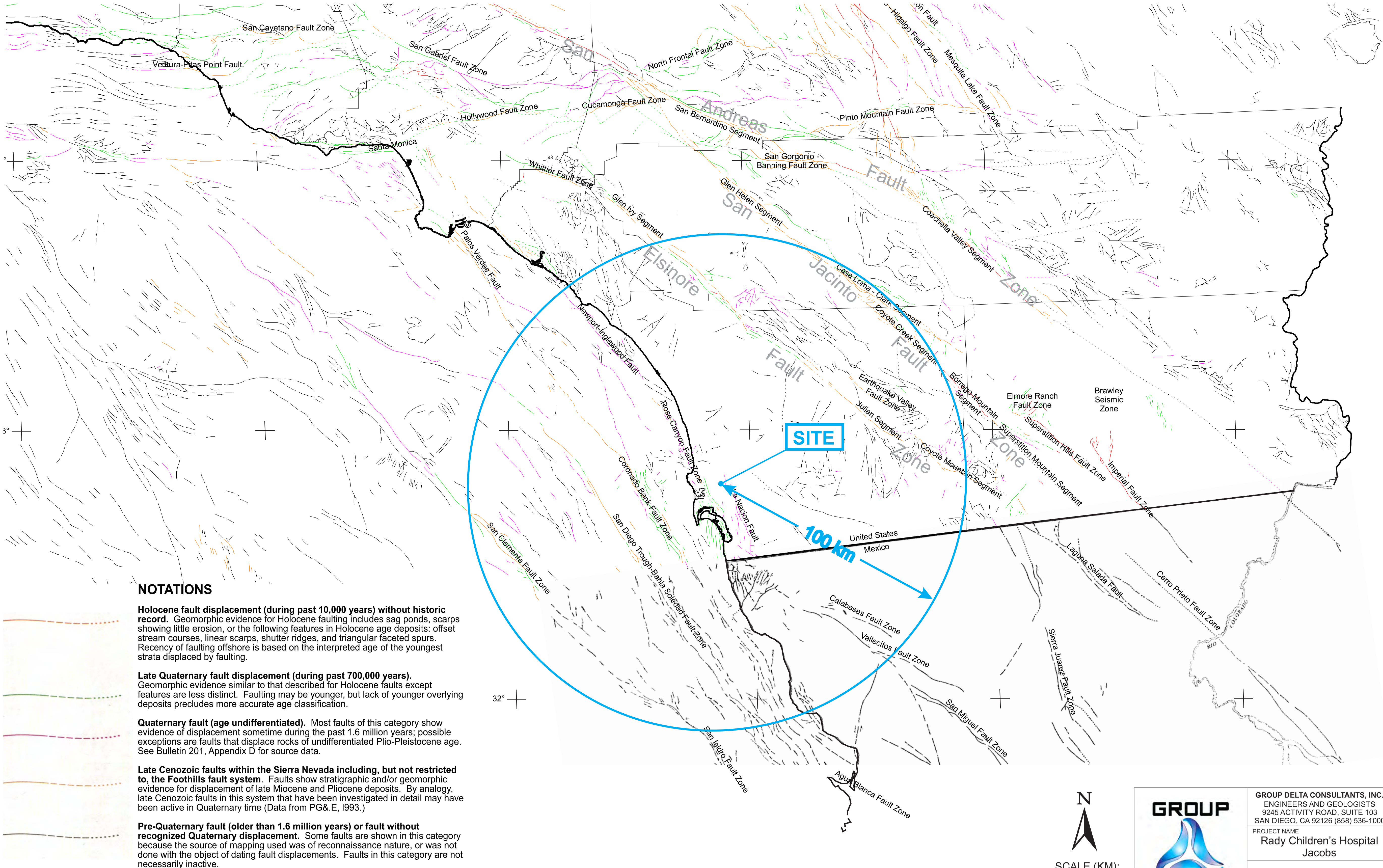
PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
4F

TOPOGRAPHIC MAP (1953)

REFERENCE: U.S. Geologic Survey (1953). *Topographic Map of the La Jolla Quadrangle, 7½ Minute Series,* Scale 1:24,000.



NOTATIONS

Holocene fault displacement (during past 10,000 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults that displace rocks of undifferentiated Plio-Pleistocene age. See Bulletin 201, Appendix D for source data.

Late Cenozoic faults within the Sierra Nevada including, but not restricted to, the Foothills fault system. Faults show stratigraphic and/or geomorphic evidence for displacement of late Miocene and Pliocene deposits. By analogy, late Cenozoic faults in this system that have been investigated in detail may have been active in Quaternary time (Data from PG&E, I993.)

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissance nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

REFERENCE: Jennings, C.W. (1994). *Fault Activity Map of Callifornia and Adjacent Areas,* CDMG Geologic Data Series, Map No. 6.

GROUP DELTA
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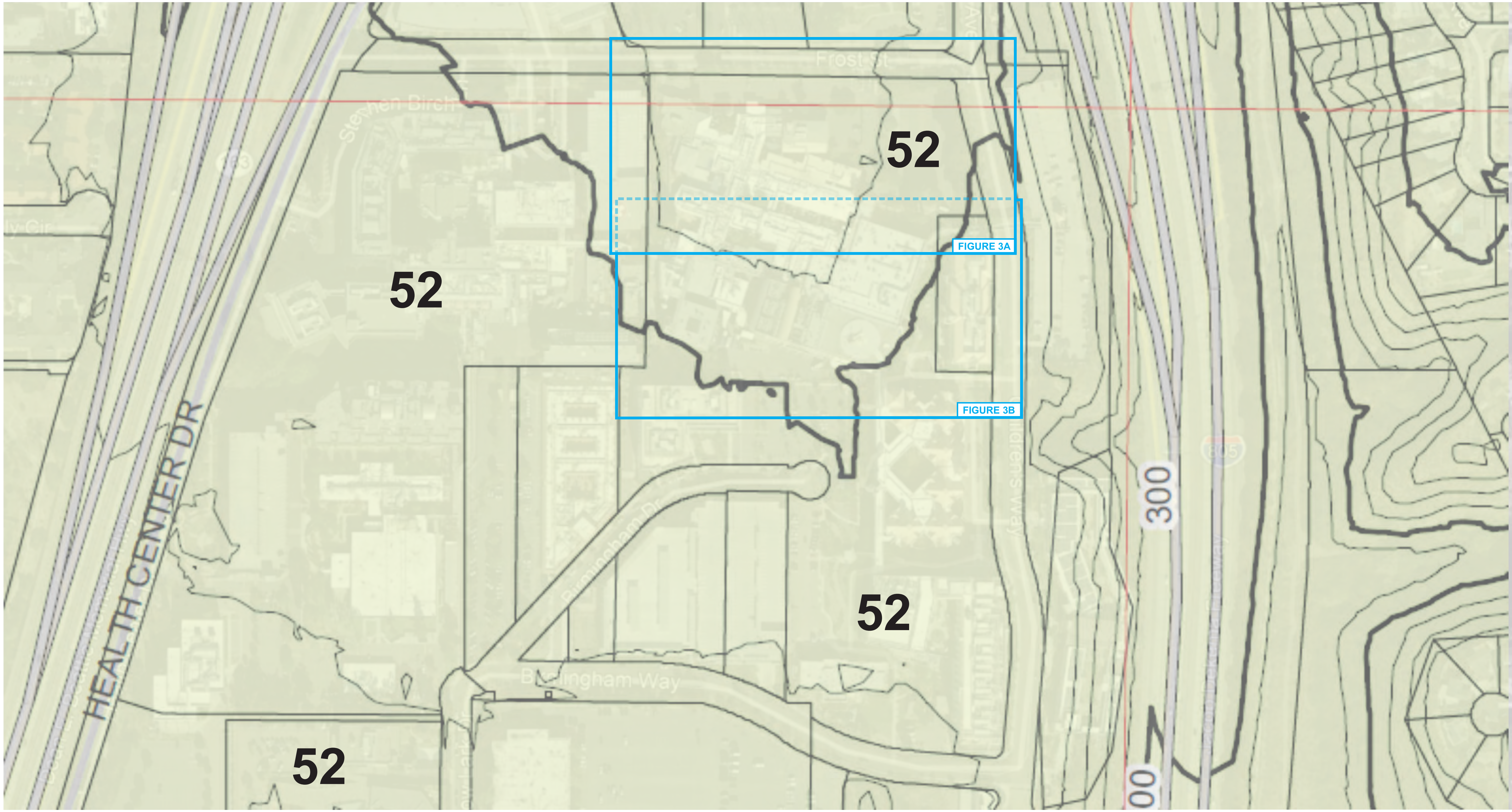
PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689

DOCUMENT NUMBER: 21-0065

FIGURE NUMBER: 5A

REGIONAL FAULT MAP



EXPLANATION:

52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk

FAULT ZONES

11 Active, Alquist-Priolo Earthquake Fault Zone

12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown

FAULTS

Fault

Inferred Fault

Concealed Fault

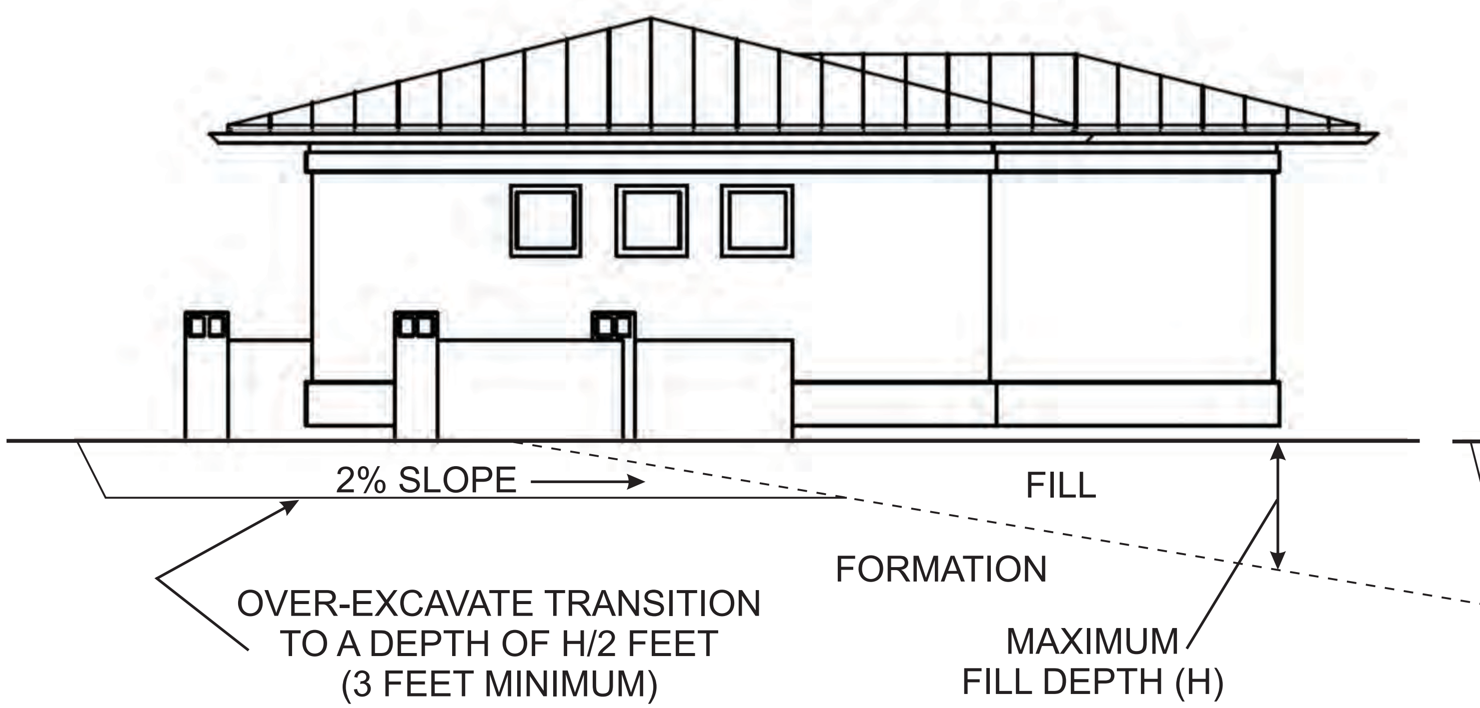
REFERENCE: City of San Diego (2008). *Seismic Safety Study, Geologic Hazards and Faults*, Grid 26, dated April 3.

GROUP DELTA

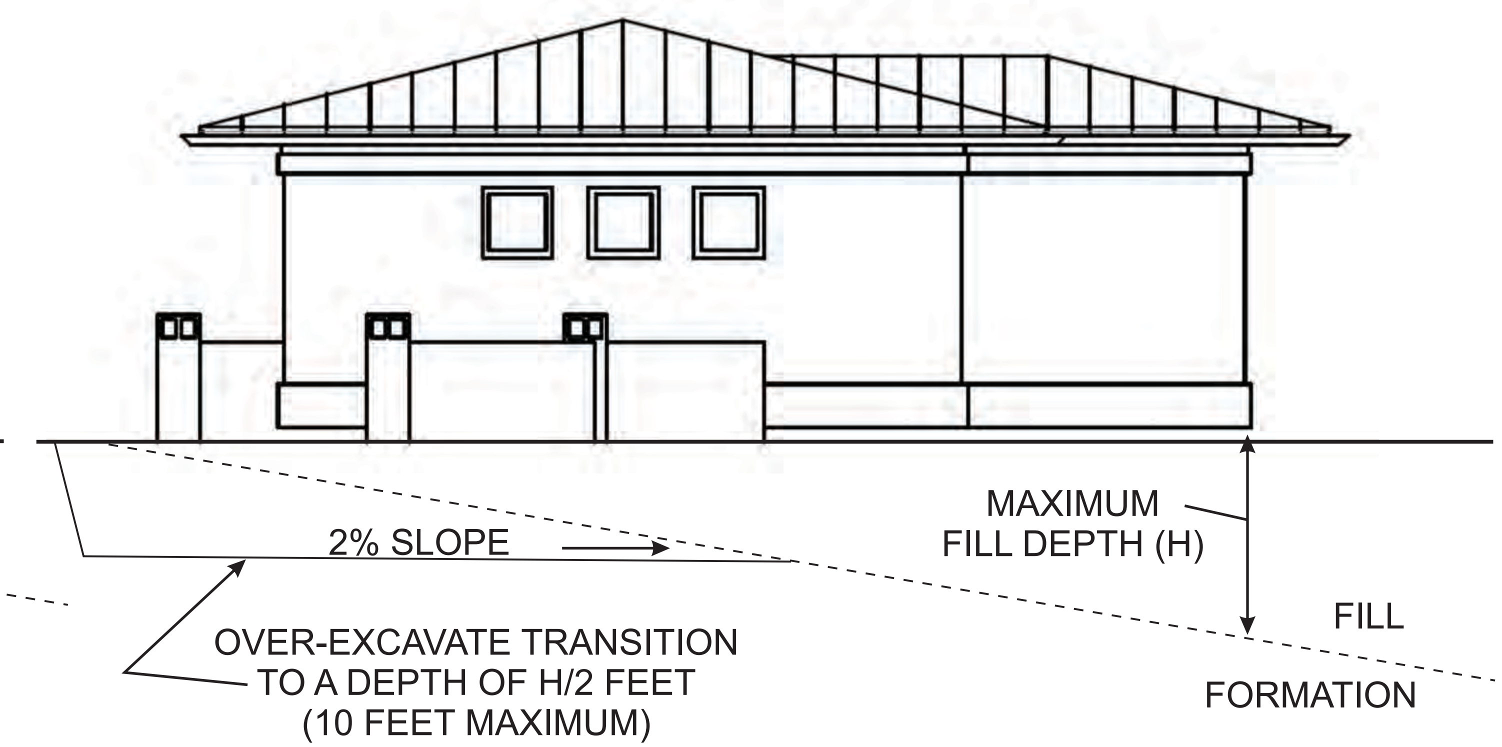
GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 9245 ACTIVITY ROAD, SUITE 103 SAN DIEGO, CA 92126 (858) 536-1000	PROJECT NUMBER SD689 DOCUMENT NUMBER 21-0065
PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 5B

LOCAL FAULT MAP

TYPICAL CUT/FILL TRANSITION



TYPICAL DEEP FILL TRANSITION



NOTES

1) Structures should not cross cut/fill nor deep fill transitions, due to the potential for adverse differential movement.

2) For building pads underlain by both cut/fill and deep fill transitions, the cut portion of the pads should be over-excavated to a depth of H/2, where H is equal to the greatest depth of fill beneath the building.

3) Over-excavations should extend at least 3 feet below pad grade, and do not need to extend more than 10 feet below pad grade.

4) Over-excavations should extend at least 10 feet beyond the perimeters of the building foundations, including any isolated column footings.

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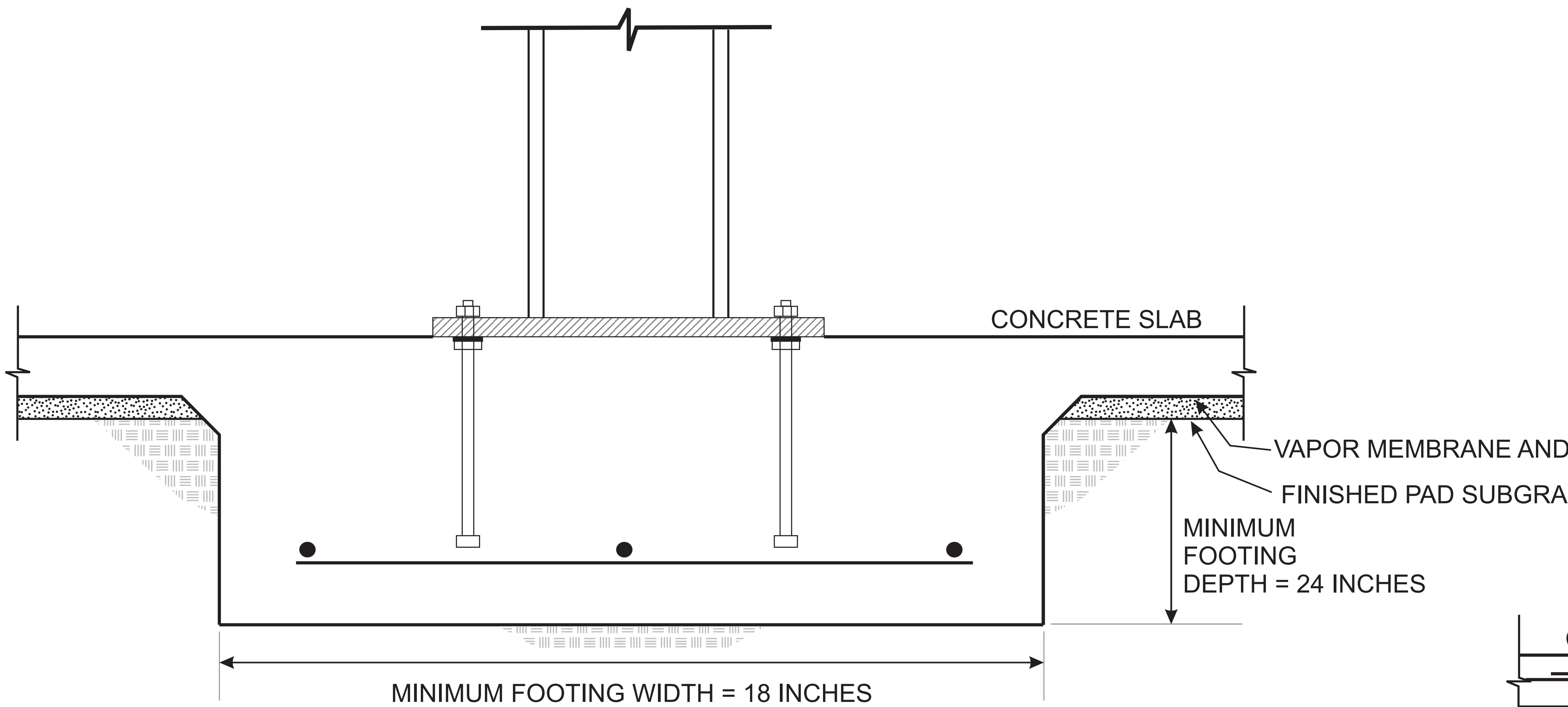
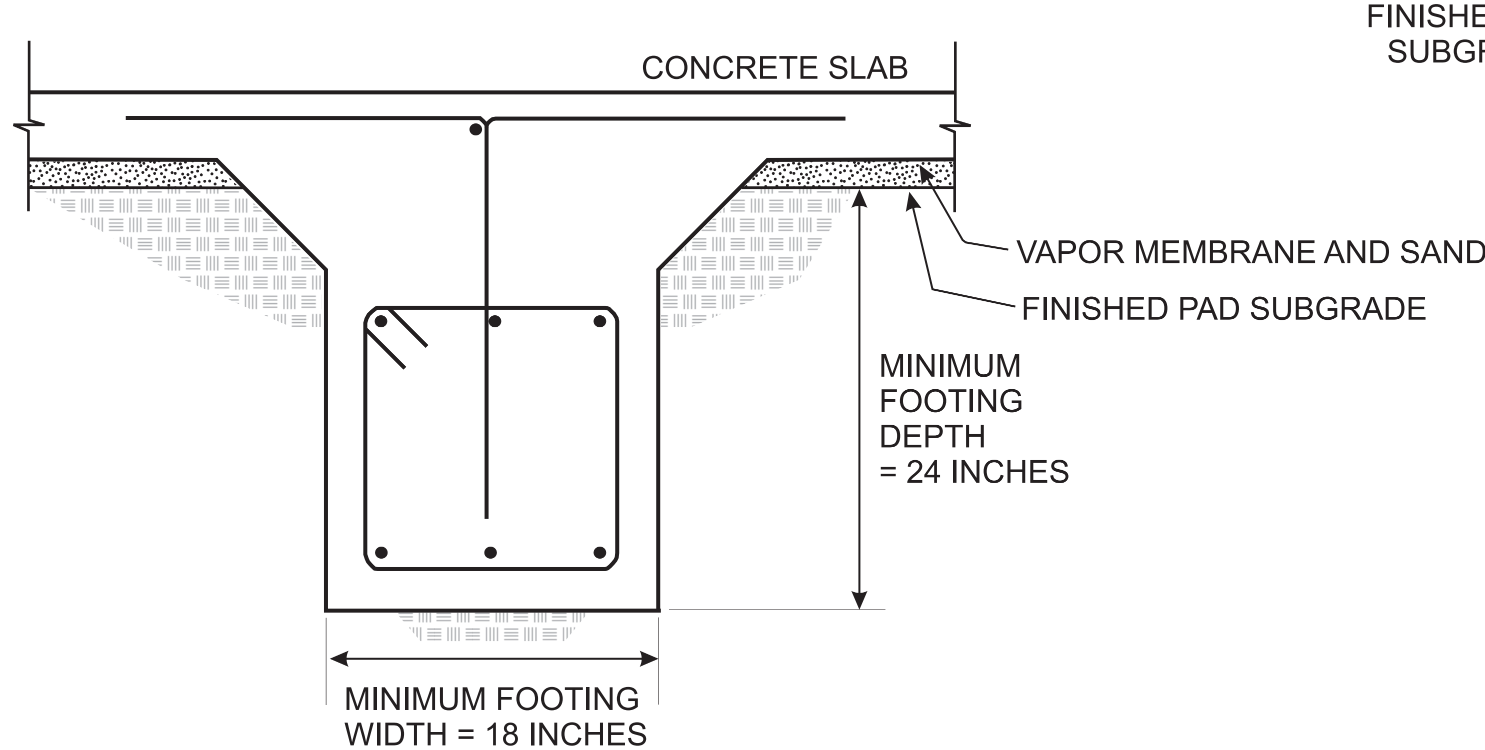
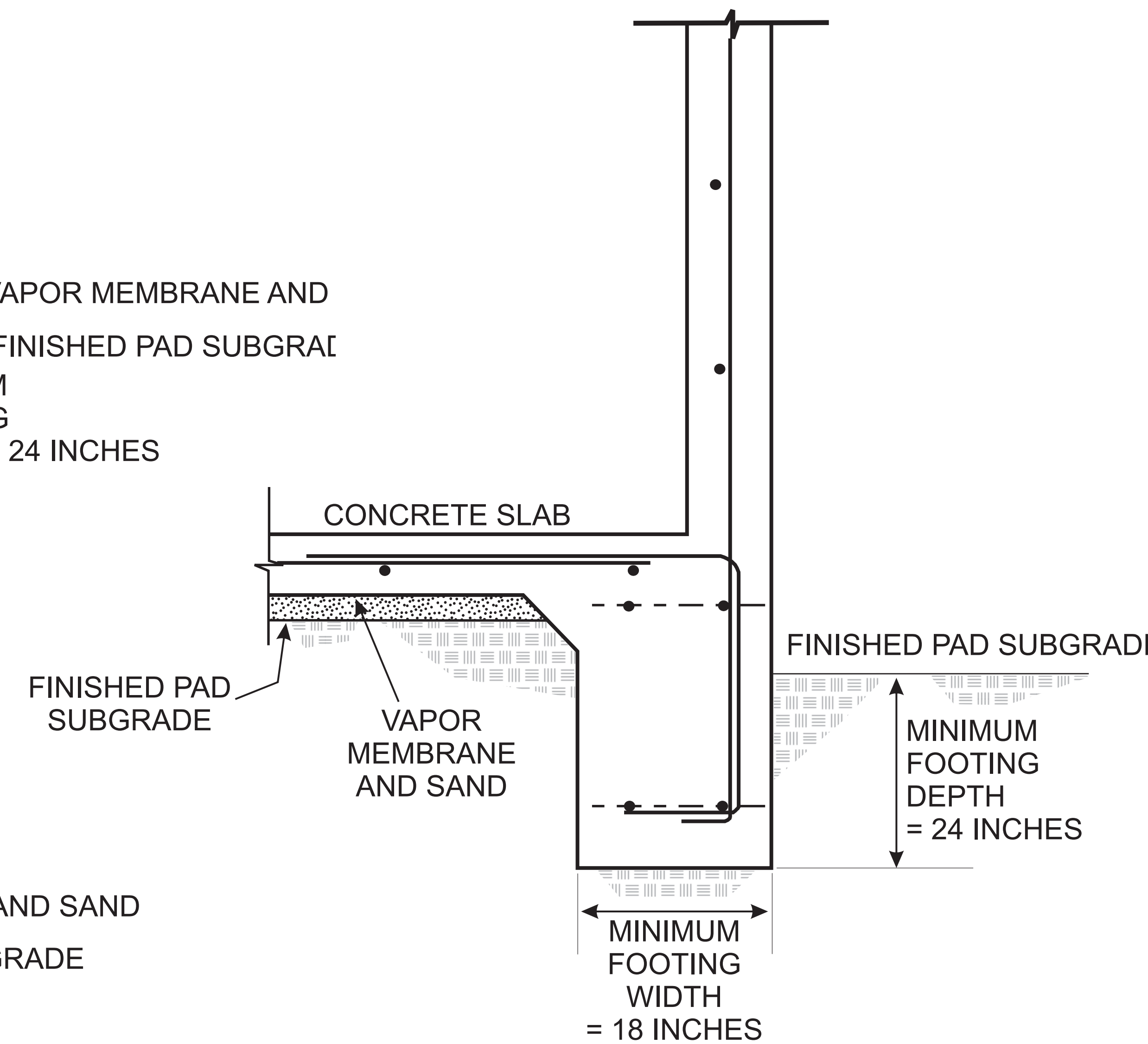
	PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 6
	TRANSITION DETAILS	



SQUARE FOOTING



INTERIOR CONTINUOUS FOOTING



EXTERIOR CONTINUOUS FOOTING

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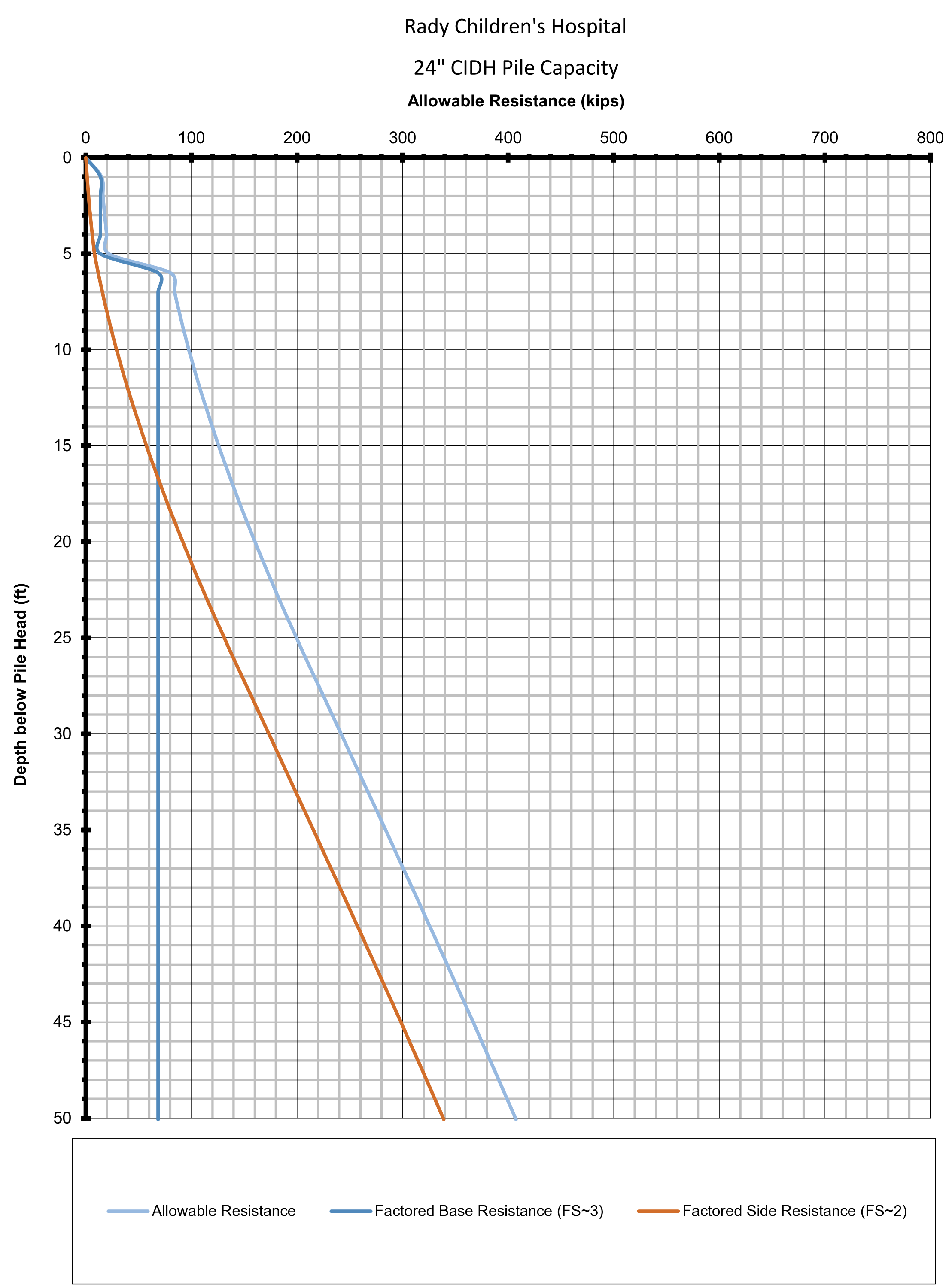
PROJECT NAME
Rady Children's Hospital
Jacobs

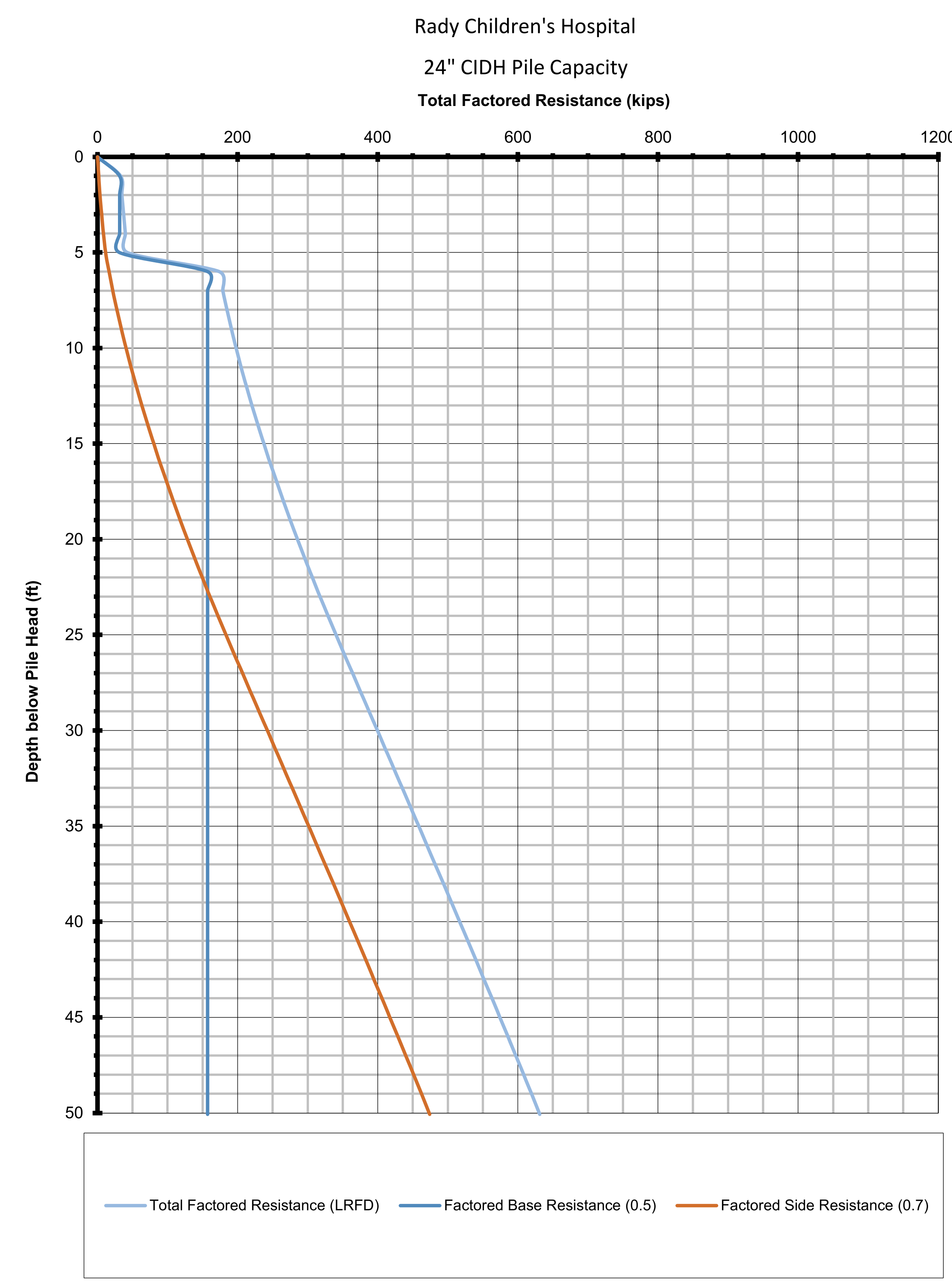
PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7A

SHALLOW FOUNDATIONS





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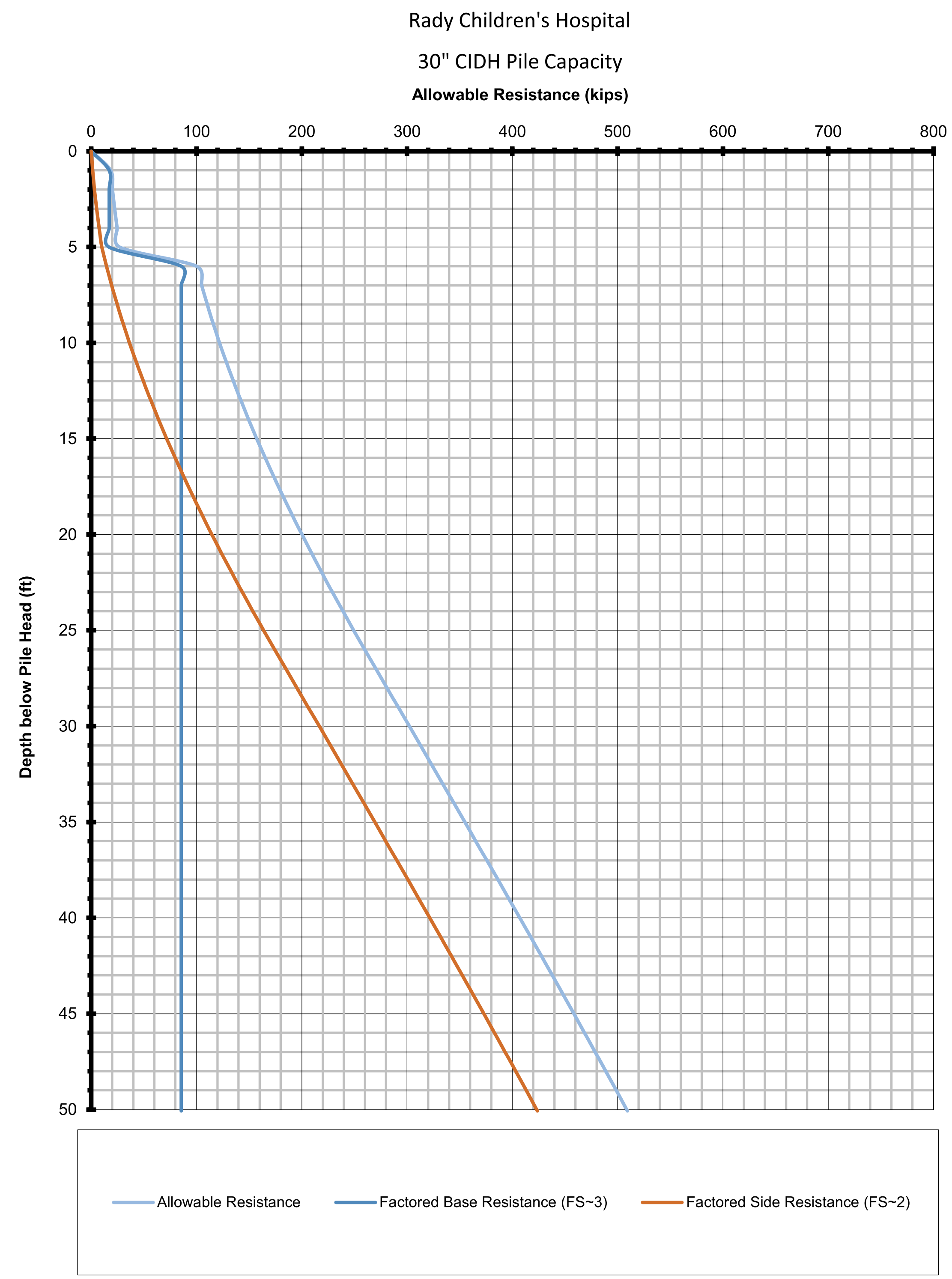
PROJECT NAME
Rady Children's Hospital
Jacobs

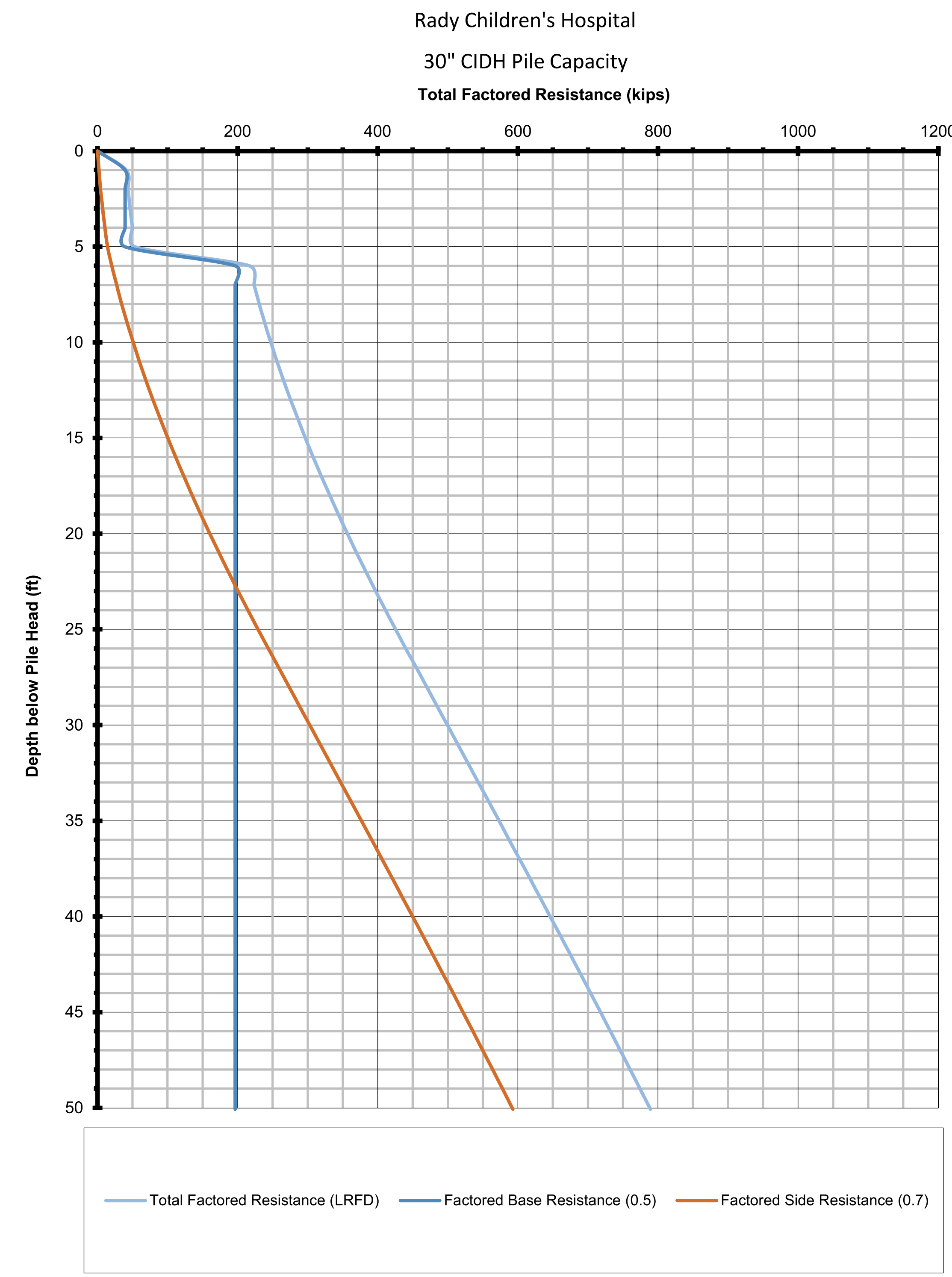
PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7B

AXIAL CAPACITY (2' CIDH)





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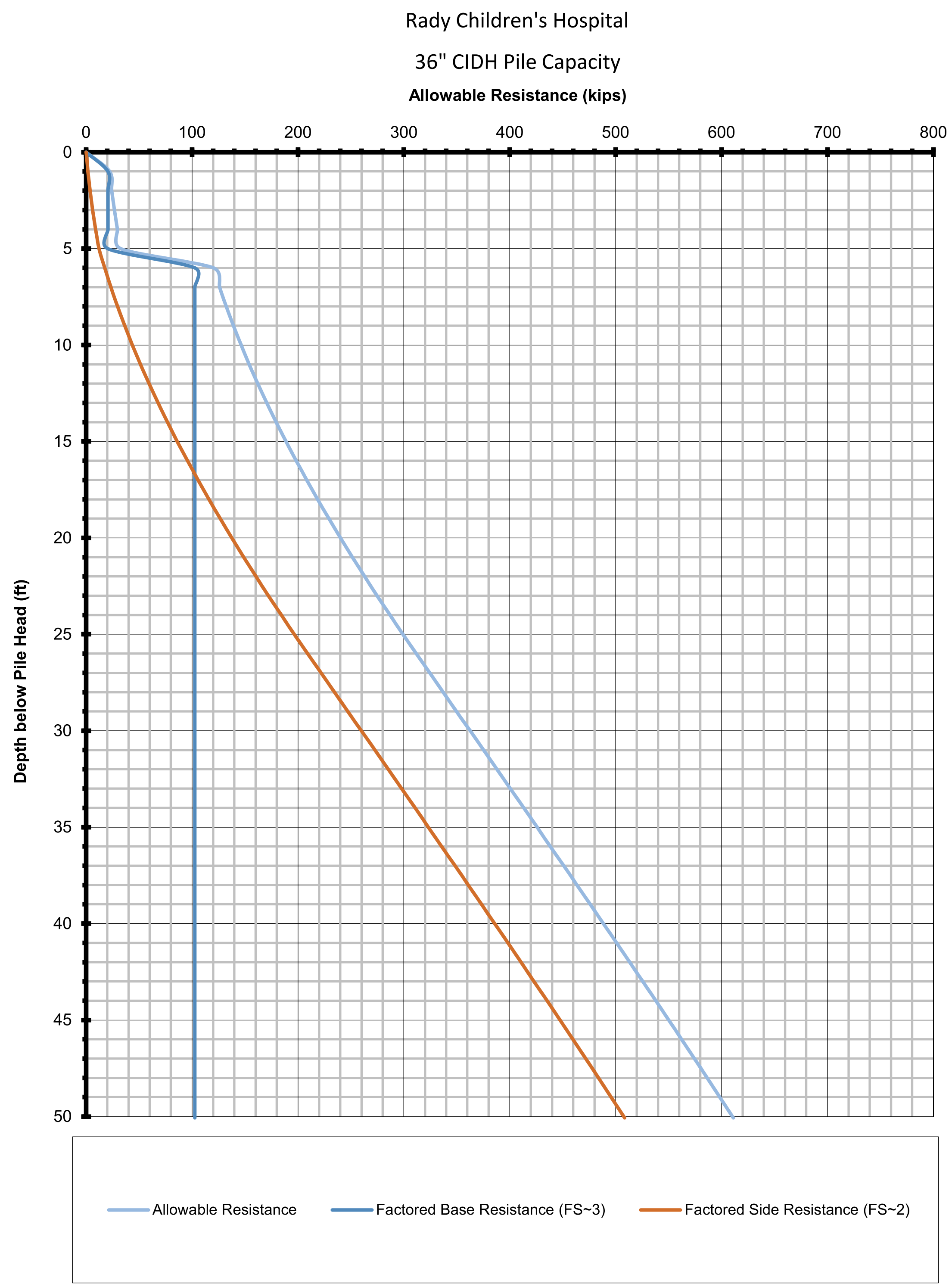
Rady Children's Hospital
Jacobs

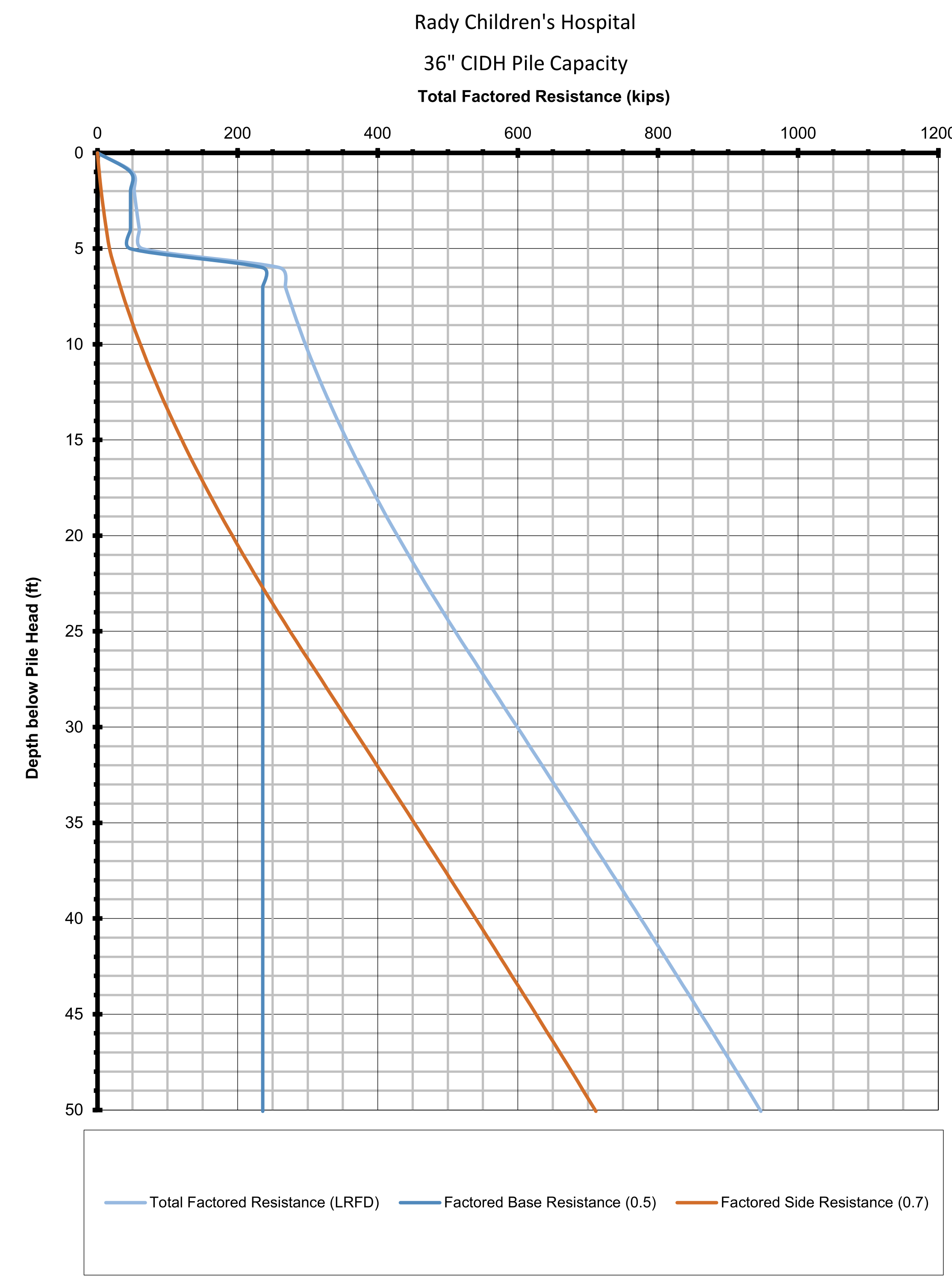
PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7C

AXIAL CAPACITY (2½' CIDH)





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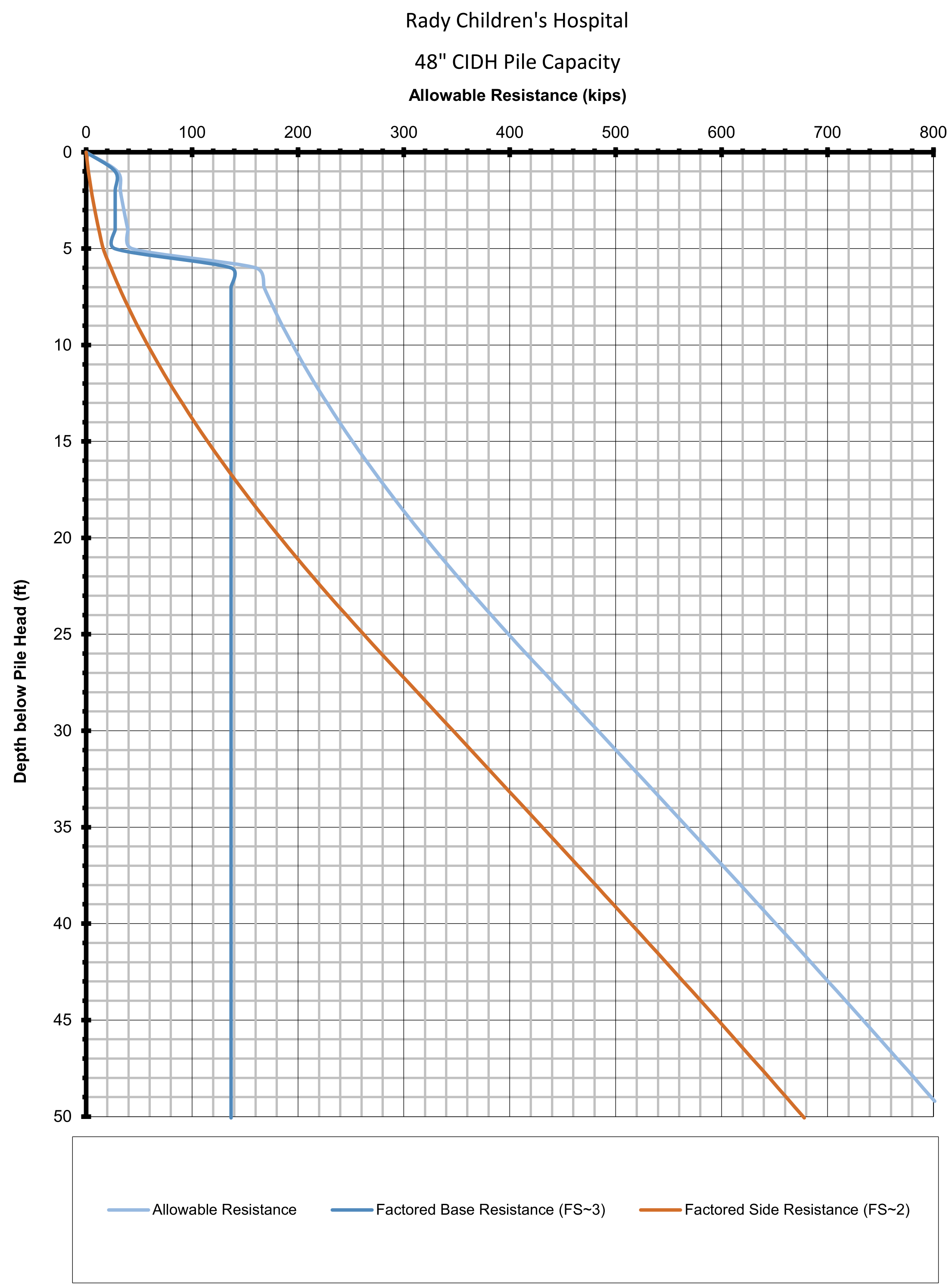
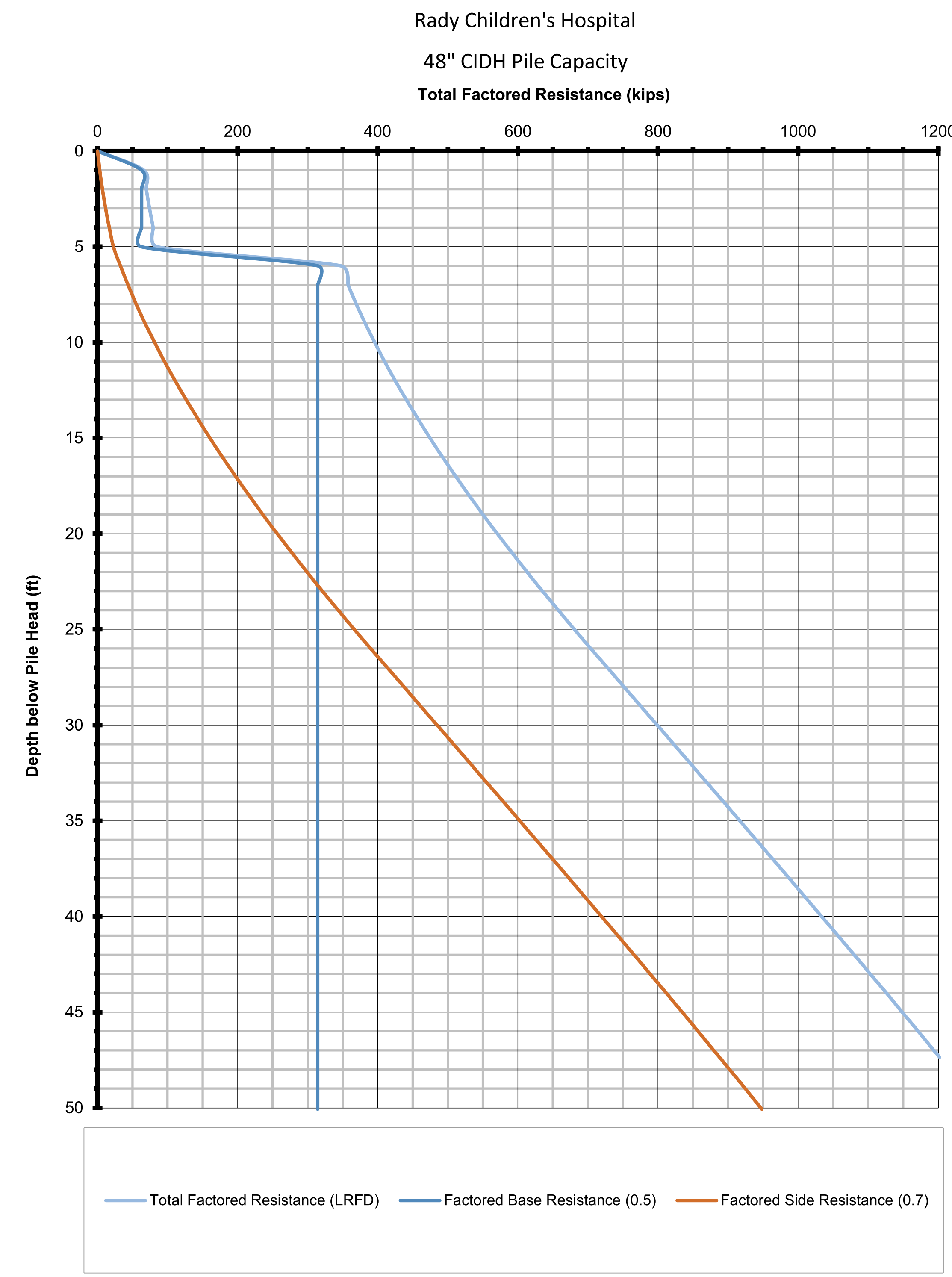
		DOCUMENT NUMBER 21-0065
	PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 7D
	AXIAL CAPACITY (3' CIDH)	





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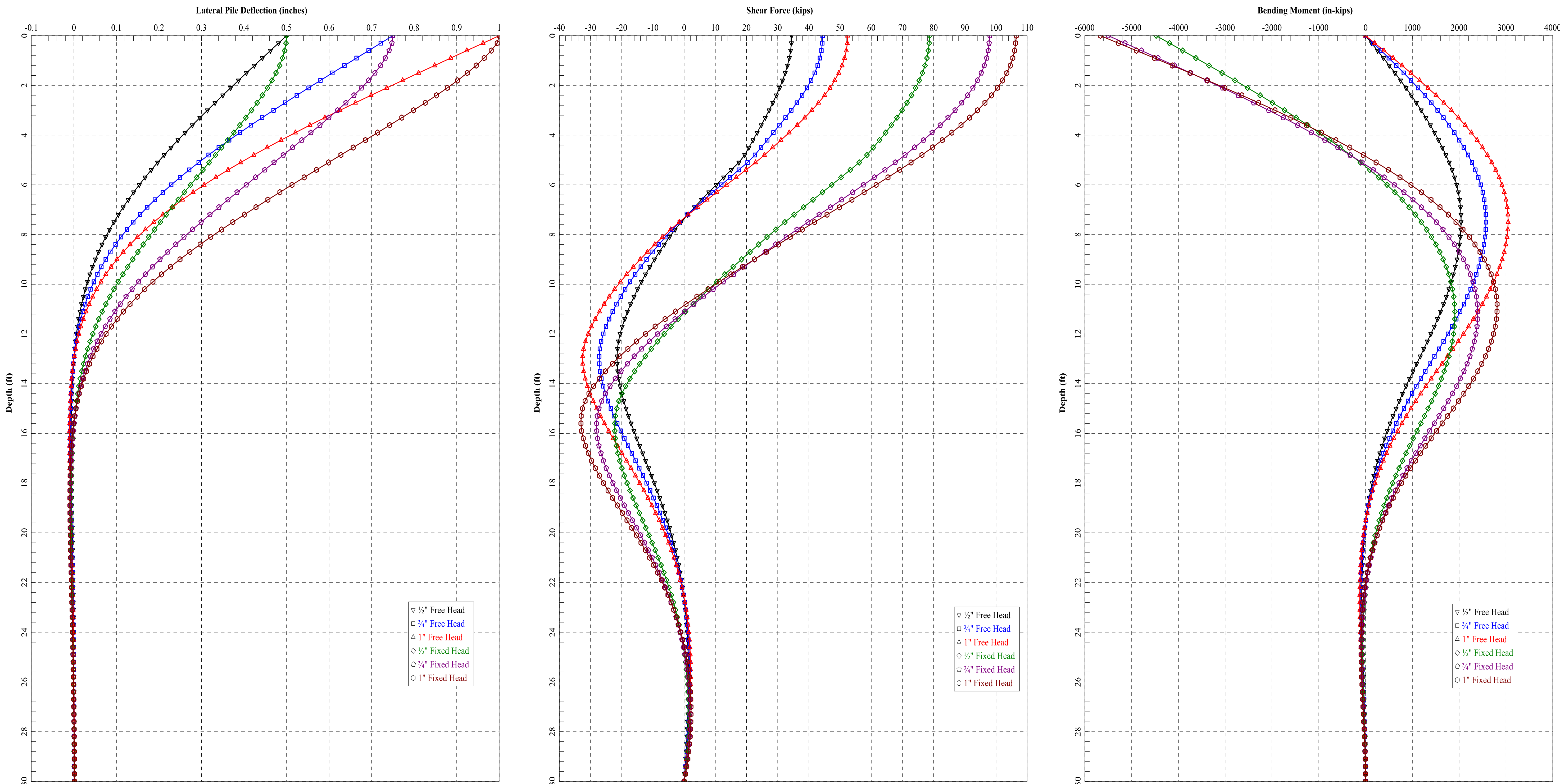
PROJECT NAME Rady Children's Hospital Jacobs	PROJECT NUMBER SD689 DOCUMENT NUMBER 21-0065 FIGURE NUMBER 7E

AXIAL CAPACITY (4' CIDH)



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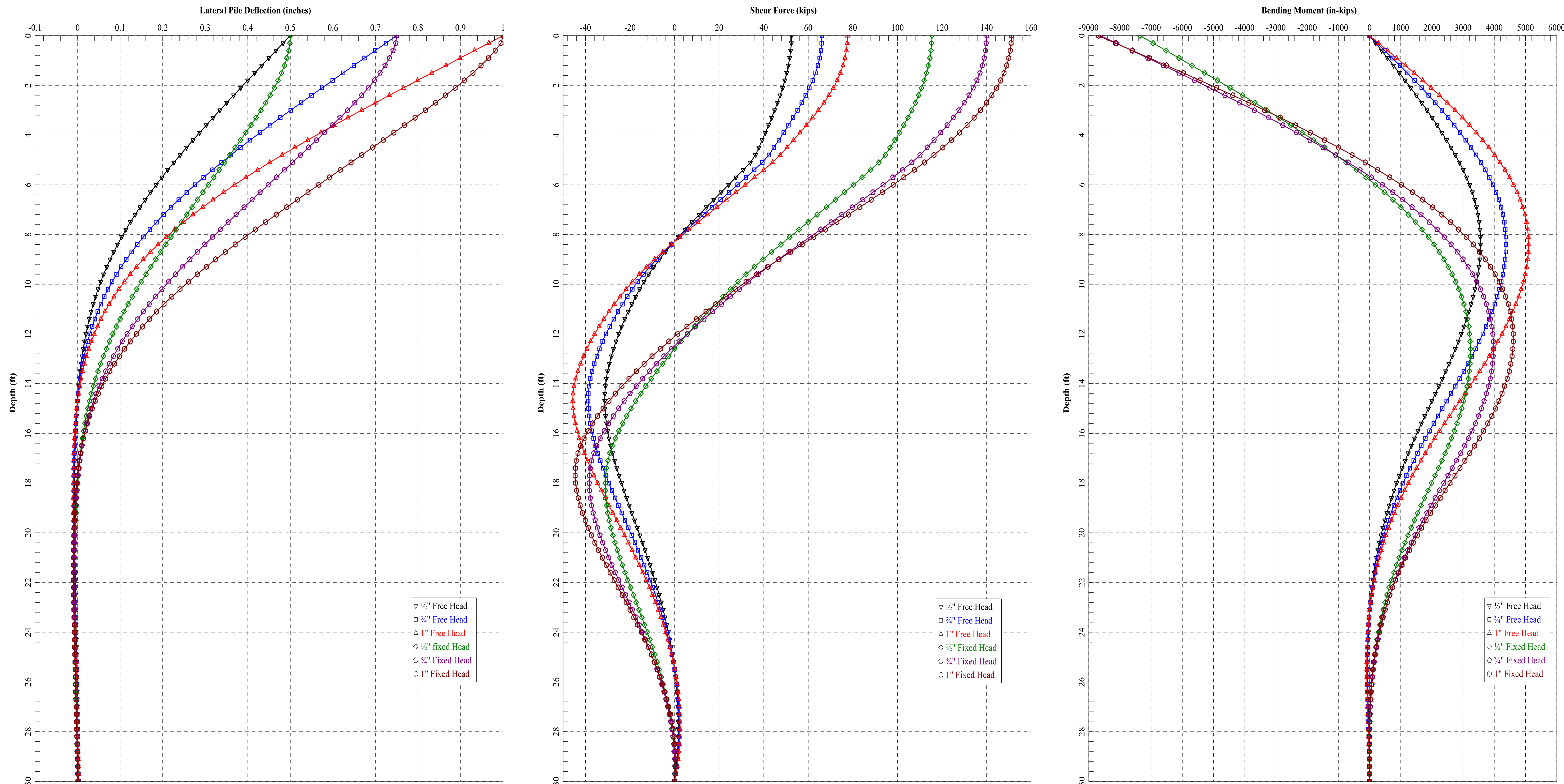
PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7F

LATERAL CAPACITY (2' CIDH)



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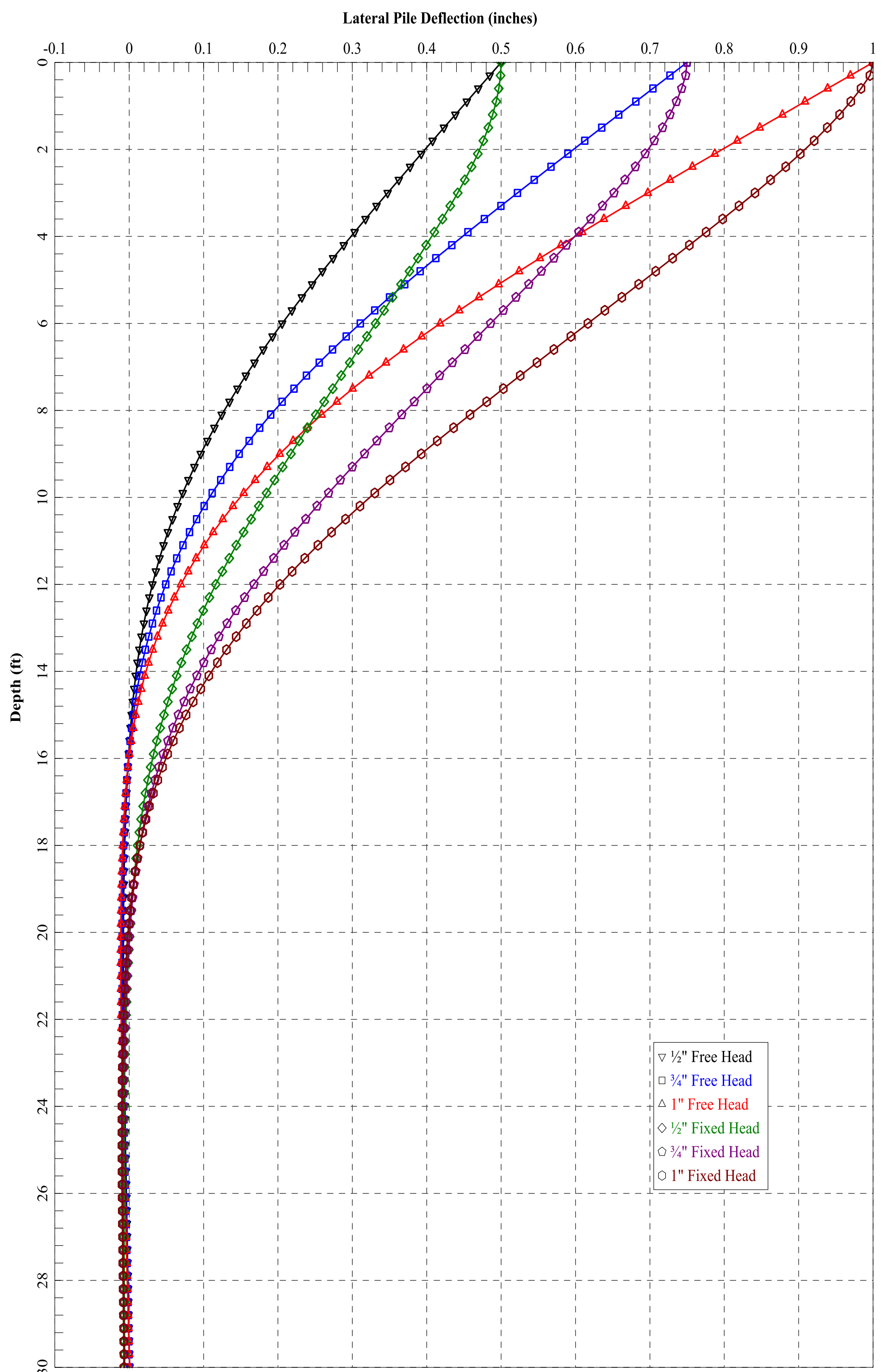
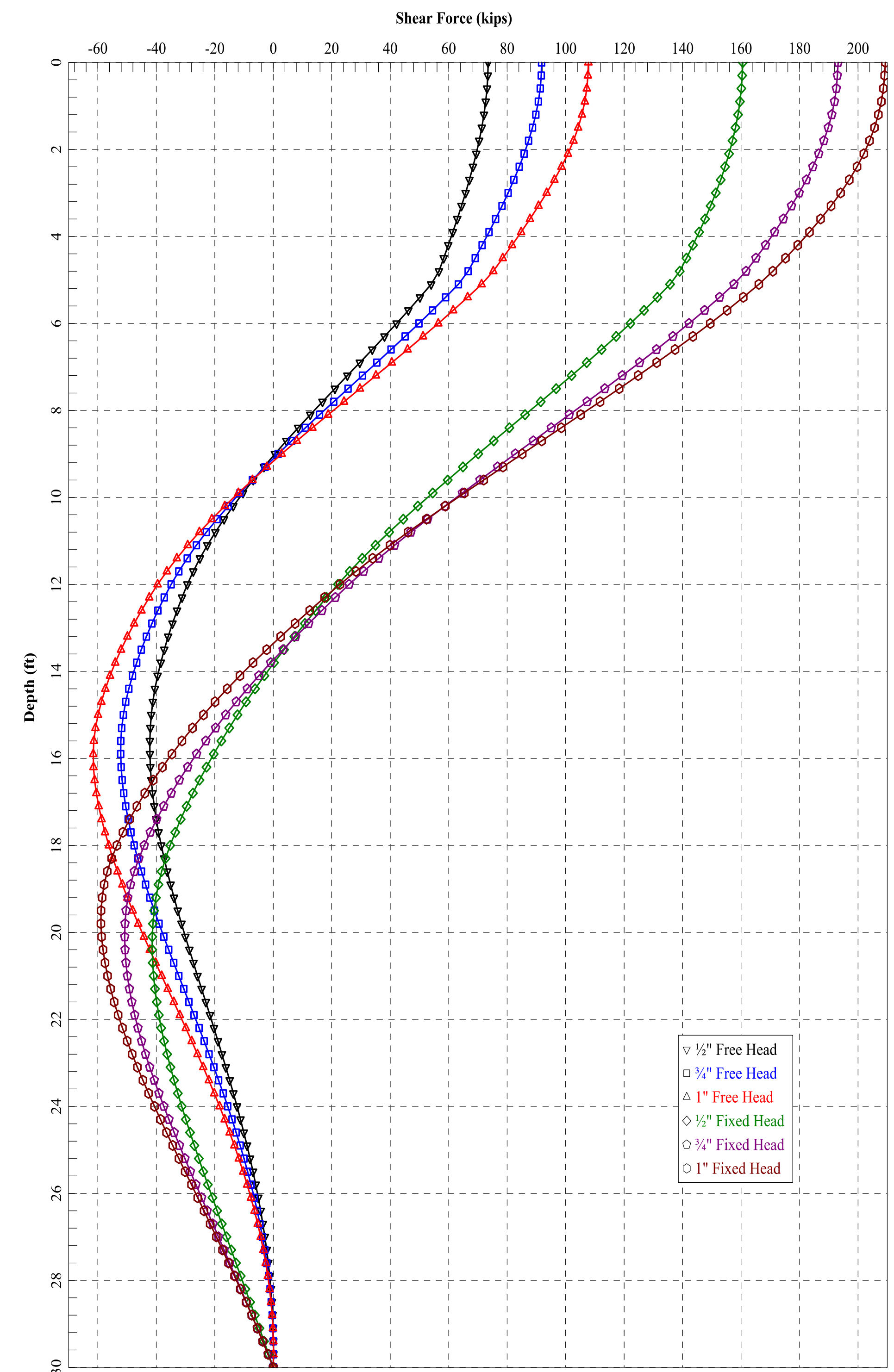
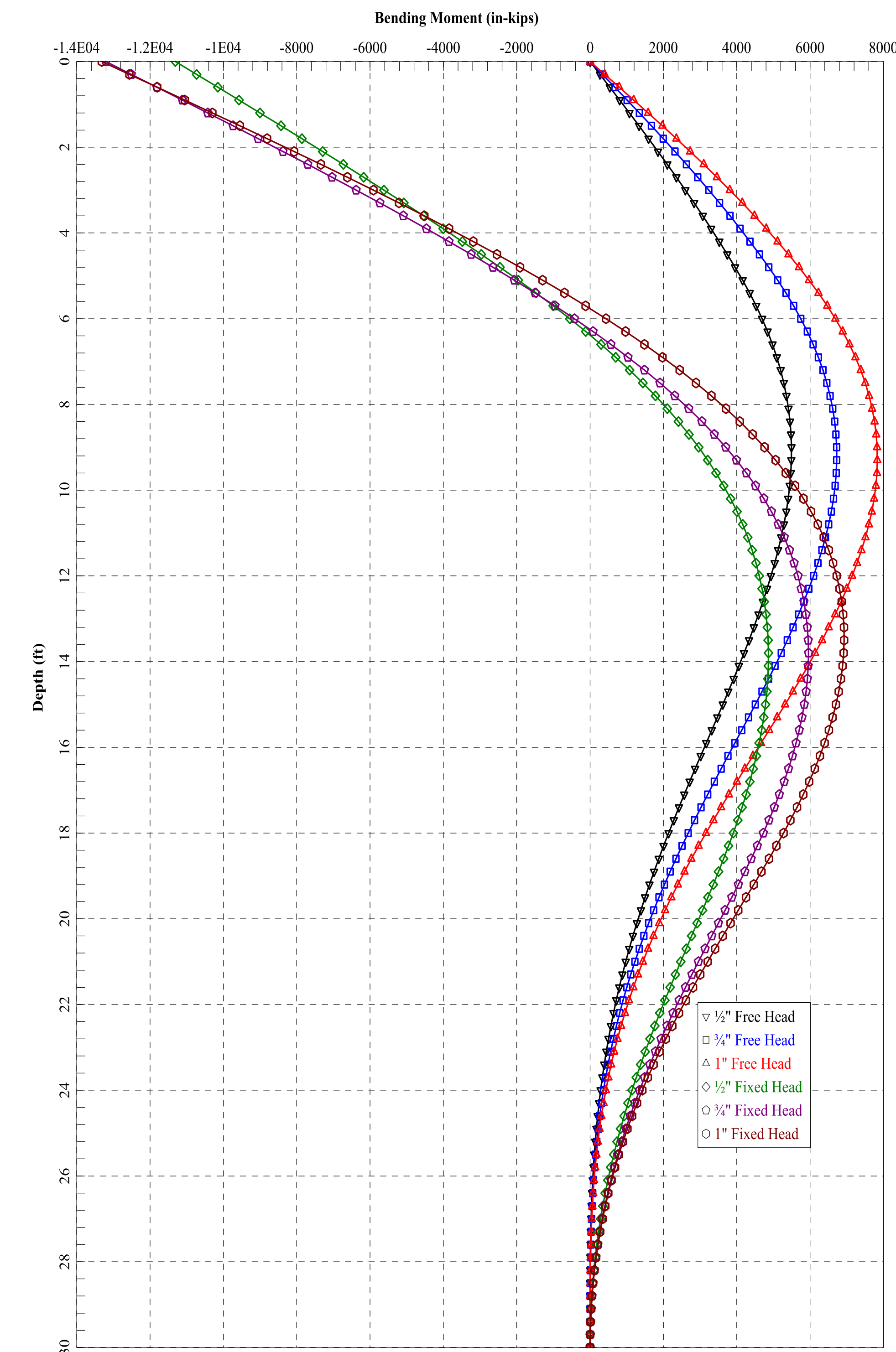
PROJECT NUMBER	SD689
DOCUMENT NUMBER	21-0065
PROJECT NAME	Rady Children's Hospital Jacobs
FIGURE NUMBER	7G

LATERAL CAPACITY (2½' CIDH)







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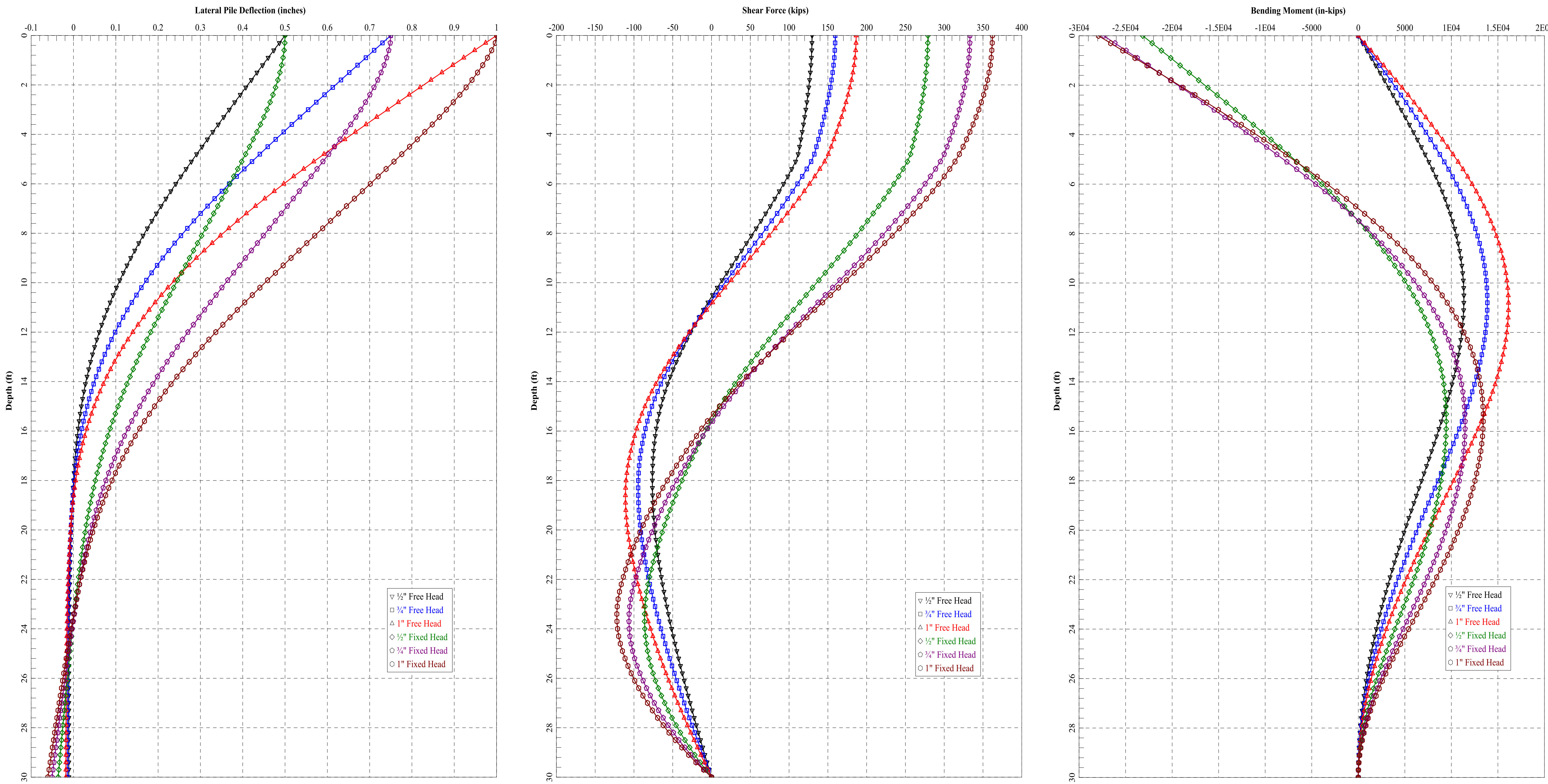
PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7H

LATERAL CAPACITY (3' CIDH)



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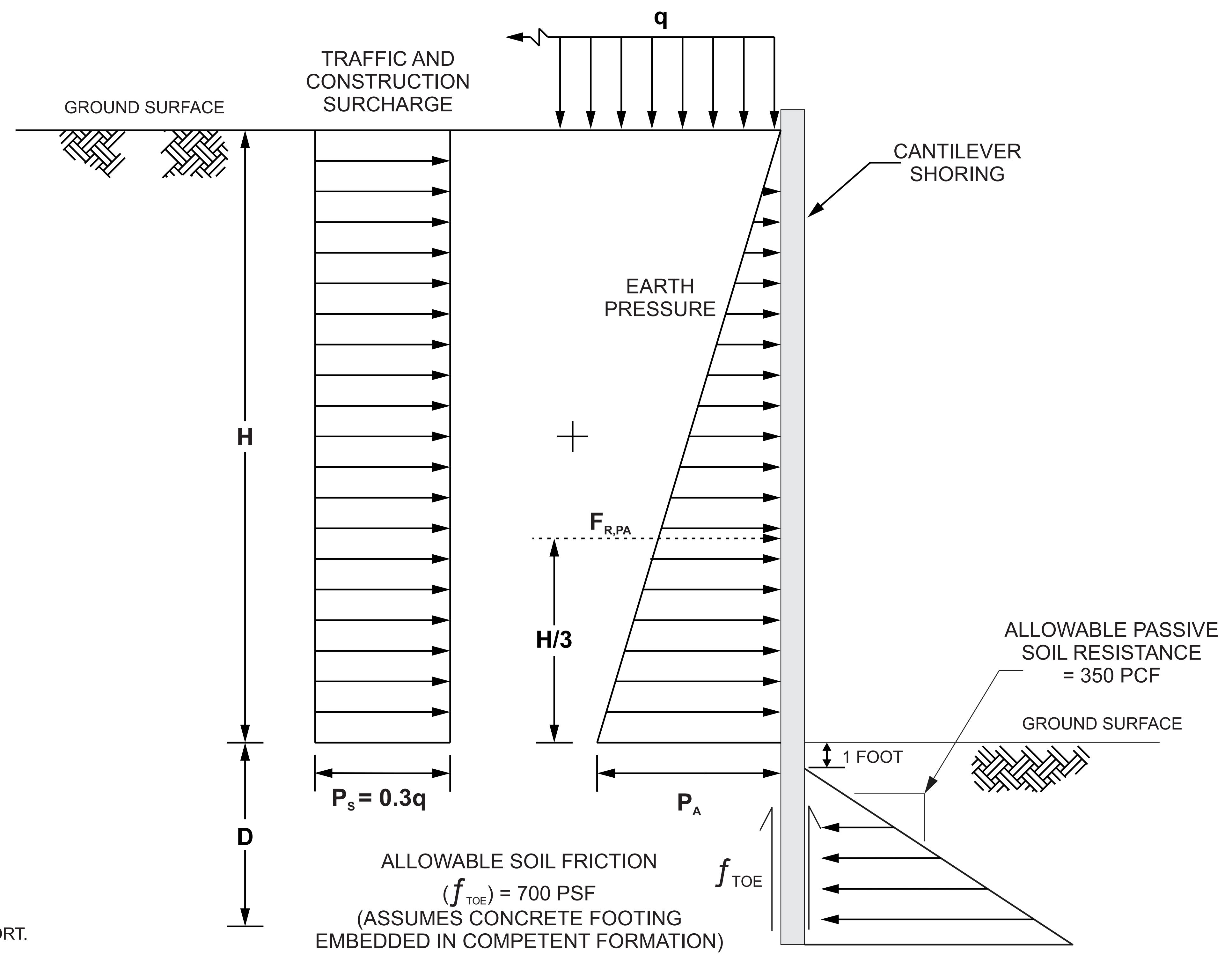
PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

FIGURE NUMBER
7I

LATERAL CAPACITY (4' CIDH)



NOTES:

1. ACTIVE LATERAL EARTH PRESSURE, PA
   - WITH LEVEL BACKFILL: P_A = 35 PCF
   - WITH 2:1 SLOPING BACKFILL: P_A = 55 PCF
2. ASSUMES NO HYDROSTATIC PRESSURE.
3. H IS MEASURED IN FEET.
4. FIGURE SHOULD BE USED WITH GEOTECHNICAL REPORT.
5. FOR PRELIMINARY DESIGN.
6. SURCHARGES FROM CONSTRUCTION EQUIPMENT, EXCAVATED SOIL, CONSTRUCTION MATERIALS, TRAFFIC LOADING OR OTHER UNIFORM LOADING (q) ABOVE THE WALL SHOULD BE CALCULATED USING THE SURCHARGE LATERAL EARTH PRESSURE, P_S. POINT LOADS OR OTHER SURCHARGES CAN BE EVALUATED UPON REQUEST.

TOTAL ALLOWABLE PASSIVE RESISTANCE PER SOLDIER PILE =
UNIT ALLOWABLE PASSIVE RESISTANCE
X
TWICE THE CONCRETED SOLDIER PILE WIDTH

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SAN DIEGO, CA 92126 (858) 536-1000

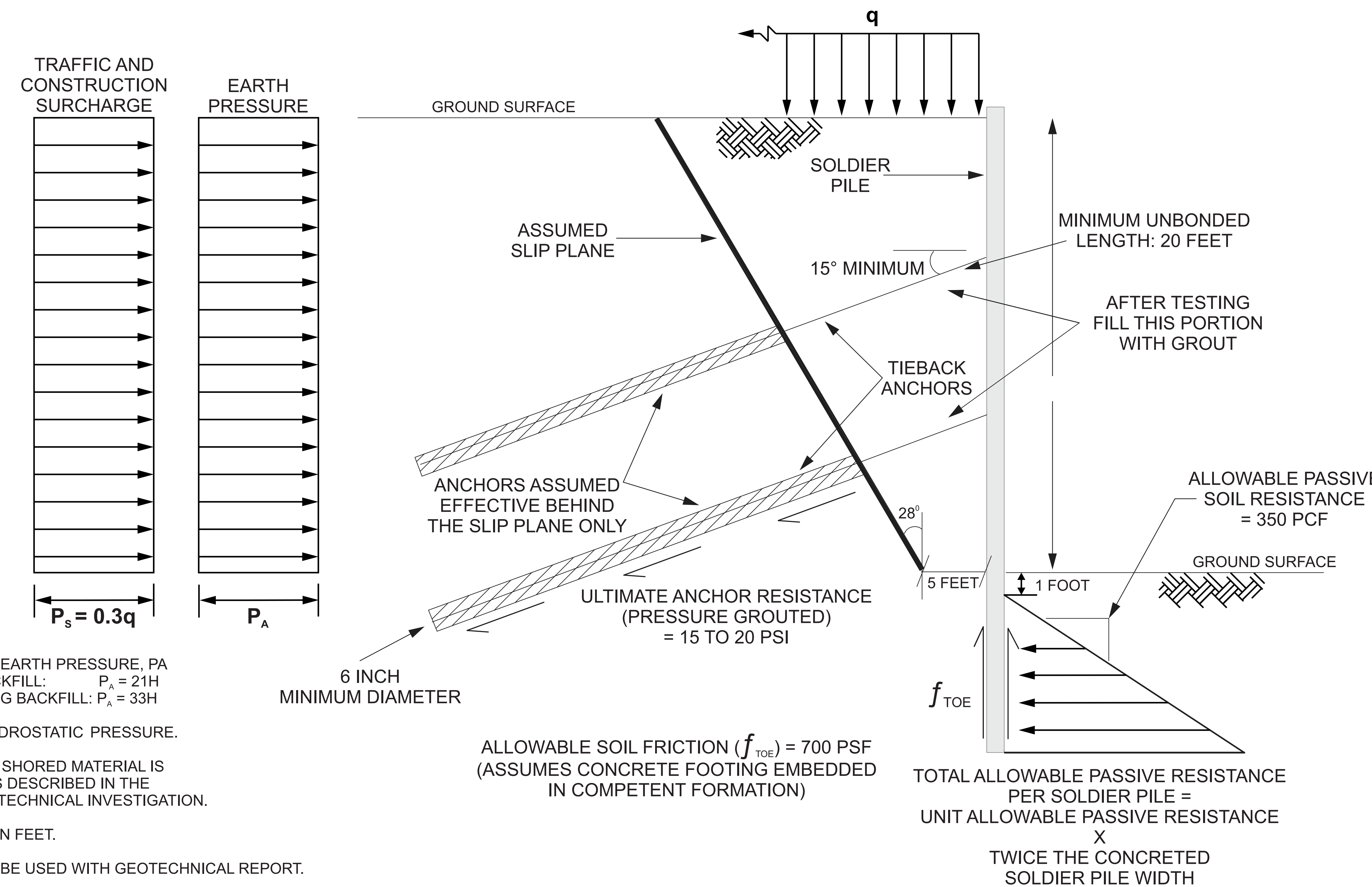
PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689

DOCUMENT NUMBER: 21-0065

FIGURE NUMBER: 8A

LATERAL EARTH PRESSURES FOR CANTILEVER SHORING



NOTES:

1. ACTIVE LATERAL EARTH PRESSURE, PA
-WITH LEVEL BACKFILL: $P_A = 21H$
-WITH 2:1 SLOPING BACKFILL: $P_A = 33H$

2. ASSUMES NO HYDROSTATIC PRESSURE.

3. VALUES ASSUME SHORED MATERIAL IS FORMATIONAL AS DESCRIBED IN THE REPORT OF GEOTECHNICAL INVESTIGATION.

4. H IS MEASURED IN FEET.

5. FIGURE SHOULD BE USED WITH GEOTECHNICAL REPORT.

6. FOR PRELIMINARY DESIGN.

7. SURCHARGES FROM CONSTRUCTION EQUIPMENT, EXCAVATED SOIL, CONSTRUCTION MATERIALS, TRAFFIC LOADING OR OTHER UNIFORM LOADING (q) ABOVE THE WALL SHOULD BE CALCULATED USING THE SURCHARGE LATERAL EARTH PRESSURE, P_S. POINT LOADS OR OTHER SURCHARGES CAN BE EVALUATED UPON REQUEST.

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SAN DIEGO, CA 92126 (858) 536-1000

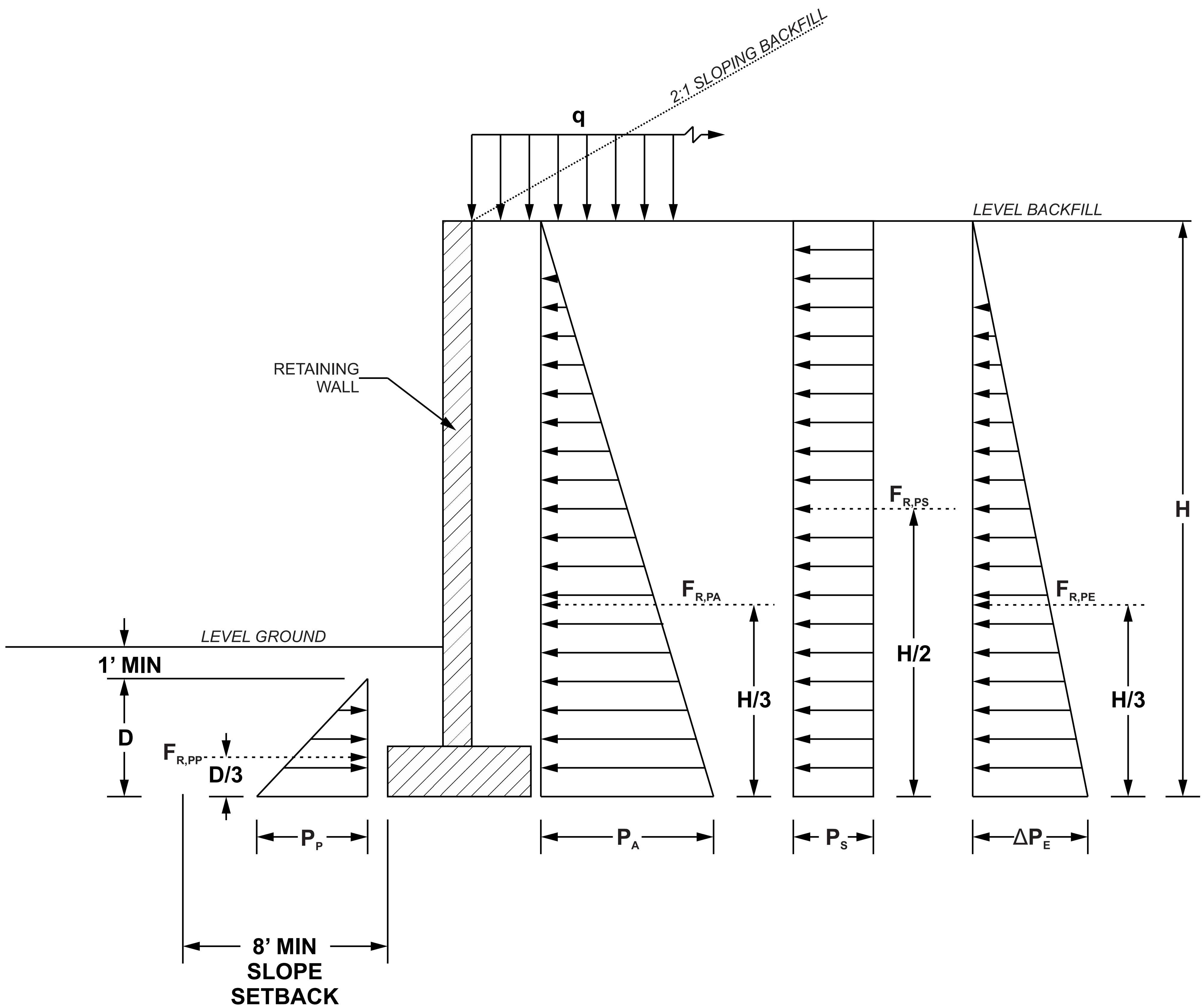
PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689

DOCUMENT NUMBER: 21-0065

FIGURE NUMBER: 8B

LATERAL EARTH PRESSURES
FOR BRACED OR ANCHORED SHORING



NOTES:

1. PASSIVE PRESSURES MAY BE INCREASED BY ⅓ DURING SEISMIC LOADING. THE UPPER 12 INCHES OF MATERIAL NOT PROTECTED BY CONCRETE SLABS OR PAVEMENTS SHOULD NOT BE INCLUDED IN THE ESTIMATION OF PASSIVE RESISTANCE.
2. ASSUMES NO HYDROSTATIC PRESSURE. A WALL BACK DRAIN SHOULD BE INSTALLED AS RECOMMENDED IN THE *WALL DRAINAGE DETAIL* FIGURE.
3. SURCHARGES FROM CONSTRUCTION EQUIPMENT, EXCAVATED SOIL, TRAFFIC LOADING OR OTHER UNIFORM LOADING ABOVE THE WALL SHOULD BE CALCULATED USING THE SURCHARGE LATERAL EARTH PRESSURE, P_S. POINT LOADS OR OTHER SURCHARGES CAN BE EVALUATED UPON REQUEST.
4. SEISMIC INCREMENT LATERAL EARTH PRESSURE (ΔP_E) IS BASED ON A DESIGN-LEVEL PEAK GROUND ACCELERATION OF 0.415g. SEISMIC INCREMENT SHOULD BE APPLIED TO WALLS SIX FEET OR GREATER IN HEIGHT.
5. 'H' AND 'D' ARE MEASURED IN FEET.
6. PRESSURES ASSUME GRANULAR AND NON-EXPANSIVE SOIL MATERIALS COMPACTED AS RECOMMENDED IN THE GEOTECHNICAL REPORT.

LATERAL EARTH PRESSURES

LATERAL EARTH PRESSURE TYPE	EQUIVALENT FLUID PRESSURE (PCF)	
ACTIVE, P_A	LEVEL BACKFILL	2:1 SLOPING BACKFILL
COMPACTED FILL	35	55
FORMATION	32	49
SEISMIC INCREMENT, ΔP_E*	25	
PASSIVE, P_P**	350	
SURCHARGE, P_S	0.3q	

*SEISMIC PRESSURE, $P_{AE} = P_A + \Delta P_E$
**PASSIVE RESISTANCE VERSUS DISPLACEMENT CURVES CAN BE PROVIDED UPON REQUEST.

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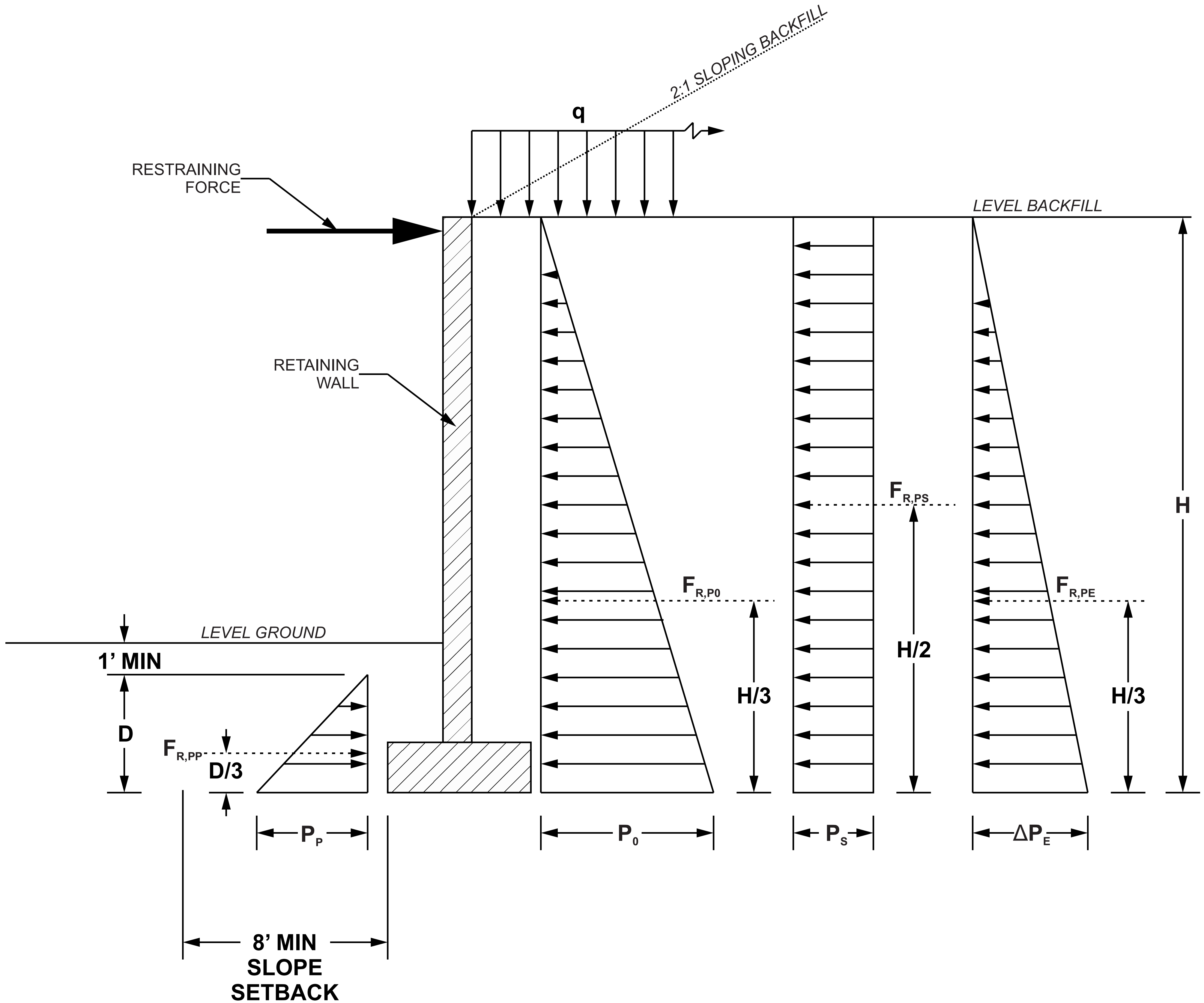
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME: Rady Children's Hospital Jacobs

PROJECT NUMBER: SD689
DOCUMENT NUMBER: 21-0065
FIGURE NUMBER: 8C

LATERAL EARTH PRESSURES
FOR YIELDING RETAINING WALLS



NOTES:

1. PASSIVE PRESSURES MAY BE INCREASED BY ⅓ DURING SEISMIC LOADING. THE UPPER 12 INCHES OF MATERIAL NOT PROTECTED BY CONCRETE SLABS OR PAVEMENTS SHOULD NOT BE INCLUDED IN THE ESTIMATION OF PASSIVE RESISTANCE.

2. ASSUMES NO HYDROSTATIC PRESSURE. A WALL BACK DRAIN SHOULD BE INSTALLED AS RECOMMENDED IN THE *WALL DRAINAGE DETAIL* FIGURE.

3. SURCHARGES FROM CONSTRUCTION EQUIPMENT, EXCAVATED SOIL, TRAFFIC LOADING OR OTHER UNIFORM LOADING ABOVE THE WALL SHOULD BE CALCULATED USING THE SURCHARGE LATERAL EARTH PRESSURE, P_S. POINT LOADS OR OTHER SURCHARGES CAN BE EVALUATED UPON REQUEST.

4. SEISMIC INCREMENT LATERAL EARTH PRESSURE (ΔP_E) IS BASED ON A DESIGN-LEVEL PEAK GROUND ACCELERATION OF 0.415g. SEISMIC INCREMENT SHOULD BE APPLIED TO WALLS SIX FEET OR GREATER IN HEIGHT.

5. 'H' AND 'D' ARE MEASURED IN FEET.

6. PRESSURES ASSUME GRANULAR AND NON-EXPANSIVE SOIL MATERIALS COMPACTED AS RECOMMENDED IN THE GEOTECHNICAL REPORT.

LATERAL EARTH PRESSURES

LATERAL EARTH PRESSURE TYPE	EQUIVALENT FLUID PRESSURE (PCF)	
AT-REST, P_0	LEVEL BACKFILL	2:1 SLOPING BACKFILL
COMPACTED FILL	55	75
FORMATION	53	70
SEISMIC INCREMENT, ΔP_E*	(SEE FIGURE 8C)	
PASSIVE, P_P**	350	
SURCHARGE, P_S	0.5q	

*SEISMIC PRESSURE, $P_{AE} = P_A + \Delta P_E$ (SEE FIGURE 8C)
**PASSIVE RESISTANCE VERSUS DISPLACEMENT CURVES CAN BE PROVIDED UPON REQUEST.

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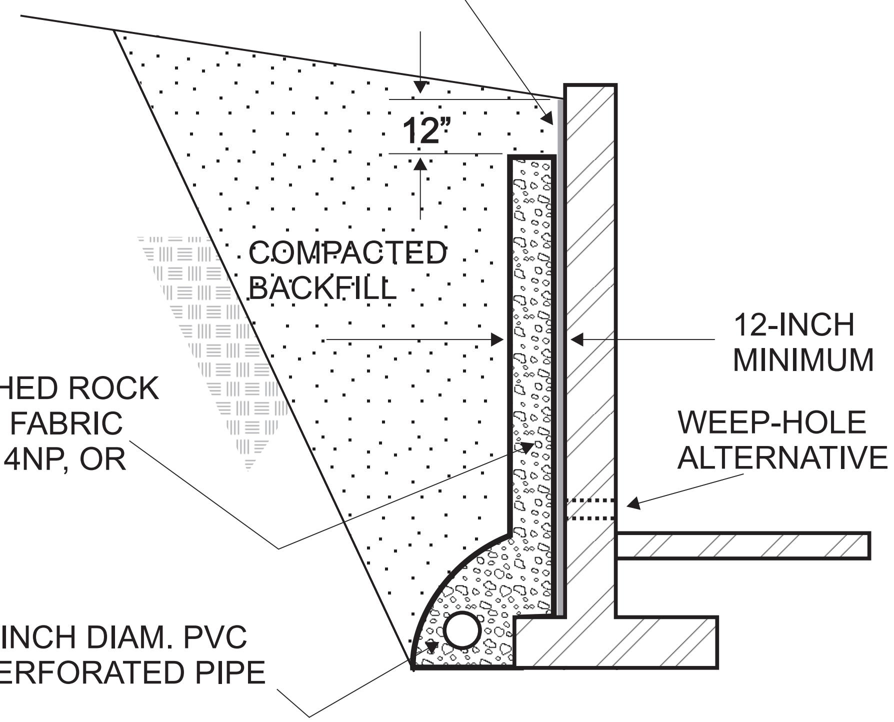
SAN DIEGO, CA 92126 (858) 536-1000

PROJECT NAME: Rady Children's Hospital Jacobs

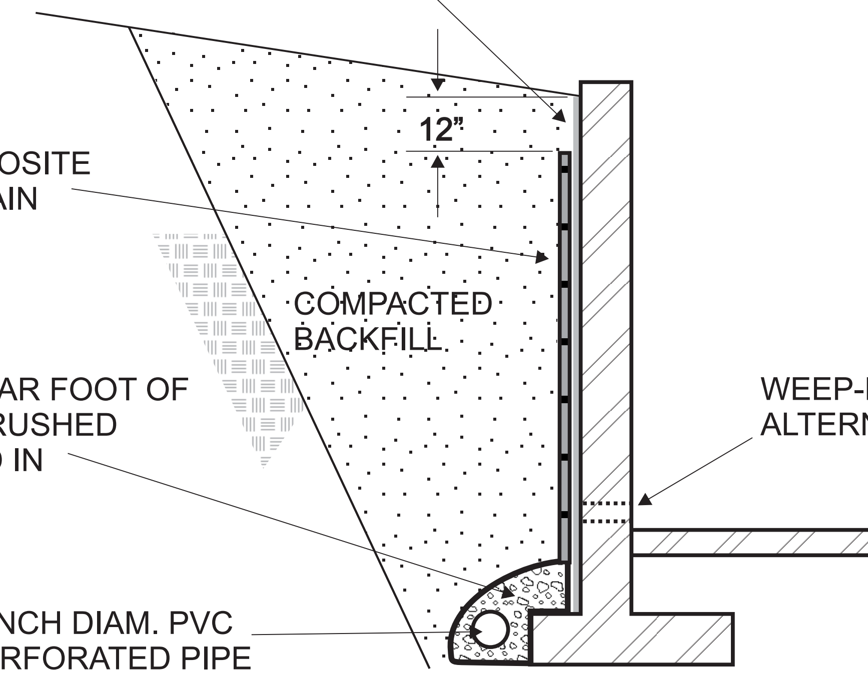
PROJECT NUMBER: SD689
DOCUMENT NUMBER: 21-0065
FIGURE NUMBER: 8D

LATERAL EARTH PRESSURES
FOR BRACED RETAINING WALLS

ROCK AND FABRIC ALTERNATIVE



PANEL DRAIN ALTERNATIVE



NOTES

1) Perforated pipe should outlet through a solid pipe to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.

2) As an alternative to the perforated pipe and outlet, weep-holes may be constructed. Weep-holes should be at least 2 inches in diameter, spaced no greater than 8 feet, and be located just above grade at the bottom of wall.

3) Filter fabric should consist of Mirafi 140N, Supac 5NP, Amoco 4599, or similar approved fabric. Filter fabric should be overlapped at least 6-inches.

4) Geocomposite panel drain should consist of Miradrain 6000, J-DRain 400, Supac DS-15, or approved similar product.

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PROJECT NAME Rady Children's Hospital Jacobs	FIGURE NUMBER 8E
WALL DRAINAGE DETAILS	

APPENDIX A
FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Field exploration included a visual reconnaissance of the site and the excavation of 20 exploratory borings and 4 infiltration test holes between June 5th and June 29th, 2021. The exploratory borings were drilled by Pacific Drilling Company using their Marl M10 (Yeti) and Marl M5 (Wolverine) truck mounted drill rigs, as well as a track-mounted limited-access drill rig (Fraste). All of the borings used 6-inch diameter hollow stem flight augers. The maximum depth of exploration was about 35 feet below surrounding grades. The approximate boring locations are shown on the Exploration Plans, Figures 3A through 3C. Boring logs are provided in Figures A-1 through A-20, immediately following the Boring Record Legends. Logs of the infiltration test holes are provided in Figures A-21 to A-24. The exploratory boring depths and locations are summarized in the table below.

Boring No.	Drill Date	Surface Elevation	Total Depth	Bottom Elevation	Approximate Latitude	Approximate Longitude	Figure No.
B-1	June 6, 2021	422½’	11’	411½’	32.800093°	-117.153116°	A-1
B-2	June 6, 2021	423’	11’	412’	32.800106°	-117.152389°	A-2
B-3	June 6, 2021	423’	30’	393’	32.800103°	-117.152126°	A-3
B-4	June 6, 2021	418’	20’	398’	32.800086°	-117.151509°	A-4
B-5	June 6, 2021	416’	30½’	385½’	32.800076°	-117.151306°	A-5
B-6	June 29, 2021	423’	4’	419’	32.799771°	-117.153193°	A-6
B-7	June 6, 2021	422’	21½’	400½’	32.799836°	-117.152026°	A-7
B-8	June 6, 2021	417½’	21’	396½’	32.799937°	-117.151487°	A-8
B-9	June 6, 2021	415½’	21½’	394’	32.799790°	-117.151277°	A-9
B-10	June 6, 2021	420½’	31½’	389’	32.799757°	-117.151713°	A-10
B-11	June 6, 2021	415’	21½’	393½’	32.799584°	-117.151493°	A-11
B-12	June 6, 2021	413½’	21’	392½’	32.799575°	-117.151262°	A-12
B-13	June 27, 2021	398½’	12½’	386	32.799528°	-117.151049°	A-13
B-14	June 27, 2021	395’	21½’	373½’	32.799181°	-117.150930°	A-14
B-15	June 27, 2021	409’	20’	389’	32.799157°	-117.151350°	A-15
B-16	June 19, 2021	409’	35’	374’	32.798861°	-117.151507°	A-16
B-17	June 27, 2021	398½’	21½’	377’	32.798610°	-117.153144°	A-17
B-18	June 27, 2021	400’	20’	380’	32.798496°	-117.152889°	A-18
B-19	June 27, 2021	397’	8’	389’	32.798531°	-117.151626°	A-19
B-20	June 5, 2021	377’	21½’	355½’	32.796139°	-117.151204°	A-20
I-1	June 5, 2021	423’	5½’	417½’	32.800105°	-117.152674°	A-21
I-2	June 5, 2021	399’	6’	393’	32.799622°	-117.151067°	A-22
I-3	June 5, 2021	396’	5’	391’	32.798738°	-117.151354°	A-23
I-4	June 5, 2021	401’	5’	396’	32.798396°	-117.152470°	A-24

Disturbed soil samples were collected from all of the borings using a 2-inch outside diameter Standard Penetration Test (SPT) sampler. Less disturbed samples were also collected using a 3-inch outside diameter ring lined sampler (a modified California sampler). These samples were sealed in plastic bags, labeled, and returned to the laboratory for testing. Bulk soil samples were also collected from the borings at selected intervals.

APPENDIX A

FIELD EXPLORATION (Continued)

The drive samples were obtained from the borings using three different automatic hammers with calibrated Energy Transfer Ratios (ETR) of 92, 93 and 83 percent for the Yeti, Wolverine and Fraste rigs, respectively. For each sample, the number of blows needed to drive the sampler for each 6-inch depth increment was recorded on the logs. The total number of blows needed to drive each sample 12 inches was then recorded as the equivalent SPT blow count (N). The field blow counts (N) were also corrected to reflect a standard 60 percent ETR (N_{60}), depending on the ETR of the automatic hammer that was used to obtain the sample, as shown on the logs.

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 excavations may be substantially different from those at the specific locations we explored. It should be noted that the passage of time may also result in changes in the soil conditions reported in the logs.

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		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬬
	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		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or 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

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

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

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.

GROUP DELTA

Project No. SD689

Rady Children's Hospital
Main Campus Master Plan

BORING 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 5333)
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 422)
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 4767)

SAMPLER GRAPHIC SYMBOLS

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

DRILLING METHOD SYMBOLS

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

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	(solid line)
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	(dashed line)
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	(wavy lines)

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

GROUP DELTA

Project No. SD689

Rady Children's Hospital
Main Campus Master Plan

BORING RECORD LEGEND #2

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 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

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

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%

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

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.

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

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.

CONSISTENCY OF COHESIVE SOILS

Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
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.

GROUP DELTA

Project No. SD689

Rady Children's Hospital
Main Campus Master Plan

BORING RECORD LEGEND #3

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	B-01

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JAS	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M5 Truck Mounted Rig (Wolverine)	6	11	422.5	⊻ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: 6-Inches asphalt concrete, no base.
			B-1						PA R~16			**FILL:** CLAYEY SAND (SC); medium dense; yellow brown; moist; mostly SAND; little fines; low plasticity.
	420		S-2	7 50 (3")	100+	100+						**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; low plasticity; weakly cemented). (0% Gravel; 74% Sand; 26% Fines)
5			R-3	43 50 (3")	100+	100+	---	---		5		
	415											Light brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
10			S-4	27 50 (4")	100+	100+				10		
	410											Total Depth: 11 feet No Groundwater Encountered
15										15		
	405											
20										20		
	400											

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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 A-1

BORING RECORD

PROJECT NAME: Rady Children's Hospital	PROJECT NUMBER: SD689	BORING: **B-02**	
SITE LOCATION: Southwest of Frost Street and Children's Way Intersection	START: 6/6/2021	FINISH: 6/6/2021	SHEET NO.: 1 of 1
DRILLING COMPANY: Pacific Drilling	DRILLING METHOD: Hollow Stem Auger	LOGGED BY: JAS	CHECKED BY: MAF
DRILLING EQUIPMENT: Marl M5 Truck Mounted Rig (Wolverine)	BORING DIA. (in): 6	TOTAL DEPTH (ft): 11	GROUND ELEV (ft): 423
DEPTH/*ELEV.* GROUND WATER (ft): ▼ N/A / *na*			
SAMPLING METHOD: Hammer: 140 lbs., Drop: 30 in. (Automatic)	NOTES: ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
0										**PAVEMENT:** 5½-Inches asphalt concrete, no base.
			B-1							**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; low plasticity; weakly cemented).
	420		R-2	11 37 60	97	100	7.3	113		
5			S-3	19 28 30	58	90				Dark yellow brown.
	415									
10			R-4	25 60	85	88	7.8	107		Light brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
										Total Depth: 11 feet No Groundwater Encountered
	410									
15										
	405									
20										
	400									

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FIGURE A-2

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-03**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JAS	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M5 Truck Mounted Rig (Wolverine)	6	30	423	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: 5-Inches asphalt concrete, no base.
			B-1						PA EI~2 CR			**FILL:** SILTY SAND (SM); medium dense; brown; moist; mostly fine SAND; little fines; low plasticity.
	420		S-2	12 18 23	41	64						**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little to some fines; low plasticity; weakly cemented).
5			R-3	18 37 50	87	90	6.7	107	DS	5		(0% Gravel; 72% Sand; 28% Fines)
	415											Light brown; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
10			S-4	20 39 50	89	100+				10		
	410											
15			R-5	21 38 41	79	82	7.1	111		15		
	405											
20			S-6	16 28 31	59	91				20		Yellowish brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to coarse SAND; trace fines; trace angular GRAVEL; nonplastic; weakly cemented).
	400											

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-03**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JAS	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M5 Truck Mounted Rig (Wolverine)	6	30	423	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-7	50 (3")	100+	100+	---	---				**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED PEBBLE CONGLOMERATE); medium to coarse grained; massive; yellow brown; highly weathered; very soft; (SILTY GRAVEL (GM); very dense; moist; mostly GRAVEL and COBBLE; some SAND; little fines; low plasticity; moderately to strongly cemented).
	395											
30			S-8	50 (1")	100+	100+				30		Total Depth: 30 feet No groundwater encountered
	390											
35										35		
	385											
40										40		
	380											
45										45		
	375											

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

BORING RECORD

PROJECT NAME Rady Children's Hospital	**PROJECT NUMBER** SD689	**BORING** **B-04**	
SITE LOCATION Southwest of Frost Street and Children's Way Intersection	**START** 6/6/2021	**FINISH** 6/6/2021	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** JAS	**CHECKED BY** MAF
DRILLING EQUIPMENT Marl M5 Truck Mounted Rig (Wolverine)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 20	**GROUND ELEV (ft)** 418
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
											PAVEMENT: 5-Inches asphalt concrete, no base.
			B-1						PA R~10		**FILL:** SILTY SAND (SM); medium dense; orange brown; moist; mostly fine to medium grained SAND; little fines; trace GRAVEL; low plasticity.
	415		R-2	9 11 14	25	26	6.3	97			(1% Gravel; 76% Sand; 23% Fines)
5			S-3	9 7 7	14	22				5	SILTY SAND with GRAVEL (SM); medium dense; orange brown; moist; mostly fine to medium grained SAND; little GRAVEL; little fines; low plasticity.
	410										
10			R-4	11 18 32	50	52	---	---		10	**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
	405										
15			S-5	43 50 (4")	100+	100+				15	Light brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to coarse SAND; trace fines; nonplastic; weakly cemented).
	400										
20			R-6	50 (1")	100+	100+	---	---		20	Total Depth: 20 feet No Groundwater Encountered
	395										

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	B-05

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	30.5	416	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	416									0		**PAVEMENT:** 3½-Inches asphalt concrete, no base.
	415	Bulk	B-1						EI~0			**FILL:** CLAYEY SAND (SC); medium dense; dark brown; moist; mostly fine to medium SAND; some fines; trace GRAVEL; low plasticity.
		Ring	R-2	7 14 11	25	26	6.9	116				
5	410	SPT	S-4	6 6 5	11	17				5		Poorly-graded SAND with SILT (SP-SM); medium dense; yellow brown; moist; mostly fine to medium SAND; few fines; nonplastic.
												Poorly-graded SAND with SILT (SP-SM); loose; dark reddish brown; moist; mostly fine to medium SAND; few fines; nonplastic. (0% Gravel; 88% Sand; 12% Fines)
10	405	Ring	R-4	4 3 4	7	7	5.6	104	PA DS	10		
15	400	SPT	S-5	4 26 24	50	77				15		**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; mottled yellowish and reddish brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; trace to few fines; nonplastic; weakly cemented).
20	395	Ring	R-6	14 50 (5")	74	75	8.4	106	DS	20		

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BORING RECORD

PROJECT NAME	Rady Children's Hospital
PROJECT NUMBER	SD689
BORING	**B-05**
SITE LOCATION	Southwest of Frost Street and Children's Way Intersection
START	6/6/2021
FINISH	6/6/2021
SHEET NO.	2 of 2
DRILLING COMPANY	Pacific Drilling
DRILLING METHOD	Hollow Stem Auger
LOGGED BY	JSF
CHECKED BY	MAF
DRILLING EQUIPMENT	Marl M10 Truck Mounted Rig (Yeti)
BORING DIA. (in)	6
TOTAL DEPTH (ft)	30.5
GROUND ELEV (ft)	416
DEPTH/*ELEV.* GROUND WATER (ft)	▼ N/A / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)
NOTES	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	390	SPT	S-7	17 22 23	45	69						**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; dark yellowish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine SAND; little fines; low plasticity; weakly cemented). Difficult drilling conditions (likely GRAVEL and COBBLE).
30		Ring	R-8	50 (4")	100+	100+	---	---		30		
	385											Total Depth: 30½ feet No groundwater encountered
35	380									35		
40	375									40		
45	370									45		

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FIGURE

A-5 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	B-06

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/29/2021	6/29/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hand Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	2.5	4	423	⊻ N/A / *na*

SAMPLING METHOD	NOTES
Bullk	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		Bulk	B-1									**FILL:** SILTY SAND (SM); loose to medium dense; dark yellowish brown; moist; mostly fine to medium SAND; little fines; trace GRAVEL; nonplastic. Roots and vegetative debris in upper 1½ feet.
	420	Bulk	B-2									SANDY lean CLAY (CL); soft; dark brown; moist; mostly fines; some fine to medium SAND; low plasticity.
5										5		Total Depth: 4 feet No Groundwater Encountered Hand Auger Refusal at 4 feet
	415											
10										10		
	410											
15										15		
	405											
20										20		
	400											

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

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BORING RECORD

PROJECT NAME Rady Children's Hospital		**PROJECT NUMBER** SD689	**BORING** B-07
SITE LOCATION Southwest of Frost Street and Children's Way Intersection	**START** 6/6/2021	**FINISH** 6/6/2021	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** JAS	**CHECKED BY** MAF
DRILLING EQUIPMENT Marl M5 Truck Mounted Rig (Wolverine)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 21.5	**GROUND ELEV (ft)** 422
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
0	422										**PAVEMENT:** 5-Inches asphalt concrete, no base.
1		Bulk	B-1						PA		**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; orange brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; low plasticity; weakly cemented). (0% Gravel; 73% Sand; 27% Fines)
2	420	SPT	S-2	19 25 31	56	87					
5		Ring	R-3	20 42 60	100+	100+	---	---		5	
7	415										
10										10	
10.5											Light brown with orange stains; (Poorly-graded SAND (SP); very dense; moist; mostly fine to medium SAND; trace fines; nonplastic; weakly cemented).
11		SPT	S-4	18 27 29	56	87					
12	410										
15		Ring	R-5	25 35 60	95	98	7.2	115		15	
17	405										
20		SPT	S-6	18 21 24	45	70				20	
21.5											Total Depth: 21½ feet No Groundwater Encountered
22	400										

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GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

BORING RECORD

PROJECT NAME Rady Children's Hospital	**PROJECT NUMBER** SD689	**BORING** **B-08**	
SITE LOCATION Southwest of Frost Street and Children's Way Intersection	**START** 6/6/2021	**FINISH** 6/6/2021	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** JAS	**CHECKED BY** MAF
DRILLING EQUIPMENT Marl M5 Truck Mounted Rig (Wolverine)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 21	**GROUND ELEV (ft)** 417.5
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 93%, N_{60} ~ 93/60 * N ~ 1.55 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS
			B-1						
	415		R-2	8 11 11	22	23	7.8	100	
5			S-3	4 3 2	5	8			
	410								
10			R-4	9 17 29	46	48	3.1	108	
	405								
15			S-5	21 37 60	97	100+			
	400								
20			S-6	25 50	75	100+			
	395								

DESCRIPTION AND CLASSIFICATION

PAVEMENT: 5-Inches asphalt concrete, no base.

FILL: SILTY SAND (SM); medium dense; brown; moist; mostly fine to medium SAND; little fines; low plasticity.

VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; light brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).

Mottled yellowish and reddish brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to medium SAND; trace fines; nonplastic).

Drill rig chatter (likely GRAVEL).

Total Depth: 21 feet
No Groundwater Encountered

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-09**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	21.5	415.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
0	415									**PAVEMENT:** 4-Inches asphalt concrete, no base.
			B-1							**FILL:** CLAYEY SAND (SC); dense to very dense; dark brown; moist; mostly fine to medium SAND; little fines; trace GRAVEL; low plasticity.
			S-2	4 19 16	35	54				
5	410		R-3	9 50 (2")	(REF)	(REF)	---	---		CLAYEY SAND with GRAVEL (SC); dense; yellowish brown; moist; mostly fine to medium SAND; little fines; little GRAVEL and COBBLE; low plasticity.
										CLAYEY SAND (SC); medium dense; yellowish and reddish brown; moist; mostly fine to medium SAND; some fines; low plasticity.
10	405		S-4	6 6 8	14	21				
15	400		R-5	10 23 60	83	85	7.1	123		**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish and reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; low plasticity).
20	395		S-6	21 20 30	50	77				
										Total Depth: 21½ feet No Groundwater Encountered

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-10**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	31.5	420.5	N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	420											**PAVEMENT:** 3-Inches asphalt concrete, no base.
		Bulk	B-1						PA			**FILL:** CLAYEY SAND (SC); medium dense to dense; yellowish and reddish brown; moist; mostly fine to medium SAND; some fines; low plasticity. (0% Gravel; 68% Sand; 32% Fines)
		SPT	S-2	8 10 15	25	38						
5	415	Ring	R-3	8 12 12	24	25	2.9	107		5		
												VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; pale yellow brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
10	410	SPT	S-4	18 30 29	59	90				10		
15	405	Ring	R-5	32 60	92	94	6.3	109		15		
20	400	SPT	S-6	21 32 37	69	100+				20		Mottled yellowish brown, reddish brown and white.

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-10**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	31.5	420.5	⊻ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	395		R-7	31 60	91	93	4.6	104				**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; mottled yellowish brown, reddish brown and white; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
												Yellowish brown; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; nonplastic; weakly cemented).
30	390		S-8	15 22 27	49	75				30		
												Total Depth: 31½ feet No groundwater encountered
35	385									35		
40	380									40		
45	375									45		

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FIGURE
A-10 b

BORING RECORD

PROJECT NAME	Rady Children's Hospital
PROJECT NUMBER	SD689
BORING	B-11
SITE LOCATION	Southwest of Frost Street and Children's Way Intersection
START	6/6/2021
FINISH	6/6/2021
SHEET NO.	1 of 1
DRILLING COMPANY	Pacific Drilling
DRILLING METHOD	Hollow Stem Auger
LOGGED BY	JSF
CHECKED BY	MAF
DRILLING EQUIPMENT	Marl M10 Truck Mounted Rig (Yeti)
BORING DIA. (in)	6
TOTAL DEPTH (ft)	21.5
GROUND ELEV (ft)	415
DEPTH/*ELEV.* GROUND WATER (ft)	⊻ N/A / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)
NOTES	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	415											**PAVEMENT:** 4-Inches asphalt concrete, no base.
			B-1									**FILL:** CLAYEY SAND (SC); medium dense; yellowish and reddish brown; moist; mostly fine SAND; some fines; low plasticity.
			R-2	6 10 12	22	22	7.9	104				
5	410		S-3	5 6 4	10	15				5		SILTY SAND (SM); medium dense; dark reddish brown; moist; mostly fine to medium SAND; little fines; nonplastic.
10	405		R-4	11 17 19	36	37	8.4	113		10		**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; light yellow and reddish brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; nonplastic; weakly cemented).
15	400		S-5	10 32 100	100+	100+				15		
20	395		R-6	7 36 60	96	98	7.0	108		20		
												Total Depth: 21½ feet No Groundwater Encountered

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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

A-11

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-12**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/6/2021	6/6/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	21	413.5	⊻ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS
		Bulk	B-1						PA PI EI~0 CR
		Ring	R-2	15 16 19	35	36	5.7	109	
	410	Bulk							
5		SPT	S-3	4 7 5	12	18			
	405								
10		Ring	R-4	10 18 16	34	35	6.4	105	DS
	400								
15		SPT	S-5	14 16 25	41	63			
	395								
20		Ring	R-6	31 60	91	93	4.5	102	
	390								

DESCRIPTION AND CLASSIFICATION

PAVEMENT: 4" asphalt concrete over 4" base.

FILL: SILTY SAND (SM); medium dense; yellowish and reddish brown; moist; mostly fine to medium SAND; little fines; few GRAVEL; nonplastic.

(5% Gravel; 73% Sand; 22% Fines)

(LL~NP; PL~NP; PI~NP)

CLAYEY SAND (SC); dense; yellowish and reddish brown; moist; mostly fine to medium SAND; some fines; low plasticity.

VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish and reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; nonplastic; weakly cemented).

Total Depth: 21 feet
No Groundwater Encountered

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FIGURE

A-12

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-13**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/27/2021	6/27/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JAS	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	12.5	398.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1									**FILL:** SILTY SAND (SM); loose to medium dense; brown; moist; mostly fine SAND; little fines; nonplastic.
	395		R-2	15 50	65	66	---	---				**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; light brown; highly weathered; very soft; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to medium SAND; some fines; little GRAVEL and COBBLE; low plasticity).
5			S-3	50 (5")	100+	100+				5		
	390											Dark yellow brown; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to coarse SAND; few fines; nonplastic; weakly cemented).
10			S-4	50 (5")	100+	100+				10		Dark yellow brown; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to medium SAND; some GRAVEL; little fines; nonplastic; weakly cemented).
	385											Total Depth: 12½ feet No groundwater encountered
15										15		
	380											
20										20		
	375											

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

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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 A-13

BORING RECORD

PROJECT NAME Rady Children's Hospital	**PROJECT NUMBER** SD689	**BORING** B-14	
SITE LOCATION Southwest of Frost Street and Children's Way Intersection	**START** 6/27/2021	**FINISH** 6/27/2021	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** JAS	**CHECKED BY** MAF
DRILLING EQUIPMENT Marl M10 Truck Mounted Rig (Yeti)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 21.5	**GROUND ELEV (ft)** 395
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS
0–3		Bulk	B-1						PA EI~29
3–4.5		SPT	S-2	20 21 25	46	70			
5	390	Ring	R-3	49 36	85	87	---	---	
10	385	SPT	S-4	49 23 26	49	75			
		Ring	R-5	26 50 (3")	100+	100+	10.5	---	
15	380	SPT	S-6	10 17 14	31	47			
20	375	SPT	S-7	33 50	83	100+			

DESCRIPTION AND CLASSIFICATION

FILL: SILTY SAND (SM); loose to medium dense; brown; moist; mostly fine SAND; little fines; nonplastic.

SANDY LEAN CLAY (CL); soft; dark yellow brown; moist; mostly fines; some fine SAND; low plasticity. PP~1¼ TSF. (0% Gravel; 68% Sand; 32% Fines)

VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; dark yellow brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine SAND; little fines; trace GRAVEL; nonplastic; moderately cemented).

Light brown; (CLAYEY SAND with GRAVEL (SC); very dense; moist; mostly fine to medium SAND; some fines; little GRAVEL and COBBLE; low plasticity).

Light brown; (Poorly-graded SAND (SP); dense to very dense; moist; mostly fine to coarse SAND; few GRAVEL; trace fines; nonplastic).

Dark yellow brown; (SILTY SAND with GRAVEL (SM); very dense; moist; mostly fine to medium SAND; some GRAVEL; little fines; nonplastic; weakly cemented).

Total Depth: 21½ feet
No groundwater encountered

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.

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-15**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/27/2021	6/27/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Limited Access Track Mounted Rig (Fraste)	6	20	409	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
0	409	Bulk	B-1								**FILL:** CLAYEY SAND (SC); loose to medium dense; dark brown; moist; mostly fine to medium SAND; some fines; trace GRAVEL; low plasticity.
	405										
5		SPT	S-2	2 2 3	5	7				5	SILTY SAND (SM); loose; dark brown; moist; mostly fine to medium grained SAND; little fines; nonplastic.
	400										Lean CLAY with SAND (CL); hard; dark grayish brown; moist; mostly fines; little fine SAND; low to medium plasticity. PP~3 TSF.
10		Ring	R-3	6 8 20	28	26	21.8	104		10	
											VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish and reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; some fines; nonplastic; weakly cemented).
		SPT	S-4	17 22 40	62	86					
	395										
15		SPT	S-5	20 22 36	58	80				15	
	390										Micaceous; contains black manganese nodules.
20		Ring	R-6	50 (1")	100+	100+	---	---		20	Total Depth: 20 feet No groundwater encountered
	385										

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FIGURE

A-15

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-16**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/19/2021	6/19/2021	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Limited Access Track Mounted Rig (Fraste)	6	35	409	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0–5	409–405	Bulk	B-1						PA PI			**FILL:** SILTY SAND (SM); loose to medium dense; dark brown; moist; mostly fine to medium SAND; little fines; trace GRAVEL; nonplastic. (1% Gravel; 82% Sand; 17% Fines) (LL~NP; PL~NP; PI~NP)
5		Ring	R-2	5 6 7	13	12	---	---		5		
	400											Difficult drilling on GRAVEL and COBBLE.
10		SPT	S-3	8 11 29	40	55				10		CLAYEY SAND (SC); dense; pale olive; moist; mostly fine to medium SAND; some fines; little GRAVEL; low plasticity; black manganese nodules.
		SPT	S-4	12 20 20	40	55						**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish and reddish brown; highly weathered; very soft; (SILTY SAND (SM); very dense; moist; mostly fine to medium SAND; little fines; few GRAVEL; nonplastic; weakly cemented).
15	395	Ring	R-5	20 34 50	84	77	10.6	114		15		Yellowish and reddish brown; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to coarse SAND; few fines; nonplastic).
20	390	SPT	S-6	50 (1")	100+	100+				20		SEDIMENTARY ROCK (POORLY INDURATED PEBBLE CONGLOMERATE); medium to coarse grained; massive; yellow brown; highly weathered; very soft; (SILTY GRAVEL (GM); very dense; moist; mostly GRAVEL and COBBLE; some SAND; little fines; low plasticity; moderately to strongly cemented).
	385											Very difficult drilling on GRAVEL and COBBLE. Switched to air rotary at 23 feet.

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-16**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/19/2021	6/19/2021	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Limited Access Track Mounted Rig (Fraste)	6	35	409	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-7	25 50 (3")	100+	100+	---	---				**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; yellowish brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; little GRAVEL; few fines; nonplastic).
	380											Yellowish brown; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to medium SAND; few fines; trace GRAVEL; nonplastic).
30			S-8	26 50 (2")	100+	100+				30		
	375											
35										35		Total Depth: 35 feet No groundwater encountered Borehole caved from 28' to 35'
	370											
40										40		
	365											
45										45		
	360											

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	B-17

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/27/2021	6/27/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JAS	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M10 Truck Mounted Rig (Yeti)	6	21.5	398.5	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 92%, N_{60} ~ 92/60 * N ~ 1.53 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: 3-Inches of asphalt concrete over 4-inches of concrete, over 5-inches of aggregate base.
												FILL: SILTY SAND (SM); medium dense; brown; moist; mostly fine SAND; little fines; nonplastic.
	395		B-1						PA EI~12 CR			Lean CLAY with SAND (CL); very stiff; dark yellow brown; moist; mostly fines; little fine to medium SAND; low plasticity. (1% Gravel; 74% Sand; 25% Fines)
5			R-2	50 (5")	100+	100+	---	---		5		**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; highly weathered; very soft; (SILTY SAND (SM); very dense; light brown; moist; mostly fine SAND; little fines; nonplastic; weakly cemented).
	390											
10			S-3	13 22 55	55	84				10		
	385											Drill rig chatter, likely GRAVEL and COBBLES.
15			R-4	21 42 50	92	94	8.1	106		15		Yellowish and reddish brown; (Poorly-graded SAND (SP); very dense; moist; mostly fine to medium SAND; trace fines; nonplastic). Contains black manganese nodules.
	380											
20			S-5	14 20 25	45	69				20		Contains black manganese nodules.
												Total Depth: 21½ feet No Groundwater Encountered
	375											

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS.GPJ GDCLOG.GDT 7/14/21

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FIGURE A-17

BORING RECORD

PROJECT NAME	Rady Children's Hospital
PROJECT NUMBER	SD689
BORING	**B-18**
SITE LOCATION	Southwest of Frost Street and Children's Way Intersection
START	6/27/2021
FINISH	6/27/2021
SHEET NO.	1 of 1
DRILLING COMPANY	Pacific Drilling
DRILLING METHOD	Hollow Stem Auger
LOGGED BY	JSF
CHECKED BY	MAF
DRILLING EQUIPMENT	Limited Access Track Mounted Rig (Fraste)
BORING DIA. (in)	6
TOTAL DEPTH (ft)	20
GROUND ELEV (ft)	400
DEPTH/*ELEV.* GROUND WATER (ft)	▼ N/A / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)
NOTES	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS
1		B-1						
3		S-2	12, 12, 12	24	33			
5	395							
6		S-3	9, 9, 9	18	25			
10	390							
11		R-4	9, 11, 24	35	32	9.8	111	
14		S-5	12, 14, 19	33	46			
15	385							
16		S-5	10, 15, 17	32	44			
20	380	R-6	50 (1")	100+	100+	---	---	

DESCRIPTION AND CLASSIFICATION

0 ft: **PAVEMENT:** 5-Inches asphalt concrete, no base.

FILL: CLAYEY SAND (SC); medium dense to dense; light yellowish and reddish brown; moist; mostly fine to medium SAND; little fines; low plasticity.

5 ft: SANDY lean CLAY (CL); very stiff; dark yellow brown; moist; mostly fines; some fine to medium SAND; low to medium plasticity.

CLAYEY SAND (SC); medium dense to dense; mottled yellowish and reddish brown; moist; mostly fine to medium SAND; little fines; low plasticity.

VERY OLD PARALIC DEPOSITS: SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; light yellowish and reddish brown; highly weathered; very soft; (SILTY SAND (SM); dense to very dense; moist; mostly fine to medium SAND; little to some fines; low plasticity; weakly cemented).

Contains black manganese nodules.

Very difficult drilling on GRAVEL and COBBLE.

20 ft: Total Depth: 20 feet
No Groundwater Encountered

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FIGURE A-18

BORING RECORD

PROJECT NAME	Rady Children's Hospital
PROJECT NUMBER	SD689
BORING	B-19
SITE LOCATION	Southwest of Frost Street and Children's Way Intersection
START	6/27/2021
FINISH	6/27/2021
SHEET NO.	1 of 1
DRILLING COMPANY	Pacific Drilling
DRILLING METHOD	Hollow Stem Auger
LOGGED BY	JSF
CHECKED BY	MAF
DRILLING EQUIPMENT	Limited Access Track Mounted Rig (Fraste)
BORING DIA. (in)	6
TOTAL DEPTH (ft)	8
GROUND ELEV (ft)	397
DEPTH/*ELEV.* GROUND WATER (ft)	⊻ N/A / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)
NOTES	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0–2	395	Bulk	B-1									**FILL:** CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; mostly fine to coarse SAND; some fines; low to medium plasticity.
2–5												**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (Poorly-graded SAND with SILT (SP-SM); very dense; moist; mostly fine to coarse SAND; few fines; nonplastic; weakly cemented).
5–8	390	SPT	S-2	16 20 27	47	64				5		Yellowish and reddish brown; (SILTY SANDSTONE (SM); very dense; moist; mostly fine SAND; some fines; low plasticity; weakly cemented; micaceous). Contains balck manganese nodules. Difficult drilling, likely on GRAVEL and COBBLE.
8												Total Depth: 8 feet No Groundwater Encountered
10	385									10		
15	380									15		
20	375									20		

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**B-20**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/5/2021	6/5/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Limited Access Track Mounted Rig (Fraste)	6	21.5	377	▼ N/A / *na*

SAMPLING METHOD	NOTES
Hammer: 140 lbs., Drop: 30 in. (Automatic)	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
0–5	375	Bulk	B-1						PA EI~8	**FILL:** CLAYEY SAND with GRAVEL (SC); medium dense to dense; dark yellow brown; dry to moist; mostly fine to coarse SAND; little GRAVEL and COBBLE; little fines; low plasticity. Cobbles up to about 4-inches in diameter were observed. Blow counts were inflated. (17% Gravel; 51% Sand; 32% Fines)
		SPT	S-2	50 (3")	(REF)	(REF)				
5		SPT	S-3	3 3 12	15	21				CLAYEY SAND (SC); medium dense; dark brown; moist; mostly fine to coarse SAND; some fines; few GRAVEL; low plasticity.
	370									
10		Ring	R-4	18 11 13	24	22	---	---		Sample disturbed.
	365	SPT	S-5	8 14 15	29	40				**MISSION VALLEY FORMATION:** SEDIMENTARY ROCK (POORLY INDURATED COBBLE CONGLOMERATE); medium to coarse grained; yellowish brown; moderately weathered; soft; unfractured; (Poorly-graded GRAVEL with CLAY (GP-GC); very dense; moist; mostly GRAVEL and COBBLE; little SAND; few fines; low plasticity).
15		Ring	R-6	15 50 (4")	90	83	---	---		No recovery.
	360									
20		SPT	S-7	5 20 100	100+	100+			PA	(67% Gravel; 28% Sand; 5% Fines)
	355									Total Depth: 21½ feet No Groundwater Encountered

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BORING RECORD

PROJECT NAME Rady Children's Hospital	**PROJECT NUMBER** SD689	**BORING** I-1	
SITE LOCATION Southwest of Frost Street and Children's Way Intersection	**START** 6/5/2021	**FINISH** 6/6/2021	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling Company	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** JSF	**CHECKED BY** MAF
DRILLING EQUIPMENT Limited Access Track Mounted Rig (Fraste)	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 5.3	**GROUND ELEV (ft)** 423
DEPTH/*ELEV.* GROUND WATER (ft) ▼ N/A / *na*			
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES** ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												PAVEMENT: 5½-inches asphalt concrete, no base.
	420											**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (CLAYEY SANDSTONE (SC); very dense; moist; mostly fine to medium SAND; some fines; low plasticity; weakly cemented).
		X	S-1	20 40 35	75	100+						
5										5		
												Total Depth: 5.3 Feet No Groundwater Encountered Coverted to Percolation Test Backfilled 06/06/21

GDC_LOG_BORING_MMX_SOIL_SD SD689 LOGS (INFILTRATION).GPJ GDCLOG.GDT 7/12/21

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BORING RECORD

PROJECT NAME	Rady Children's Hospital
PROJECT NUMBER	SD689
BORING	**I-2**
SITE LOCATION	Southwest of Frost Street and Children's Way Intersection
START	6/5/2021
FINISH	6/6/2021
SHEET NO.	1 of 1
DRILLING COMPANY	Pacific Drilling Company
DRILLING METHOD	Hollow Stem Auger
LOGGED BY	JSF
CHECKED BY	MAF
DRILLING EQUIPMENT	Limited Access Track Mounted Rig (Fraste)
BORING DIA. (in)	6
TOTAL DEPTH (ft)	6
GROUND ELEV (ft)	399
DEPTH/*ELEV.* GROUND WATER (ft)	▼ N/A / *na*
SAMPLING METHOD	Hammer: 140 lbs., Drop: 30 in. (Automatic)
NOTES	ETR ~ 83%, N_{60} ~ 83/60 * N ~ 1.38 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	399											**FILL:** CLAYEY SAND (SC); dark yellowish brown; stiff; moist; mostly fine SAND; some fines; low plasticity. Some roots observed in the upper 6-inches.
	395		S-1	7 11 23	34	47						
4.5												**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (SILTY SANDSTONE (SM); dense to very dense; moist; mostly fine to medium SAND; little fines; nonplastic; weakly cemented.
5										5		
6												Total Depth: 6.0 Feet No Groundwater Encountered Coverted to Percolation Test Backfilled 06/06/21

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FIGURE A-22

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	I-3

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/5/2021	6/6/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling Company	Hand Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	5	4.8	396	▼ N/A / *na*

SAMPLING METHOD	NOTES
Auger and Shovel	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	395		B-1									**FILL:** CLAYEY SAND (SC); brown; loose to medium dense; moist; mostly fine to medium SAND; little fines; low plasticity.
			B-2									**VERY OLD PARALIC DEPOSITS:** SEDIMENTARY ROCK (POORLY INDURATED SANDSTONE); fine to medium grained; massive; reddish brown; highly weathered; very soft; (SILTY SANDSTONE (SM); dense to very dense; moist; mostly fine to medium SAND; little fines; nonplastic; weakly cemented.
			B-3									(Poorly-graded SAND with SILT (SP-SM); brown; very dense; moist; mostly fine to medium SAND; few fines; nonplastic).
5										5		Total Depth: 4.8 Feet No Groundwater Encountered Coverted to Percolation Test Backfilled 06/06/21
	390											

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Rady Children's Hospital	SD689	**I-4**

SITE LOCATION	START	FINISH	SHEET NO.
Southwest of Frost Street and Children's Way Intersection	6/5/2021	6/6/2021	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling Company	Hand Auger	JSF	MAF

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Hand Auger	5	5.2	401	▼ N/A / *na*

SAMPLING METHOD	NOTES
Auger and Shovel	

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												FILL: SILTY SAND (SM); dark brown; loose to medium dense; moist; mostly fine to medium SAND; little fines; nonplastic.
	400		B-1									
												SILTY SAND (SM); reddish brown; medium dense to dense; moist; mostly fine to medium SAND; little fines; nonplastic.
			B-2									
5										5		
												Total Depth: 5.2 Feet No Groundwater Encountered Coverted to Percolation Test Backfilled 06/06/21
	395											

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FIGURE A-24

APPENDIX B
LABORATORY TESTING

APPENDIX B

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 various tests performed for this project 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 D422, and were used to supplement visual soil classifications. The test results are summarized in Figures B-1.1 through B-1.12.

Atterberg Limits: ASTM D4318 was used to determine the liquid and plastic limits, and plasticity index of selected samples. The results are shown in selected Figures B-1.1 through B-1.12.

Expansion Index: The expansion potential of a selected soil sample was estimated in general accordance with the laboratory procedures outlined in ASTM test method D4829. The test results are summarized in Figure B-2. Figure B-2 also presents common criteria for evaluating the expansion potential based on the expansion index.

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

Sulfate Content: To assess the potential for reactivity with concrete, a selected soil sample was 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 B-3, along with common criteria for evaluating soluble sulfate content.

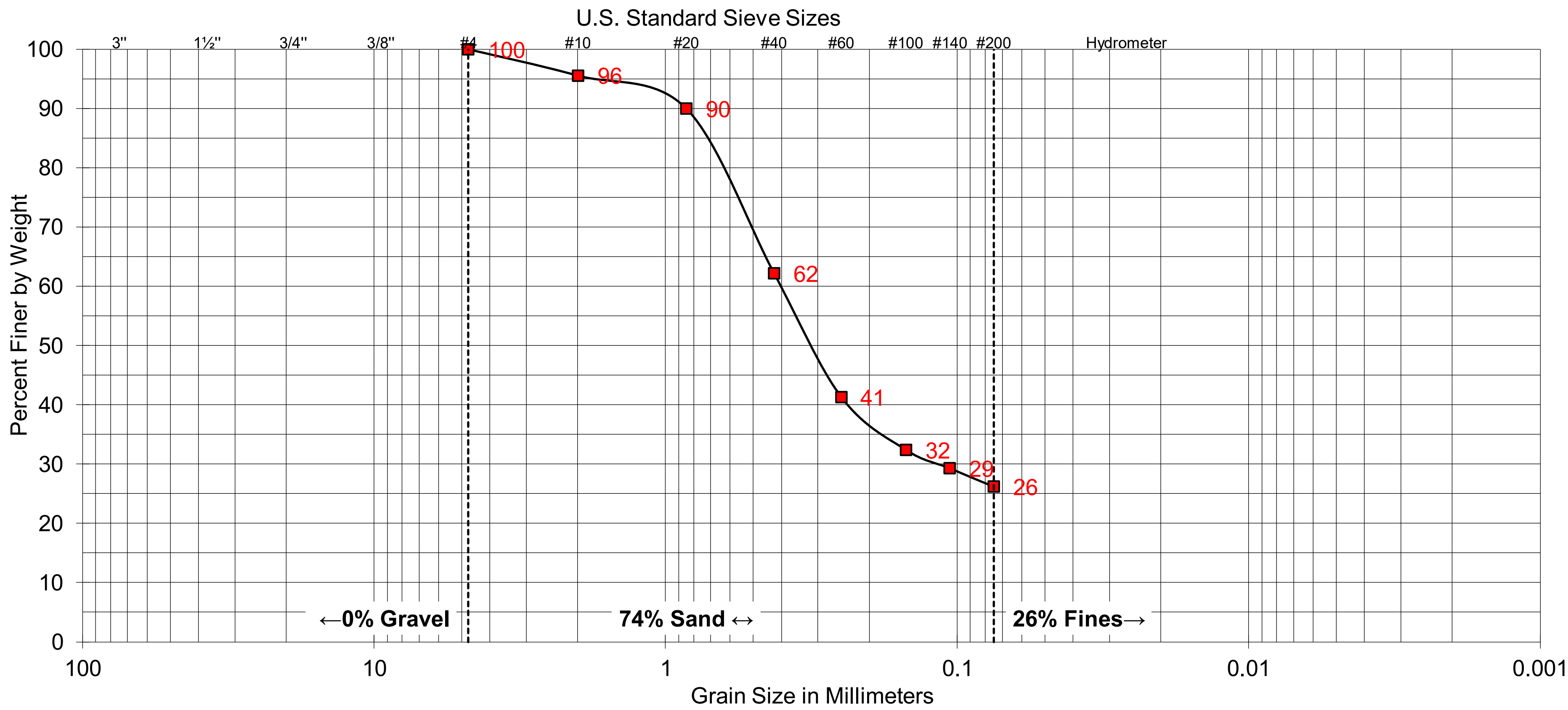
Chloride Content: A soil sample was also tested for water soluble chloride. The chloride was extracted from the soil under vacuum using a 10:1 (water to dry soil) dilution ratio. The extracted solution was then tested for water soluble chloride using a calibrated ion specific electronic probe. The test results are also shown in Figure B-3.

APPENDIX B

LABORATORY TESTING (Continued)

Direct Shear: The shear strength of a selected samples of the on-site soils was assessed using direct shear testing performed in general accordance with ASTM D3080. The individual test results are shown in Figures B-4.1 through B-4.4. All four shear tests are summarized in Figure B-4.5.

R-Value: R-Value tests were performed on selected samples of the on-site soils in general accordance with CTM 301. The test results are shown in Figures B-5.1 and B-5.2.



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-1
SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SM

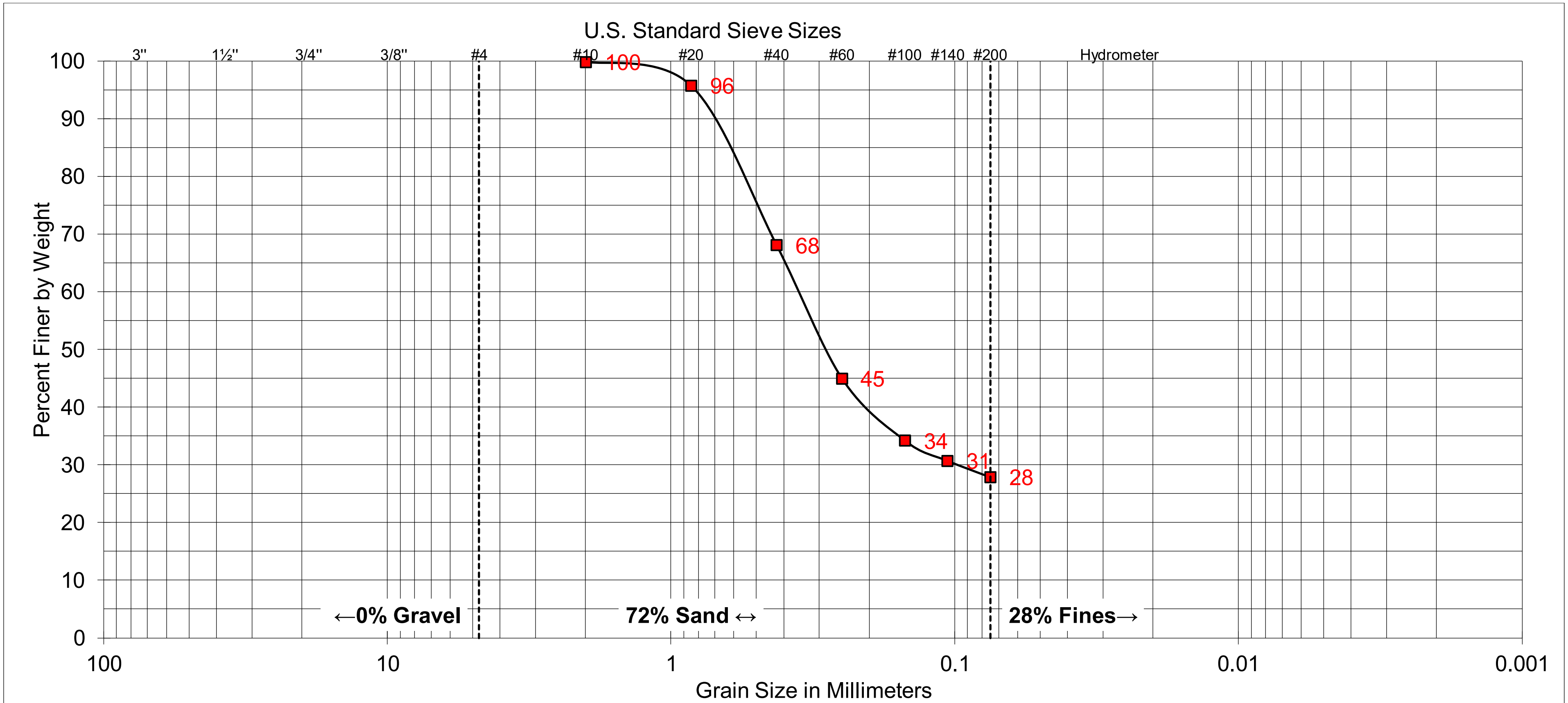
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.1



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-3
SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SM

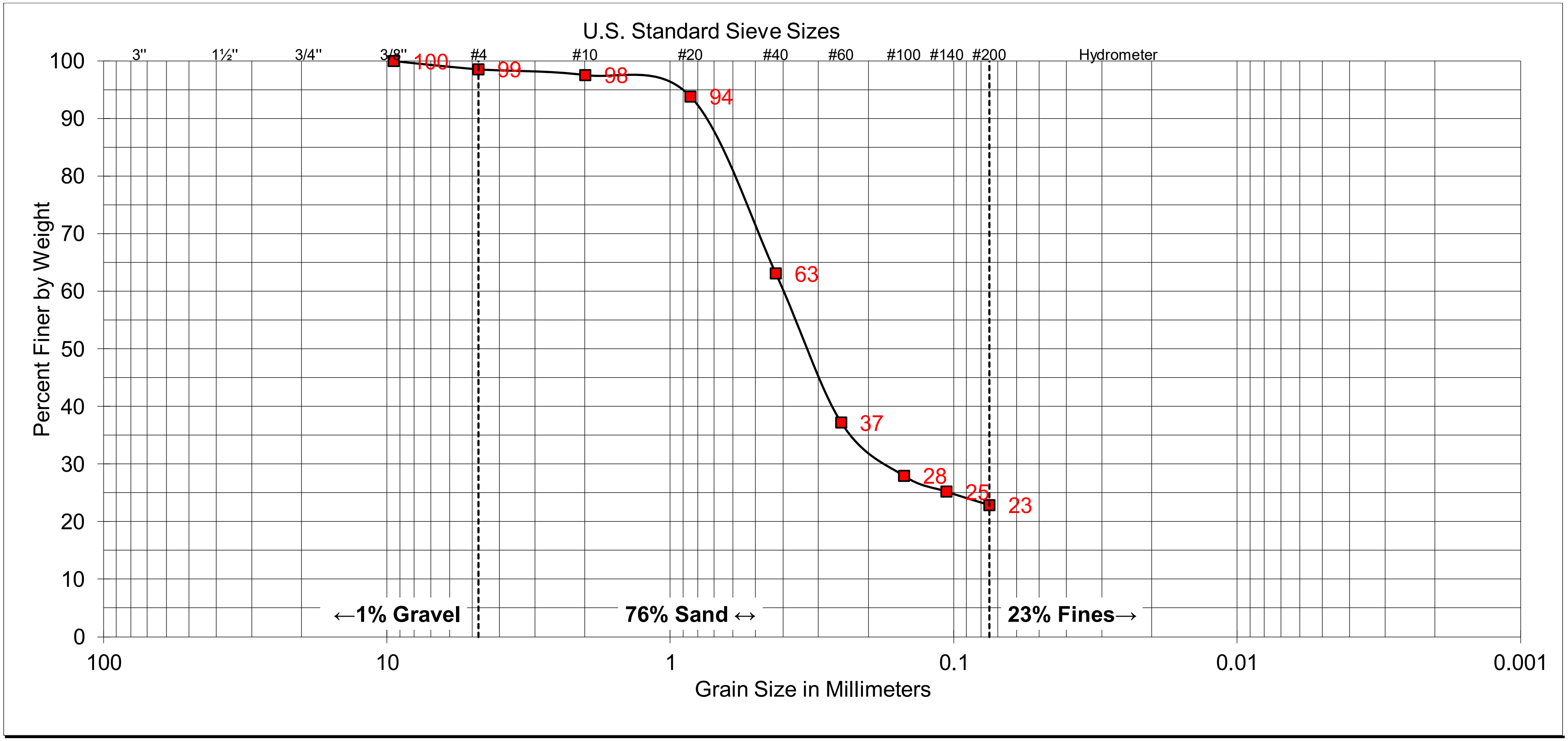
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.2



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-4
SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SM

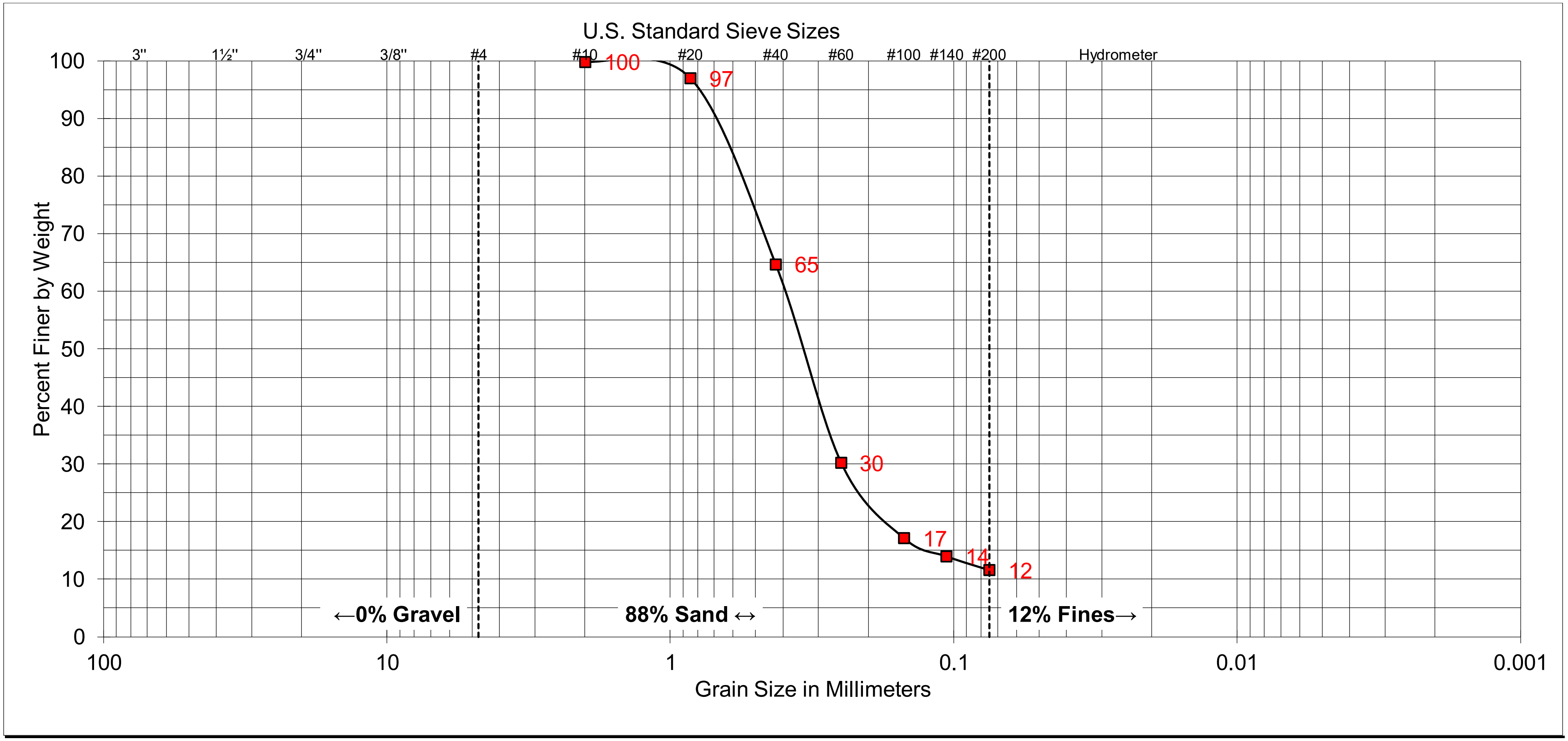
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.3



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-5
SAMPLE DEPTH: 10' - 11½'

UNIFIED SOIL CLASSIFICATION: SP-SM

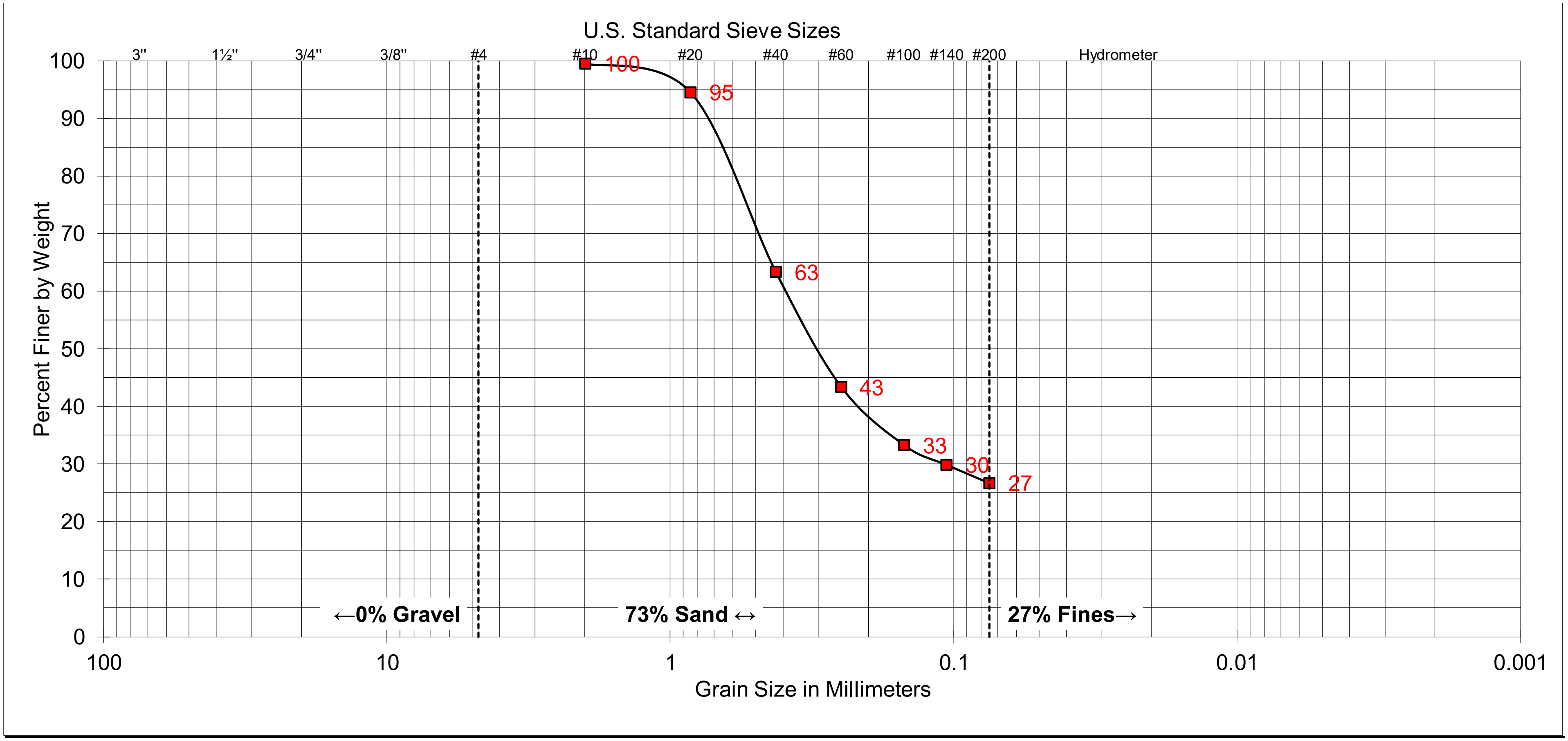
DESCRIPTION: POORLY GRADED SAND WITH SILT

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.4



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-7
SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SM

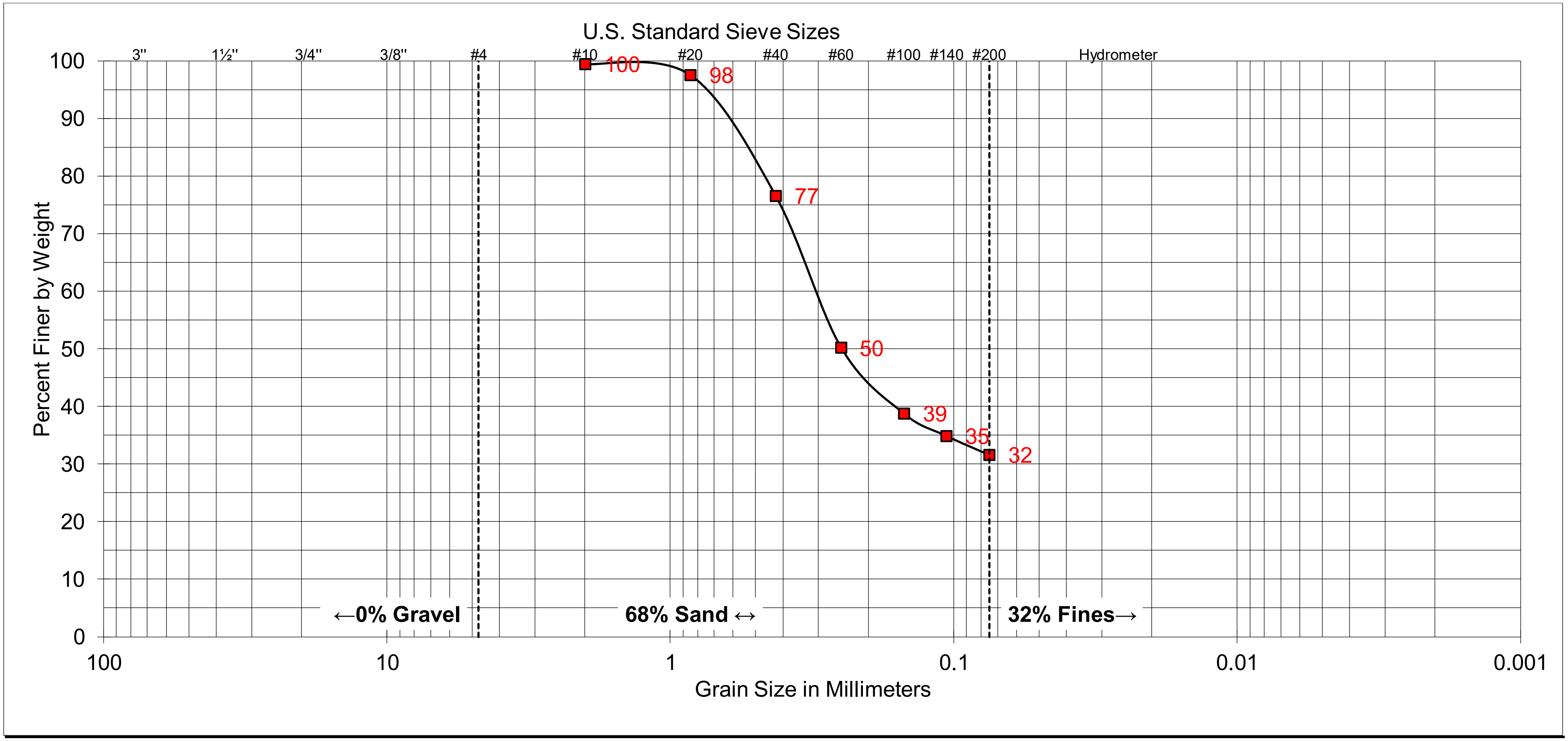
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.5



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE

SAMPLE NUMBER: B-10

SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: CLAYEY SAND

ATTERBERG LIMITS

LIQUID LIMIT: ---

PLASTIC LIMIT: ---

PLASTICITY INDEX: ---

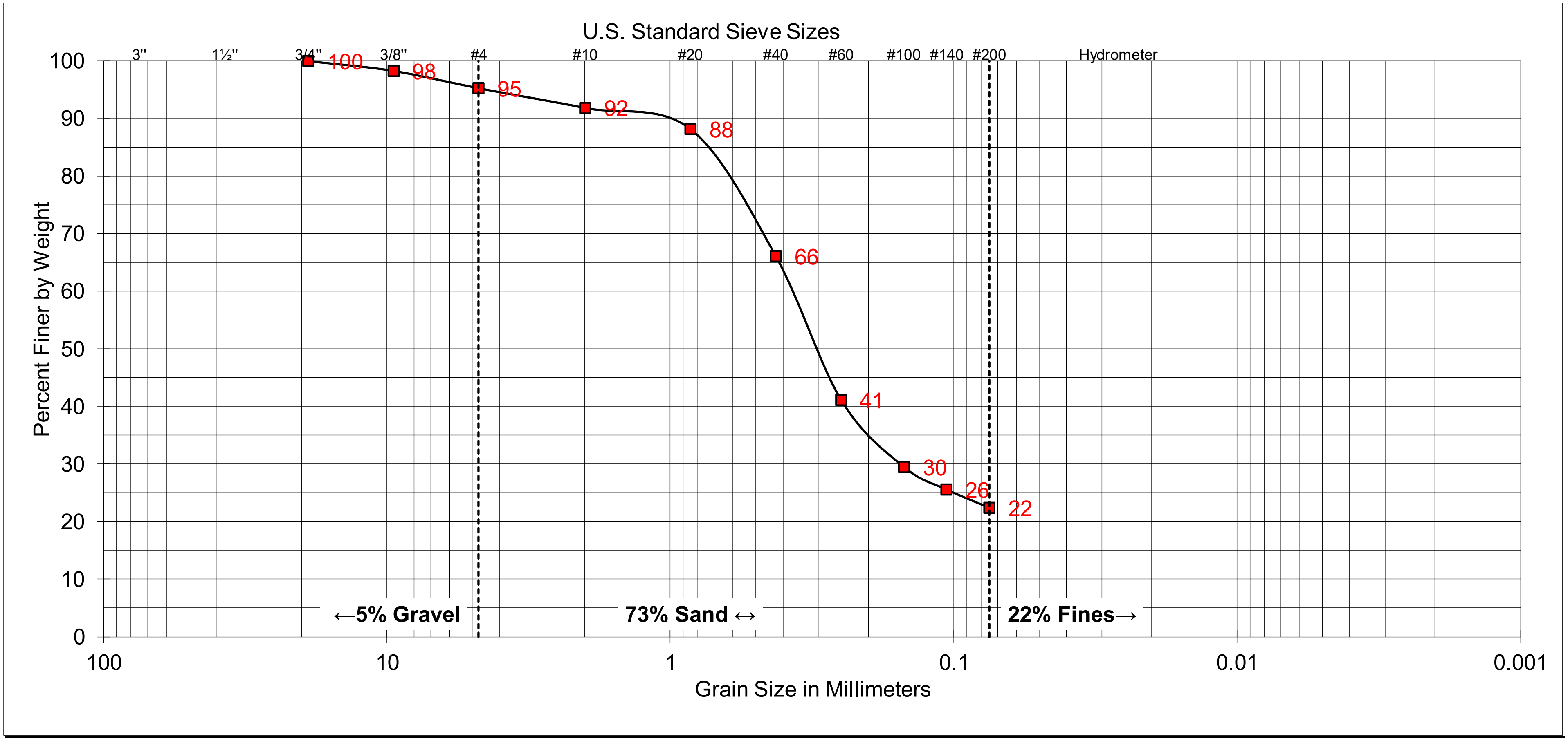
GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065

Project No. SD689

FIGURE B-1.6



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-12
SAMPLE DEPTH: ½' - 5'

UNIFIED SOIL CLASSIFICATION: SM

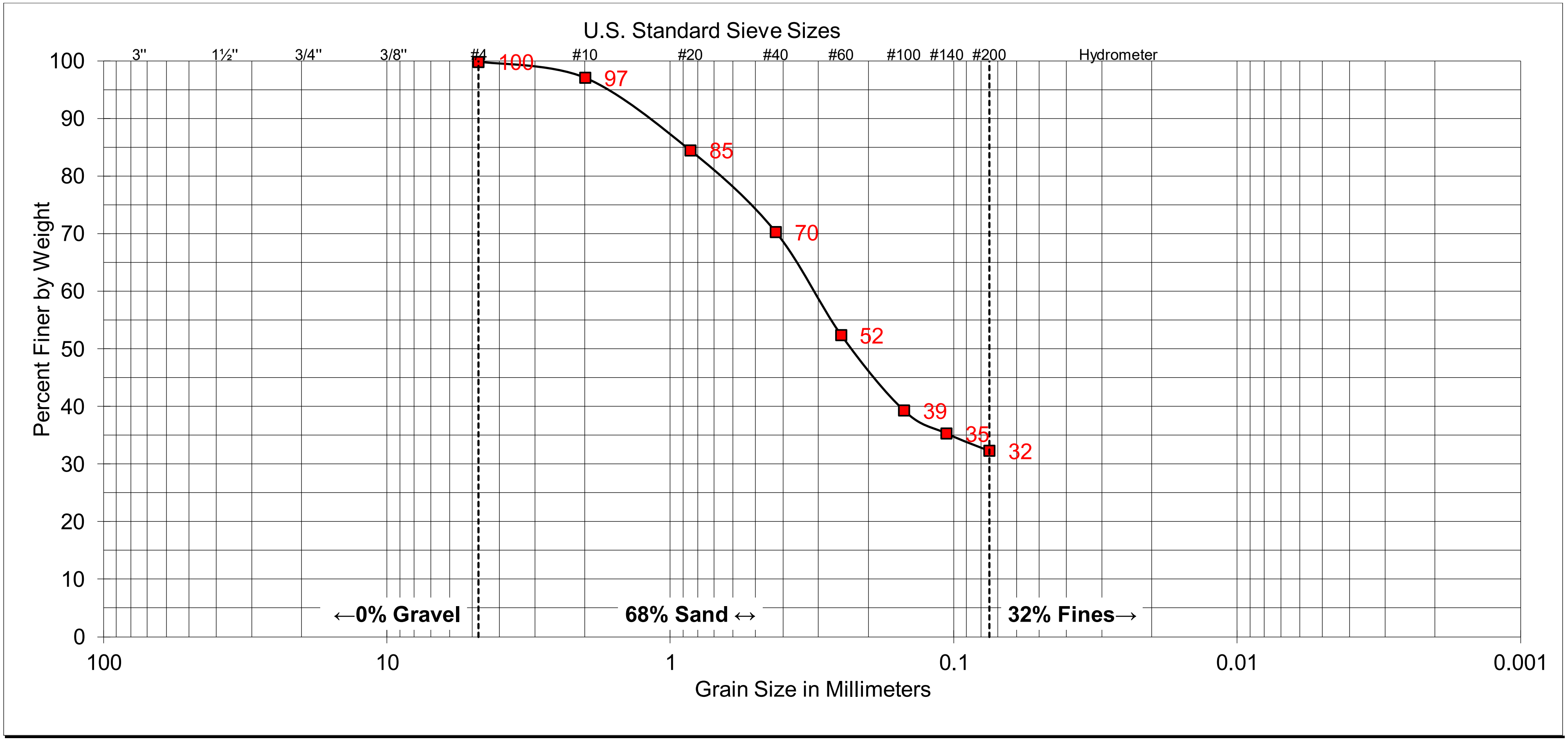
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.7



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE
SAMPLE NUMBER: B-14
SAMPLE DEPTH: 0' - 3'

UNIFIED SOIL CLASSIFICATION: SC

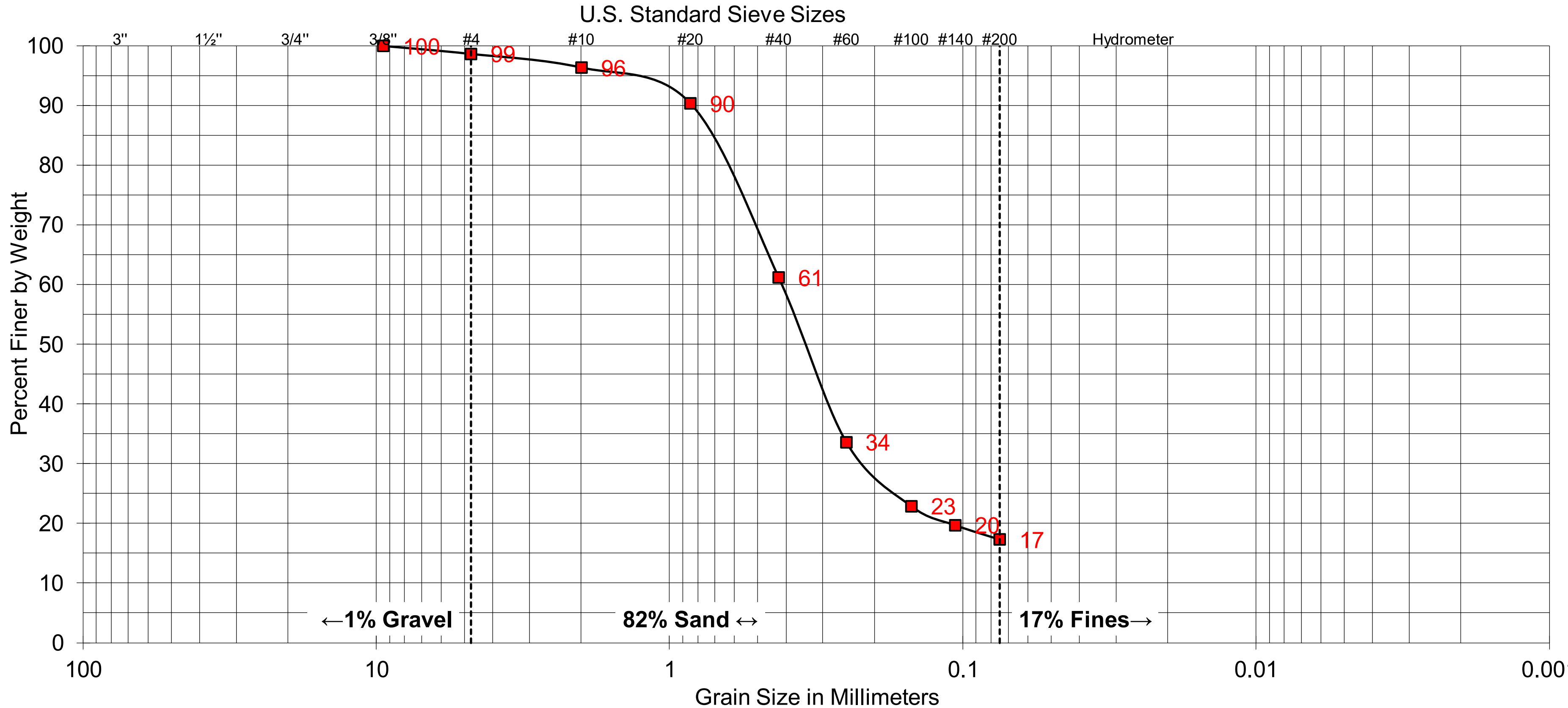
DESCRIPTION: CLAYEY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.8



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-16
SAMPLE DEPTH: 0' - 5'

UNIFIED SOIL CLASSIFICATION: SM

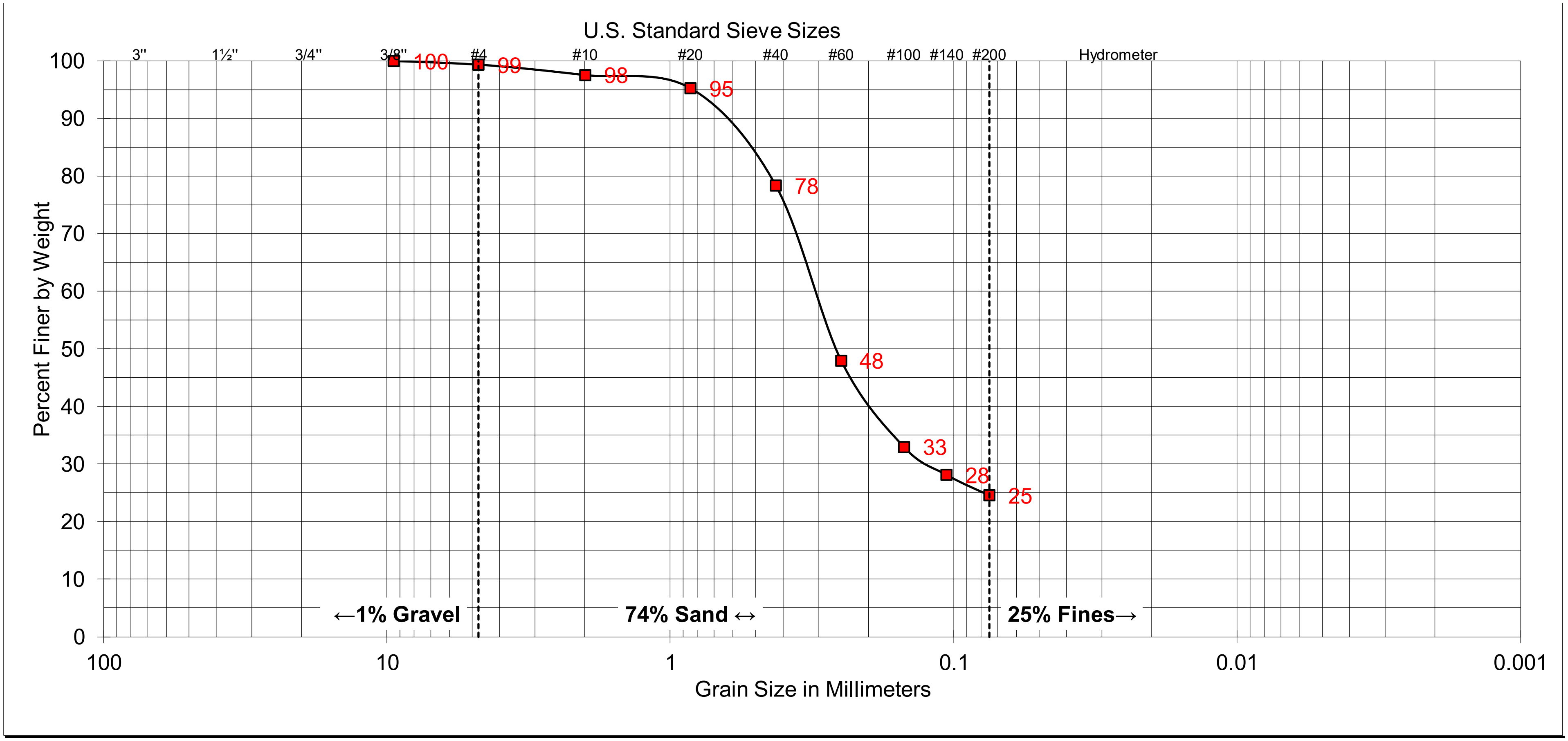
DESCRIPTION: SILTY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.9



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-17
SAMPLE DEPTH: 1' - 5'

UNIFIED SOIL CLASSIFICATION: SC

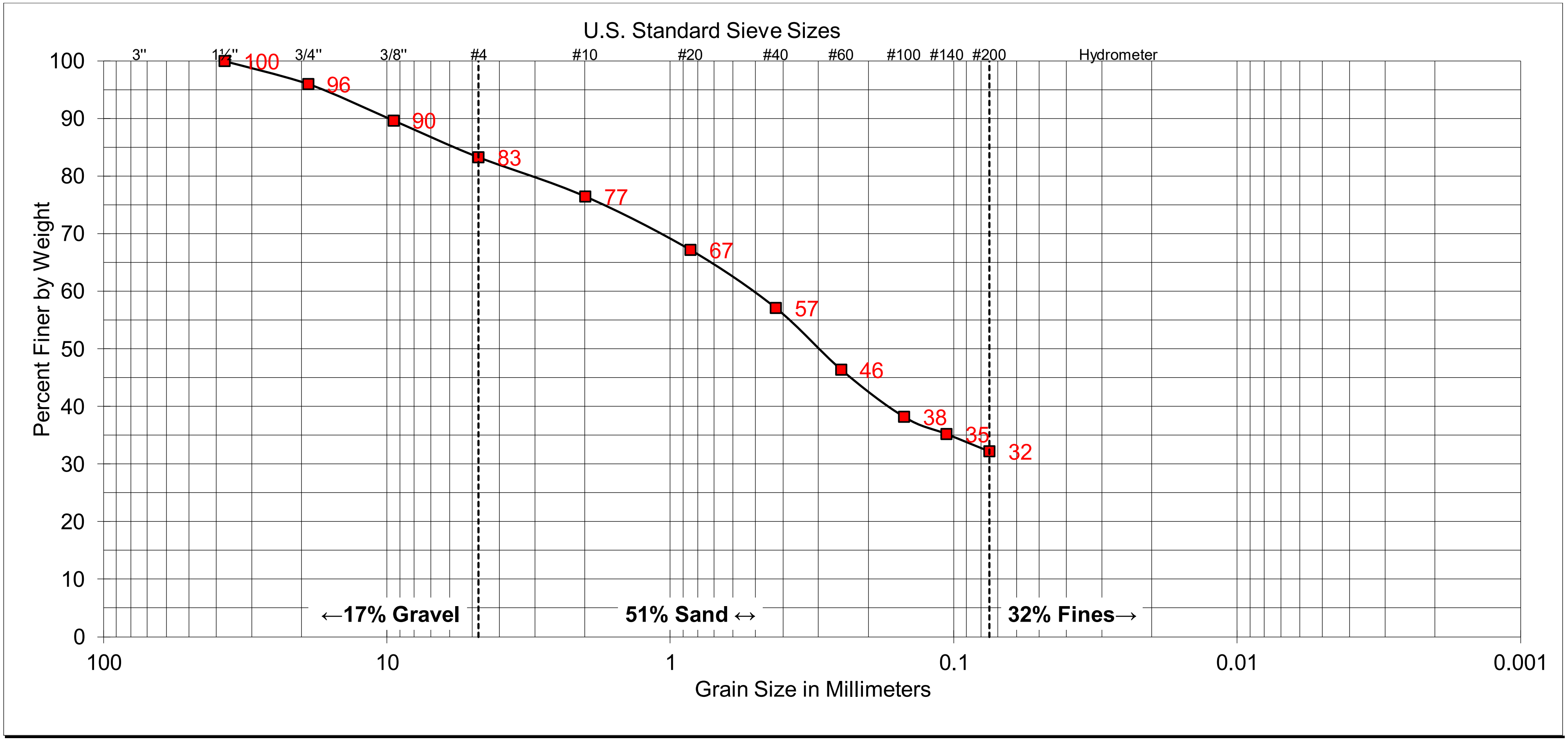
DESCRIPTION: CLAYEY SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.10



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-20
SAMPLE DEPTH: 0' - 5'

UNIFIED SOIL CLASSIFICATION: SC

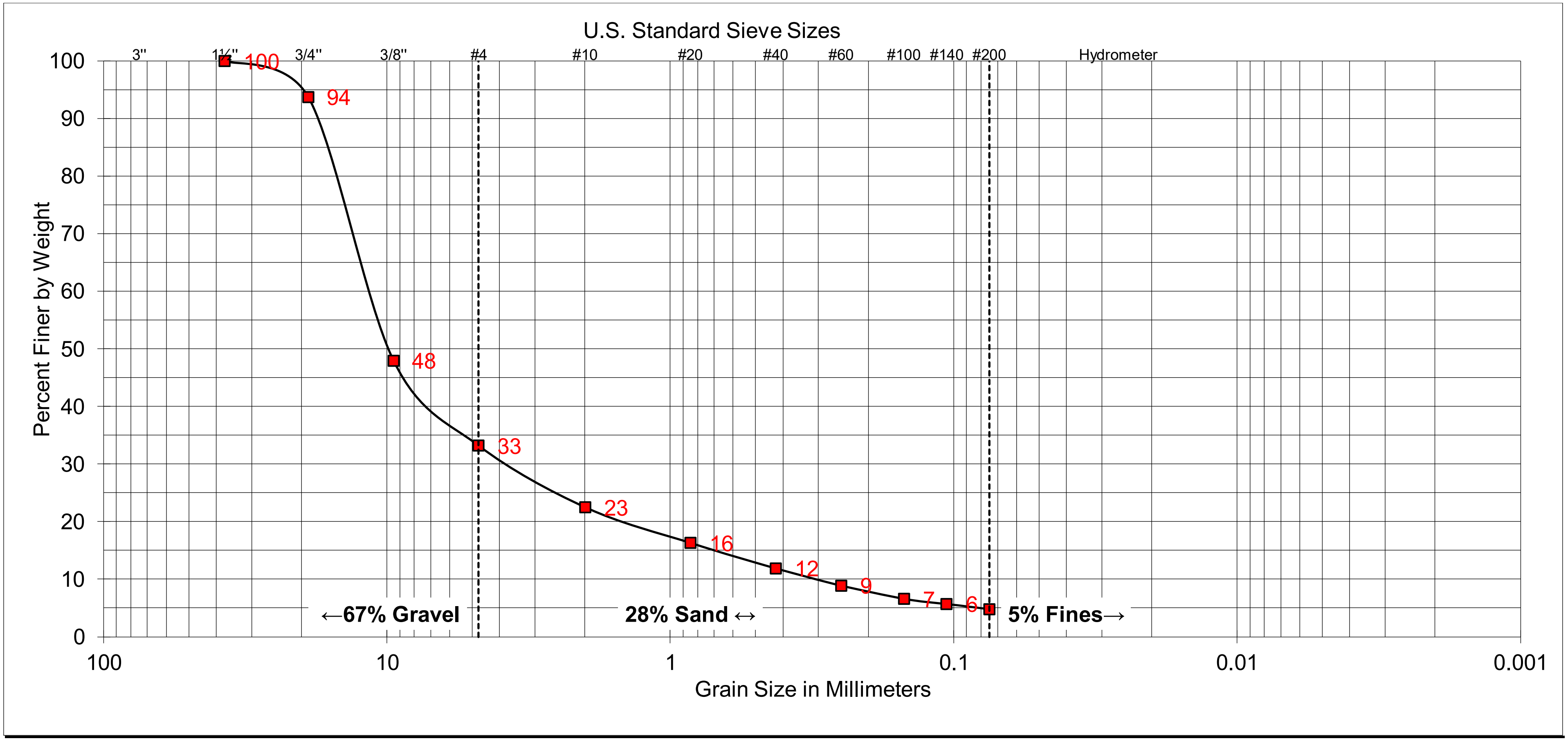
DESCRIPTION: CLAYEY SAND WITH GRAVEL

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.11



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY
GRAVEL		SAND			

SAMPLE
SAMPLE NUMBER: B-20
SAMPLE DEPTH: 20' - 21½'

UNIFIED SOIL CLASSIFICATION: GP

DESCRIPTION: POORLY GRADED GRAVEL WITH SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Document No. 21-0065
Project No. SD689
FIGURE B-1.12

EXPANSION TEST RESULTS
(ASTM D4829)

SAMPLE	DESCRIPTION	EXPANSION INDEX
B-3 @ ½' – 5'	**FILL**: Reddish brown silty sand (SM).	2
B-5 @ ½' – 10'	**FILL**: Reddish brown poorly-graded sand with silt (SP-SM).	0
B-12 @ ½' – 5'	**FILL**: Yellow to reddish brown silty sand (SM).	0
B-14 @ 0' – 3'	**FILL**: Dark yellow brown clayey sand (SC).	29
B-17 @ 1' – 5'	**FILL**: Dark yellow brown clayey sand (SC).	12
B-20 @ 0' – 5'	**FILL**: Dark yellow brown clayey sand with gravel (SC).	8

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

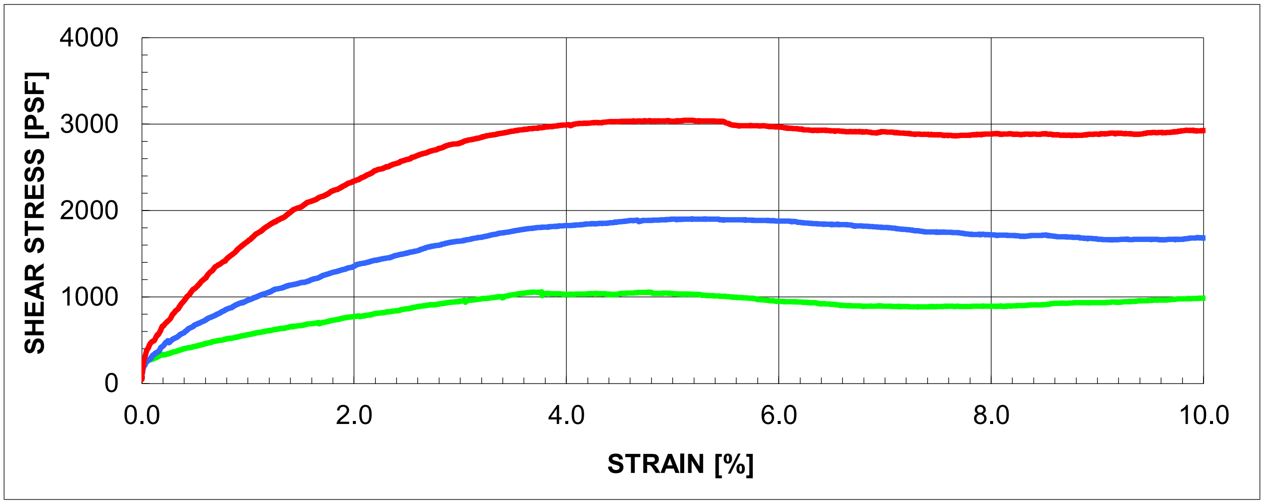
CORROSIVITY TEST RESULTS
(ASTM D516, CTM 643)

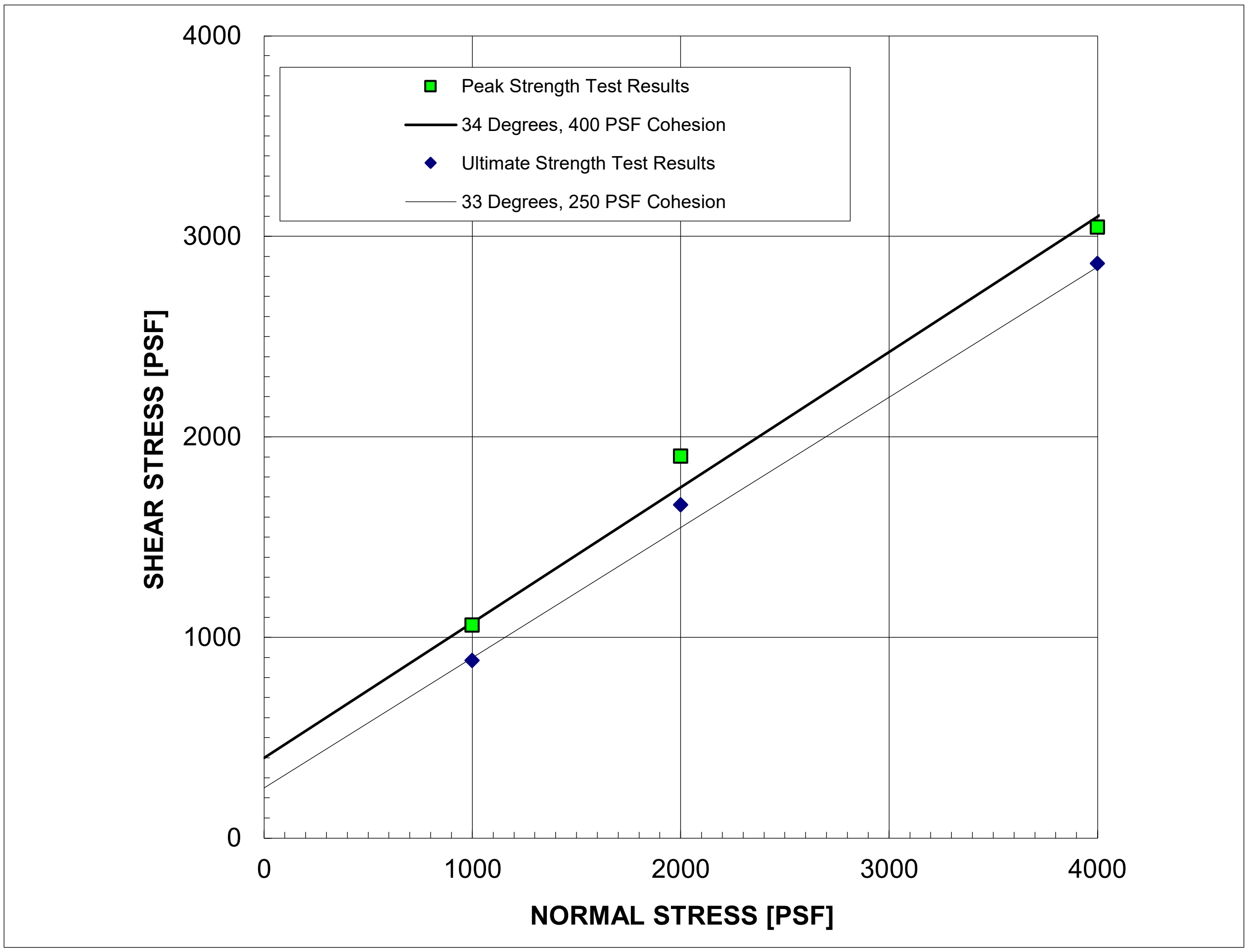
SAMPLE	pH	RESISTIVITY [OHM-CM]	SULFATE CONTENT [%]	CHLORIDE CONTENT [%]
B-3 @ ½' – 5'	7.3	2,840	< 0.01	< 0.01
B-12 @ ½' – 5'	7.7	2,590	0.01	< 0.01
B-17 @ 1' – 5'	7.7	1,410	0.02	< 0.01

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





SAMPLE: B-3 @ 5½' - 6'

Very Old Paralic Deposits:
Reddish brown Silty Sandstone (SM)

	PEAK	ULTIMATE
ϕ'	34 °	33 °
C'	400 PSF	250 PSF

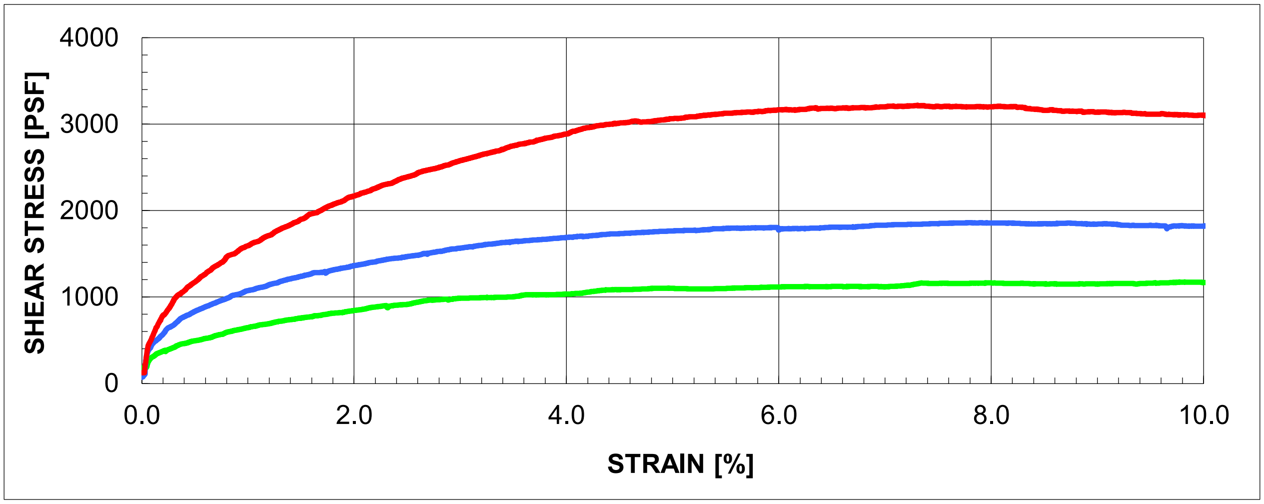
STRAIN RATE: 0.0020 IN/MIN
(Sample was consolidated and drained)

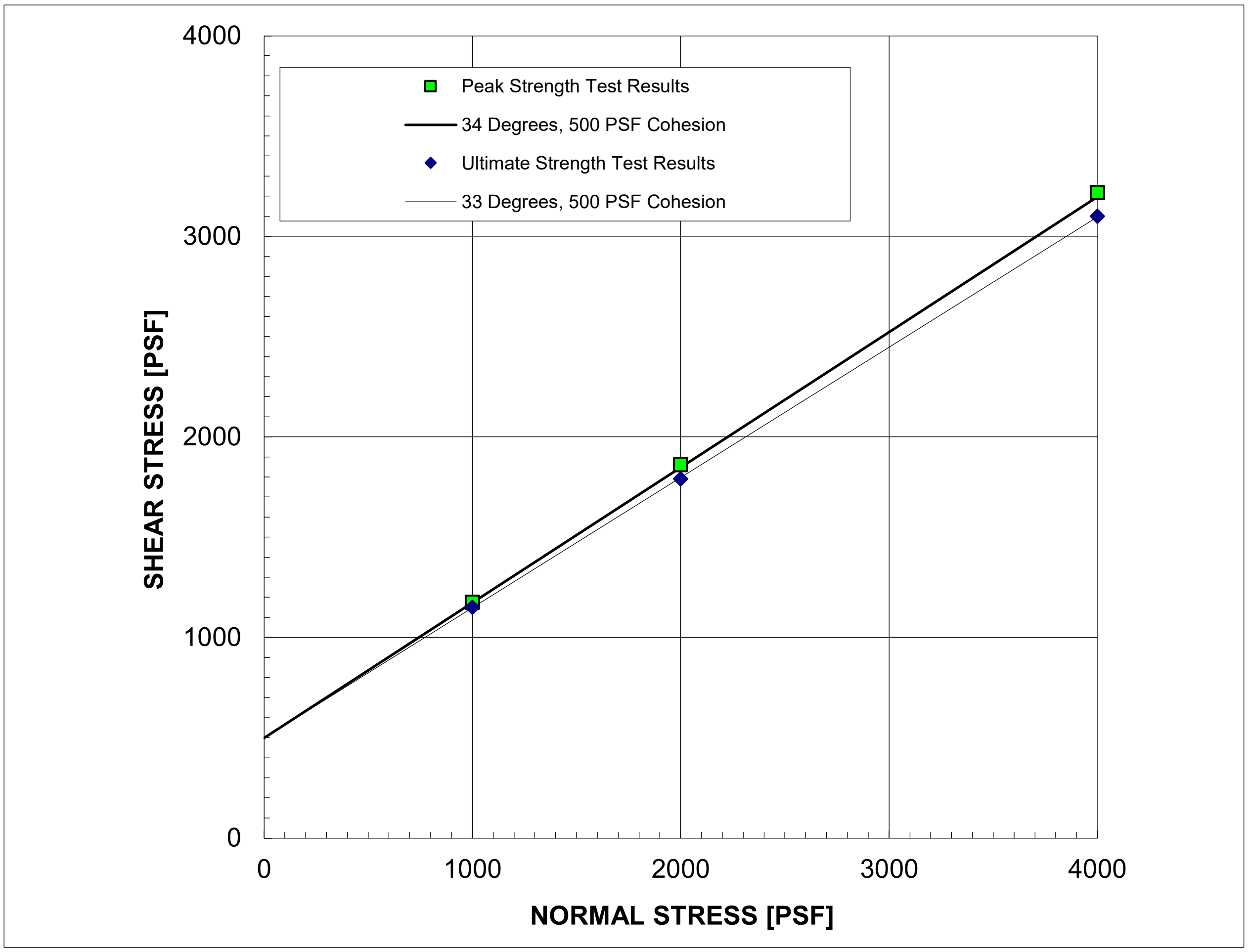
	IN-SITU	AS-TESTED
γ_d	107.3 PCF	107.3 PCF
w_c	6.7 %	18.0 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 21-0065
Project No. SD689
FIGURE B-4.1





SAMPLE: B-5 @ 10' - 11'

Fill:
Poorly-Graded Sand with Silt (SP-SM)

	PEAK	ULTIMATE
φ'	34 °	33 °
C'	500 PSF	500 PSF

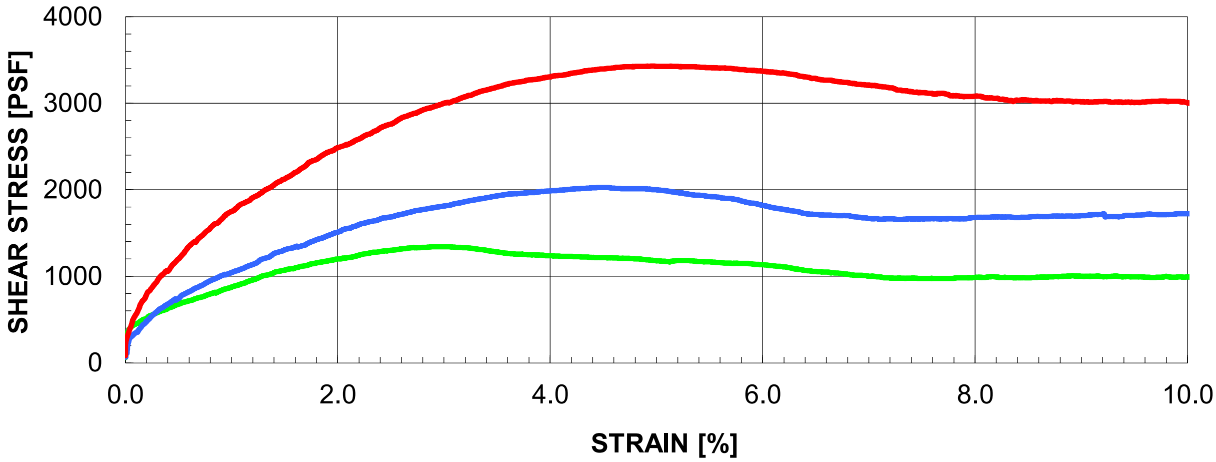
STRAIN RATE: 0.0020 IN/MIN
(Sample was consolidated and drained)

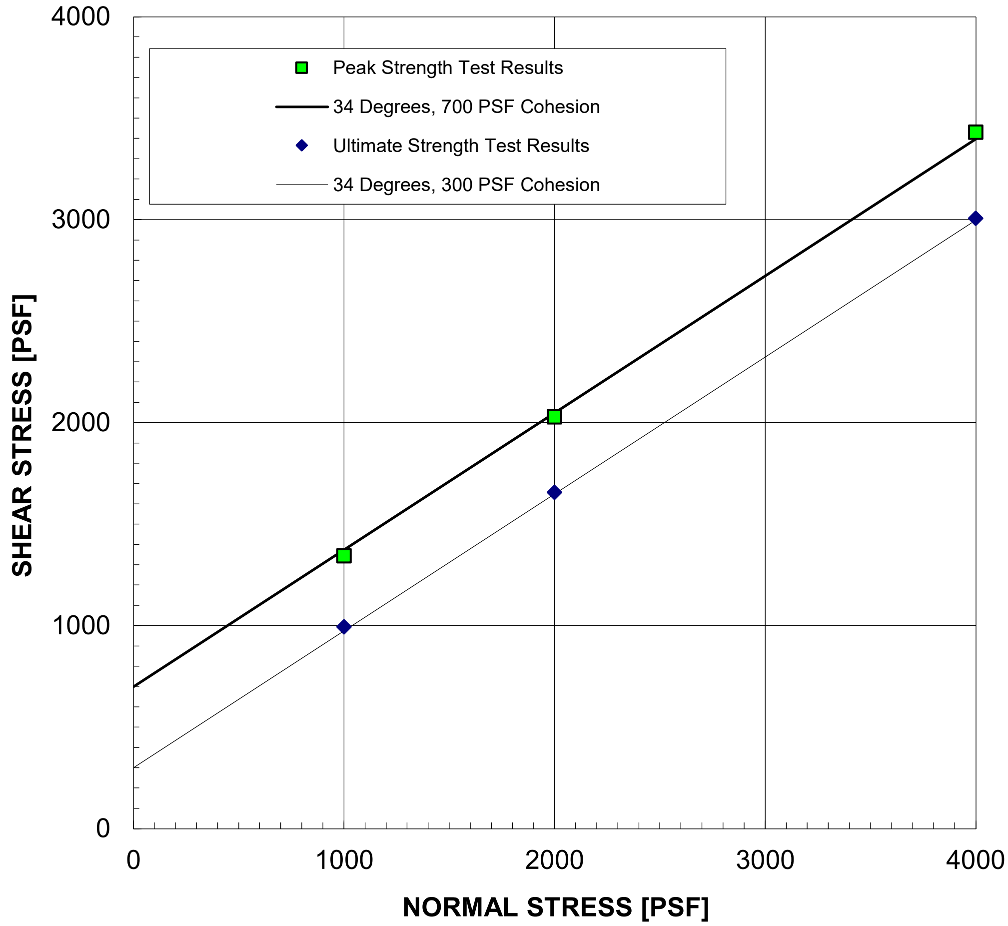
	IN-SITU	AS-TESTED
γ_d	103.6 PCF	103.6 PCF
w_c	5.6 %	17.9 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 21-0065
Project No. SD689
FIGURE B-4.2





SAMPLE: B-5 @ 20' - 21'

Very Old Paralic Deposits:
Poorly-Graded Sandstone with Silt (SP-SM)

	PEAK	ULTIMATE
ϕ'	34 °	34 °
C'	700 PSF	300 PSF

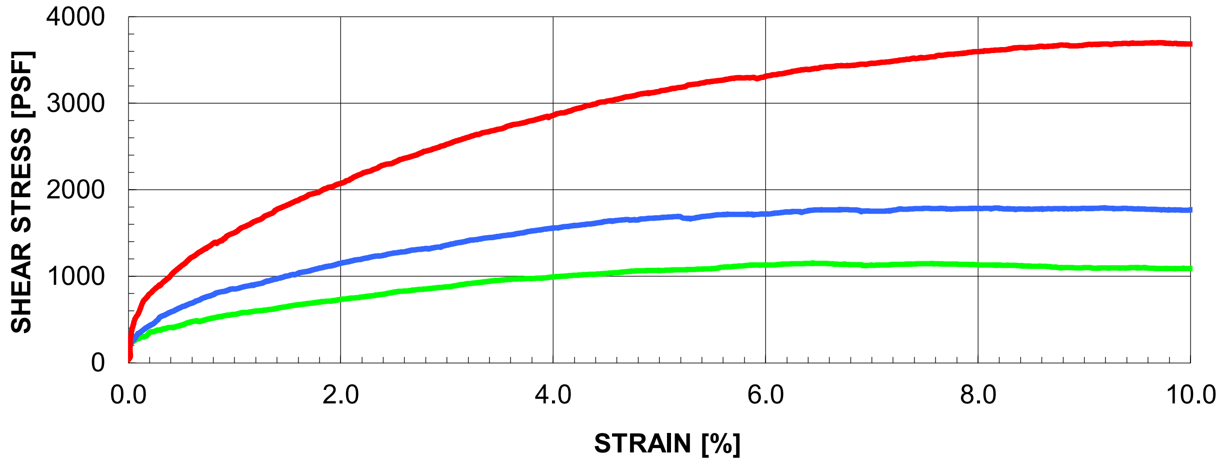
STRAIN RATE: 0.0020 IN/MIN
(Sample was consolidated and drained)

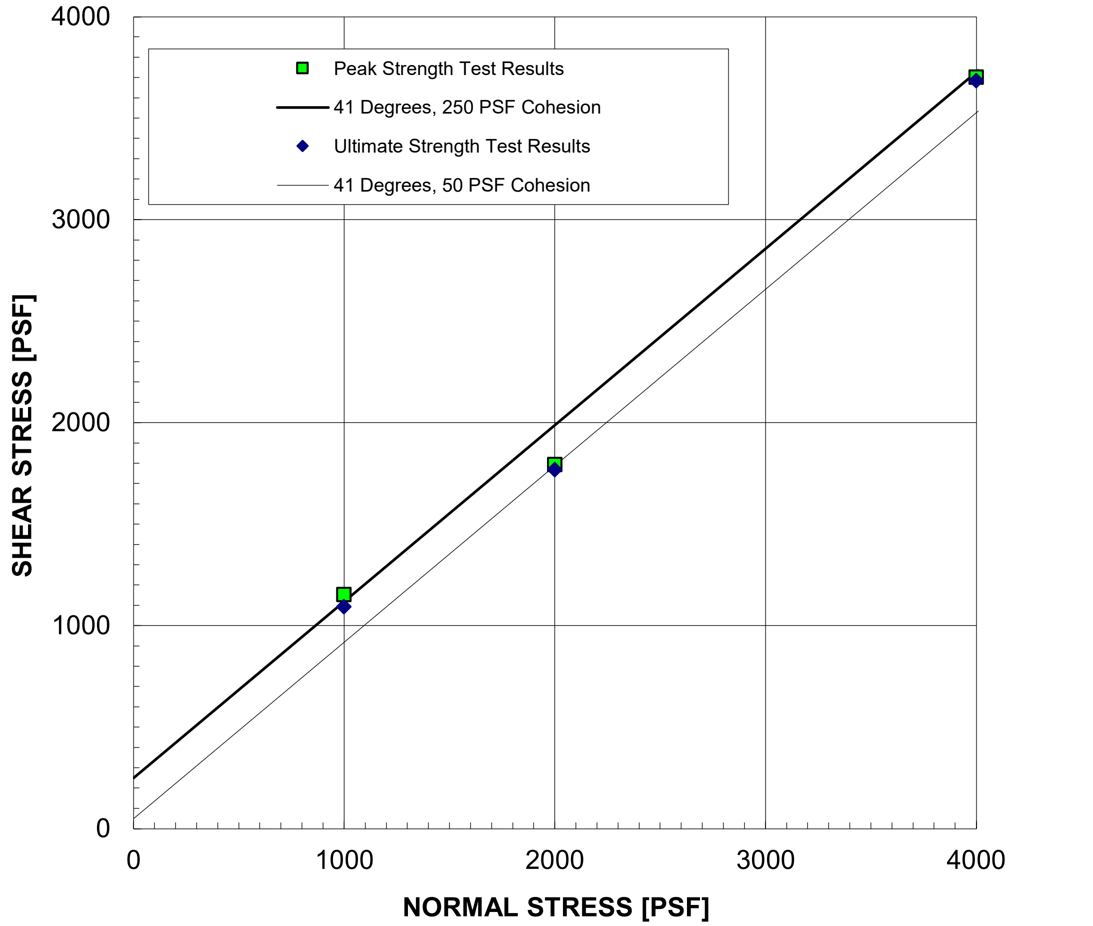
	IN-SITU	AS-TESTED
γ_d	106.2 PCF	106.2 PCF
w_c	8.4 %	19.8 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 21-0065
Project No. SD689
FIGURE B-4.3





SAMPLE: B-12 @ 10' - 11½'

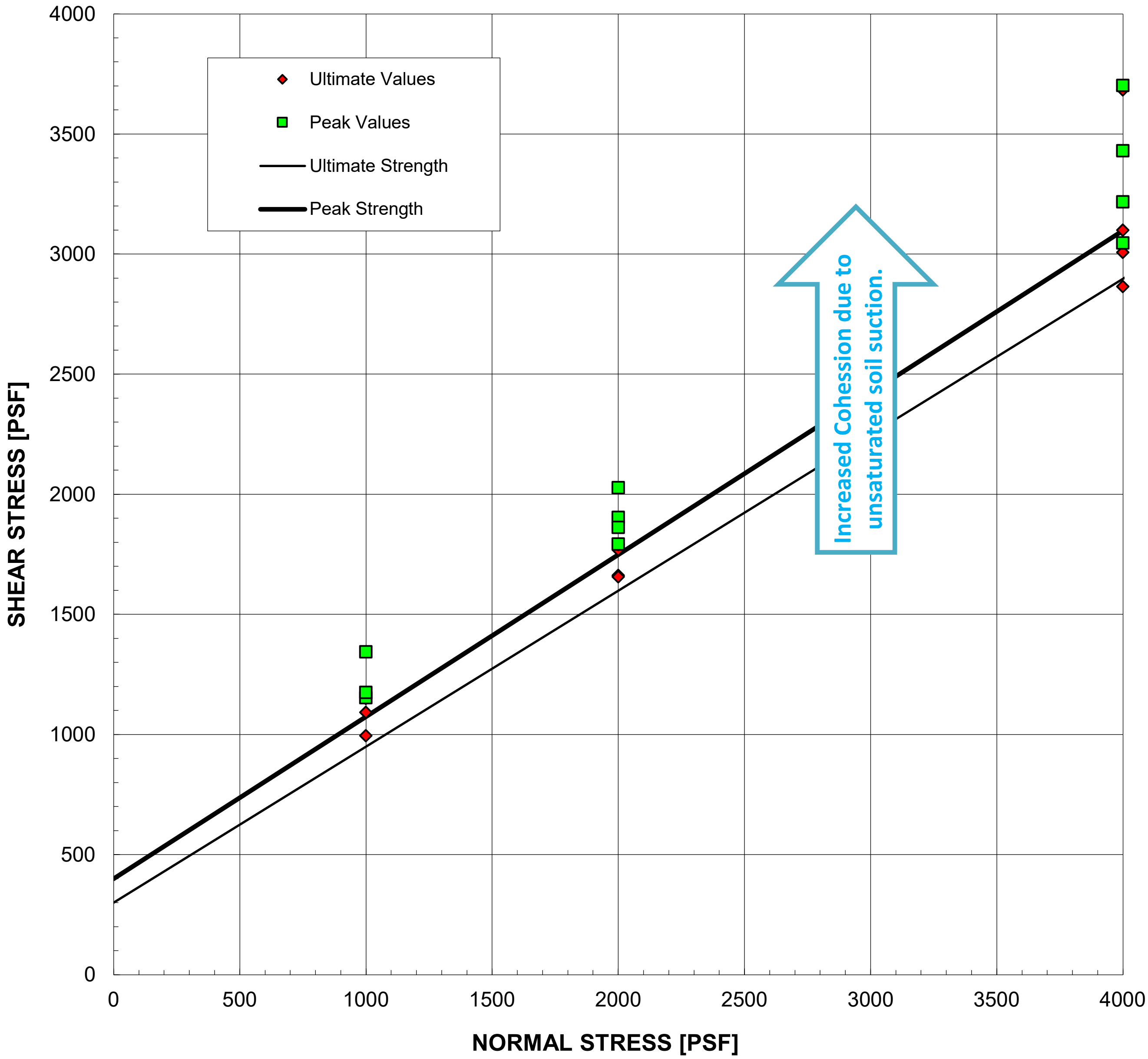
Fill:
Yellow brown Clayey Sand (SC)

	PEAK	ULTIMATE
φ'	41 °	41 °
C'	250 PSF	50 PSF

STRAIN RATE: 0.0020 IN/MIN

(Sample was consolidated and drained)

	IN-SITU	AS-TESTED
γ_d	105.3 PCF	105.3 PCF
w_c	6.4 %	18.6 %



DESCRIPTION

A summary of four direct shear tests on samples of both the sandy fill soil and Very Old Parlic Deposits (GDC, 2021).

	PEAK ESTIMATE	ULTIMATE ESTIMATE
ϕ'	34 °	33 °
C'	400 PSF	300 PSF

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DIRECT SHEAR TEST SUMMARY

Document No. 21-0065
Project No. SD689
FIGURE B-4.5

SAMPLE NO.: B-1 **SAMPLE DATE:** 6/5/21
SAMPLE LOCATION: ½' - 5' **TEST DATE:** 6/21/21
SAMPLE DESCRIPTION: Yellowish brown silty sand (SM)

LABORATORY TEST DATA

	TEST SPECIMEN	1	2	3	4	5	
A	COMPACTOR PRESSURE	150	110	230			[PSI]
B	INITIAL MOISTURE	3.1	3.1	3.1			[%]
C	BATCH SOIL WEIGHT	1200	1200	1200			[G]
D	WATER ADDED	100	111	87			[ML]
E	WATER ADDED (D*(100+B)/C)	8.6	9.5	7.5			[%]
F	COMPACTION MOISTURE (B+E)	11.7	12.6	10.6			[%]
G	MOLD WEIGHT	2089.9	2017.0	2103.9			[G]
H	TOTAL BRIQUETTE WEIGHT	3285.7	3185.0	3241.2			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1195.8	1168.0	1137.3			[G]
J	BRIQUETTE HEIGHT	2.62	2.57	2.47			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	123.8	122.3	126.2			[PCF]
L	EXUDATION LOAD	3898	3094	7196			[LB]
M	EXUDATION PRESSURE (L/12.54)	311	247	574			[PSI]
N	STABILOMETER AT 1000 LBS	50	53	34			[PSI]
O	STABILOMETER AT 2000 LBS	118	120	78			[PSI]
P	DISPLACEMENT FOR 100 PSI	5.10	5.65	4.25			[Turns]
Q	R VALUE BY STABILOMETER	15	13	38			
R	CORRECTED R-VALUE (See Fig. 14)	17	13	38			
S	EXPANSION DIAL READING	0.0000	0.0000	0.0000			[IN]
T	EXPANSION PRESSURE (S*43,300)	0	0	0			[PSF]
U	COVER BY STABILOMETER	0.89	0.93	0.66			[FT]
V	COVER BY EXPANSION	0.00	0.00	0.00			[FT]

TRAFFIC INDEX:	5.0
GRAVEL FACTOR:	1.49
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	16
R-VALUE BY EXPANSION:	100
R-VALUE AT EQUILIBRIUM:	16

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

REV. 2, DATED 1/31/15

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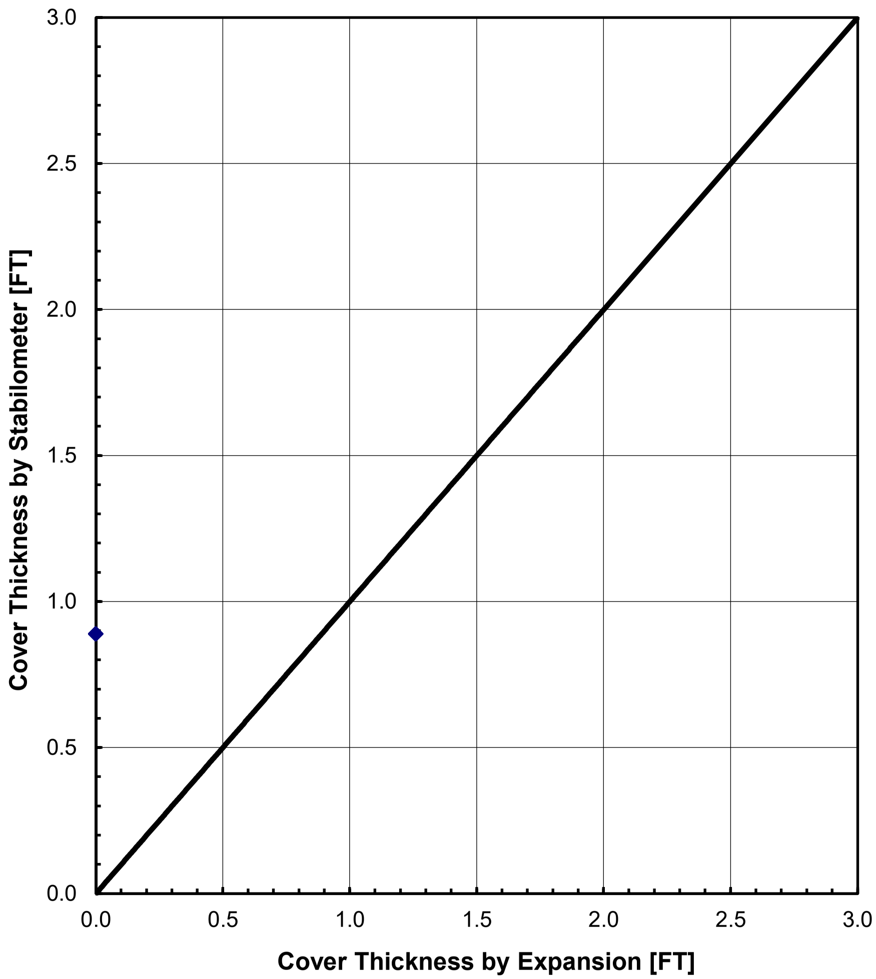
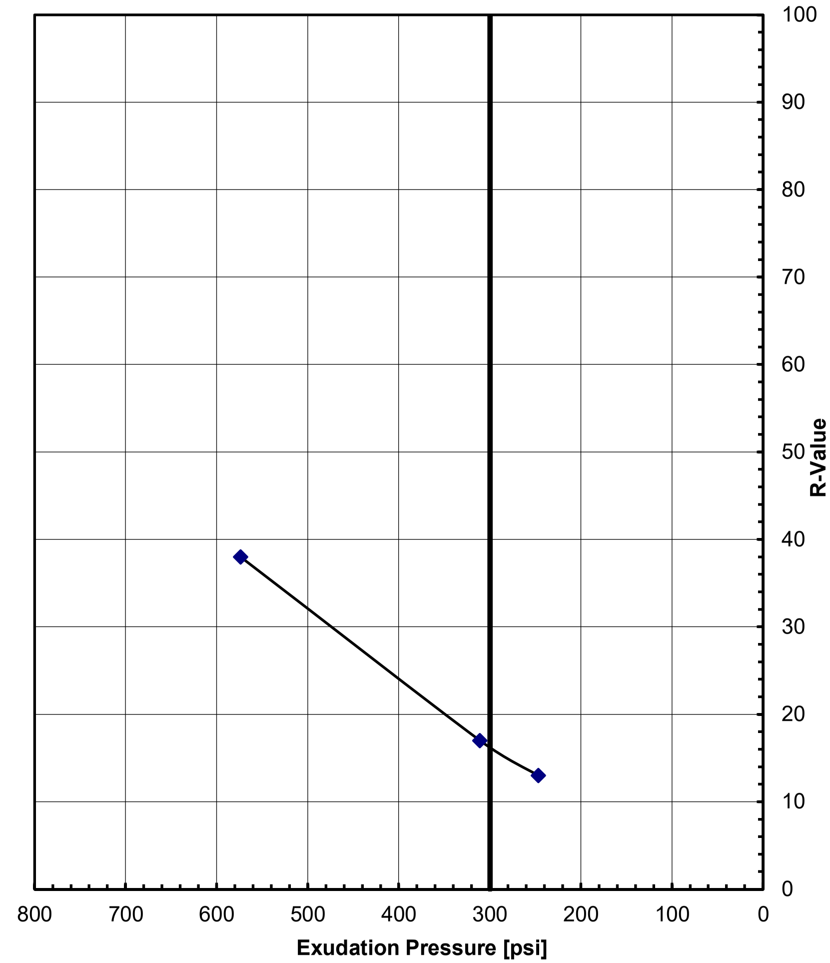
R-VALUE TEST RESULTS
CT301

Document No. 21-0065
Project No. SD689
FIGURE B-5.1a

Sample: B-1 @ ½' - 5'



R-Value at Equilibrium: 16



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COVER AND EXUDATION CHARTS

Document No. 21-0065
Project No. SD689
FIGURE B-5.1b

SAMPLE NO.: B-4 **SAMPLE DATE:** 6/5/21

SAMPLE LOCATION: ½' - 5' **TEST DATE:** 6/21/21

SAMPLE DESCRIPTION: Dark reddish brown silty sand (SM)

LABORATORY TEST DATA

	TEST SPECIMEN	1	2	3	4	5	
A	COMPACTOR PRESSURE	140	105	40			[PSI]
B	INITIAL MOISTURE	2.2	2.2	2.2			[%]
C	BATCH SOIL WEIGHT	1200	1200	1200			[G]
D	WATER ADDED	100	112	132			[ML]
E	WATER ADDED (D*(100+B)/C)	8.5	9.5	11.2			[%]
F	COMPACTION MOISTURE (B+E)	10.7	11.7	13.4			[%]
G	MOLD WEIGHT	2079.8	2012.7	2012.1			[G]
H	TOTAL BRIQUETTE WEIGHT	3206.5	3156.8	3224.1			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1126.7	1144.1	1212.0			[G]
J	BRIQUETTE HEIGHT	2.55	2.55	2.65			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	120.9	121.7	122.2			[PCF]
L	EXUDATION LOAD	6331	5206	3400			[LB]
M	EXUDATION PRESSURE (L/12.54)	505	415	271			[PSI]
N	STABILOMETER AT 1000 LBS	44	54	60			[PSI]
O	STABILOMETER AT 2000 LBS	109	118	126			[PSI]
P	DISPLACEMENT FOR 100 PSI	5.53	6.30	6.49			[Turns]
Q	R VALUE BY STABILOMETER	17	12	9			
R	CORRECTED R-VALUE (See Fig. 14)	17	12	10			
S	EXPANSION DIAL READING	0.0004	0.0001	0.0000			[IN]
T	EXPANSION PRESSURE (S*43,300)	17	4	0			[PSF]
U	COVER BY STABILOMETER	0.91	0.96	0.99			[FT]
V	COVER BY EXPANSION	0.13	0.03	0.00			[FT]

TRAFFIC INDEX:	5.0
GRAVEL FACTOR:	1.46
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	10
R-VALUE BY EXPANSION:	17
R-VALUE AT EQUILIBRIUM:	10

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

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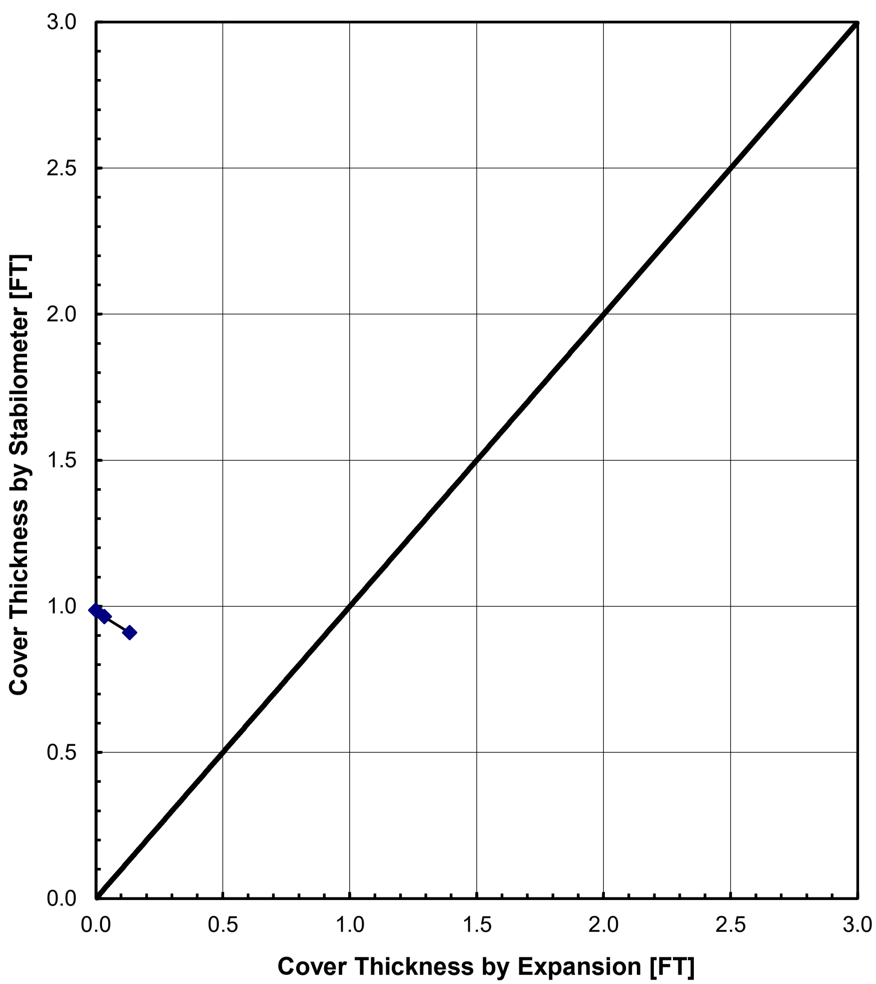
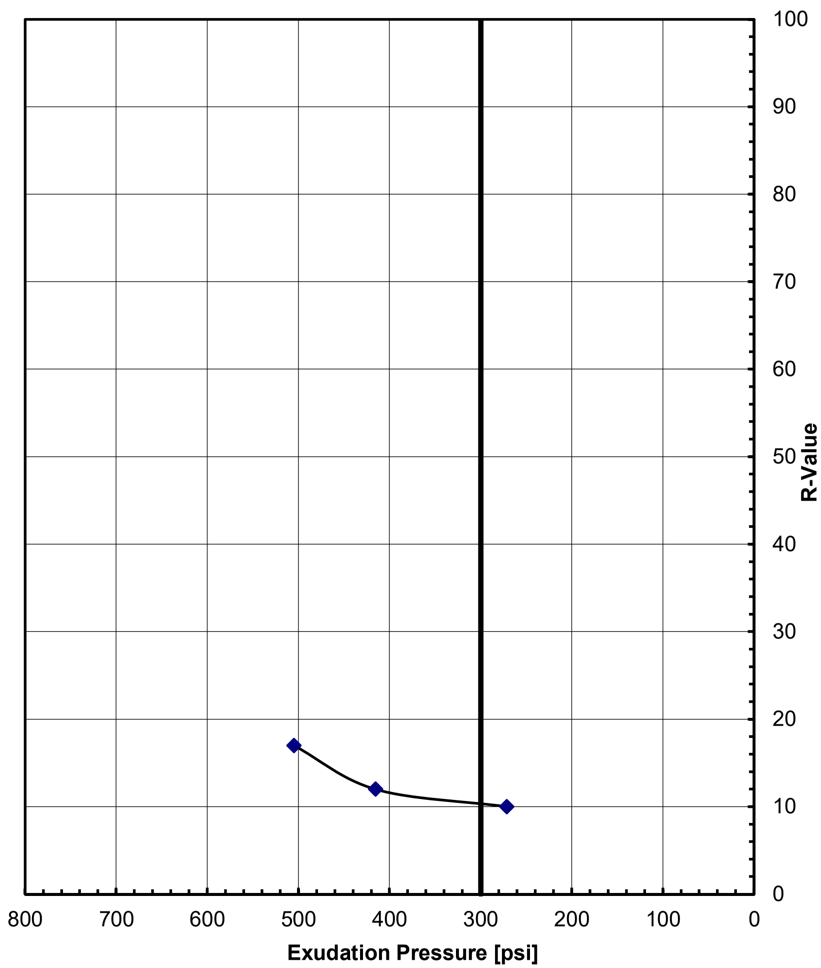
R-VALUE TEST RESULTS
CT301

Document No. 21-0065
Project No. SD689
FIGURE B-5.2a

Sample: B-4, ½' - 5'



R-Value at Equilibrium: 10



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COVER AND EXUDATION CHARTS

Document No. 21-0065
Project No. SD689
FIGURE B-5.2b

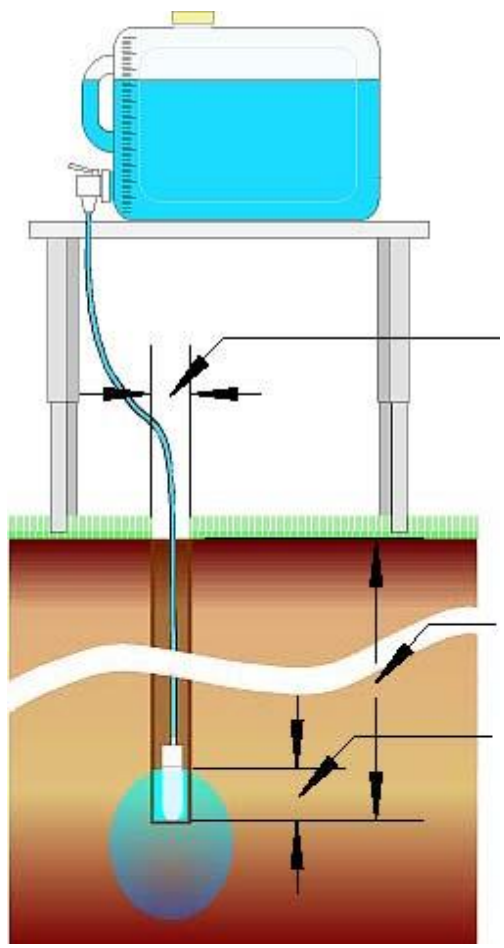
APPENDIX C
INFILTRATION ASSESSMENT

APPENDIX C

INFILTRATION ASSESSMENT

We understand that detention basins or swales will be incorporated into the development to help promote on-site infiltration. To aid in BMP design, the vertical infiltration rates were estimated at four test locations using the standard borehole percolation test method. The borehole percolation test method requires filling the borehole repeatedly to maintain a relatively constant water head throughout the test duration, while measuring the volume of water used at specified time intervals. The test configuration is depicted schematically below. The field infiltration tests were completed between June 5th and 6th, 2021. The approximate infiltration test locations are shown on the Exploration Plans, Figure 3A and 3B. The test results are shown in Figures C-1.1 through C-4.2.

Worksheet C.4-1 of the City of San Diego BMP Design Manual is attached to the end of this appendix. Per Table D.3-1 of the BMP manual, the borehole percolation test may be used for both planning level screening and BMP design purposes. Per Section D.4.5 of the Storm Water Manual, the percolation testing "…shall be conducted at approximately the same depth and the same material as the base of the proposed storm water BMP." The Storm Water Manual also requires that two infiltration tests be conducted within 50-feet of each proposed BMP. We conducted the four infiltration tests at the depths and locations agreed upon in the Geotechnical Work Plan, as shown on the Exploration Plans, Figures 3A and 3B.



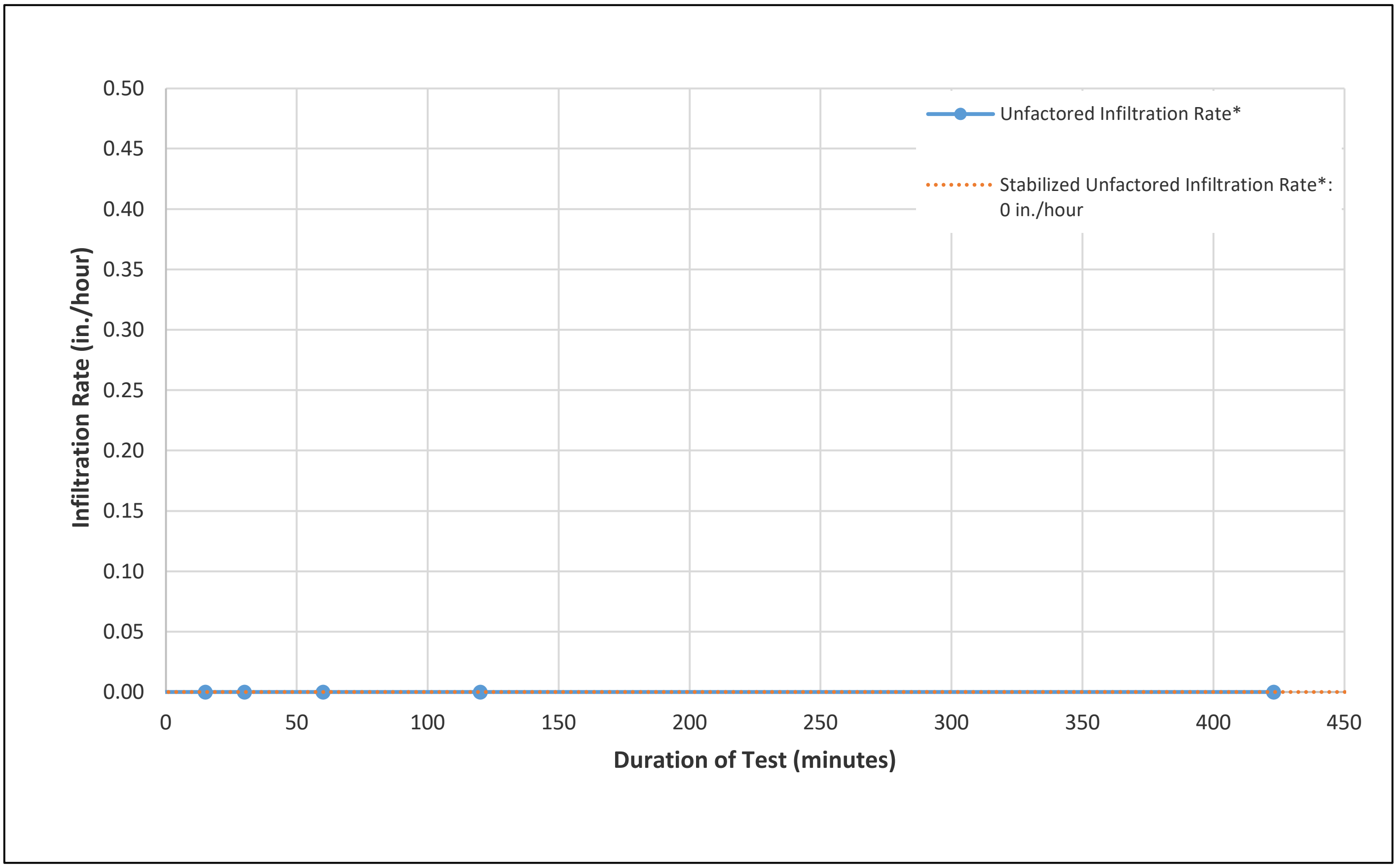
The field infiltration tests were conducted in general accordance with the City of San Diego requirements. The infiltration test wells were drilled to depths ranging from 5 to 6 feet (the boring logs are provided in Appendix A). Prior to testing, each well was cleared of loose soil and presoaked with water overnight. The water was then allowed to infiltrate into the soil with flow measurements taken at discrete time intervals. Each test was continued until a constant infiltration rate was attained.

The field testing indicated preliminary factored infiltration rates ranging from about 0.00 to 0.03 inches per hour and averaging 0.01 inches per hour (see Figures C-1.1 to C-4.2). Note that a Factor of Safety of 2.0 is recommended for BMP design. A threshold of 0.50 inches per hour is commonly considered the minimum rate for effective "Full Infiltration" measures. A threshold of 0.05 inches per hour is commonly considered the minimum rate for "Partial Infiltration" measures. The test results at this site are indicative of a "No Infiltration" condition per BMP guidelines.

BOREHOLE PERCOLATION TEST

Project Name:	Rady Children's	**Date Drilled:**	6/5/2021	**Borehole Radius (*r):**	3 in.
Project Number:	SD689	**Date Tested:**	6/6/2021	**Casing Diameter:**	4 in.
Test Hole Number:	I-1	**Tested By:**	T. Herrera	**Depth of Hole:**	5.3 ft
Drilling Method:	Hollow Stem	**Average Water Temperature:**	77 F	**Average Test Depth:**	2.2' - 5.3'

UNFACTORED INFILTRATION RATES* DURING TEST



Preliminary Factored Infiltration Rate[1]: 0.00 in./hr.

Feasibility Screening Factor of Safety, F.S.[2]: 2

Temperature Correction Factor[2,3]: 0.8

Factored Infiltration Rate[2]	Design Condition[2]
Below 0.05	No Infiltration
0.05 to 0.50	Partial Infiltration
Above 0.50	Full Infiltration

*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

1: Rate Factored by Factor of Safety and Temperature Correction Factor.

2: Reference: The City of San Diego, BMP Design Manual (2018).

3: Factor based on as-tested water temperature of 77 F and rainfall temperature of 60 F.

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	**BOREHOLE PERCOLATION TEST I-1 INFILTRATION RATE**	GROUP DELTA PROJECT NUMBER **SD689**	FIGURE NUMBER **C-1.1**

BOREHOLE PERCOLATION TEST

Project Name: Rady Children's
Project Number: SD689
Test Hole Number: I-1
Drilling Method: Hollow Stem

Date Drilled: 6/5/2021
Date Tested: 6/6/2021
Tested By: T. Herrera
Average Water Temperature: 77 F

Borehole Radius (*r): 4 in.
Casing Diameter: 4 in.
Depth of Hole: 5.3 ft
Gravel Base Thickness: 6 in.

DATA SHEET

Reading Number	Time Interval (min.)	Cumulative Time (min.)	Initial Depth to Water (ft.)	Final Depth to Water (ft.)	Avg. Height of Water above Gravel Base (in.)		Measured Drop in Water Level (in.)	Corrected Drop in Water Level[1] (in.)	Corrected Percolation Rate[1] (in./hour)	Unfactored Infiltration Rate* (in./hour)
	Δt	T	[from ground surface]		H_{avg}	X radius	ΔH	ΔH_c	$\Delta H_c/\Delta t$	I_t
Pre-soak	(1,200)	(1,200)	--	--	--	--	--	--	--	--
1	15	15	2.20	2.20	31.20	7.8*r	0.00	0.00	0.00	0.00
2	15	30	2.20	2.20	31.20	7.8*r	0.00	0.00	0.00	0.00
3	30	60	2.20	2.20	31.20	7.8*r	0.00	0.00	0.00	0.00
4	60	120	2.20	2.20	31.20	7.8*r	0.00	0.00	0.00	0.00
5	303	423	2.20	2.20	31.20	7.8*r	0.00	0.00	0.00	0.00

1: Porosity of gravel assumed to be 0.4 to correct drop in water. See text of Appendix C.
*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

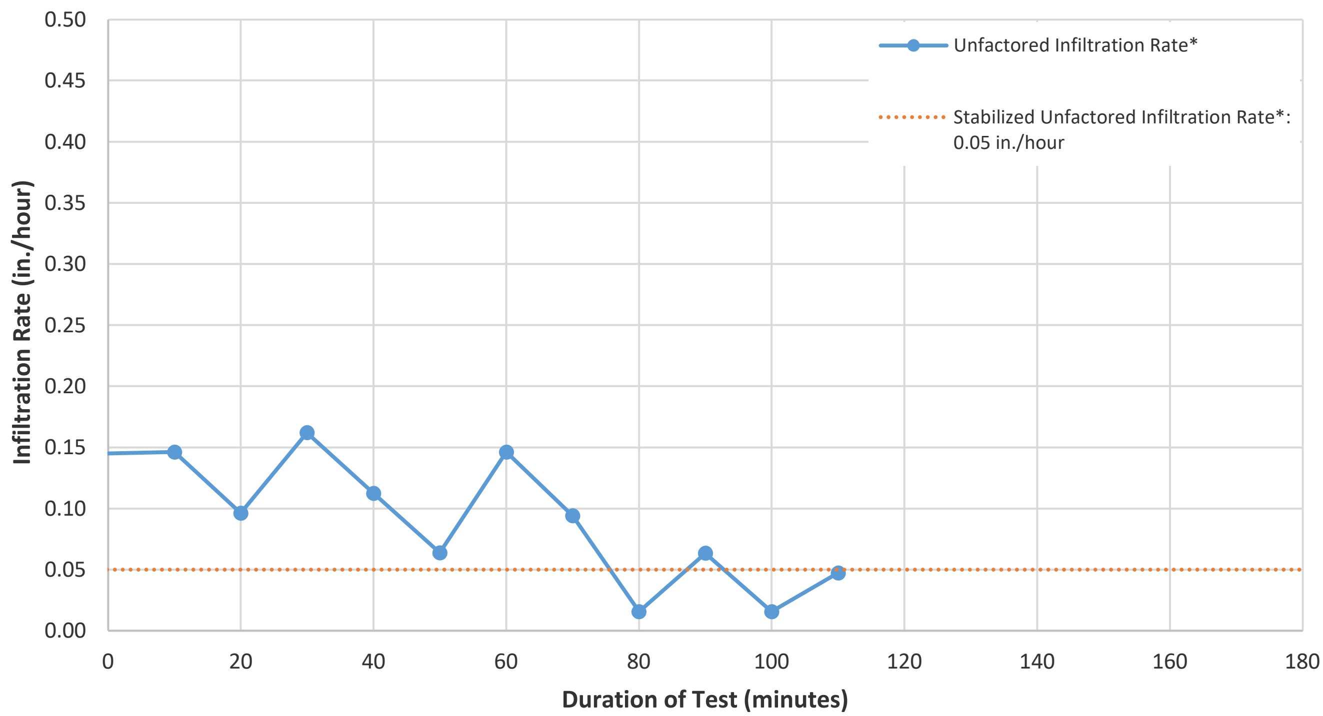
Stabilized, Unfactored Infiltration Rate*: 0.00 inch/hour

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	BOREHOLE PERCOLATION TEST I-1 INFILTRATION RATE	GROUP DELTA	
		PROJECT NUMBER	FIGURE NUMBER
		SD689	C-1.2

BOREHOLE PERCOLATION TEST

Project Name:	Rady Children's	**Date Drilled:**	6/5/2021	**Borehole Radius (*r):**	3 in.
Project Number:	SD689	**Date Tested:**	6/6/2021	**Casing Diameter:**	4 in.
Test Hole Number:	I-2	**Tested By:**	T. Herrera	**Depth of Hole:**	6.0 ft
Drilling Method:	Hollow Stem	**Average Water Temperature:**	78 F	**Average Test Depth:**	2.8' - 6'

UNFACTORED INFILTRATION RATES* DURING TEST



Preliminary Factored Infiltration Rate[1]: 0.02 in./hr.

Feasibility Screening Factor of Safety, F.S.[2]: 2

Temperature Correction Factor[2,3]: 0.78

Factored Infiltration Rate[2]	Design Condition[2]
Below 0.05	No Infiltration
0.05 to 0.50	Partial Infiltration
Above 0.50	Full Infiltration

*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

1: Rate Factored by Factor of Safety and Temperature Correction Factor.

2: Reference: The City of San Diego, BMP Design Manual (2018).

3: Factor based on as-tested water temperature of 78.0909090909091 F and rainfall temperature of 60 F.

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	**BOREHOLE PERCOLATION TEST I-2 INFILTRATION RATE**	GROUP DELTA PROJECT NUMBER **SD689**	FIGURE NUMBER **C-2.1**

BOREHOLE PERCOLATION TEST

Project Name: Rady Children's
Date Drilled: 6/5/2021
Borehole Radius (*r): 4 in.

Project Number: SD689
Date Tested: 6/6/2021
Casing Diameter: 4 in.

Test Hole Number: I-2
Tested By: T. Herrera
Depth of Hole: 6.0 ft

Drilling Method: Hollow Stem
Average Water Temperature: 78 F
Gravel Base Thickness: 6 in.

DATA SHEET

Reading Number	Time Interval (min.)	Cumulative Time (min.)	Initial Depth to Water (ft.)	Final Depth to Water (ft.)	Avg. Height of Water above Gravel Base (in.)		Measured Drop in Water Level (in.)	Corrected Drop in Water Level[1] (in.)	Corrected Percolation Rate[1] (in./hour)	Unfactored Infiltration Rate* (in./hour)
	Δt	T	[from ground surface]		H_{avg}	X radius	ΔH	ΔH_c	$\Delta H_c/\Delta t$	I_t
Pre-soak	(1,200)	(1,200)	--	--	--	--	--	--	--	--
1	10	10	2.85	2.94	31.26	7.8*r	1.08	0.40	2.43	0.15
2	10	20	2.83	2.89	31.68	7.9*r	0.72	0.27	1.62	0.10
3	10	30	2.84	2.94	31.32	7.8*r	1.20	0.45	2.70	0.16
4	10	40	2.83	2.90	31.62	7.9*r	0.84	0.31	1.89	0.11
5	10	50	2.83	2.87	31.80	8*r	0.48	0.18	1.08	0.06
6	10	60	2.85	2.94	31.26	7.8*r	1.08	0.40	2.43	0.15
7	10	70	2.77	2.83	32.40	8.1*r	0.72	0.27	1.62	0.09
8	10	80	2.80	2.81	32.34	8.1*r	0.12	0.05	0.27	0.02
9	10	90	2.81	2.85	32.04	8*r	0.48	0.18	1.08	0.06
10	10	100	2.80	2.81	32.34	8.1*r	0.12	0.05	0.27	0.02
11	10	110	2.80	2.83	32.22	8.1*r	0.36	0.14	0.81	0.05

1: Porosity of gravel assumed to be 0.4 to correct drop in water. See text of Appendix C.
*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

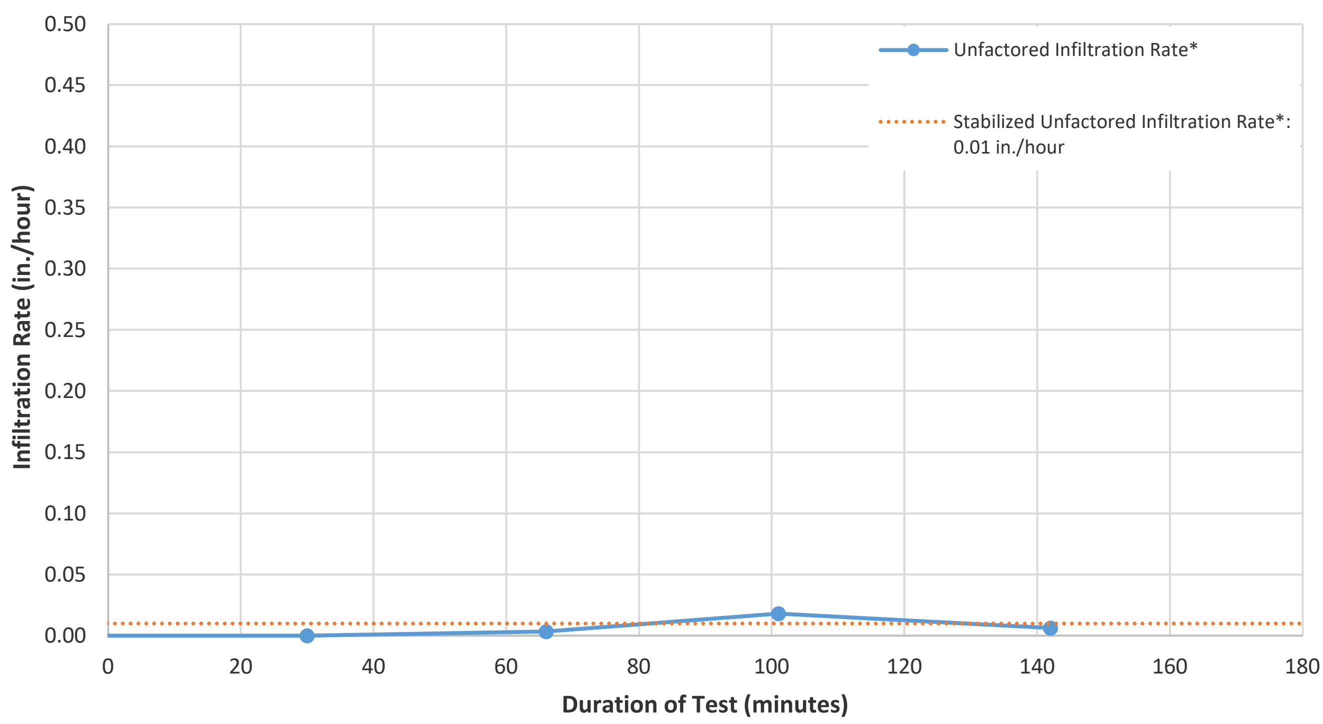
Stabilized, Unfactored Infiltration Rate*: 0.05 inch/hour

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	**BOREHOLE PERCOLATION TEST I-2 INFILTRATION RATE**	GROUP DELTA PROJECT NUMBER: **SD689** FIGURE NUMBER: **C-2.2**

BOREHOLE PERCOLATION TEST

Project Name:	Rady Children's	**Date Drilled:**	6/5/2021	**Borehole Radius (*r):**	3 in.
Project Number:	SD689	**Date Tested:**	6/6/2021	**Casing Diameter:**	3 in.
Test Hole Number:	I-3	**Tested By:**	T. Herrera	**Depth of Hole:**	4.8 ft
Drilling Method:	Hollow Stem	**Average Water Temperature:**	68 F	**Average Test Depth:**	2.4' - 4.8'

UNFACTORED INFILTRATION RATES* DURING TEST



Preliminary Factored Infiltration Rate[1]: 0.00 in./hr.

Feasibility Screening Factor of Safety, F.S.[2]: 2

Temperature Correction Factor[2,3]: 0.89

Factored Infiltration Rate[2]	Design Condition[2]
Below 0.05	No Infiltration
0.05 to 0.50	Partial Infiltration
Above 0.50	Full Infiltration

*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

1: Rate Factored by Factor of Safety and Temperature Correction Factor.

2: Reference: The City of San Diego, BMP Design Manual (2018).

3: Factor based on as-tested water temperature of 68 F and rainfall temperature of 60 F.

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	**BOREHOLE PERCOLATION TEST I-3 INFILTRATION RATE**	GROUP DELTA PROJECT NUMBER **SD689**	FIGURE NUMBER **C-3.1**

BOREHOLE PERCOLATION TEST

Project Name: Rady Children's
Project Number: SD689
Test Hole Number: I-3
Drilling Method: Hollow Stem

Date Drilled: 6/5/2021
Date Tested: 6/6/2021
Tested By: T. Herrera
Average Water Temperature: 68 F

Borehole Radius (*r): 4 in.
Casing Diameter: 3 in.
Depth of Hole: 4.8 ft
Gravel Base Thickness: 3 in.

DATA SHEET

Reading Number	Time Interval (min.)	Cumulative Time (min.)	Initial Depth to Water (ft.)	Final Depth to Water (ft.)	Avg. Height of Water above Gravel Base (in.)		Measured Drop in Water Level (in.)	Corrected Drop in Water Level[1] (in.)	Corrected Percolation Rate[1] (in./hour)	Unfactored Infiltration Rate* (in./hour)
	Δt	T	[from ground surface]		H_{avg}	X radius	ΔH	ΔH_c	$\Delta H_c/\Delta t$	I_t
Pre-soak	(1,200)	(1,200)	--	--	--	--	--	--	--	--
1	30	30	2.41	2.41	25.68	6.4*r	0.00	0.00	0.00	0.00
2	36	66	2.41	2.42	25.62	6.4*r	0.12	0.03	0.05	0.00
3	35	101	2.42	2.47	25.26	6.3*r	0.60	0.14	0.25	0.02
4	41	142	2.47	2.49	24.84	6.2*r	0.24	0.06	0.08	0.01

1: Porosity of gravel assumed to be 0.4 to correct drop in water. See text of Appendix C.
*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

Stabilized, Unfactored Infiltration Rate*: 0.01 inch/hour

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	BOREHOLE PERCOLATION TEST I-3 INFILTRATION RATE	GROUP DELTA — PROJECT NUMBER: SD689	FIGURE NUMBER: C-3.2

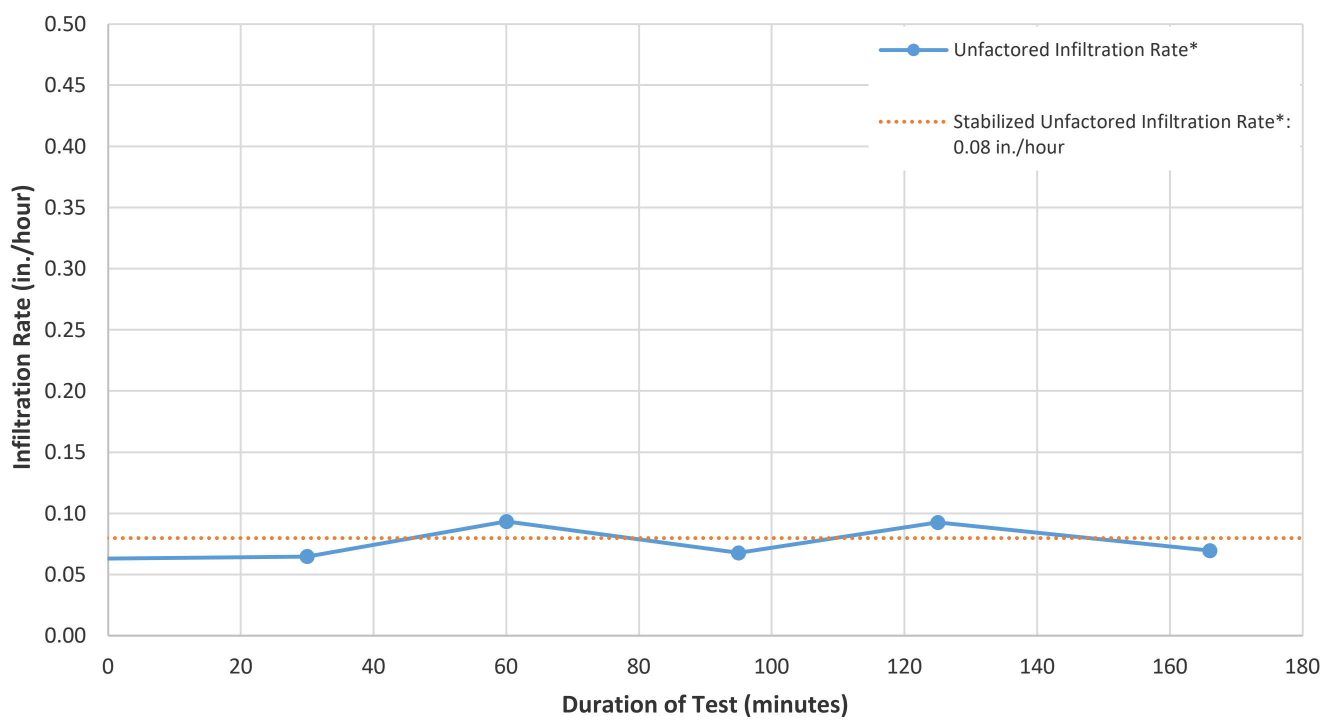
BOREHOLE PERCOLATION TEST

Project Name: Rady Children's
Project Number: SD689
Test Hole Number: I-4
Drilling Method: Hollow Stem

Date Drilled: 6/5/2021
Date Tested: 6/6/2021
Tested By: T. Herrera
Average Water Temperature: 75 F

Borehole Radius (*r): 3 in.
Casing Diameter: 3 in.
Depth of Hole: 5.2 ft
Average Test Depth: 2.1' - 5.2'

UNFACTORED INFILTRATION RATES* DURING TEST



Preliminary Factored Infiltration Rate[1]: 0.03 in./hr.

Feasibility Screening Factor of Safety, F.S.[2]: 2

Temperature Correction Factor[2,3]: 0.82

Factored Infiltration Rate[2]	Design Condition[2]
Below 0.05	No Infiltration
0.05 to 0.50	Partial Infiltration
Above 0.50	Full Infiltration

*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

1: Rate Factored by Factor of Safety and Temperature Correction Factor.

2: Reference: The City of San Diego, BMP Design Manual (2018).

3: Factor based on as-tested water temperature of 75 F and rainfall temperature of 60 F.

Rady Children's Hospital Main Campus Master Plan Infiltration Assessment	BOREHOLE PERCOLATION TEST I-4 INFILTRATION RATE	GROUP DELTA PROJECT NUMBER: SD689 FIGURE NUMBER: C-4.1

BOREHOLE PERCOLATION TEST

Project Name: Rady Children's
Project Number: SD689
Test Hole Number: I-4
Drilling Method: Hollow Stem

Date Drilled: 6/5/2021
Date Tested: 6/6/2021
Tested By: T. Herrera
Average Water Temperature: 75 F

Borehole Radius (*r): 4 in.
Casing Diameter: 3 in.
Depth of Hole: 5.2 ft
Gravel Base Thickness: 2 in.

DATA SHEET

Reading Number	Time Interval (min.)	Cumulative Time (min.)	Initial Depth to Water (ft.)	Final Depth to Water (ft.)	Avg. Height of Water above Gravel Base (in.)		Measured Drop in Water Level (in.)	Corrected Drop in Water Level[1] (in.)	Corrected Percolation Rate[1] (in./hour)	Unfactored Infiltration Rate* (in./hour)
	Δt	T	[from ground surface]		H_{avg}	X radius	ΔH	ΔH_c	$\Delta H_c/\Delta t$	I_t
Pre-soak	(1,200)	(1,200)	--	--	--	--	--	--	--	--
1	30	30	2.28	2.47	31.90	8*r	2.28	0.55	1.10	0.06
2	30	60	1.85	2.16	36.34	9.1*r	3.72	0.90	1.79	0.09
3	35	95	2.16	2.40	33.04	8.3*r	2.88	0.69	1.19	0.07
4	30	125	1.93	2.23	35.44	8.9*r	3.60	0.87	1.73	0.09
5	41	166	2.23	2.51	31.96	8*r	3.36	0.81	1.18	0.07

1: Porosity of gravel assumed to be 0.4 to correct drop in water. See text of Appendix C.
*Porchet method used to convert percolation rate to infiltration rate. See Appendix C.

Stabilized, Unfactored Infiltration Rate*: 0.08 inch/hour

Rady Children's Hospital
Main Campus Master Plan
Infiltration Assessment

BOREHOLE PERCOLATION TEST I-4
INFILTRATION RATE

GROUP DELTA

PROJECT NUMBER: **SD689**
FIGURE NUMBER: **C-4.2**

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions[9]

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]
Part 1 - Full Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		Project Phase:
Shallow BMP		Preliminary
Criteria 1: Infiltration Rate Screening		
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ☒ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).	
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ☒ Yes; Continue to Step 1C. ☐ No; Skip to Step 1D.	
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ☒ No; full infiltration is not required. Answer "No" to Criteria 1 Result.	
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ☒ Yes; continue to Step 1E. ☐ No; select an appropriate infiltration testing method.	

[9] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ☒ Yes; continue to Step 1F. ☐ No; conduct appropriate number of tests.	
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ☒ Yes; continue to Step 1G. ☐ No; select appropriate factor of safety.	
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ☐ Yes; answer "Yes" to Criteria 1 Result. ☒ No; answer "No" to Criteria 1 Result.	
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ☒ No; full infiltration is not required. Skip to Part 1 Result.	
Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report. The four borehole percolation tests all indicated factored infiltration rates of less than 0.05 inches (see Figures C-1.1 through C-4.2). The approximate infiltration test locations are shown on the Exploration Plans, Figures 3A and 3B. The Hydrologic Soil Map indicates a Soil Type D (see final attachment in Appendix D). The site is a "No Infiltration" condition per the 2018 City of San Diego BMP guidelines (less than 0.05 inches per hour).		

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	☐ Yes	☒ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☒ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☒ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☒ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☒ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☒ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☒ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☒ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☒ No

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions</th><th colspan="2">Worksheet C.4-1: Form I-8A[10]</th></tr>
<tr><td>2C</td><td>Mitigation Measures. Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures.

Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered “Yes,” then answer “Yes” to Criteria 2 Result.
If the question in Step 2C is answered “No,” then answer “No” to Criteria 2 Result.</td><td>☐ Yes</td><td>☒ No</td></tr>
<tr><td>Criteria 2 Result</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?</td><td>☐ Yes</td><td>☒ No</td></tr>
<tr><td colspan="4">Summarize findings and basis; provide references to related reports or exhibits.

The four borehole percolation tests all indicated factored infiltration rates of less than 0.05 inches (see Figures C-1.1 through C-4.2). The approximate infiltration test locations are shown on the Exploration Plans, Figures 3A and 3B. The Hydrologic Soil Map indicates a Soil Type D (see final attachment in Appendix D). The site is a "No Infiltration" condition per the 2018 City of San Diego BMP guidelines (less than 0.05 inches per hour).</td></tr>
<tr><th colspan="2">Part 1 Result – Full Infiltration Geotechnical Screening [12]</th><th colspan="2">Result</th></tr>
<tr><td colspan="2">If answers to both Criteria 1 and Criteria 2 are “Yes”, a full infiltration design is potentially feasible based on Geotechnical conditions only.

If either answer to Criteria 1 or Criteria 2 is “No”, a full infiltration design is not required.</td><td colspan="2">☐ Full infiltration Condition

☒ Complete Part 2</td></tr>
</table>

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		Project Phase:
Criteria 3 : Infiltration Rate Screening		
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ☒ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.	
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ☒ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.	
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ☐ Yes; Continue to Criteria 4. ☒ No: Skip to Part 2 Result.	
Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate). The four borehole percolation tests all indicated factored infiltration rates of less than 0.05 inches (see Figures C-1.1 through C-4.2). The approximate infiltration test locations are shown on the Exploration Plans, Figures 3A and 3B. The Hydrologic Soil Map indicates a Soil Type D (see final attachment in Appendix D). The site is a "No Infiltration" condition per the 2018 City of San Diego BMP guidelines (less than 0.05 inches per hour).		

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	☐ Yes	☒ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	☐ Yes	☒ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	☐ Yes	☒ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1 If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	☐ Yes	☒ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	☐ Yes	☒ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	☐ Yes	☒ No
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	☐ Yes	☒ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	☐ Yes	☒ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	☐ Yes	☒ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	☐ Yes	☒ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[10]	
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	☐ Yes	☒ No
Summarize findings and basis; provide references to related reports or exhibits. The four borehole percolation tests all indicated factored infiltration rates of less than 0.05 inches (see Figures C-1.1 through C-4.2). The approximate infiltration test locations are shown on the Exploration Plans, Figures 3A and 3B. The Hydrologic Soil Map indicates a Soil Type D (see final attachment in Appendix D). The site is a "No Infiltration" condition per the 2018 City of San Diego BMP guidelines (less than 0.05 inches per hour).			

Part 2 – Partial Infiltration Geotechnical Screening Result[13]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	☐ Partial Infiltration Condition ☒ No Infiltration Condition

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

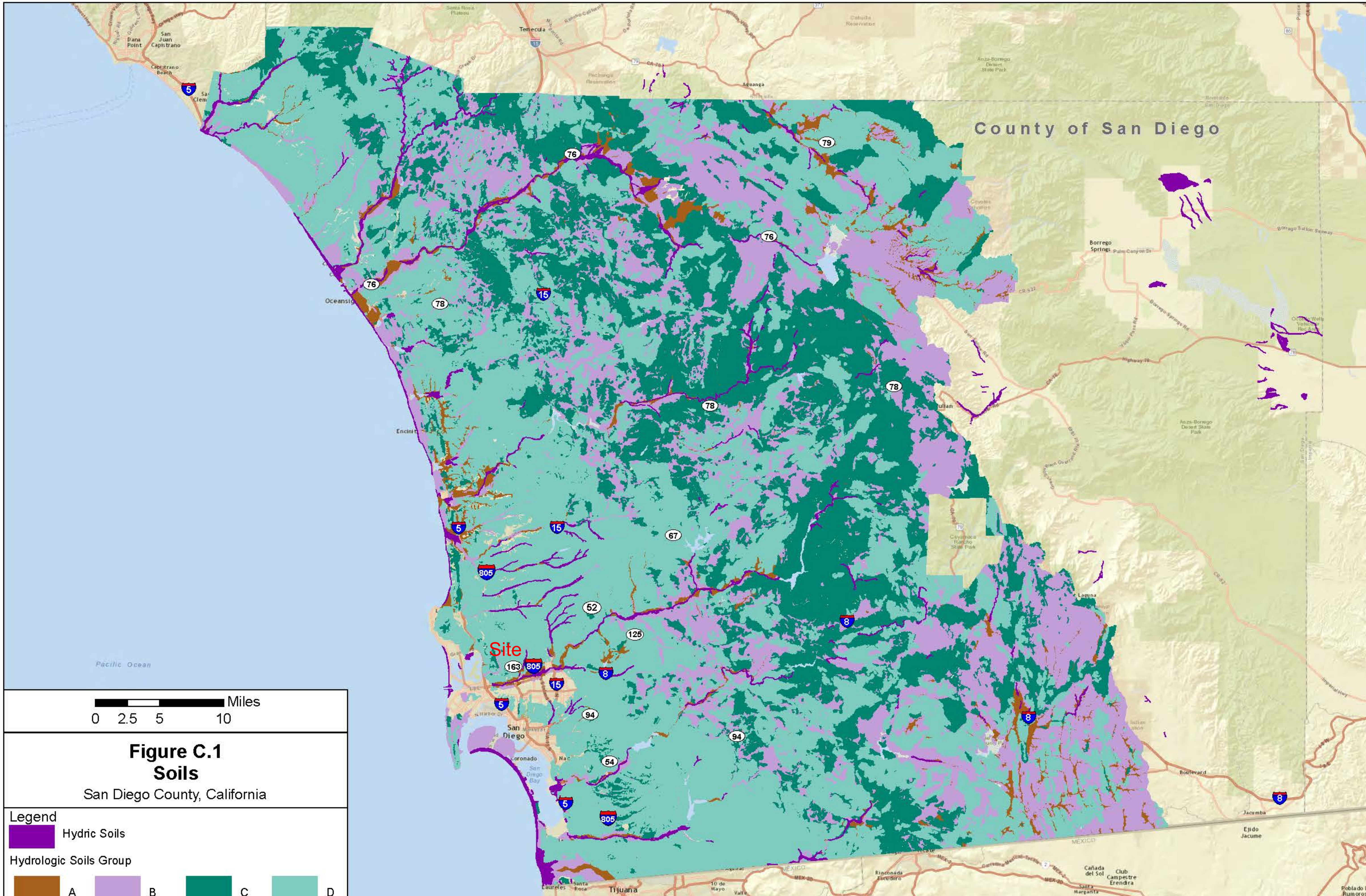
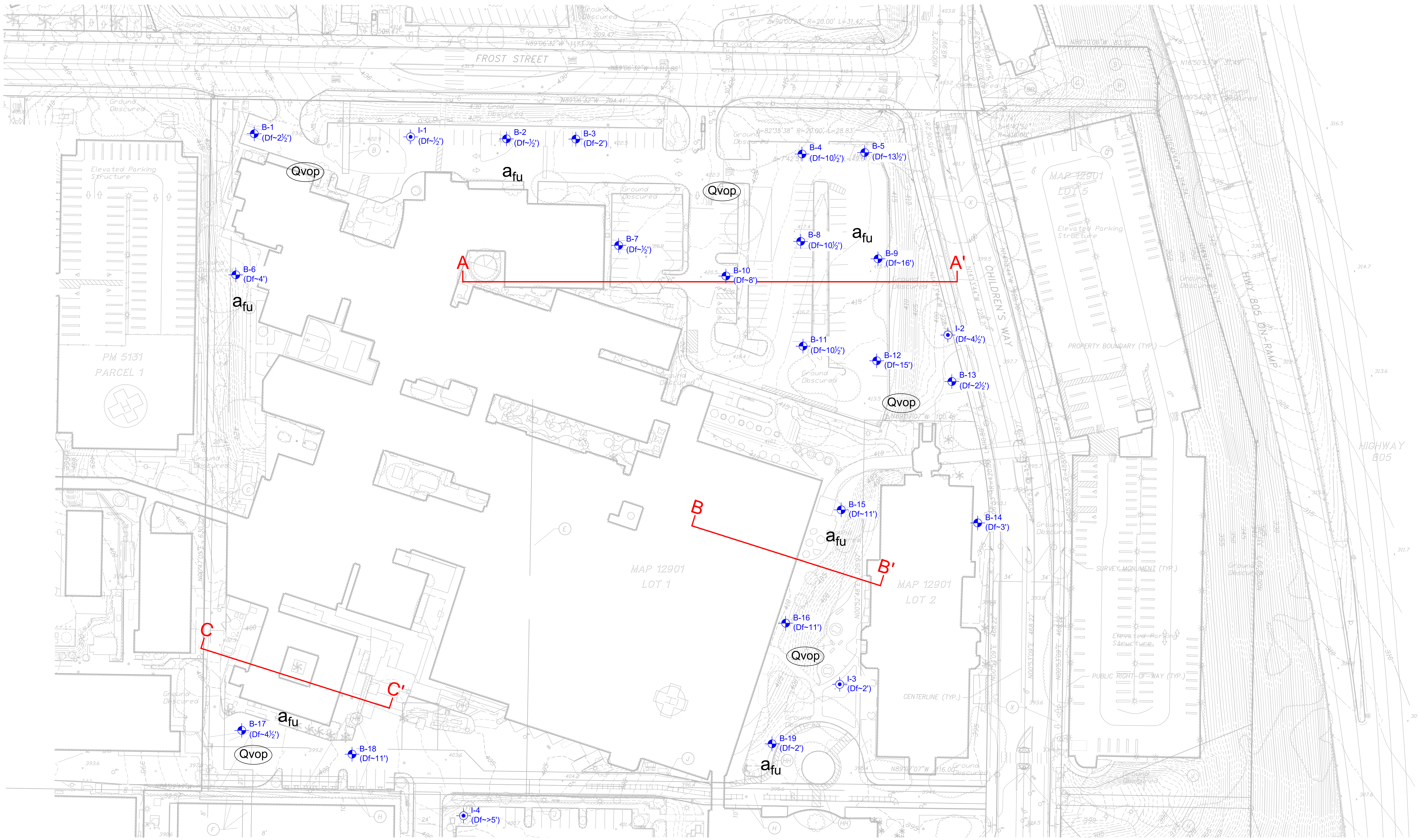


Figure C.1
Soils
San Diego County, California

PLATES



REFERENCE: BASE MAP, BY SB&O INC., DATED, 10/9/2020

LEGEND:

a_{fu}	UNDOCUMENTED FILL
Qvop	VERY OLD PARALIC DEPOSITS, CIRCLED WHERE BURIED
B-19	APPROXIMATE BORING LOCATIONS, WITH DEPTH OF FILL (Df) SHOWN
I-4	APPROXIMATE PERCOLATION TEST LOCATIONS
A–A'	CROSS SECTION LOCATION

0 40' 80'

REFERENCE: BASE MAP BY SB&O INC., DATED, 10/09/2020

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PROJECT NAME
Rady Children's Hospital
Jacobs

PROJECT NUMBER
SD689

DOCUMENT NUMBER
21-0065

PLATE NUMBER
1

GEOTECHNICAL MAP