GEOTECHNICAL RECOMMENDATIONS
PARCEL "F"
A-TOWN METRO PROJECT
1404 E. KATELLA AVENUE
ANAHEIM, CALIFORNIA

Prepared for

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Group Delta Project No. IR392H

August 27, 2021

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August 27, 2021
Project No. IR392H

Attention: Ms. Vivian Gianetti Extale
Project Manager

SUBJECT: GEOTECHNICAL RECOMMENDATIONS
PARCEL "F"
A-TOWN METRO PROJECT
1404 E. KATELLA AVENUE
ANAHEIM, CALIFORNIA

Dear Ms. Extale:

Group Delta Consultants (Group Delta) submits this updated geotechnical report for Parcel "F" in the A-Town Metro Project in Anaheim, California. The work was performed in general accordance with our proposal dated July 29, 2021. Our original report for Parcel F was issued on June 5, 2007. The 2007 report included recommendations for at grade residential buildings which consist of 4-story at-grade Type 5 wooden constructions and separate at-grade 5-story concrete parking structure. Since the development of our previous report, Parcel F has expanded to include addition property to the east. The results of our evaluation and our foundation recommendations for development of the subject parcel are presented in the following report. The recommendations contained, herein, account for the site history.

Should you have any questions regarding this report, please feel free to call us at 949-450-2100.

Sincerely,

GROUP DELTA CONSULTANTS, INC.

Michael Givens, PhD, PE, GE, PG
Associate Geotechnical Engineer

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1.0 INTRODUCTION

This report presents our recommendations for the foundation design of the proposed 3 to 4-story residential buildings at Parcel "F" within the A-Town Metro Project at 1404 Katella Avenue, in Anaheim California. A-Town Metro Project consists of a development of eight parcels for the construction of residential and commercial buildings and one public park on a total area of 44.6 acres. Previously, the site was divided into 13 parcels. The current Parcel F includes the former Parcels F and additional expansion towards the east from the original geotechnical report issued on June 5, 2007. The site location is presented on the Vicinity Map in Figure 1. The Parcel "F" site improvements are shown in Figure 2.

The subject site (Parcel "F") is located east of Union Street and South of Park Street as shown in Figure 2. The area used to be occupied with office buildings and a paved parking lot.

1.1 Objectives of the Geotechnical Evaluation

The objective of this report is to provide updated site-specific geotechnical recommendations for the final design and construction of the proposed structures on Parcel "F".

1.2 Scope of Work

We performed the following general scope of work to fulfill the objectives of our services. Our scope of work for Parcel "F" included the following tasks:

- Review the preliminary geotechnical report for the project (Leighton, 2004);
- Review the previous investigation and geotechnical report (Group Delta Consultants, 2007);
- Perform limited field investigation, and laboratory testing;
- Perform in-hole permeability testing;
- Perform geotechnical analyses to develop recommendations for the final foundation design and construction of the proposed structures; and
- Document our analyses and recommendations in this report.

1.3 Project Description

The subject site (Parcel "F") is located within the A-Town Metro development, east of Union Street and south of Park Street as shown on Figure 2. The area used to be occupied by commercial buildings and paved parking lots that had been demolished prior to our field investigation. Parcel

F has been extended to include additional east bound area from the original proposed construction in 2007. The proposed residential buildings will have a 3 to 4-story at-grade wooden construction site improvement plan, Figure 2.

Prior to our 2007 field investigation all buildings and parking lots were demolished to the approximate elevation of El. +146 feet to El. +149 feet. The 2007 development included 4-story at-grade Type 5 wooden construction and a separate at-grade 4 to 5-story concrete parking structure. The project was then put on hold for several years.

2.0 GEOTECHNICAL INVESTIGATION

2.1 Previous Field and Laboratory Investigation

Group Delta Consultants' (Group Delta) performed a field exploration within the A-Town Metro Project in 2007. The field investigation consisted of drilling hollow stem auger boring B-26 and CPT soundings C-39 and C-40 on March 8, 2007 within the current Parcel F. The CPT's were pushed to depths of 50 feet below the ground surface and the borings were drilled to a depth of 51.5 feet. A previous field investigation was performed on March 2, 2006, which included drilling one hollow stem auger (B-9) to a maximum depth of 116.5 feet bgs. Figure 3 shows the location of the borings and CPTs performed at the subject site.

Laboratory testing was performed on the samples recovered from the borings. The laboratory tests included: moisture content and dry density, fines content (percent passing No. 200 sieve), Atterberg limits, grain size analyses, pocket penetrometer, direct shear, and corrosivity tests. The boring and CPT logs are presented in Appendix A. The results of the laboratory tests are presented in Appendix B.

2.2 Previous Investigations by Others

Prior to Group Delta investigation, a preliminary site investigation was performed at the site by Leighton in 2004 (Leighton, 2004). Group Delta had reviewed the results of this preliminary investigation, which included boring BH-6 drilled to a depth of 103.5 feet within Parcel "F". The results of previous investigation are presented in Appendix A and the locations of this boring is also shown on Figure 3.

2.3 Current Limited Field Exploration

A limited field exploration was performed by Group Delta for the current Parcel F on August 16, 2021, which consisted of drilling three (3) HSA borings to a maximum depth of 19.0 feet bgs. The locations of our current field exploratory borings are also shown on Figures 3.

Prior to any field investigation, Underground Service Alert (USA) was notified of each exploration location for identifying possible subsurface utilities.

Bulk samples and relatively undisturbed drive samples of representative soil layers were obtained during drilling at appropriate 5-foot depth intervals. Blow counts were recorded for both standard penetration test (SPT-N value) and California Modified Samplers. Upon withdrawal from borings, the samples were cleaned, the material was classified visually, and the information was entered a field boring log by the field engineer. Visual descriptions and classifications of samples were performed in accordance with ASTM D2488 procedures. Samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the laboratory for further evaluation. Soil samples were handled and transported to our laboratory in accordance with ASTM D4220 guidelines.

Completed borings were backfilled with tamped soil cuttings and surface was restored to original condition.

Details of the exploration program and the boring logs are presented in Appendix A.

2.4 Current Limited Lab Testing Program

Laboratory testing on samples of the soils obtained from the current field investigation were performed in accordance with ASTM and/or Caltrans specifications for laboratory testing. The laboratory testing program consisted of the following:

- In-situ Moisture Content and Dry Density;
- Grain Size Analysis;
- Materials Finer than No. 200;
- Soil Corrosivity.

The performed tests are identified on the boring logs in Appendix A and laboratory test results are presented in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Regional Geology

The site is located within the Los Angeles Basin which is part of the Peninsular Range Geomorphic Province of California. The Peninsular Ranges are characterized by a series of northwest trending mountain ranges separated by valleys. Range geology consists of granitic rock intruding the older metamorphic rocks. Valley geology is typified by shallow to deep alluvial basins consisting of gravel, sand, silt, and clay.

Based on the geologic maps, the site is situated on Holocene alluvial soils. The near surface soils are characterized by medium dense sands and silty sands. Figure 4 shows the regional geologic map of this section of Orange County.

3.2 Site Conditions

Construction observation for the mass grading of the overall A-Town Metro Project was performed in 2014 by Group Delta. Based on reviewing the compaction report dated February 13, 2014, only the northwestern portion of parcel F was included in the previous grading, and the remainder of the current parcel F was not included within the mass grading efforts.

The Site is generally flat and has an approximate elevation of 146 feet to 148 feet mean sea level (MSL). Two basin embankments were observed within the northern area of parcel F. The smaller of the two basins is located within the area that was previously graded. The inclination of the basins is about 2H:1V (horizontal: vertical). The site is currently vacant with the exception of construction storage area near the south portion of the parcel. Construction storage area is surrounded by a silt fence and stored with construction material containers.

3.3 Subsurface Conditions

Previous field explorations at the site indicated the borings and CPTs by Group Delta and Leighton were performed from the site grade elevation of about El. 145 ft to El. 147 feet. The site consisted of sands and silty sand to about 37 feet depth. The silty sands to a depth of 37 feet below the ground surface are generally medium dense to very dense in consistency with cone tip resistance of 90 and 300 tsf.

Below this layer, a zone of sands interbedded with clays and silts from 37 to 103 feet. The sands were found to be dense to very dense and clays are stiff to hard.

The current limited field investigation performed on August 16, 2021 encountered clayey sand (SC), silty sand (SM) at the upper 5 feet, and silty sand (SM) and poorly graded sand (SP) below 5 feet to a maximum explored depth of 20.5 feet bgs. The materials were generally medium dense to very dense in consistency, with the exception of boring B-3, where loose sands were encountered at a depth of 5 feet below grade. B-3 is located in an area of Parcel F which was not previously graded. This indicates that loose sandy materials are present up to a depth of approximately 6 feet, in portions of Parcel F, where mass grading was not previously performed.

3.4 Groundwater

Groundwater was not encountered in our recent field exploration to depths of 20.5 feet below the site grade. Groundwater was encountered at the site in the Leighton boring (BH-6) April 2005 at a depth of 82.5 feet. Additionally, groundwater was encountered in Group Delta boring (B-9) March 2006 at a depth of 76 feet. Groundwater in other borings within the development was encountered at depths deeper than 65 to feet below the ground surface. Historic groundwater at the site is deeper than 50 feet. Figure 5 shows the historic high groundwater table for the property.

3.5 Infiltration Rates

Our current limited field investigation included percolation testing at one locations (B-1) as shown in Figure 3. B-1 was drilled using the truck mounted rig to a maximum depth of 19 feet bgs. Groundwater was not encountered at the explored depths at the percolation test locations. Our field procedures were conducted in accordance with the Orange County Technical Guidance Document (OCTGD) for the Water Quality Management Plan (WQMP).

Percolation testing at B-1 was performed in accordance with the OCTGD Section VII, Infiltration Rate Protocol and Factor of Safety Recommendations. The wells were installed using 2-inch-diameter schedule 40 PVC solid and screen-wall casing. Logs of the percolation borings are shown in Appendix A. After the completion of the percolation tests, the wells were abandoned, PVC pipes were removed, and the boreholes backfilled with either tamped soil cuttings. The results of the percolation field tests are summarized in Table 1 and provided in Appendix C.

Table 1: Field Unfactored Infiltration Rates

Test ID (Boring)	Approximate Ground Elevation (feet)	Location	Field Infiltration Rate (in/hr)	Predominant Soil Type	Bottom of test hole Elevation (feet)	Depth of Test Interval (feet)
B-1	148	Parcel F	9.7	SP	129	14 to 19

The rates reported are unfactored infiltration rate measured in the field per the described procedure. The Civil Engineer should use the information to calculate factored infiltration rates as appropriate for the proposed BMPs.

To account for plugging of infiltration facilities, post-grading compaction, testing procedures, and the presence of layers of fine-grained soils, OCTGD recommends using a factor of safety to determine design infiltration rates. We recommend that procedure from OCTGD, as shown in Appendix C, should be used to determine factor of safety. We recommend that design factor of safety should be provided to us for review.

A successful BMP should satisfy the following conditions.

1. Meet the requirements of the County of Orange Technical Guidance (OCTGD) for the Project Water Quality Management Plans (2013)
2. Should not release water within 10 feet of the permanent groundwater table
3. Should not release water at depths where it could adversely affect nearby structures, roads, and wall footings.

Each of the three conditions is discussed in the below with respect to the project site.

1. The soil within the percolation zones in both tests meets the minimum infiltration criteria by the County of Orange.
2. The historic high groundwater table is greater than 50 feet deep. Water should not be discharged within 10 feet of the permanent groundwater table.
3. At this time, information with regard to the distance of the proposed stormwater vaults with respect to the future structure foundations, roads, and underground utilities trenches is preliminary.

4.0 POTENTIAL SEISMIC AND GEOLOGIC HAZARDS

4.1 Potential Seismic Hazards

Potential geologic and seismic hazards for any site include ground rupture, slope instability, lateral spreading, subsidence, liquefaction, seismic compaction and settlement, tsunamis / flooding, and seismic shaking.

4.2 Ground Surface Rupture

The site is not located within an Alquist-Priolo Earthquake Fault Zone. The closest faults are the Puente Hills and San Joaquin Hills Thrust Faults located at distances of about 9.1 and 9.3 miles from the site, respectively. Newport-Inglewood and Whittier Fault Zones are located at distances of about 10.7 and 9.6 miles from the site, respectively. Due to the large distances of active faults from the site, ground surface rupture is not a significant hazard. A Regional Fault Map is shown in Figure 6.

4.3 Seismic Slope Stability

The site is generally level and no post-construction slopes are planned. Therefore, slope stability is not considered a hazard at the site. This is consistent with the California Seismic Hazard Zone Map for the Anaheim 7.5-minute Quadrangle, which shows that the site is not within a seismic-induced landslide hazard zone area.

4.4 Liquefaction Potential

For liquefaction to occur, three conditions must simultaneously exist: loose to medium dense granular soils, saturation of the soils by groundwater (typically the upper 50 feet), and strong earthquake ground motions.

Strong earthquake ground motions should be expected at the site during the life of the structure. The current and historic groundwater levels are deeper than 50 feet, therefore liquefaction potential is very low.

4.5 Other Seismic Hazards

Zones of loose and medium dense clean sands are presented above the water table and as such seismic compaction may result in settlement of about 0.5 inch at the site. The site has no known history of subsidence. The site is generally level and no post-construction slopes are planned. Therefore, slope stability is not a hazard at the site. All low-lying areas along California's coast are subject to potentially dangerous tsunamis. Due to the distance from the ocean and site elevation (EL. 148), tsunamis are not a hazard at the site.

4.6 Flood Hazard Zone

Figure 7 shows that the site is not in a flood hazard zone as defined by the United States Federal Emergency Management Agency.

4.7 Seismic Design Parameters per CBC 2019/ASCE -16

Seismic design acceleration parameters were developed per the 2019 California Building Code (CBC) and ASCE 7-16 (ASCE/SEI 7-16) for the proposed project and are presented in Table 1. Based on the underlying geology, subsurface exploration data, and previous reports, the site classification for seismic design is Site Class D per Chapter 20 of ASCE 7-16. The site coordinates used in our seismic hazard analysis are -117.89179 (Longitude) and 33.801879 (Latitude).

Table 2: 2019 California Building Code Seismic Design Parameters from ASCE 7-16

Design Parameters	General Seismic Design Parameter (ASCE 7-16 Section 11.4)
S_s (g)	1.399
S_1 (g)	0.496
Site Class	D
F_a	1
F_v	1.804
S_{MS} (g)	1.399
S_{M1} (g)	0.896
S_{DS} (g)	0.933
S_{D1} (g)	0.597[(1)]

Mapped design acceleration parameters determined per ASCE 7-16 Section 11.4 for Site Class D are presented in Table 1. Based on Section 11.4.8 of ASCE 7-16, if desired, these values may only be used if Exception 2 is met:

- If $T \leq 1.5\ T_S$: The value of the seismic response coefficient C_S is determined by Eq. (12.8-2), i.e., S_{DS} is used to obtain C_S

- If $T \geq 1.5\ T_S$: The value of seismic response coefficient C_S is taken as ***1.5 times*** the value computed in Eq. (12.8-3), i.e., ***1.5***$*S_{D1}$ is used to obtain C_S, or

- If $T > TL$: The value of seismic response coefficient C_S is taken as 1.5 times the value computed in Eq. (12.8-4), i.e., $1.5*S_{D1}$ is used to obtain C_S.

5.0 FOUNDATION RECOMMENDATIIONS

5.1 General

Mass grading of the overall A-Town Metro Project was performed in 2014, and construction observation was performed by Group Delta. Loose and/or unsuitable soils were primarily removed in areas that were mass graded. Based on reviewing the compaction report dated February 13, 2014, only the northwestern portion of parcel F was included during mass grading. Also, since around early 2017, a basin has been excavated near the northwestern corner of Parcel F, which likely has disturbed soils in part of the previously graded areas. The remainder of the current parcel F was not included within the mass grading efforts. Figure 3 delineates the areas of the site that were previously mass graded, as well as areas where mass grading is still required within Parcel F.

Remedial grading including removal and recompaction of the upper 6 feet of the subsurface soils is required in areas where mass grading had not previously been performed, or where subsequent excavations may have disturbed the near-surface soils.

Following the grading recommendations of this report, the proposed buildings can be shallow spread footing, and slab-on-grade, and or post-tension slabs. The shallow foundations recommendations are provided in the following section.

5.2 Shallow Foundation Recommendations

5.2.1 Subgrade Preparation

In areas of the site, where mass grading was not previously performed, remedial grading should include removal and recompaction of the upper 6 feet of the subsurface soils to a minimum of 90% relative compaction in accordance with ASTM D-1557.

In areas of the site, where mass grading was previously performed, grading should include excavation of the soils to subgrade elevation, followed by scarification of the upper 10-inches of the subgrade, moisture conditioning near optimum moisture content (+2%), and recompaction to a minimum of 90% relative compaction in accordance with ASTM D-1557.

All footing excavations should be observed by Group Delta before placement of concrete to verify that the foundation conditions meet the requirements of the geotechnical report. Group Delta may require compaction tests or proof rolling of the subgrade to verify that the foundations will be supported in competent soils. If loose, disturbed or otherwise unsuitable soils are encountered at the foundation depth, they shall be removed and replaced with compacted granular fill or lean concrete slurry as recommended by Group Delta.

5.2.2 Bearing Capacity

The following design criteria are recommended for the footings founded on engineered fill or competent natural sandy soils:

- Shallow spread footings should have a minimum dimension of 2 feet.
- Shallow continuous footings should have a minimum dimension of 1.5 feet.
- Locate the bottom of the footing at least 2 feet below the adjacent grade.
- Design the footings bearing using an allowable bearing pressure of 2.0 ksf.

The allowable bearing pressure may be increased by one-third for transient loading conditions. At an allowable bearing capacity of 2 ksf, the foundation settlement is estimated to be less than one inch. The allowable pressures above may be increased by 33% for short-term transient loading conditions such as wind or seismic.

All footing excavations should be observed by Group Delta before placement of concrete to verify that the foundation conditions meet the requirements of the geotechnical report. Group Delta may require compaction tests or proof rolling of the subgrade to verify that the foundations will be supported in competent soils. If loose, disturbed or otherwise unsuitable soils are encountered at the foundation depth, they shall be removed and replaced with compacted granular fill as recommended by Group Delta.

5.2.3 Post-Construction Settlement

Settlement will depend on column loads. We estimate the footing settlement to be less than about 1 inch. Most of the settlement is anticipated to occur during or shortly after application of structural loads. Post-construction differential settlement between similarly loaded foundations is estimated to be on the order of 1/2 inch.

5.2.4 Lateral Resistance

For footings placed in compacted fill or native soils on level ground above the water table, we recommend an ultimate passive fluid pressure of 350 pcf. We recommend an ultimate sliding friction coefficient of 0.45 for design. Passive and sliding resistance may be used in combination

without reduction. The required factor of safety is 1.5 for static loads and 1.1 for wind or seismic loads.

5.2.5 Slabs-on-Grade

Concrete slab-on-grade floors should be supported on onsite sandy compacted fill at the subgrade level. Contingent on following the grading recommendations of this report, the slabs-on-grade, and/or post-tension slabs are anticipated to be supported compacted sandy fills of medium dense to dense consistency.

Modulus of subgrade reaction for the design of the slabs-on-grade and post-tension slabs may be obtained from the following formula:

$$k_b = 250 \{(B+1)/2B\}^2$$

Where B is the footing width and kb is the modulus of subgrade reaction in kips / cubic feet (kcf).

5.2.6 Post Tensioned Slab Design Parameters

The soil at the site are generally non-expansive or have a very low expansion potential. The design parameters for the post tensioned slab to resist the very low expansive materials are provided in Table 2 below:

Table 3: Post-Tensioned Slab Foundation Design Recommendation

Design Parameter		Value
Plasticity Index		0-15
Expansion Index		0-20
Percent Passing No. 200 Sieve		15-40
Thornthwaite Moisture Index		-20
Depth of Constant Soil Suction (feet)		3.6
Center Lift	Edge Moisture Variation Distance, e_m, (feet)	9.0
	Center Lift, y_m, (inches)	-0.15
Edge Lift	Edge Moisture Variation Distance, e_m, (feet)	5.0
	Edge Lift, y_m, (inches)	0.25

5.2.7 Moisture Barrier

To reduce the potential for moisture transmission through slabs where moisture sensitive floor covering will be installed, we recommend that a vapor barrier be used. The membrane may be placed directly on top of soils. A membrane greater than 15 mil is recommended, however, a 10-mil membrane may be used if manufacturer sheet is provided to the Geotechnical Engineer for review. A 2-inch thick layer of sand above the membrane may be required to prevent curl during curing. However, if the concrete mix is properly designed, 2-inch thick layer of sand above the membrane may be omitted.

In accordance with ACI 302.2R-06, the material must comply with the requirements of ASTM E1745, "Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs," and have a permeance of less than 0.01 perms per ASTM E96. The installation of the moisture barrier should comply with ASTM E1643. Concerning whether to place two inches of sand over the retarder, reference is made to ACI 302.2R, Section 7.2, which states that the anticipated benefits and risks associated with the location of the vapor retarder should be reviewed on a case by case basis with all appropriate parties, considering anticipated project conditions and the potential effects of concrete curing, cracking, and curling. Site preparation should be performed in accordance with our recommendations discussed in Section 6.1.

5.3 Retaining Walls

5.3.1 Minor Retaining Walls

Minor retaining walls for hardscape around the building exterior (if used) may be supported near the finish grade on spread footings. Footings may be designed using an allowable bearing pressure of 1.5 ksf. The upper 12 inches of wall footing subgrade should be scarified, moisture conditioned as required, and compacted to a minimum of 90% relative compaction in accordance with ASTM D 1557. Retaining wall footings on level ground should have a minimum embedment of 18 inches below finish grade.

We recommend that retaining walls be backfilled with non-expansive granular soils with a PI less than 15 and percent passing No. 200 sieve of less than 15 percent. A 2-foot thick cap consisting of less pervious onsite materials should be used to minimize infiltration of surface water. The finish surface should be graded to drain away from the walls. Heavy compaction equipment operating adjacent to retaining walls can cause excessively high lateral soil pressures to be exerted on the wall. Therefore, soils within 5 feet of the wall should either be compacted with hand operated equipment or designed to withstand compaction pressure from heavy equipment.

Cantilever walls, which are free to move laterally at least ½ in. for each 10-ft height, may be designed for an equivalent fluid pressure of 38 pcf (with level backfill) or 45 pcf (2:1 sloping

backfill). Walls restrained at the top with level backfill should be designed for an equivalent fluid pressure of 55 pcf.

5.3.2 Retaining Wall Drainage

The above design parameters assume that all walls are constructed with a properly designed drainage system behind the wall to prevent buildup of hydrostatic pressures behind the wall. This may consist of a geocomposite drain board or 12 inches of clean crushed rock encapsulated in filter fabric, discharging to weep holes or drain pipes.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Earthwork and Grading

Previous mass grading operations did not include the majority of Parcel F. As noted in Section 5.1, remedial grading is required in areas where mass grading was not previously performed.

In areas of the site, where mass grading was not previously performed, remedial grading should include removal and recompaction of the upper 6 feet of the subsurface soils to a minimum of 90% relative compaction in accordance with ASTM D-1557.

In areas of the site, where mass grading was previously performed, grading should include excavation of the soils to subgrade level, followed by scarification of the upper 10-inches of the subgrade, moisture conditioning near optimum moisture content (+2%), and recompaction to a minimum of 90% relative compaction in accordance with ASTM D-1557.

In general, the subgrade soils at the foundation excavation depth should be tested and verified by Group Delta that they are appropriate for support of the footings or floor slabs. If loose disturbed or otherwise unsuitable soils are found at the subgrade level, these soils shall be removed, or brought to near optimum moisture content (+2%), and re-compacted to a minimum of 90% of relative compaction. Only granular soils should be used for compacted fill.

Compaction shall be done in maximum 8-inch lifts. A sufficient number of field density and laboratory compaction tests should be performed during construction to verify minimum compaction requirements. We recommend that all permanent fills be compacted to a minimum relative compaction of 90% in accordance with ASTM D-1557. Footing excavations should be clean and free of loose soils, and should be observed by Group Delta Consultants before placement of steel or concrete.

6.2 Temporary Excavation and Shoring

In general, temporary construction excavations may be made at a 1.5H:1V slope without shoring to depths of about 20 feet below the adjacent surrounding grade. All excavation and shoring

systems should meet the minimum requirements of the Occupational Safety and Health (OSHA) Standards.

Permanent groundwater is not anticipated within proposed excavation depths and therefore, dewatering is not anticipated. Perched groundwater and seepage could be encountered locally within the more pervious layers in the profile. Perched water can be controlled through the use of sumps.

If the excavation is exposed during periods of heavy rainfall, provision for collection of the runoff should be made. Depending on the depth of the excavation, where sand is exposed at the bottom of the excavation, the water will quickly percolate into the subsoils within a few days. In case clayey soils are exposed, any collected water should be pumped out. Soils softened by wetting should be removed and recompacted as directed by the geotechnical engineer.

6.3 Utility Trenches

6.3.1 Excavation

Excavations for utility trenches should be achievable with conventional excavating equipment. The excavation should comply with current OSHA regulations and observed by the designated competent person on site. Trenches deeper than 4 feet should be shored or sloped at in inclinations of 1.5H:1V.

6.3.2 Bedding

The bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 1 foot above the top of the pipe. The bedding shall satisfy the requirements of the Standard Specifications for Public Works Construction (SSPWC) Section 306-1.2.1. There shall be a 4-inch minimum of bedding below the pipe and 1-inch minimum clearance below a projecting bell. There shall be a minimum side clearance of 6 inches on each side of the pipe. Bedding material shall be sand, gravel, crushed aggregate, or native free-draining material having a Sand Equivalent of not less than 30, or other material approved by the engineer. We recommend that the materials used for the bedding zone be placed and compacted with mechanical means. Jetting shall not be allowed.

6.3.3 Backfill

Backfill shall be considered as starting 12-inches above the pipe. On-site excavated materials are suitable as backfill. Any boulders or cobbles larger than 3 inches in any dimensions should be removed before backfilling. We recommend that all backfill should be placed in lifts not exceeding six to eight inches in thickness and be compacted to at least 90 percent of maximum dry density as determined by the ASTM D-1557. The upper 12 inches below pavement should be compacted to at least 95 percent of maximum dry density. Mechanical compaction will be required to accomplish compaction above the bedding along the entire pipeline alignments.

In backfill areas, where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain one sack of cement per cubic yard and have a maximum slump of 5-inches. When set, such a mix typically has the consistency of hard compacted soil and allows for future excavation.

6.4 Soil Corrosivity

A representative sample of the near-surface material collected to the depth of 5 feet below the existing ground surface from boring B-1 was tested for evaluating corrosion characteristics. The results indicate the test sample had a pH of 7.3; a water-soluble sulfate content of 0.24 %, and a soluble chloride content of less than 0.01 %. The sulfate results indicate that sulfate exposure to Portland cement is negligible.

Table 4: Soil Corrosion Summary

Boring No.	Depth (feet)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Minimum Resistivity (ohm-cm)
B-1	0-5	7.3	<100	240	1,395

Based on the 2019 CBC, the corrosion potential for sulfate attack on concrete in contact with native soils is negligible. Therefore, no special type of cement is required for concrete in contact with site soils.

The following correlation can generally be used between electrical resistivity and corrosion potential:

Elect. Resistivity, Ohm-cm	Corrosion Potential
less than 1,000	Severe
1,000 to 2,000	Corrosive
2,000 to 10,000	Moderate
greater than 10,000	Mild

Based on these data and our test results, onsite soils at the foundation depth have a corrosive potential for buried metal. Further evaluation/testing and recommendations for corrosion protection should be provided by a corrosion consultant.

6.5 Pavement Design

Laboratory testing on soil samples for pavement design was not performed. For the purposes of the preliminary pavement design, an R-Value of 50 was chosen for flexible pavement design. The City of Anaheim minimum pavement section was chosen for the site. The analysis confirmed that an R-value of 50 was suitable for the minimum pavement section. The flexible pavement recommendations provided below are based on this R-Value. Further R-value testing should be conducted prior to pavement construction to verify the actual subgrade soils in the areas to be paved and to modify the pavement recommendations, if necessary.

6.5.1 General Pavement Recommendations

Subgrade drainage is an important factor that enhances pavement performance. Subgrade surfaces below the pavement structural sections should be sloped to direct runoff to suitable collection points and to prevent ponding. Concrete curbs separating pavement from landscape or exposed earth areas should extend at least 6 inches below subgrade surfaces to reduce the potential for the movement of moisture through the aggregate base-course layers.

The actual soils present at subgrade elevation after grading may be different than those assumed for the preliminary design contained herein. Group Delta recommends that the subgrade soils be observed after grading is completed and that the actual subgrade materials be sampled and a tested. Final pavement design recommendations may be presented after the observation and R-value testing is reviewed.

6.5.2 Flexible Asphaltic Concrete Pavements

Based on our experience at the site, the City of Anaheim's minimum pavement thickness is sufficient for this site. The City of Anaheim's minimum pavement thickness is four inches of asphalt concrete over six inches of Class II aggregate base.

7.0 LIMITATIONS

This investigation was performed in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made.

The recommendations for this project are, to a high degree, dependent upon proper quality control of grading and foundation construction. Consequently, the recommendations are made contingent on the opportunity of Group Delta to observe grading operations, spread footing construction, and subgrade/base preparation. If parties other than Group Delta are engaged to provide such services, they must be notified that they will be required to assume complete

responsibility for the geotechnical phase of the project by concurring with the recommendations in this report or provide alternate recommendations as deemed appropriate.

8.0 REFERENCES

Bowles, J.E., "Foundation Analysis and Design," 5th Edition, McGraw Hill, New York, 1996.

California Department of Conservation, Division of Mines and Geology, " Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, to be used with the 1997 Uniform Building Code," published by International Conference of Building Officials, February, 1998.

California Department of Conservation, Division of Mines and Geology," Seismic Hazard Zone Report for the Tustin 7.5-Minute Quadrangle, Orange County, California, Revised 2001," Seismic Hazard Zone Report 97-20.

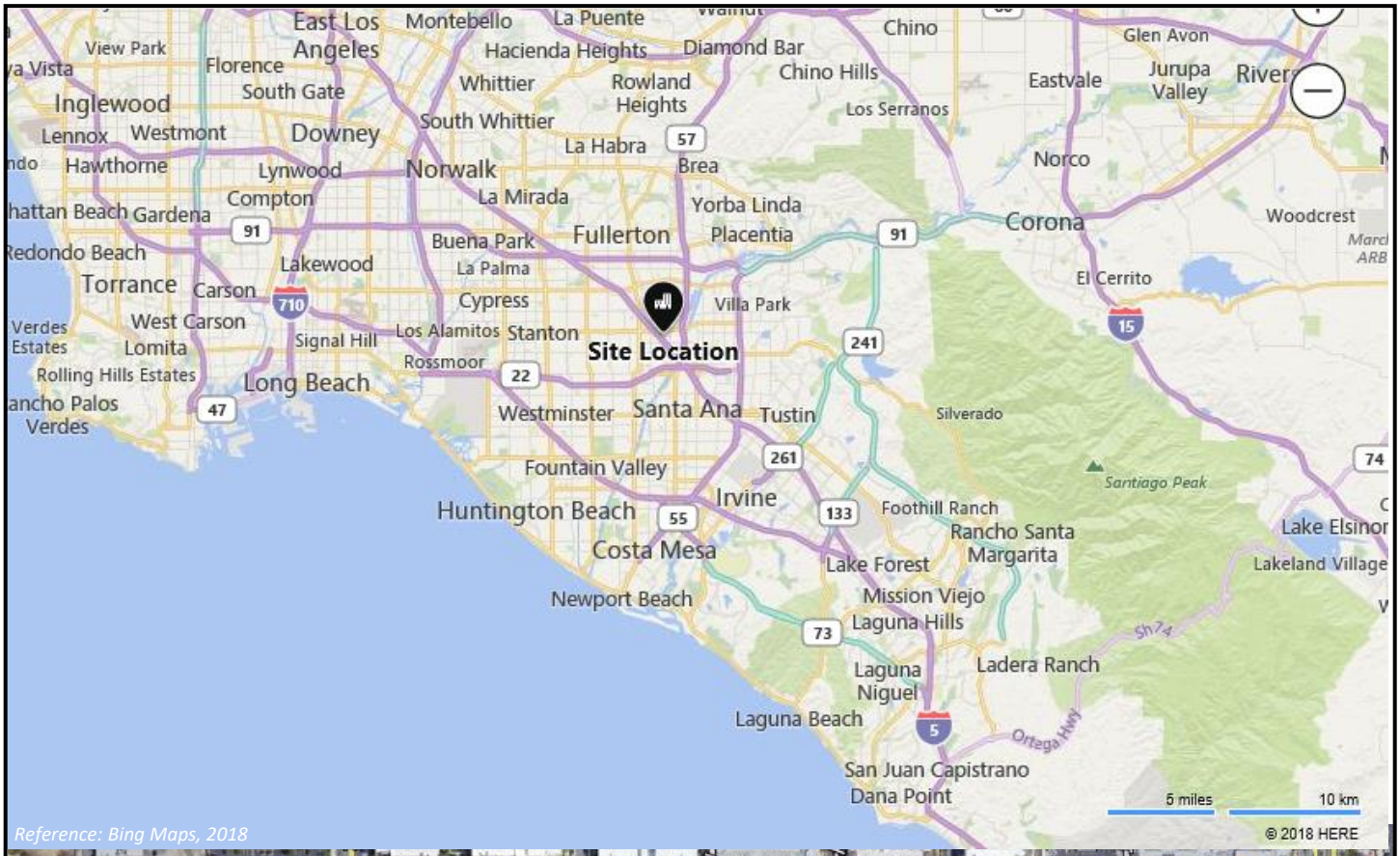
Leighton & Associates, " Due Diligence Geotechnical Evaluation for the Goldenwest Business Park and Gene Autry Business Park, 1200 to 1558 East Katella Avenue and 1301 to 1395 Gene Autry Way, Anaheim, California," a report prepared for Lennar Communities, September 8, 2004.

Terzaghi, Karl, Peck, R. B., "Soil Mechanics in Engineering Practice," 2nd Edition, John Wiley and Sons, New York, 1967.

Tokimatsu, Kohji, and Seed, H.B., " Evaluation of Settlements in Sands Due to Earthquake Shaking," Journal of Geotechnical Engineering, Vol. 113, No. 8, Proc. Paper No. 21706, August 1987.

California Building Code, California Building Standards Commission, Sacramento, California, 2019.

FIGURES



Reference: Bing Maps, 2018

Reference: Google Earth, 2018

SCALE: AS SHOWN

N

GROUP DELTA	**GROUP DELTA CONSULTANTS, INC.** ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE, CA 92618 (949) 450-2100	Figure Number: 1
	Project Name: A-Town Parcel F Anaheim, CA	Project Number: IR392H
	SITE LOCATION & VICINITY MAP	

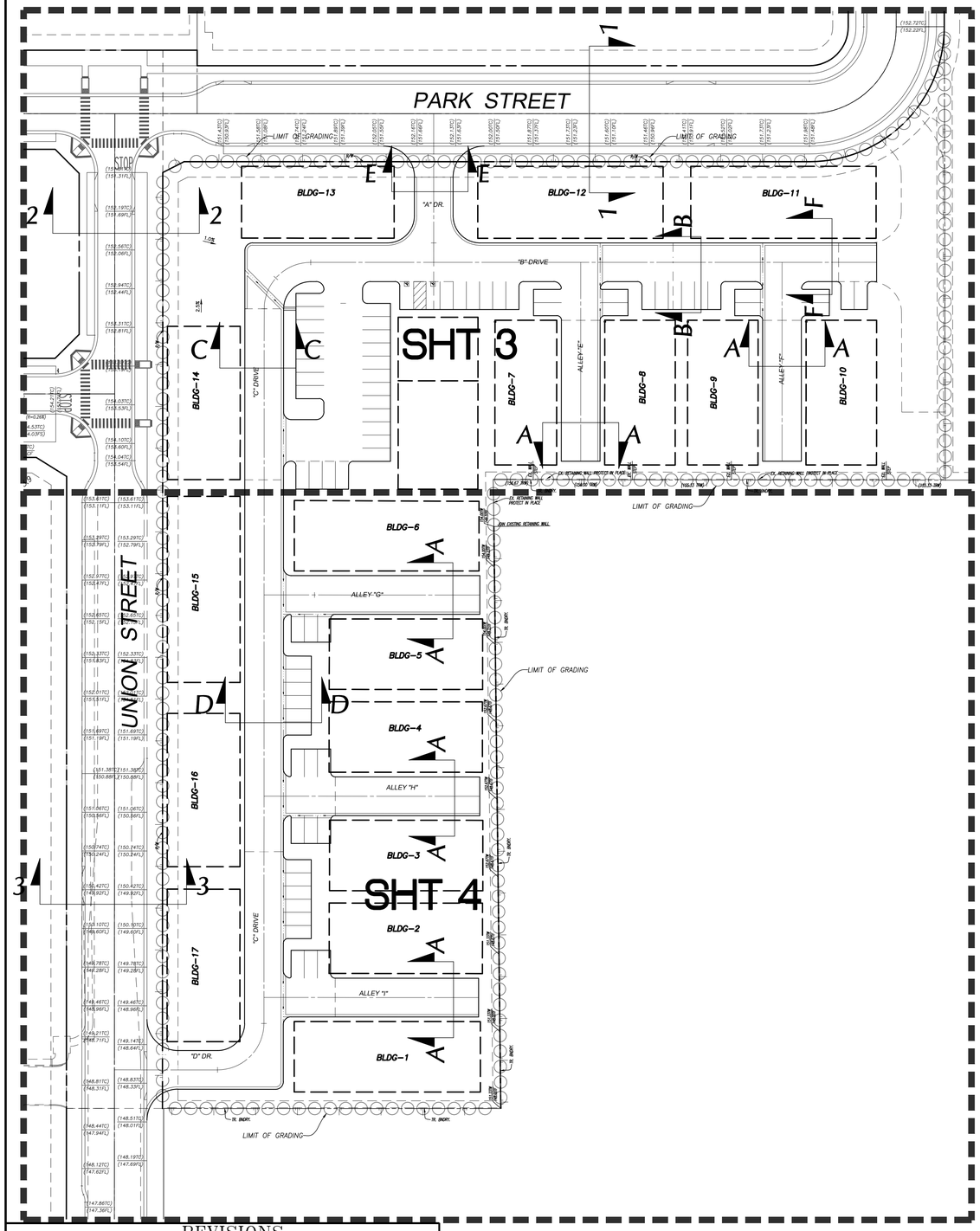
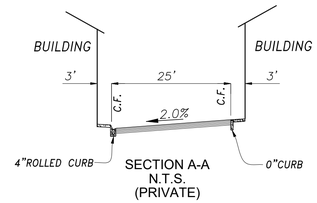


FIGURE 2: Proposed Improvements Plan

CONSTRUCTION NOTES/ESTIMATE OF QUANTITIES

NO.	DESCRIPTION	QTY.	UNIT
	ROUGH GRADING NOTES		
1	REMOVE EXIST. CSP RISER AND SD PIPE ON SHEETS 3 AND 4	3	EA
2	CONSTRUCT MASONRY RETAINING WALL PER SEPARATE PLAN AND PERMIT ON SHEET 4	0	EA



SECTION A-A
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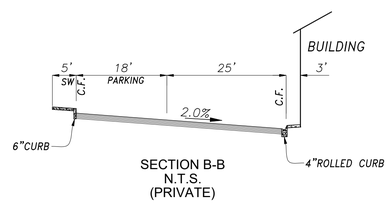

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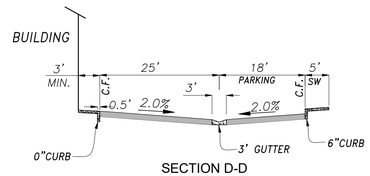
(PRIVATE)



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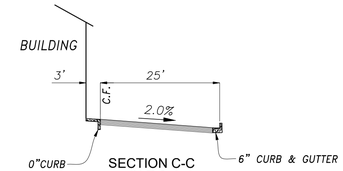

SECTION C-C
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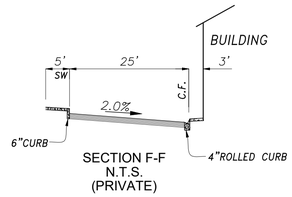
(PRIVATE)



SECTION F-F
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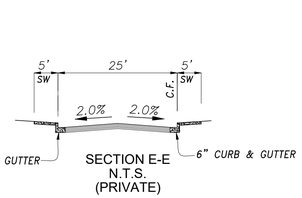
(PRIVATE)



SECTION E-E
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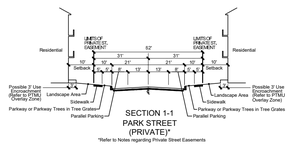
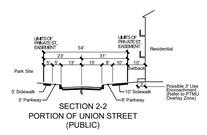
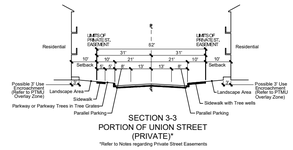
(PRIVATE)



SECTION 1-1
PARK STREET
(PRIVATE)*
*Refer to Notes regarding Private Street Easements



SECTION 2-2
PORTION OF UNION STREET
(PUBLIC)



SECTION 3-3
PORTION OF UNION STREET
(PRIVATE)*
*Refer to Notes regarding Private Street Easements

NOTE:
- IMPROVEMENT PLANS FOR GENE AUTRY WAY ACCOUNT NO's: 828-412-K935-7892, 502-521-3743-7865-1700681.01, 502-521-3779-7865-1600186.01, 278-412-K935-7897 & 502-521-3779-7865-1600186.01

NOTE:
- WATER IMPROVEMENT PER UWM 2015-00041 PLAN # W-3183
- STORM DRAIN IMPROVEMENT PER RCP 2015-11013 PLAN # 36238-36244
- SEWER IMPROVEMENT PER RCP 2015-11012 PLAN # 36168-36170
- STREET IMPROVEMENT PER RCP 2015-11014 PLAN # 36909-36952
- LANDSCAPING PLANS PER PERMIT NUMBERS: BLD2018-01478, BLD2018-01479 & BLD2018-01480
- PRECISE GRADING PER GRA2019-03473

REQUIRED VERIFICATION AND INSPECTION OF SOILS

PER CBC SECTION 1705 - TABLE 1705.6

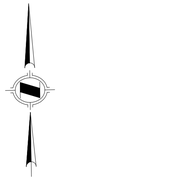
VERIFICATION AND INSPECTION TASK	CONTINUOUS DURING TASK LISTED	PERIODICALLY DURING TASK LISTED
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	-	X
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	-	X
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.	-	X
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X	-
5. PRIOR TO PLACEMENT OF COMPACTED FILL, OBSERVE SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	-	X

SPECIAL INSPECTIONS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATIONS

PER CBC SECTION 1704.2
CONSTRUCTION AS DESCRIBED IN THIS SECTION, THE OWNER OR THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE ACTING AS THE OWNER'S AGENT SHALL EMPLOY ONE OR MORE APPROVED AGENCIES TO PERFORM INSPECTIONS DURING CONSTRUCTION ON THE TYPES OF WORK LISTED UNDER SECTION 1705. THESE INSPECTIONS ARE IN ADDITION TO THE INSPECTIONS IDENTIFIED IN SECTION 110.

REQUIRED VERIFICATION AND INSPECTION

PER CBC SECTION 1705.6
SPECIAL INSPECTIONS FOR EXISTING SITE SOIL CONDITIONS, FILL PLACEMENT AND LOAD-BEARING REQUIREMENTS SHALL BE AS REQUIRED BY THIS SECTION AND TABLE 1705.6. THE APPROVED GEOTECHNICAL REPORT, AND THE CONSTRUCTION DOCUMENTS PREPARED BY THE REGISTERED DESIGN PROFESSIONALS SHALL BE USED TO DETERMINE COMPLIANCE. DURING FILL PLACEMENT, THE SPECIAL INSPECTOR SHALL DETERMINE THAT PROPER MATERIALS AND PROCEDURES ARE USED IN ACCORDANCE WITH THE PROVISIONS OF THE APPROVED GEOTECHNICAL REPORT.



0 20 40 80 120 160
SCALE: 1" = 40'

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	APP'D	DATE

LIMITS OF GRADING

ENGINEER:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

I HEREBY CERTIFY THAT:
1. THESE PLANS HAVE BEEN PREPARED UNDER MY SUPERVISION:
2. THE GRADING SHOWN HEREON WILL NOT DIVERT DRAINAGE FROM ITS NATURAL DOWNSTREAM COURSE OR OBSTRUCT THE DRAINAGE OF ADJACENT PROPERTIES:

REGISTERED PROFESSIONAL ENGINEER — EDWARD A. MANDICH — No. 59089 — CIVIL — STATE OF CALIFORNIA

ENGINEER _____ Jul. 06, 2021
EDWARD A. MANDICH — DATE

INDEX MAP & STREET SECTIONS
LOT 5 OF TRACT NO. 17703

GRA 0000-00000

SITE ADDRESS: 1589 E. GENE AUTRY WAY ANAHEIM, CALIFORNIA

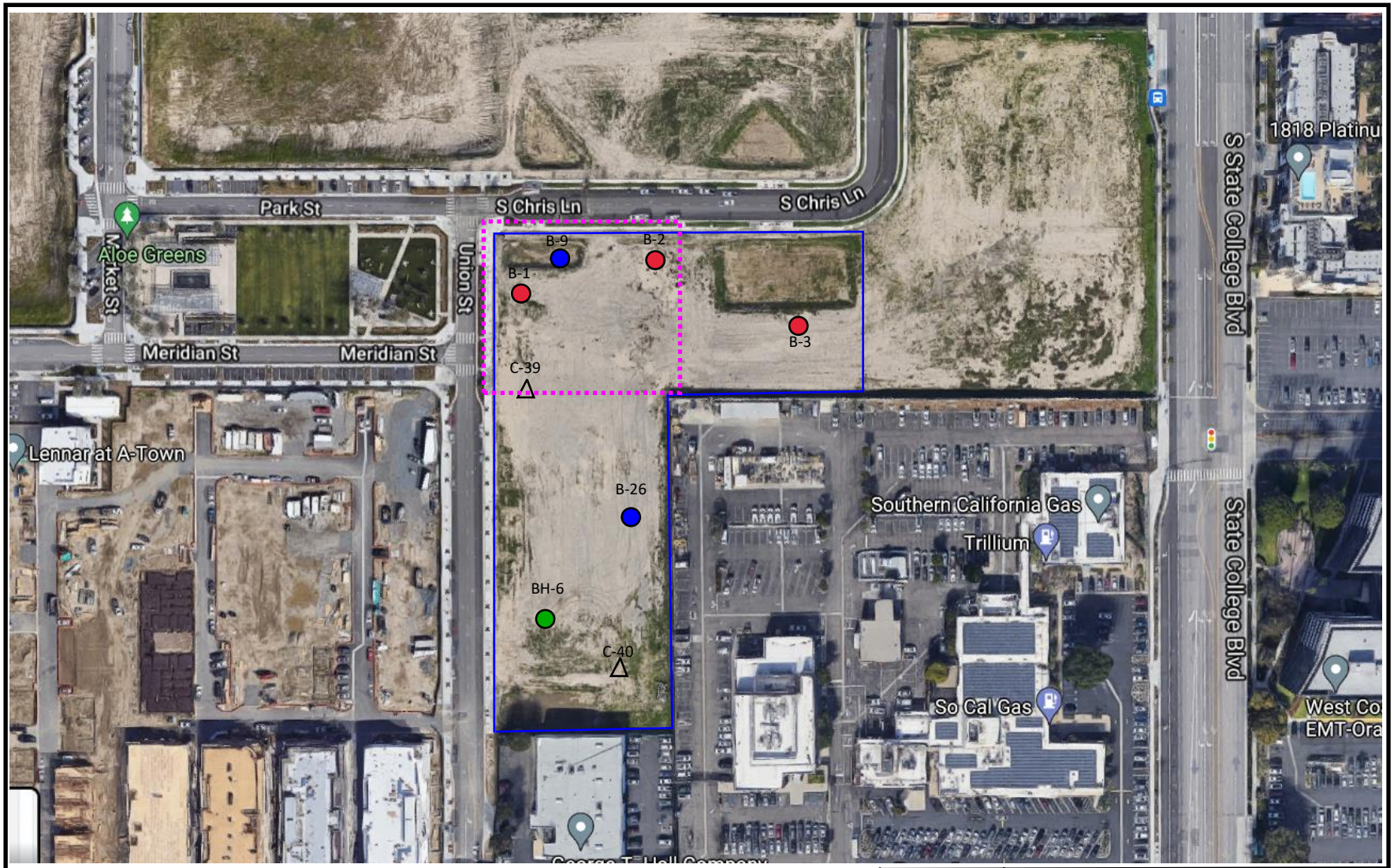
SHEET 2 OF 7

SCALE: AS SHOWN | DRAWN BY: EG | CHECKED BY: EM

CITY OF ANAHEIM

W.O. 3916-66 LOT 5 OF TRACT 17703 ROUGH GRADING PLAN

FOR CITY USE ONLY



B-# Approximate Boring Location

B-26 Approximate Previous Boring Location by Group Delta

BH-6 Approximate Boring Location by Others

C-40 Approximate Location of CPT by Group Delta

Parcel F Site Area

Approximate Previous Mass Grading Area

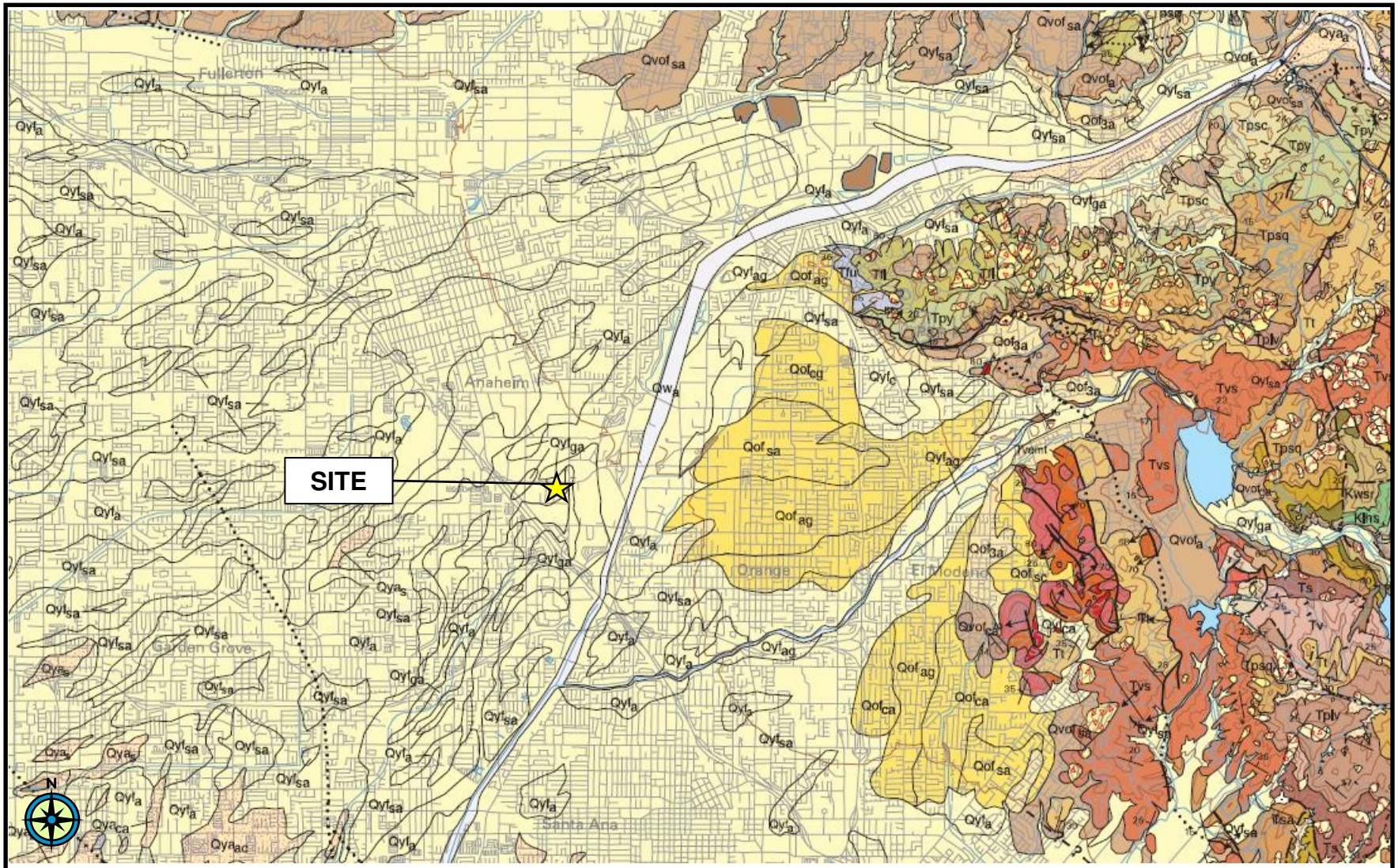
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

Figure Number: 3

Project Name: A-Town Parcel F Anaheim, CA

Project Number: IR392H

EXPLORATION LOCATION PLAN



Reference: Preliminary Digital Geologic Map of the Santa Ana 30' X 60' Quadrangle, Southern California by CGS, 2004

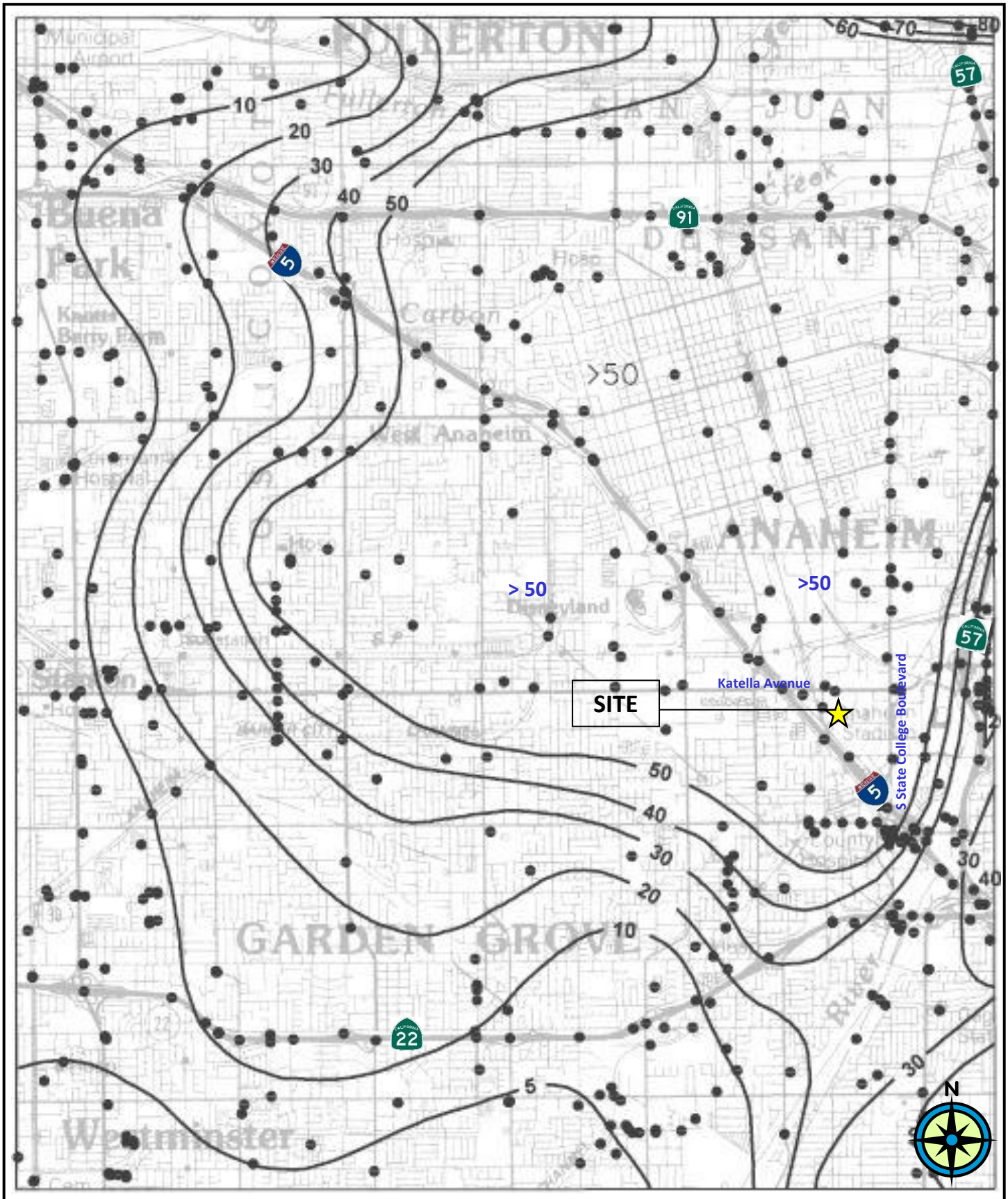
GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

Figure Number: **4**

Project Name: A-Town Parcel F
Anaheim, CA

Project Number: IR394H

QUATERNARY GEOLOGIC MAP



Reference: Seismic Hazard Zone Report for the Anaheim 7.5-Minute Quadrangle, Orange County, California, CGS 1997.

NOT TO SCALE

● Borehole Site

30 Depth to ground water in feet

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

Figure Number: 5

Project Name:
A-Town Parcel F
City of Anaheim, California

Project Number: IR392H

HISTORICALLY HIGHEST GROUNDWATER CONTOURS

Reference: USGS Quaternary Faults, NSHM 2014 Fault Sources https://usgs.maps.arcgis.com/apps/webappviewer/index.html

NSHM 2014 Fault Sources

- Normal
- Strike Slip
- Thrust
- Unassigned

GROUP DELTA

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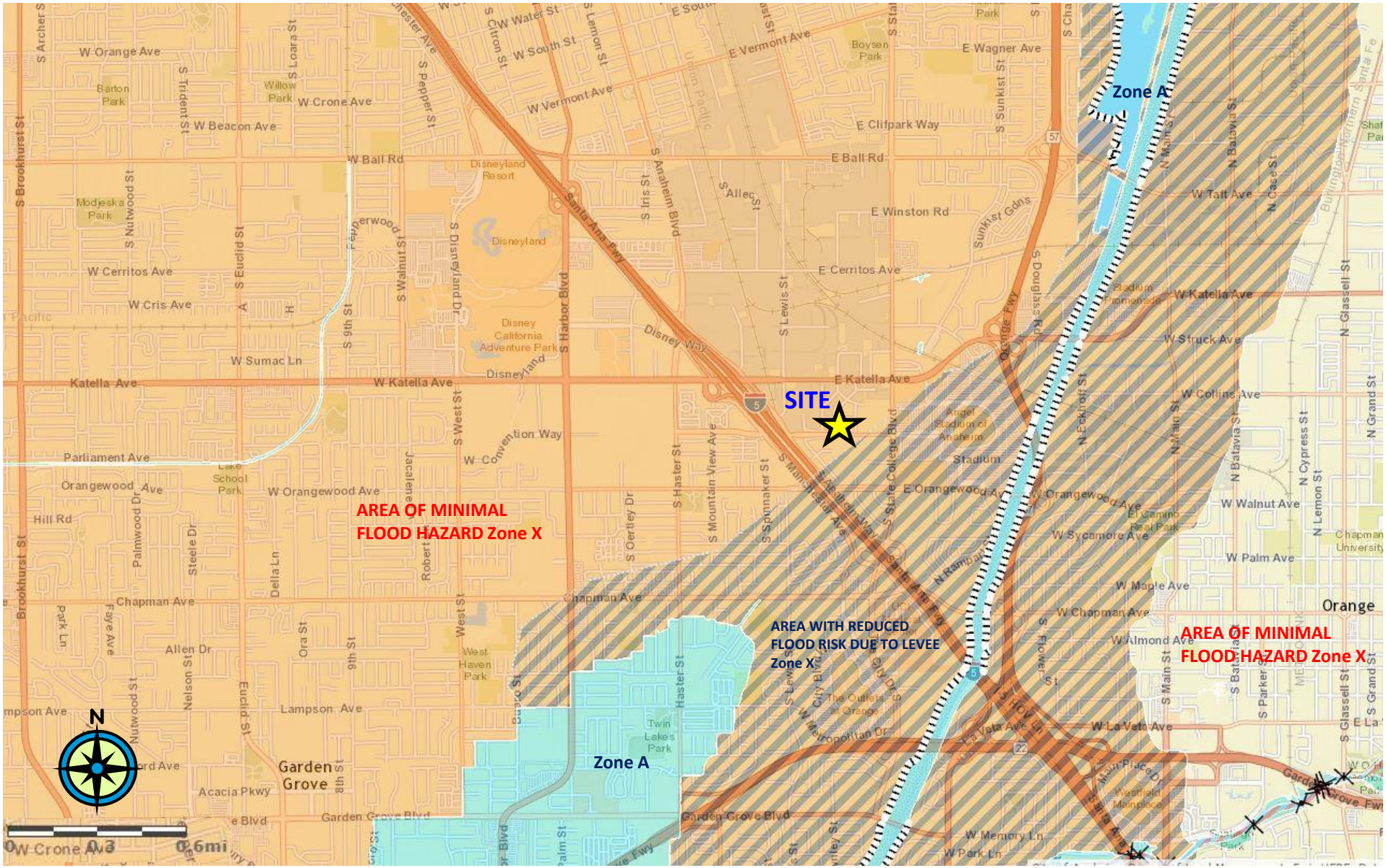
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

Figure Number: 6

Project Name: A-Town Parcel F Anaheim, CA

Project Number: IR394H

REGIONAL FAULT MAP



Reference: Federal Emergency Management Agency (FEMA), 2016

EXPLANATION

Zone X : Areas of minimal flood hazard

Zone A : Areas within 100-year floods

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

Figure Number: 7

Project Name:
A Town Parcel F
Anaheim, California

Project Number:
IR 392H

FLOOD HAZARD ZONE MAP

APPENDIX A
FIELD INVESTIGATION

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence		Refer to Section		Required	Optional
		Field	Lab		
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

Ref.: 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	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

GROUP DELTA CONSULTANTS, INC.
GEOTECHNICAL ENGINEERS AND GEOLOGISTS

FIGURE NUMBER
A-1A

PROJECT NAME
A-Town Parcel F
Anaheim, CA

PROJECT NUMBER
IR392H

BORING RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL 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
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
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
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
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)
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)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
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
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
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT 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
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
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
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
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
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
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

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- 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 measured.	———
Estimated Material Change	Change in material cannot be accurately located because either the change is gradational or because of limitations in the drilling/sampling methods used.	- - - - - - - -
Soil/Rock Boundary	Material changes from soil characteristics to rock characteristics.	~~~~~

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

GROUP DELTA

GROUP DELTA CONSULTANTS, INC. GEOTECHNICAL ENGINEERS AND GEOLOGISTS	FIGURE NUMBER **A-1B**
PROJECT NAME A-Town Parcel F Anaheim, CA	PROJECT NUMBER IR392H

BORING RECORD LEGEND #2

CONSISTENCY OF COHESIVE SOILS

Descriptor	Shear Strength (tsf)	Pocket Penetrometer, PP Measurement (tsf)	Torvane, TV. Measurement (tsf)	Vane Shear, VS. Measurement (tsf)
Very Soft	< 0.12	< 0.25	< 0.12	< 0.12
Soft	0.12 - 0.25	0.25 - 0.50	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.50	0.50 - 1.0	0.25 - 0.50	0.25 - 0.50
Stiff	0.50 - 1.0	1.0 - 2.0	0.50 - 1.0	0.50 - 1.0
Very Stiff	1.0 - 2.0	2.0 - 4.0	1.0 - 2.0	1.0 - 2.0
Hard	> 2.0	> 4.0	> 2.0	> 2.0

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

MOISTURE

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

PERCENT OR PROPORTION OF SOILS

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

PARTICLE SIZE

Descriptor		Size (in)
Boulder		> 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		< 1/300

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch 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; it 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 VS. N_{60}

Description	SPT N_{60} (blows / foot)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	> 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 Classificaton Manual, 2010

CEMENTATION

Descriptor	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.

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

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
GEOTECHNICAL ENGINEERS AND GEOLOGISTS

FIGURE NUMBER
A-1C

PROJECT NAME
A-Town Parcel F
Anaheim, CA

PROJECT NUMBER
IR392H

BORING RECORD LEGEND #3

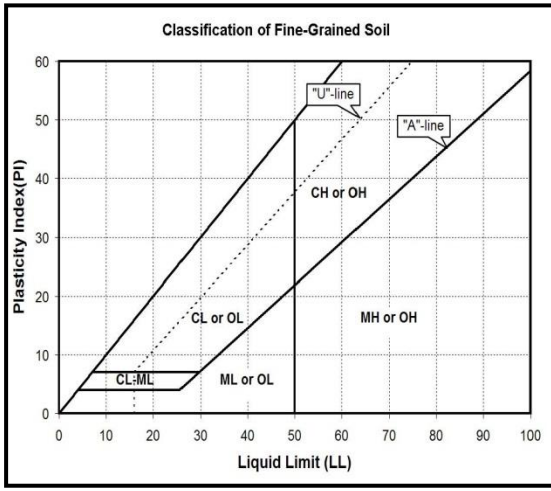
CLASSIFICATION OF INORGANIC FINE GRAINED SOILS (Soils with ≥50% finer than No. 200 Sieve)

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	%sand ≥%gravel	Lean clay with sand
			%sand <%gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand < % gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	%sand ≥%gravel	Silt with sand
			%sand <%gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand < % gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	%sand ≥%gravel	Fat clay with sand
			%sand <%gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand < % gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	%sand ≥%gravel	Elastic silt with sand
			%sand <%gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand < % gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

Reference:
ASTM D 2487 and 2488

Laboratory Classification of Clay and Silt

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



CL: LL<50; above A-Line.

CH: LL≥50; above A-Line.

ML: LL<50; below A-Line, or PI<4, or Non-Plastic

MH: LL≥50; below A-Line.

CL-ML: above A-Line and PI=4 to 7

CL/CH, ML/MH: at or near LL=50

ML/CL, MH/CH: at or near the A-Line

Field Identification of Clays and Silts

Group Symbol	Dry Strength	Dilatancy	Toughness	Plasticity
ML	None to low	Slow to rapid	Low or thread cannot be formed	Low to nonplastic
CL	Medium to high	None to slow	Medium	Medium
MH	Low to medium	None to slow	Low to medium	Low to medium
CH	High to very high	None	High	High

GROUP DELTA

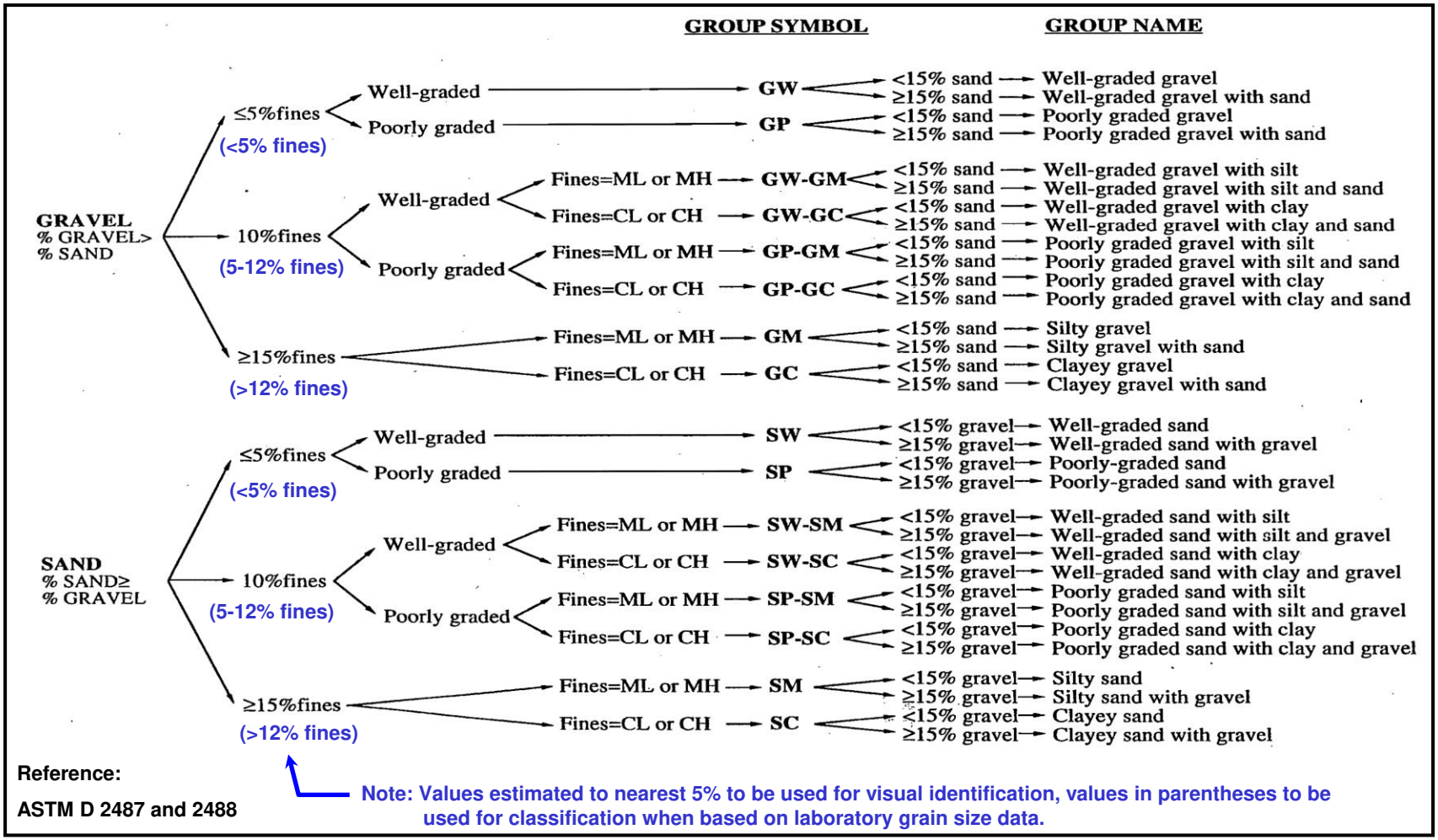
Group Delta Project No. IR392H

A-Town Parcel F

Anaheim, CA

KEY FOR SOIL CLASSIFICATION #1

CLASSIFICATION OF COARSE-GRAINED SOILS (Soils with <50% "fines" passing No. 200 Sieve)



Reference:

ASTM D 2487 and 2488

Note: Values estimated to nearest 5% to be used for visual identification, values in parentheses to be used for classification when based on laboratory grain size data.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60}/D_{10}$

Coefficient of Curvature: $Cc = D_{30}^2 / (D_{60} \times D_{10})$

D_{10} = 10% of soil is finer than this diameter

D_{30} = 30% of soil is finer than this diameter

D_{60} = 60% of soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	$C_u > 6$ and $1 \leq C_c \leq 3$
GW	$C_u > 4$ and $1 \leq C_c \leq 3$
GP or SP	Clean gravel or sand not meeting requirement for SW or GW
SM or GM	Non-plastic fines or below A-Line or PI<4
SC or GC	Plastic fines or above A-Line and PI>7

GROUP DELTA

Group Delta Project No. IR392H

A-Town Parcel F

Anaheim, CA

KEY FOR SOIL CLASSIFICATION #2

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Lennar - A Town Parcel F	IR392H	**B-1**

SITE LOCATION	START	FINISH	SHEET NO.
Union Street and Park Street, Anaheim	8/16/2021	8/16/2021	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
BC2 Environmental	CME 75	Hollow Stem Auger	G.Valdivia	M.Givens

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic (140 lbs, 30 inch)	81%	8	20.5	42	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Bulk, MC (2.4"), SPT (1.4")	N_{60}* = 1.35N_{SPT} = 0.90N_{MC}	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	40														CLAYEY SAND (SC): light brown (7.5YR 6/4), dry, mostly fine grained SAND, little fines.
			B-1									CR			
			R-2	17 17 27	44	40			12	119					Dense, reddish yellow (5YR 6/6), moist, mostly medium grained SAND.
5															SILTY SAND (SM): dense, brown (7.5YR 5/3), moist, mostly medium grained SAND, little fines.
			S-3	7 13 20	33	45									
	35														
10															No Recovery
			R-4	2 3 7	10	9									
	30														
			S-5	3 3 5	8	11						PA			Poorly-graded SAND(SP): medium dense, pink brown (5YR, 7/4), dry mostly medium grained SAND, trace fines, trace of gravel. (Gravel = 2%, Sand = 96%, Fines = 2%)
15															
			R-6	5 7 11	18	16			2	100					
	25														
			S-7	3 6 12	18	24						PA			Tan brown (7.5YR 8/4), mostly fine to medium grained SAND. (Gravel = 1%, Sand = 96%, Fines = 3%)
20	20														Bottom of borehole at 20.5 feet. Excavation terminated at target depth. Groundwater not encountoured. Borehole backfilled with soil cuttings.

GDC_LOG_BORING_2016 IR392H PARCEL F.GPJ GDC2013.GDT 8/24/21

GROUP DELTA CONSULTANTS
32 Mauchly, Suite B
Irvine, CA 92618

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

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Lennar - A Town Parcel F	IR392H	**B-2**

SITE LOCATION	START	FINISH	SHEET NO.
Union Street and Park Street, Anaheim	8/16/2021	8/16/2021	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
BC2 Environmental	CME 75	Hollow Stem Auger	G.Valdivia	M.Givens

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic (140 lbs, 30 inch)	81%	8	11.5	41	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Bulk, MC (2.4"), SPT (1.4")	N_{60}* = 1.35N_{SPT} = 0.90N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	40														SILTY SAND (SM): light brown (7.5YR 6/4), dry, mostly fine grained SAND, little fines.
			B-1						4						
			S-2	9 18 22	40	54						-200			Very dense, moist, mostly medium grained SAND, some fines. (Gravel = 1%, Sand = 68%, Fines = 31%)
5	35		R-3	3 15 20	35	32			1	105					Poorly-graded SAND (SP): medium dense, pinkish white (7.5YR 8/2), dry, mostly fine grained SAND.
10	30		S-4	2 3 5	8	11									Pink brown (7.5YR 7/3), mostly fine to medium grained SAND.
															Bottom of borehole at 11.5 feet. Excavation terminated at target depth. Groundwater not encountoured. Borehole backfilled with soil cuttings.
15	25														
20	20														

GDC_LOG_BORING_2016 IR392H PARCEL F.GPJ GDC2013.GDT 8/24/21

GROUP DELTA CONSULTANTS
32 Mauchly, Suite B
Irvine, CA 92618

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FIGURE

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Lennar - A Town Parcel F	IR392H	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
Union Street and Park Street, Anaheim	8/16/2021	8/16/2021	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
BC2 Environmental	CME 75	Hollow Stem Auger	G.Valdivia	M.Givens

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic (140 lbs, 30 inch)	81%	8	6.5	43	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Bulk, MC (2.4"), SPT (1.4")	N_{60}* = 1.35N_{SPT} = 0.90N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	40														SILTY SAND (SM): brown (7.5YR 5/3), dry, mostly fine to medium grained SAND, little fines.
			B-1												
			R-2	9 18 18	36	32			6	122					Dense, moist, red brown (5YR 5/3), mostly coarse grained SAND, some fines.
5															
			S-3	4 2 4	6	8						-200			Loose, moist, brown (7.5YR 5/3), mostly fine grained SAND, little fines.
															(Gravel = 0%, Sand = 80%, Fines = 20%)
	35														Bottom of borehole at 6.5 feet. Excavation terminated at target depth. Groundwater not encountoured. Borehole backfilled with soil cuttings.
10															
	30														
15															
	25														
20															
	20														

GDC_LOG_BORING_2016 IR392H PARCEL F.GPJ GDC2013.GDT 8/24/21

GROUP DELTA CONSULTANTS
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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

LOG OF TEST BORING

PROJECT NAME A-Town Metro Project, Parcel "F"		**PROJECT NUMBER** I-392-14	**BORING** **B-26**
SITE LOCATION Anaheim, California	**START** 3/8/207	**FINISH** 3/8/207	**SHEET NO.** 1 of 2
DRILLING COMPANY J&H Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** V. Glisic	**CHECKED BY** K. Bhushan
DRILLING EQUIPMENT BK-81	**BORING DIA. (in)** 8"	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 148
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.		**NOTES**	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ / *na*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty Sand (SM) medium dense, damp, brown, medium grained with trace fine rounded gravel
	145		1	4 8 12		2.2						
5			2	9 9 12	82.8	3.5						**Poorly Graded Sand (SP)** medium dense, damp to moist, light grayish brown, medium grained
	140		3	6 9 14								@7.5 ft: pH=8.3 Sol. Sulfates=90 ppm Sol. Chlorides= 198 ppm Resistivity= 6,100 ohm/cm
10			4	10 50/6"			DS					**Poorly Graded Sand with Silt (SP-SM)** very dense, damp to moist, light grayish brown, medium grained
	135											
15			5	4 5 8		3.5						becomes medium dense, medium to coarse with rounded medium gravel 4" thick lense of Lean Clay with gravel
	130											
20			6	8 12 17	104.5	5.3						becomes medium to fine grained without gravel
	125											
25			7	11 16 24		4.2		8				same as above, becomes medium dense to dense
	120											

GDC_LOG_BORING_1A PARCEL F.GPJ GDCLOG.GDT 4/2/07

GROUP DELTA CONSULTANTS, INC.
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

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-3 a

LOG OF TEST BORING

PROJECT NAME A-Town Metro Project, Parcel "F"		**PROJECT NUMBER** I-392-14	**BORING** **B-26**
SITE LOCATION Anaheim, California	**START** 3/8/207	**FINISH** 3/8/207	**SHEET NO.** 2 of 2
DRILLING COMPANY J&H Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** V. Glisic	**CHECKED BY** K. Bhushan
DRILLING EQUIPMENT BK-81	**BORING DIA. (in)** 8"	**TOTAL DEPTH (ft)** 51.5	**GROUND ELEV (ft)** 148	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ / *na*
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in.		**NOTES**	

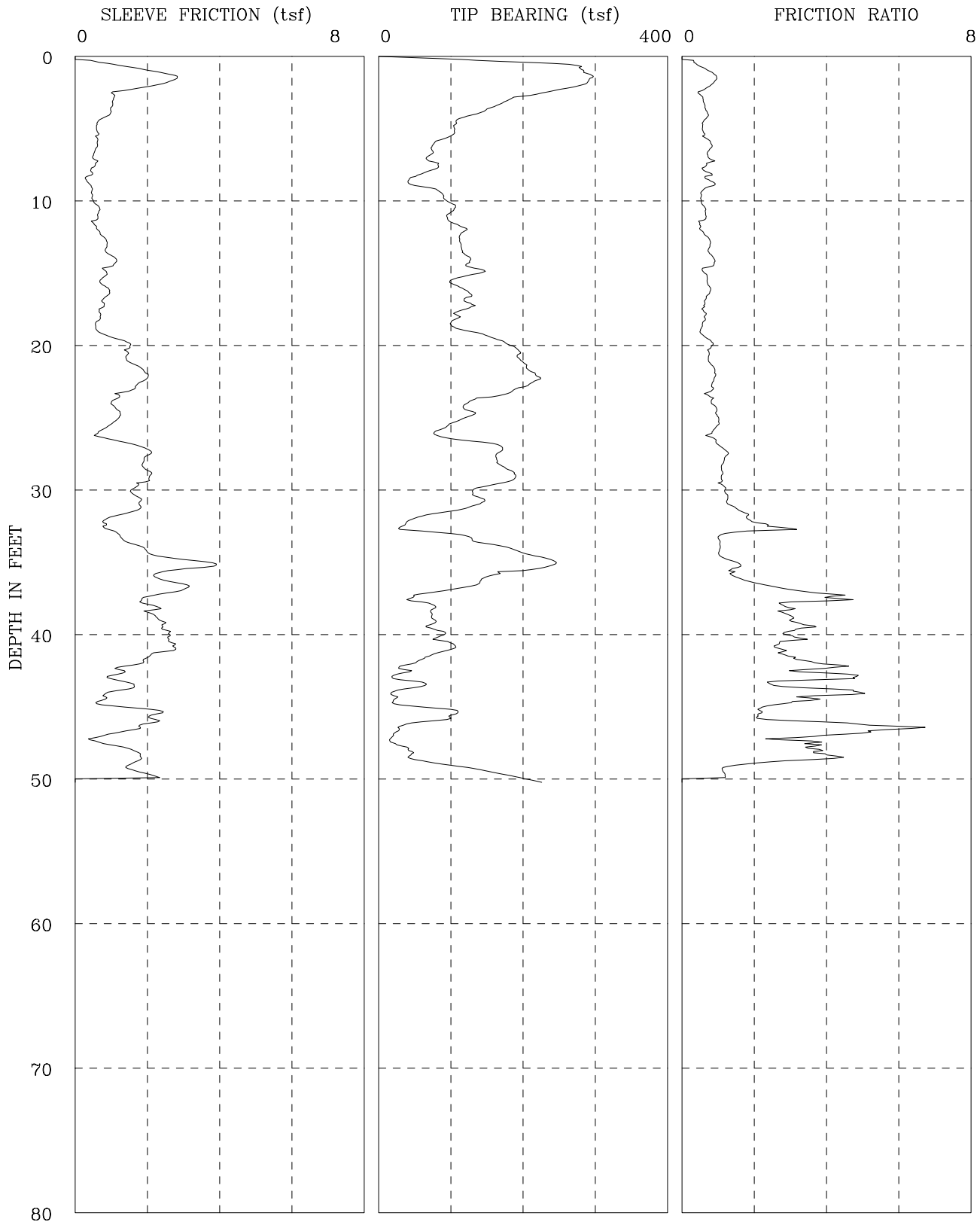
DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			8	13 18 28	85.6	3.11						**Poorly Graded Sand (SP)** dense, damp to moist, light grayish brown, medium grained
	115											
35			9	11 19 31		2.5						becomes very dense
	110											
40			10	50/6"	98.3	2.3						becomes fine grained
	105											**Fat Clay (CH)** hard, moist, olive brown, occasionally interbedded with sand
45			11	41 50/6"		23.9			53:25:28	0.5-1.5		
	100											**Silty Sand (SM)** very dense, moist, brown, medium grained
50			12	23 50/6"	114.5	17.8						
	95											Boring completed at 51.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.
55												
	90											

GDC_LOG_BORING_1A PARCEL F.GPJ GDCLOG.GDT 4/2/07

GROUP DELTA CONSULTANTS, INC.
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

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-3 b



C-39	A-Town Metro Parcel F
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-4a

GROUP DELTA CONSULTANTS

Cone Used : C-39 | Job No. : I-392-14 A-Town Metro, Parcel F
Depth to water table (ft) : n/a | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	221.85	1.09	0.49	0.03	sand	>90	>48	43	UNDEFINED
0.60	2	289.80	2.59	0.89	0.09	sand	>90	>48	>50	UNDEFINED
0.95	3	217.31	1.24	0.57	0.15	sand	>90	>48	42	UNDEFINED
1.25	4	148.92	0.99	0.66	0.22	sand	>90	>48	29	UNDEFINED
1.55	5	107.37	0.64	0.59	0.28	sand to silty sand	80-90	46-48	26	UNDEFINED
1.85	6	91.25	0.62	0.68	0.33	sand to silty sand	70-80	44-46	22	UNDEFINED
2.15	7	71.95	0.54	0.75	0.39	sand to silty sand	70-80	42-44	17	UNDEFINED
2.45	8	75.36	0.52	0.69	0.45	sand to silty sand	60-70	42-44	18	UNDEFINED
2.75	9	48.00	0.38	0.78	0.51	silty sand to sandy silt	50-60	40-42	15	UNDEFINED
3.05	10	87.91	0.48	0.54	0.57	sand to silty sand	70-80	42-44	21	UNDEFINED
3.35	11	101.49	0.63	0.62	0.63	sand to silty sand	70-80	42-44	24	UNDEFINED
3.65	12	106.67	0.57	0.54	0.69	sand to silty sand	70-80	42-44	26	UNDEFINED
3.95	13	113.50	0.79	0.70	0.75	sand to silty sand	70-80	42-44	27	UNDEFINED
4.25	14	118.57	0.93	0.78	0.81	sand to silty sand	70-80	42-44	28	UNDEFINED
4.55	15	131.53	0.98	0.74	0.87	sand	70-80	42-44	25	UNDEFINED
4.85	16	110.17	0.78	0.70	0.93	sand to silty sand	70-80	40-42	26	UNDEFINED
5.15	17	122.28	0.88	0.72	0.98	sand to silty sand	70-80	40-42	29	UNDEFINED
5.45	18	118.98	0.73	0.61	1.04	sand	70-80	40-42	23	UNDEFINED
5.75	19	105.33	0.61	0.58	1.10	sand to silty sand	60-70	40-42	25	UNDEFINED
6.05	20	155.16	1.05	0.68	1.16	sand	70-80	42-44	30	UNDEFINED
6.40	21	192.20	1.45	0.75	1.23	sand	80-90	42-44	37	UNDEFINED
6.70	22	207.33	1.79	0.87	1.29	sand	80-90	42-44	40	UNDEFINED
7.00	23	210.99	1.82	0.86	1.35	sand	80-90	42-44	40	UNDEFINED
7.35	24	149.42	1.17	0.78	1.41	sand	70-80	40-42	29	UNDEFINED
7.65	25	123.36	1.19	0.97	1.48	sand to silty sand	60-70	40-42	30	UNDEFINED
7.95	26	90.83	0.85	0.94	1.54	sand to silty sand	50-60	38-40	22	UNDEFINED
8.25	27	131.40	1.26	0.96	1.59	sand to silty sand	60-70	40-42	31	UNDEFINED
8.55	28	165.05	1.99	1.20	1.65	sand to silty sand	70-80	40-42	40	UNDEFINED
8.85	29	179.96	1.99	1.10	1.71	sand	70-80	40-42	34	UNDEFINED
9.15	30	159.90	1.79	1.12	1.77	sand to silty sand	70-80	40-42	38	UNDEFINED
9.45	31	138.07	1.73	1.25	1.83	sand to silty sand	60-70	38-40	33	UNDEFINED
9.75	32	86.09	1.40	1.63	1.89	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
10.05	33	47.03	0.91	1.93	1.95	sandy silt to clayey silt	UNDFND	UNDFD	18	3.0
10.35	34	142.20	1.48	1.04	2.01	sand to silty sand	60-70	38-40	34	UNDEFINED
10.65	35	215.55	2.48	1.15	2.07	sand	70-80	40-42	41	UNDEFINED
10.95	36	202.67	2.96	1.46	2.13	sand to silty sand	70-80	40-42	49	UNDEFINED
11.25	37	129.15	2.80	2.17	2.18	silty sand to sandy silt	60-70	38-40	41	UNDEFINED
11.55	38	57.60	2.09	3.62	2.24	clayey silt to silty clay	UNDFND	UNDFD	28	3.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4b

GROUP DELTA CONSULTANTS

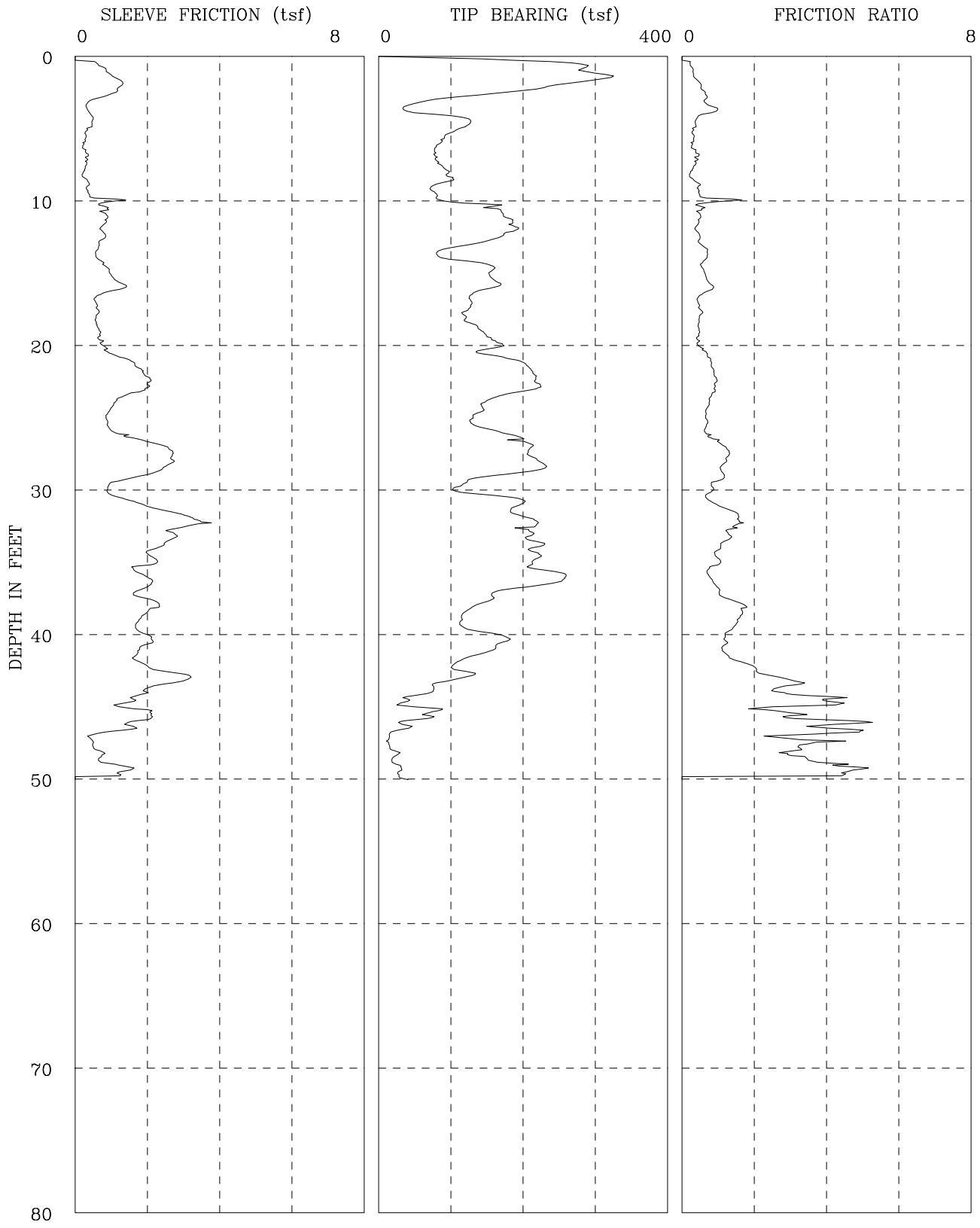
Cone Used : C-39 | Job No. : I-392-14 A-Town Metro, Parcel F
Depth to water table (ft) : n/a | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	74.74	2.20	2.94	2.30	sandy silt to clayey silt	UNDFND	UNDFD	29	4.8
12.15	40	78.14	2.47	3.16	2.36	sandy silt to clayey silt	UNDFND	UNDFD	30	5.0
12.45	41	93.00	2.65	2.85	2.42	sandy silt to clayey silt	UNDFND	UNDFD	36	6.0
12.80	42	71.45	2.15	3.02	2.48	sandy silt to clayey silt	UNDFND	UNDFD	27	4.5
13.10	43	29.53	1.19	4.03	2.55	silty clay to clay	UNDFND	UNDFD	19	1.7
13.40	44	44.25	1.37	3.09	2.61	clayey silt to silty clay	UNDFND	UNDFD	21	2.7
13.75	45	33.99	0.95	2.79	2.67	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
14.05	46	91.19	2.22	2.43	2.74	silty sand to sandy silt	40-50	34-36	29	UNDEFINED
14.35	47	25.54	1.33	5.20	2.79	clay	UNDFND	UNDFD	24	1.5
14.65	48	29.34	1.04	3.54	2.85	clayey silt to silty clay	UNDFND	UNDFD	14	1.7
14.95	49	61.68	1.71	2.77	2.91	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
15.25	50	167.70	1.54	0.92	2.97	sand	60-70	38-40	32	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-4c



C-40	A-Town Metro Parcel F
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

Figure A-5a

GROUP DELTA CONSULTANTS

Cone Used : C-40 | Job No. : I-392-14 A-Town Metro, Parcel F
Depth to water table (ft) : n/a | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.30	1	246.86	0.56	0.23	0.03	gravelly sand to sand	>90	>48	39	UNDEFINED
0.60	2	292.48	1.15	0.39	0.09	gravelly sand to sand	>90	>48	47	UNDEFINED
0.95	3	146.85	0.88	0.60	0.15	sand	>90	>48	28	UNDEFINED
1.25	4	52.60	0.37	0.69	0.22	sand to silty sand	70-80	44-46	13	UNDEFINED
1.55	5	120.43	0.44	0.37	0.28	sand	>90	46-48	23	UNDEFINED
1.85	6	90.67	0.28	0.31	0.33	sand	70-80	44-46	17	UNDEFINED
2.15	7	78.21	0.29	0.37	0.39	sand to silty sand	70-80	44-46	19	UNDEFINED
2.45	8	88.53	0.29	0.32	0.45	sand to silty sand	70-80	42-44	21	UNDEFINED
2.75	9	90.49	0.31	0.34	0.51	sand to silty sand	70-80	42-44	22	UNDEFINED
3.05	10	80.01	0.58	0.72	0.57	sand to silty sand	60-70	42-44	19	UNDEFINED
3.35	11	159.82	0.81	0.51	0.63	sand	80-90	44-46	31	UNDEFINED
3.65	12	185.45	0.80	0.43	0.69	sand	80-90	44-46	36	UNDEFINED
3.95	13	160.77	0.76	0.47	0.75	sand	80-90	44-46	31	UNDEFINED
4.25	14	90.25	0.60	0.67	0.81	sand to silty sand	60-70	40-42	22	UNDEFINED
4.55	15	146.60	0.84	0.57	0.87	sand	70-80	42-44	28	UNDEFINED
4.85	16	160.68	1.17	0.73	0.93	sand	80-90	42-44	31	UNDEFINED
5.15	17	132.78	0.78	0.59	0.98	sand	70-80	42-44	25	UNDEFINED
5.45	18	123.29	0.61	0.50	1.04	sand	70-80	40-42	24	UNDEFINED
5.75	19	128.56	0.60	0.47	1.10	sand	70-80	40-42	25	UNDEFINED
6.05	20	154.55	0.70	0.45	1.16	sand	70-80	42-44	30	UNDEFINED
6.40	21	161.52	1.04	0.64	1.23	sand	70-80	42-44	31	UNDEFINED
6.70	22	208.42	1.76	0.85	1.29	sand	80-90	42-44	40	UNDEFINED
7.00	23	219.44	2.03	0.92	1.35	sand	80-90	42-44	42	UNDEFINED
7.35	24	165.05	1.33	0.81	1.41	sand	70-80	40-42	32	UNDEFINED
7.65	25	136.94	0.92	0.67	1.48	sand	70-80	40-42	26	UNDEFINED
7.95	26	146.96	0.97	0.66	1.54	sand	70-80	40-42	28	UNDEFINED
8.25	27	201.72	2.00	0.99	1.59	sand	80-90	42-44	39	UNDEFINED
8.55	28	213.01	2.68	1.26	1.65	sand	80-90	42-44	41	UNDEFINED
8.85	29	205.63	2.28	1.11	1.71	sand	70-80	40-42	39	UNDEFINED
9.15	30	115.94	1.07	0.92	1.77	sand to silty sand	60-70	38-40	28	UNDEFINED
9.45	31	176.00	1.36	0.77	1.83	sand	70-80	40-42	34	UNDEFINED
9.75	32	192.71	2.73	1.42	1.89	sand to silty sand	70-80	40-42	46	UNDEFINED
10.05	33	211.80	3.03	1.43	1.95	sand to silty sand	70-80	40-42	>50	UNDEFINED
10.35	34	215.88	2.58	1.19	2.01	sand	70-80	40-42	41	UNDEFINED
10.65	35	216.58	2.12	0.98	2.07	sand	70-80	40-42	41	UNDEFINED
10.95	36	231.27	1.81	0.78	2.13	sand	70-80	40-42	44	UNDEFINED
11.25	37	224.66	2.02	0.90	2.18	sand	70-80	40-42	43	UNDEFINED
11.55	38	153.16	1.95	1.27	2.24	sand to silty sand	60-70	38-40	37	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5b

GROUP DELTA CONSULTANTS

Cone Used : C-40 | Job No. : I-392-14 A-Town Metro, Parcel F
Depth to water table (ft) : n/a | Tot. Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.85	39	120.78	2.01	1.66	2.30	silty sand to sandy silt	60-70	36-38	39	UNDEFINED
12.15	40	123.33	1.73	1.40	2.36	sand to silty sand	60-70	36-38	30	UNDEFINED
12.45	41	170.92	2.03	1.19	2.42	sand to silty sand	60-70	38-40	41	UNDEFINED
12.80	42	130.97	1.73	1.32	2.48	sand to silty sand	60-70	36-38	31	UNDEFINED
13.10	43	115.82	2.59	2.23	2.55	silty sand to sandy silt	50-60	36-38	37	UNDEFINED
13.40	44	81.31	2.36	2.90	2.61	sandy silt to clayey silt	UNDFND	UNDFD	31	5.2
13.75	45	47.05	1.52	3.23	2.67	clayey silt to silty clay	UNDFND	UNDFD	23	2.9
14.05	46	60.06	1.95	3.25	2.74	sandy silt to clayey silt	UNDFND	UNDFD	23	3.8
14.35	47	26.23	1.04	3.96	2.79	silty clay to clay	UNDFND	UNDFD	17	1.5
14.65	48	15.95	0.53	3.30	2.85	silty clay to clay	UNDFND	UNDFD	10	.8
14.95	49	23.25	0.83	3.56	2.91	clayey silt to silty clay	UNDFND	UNDFD	11	1.3
15.25	50	31.21	0.93	2.97	2.97	clayey silt to silty clay	UNDFND	UNDFD	15	1.8

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

Figure A-5c

GEOTECHNICAL BORING LOG BH-6

Date 4-20-05 **Sheet** 1 **of** 4
Project Platinum Triangle **Project No.** 011331-011-
Drilling Co. Martini Drilling **Type of Rig** CME-75
Hole Diameter 6" **Drive Weight** 140 **Drop** 30"
Elevation Top of Hole 147' **Location** Anaheim, California

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION (Logged By JAR; Sampled By JAR)	Type of Tests
147	0								@0': 3" Asphalt concrete over Gravelley Sand (SP) base @.7': Fill Sand (SP), fine to coarse grained sand and gravel, some silt and asphalt debris, cobbles to >4", moist, orange brown @1.5': Alluvium (Qal) Sand (SP), fine to coarse grained sand, fine rounded gravel, trace silt, moist, medium dense, micaceous, orange grey	
145										
	5			1	8 9 13			SP	@5': Sand (SP), fine to coarse grained sand, moist, micaceous, medium dense, orange grey	
140										
	10			2	3 5 10			SP	@10': Sand (SP), medium to coarse grained sand, dry, medium dense, light yellow brown	
135										
	15			3	4 6 14			SP-SM	@15': Sand with Silt (SP/SM), fine to coarse grained sand, micaceous, dry, light yellow brown	
130										
	20			4	6 10 12			SP	@20': Sand (SP), fine to coarse grained sand, moist, micaceous, medium dense, orange grey	
125										
	25			5	8 19 21			SP-SM	@25': Sand with Silt (SP/SM), fine to coarse grained sand, micaceous, moist, dense, medium brown	
120				6				SP-SM		
	30									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
CU TRIAXIAL SHEAR
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Figure A-6a

GEOTECHNICAL BORING LOG BH-6

Date 4-20-05 **Sheet** 2 **of** 4
Project Platinum Triangle **Project No.** 011331-011-
Drilling Co. Martini Drilling **Type of Rig** CME-75
Hole Diameter 6" **Drive Weight** 140 **Drop** 30"
Elevation Top of Hole 147' **Location** Anaheim, California

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION (Logged By JAR; Sampled By JAR)	Type of Tests
	30			7	6 7 10			SP	@30': Sand (SP), fine to coarse grained sand, some silt, moist, medium dense, light brown	
115										
	35			8	9 27 45			SM	@35': Silty Sand (SM), fine grained sand, micaceous, moist, medium stiff, brown	
110										
	40			9	4 6 7			ML	@40': Sandy Silt (ML), very fine grained sand, micaceous, moist, medium stiff, brown	
105										
	45			10	5 9 11			ML	@45': Sandy Silt (ML), very fine grained sand and thinly interbedded clay (CL), moist, medium stiff, light brown to olive brown	
100										
	50			11	2 3 5			ML	@50': Sandy Silt (ML) to Silty Sand (SM), very fine grained sand, micaceous, moist, loose; grades to Silty Sand (SM), fine grained sand and fine gravel, moist, brown to dark olive brown	
95										
	55			12	14 34 44			ML/SM	@55': Silt (ML), trace of fine grained sand, trace clay, well indurated, very stiff, moist, dark olive black grades to Sand (SP), medium to coarse grained sand, some silt, very dense, light yellow brown	
90										
	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
CU TRIAXIAL SHEAR
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Figure A-6b

GEOTECHNICAL BORING LOG BH-6

Date 4-20-05 **Sheet** 3 **of** 4
Project Platinum Triangle **Project No.** 011331-011-
Drilling Co. Martini Drilling **Type of Rig** CME-75
Hole Diameter 6" **Drive Weight** 140 **Drop** 30"
Elevation Top of Hole 147' **Location** Anaheim, California

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION (Logged By JAR, Sampled By JAR)	Type of Tests
	60									
85				13	2 5 15			ML	@60': Sandy Silt (ML), very fine grained sand, trace of clay, moist, medium stiff, dark brown grades to Silty Sand (SM), fine to medium grained sand, dry, light yellow brown	
	65									
80				14	20 46 50			SM	@65': Sand (SP), fine to coarse grained sand, fine gravel, micaceous, moist, very dense, light yellow brown	
	70									
75				15	12 25 35			SP	@70': Sand (SP), same as above	
	75									
70				16	13 29 47			SP	@75': Sand (SP), medium to coarse grained sand, dry, very dense, light yellow brown	
	80									
65 ▽				17	11 50			CL	@80': Silty Clay (CL), trace of fine grained sand, fine gravel, very moist, stiff, dark reddish brown grades to Gravelley Sand (SP), medium to coarse grained sand, fine slaty gravel, moist, well indurated, very dense @81': Hard drilling, added bentonite mud to augers @82.5': encountered groundwater	
	85									
60				18	41 50			GP	@85': Gravelley Sand (SP), coarse grained sand, some silt, fine to coarse gravel to 3" in size, very dense, wet	
	90									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
CU TRIAXIAL SHEAR
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Figure A-6c

GEOTECHNICAL BORING LOG BH-6

Date 4-20-05 **Sheet** 4 **of** 4

Project Platinum Triangle **Project No.** 011331-011-

Drilling Co. Martini Drilling **Type of Rig** CME-75

Hole Diameter 6" **Drive Weight** 140 **Drop** 30"

Elevation Top of Hole 147' **Location** Anaheim, California

Logged By JAR

Sampled By JAR

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
55	90			19	42 29 25			SP	@90': Sand (SP), coarse grained sand and coarse gravel, wet, some silt, very dense, very hard, reddish brown @91.5': grades to fine Sand with Clay (SC)	
50	95			20	8 20 25			SC	@95': Silty Sand (SM) to Clayey Sand (SC), fine grained sand, some coarse grained sand and gravel, wet, dense grades to Sandy Silt (ML), fine grained sand, wet	
45	100			21	3 4 6			CL	@100': Silty Clay (CL), fine grained sand, wet, loose, dark reddish brown	
				22	17 33 30			SM	@102': Silty Sand to Clayey Sand (SM/SC), fine grained sand, trace of fine gravel,wet, very dense, dark reddish brown	
40	105								Total depth: 103.5' Encountered groundwater @ 82.5' below ground surface Boring backfilled with soil cuttings and patched with asphalt upon completion	
35	110									
30	115									
	120									

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

TYPE OF TESTS:

- DS DIRECT SHEAR
- MD MAXIMUM DENSITY
- CN CONSOLIDATION
- CR CORROSION
- SA SIEVE ANALYSIS
- CU TRIAXIAL SHEAR
- EI EXPANSION INDEX
- RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

Figure A-6d

LOG OF TEST BORING

PROJECT NAME A-Town Metro Parcel "E"		**PROJECT NUMBER** I-392-4	**BORING** B-9
SITE LOCATION Anaheim, California	**START** 3/1/2006	**FINISH** 3/2/2006	**SHEET NO.** 1 of 5
DRILLING COMPANY Layne Christiensen	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Shu	**CHECKED BY** V. Glisic
DRILLING EQUIPMENT CME 75	**BORING DIA. (in)** 8"	**TOTAL DEPTH (ft)** 116.5	**GROUND ELEV (ft)** 150.0
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 76.0 / *74.0*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			1			11.0	RV					**Silty Sand (SM)** medium dense, moist, brown, fine-to coarse-grained sand
5	145		2	4 8 10	107	9.6						**Poorly Graded Sand with Sand (SP-SM)** medium dense, dry, light gray, fine-to coarse-grained sand
10	140		3	4 5 6		3.0		5				trace fine gravel
15	135		4	4 10 16	102	4.2						**Poorly Graded Sand (SP)** medium dense, dry, light gray, fine- to coarse-grained sand, trace fine to coarse gravel
20	130		5	5 12 13		2.9						fine-to medium-grained sand, trace fine gravel
			6	14 23 29	102	6.0						dense, fine-to coarse-grained sand

GDC_LOG_BORING_1A PARCEL-E.GPJ GDCLOG.GDT 6/5/06

GROUP DELTA CONSULTANTS, INC.
92 Argonaut, Suite 120
Aliso Viejo, CA 92656

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-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
A-Town Metro Parcel "E"	I-392-4	**B-9**

SITE LOCATION	START	FINISH	SHEET NO.
Anaheim, California	3/1/2006	3/2/2006	2 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Layne Christiensen	Hollow Stem Auger	S. Shu	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 75	8"	116.5	150.0	▼ 76.0 / *74.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			7	6 9 13		5.1		3				**Poorly Graded Sand (SP)** medium dense, dry, light gray, fine-to medium-grained sand dense
			8	9 17 30	107	3.8						
30	120		9	4 7 8		4.2						medium dense, fine-to medium-grained sand
			10	7 7 23	104	4.0						
35	115		11	4 7 9		3.5	CO					brown
			12	8 10 14	109	2.8						
40	110		13	5 7 8		7.6						**Silty Sand (SM)** medium dense, mosit, brown, fine grained sand
												Silty Clay with Sand (CL-ML) stiff, moist, brown, fine-grained sand, 3-inch lean clay on the top
45	105		14	8 8 7	89	24.3	CN	72	24:4			

GDC_LOG_BORING_1A PARCEL-E.GPJ GDCLOG.GDT 6/5/06

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92 Argonaut, Suite 120
Aliso Viejo, CA 92656

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-4 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
A-Town Metro Parcel "E"	I-392-4	**B-9**

SITE LOCATION	START	FINISH	SHEET NO.
Anaheim, California	3/1/2006	3/2/2006	3 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Layne Christiensen	Hollow Stem Auger	S. Shu	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 75	8"	116.5	150.0	▼ 76.0 / *74.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			15	4 6 7		9.6						**Poorly-Graded Sand with Silt (SP-SM)** medium dense, moist, brown, fine-grained sand, trace fine gravel
55	95		16	14 25 42	106	6.0						dense, light gray
												Sandy Silt (ML) very stiff, moist, brown, fine-to coarse-grained sand
60	90		17	4 8 10		18.8		51		>4.5		
												Clayey Sand (SC) medium dense, moist, brown, fine-grained sand, trace fine gravel
65	85		18	3 11 29	125	11.9						
												Well Graded Gravel with Silt and Sand and Clay (GW-GC) very dense, dry, gray, fine to coarse gravel, pieces of cobble
70	80		19	6 27 38		2.6	GS	6				

GDC_LOG_BORING_1A PARCEL-E.GPJ GDCLOG.GDT 6/5/06

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Aliso Viejo, CA 92656

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FIGURE A-4 c

LOG OF TEST BORING

PROJECT NAME A-Town Metro Parcel "E"		**PROJECT NUMBER** I-392-4	**BORING** **B-9**
SITE LOCATION Anaheim, California	**START** 3/1/2006	**FINISH** 3/2/2006	**SHEET NO.** 4 of 5
DRILLING COMPANY Layne Christiensen	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** S. Shu	**CHECKED BY** V. Glisic
DRILLING EQUIPMENT CME 75	**BORING DIA. (in)** 8"	**TOTAL DEPTH (ft)** 116.5	**GROUND ELEV (ft)** 150.0
SAMPLING METHOD Hammer: 140 lbs., Drop: 30 in. (Automatic)	**NOTES**		**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 76.0 / *74.0*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			20	5 16 18	125	9.3						**Well Graded Gravel with Silt and Sand (GW-GM)** medium dense, wet, reddish brown
80	70		21	11 20 29		8.3						dense
85	65		22	15 52/6"	125	11.2		18				**Silty Gravel with Sand (GC)** very dense, dry, gray, fine to coarse gravel, pieces of cobble
90	60		23	9 11 6		23.0	GS	36				**Clayey Sand (SC)** medium dense, brown, wet, fine-grained sand
95	55		24	4 4 5	117	12.4						loose, trace fine gravel

GDC_LOG_BORING_1A PARCEL-E.GPJ GDCLOG.GDT 6/5/06

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Aliso Viejo, CA 92656

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FIGURE A-4 d

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
A-Town Metro Parcel "E"	I-392-4	**B-9**

SITE LOCATION	START	FINISH	SHEET NO.
Anaheim, California	3/1/2006	3/2/2006	5 of 5

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Layne Christiensen	Hollow Stem Auger	S. Shu	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 75	8"	116.5	150.0	▼ 76.0 / *74.0*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in. (Automatic)

NOTES

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			25	5 6 8		19.2		45				**Clayey Sand (SC)** medium dense, dark brown, interbedded with lean clay
												Lean Clay (CL) hard, medium plasticity, wet, brown
105	45		26	9 23 27	109	20.6				3.0		
110	40		27	8 11 16		22.6						very stiff, brown to gray, trace fine gravel
												Clayey Sand / Sandy Clay (SC/CL) very dense/ hard, wet, olive to brown, fine-to medium-grained sand
115	35		28	18 55/6"	108	19.0				2.75		
												Bottom of boring at 116.5 Groundwater encountered at 76 feet during drilling Borehole backfilled with soil cuttings
120	30											

GDC_LOG_BORING_1A PARCEL-E.GPJ GDCLOG.GDT 6/5/06

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Aliso Viejo, CA 92656

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FIGURE A-4 e

APPENDIX B
LABORATORY RESULTS

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
B-1	B-1	0.0	BULK		SC															CR
B-1	R-2	2.5	MC		SC	40				12.0	119	133								
B-1	S-3	5.0	SPT		SM	45														
B-1	R-4	10.0	MC		SM	9														
B-1	S-5	12.5	SPT		SP	11										2	96	2		PA
B-1	R-6	15.0	MC		SP	16				2.0	100	102								
B-1	S-7	19.0	SPT		SP	24										1	96	3		PA
B-2	B-1	0.0	BULK		SM					4.0										
B-2	S-2	2.5	SPT		SM	54										1	68	31		-200
B-2	R-3	5.0	MC		SP	32				1.0	105	106								
B-2	S-4	10.0	SPT		SP	11														
B-3	B-1	0.0	BULK		SP															
B-3	R-2	2.5	MC		SP	32				6.0	122	129								
B-3	S-3	5.0	SPT		SP	8										0	80	20		-200

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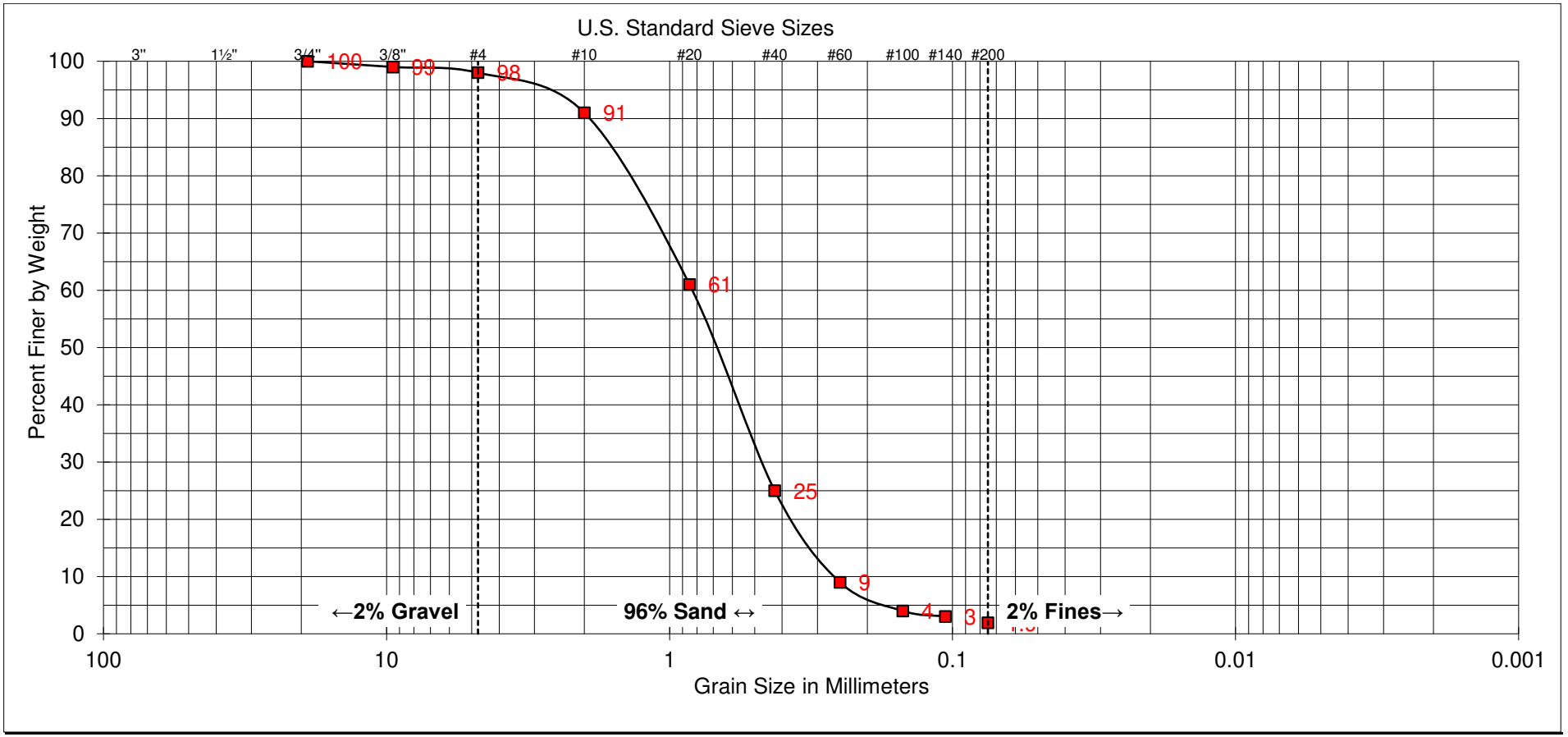
Voice: (949) 450-2100 Fax: (949) 450-2108
www.GroupDelta.com

TABLE B-1: Summary of Laboratory Results

Project: Lennar - A Town Parcel F

Location: Union Street and Park Street, Anaheim

Number: IR392H



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	B-1
SAMPLE NUMBER:	S-5
SAMPLE DEPTH:	12.5'

UNIFIED SOIL CLASSIFICATION: SP

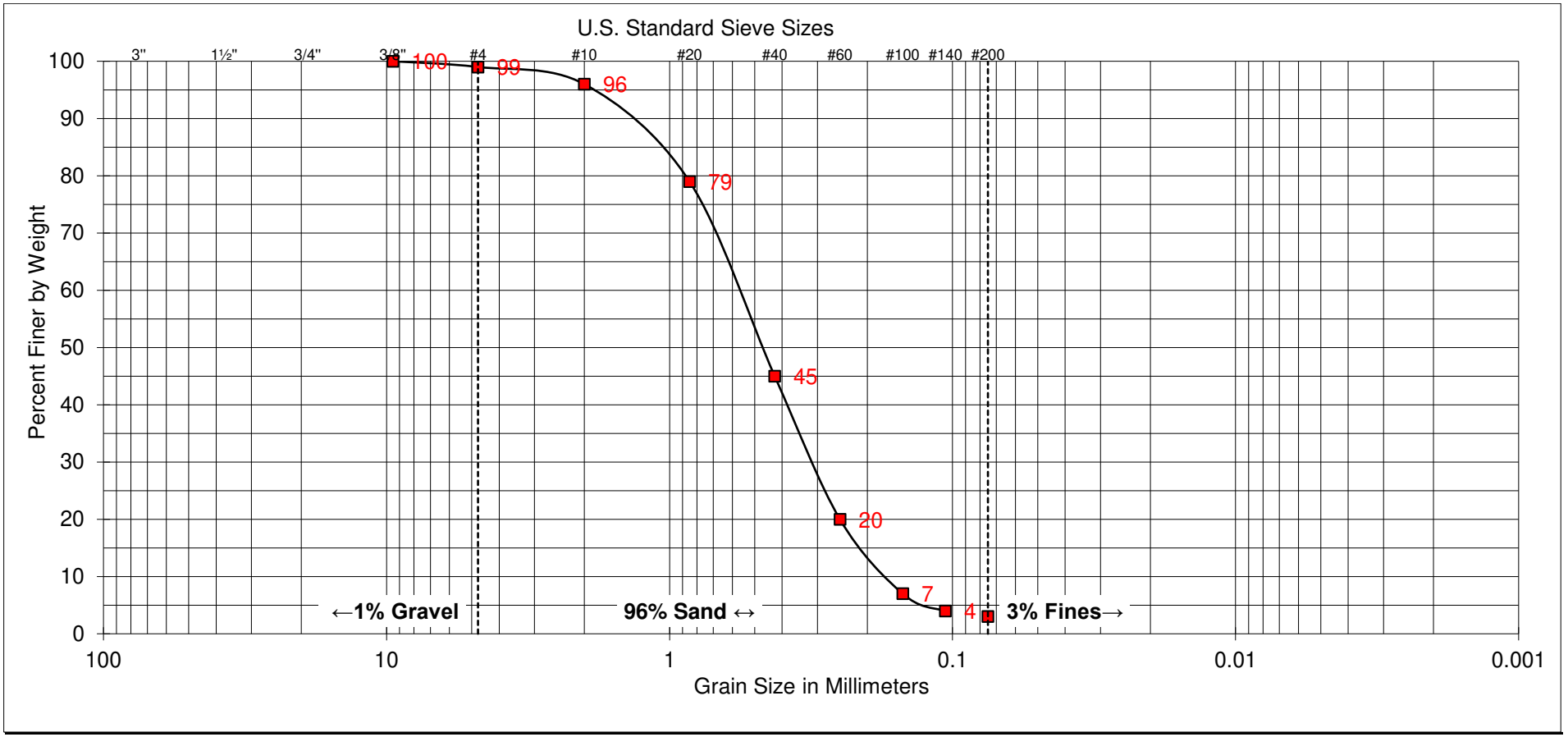
DESCRIPTION: POORLY GRADED SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Laboratory No. SO6159
Project No. IR392H



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	B-1
SAMPLE NUMBER:	S-7
SAMPLE DEPTH:	19'

UNIFIED SOIL CLASSIFICATION: SP

DESCRIPTION: POORLY GRADED SAND

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

GROUP DELTA

SOIL CLASSIFICATION

Laboratory No. SO6159
Project No. IR392H

CORROSIVITY TEST RESULTS
(ASTM D516, CTM 643)

SAMPLE	pH	RESISTIVITY (OHM-CM)	SULFATE CONTENT (%)	CHLORIDE CONTENT (%)
B-1 @ 0-5'	*7.30*	*1,395*	*0.24*	*< 0.01*

CORROSIVITY PARAMETERS

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

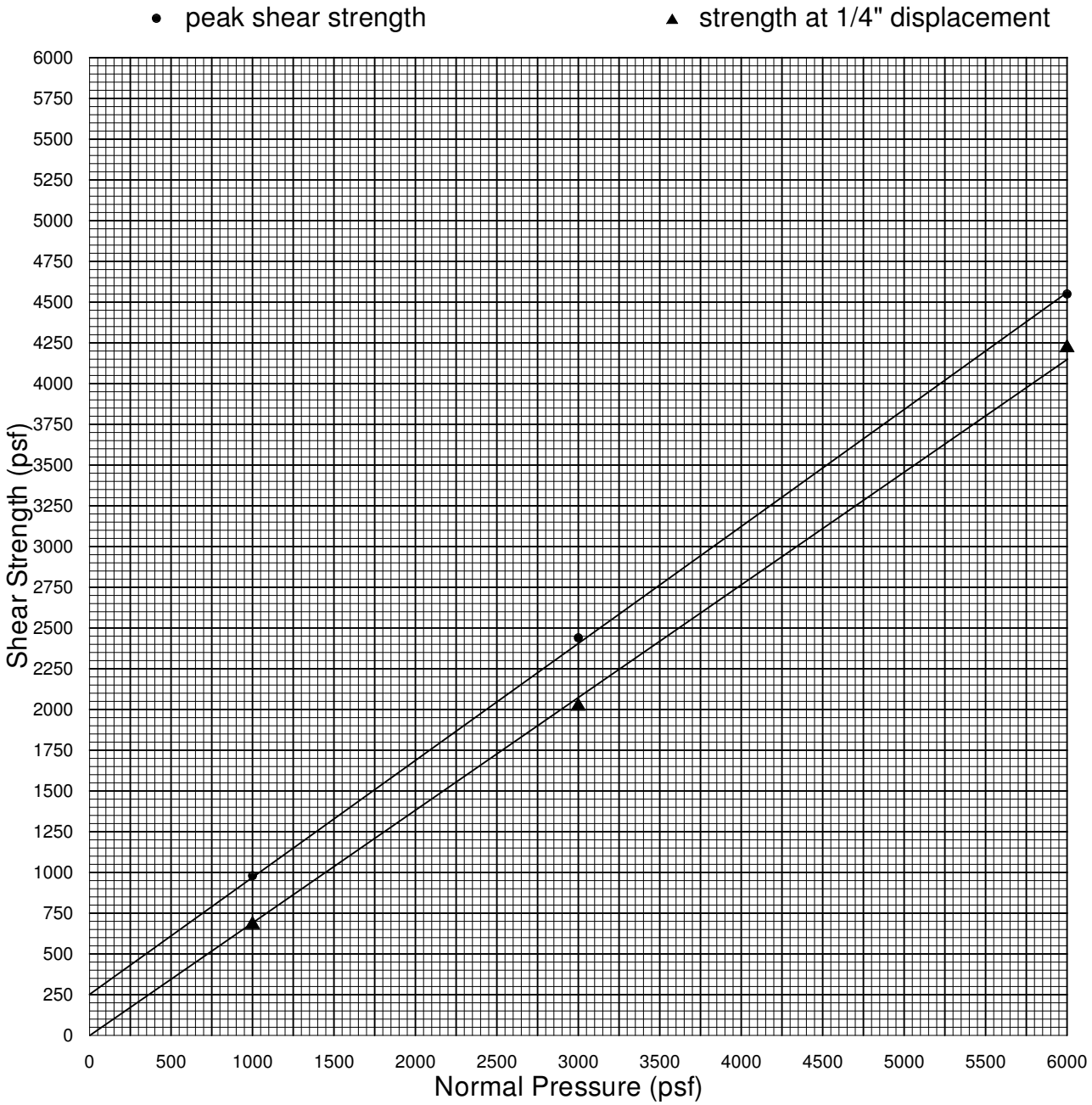
SOIL RESISTIVITY (OHM-CM)	GENERAL DEGREE OF CORROSIVITY TO FERROUS METALS
0 to 1,000	Very Corrosive
1,000 to 2,000	Corrosive
2,000 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
Above 10,000	Slightly Corrosive

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

GROUP DELTA CONSULTANTS
9245 Activity Road, Suite 103
San Diego, CA 92126

Project Name: A Town Parcel F
Project Number: IR392H

DIRECT SHEAR TEST - ASTM D-3080



Strain Rate: 0.0084 in. / min.

Sample	Type	Description	Dry Density (pcf)	Initial Water Content (%)
B26 / R4 @ 10'	Undisturbed & Saturated	Silty Sand	105.6	3.7

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
1000	980 @ 0.0505"	680
3000	2440 @ 0.1095"	2020
6000	4550 @ 0.1265"	4220
	C = 250 psf	C = 0 psf
	ϕ = 35 deg.	ϕ = 34 deg.

Figure B-1

ATTERBERG LIMITS

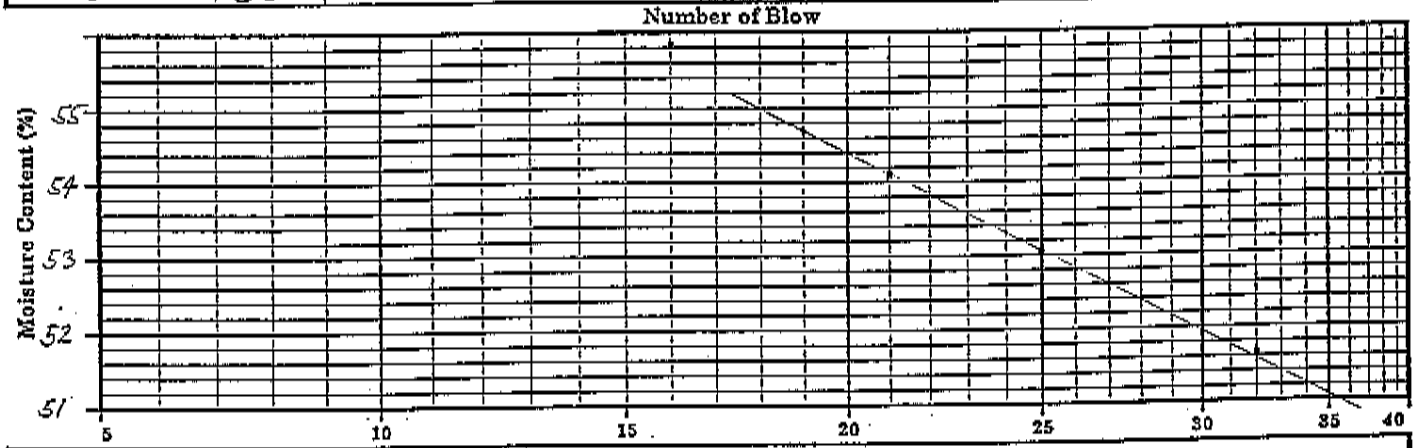
ASTM D-4318-00 / CT-204 / AASHTO T-89, 90

Project No. : I-392-14 Project Name : A TOWN METRO PARCEL F

Boring Number : B-26	Depth (ft/m) : 45.0				1
Sample Number : S-11	Description :				
Prepared By : E.Y.	Date : 3-16-07	Computered By :		Date :	Container Number
Pulverized By : E.Y.	Date : 3-19-07	Checked By :		Date :	Air : SSP-22
Tested By : E.Y.	Date : 3-19-07				Field :

Trial Number		Field Moisture	Liquid Limit (min. 20 gm) 1	2	3	4	Plastic Limit (min. 6 gm) 1	2
Number of Blow	Range		25 - 35	20 - 30	15 - 25	Extra		
	Test		32	25	21	16		
Can Number			7	8	9	10	11	12
Wt. Wet Soil + Can (gm)			47.62	45.67	47.12	46.58	31.92	32.84
Wt. Dry Soil + Can (gm)			40.31	38.35	39.79	38.94	30.47	31.36
Weight of Can (gm)			26.16	24.55	26.24	25.26	24.74	25.47
Water Content (%)			51.66	53.04	54.10	55.85	25.81	25.13

Liquid Limit : 53 Plastic Limit : 25 Plastic Index : 28 Average : 25.22



Remark :

Boring Number :	Depth (ft/m) :				2
Sample Number :	Description :				
Prepared By :	Date :	Computered By :		Date :	Container Number
Pulverized By :	Date :	Checked By :		Date :	Air : -
Tested By :	Date :				Field : -

Trial Number		Field Moisture	Liquid Limit (min. 20 gm) 1	2	3	4	Plastic Limit (min. 6 gm) 1	2
Number of Blow	Range		25 - 35	20 - 30	15 - 25	Extra		
	Test							
Can Number								
Wt. Wet Soil + Can (gm)								
Wt. Dry Soil + Can (gm)								
Weight of Can (gm)								
Water Content (%)								

Liquid Limit : Plastic Limit : Plastic Index : Average :

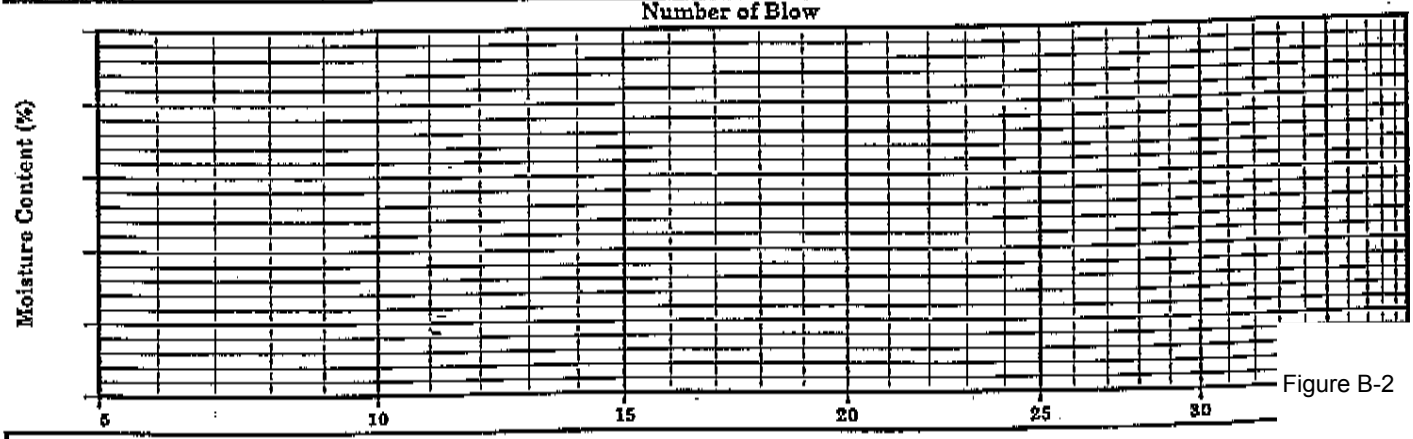


Figure B-2

Table B-2
SUMMARY OF CORROSION TEST RESULTS

PROJECT NAME: A-Town Parcel "E" GDC JOB NO.: I-392-4
DATE: 04-18-06 SUMMARIZED BY: S. SHU

BORING NO	SAMPLE NO	DEPTH (FT)	PH CALTRANS 643	CHLORIDE CONTENT CALTRANS 422 (ppm)	SULFATE CONTENT CALTRANS 417 (ppm)	MINIMU RESISTIVITY CALTRANS 532 (ohm-cm)
B-8	B-1	0-5.0	8.3	148	33	4435
B-9	S-11	35.0	8.5	121	40	22000

Table B-3
SUMMARY OF R-VALUE TEST RESULTS

PROJECT NAME: A-TOWN PARCEL "E" GDC JOB NO.: I-392-4
DATE: 04-20-06 SUMMARIZED BY: S. SHU

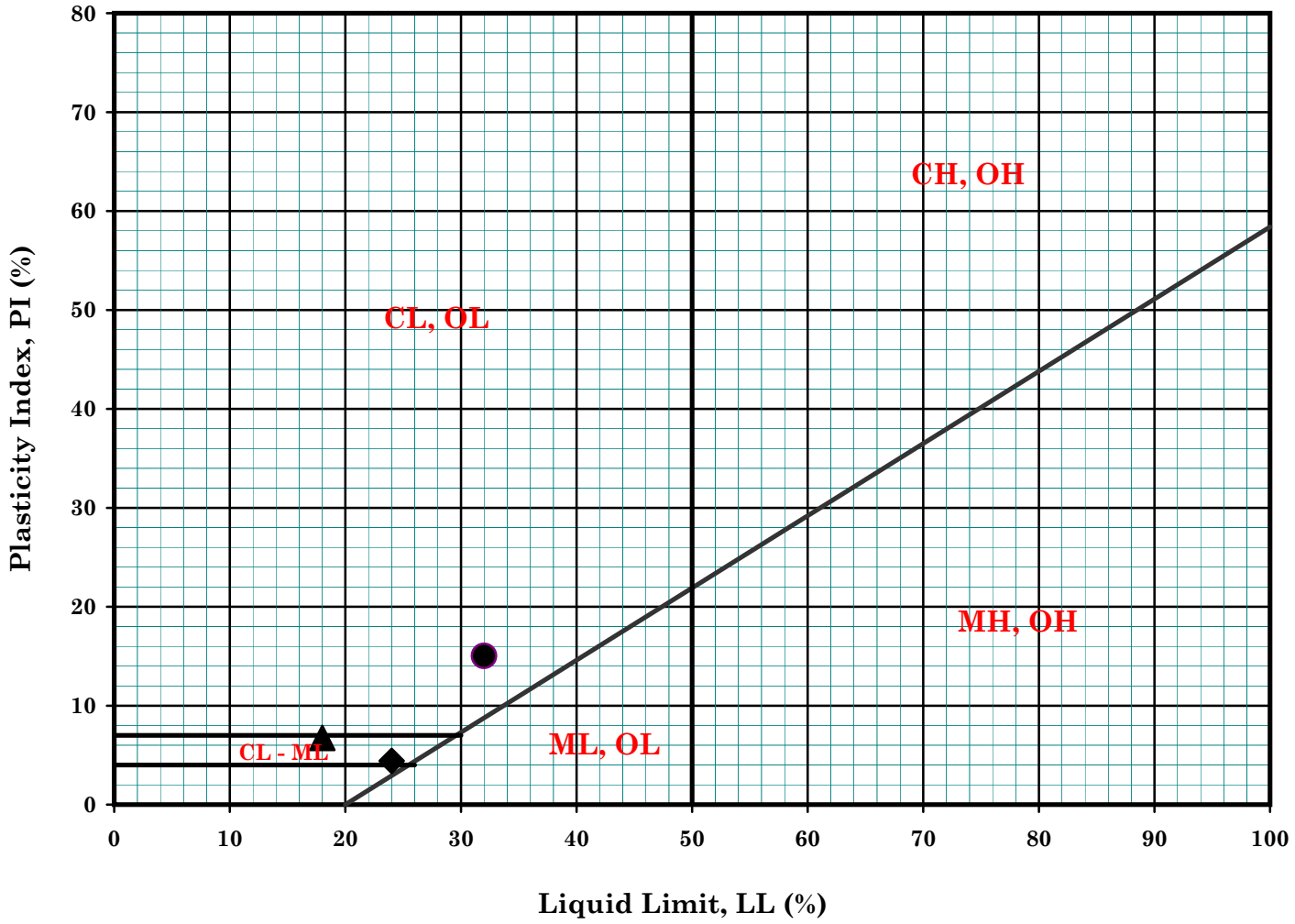
BORING NO	SAMPLE NO	DEPTH (FEET)	SOIL TYPE	R-VALUE
B-9	B-1	0-5.0	SM	74

Table B-4
SUMMARY OF TORVANE SHEAR TEST RESULTS

PROJECT NAME: A-Town Parcel "E" GDC JOB NO.: I-392-4
DATE: 04-20-06 SUMMARIZED BY: S. SHU

BORING NO	SAMPLE NO	DEPTH (feet)	SOIL TYPE	UNDRAINED SHEAR STRENGTH (tsf)
B-8	R-25	100	CL	4.3
B-8	R-27	115	CL	0.3
B-9	R-26	105	CL	1.4
B-9	R-28	115	SC/CL	0.9

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	Description
●	B - 8	S - 14	45.0	46.0	13.7	14.0	22.34	32	17	15	Olive Gray, Sandy Lean Clay (CL) or Clayey Sand (SC)
▲	B - 8	S - 18	65.0	66.0	19.8	20.1	12.15	18	11	7	Brown, Sandy Lean Clay (CL)
◆	B - 9	D - 14	45.0	46.0	13.7	14.0	24.27	24	20	4	Light Olive Brown, Silty Clay with fine Sand (CL-ML)
■											
○											
△											
◇											
□											

Remark :

GROUP DELTA CONSULTANTS

A - Town Metro Parcel "E"

Project No. : I-392-04

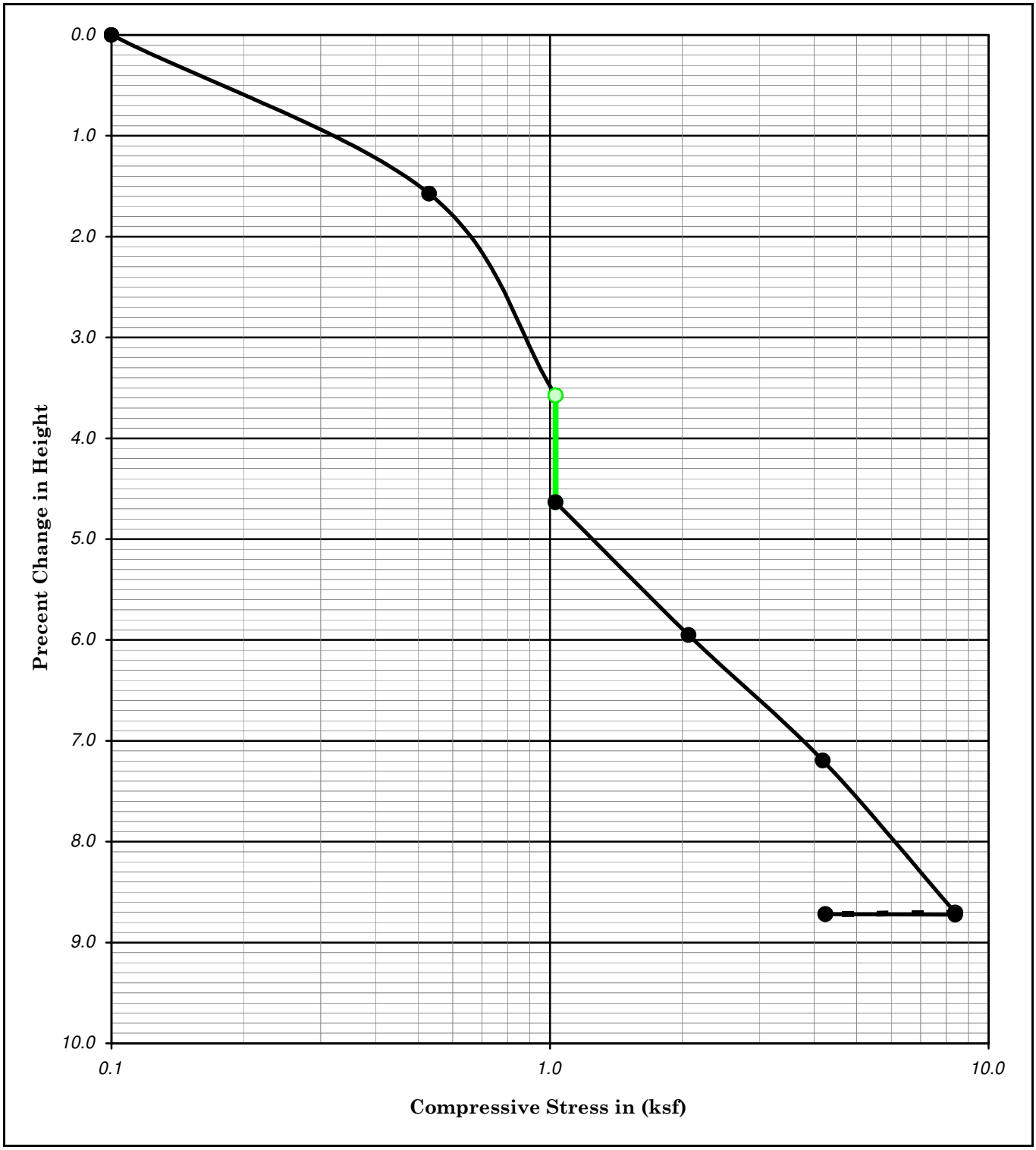
Date : 04/06/06

ATTERBERG LIMITS

(ASTM D-4318-00 / CT-204 / T-89)

FIGURE B-1

P.F. Chan (2000')



Boring No. :	B - 9		Liquid Limit :	24		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No. :	D - 14		Plastic Limit :	20						
Depth (ft) :	45.0	46.5	Plastic Index :	4	Initial	24.27	87.07	13.71	68.69	0.97
Depth (m) :	13.73	14.18	Specific Gravity :	2.75	Final	29.69	97.75	15.39	100.00	0.76

Description : *Light Olive Brown, Silt or Lean Clay with fine Sand (CL-ML)*

GROUP DELTA CONSULTANTS

A - Town Metro Parcel "E"

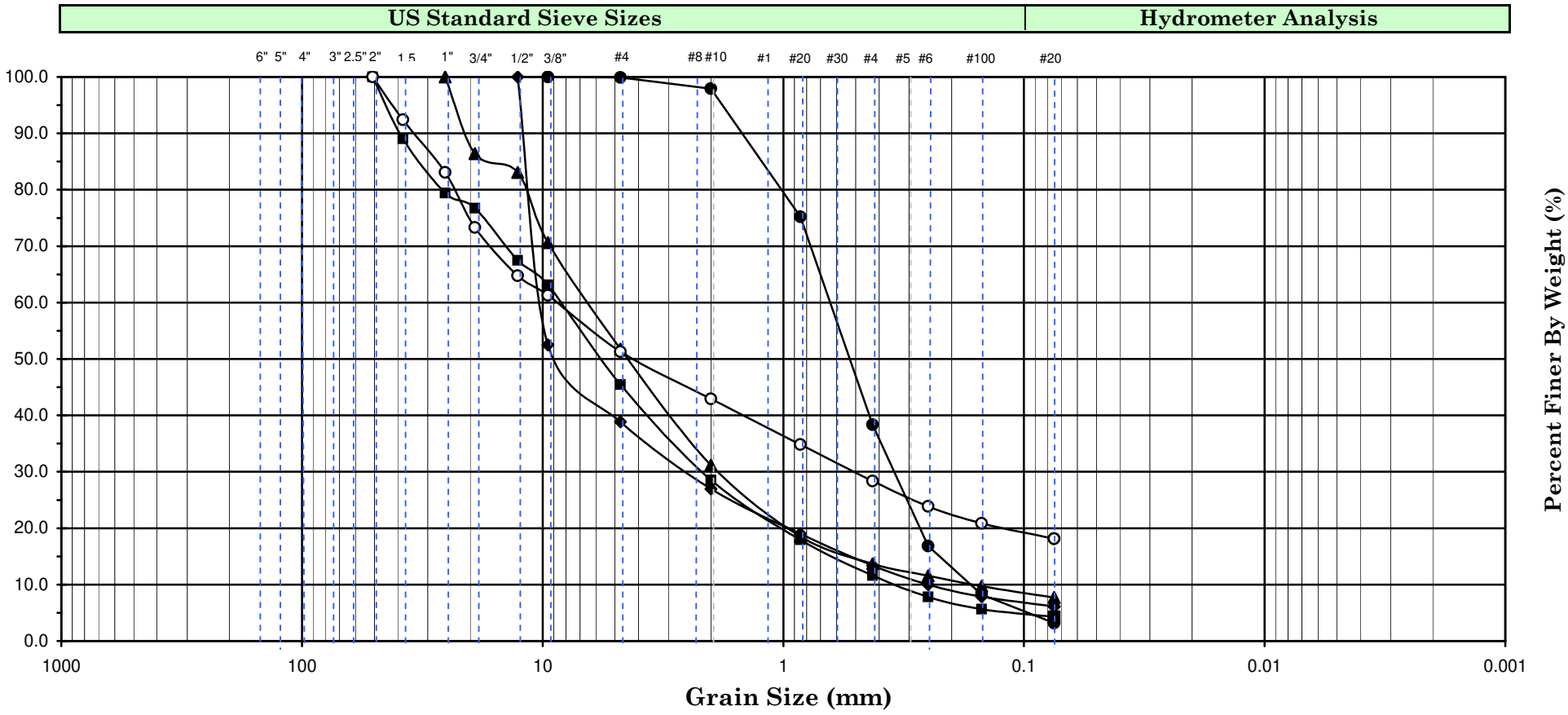
Project No. : *I-392-04*

Date : *04/07/06*

CONSOLIDATION TEST

(ASTM D-2435 / CT-219)

FIGURE B-2



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	B - 8	D - 5	20.0	21.5	6.10	6.56	Light Olive Brown	Poorly-Graded Sand	SP
▲	B - 8	D - 19	70.0	71.5	21.35	21.81	Dark Olive Brown	Poorly-Graded Gravel with Sand and Clay	GP-GC
■	B - 8	D - 21	80.0	81.5	24.40	24.86	Dark Grayish Brown	Well-Graded Gravel with Sand	GW
◆	B - 9	S - 19	70.0	71.5	21.35	21.81	Dark Grayish Brown	Well-Graded Gravel with Sand and Clay	GW-GC
○	B - 9	D - 22	85.0	86.5	25.93	26.38	Brown	Silty Gravel with Sand	GC
△									

Remark : *Gravel had been crushed by sampler bit.*

GROUP DELTA CONSULTANTS

A - Town Metro Parcel "E"

Project No. : I - 392 - 04

Date : 04/05/06

GRAIN SIZE ANALYSIS

(ASTM D-422-63)

FIGURE B-3

APPENDIX C
PERCOLATION TEST RESULTS

Boring Percolation Test Data Sheet

Project Number:	IR392H	**Test Hole Number:**	B-1
Project Name:	Lennar A Town Parcel F	**Date Excavated:**	16-Aug-21
USCS Soil Classification		**Date Tested:**	16-Aug-21
Liquid Description:	Clean Water	**Depth of Boring, D_T (ft):**	19
Tested By:	G. Valdivia	**Diameter of boring, D_B (in):**	8
Test Time Interval:	10 Minutes	**Diameter of casing, D_C (in):**	2
Start Time for Pre-Soak:	9:18 AM	**Annulus Backfill Material:**	3/4" Gravel
Start Time for Test:	11:07 AM	**Gravel Void Ratio, GF:**	0.4
Screened Interval :	15-20 feet bgs	**Depth to Initial Water Depth (ft):**	18.30

Percolation Data

Sandy Soil Criteria Test:

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (in)	Final Depth to Water (in)	Change in Water Level ΔD (in)	Greater than or equal to 6 inches ?
1	9:18 AM	9:48 AM	30	219.60	223.20	3.6	No
2	9:50 AM	9:55 AM	5	204.00	223.20	19.2	Yes

Shallow Percolation Test Data:

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_0 Initial Depth to Water (in)	D_f Final Depth to Water (in)	ΔD Change in Water Level (in)	Percolation Rate (min/in)
1	11:07 AM	11:12 AM	10	213.60	223.20	9.60	1.04
2	11:14 AM	11:19 AM	10	206.40	223.20	16.80	0.60
3	11:21 AM	11:25 AM	10	204.00	223.20	19.20	0.52
4	11:27 AM	11:32 AM	10	204.00	223.20	19.20	0.52
5	11:34 AM	11:40 AM	10	204.00	223.20	19.20	0.52
6	11:42 AM	11:48 AM	10	204.00	223.20	19.20	0.52

The conversion equation is used: $I_t = \frac{\Delta H(60 r_{eff})}{\Delta t(r_{eff} + 2H_{avg})}$

where: $R_{eff} = \sqrt{(R^2 - r^2) * GF + r^2} = 2.64\ inches$

Boring Radius, R = 4 inches
Casing Radius, r = 1.0 inches
Time interval, Δt = 10 minutes
Initial Depth to Water, D_0 = 204 inches
Final Depth to Water, D_f = 223.2 inches
Total Depth of Test Hole, D_T = 224 inches

"H_o" is the initial height of water at the selected time interval.
$H_o = D_T - D_0 = 228 - 204 = 24$ inches
"H_f" is the final height of water at the selected time interval.
$H_f = D_T - D_f = 228 - 223.2 = 4.8$ inches
"ΔH" is the change in height over the time interval.
$\Delta H = \Delta D = H_o - H_f = 24 - 4.8 = 19.2$ inches
"Havg" is the average head height over the time interval.
$Havg = (H_o + H_f)/2 = (24 + 4.8)/2 = 14.4$ inches

"I_t" is the tested infiltration rate:

$$\boldsymbol{I_t = \frac{\Delta H(60 r_{eff})}{\Delta t(r_{eff} + 2H_{avg})} = 9.69\ inches/hour}$$