Appendix E
Geotechnical Investigation Report

GEOTECHNICAL INVESTIGATION REPORT

for

PROPOSED ROBERTS CAMPUS SPORTS BOWL

Claremont McKenna College
West Arrow Route and Claremont Boulevard
Claremont and Upland, California

Prepared For:

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January 12, 2024
Langan Project No.: 700114101

LANGAN

January 12, 2024

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Attn.: Michelle Barlow

Geotechnical Investigation Report
Proposed Roberts Campus Sports Bowl
Claremont McKenna College
Claremont and Upland, California
Langan Proposal No. 700114101

Dear Michelle, Andres and Matt:

Langan Engineering & Environmental Services, Inc. is pleased to submit this geotechnical engineering report for the Proposed Roberts Campus Sports Bowl to be constructed for Claremont McKenna College (CMC) in Claremont and Upland, California.

This report was prepared in general accordance with our proposal dated March 21, 2022 and our contract for professional services with CMC that was executed on June 28, 2022.

♦ ♦ ♦

We sincerely appreciate the opportunity to be of service to you on this project. Please contact us if you have questions regarding this report.

Sincerely,
Langan Engineering & Environmental Services, Inc.

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 GENERAL 1
1.2 SITE BACKGROUND 1
1.3 PROPOSED SPORTS BOWL DEVELOPMENT 2
1.4 PRIOR GEOTECHNICAL INVESTIGATION 6

2.0 SUBSURFACE EXPLORATIONS AND CONDITIONS 6

2.1 CURRENT GEOTECHNICAL EXPLORATIONS 6
2.2 PRIOR GEOTECHNICAL EXPLORATIONS 6
2.3 SUBSURFACE CONDITIONS 7
2.4 GROUNDWATER 7
2.5 FIELD PERCOLATION TESTING 8
2.6 SOIL-GAS (METHANE) MONITORING WELL INSTALLATION 9

3.0 GEOTECHNICAL LABORATORY TESTING 10

3.1 CURRENT LABORATORY TESTING 10
3.2 PRIOR LABORATORY TESTING 10

4.0 GEOLOGIC AND SEISMIC HAZARDS EVALUATION 10

4.1 REGIONAL AND LOCAL GEOLOGIC SETTING 10
4.2 RECLAMATION BACKFILL 12
4.3 GEOLOGIC AND SEISMIC HAZARD EVALUATION 13
4.4 REGIONAL FAULTING 13
4.5 REGIONAL SEISMICITY 13
4.6 GROUND SURFACE RUPTURE POTENTIAL 13
4.7 LIQUEFACTION POTENTIAL 14
4.8 LATERAL SPREADING POTENTIAL 14
4.9 SEISMIC (AKA 'DRY') SETTLEMENT 14
4.10 EARTHQUAKE-INDUCED LANDSLIDES 15
4.11 FLOOD MAPPING 15
4.12 TSUNAMIS, SEICHE, AND DAM INUNDATION 15
4.13 SUBSIDENCE 15
4.14 EXPANSIVE SOILS 15
4.15 SOIL-GAS (METHANE) 15

5.0 CONCLUSIONS 16

5.1 GENERAL 16
5.2 PARKING STRUCTURE, PEDESTRIAN TUNNEL AND MAINTENANCE FACILITY STRUCTURE 16
5.3 PRESS BOX, FIELD HOUSE, STORAGE, FIELD STRUCTURES, DUGOUTS (MINOR STRUCTURES) 17
5.4 BUILDING FLOOR SLABS / PEDESTRIAN TUNNEL BOTTOM SLAB 17
5.5 SEISMIC DESIGN 17
5.6 PLAYING FIELDS 18
5.7 PAVEMENT AND SITE FLATWORK 19
5.8 FREE-STANDING SITE RETAINING WALLS 19
5.9 TEMPORARY SHORING 19
5.10 GROUNDWATER 19
5.11 SLOPE STABILITY, EARTHWORK AND GRADING 19
5.12 SOIL-GAS (METHANE) CONSIDERATIONS 20
5.13 CORROSION POTENTIAL 20

6.0 RECOMMENDATIONS 20

6.1 FOUNDATION DESIGN 20
6.2 BUILDING FLOOR SLABS / PEDESTRIAN TUNNEL BOTTOM SLAB 21
6.3 SEISMIC DESIGN CONSIDERATIONS 22

6.4 PERMANENT BELOW GRADE WALLS 22
6.5 PLAYING FIELDS 23
6.6 PAVEMENT DESIGN RECOMMENDATIONS 23
6.7 SITE FLATWORK 25
6.8 SITE RETAINING WALLS 25
6.9 TEMPORARY SHORING 26
6.10 EARTHWORK CONSIDERATIONS 28

7.0 GEOTECHNICAL FIELD OBSERVATION AND TESTING 30

8.0 LIMITATIONS 30

9.0 CLOSING 31

FIGURES

1 SITE LOCATION MAP
2 SITE PLAN – SCENARIO 1 GEOTECHNICAL MAP (2A)
3 SITE PLAN – SCENARIO 2 & 2B GEOTECHNICAL MAP (3A AND 3B)
4 SCENARIO 1 CROSS SECTION A-A' THROUGH H-H' (4A THROUGH 4I)
5 SCENARIO 2 & 2B CROSS SECTION A-A' THROUGH H-H' (5A THROUGH 5H)
6 HISTORICAL HIGH GROUNDWATER MAP
7 REGIONAL GEOLOGY
8 QUATERNARY FAULT AND EARTHQUAKE EPICENTER (8A AND 8B)
9 SEISMIC HAZARD ZONES MAP
10 AT-REST LATERAL EARTH PRESSURE
11 DYNAMIC LATERAL EARTH PRESSURE

APPENDICES

A CURRENT FIELD EXPLORATIONS AND LABORATORY TEST RESULTS
B PRIOR FIELD EXPLORATIONS AND LABORATORY TEST RESULTS
C FIELD PERCOLATION TEST RESULTS
D SOIL-GAS (METHANE) TEST RESULTS
D HISTORIC AERIAL PHOTOGRAPHS (1938 TO 2005)
E ESTIMATED DEBRIS PERCENTAGES IN LANDFILL MATERIALS

1.0 INTRODUCTION

1.1 General

Langan Engineering and Environmental Services, Inc. (LANGAN) has completed a geotechnical investigation for the proposed Roberts Campus Sports Bowl development. The proposed development will be constructed primarily within a portion of the existing Claremont Landfill (aka Roberts Campus East; previously known as East Campus) noting a pedestrian tunnel is also planned that will extend from the Claremont Landfill west beneath Claremont Boulevard and provide access to the Sports Bowl from the main campus. The site location is shown on Figure 1.

The existing landfill site is approximately 74 acres and is bound on the east by Monte Vista Avenue, on the west by Claremont Boulevard, on the north by Foothill Boulevard and on the south by West Arrow Route. The proposed Roberts Campus Sports Bowl is to be developed on approximately 66.5 acres of the 74-acre site.

The boundary between the City of Claremont (Los Angeles County) and the City of Upland (San Bernardino County) crosses the site diagonally with the northwesterly approximately 29 acres located with the City of Claremont and the southeasterly approximately 45 acres located in the City of Upland (San Bernardino County).

1.2 Site Background

The existing inert debris landfill site began as a quarry in the 1920s. Quarry operations ended in 1972. In late 1972, the site was permitted for disposal of inert debris consisting of non-decomposable, non-water soluble, inert solids. In 1984, landfilling operations were suspended pending potential development. Inert debris landfill operations resumed in 1991. By 1994, significant inert debris fills were placed in the northwestern corner and along the western side of the site.

The landfill is in Los Angeles and San Bernardino counties, however, in 1987 staff from the Regional Water Quality Control Board (RWQCB) for both Los Angeles and Santa Ana agreed that the Los Angeles RWQCB would assume jurisdictional responsibility for the entire landfill, including those portions within San Bernardino County.

In 1998, the inert debris landfill was purchased by The Claremont Colleges Services (TCCS) (formerly known as the Claremont University Consortium) which is the central coordinating and support organization for the seven independent colleges (including CMC) known as The Claremont Colleges.

Following TCCS's purchase of the inert debris landfill, waste disposal was restricted to inert debris from construction projects within TCCS, including CMC, Pomona College, Scripps College, Harvey Mudd College, Pitzer College, and Claremont Graduate University.

On May 4, 2000, updated Waste Discharge Requirements (WDR) were adopted by Los Angeles RWQCB Order 00-070, reflecting, among other things, the change to TCCS's ownership. Because TCCS limited disposal to material from construction sites or projects by TCCS or its associated colleges, the updated WDR included exemptions from certain provisions including the waste load checking program.

On August 19, 2019, a superseding WDR was issued, Order R4-2019-0087 (Current WDRs; 2019 RWQCB). These superseding WDRs were issued in anticipation of the commencement of an Inert Debris Engineered Fill Operation (IDEFO) on the site, which would have accepted inert debris from the general public (i.e. sources other than construction projects within TCCS). An IDEFO also would have been regulated by the California Department of Resources Recycling and Recovery (CalRecycle), through its Local Enforcement Agencies (LEAs), in accordance with Division 7, Chapter 3 of Title 14 of the California Code of Regulations (Title 14). Accordingly, the WDRs were revised to include updated requirements, including waste characterization, waste load checking, and groundwater quality monitoring, as required for the anticipated IDEFO. These superseding WDRs also reflected a change of the operator (to Arcadia Reclamation Inc.). The superseding WDRs did not change the acceptable materials that include soil, rock, gravel, broken concrete, broken asphalt, glass, brick, and other inert debris. Additionally, the superseding WDRs state that asphaltic material shall not be dumped into standing water, nor shall it be placed below the highest anticipated groundwater elevation.

However, despite the fact that the Current WDR (Order R4-2019-0087) anticipated operation of an IDEFO, the landfill was never operated as an IDEFO. Instead, the site has consistently continued to operate as it had since acquisition by TCCS. Thus, with one exception, operations since at least May, 2000 have been continuously limited to acceptance of inert debris waste from TCCS and its associated colleges, and this limited use continues to the present. The one exception consisted of disposal of soil and construction debris from a City of Upland stormwater basin expansion project in 2004 and 2007. The Los Angeles RWQCB approved waivers to allow the one-time acceptance of waste material from projects outside of TCCS. Although an IDEFO was never commenced on the site, the Detection Monitoring Program (DMP) reporting has occurred as required by the Current WDR. Because the landfill has only accepted inert debris, the landfill is unlined and does not include environmental control provisions for gas and leachate collection.

In 2021, CMC completed acquisition of all parcels comprising the inert debris landfill. CMC plans to close the landfill and implement existing entitlements approved by the cities of Claremont and Upland in 2016, with some modifications, to develop the majority of the property (i.e. approximately 66.5 acres) with sports fields, parking and related uses.

Based on our review of a topographic survey prepared by Atlas Civil Design, the ground surface level around the site perimeter ranges from approximately 1,330 feet at the northeast corner to 1,240 at the southwest corner. Existing slopes descend from the perimeter to a low point of approximately Elevation 1,184 near within the southerly portion of the site.

Concurrent with this geotechnical investigation and report, Langan also prepared a landfill closure plan dated December 15, 2023.

1.3 Proposed Sports Bowl Development

1.3.1 General

The following information describes currently contemplated development scenarios and is presented in this report to provide context for evaluation of geotechnical feasibility and development of geotechnical design recommendations provided herein. The development scenarios summarized herein may be subject to change as the planning process evolves.

Three alternative development options are currently contemplated for the site and are designated as Scenarios 1, 2 and 2B.

We were furnished with conceptual plans for the three alternative scenarios dated December 6, 2023, provided by BIG Architects and grading plans dated April 27, 2023 and December 11, 2023 for Scenarios 1 and 2/2B, respectively, provided by Atlas Civil Design.

The contemplated scenarios include development of athletic playing fields, a pedestrian access tunnel and various 'minor' structures with relatively small footprints, limited occupancy and relatively light foundation loading to service the planned athletic field development.

Scenarios 2 and 2B will also include a large-footprint parking structure and an adjacent maintenance facility structure.

The proposed pedestrian tunnel will be constructed by cut-and-cover methodology and the invert will be established approximately 21 feet below Claremont Boulevard and four to approximately nine feet of soil cover are planned above the top of the tunnel structure.

Surface parking is also planned along the northern end of the site, and along portions of the east and west sides of the site. Vehicular access driveways will be located along Claremont Boulevard, Foothill Boulevard and Monte Vista Avenue. Parking and vehicular access driveways vary with the three alternative development scenarios.

Another component of the proposed development is a network of paths and trails surrounding the proposed playing fields.

Mass grading will be required to accomplish the planned finish grades and the mass grading will include excavation, processing, and re-placement of the existing landfill materials. The planned grading will establish permanent slopes and will likely require construction of retaining walls at one or more locations.

Each of the alternate scenarios will include development of approximately 66.5 acres of the landfill site. The 66.5 acres encompass lots 1-4 of the Upland Parcel Maps 18989 and Lots 1-2 of the Claremont Parcel Map 70243.

Development is not currently contemplated as part of the Sports Bowl project within the southerly 10 acres, approximately 15 percent of the site (Lot 3 of the Claremont Parcel Map 70243 and Lots 5 and 6 of Upland Parcel Map 18989).

The following sections describe each of the alternate development scenarios.

1.3.2 Development Scenario 1

Scenario 1 would develop the northerly 66.5 acres and would consist of construction of a football / track / lacrosse field, three multi-purpose fields, a soccer / rugby field, and a baseball field, a softball field, and a golf practice facility.

Minor structures are planned that include an approximately 15,000 square foot (sf) sports pavilion (Field Sports Pavilion) along the north side of the football / track / lacrosse field, an approximately 14,000 sf field house (North Field House) south of the proposed baseball and softball fields, and an approximately 11,000 sf maintenance facility structure northeast of the proposed softball field. Dugout structures, batting cages and bullpens are planned adjacent to the baseball and softball fields.

A pedestrian access tunnel is planned to connect the Sports Bowl to the main (west) CMC campus adjacent to the football / track / lacrosse field. The invert of the tunnel will be established approximately 21 feet below Claremont Boulevard grade.

Surface parking lots are also planned along the southeast, west, and northerly sides of the site. Scenario 1 is depicted on Figure 2A.

1.3.3 Development Scenario 2

Scenario 2 would also develop the northerly 66.5 acres and would consist of construction of a football / track / lacrosse field, three multi-purpose fields, a soccer / rugby field, a baseball field, a softball field, and a golf practice facility.

A large-footprint subterranean parking structure is planned along the west side of the site. A preliminary concept for the proposed parking structure indicates it will consist of one-subterranean level that will be established approximately 11.5 feet below the existing ground surface level (bgs).

Minor structures are planned that include an approximately 11,200 sf field house (North Field House) south of the baseball and softball fields, an approximately 3,200 sf press box along the south side of the football / track / lacrosse field, three field storage support structures ranging from approximately 4,000 sf to 9,000 sf at the east, west and north sides of the football / track / lacrosse field. Dugout structures, batting cages, bullpens and approximately 1,800 sf support facilities are planned adjacent to the baseball and softball fields.

A pedestrian access tunnel is planned to connect the Sports Bowl to the main (west) CMC campus adjacent to the football / track / lacrosse field. The invert of the tunnel will be established approximately 21 feet below Claremont Boulevard grade.

A maintenance facility structure is planned immediately south of the parking structure and pedestrian tunnel. The lowest finish floor level for the maintenance facility structure will be established at Elevation 1,235.5.

Surface parking lots are also planned at the southeast, northerly and southwestern sides of the site. Scenario 2 is depicted on Figure 3A.

Phasing of Scenario 2 development is also being considered wherein the football / track / lacrosse fields, baseball and softball fields and golf practice facility will be constructed first and will utilize fill materials borrowed from the northerly side of the site.

1.3.4 Development Scenario 2B

Scenario 2B would also develop the northerly 66.5 acres and would consist of construction of a football / track / lacrosse field, three multi-purpose fields, a soccer / rugby field, a baseball field, a softball field, and a golf practice facility.

A large-footprint subterranean parking structure is planned along the west side of the site. A preliminary concept for the proposed parking structure indicates it will consist of one-subterranean level that will be established approximately 11.5 feet below the existing ground surface level (bgs).

Minor structures are planned including an approximately 29,200 sf field house (aka North Field House) along the north side of the football / track / lacrosse field, and an approximately 3,200 sf press box along the south side of the football / track / lacrosse field. Please note the North Field House planned in Scenario 2B consolidates several smaller structures planned in Scenario 2. Dugout structures, batting cages, bullpens, and approximately 1,800 sf support facilities are planned adjacent to the baseball and softball fields.

A pedestrian access tunnel is planned to connect the Sports Bowl to the main (west) CMC campus adjacent to the football/ track/ lacrosse field. The invert of the tunnel will be established approximately 21 feet below Claremont Boulevard grade.

Surface parking lots are also planned at the southeast, northerly, and southwestern sides of the site. Scenario 2B is depicted on Figure 3B.

Phasing of Scenario 2B development is also being considered wherein the football / track / lacrosse fields, baseball and softball fields and golf practice facility will be constructed first and will utilize fill materials borrowed from the northerly side of the site.

1.3.5 Summary of Alternative Development Scenarios 1, 2 and 2B

Each of the proposed alternative development concepts will require mass grading and the installation temporary shoring. To achieve the planned playing field finish surface level, cuts up to approximately 46 feet and fills up to approximately 24 feet are required for Scenario 1 and cuts and fills each up to approximately 40 feet are required for Scenarios 2 and 2B as summarized in Tables 1 and 2.

Table 1 – Summary of Development Scenario 1

Playing Field / Structure	Finish Playing Field Surface Level or Lowest Finish Floor Level (feet, msl)	Approximate Cut/Fill[1] (Feet)	
		Max Cut	Max Fill
Football / Track / Lacrosse Field	1,209.0	31	24
Multi-purpose Field	1,224.0	21	9
Soccer / Rugby Field	1,243.0	7	15
Baseball Field	1,257.0	46	20
Softball Field	1,257.0	3	7
Golf Practice Area	1,257.0	39	7
Pedestrian Tunnel	1,233.0	21	0

[1]To achieve finish playing surface level / lowest finish floor level

Table 2 – Summary of Development Scenarios 2 and 2B

Playing Field / Structure	Finish Playing Field Surface Level or Lowest Finish Floor Level (feet, msl)	Approximate Cut/Fill[1] (Feet)	
		Max Cut	Max Fill
Football / Track / Lacrosse Field	1,216.0	24	31
Multi-purpose Field	1,260.0	40	17
Soccer / Rugby Field	1,251.0	4	16
Baseball Field	1,226.0	19	0
Softball Field	1,226.0	14	11
Golf Practice Area	1,226.0	19	11
Maintenance Facility Structure	1,235.5	27	0
Parking Structure	1,243.0 to 1,263.0	13	0
Pedestrian Tunnel	1,233.0	21	0

[1]To achieve finish playing surface level / lowest finish floor level

Lowest finish floor elevations for the proposed structures remain a work in progress and will be provided in an addendum once finalized.

1.3.6 Stormwater Management

The proposed stormwater management concept will include infiltration as well as retention beneath the football / track / lacrosse field playing surface.

1.4 Prior Geotechnical Investigation

We have reviewed reports of prior geotechnical investigations for the landfill site dated December 23, 2020 and January 28, 2022 that were prepared by Geotechnical Professionals Inc. (GPI).

We have also reviewed a prior geotechnical report for the landfill site dated June 6, 2001, June 15, 2005, and August 21, 2007 prepared by RMA that summarize RMA's field observations during earthwork and grading within the southerly portion of the site.

We have reviewed the data presented in the prior reports and assume the responsibility for the use and interpretation of the prior available geotechnical data.

2.0 SUBSURFACE EXPLORATIONS AND CONDITIONS

2.1 Current Geotechnical Explorations

We drilled 49 borings (B-14 through B-62) at the site using truck-mounted and track-mounted hollow-stem auger drilling equipment. The borings were drilled to depths ranging from ten to 60 feet below the existing ground surface level (bgs).

We also performed field percolation testing at six locations (FP-1 through FP-6) and installed three soil gas (methane) wells at the site during subsequent mobilizations. Field percolation testing and soil-gas (methane) testing are summarized in Sections 2.5 and 2.6, respectively.

During each our initial and subsequent exploration programs, our field representative maintained a log of the subsurface conditions, collected relatively undisturbed and bulk samples and performed standard penetration tests (SPT) at regular intervals during drilling. The samples collected from the borings were transported to our office for further review, classification, and assignment of geotechnical laboratory testing. Our laboratory testing program is summarized in Section 3.0.

Upon completion of drilling and/or percolation testing, the borings were backfilled with the drill cuttings.

The locations of our current explorations are shown on Figures 2A, through 3B and logs of our current explorations are presented in Appendix A.

2.2 Prior Geotechnical Explorations

GPI excavated 32 test pits to depths ranging from approximately three to 21 feet bgs, drilled 13 exploration borings to depths ranging from approximately six to 61 feet bgs as part of a prior investigation.

GPI also engaged a subconsultant to perform seismic refraction testing at 11 locations. Seismic refraction is a passive geophysical technique that utilizes introduces a low-strain signal at the ground surface level that propagates through the subsurface materials and is redirected (refracted) at interfaces between subsurface materials. The refracted waves are detected by the geophones and a subsurface profile is developed to estimate the stiffness and/or uniformity of the subsurface conditions.

The locations of the prior test pits, exploration borings and seismic refraction lines are shown on Figures 2A through 3B and logs of the prior explorations and geophysical testing are presented in Appendix B.

2.3 Subsurface Conditions

Documented fill materials were encountered at the south side of the site and ranged from one to 45 feet in thickness. The documented fill materials consisted of dry to moist silty sand with various amount of gravel and cobbles.

Undocumented inert landfill debris was encountered over a majority of the site. Fill thickness ranges from a few feet to over 30 feet in the central portion of the site to as much as 55 feet thick in the western and northern portions of the site. These materials consisted of dry silty sand with various amounts of gravel and cobbles, and various amounts of asphalt, brick, concrete, and metallic debris. A thin layer of scattered fills, less than a few feet thick, cover most of the old quarry bottom. Local stockpiles scatter the bottom of the quarry, consisting of undocumented fill soils and inert debris. A majority of the quarry bottom contains surficial undocumented fill that form a thin mantle over native alluvial soils.

Native soils consist of young and old alluvial fan deposits. Younger alluvial fan deposits are present at the northern end of the site and along the site boundaries, generally near street grade. Older alluvial fan deposits are present near surface and underlying fill soils. These units primarily consist of dense to very dense silty sands with various amounts of gravel and cobbles. More detailed description of on-site soils and units is presented in Sections 4.1 and 4.2.

Generalized subsurface conditions are presented on Figures 4A through 4H for development Scenario 1 and Figures 5A through 5H for development Scenarios 2 and 2B.

2.4 Groundwater

The site is somewhat unique in that a distinctive groundwater barrier, the San Jose fault, transects the site diagonally from the northeast to the southwest. The San Jose fault acts as a groundwater barrier and the depth to groundwater is very deep on the east side of the fault and is shallower on the west side of the fault as discussed below.

Based on our review of the California Geologic Survey (CGS) Seismic Hazard Zone Report (SHZR) 040 for the Ontario Quadrangle, the historical high groundwater level at the site ranges between depths of approximately 50 to 150 feet bgs (CGS, 2000) as shown on Figure 6 west of the San Jose fault.

Groundwater contour data prepared by Carson and Matti (1985) indicates that groundwater is estimated to be greater than 600± feet in depth east of the San Jose fault.

Groundwater data for a well located less than 2,000± feet to the west (Well 341006N1177096W001), indicates that groundwater has ranged from a depth of approximately156 to 184 feet between the time period of 2011 to 2022 (CDWR, 2022). This well is west of the San Jose Fault.

In 1983 groundwater was reported to be at a depth of 195 and 140 feet in the northwest and southwest portions of the site, respectively (RMA, 2007).

Three groundwater monitoring wells are located on the site. Pit Well No. 1, located at the north end of the site was installed in the 1980's and has been used for periodic water quality testing. r Additional groundwater monitoring wells we installed in August 2021, and, along with Pit Well No.1, make up the revised ground water monitoring network. Anacapa Geoservices has performed groundwater monitoring and prepared semi-annual reports that are submitted to the State Water Board and available for reference on the GeoTracker data system (GeoTracker Global ID L10002913798).

Groundwater was measured in Pit Well 1 in 2004 at a depth of 417 feet bgs. Attempts in 2010 and 2011 to read this well were unsuccessful due to access limitations and/or complications with the measuring devices. No other measurements were made available.

Groundwater was not encountered to the maximum explored depths during prior field explorations at the site.

Tri-annual groundwater sampling events were conducted at the inert debris landfill from 2001 through 2017 as required by the Los Angeles RWQCB. These sampling events were conducted in accordance with the guidelines set by WDR (File No. 66-016) and Amended Monitoring and Reporting Program (MRP) No. 5766.

Groundwater data was collected from the one monitoring well located on site during this time period, Pit Well No. 1 (formerly Well No. A), located at the northernmost area of the Site, approximately 200 feet south of Foothill Boulevard. No exceedances of the California Primary or Secondary MCLs were reported, indicating that the inert landfill has not impacted the quality of groundwater represented by Pit Well No. 1 (Earthcon, 2017).

On 21 August 2019, the Los Angeles RWQCB issued the current WDRs (file No. 66-016, order number R4-2019-0087), which require semi-annual groundwater monitoring at Pit Well No. 1 and two additional groundwater wells. The two additional groundwater wells (CMW-1 and CMW-2) were installed by Arcadia Reclamation, Inc. (Arcadia) as the downgradient Point of Compliance as shown on Figures 2A through 3B. The wells were installed to the depth of approximately 150 below ground surface (bgs) (Arcadia, 2021).

Semi-annual monitoring and testing have been provided by Anacapa Geoservices Inc. (Anacapa) since 2021. Due to drought-induced declining groundwater elevation, none of the two onsite monitoring wells detected water during monitoring and sampling events. Therefore, calculation of the gradient and flow direction was not possible and no samples were collected. The production well (Pit Well No. 1) was reconditioned (repair pump, repair electrical, etc.) and was not monitored and sampled in 2021 (Arcadia, 2021).

Geotechnical and multiple phases of environmental investigations and on-going monitoring programs have been completed at the landfill, as described above. The investigation results and monitoring data obtained have not indicated any contamination of groundwater at the site. Because the former quarry and landfill have only accepted inert debris, the landfill is unlined and does not include environmental control measures for gas and leachate collection.

2.5 Field Percolation Testing

FP-1 was located within Los Angeles County and we performed field percolation testing in FP-1 within general conformance with the *Boring Percolation Test Procedure* outlined in the *County of Los Angeles, Department of Public Works, Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration Manual (LA County Guidelines, GS200.2),* dated June 30, 2021.

FP-2 through FP-6 were located within San Bernardino County and we performed field percolation testing within FP-2 through FP-6 in general conformance with the *Technical Guidance Document Appendix VII. – Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations, provided in the San Bernardino County technical guidance document* dated May 19, 2011.

Upon the completion of drilling, we installed solid and slotted 3-inch outside diameter PVC piping and filled the annular space between the PVC piping and the borehole sidewalls with gravel. The borings were drilled between approximately 10 to 70 feet bgs. The slotted PVC pipe was installed within the lower five feet of each boring to allow introduction of water for the percolation test.

After completion of the well construction, the well was pre-soaked in advance of field percolation testing. Pre-soaking and subsequent field percolation testing was performed in general conformance with LA County Guidelines (FP-1) and San Bernardino Guidelines (FP-2 through FP-6).

The testing was repeated in the test well until the measured rate of percolation stabilized and county testing requirements were achieved. Six trials were performed within each test well.

The results of the field percolation testing are presented in the Tables 3 (LA County) and 4 (San Bernardino County).

Table 3 – Field Percolation Test Results (LA County)

Field Percolation Test #	Depth (Feet)	Ground Surface Elevation (feet/msl)	Soil Type[1]	Measured Field Percolation Rate (inches/hour)
FP-1	12	1,235	SM	1.08

Table 4 – Field Percolation Test Results (SB County)

Field Percolation Test #	Depth (Feet)	Ground Surface Elevation (feet/msl)	Soil Type[1]	Measured Field Percolation Rate (inches/hour)
FP-2	10	1,215	SP-SM	3.79
FP-3	10	1,229	SP-SM	3.18
FP-4	19	1,195	SP-SM	1.14
FP-5	70	1,247	SP-SM	5.37
FP-6	40	1,185	SP-SM	9.69

[1]Field percolation testing was performed in native soils, in each case

The results of the field percolation testing are presented in Appendix C.

Please note the above test results do not include factors of safety that may be required by each respective county.

2.6 Soil-Gas (Methane) Monitoring Well Installation

We installed three soil-gas (methane) monitoring probes on site, MW-1 through MW-3, within the footprint of the proposed parking structure along the west side of the site (included in Scenarios 2 and 2B) on August 14th and 15th, 2023.

The methane wells boreholes were drilled using track-mounted hollow-stem auger drilling equipment and the construction of the methane wells consisted of installing a four-inch diameter PVC pipe within the borehole. Three one-inch diameter PVC pipes were installed within the four-inch diameter PVC section and the HDPE tubing was installed within the one-inch PVC pipes. The one-inch PVC pipes consisted of solid casing with the exception the sampling interval that consisted of slotted casing to allow soil-gas testing, also referred to as screened intervals. Screened intervals were established at depths of 17, 22, and 33 feet bgs, corresponding with depths of approximately five, ten and 20 feet below the currently planned lowest finish floor level of the parking structure. Each depth interval was isolated from the below interval by placing concrete slightly above and the remaining annular space was filled with fine gravel.

Soil-gas testing was performed in MW-1 through MW-3 using a Landtec GEM 5000 Plus Landfill Gas Monitor on two subsequent days. The results of the testing indicated zero methane gas was present at each screened depth interval.

Logs of the methane wells and results of the methane testing are presented in Appendix D.

3.0 GEOTECHNICAL LABORATORY TESTING

3.1 Current Laboratory Testing

As part of our current investigation, we performed the following geotechnical laboratory testing:

- In-situ moisture content and in-place dry-density
- Maximum dry density and optimum moisture content
- Direct Shear Strength
- Consolidation
- Corrosion Potential
- Expansion Index
- Percent Passing # 200 Sieve

The results of our current geotechnical laboratory testing are presented in Appendix A.

3.2 Prior Laboratory Testing

As part of their prior investigations, GPI performed the following geotechnical laboratory testing:

- Moisture Content and Dry Density
- Maximum Dry-Density and Optimum Moisture Content
- Direct Shear
- Grain-size Distribution

The results of the prior geotechnical laboratory testing are presented in Appendix B.

4.0 GEOLOGIC AND SEISMIC HAZARDS EVALUATION

4.1 Regional and Local Geologic Setting

The site is located in the northern portion of the Peninsular ranges Geomorphic Province along the southern side of the San Gabriel Mountains.

Regional topography is dominated by the presence of the faults that define the mountains and hills of the Southern California region including the Cucamonga Fault that locally defines the southern boundary of the San Gabriel Range, the Chino Fault to the west of the site that bounds the Chino Hills in that area, and the San Jacinto and San Andreas Faults to the east of the site. The Santa Ana River is located about ten miles south of the site where it flows to the southwest through the Prado Dam area (CDMG, 2007 and Morton & Miller, 2006). Figure 7 presents a local geologic map.

Based on review of available geologic maps (Morton & Miller, 2006), the site is specifically on the western extent of an alluvial fan deposit emanated from the San Antonio Creek at the base of the San Gabriel Mountains. The large, well-formed fan is largely mapped as mixtures of unconsolidated sand, gravel, and boulders deposited through braided streams.

Sediments at the site were mined for sand and gravel beginning in the 1920s and ending in 1972. In late 1972, the site was permitted for disposal of inert debris consisting of non-decomposable, non-water soluble, inert solids. In 1984, landfilling operations were suspended pending potential development. Inert debris landfill operations resumed in 1991. By 1994, significant inert debris fills were placed in the northwestern corner and along the western side of the site. Since at least May 2000, waste disposal has been restricted to inert debris from construction projects within TCCS and its associated colleges. Because the landfill only accepted inert debris, the landfill is unlined and does not include environmental control measures for gas and leachate collection. Previous filling operations were undocumented except for fill placed the southeast corner of the site. Large quantities of landfill generally consisting of silty sand were placed across the site up to thicknesses of approximately 55 feet.

Figures 2A through 3B also include geologic mapping conducted in this investigation in conjunction with GPI (2022) overlaying the Sports Bowl site plan. Figures 4A through 5H present geotechnical cross-sections of subsurface soils. A description of units in order of relative age, from youngest to oldest is presented below.

A historical summary of aerial photographs for the site is presented in Appendix E.

4.1.1 Undocumented Surficial Fill

Local stockpiles scatter the bottom of the quarry, consisting of undocumented fill soils and inert debris. A majority of the quarry bottom contains surficial undocumented fill that form a thin mantle over native alluvial soils.

4.1.2 Compacted Fill (a_{fc})

Between 2004 and 2005, up to approximately 75 feet of compacted fill was placed within Parcel 6 of Upland Parcel Map 18989 and a portion of Parcel 5 in the southeastern portion the site along Arrow Route (RMA, 2004 & 2005). Prior to placement of the compacted fill, undocumented fills and loose soils were reportedly removed, and a keyway was excavated along the toe of the north facing fill slope. Removals did not include the road embankment fill on the east side of Parcel 6 or landfill materials on the west side within Parcel 5. The compacted fill was reportedly benched into the road embankment fill placed along Monte Vista Avenue. Based on the report by RMA and the explorations, the compacted fill consists of silty sands and gravelly sands with variable amounts of silt, gravel, and cobbles and was compacted to at least 90 percent relative compaction.

4.1.3 Undocumented Fill (a_{fu})

Undocumented fill soils stockpiled and spread over the central portion of the site on the former quarry bottom range in thickness from a few feet to over 30 feet. These deposits consist generally of inert construction debris (concrete and asphalt rubble), sand, gravel, cobbles and occasional boulders. These undocumented rubble fills were likely end dumped and spread and contain significant voids. A thin layer of scattered fills, less than a few feet thick, cover most of the old quarry bottom.

4.1.4 Undocumented Inert Debris Landfill (a_{lf})

Undocumented inert debris fills up to approximately 55 feet thick were encountered overlying older alluvial fan deposits near the upper terrace area in the northwest and southwest corners and western side of the site. These materials consist of sand and gravel with varying amounts of silts, cobbles and local boulders and inert debris consisting primarily of concrete and asphalt rubble were encountered at variable depths throughout the unit. Pieces of concrete and asphalt up to three feet in size were encountered by GPI (2022) in their test pits. Larger pieces of concrete and asphalt debris, and lesser deposits of clay pipe, brick, masonry block, and pieces of metal were observed near the surface. The inert debris fill soils were likely placed in an uncontrolled manner resulting in poorly compacted conditions. Based on surface expression, as well as drilling and sampling characteristics, these deposits likely include layers of nested concrete and asphalt rubble intermixed with layers of sand, gravel, cobbles, and boulders.

4.1.5 Old Access Road Fill (a_{rf})

Based on historic aerial photography, old access road fill was placed for site access to the quarry beginning between 1953 and 1959. Fill was likely placed on an ongoing basis as the quarry deepened. Where investigated near the quarry bottom, soils consisted of loose gray silty sand with zones of gravel, and some buried metal. Fill depth was observed at nine feet bgs, though actual depths may be deeper toward Monte Vista Avenue.

4.1.6 Road Embankment Fill (a_{rfe})

Research conducted by GPI (2020) utilized historic aerial photos to constrain the age of the road embankment fill associated with the construction of Monte Vista Avenue on the eastern side of the site to the early 1990s. The approximately 2:1 (horizontal:vertical, h:v) slope was constructed with fills between 30 to 50 feet in thickness, with a mid-slope terrace drain. GPI reports (2022) that the fill was placed under the jurisdiction of San Bernardino County prior to incorporation into the City of Upland, though geotechnical documentation of the fill has not been made available.

4.1.7 Alluvial Fan Deposits (Q_{yf} and Q_{of})

Native alluvial soils encountered in explorations generally consisted of sand and silty sands with gravel and cobbles. Surficial boulders mantle a majority of the site. The younger alluvial fan deposits were observed near the ground surface in the northeastern and perimeter portions of the site at higher elevations. The older alluvial fan deposits are exposed sporadically on the quarry bottom, and beneath landfill deposits at variable depths. Where observed, these deposits generally consist of an orangish brown silty sand with gravel. Many of these deposits contain manganese oxide-stained clasts and signs of oxidation.

4.2 Reclamation Backfill

Undocumented fill soils were encountered in a majority of geotechnical borings and test pits. These fill soils were divided into categories based on relative age to generalize materials imported to the site. Based on field explorations and surface mapping, these units consisted of soil, concrete, asphalt, brick, and metal debris and rubble. These units are delineated on Figures 2A, 2B, 3A and 3B. These units are classified into four generalized fill units based on prevailing material as soil fill (more than 50 percent soil), oversize cobbles and boulders (more than 50 oversize), concrete debris (more than 50 percent concrete), asphalt (more than 50 percent asphalt), brick (more than 50 percent brick), and miscellaneous debris including rebar, old pipes, plastic, and variable metals (misc. debris more than 50 percent). The estimated percentages of materials from each boring and their weighted averages are summarized in Table 5 and presented in detail in Appendix F.

Table 5: Weighted Average Summary of Debris in Reclamation Fill Units

Fill Type	Approximate Percentage of Debris Generalized Fill Units Weighted Averages %				
	>50% Oversize	>50% Concrete	>50% Asphalt	>50% Brick	Miscellaneous Debris
a_{sf}	12	1	1	0	1
a_{fc}	28	0	1	1	1
a_{fu}	14	2	2	3	2
a_{lf}	14	4	6	1	1

Based on the weighted averages of the fill units listed in the above table, fill units are predominately composed of soil, complemented by significant amounts of oversized cobbles and boulders, and lesser amounts of concrete, asphalt, brick, and other miscellaneous debris. The distributions of these materials with depth in each fill unit is highly variable.

4.3 Geologic and Seismic Hazard Evaluation

We evaluated the geologic and seismic hazards at the site in general accordance with California Geological Survey (CGS) Special Publication 117A, "Guidelines for Evaluating and Mitigating Seismic Hazards in California." The results of our evaluation are summarized below.

4.4 Regional Faulting

We reviewed the CGS 2010 Fault Activity Map (FAM) of California and the USGS Quaternary Fault and Fold Database (QFFD), to identify mapped faults within 100 kilometers of the site. The FAM and QFFD show that the closest mapped fault to the site is the Indian Hills fault, located approximately 1 mile (1.6 km) to the northwest and the San Jose Fault, located approximately 1.1 mile (1.8 km) to the southwest. A queried portion of the San Jose fault has been mapped beneath the site. Additional discussions are presented in Section 4.6.

Figures 8A and 8B show the site location relative to the nearby seismic sources.

4.5 Regional Seismicity

The site is located in an active seismic area that has historically been affected by generally moderate to occasionally high levels of ground motion. Therefore, the proposed development will probably experience moderate to occasionally high levels of ground motion from nearby faults as well as ground motions from other active seismic areas of the southern California region.

A search of the USGS ANSS Comprehensive Earthquake Catalog (ComCat) using a web-based Earthquake Archive Search and URL builder tool, found that as of December 17, 2023, 66 earthquakes with magnitudes of 5.0 or greater have occurred within a 100-km radius of the site since 1800 as shown on Figure 8A and 8B.

4.6 Ground Surface Rupture Potential

Historically, ground surface displacements closely follow the traces of geologically young faults. The site is not located within a California Geologic Survey (CGS) Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act.

GPI noted that a queried strand of the San Jose Fault running across the site warranted a surface rupture fault hazard investigation by RMA Group in 2001 to investigate suspected mapped traces. It was concluded that the San Jose Fault does not pose a hazard toward surface fault rupture, and no setbacks were required.

Since active or potentially active faults are not present at the site, the potential for ground surface rupture is considered very low.

4.7 Liquefaction Potential

Liquefaction may occur in loose to medium dense granular soils and low-plasticity silts and clays below the groundwater level due to strong ground shaking.

Liquefaction occurs when the cyclic loading to the soil due to strong ground shaking results in a buildup of excessive pore-water pressure in the pore spaces between the soil grains and the grain-to-grain contact of the soils is disrupted temporarily resulting in settlement as the soil particles reconstitute.

Typically, liquefaction occurs within the upper approximately 50 feet bgs; at greater depths, the confining stress of the overburden soils is typically sufficient to preclude liquefaction.

The site is not located within a City- or State-designated liquefaction hazard zone as shown on Figure 9. Groundwater was not encountered within the upper 50 feet and the soils encountered in the explorations consist of medium dense to very dense granular material.

Thus, the potential for liquefaction at the site is negligible.

4.8 Lateral Spreading Potential

Lateral spreading is a seismically-induced slope instability phenomenon wherein slope failure can occur as a result of liquefaction. The site is not located within a liquefaction hazard zone as noted is Section 5.7, the potential for liquefaction at the site is negligible and therefore by definition, the potential for lateral spreading is also considered to be negligible.

4.9 Seismic (aka 'Dry') Settlement

Seismically-induced (aka 'dry') settlement may occur in loose granular soils due to strong ground shaking as the loose granular particles tend to redistribute during shaking resulting in settlement.

The native soils on site consist of dense to very dense granular deposits that are not subject to seismically induced settlement based on field blow count data.

Existing engineered fill materials present at the southerly portion of the site are also sufficiently dense to preclude seismically-induced settlement.

Existing landfill materials, however, are more challenging to evaluate since the field blow count data available is in some cases skewed (overly high) due to the presence of large concrete rubble or other similar debris.

As an alternative method to evaluate the potential for seismically-induced settlement of the existing landfill debris, we reviewed the geophysical data available from the prior GPI report noting that the prior data provides an indication of the stiffness of on-site materials as well as data available from shear strength testing on samples of the inert landfill materials. Based on our evaluation, the stiffness of the on-site landfill materials is generally comparable of greater than the stiffness of the engineering fill materials.

Therefore, the potential for seismically-induced settlement within the landfill debris very low.

4.10 Earthquake-Induced Landslides

Portions of the site are located in a zone of potential earthquake induced landsliding per the CGS Seismic Hazard Zones map for the Ontario Quadrangle as shown on Figure 9.

These areas consist of steep natural and man-made quarry slopes. However, the planned grading will generally remove the overly-steep existing slopes and the permanent condition will consist of slopes with a gradient of 2:1 (horizontal:vertical) or flatter. Therefore, the risk for earthquake-induced landsliding subsequent to site improvement is considered low.

4.11 Flood Mapping

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Number 06037C1750F, the landfill site is located outside the 0.2 percent annual chance floodplain (Zone X).

4.12 Tsunamis, Seiche, and Dam Inundation

Based on information and maps available from the CGS, the site is not located within a Tsunami inundation hazard zone. Based on review of adjacent water bodies, the site is not subject to inundation from seiche. A review of the California Dam Breach Inundation Maps hosted by the California Division of Safety of Dams shows that the site is not located within an inundation boundary in the case of dam breach. Based on the City of Claremont General plan, the subject site is located within a flood zone from failure of the San Antonio Dam.

4.13 Subsidence

Land subsidence may be induced from withdrawal of oil, gas, or water from wells. Based on a search of the CalGEM (formerly known as Division of Oil, Gas, and Geothermal Resources [DOGGR]) GIS Well Finder online tool, there are no wells within 2.5 miles of the site. Thus, the likelihood of land subsidence caused by oil or gas withdrawal from oil wells is very low.

4.14 Expansive Soils

Expansive soils swell and shrink when the moisture content in the soil changes as a result of cyclic - wet/dry weather cycles, installation of irrigation systems, change in landscape plantings, or changes in grading.

Swelling and shrinking soils can result in differential movement of structures including floor slabs and foundations, and site work including hardscape, utilities, and sidewalks.

The materials encountered during the current and prior investigations at the site generally consist of sand with gravels, cobbles, and boulders and associated debris (primarily concrete and asphalt) and these materials have a low potential for expansion.

4.15 Soil-gas (Methane)

We installed three soil-gas wells at the site and performed soil gas measurements; the results of the soil-gas readings do not indicate the presence of methane gas at the site. These results are consistent with the inert (non-reactive) nature of the landfill materials.

Based on the data available, the potential for the accumulation of methane gas in confined spaces at the site is negligible.

5.0 CONCLUSIONS

5.1 General

The site is generally free from geologic or seismic hazards that would preclude the proposed development. Proposed development Scenarios 1, 2 and 2B are each feasible from a geotechnical perspective, provided that the recommendations presented herein are followed.

The proposed development will include mass grading and consist of construction of athletic playing fields and various support structures, a pedestrian tunnel, surface parking lots, and, in some scenarios, a large-footprint subterranean parking structure and a maintenance facility. Walking paths and site retaining walls are also planned as part of each alternate development scenario.

The primary geotechnical condition at the site that will impact the proposed development is the presence of undocumented landfill materials where these materials are present below the planned finish playing field surface levels and/or below the foundation and floor slab levels of the proposed structures.

The planned mass grading will include cuts into on-site landfill materials. Thus, sorting and processing of these materials will be required to allow reuse in required fills.

Existing landfill debris is not considered suitable for support of the proposed pedestrian tunnel planned for each scenario nor the proposed parking structure the maintenance facility structure planned as part of Scenarios 2 and 2B. For these structures, existing landfill debris should be removed and replaced as properly compacted fill as recommended herein.

Existing landfill debris may remain in place beneath the planned minor structures provided the recommendation presented herein are followed. In this regard, it’s worth noting that the data collected from the existing landfill debris including field blow count data, laboratory test data, and the results of the prior geophysical testing, indicate these materials are reasonably firm and dense with isolated, discontinuous zones that are less firm and dense. Notably, the seismic refraction data collected as part of the prior investigation generally shows the landfill debris to be comparable to or stiffer than engineered fill that was placed at the south side of the site and generally comparable to the upper native soils at the site.

5.2 Parking Structure, Pedestrian Tunnel and Maintenance Facility Structure (Primary Structures)

The lowest finish floor level for each the proposed parking structure, the pedestrian tunnel and maintenance facility support structure are underlain by varying thickness of undocumented landfill materials. Although foundation loading information was not available for these structures at the time this report was prepared, we anticipate the magnitude of foundation loading and/or variation in thickness of landfill materials beneath the structures would preclude allowing existing landfill materials to remain in place beneath these structures.

Therefore, existing landfill materials present beneath foundation and floor slab level for these structures should be removed and replaced as properly compacted fill. Each structure may be supported on spread, continuous and/or mat-type foundations established in properly compacted fill and/or dense native soils where dense native soils are present at the foundation levels for the westerly side of the pedestrian tunnel.

For general reference, Table 6 summarizes the approximate thickness of landfill materials present beneath the lowest finish floor level for the proposed parking structure and maintenance facility structure and invert of the proposed pedestrian tunnel.

Table 6 – Summary of Landfill Materials Thickness Beneath Primary Structures

Structure	Lowest Finish Floor Level (feet, msl)	Landfill Thickness Beneath Lowest Finish Floor Level (feet)
Parking Structure	1,243.0 to 1,263.0	Up to ~ 35 feet
Maintenance Facility Structure	1,235.5	Up to ~ 26 feet
Pedestrian Tunnel	1,233.0	Up to ~ 33 feet

Recommendations for foundation design for the proposed structures are presented in Section 6.1. and recommendations for permanent walls below grade are presented in Section 6.4.

5.3 Press Box, Field House, Storage, Field Structures, Dugouts (Minor Structures)

As noted above, the existing landfill materials are generally firm and dense noting there are localized and apparently discontinuous zones that are less firm and dense. Based on this information, minor structures may be supported on spread and continuous footings established in a nominally thick layer of properly compacted select fill so that existing landfill materials present below the recommended properly compacted select fill may remain in place provided the recommendations presented herein are followed.

Spread and continuous footings should also be connected by grade beams to minimize potential differential settlement.

It would also be prudent to install settlement monuments after and possibly during the placement of the fill within the footprints of the planned minor structures to assure that any settlement due to placement of new fill, although expected to be minor, has sufficiently occurred to allow foundation and floor slab construction.

Recommendations for foundation support for minor structures are presented in Section 6.1.

5.4 Building Floor Slabs / Pedestrian Tunnel Bottom Slab

The proposed building floor slabs and pedestrian tunnel bottom slab may be established in properly compacted select fill and/or in dense native soils.

Properly compacted select fill should extend a minimum of two feet vertically below building and tunnel floor slabs on-grade and a minimum of two feet horizontally beyond the outside edges of the floor slabs-on-grade.

Recommendations for floor slab support are presented in Section 6.2.

5.5 Seismic Design

The site is also subject to strong ground shaking that would result from an earthquake occurring on a nearby or distant fault source; however, this hazard is common in Southern California and can be mitigated by following the seismic design requirements of the 2019 California Building Code and ASCE 7-16.

Due to the presence of undocumented landfill materials, the seismic site classification should be taken as S_D. Recommendations for seismic design are presented in Section 6.3.

5.6 Playing Fields

The finish levels of the planned playing field surfaces range from Elevation 1,209.0 to 1,2577.0 for Scenario 1 and from 1216.0 to 1260.0 for Scenarios 2 and 2B. In each case, existing undocumented landfill materials are present beneath the planned playing field surfaces ranging on the order of seven to 36 feet as summarized in Tables 7 and 8 for development Scenarios 1 / 1B and 2 / 2B.

Table 7 – Scenario 1
Summary of Landfill Materials Thickness by Playing Field

Playing Field	Lowest Playing Surface (msl)	Existing Ground Surface Level (msl)	Planned Grading	Landfill Thickness Beneath Lowest Playing Surface
Football / Track / Lacrosse Field	1,209.0	1,185 to 1,240	Cut up to 31 feet Fill up to 24 feet	Up to ~ 29 feet
Multi-purpose Field	1,224.0	1,215 to 1,245	Cut up to 21 feet Fill up to 9 feet	Up to ~ 26 feet
Soccer / Rugby	1,243.0	1,228 to 1,250	Cut up to 7 feet Fill up to 15 feet	Up to ~ 23.5 feet
Golf Practice Area	1,257.0	1,250 to 1,296	Cut up to 39 feet Fill up to 7 feet	Up to ~ 7 feet
Baseball Field	1,257.0	1,237 to 1,303	Cut up to 46 feet Fill up to 20 feet	Up to ~ 13 feet
Softball Field	1,257.0	1,250 to 1,260	Cut up to 3 feet Fill up to 7 feet	Up to ~ 25 feet

Table 8 – Scenarios 2 and 2B
Summary of Landfill Materials Thickness by Playing Field

Playing Field	Lowest Playing Surface (msl)	Existing Ground Surface Level (msl)	Planned Grading	Landfill Thickness Beneath Lowest Playing Surface
Football / Track / Lacrosse Field	1,216.0	1,185 to 1,240	Cut up to 24 feet Fill up to 31 feet	Up to ~ 36 feet
Multi-purpose Field (Phase 2)	1,260.0	1,243 to 1,300	Cut up to 40 feet Fill up to 17 feet	Up to ~ 36 feet
Soccer / Rugby (Phase 2)	1,251.0	1,235 to 1,255	Cut up to 4 feet Fill up to 16 feet	Up to ~ 36 feet
Golf Practice Area	1,226.0	1,215 to 1,245	Cut up to 19 feet Fill up to 11 feet	Up to ~ 10 feet
Baseball Field	1,226.0	1,230 to 1,245	Cut up to 19 feet Fill up to 0 feet	Up to ~ 15 feet
Softball Field	1,226.0	1,215 to 1,240	Cut up to 14 feet Fill up to 11 feet	Up to ~ 28 feet

Based on the field blow count and geophysical data from our current and the prior investigations, landfill materials present below the lowest playing surface levels is generally stiff to dense noting there are localized and apparently discontinuous zones that are less dense and less stiff.

The only significant load increase within the planned playing fields is where new fill is planned to raise the ground surface level. In these areas, it would be prudent to install settlement monuments after and possibly during the placement of the fill to document the performance of the underlying landfill materials on a case-by-case basis.

Noting that the landfill materials are typically coarse-grained and/or over-sized particles, it's reasonable to conclude that settlement due to new loading may be considered 'immediate' meaning the settlement will occur as the fill is placed.

To assure uniform performance within each playing field, it would also be prudent to place a rigid cap of select backfill materials to bridge local softer or less stiff zones. Recommendations for each playing field are presented herein.

Recommendations for playing field support are presented in Section 6.5.

5.7 Pavement and Site Flatwork

To assure uniform support for pavement and site flatwork, the upper 12 inches of existing materials should be removed and replaced as properly compacted select fill. The results of laboratory testing indicate an R-value of 40 may be assumed for pavement design.

Recommendations for pavement are presented in Section 6.6 and recommendations for site flatwork are presented in Section 6.7.

5.8 Free-standing Site Retaining Walls

Free-standing site retaining walls may be supported on a properly compacted selected fill materials as recommended in Section 6.8.

5.9 Temporary Shoring

Temporary shoring may be utilized during construction of the pedestrian tunnel, parking structure and maintenance facility structure. A suitable method of temporary shoring is solider pile and timber lagging and recommendations for temporary shoring are presented in Section 6.9.

5.10 Groundwater

The groundwater level at the site is relatively deep and in general is not anticipated to impact the proposed development scenarios. Localized zones of perched water, however, may be seasonally present on less permeable layers within the overall granular landfill materials and coarse-grained native deposits at the site.

If encountered, localized perched groundwater could be routed away from excavations and discharged of off-site through a groundwater discharge permit process, removed from site in pump trucks and disposed off-site. Alternatively localized perched groundwater may be re-injected into the permeable native soils at the site if allowed to do so by permit.

5.11 Slope Stability, Earthwork and Grading

Permanent unreinforced slopes should not exceed a gradient of 2:1 (h:v) and earthwork and grading for the planned mass grading will need to be performed in accordance with an approved landfill closure plan and post closure land use plan, when available.

Recommendations for grading for permanent slopes as well as for general earthwork and grading are presented in Section 6.10.

5.12 Soil-Gas (Methane) Considerations

Based on the results of soil-gas testing performed as part of our current investigation, special provisions for methane gas are not required for the planned buildings, parking structure and pedestrian tunnel.

5.13 Corrosion Potential

Corrosion testing was performed as part of our investigation and the prior RMA investigation. The results of the current and prior testing indicate that the on-site materials have negligible potential for sulfate attack on concrete and are not corrosive to ferrous metals.

6.0 RECOMMENDATIONS

6.1 Foundation Design

6.1.1 Parking Structure, Pedestrian Tunnel and Maintenance Facility Structure (Primary Structures)

The proposed parking structure, pedestrian tunnel and maintenance facility structure may be supported on spread and continuous or mat-type footings established in properly compacted select fill materials or dense native soils where present noting that native soils are present at the planned foundation level within the pedestrian tunnel alignment west of the landfill west property line.

Where required, the select fill should extend a minimum of three horizontal feet beyond the limits of the footings.

Existing landfill materials should be removed to expose dense native soils and the exposed excavation bottoms should be observed and documented by a Langan field representative. Excavation bottoms should be scarified for a depth of eight inches, moisture conditioned and compacted as recommended in Section 6.10.

Spread and continuous footings a minimum of two feet in width and established at least two feet below the lowest adjacent grade or top of floor slab in properly compacted select fill and/or dense native soils may be designed using an allowable bearing pressure of 5,500 psf. The recommended bearing pressure may be increased by one-third when considering short term wind and seismic loading conditions.

We estimate the total static settlement for foundations designed as recommended herein will be on the order of one inch or less and the differential static settlement will be on the order of ¼ inch or less.

Lateral loading may be resisted by passive pressure of the soils acting against the sides of the footings and friction along the bottom of the footing.

To resist lateral loading, an ultimate passive resistance equal to 800 psf per foot of embedment up to a maximum value of 8,000 psf and an ultimate coefficient of friction equal to 0.6 may be used. The ultimate passive pressure and the ultimate coefficient of friction may be combined noting that the ultimate passive resistance should be reduced in this case by 50 percent in consideration of the deformation required to mobilize the full passive resistance.

An allowable passive resistance equal to 400 psf per foot of embedment up to a maximum value of 6,000 psf and an allowable coefficient of friction equal to 0.4 may be used. The allowable passive pressure and the allowable coefficient of friction may be combined without reduction.

6.1.2 Press Box, Field House, Storage, Field Structures, Dugouts (Minor Structures)

Proposed minor structures may be supported on three feet of properly compacted select fill materials. The select fill should extend three horizontal feet beyond the limits of the footings.

The exposed excavation bottom should be compacted using a minimum 16-ton steel-drum vibratory compactor or similarly heavy vibratory equipment. The intent of the vibratory roller is to impart vibration to the existing landfill materials and provided an added measure of densification to these materials.

Settlement monitoring should be performed during and/or after the placement of the fill to confirm that any settlement due to the placement of the new fill has occurred to a sufficient degree to allow the construction of the support structure building foundations n the properly compacted select fill materials. A settlement monitoring program shall be developed by Langan in collaboration with the selected grading contractor prior to the start of earthwork.

Spread and continuous footings a minimum of two feet in width and established at least two feet below the lowest adjacent grade or top of floor slab in properly compacted select fill may be designed using an allowable bearing pressure of 2,500 psf. The recommended bearing pressure may be increased by one-third when considering short term wind and seismic loading conditions.

We estimate the total static settlement for foundations designed as recommended herein will be on the order of 1½ inch or less and the differential static settlement will be on the order of ½ inch or less.

Lateral loading may be resisted by passive pressure of the soils acting against the sides of the footings and friction along the bottom of the footing.

To resist lateral loading, an ultimate passive resistance equal to 600 psf per foot of embedment up to a maximum value of 6,000 psf and an ultimate coefficient of friction equal to 0.6 may be used. The ultimate passive pressure and the ultimate coefficient of friction may be combined noting that the ultimate passive resistance should be reduced in this case by 50 percent in consideration of the deformation required to mobilize the full passive resistance.

An allowable passive resistance equal to 400 psf per foot of embedment up to a maximum value of 6,000 psf and an allowable coefficient of friction equal to 0.4 may be used. The allowable passive pressure and the allowable coefficient of friction may be combined without reduction.

6.2 Building Floor Slabs / Pedestrian Tunnel Bottom Slab

The proposed building floor slabs and entire pedestrian tunnel bottom slab may be established in properly compacted select fill and/or in dense native soils.

Properly compacted select fill should extend a minimum of two feet vertically below building and tunnel floor slabs on-grade and a minimum of two feet horizontally beyond the outside edges of the floor slabs-on-grade.

Where moisture-sensitive flooring is planned, a capillary beath section should be installed beneath the building floor slab. The capillary break section should consist of six inches of gravel underlying a 15-mil visqueen moisture barrier. A capillary break section is not required for floor slabs where moisture-sensitive flooring is not planned.

6.3 Seismic Design Considerations

Considering undocumented landfill materials will remain in place, we determined the seismic site class to be Site Type D in accordance with Chapter 20 of ASCE-7-16. Seismic design parameters for Site Type D are presented in Table 9.

Table 9 – CBC Prescriptive Seismic Design Parameters

Criteria	Value
MCE_R Ground Motion at Short Periods, S_s	1.697
MCE_R Ground Motion at 1Second Period, S_1	0.638
Site-Modified Spectral Acceleration Value at Short Periods, S_{MS}	1.697
Site-Modified Spectral Acceleration Value at 1 Second Period, S_{M1}	0.893
Design Spectral Response Acceleration at short periods, S_{DS}	1.131
Design Spectral Response Acceleration at 1 second period, S_{D1}	0.595
MCE_G Peak Ground Acceleration, PGA_M	0.794

Requirements outlined in Chapter 11 of ASCE 7-16 should be followed in determining the base shear for each proposed structure.

6.4 Permanent Below Grade Walls

6.4.1 Design Lateral Earth Pressures

For static conditions, drained below-grade building internally braced walls should be designed to resist a trapezoidal-shaped at-rest lateral earth pressure distribution equal to 28H psf as shown on Figure 10.

For seismic loading conditions, drained below-grade internally-braced building walls should be designed to resist a triangular-shaped active lateral earth pressure distribution equal to 35H psf in conjunction and a triangular-shaped seismic lateral earth pressure distribution equal to 15H psf as shown on Figure 11.

The upper 10 feet of the below-grade building walls should also be designed to resist a uniform lateral pressure of 100 psf to account for normal traffic loading as shown on Figures 10 and 11.

The recommended traffic surcharge is applicable where traffic loading is anticipated adjacent to walls below grade. Please note that the recommended surcharge should be increased by 50 percent when considering fire truck loading. For other areas subject to live loading conditions (non-traffic), we recommend applying one-third of the live load to the wall-below grade within the upper 10 feet. The geotechnical engineer of record can review any such cases and provide specific recommendations if needed.

The load combination (active and seismic earth pressure) and the shape of the seismic pressure distribution are each based on *Seismic Earth Pressures on Cantilevered Retaining Structures* (Atik and Sitar, 2010) and *Seismic Earth Pressures: Fact or Fiction* (Lew, Sitar, and Atik, 2010).

If the surface at the top of the wall is sloped, the recommended lateral earth pressures should be increased as indicated in Table 10.

Table 10 - Permanent Below-Grade Walls – Lateral Earth Pressures

Slope Inclination at Top of Wall (H:V)	Increase in Lateral Earth Pressure (percent)
1:1	200
1.5:1	165
2:1	150

6.4.2 Wall Back Drainage

For static conditions, drained below-grade permanent retaining walls should be constructed with adequate back-drainage to prevent the buildup of hydrostatic pressure behind the walls.

For shored walls, we recommend the use of a pre-fabricated geo-composite drainage board that is fixed to the shoring wall, and the below-grade building wall is constructed by the placement of shotcrete directly against the drainage board.

In cases where temporary construction slopes and retaining walls are utilized, a perimeter collector pipe could be installed at the base of the walls noting a suitable discharge outlet for the collector pipe will be required.

6.5 Playing Fields

Cuts up to approximately 46 feet in height and fills up to approximately 24 feet will be required for development Scenario 1 and cuts up to approximately 40 feet and fills up to approximately 31 feet will be required for development Scenarios 2 and 2B.

The finish levels of the planned playing field surfaces range from Elevation 1,209.0 to 1,257.0 for Scenario 1 and from 1216.0 to 1260.0 for Scenarios 2 and 2B. In each case, existing undocumented landfill materials are present beneath the planned playing field surfaces ranging on the order of seven to 39 feet.

The proposed playing fields may be established on three feet of properly compacted select fill materials where greater than ten feet of landfill materials are present and two feet of properly compacted select fill materials where ten feet or less.

The exposed excavation bottom should be compacted using a minimum 16-ton steel-drum vibratory compactor. The intent of the vibratory roller is to impart vibration to the existing landfill materials and provided an added measure of densification to these materials.

Settlement monitoring should be performed during and/or after the placement of the fill to confirm that any settlement due to the placement of the new fill has occurred to a sufficient degree to allow the construction of the playing fields on the properly compacted select fill materials.

Settlement monitoring requirements are presented in Section 6.10.

6.6 Pavement Design Recommendations

6.6.1 General

To provide uniform support for the proposed perimeter surface parking lot pavement sections, the upper 12 inches of existing soil should be removed and replaced as properly compacted fill. Based on the results of prior geotechnical laboratory testing, an R-value of 40 may be assumed in the design of AC and PCC pavement sections.

Excavation bottoms for pavement support should be carefully evaluated by a Langan field representative during construction to assure locally loose, soft or otherwise unsuitable materials are not present.

Pavement design recommendations for asphalt concrete (AC) and Portland cement concrete (PCC) are presented below.

6.6.2 Asphalt-Concrete Pavement Design

AC pavement for surface parking shall be designed in accordance with the CALTRANS method. Table 11 ow summarizes our AC pavement recommendations for assumed TIs of 4.5, 5, 6, and 7.

Table 11 – AC Pavement Design Recommendations

Traffic Use	TI	AC (inches)	AB (inches)
Parking Areas	4.5	3.0	4.0
Automobile Drive Lanes	5.0	3.5	4.0
Truck and Trailer Drive Lanes	6.0	4.0	6.0
Delivery Access and Loading Docks	7.0	5.0	6.5

Our Langan team can determine the recommended pavement and aggregate base thickness for other TIs if required. Careful inspection is recommended to confirm that the recommended thickness or greater is achieved and that proper construction procedures are followed.

The aggregate base should conform to requirements of Section 26 of State of California Standard Specifications for Public Works Construction (Green Book). The aggregate base should be compacted to at least 95 percent relative compaction.

6.6.3 Portland Concrete Pavement Design

Table 12 summarizes our Portland cement concrete (PCC) pavement recommendations for assumed TIs of 4.5, 5, 6, and 7 based on minimum compressive strength of 3,000 psi for the PCC.

Table 12. PCC Pavement Design Recommendations

Traffic Use	TI	PCC (inches)	AB (inches)
Parking Areas	4.5	5.0	4.0
Automobile Drive Lanes	5.0	5.5	4.0
Truck and Trailer Drive Lanes	6.0	6.0	4.0
Delivery Access and Loading Docks	7.0	7.0	4.0

Our Langan team can determine the recommended pavement and aggregate base thickness for other TIs if required. Careful inspection is recommended to confirm that the recommended thickness or greater is achieved and that proper construction procedures are followed.

PCC pavement should be reinforced with Number 3 bars spaced 24 inches on-center in each direction.

Careful inspection is recommended to check that the recommended thickness or greater is achieved and that proper construction procedures are followed.

State of California Department of Transportation Type 2 base, or equivalent, should be used in the required sections. The base should be compacted to at least 95 percent relative compaction.

6.7 Site Flatwork

Site flatwork, including sidewalks, shall consist of five inches decomposed granite (DG) placed on a geotextile fabric placed on 12 inches of properly compacted select fill materials.

The select fill should be processed, placed and compacted as recommended in Section 6.10.

6.8 Site Retaining Walls

Site retaining walls may be supported on continuous footings established on 12 inches of properly compacted select fill. The select fill should consist of 1-inch minus crushed rock and should extend at least two horizontal feet beyond the limits of the footing.

Continuous retaining wall footings a minimum of two feet in width and established at least 18 inches below the lowest adjacent grade or top of floor slab in properly compacted select fill may be designed using an allowable bearing pressure of 2,000 psf. The recommended bearing pressure may be increased by one-third when considering short term wind and seismic loading conditions.

We estimate the total static settlement for retaining wall foundations designed as recommended herein will be on the order of 1 inch or less and the differential static settlement will be on the order of ½ inch or less.

For drained conditions, unrestrained, free-standing retaining walls should be designed to resist a triangular lateral earth pressure distribution with a maximum value equal to 35H psf, where H is the height of the wall.

Per Section 1807A.2.2 of the 2019 CBC, seismic loading conditions shall be included in design of retaining walls supporting at least six feet of soil. Seismic lateral earth pressure distribution in this case should be taken as a triangular-shaped active lateral earth pressure with the maximum value equal to 35H psf in conjunction with a triangular-shaped seismic lateral earth pressure distribution with the maximum value equal to 15H psf.

In cases where free-standing below grade walls are situated adjacent to roadways, parking areas, or loading docks the upper 10 feet of the below-grade walls should also be designed to resist a uniform lateral earth pressure equal to 100 psf to account for normal traffic loading.

Additional surcharge loading may be required if below grade walls are situated in close proximity to any of the proposed building foundations and can be provided on a case-by-case basis.

If the surface at the top of the walls is slope, the recommended lateral earth pressures should be increased as indicated in Table 10.

Below-grade walls should be constructed with adequate back-drainage to prevent the build-up of hydrostatic pressure behind the walls. Pre-fabricated geo-composited drainage boards affixed to the back of the wall prior to backfill may be utilized.

Alternatively, a 12-inch wide zone of relatively free-draining aggregate material can be utilized behind walls to provide adequate drainage. To prevent water accumulation at the bottom of the wall weep holes should be provided or otherwise suitably discharged.

6.9 Temporary Shoring

6.9.1 Design Lateral Earth Pressure

Typically, cantilevered shoring is feasible for temporary shoring when the retained height is less than approximately 15 feet. Braced shoring typically becomes economical for retained heights in excess of 15 feet.

Cantilever shoring may be designed to resist a triangular lateral earth pressure distribution where the maximum value is 30H psf.

Internally brace shoring may be designed to resist a trapezoidal lateral earth pressure distribution where the maximum value is 26H psf.

Temporary shoring, should also be designed to resist a nominal surcharge load of 100 psf distributed uniformly within the upper 10 feet to account for vehicular traffic where adjacent to temporary roadways and parking areas.

For cantilevered shoring design, where the surface at the top of the shoring is sloped, the recommended lateral earth pressures should be increased as indicated in Table 10.

The design of temporary shoring walls should consider the location of construction cranes and other potentially heavy equipment or loads that may act against the shoring system. Surcharge loading for these features may be determined by using NAVFAC DM 7.2 Chapter 3, Section 4. If needed, we can provide additional surcharge loading on a case-by-case basis.

6.9.2 Soldier Pile Design and Installation

For the design of solider piles spaced at least two diameters on-center, the allowable lateral bearing value (passive pressure) of the native soils below the planned bottom of the excavation may be assumed to be 400 psf per foot of depth, up to a maximum value of 6,000 psf. To develop the full lateral bearing value, provides should be taken to assure firm contact between the soldier piles and the undisturbed native soils.

If the embedded portion of the solider pile shafts are filled with lean-mix concrete, the effective width of the soldier pile shaft for use in developing passive resistance may be assumed to be twice the diameter of the soldier pile shaft. If the embedded portion of the soldier pile shaft is filled with other material (such as low-strength sand-cement slurry, for instance), the effective width of the solider pile should be limited to be the diagonal dimension of the solider beam.

The portion of the soldier piles below the bottom of the excavation may also be relied on to support downward loading. For soldier piles that are drilled and filled with structural concrete below the bottom of the excavation, the frictional resistance between the concrete and surrounding soil may be taken as 600 psf. For solider piles that are vibrated into place, the frictional resistance may be taken as 800 psf.

6.9.3 Timber Lagging Design

Continuous lagging will be required between the solider piles. The soldier piles should be designed for the full anticipated lateral earth pressure; however, the pressure on the lagging will be less due to arching in the soil. For clear spans of up to six feet, we recommend the lagging be designed for a triangular where the maximum pressure is 400 psf at the mid-point between the solider piles and zero at the solider piles.

6.9.4 Tiebacks

The capacities of anchors should be determined by testing the initial anchors as outlined below. We anticipate that gravity-filled anchors will achieve an allowable bond strength of 1 kips to 2 kips per lineal foot of anchor in the on-site terrace deposits, depending on the method of construction. A variety of methods are available for construction of anchors. If post-grouted anchors are used, we estimate the anchors will develop resistance on the order of three times the estimated value. We recommend that the shoring designer and contractor be responsible for selecting the appropriate bond length and installation methods to achieve the required capacity. Only the frictional resistance developed beyond the active wedge would be effective in resisting lateral loads. If the anchors are spaced at least 6 feet on-center, reduction in the capacity of the anchors do not need to be considered due to group action.

The anchors are commonly installed at angles of 15 to 40 degrees below the horizontal: however, in some cases it is necessary to use steeper inclinations where adjacent private property is present. Caving of the anchor holes should be anticipated and provisions made to minimize such caving.

The geotechnical engineer of record representative should select a representative number of the initial anchors for 24-hour, 200 percent tests and 200 percent quick tests. The purpose of the 200 percent test is to verify the friction value assumed in design. The anchors should be tested to develop twice the assumed friction value. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

For post-grouted anchors where concrete is used to backfill the anchor along its entire length, the test load should be computed as required to develop the appropriate friction along the entire bonded length of the anchor. We estimate that the influence of the post-grouting and the adjacent soil within the bonded length of the anchors will be less than 5 feet from the anchor.

Total deflection during the 24-hour, 200 percent test should not exceed 12 inches during loading. Anchor deflection should not exceed 0.75 inch during the 24-hour period. Measured after the 200 percent test load is applied. If the anchor movement after the 200 percent load has been applied for six hours is less than 0.5 inch and the movement over the previous four hours has been less than 0.1 inch, the test may be terminated.

For the quick 200 percent tests, the 200 percent test load should be maintained for 30 minutes. The total deflection of the anchor during the quick 200 percent tests should not exceed 12 inches. Anchor deflection after the 200 percent test load has been applied should not exceed 0.75 inch during the 30 minute period. Where satisfactory tests are not achieved on the initial anchors, the anchor diameter and/or length should be increased until satisfactory test results are obtained.

All the production anchors should be pre-tested to at least 150 percent of the design load. Total deflection during the tests should not exceed 12 inches. The rate of creep under the 150 percent test should not exceed 0.1 inch over a 15-minute period for the anchor to be approved for the design loading.

After satisfactory test, each production anchor should be locked off at the design load. The locked-off load should be verified by rechecking the load in the anchor. If the locked-off load varies by more than 10 percent from the design load, the load should be until the anchor is locked off within 10 percent of the design load. Installation of the anchors and testing of the completed anchors should be observed by a representative of the geotechnical engineer of record.

6.9.5 Lateral Deflection and Shoring Monitoring

Some means of monitoring the performance of the shoring system is recommended. The monitoring should consist of periodic surveying of the lateral and vertical deflections of top of each soldier pile. When design of the shoring system is finalized, the geotechnical engineer of record can discuss appropriate monitoring methods with the design consultants and shoring contractor.

It is difficult to accurately predict the amount of deflection of a shoring system and it should be understood that the shoring system is designed to deflect at the top. We recommend the shoring system be designed to limit deflection at the top to be 0.5 inch or less where the shoring provides lateral support for existing buildings, and 1 inch or less where existing buildings are not present. If greater deflection occurs during construction, additional vertical support or lateral bracing may be required.

6.9.6 Construction Considerations

Drilling for soldier piles will encounter large-size granular particles and will likely require the use of core barrels of chopping buckets to advance. Additionally, caving of the solider pile shaft walls is also possible since the shafts will be advanced through predominantly granular materials. It’s unlikely drilling mud will be very effective in the on-site soil conditions as we anticipate that circulation of the drilling mud will be difficult due to the large-particle sizes and corresponding void spaces. Casing or other provisions to mitigate caving may be required to advance the soldier pile shafts to the design depths.

The shoring contractor should include appropriate provisions to achieve solider pile installation.

6.10 Earthwork Considerations

6.10.1 Temporary Construction Slopes

Temporary, unsurcharged slopes may be excavated into the on-site engineering fill, undocumented fill and landfill materials may be constructed at a 1:1 (h:v) gradient for slopes less than 15 feet in height, 1¼:1 (h:v) for slopes less than 25 feet in height, and 1½:1 (h:v) for slopes greater than 25 feet in height.

Temporary construction slopes should be protected from erosion by directing surface water away from the top of the slope, by placing sand-bags at the top of the slopes cuts, and/or covering the slopes with plastic sheeting during rain events.

6.10.2 Permanent Slope Construction

The planned mass grading includes construction of permanent slopes. Permanent slopes should be constructed at a maximum gradient of 2:1 (h:v). In cases where steeper permanent slopes are planned, the steeper slopes should include geotextile reinforcement and/or soil-cement. Design of either geotextile reinforced or cement-improved permanent slopes should be done in collaboration with the selected grading contractor and/or specialty contractor.

Permanent slopes should be over-filled and trimmed back. Horizontal benches should be included for every 25 vertical feet of permanent slope; noting that if only one bench is required it should be constructed at the mid-height of the slope.

New fill should be benched into the existing slope using a minimum horizontal bench width of two feet for every four vertical feet. All benches should be observed by a representative of our firm noting that we anticipate significant degree of variation throughout the site.

A keyway should be constructed at the toe of each planned permanent slope; the keyway should be a minimum of five feet in width and four feet in height for slopes less than 25 feet in height and a minimum of ten feet in width and six feet in height for slopes great than 25 feet in height. The bottom of the keyway inclined two degrees towards the slope in each case.

6.10.3 Excavation Bottom Preparation

Exposed excavation bottoms should be carefully probed or otherwise evaluated by our field representative and any localized deposits of loose, soft or otherwise unsuitable soils should be removed and replaced as determined in the field with our Langan field technician.

The exposed bottom should be scarified for a depth of six inches to the extent possible, moisture-conditioned and compacted as recommended below.

If the exposed bottom of the excavation consists of soft, compressible, wet and/or otherwise unsuitable materials, removal of an additional six to 12 inches of soil and replacement with ¾-inch crushed rock should be placed to provide a firm working surface suitable to receive new fill.

As recommended previously, where existing landfill materials are present in excavation bottoms, and these materials are allowed to remain in place as recommended herein, these materials should be densified using a 16-ton vibratory roller, or other suitable equipment, prior to placement and compaction of new fill.

6.10.4 Materials for Fill

Existing landfill materials are suitable for use in required fill provided these materials are processed so that less than one third of the materials is larger than one inch in maximum dimension and only five percent of the materials exceed eight inches in maximum particle size.

On-site alluvial materials are also suitable for use in required fills noting also the alluvial materials should be processed, if necessary, so that less than one third of the materials is larger than one inch in maximum dimension and only five percent of the materials exceed eight inches in maximum particle size.

In general, suitable materials to be included within inert debris fill include soil, gravel, rock, concrete, fully cured asphalt, glass, plaster products (except for plasterboard), brick, and clay products. Deleterious materials, materials other than those listed, should be removed; noting that reinforcing steel that is embedded in concrete should be cut flush to allow re-use.

Landfill debris and alluvial materials great than 12 inches in any dimension may be used in deep fills provided these materials are placed at least ten feet below the finish fill surface and placed in windrows are recommended in Section 6.10.5.

6.10.5 Fill Placement and Compaction

Fill soils shall be moisture conditioned as recommended herein, placed in loose lifts not exceeding 12-inches in thickness and mechanically compacted using heavy equipment. If lightweight equipment is used, the lift thickness should be limited to 8 inches in thickness.

The processed fill materials should be moisture conditioned within two percent of the optimum moisture content and compacted to at least 90 percent of the maximum dry density obtained per ASTM D-1557 when possible, and using large ring tests in accordance with ASTM D4914 or D5030 or other methods deem suitable and/or practical.

It should be understood that while performing field density testing is key quality control quality assurance provision, documentation of the number of passes (compactive effort), the response of the fill materials to the equipment (i.e. yielding / non-yielding bottom) and frequent probing of the fill as compacted by a qualified geotechnical engineer noting that these observations are equally important to confirm the adequacy of the compacted fill as field density testing.

Materials greater than 12 inches in largest dimension and up to 36 inches in largest dimension may be utilized in the deeper fills, defined as at least ten feet below the finish surface, The over-sized particles may be placed in trenches to create windrows that are spaced at least 15 horizontal feet center-to-center and at least five vertical feet. Windrows should be less than 100 feet in length. The trenches containing the over-sized particles should be filled with granular materials and densified using heavy compaction equipment.

6.10.6 Development of Detailed Grading Control and Settlement Monitoring Plan

A customized grading control plan should be developed prior to start of mass grading that takes into consideration the geotechnical requirements outlined herein and well as applicable environmental requirements outlined in our landfill closure report.

Settlement monitoring should be performed during the mass grading at locations where more than ten feet of new fill is planned over existing landfill materials. The primary purpose of the monitoring is to observe any potential settlement that may occur within existing landfill materials due to the increased weight of the new fill. The settlement monuments can be established at the planned finish surface.

Foundation and floor slab construction should not commence until satisfactory readings are obtained from the settlement monuments in accordance with a formal settlement monitoring program. The formal settlement monument program should be developed as part of the pre-construction phase of the project and included in the grading control plan.

7.0 GEOTECHNICAL FIELD OBSERVATION AND TESTING

Geotechnical field observation and testing is necessary during the construction phase of the project and that testing should be performed by a licensed geotechnical engineer including the following primary items:

- Observation and approval of excavation bottoms
- Processing and sorting of proposed fill materials
- Moisture-conditioning, placement and compaction of fill materials
- Installation of temporary shoring and lagging
- Observation and approval of foundation bottoms
- Observation and testing of utility trench backfill
- Observation and testing of pavement subgrade and base materials
- Observation and testing of retaining wall backfill and wall backdrainage provisions

8.0 LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from available boring and test pit data, as well as project information provided to date. This report was prepared for CMC, their design consultants and subcontractors for use in the proposed development.

If changes to the proposed development are made, we should be notified to review our conclusions and recommendations. Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation.

9.0 CLOSING

We sincerely appreciate the opportunity to provide professional services for this project and look forward to working with you on this project. Please contact us at your convenience to discuss any questions you may have regarding this report.

Sincerely,

Langan Engineering and Environmental Services, Inc.

signed 1/12/24

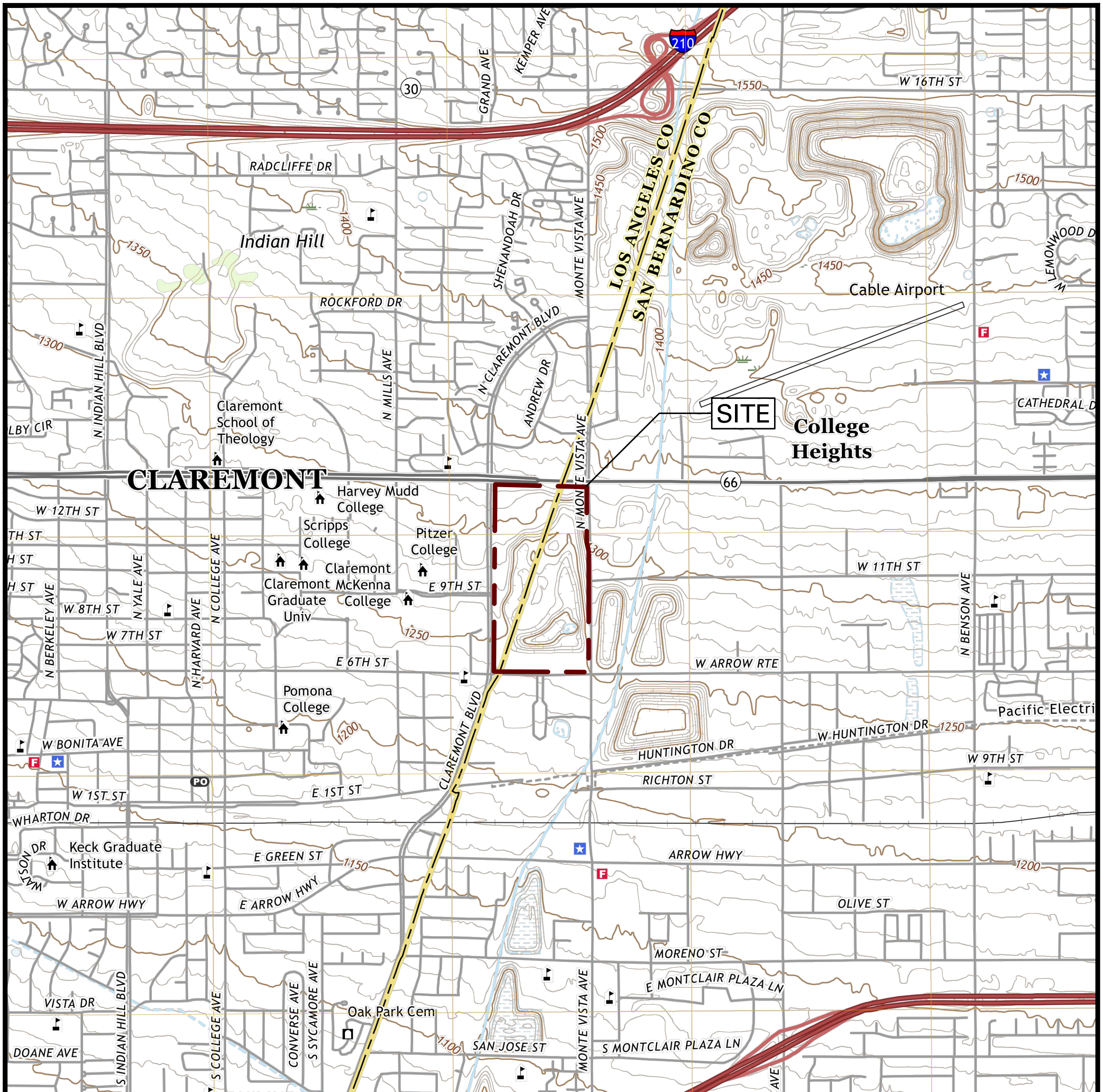
Claudia Rangel
Staff Engineer

Andrew Nieblas
Project Geologist

signed 1/12/24

Christopher J. Zadoorian
Senior Associate

FIGURES



LEGEND:

SITE LIMITS

2000 1000 0 2000

SCALE IN FEET

REFERENCE: USGS 7.5-MINUTE TOPOGRAPHIC MAP OF THE ONTARIO QUADRANGLE (201

LANGAN

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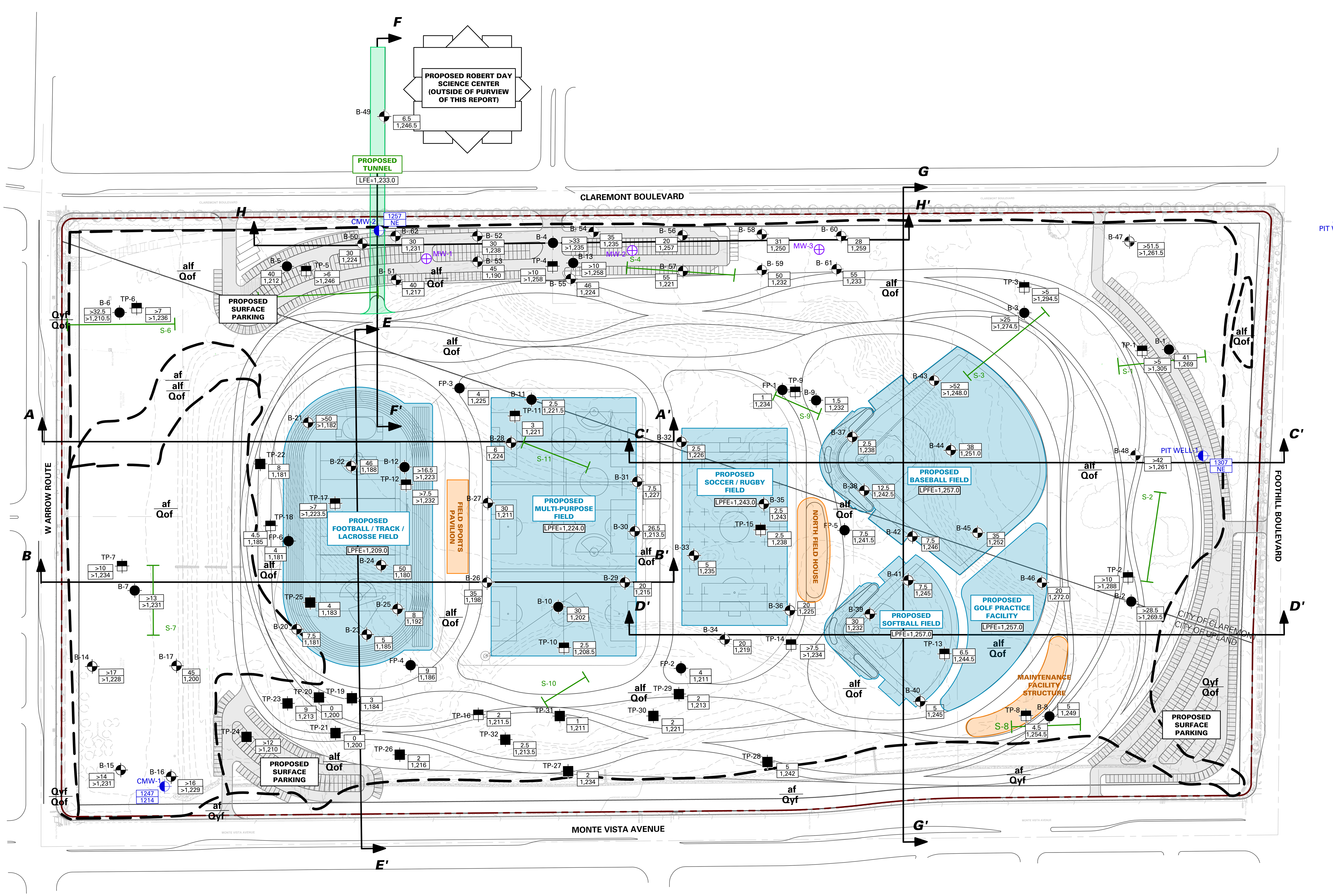
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY CALIFORNIA	**SITE LOCATION MAP**	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: EB	**1**

Filename: \\langan.com\data\IRV\Data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL FIGURES.dwg Date: 7/8/2022 Time: 15:49 User: ebalassa Style Table: Langan.stb Layout: SLM



LEGEND:

	SITE LIMITS
B-14 >17 >1,228	BORING LOCATION (LANGAN) DEPTH TO TOP OF NATIVE SOIL (FEET) ELEVATION OF NATIVE SOIL (FEET, NAVD88)
MW-1	SOIL GAS MONITORING WELL LOCATIONS
FP-1 1 1,234	PERCOLATION BORING (LANGAN, 2022) DEPTH TO TOP OF NATIVE SOIL ELEVATION OF NATIVE SOIL
B-1 41 1,269	PRIOR BORING LOCATION (GPI, 2020) DEPTH TO TOP OF NATIVE SOIL ELEVATION OF NATIVE SOIL
TP-1 >5 >1,305	PRIOR TEST PIT LOCATION (GPI, 2020) DEPTH TO TOP OF NATIVE SOIL ELEVATION OF NATIVE SOIL
TP-19 3 1,184	PRIOR TEST PIT LOCATION (GPI, 2021) DEPTH TO TOP OF NATIVE SOIL ELEVATION OF NATIVE SOIL
CMW-1 PIT WELL-1 1247 33	PRIOR MONITORING WELL (ARI, 2021) AND PIT WELL GROUND SURFACE ELEVATION GROUNDWATER ELEVATION (NE = NOT ENCOUNTERED)
	PROPOSED PLAYING FIELD AREA
	PROPOSED FIELD STRUCTURE
	PROPOSED TUNNEL
	PROPOSED PARKING AREA
S-1	SEISMIC REFRACTION LINE (GPI 2020)
LFE=1,223.0	LOWEST FINISHED FLOOR ELEVATION
LPFE=1,208.5	LOWEST PLAYING FIELD ELEVATION
af	ARTIFICIAL FILL
alf	UNDOCUMENTED INERT DEBRIS
Qyf	QUARTENARY YOUNG FAN DEPOSITS
Qof	QUARTENARY OLDER FAN DEPOSITS
	GEOLOGIC CONTACT

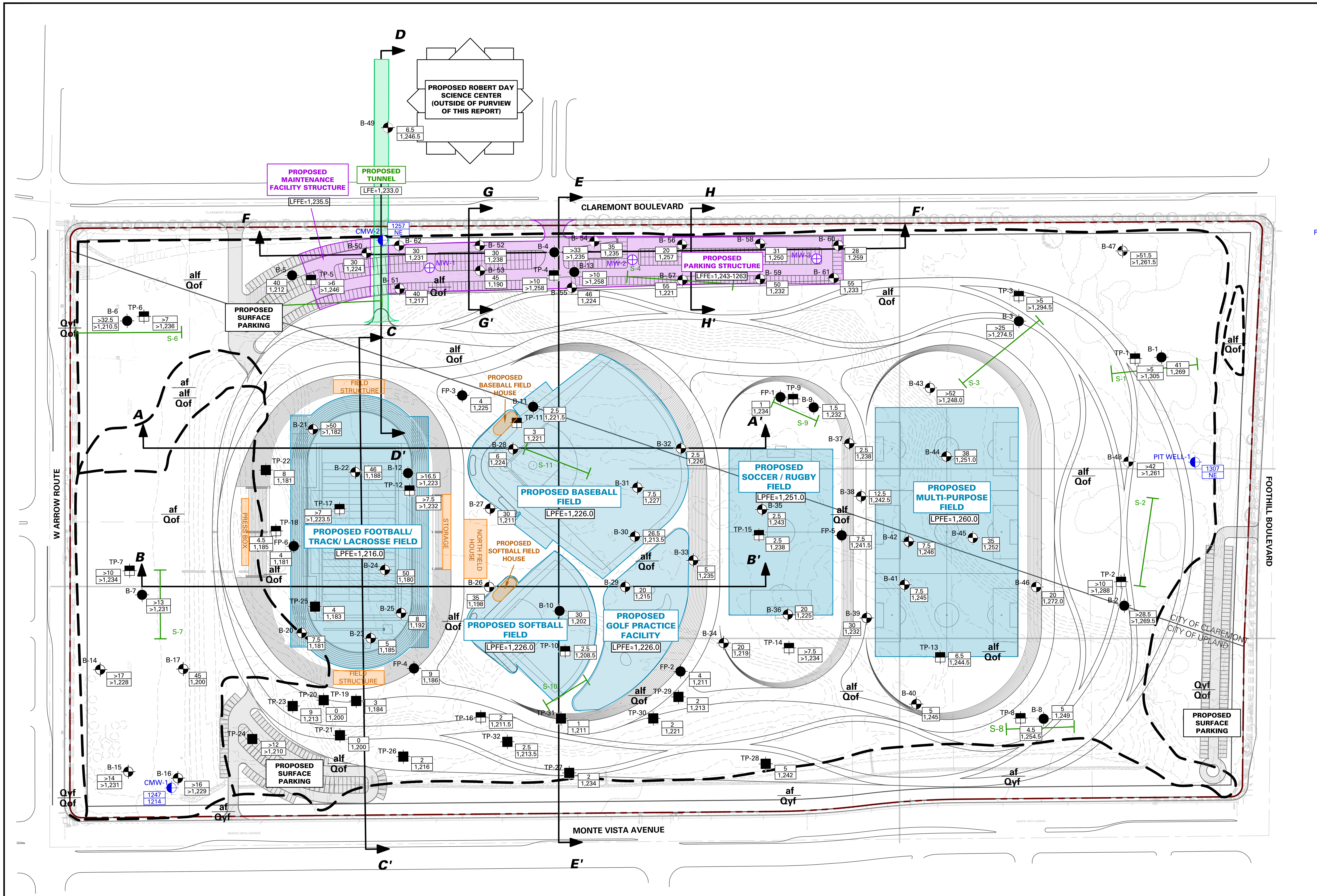
NOTES:

1. BACKGROUND TOPOGRAPHIC MAP REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
2. BACKGROUND CONCEPTUAL PLANS REFERENCED FROM ARCHITECTURAL SPORTS BOWL SITE PLANS DATED DECEMBER 4, 2023.
3. PRIOR BORINGS AND TEST PITS REFERENCED FROM "GEOTECHNICAL INVESTIGATION INERT DEBRIS LANDFILL CLOSURE, NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED JANUARY 28, 2022.
4. PRIOR BORINGS AND TEST PITS REFERENCED FROM "PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED EAST CAMPUS EXPANSION NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED DECEMBER 23, 2022.

100 50 0 100
SCALE IN FEET

LANGAN	Project	Figure Title		Figure No.
Langan Engineering & Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	**PROPOSED ROBERTS CAMPUS SPORTS BOWL** CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	**SCENARIO 1 CONCEPTUAL SITE PLAN**	Project No. 700114101 Date JANUARY 2024 Scale AS SHOWN Drawn By CR	**2A**

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:19 User: crangel Style Table: Langan.stb Layout: FIG 2A- SCENARIO 1 24X36



100 50 0 100
SCALE IN FEET

LEGEND:

	SITE LIMITS
B-14 >17 >1,228	BORING LOCATION (LANGAN) DEPTH TO TOP OF NATIVE SOIL (FEET) ELEVATION OF NATIVE SOIL (FEET, NAVD88)
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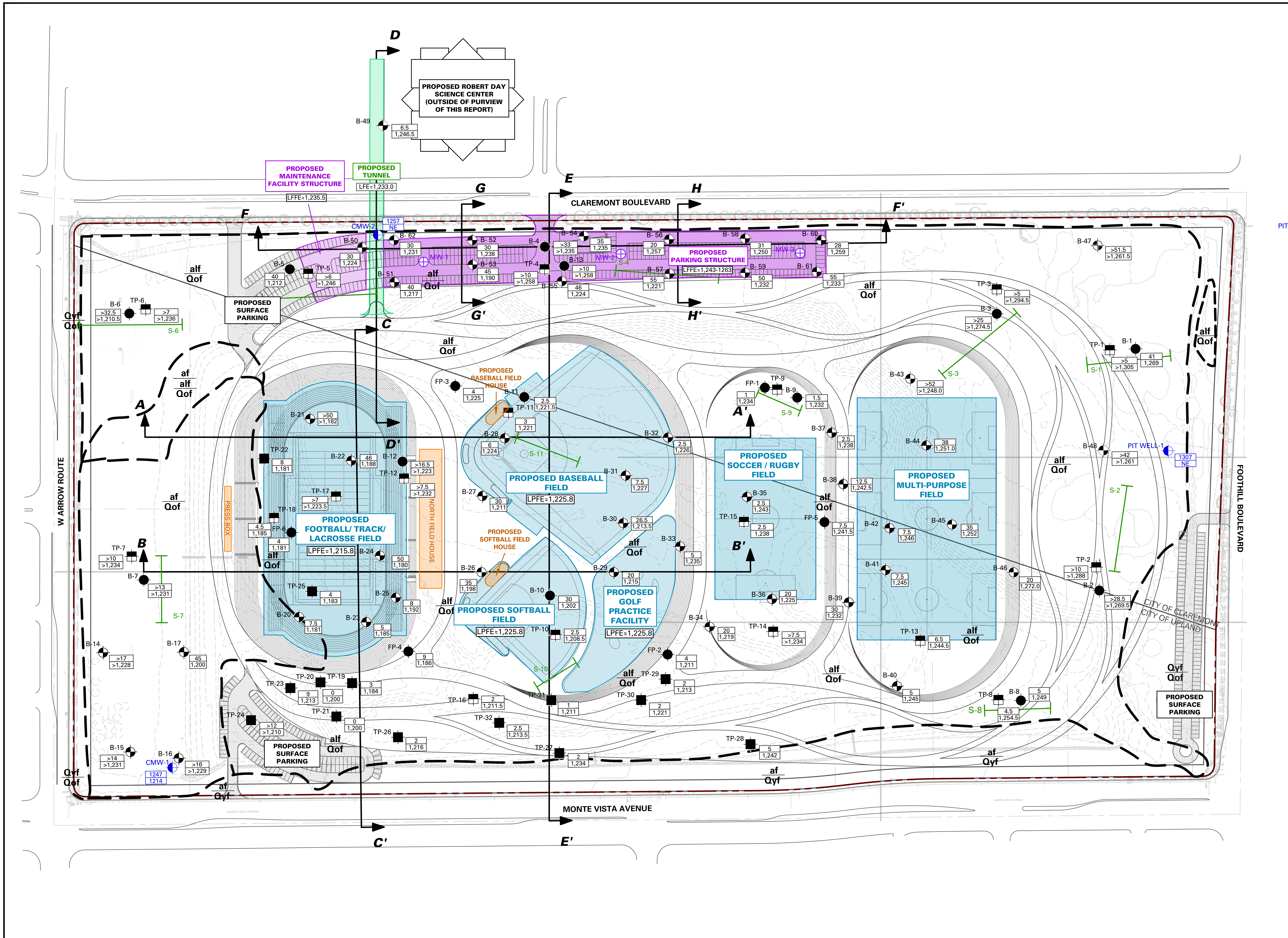
	PROPOSED PLAYING FIELD AREA
	PROPOSED FIELD STRUCTURE AND MAINTENANCE FACILITY
	PROPOSED TUNNEL
	PROPOSED PARKING STRUCTURE AND MAINTENANCE FACILITY
	PROPOSED PARKING AREA
S-1	SEISMIC REFRACTION LINE (GPI 2020)
LFE=1,223.0	LOWEST FINISHED FLOOR ELEVATION
LPFE=1,208.5	LOWEST PLAYING FIELD ELEVATION
af	ARTIFICIAL FILL
alf	UNDOCUMENTED INERT DEBRIS
Qyf	QUARTENARY YOUNG FAN DEPOSITS
Qof	QUARTENARY OLDER FAN DEPOSITS
	GEOLOGIC CONTACT

NOTES:

1. BACKGROUND TOPOGRAPHIC MAP REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
2. BACKGROUND CONCEPTUAL PLANS REFERENCED FROM ARCHITECTURAL SPORTS BOWL SITE PLANS DATED DECEMBER 4, 2023.
3. PRIOR BORINGS AND TEST PITS REFERENCED FROM "GEOTECHNICAL INVESTIGATION INERT DEBRIS LANDFILL CLOSURE, NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED JANUARY 28, 2022.
4. PRIOR BORINGS AND TEST PITS REFERENCED FROM "PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED EAST CAMPUS EXPANSION NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED DECEMBER 23, 2022.

LANGAN Langan Engineering & Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	Figure Title SCENARIO 2 CONCEPTUAL SITE PLAN	Project No. 700114101 Date JANUARY 2024 Scale AS SHOWN Drawn By CR	Figure No. 3A



LEGEND:

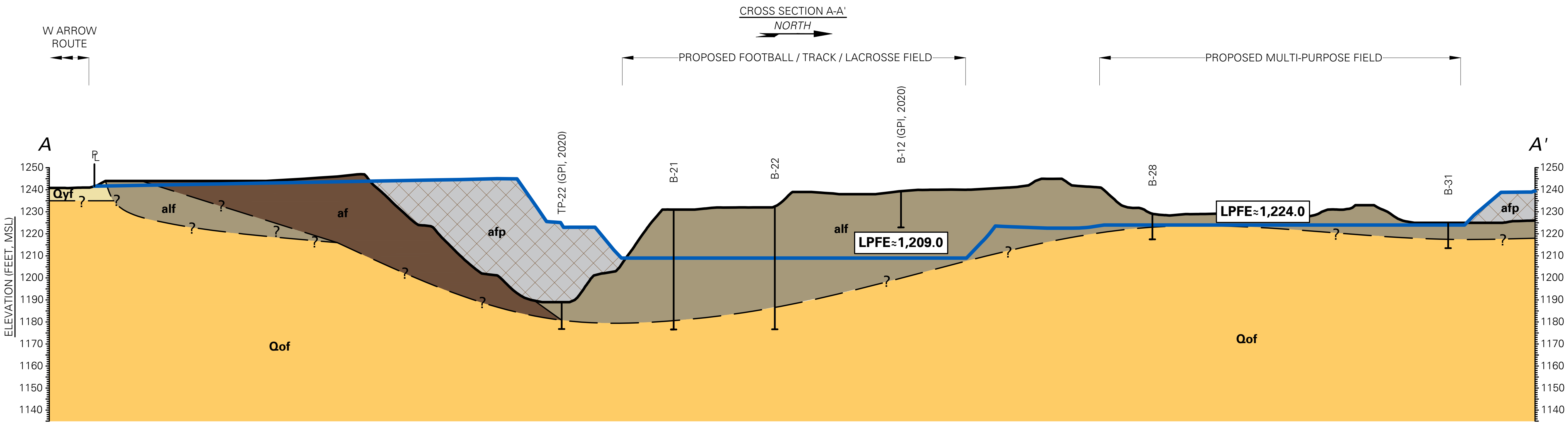
- SITE LIMITS
- B-14 BORING LOCATION (LANGAN) — DEPTH TO TOP OF NATIVE SOIL (FEET); ELEVATION OF NATIVE SOIL (FEET, NAVD88) (>17 / >1,228)
- MW-1 SOIL GAS MONITORING WELL LOCATIONS
- FP-1 PERCOLATION BORING (LANGAN, 2022) — DEPTH TO TOP OF NATIVE SOIL; ELEVATION OF NATIVE SOIL (1 / 1,234)
- B-1 PRIOR BORING LOCATION (GPI, 2020) — DEPTH TO TOP OF NATIVE SOIL; ELEVATION OF NATIVE SOIL (41 / 1,269)
- TP-1 PRIOR TEST PIT LOCATION (GPI, 2020) — DEPTH TO TOP OF NATIVE SOIL; ELEVATION OF NATIVE SOIL (>5 / >1,305)
- TP-19 PRIOR TEST PIT LOCATION (GPI, 2021) — DEPTH TO TOP OF NATIVE SOIL; ELEVATION OF NATIVE SOIL (3 / 1,184)
- CMW-1 PIT WELL-1 PRIOR MONITORING WELL (ARI, 2021) AND PIT WELL — GROUND SURFACE ELEVATION; GROUNDWATER ELEVATION (NE = NOT ENCOUNTERED) (1247 / 33)
- PROPOSED PLAYING FIELD AREA
- PROPOSED FIELD STRUCTURE AND MAINTENANCE FACILITY
- PROPOSED TUNNEL
- PROPOSED PARKING STRUCTURE AND MAINTENANCE FACILITY
- PROPOSED PARKING AREA
- S-1 SEISMIC REFRACTION LINE (GPI 2020)
- LFE=1,223.0 LOWEST FINISHED FLOOR ELEVATION
- LPFE=1,208.5 LOWEST PLAYING FIELD ELEVATION
- af ARTIFICIAL FILL
- alf UNDOCUMENTED INERT DEBRIS
- Qyf QUARTENARY YOUNG FAN DEPOSITS
- Qof QUARTENARY OLDER FAN DEPOSITS
- GEOLOGIC CONTACT

NOTES:

1. BACKGROUND TOPOGRAPHIC MAP REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
2. BACKGROUND CONCEPTUAL PLANS REFERENCED FROM ARCHITECTURAL SPORTS BOWL SITE PLANS DATED DECEMBER 4, 2023.
3. PRIOR BORINGS AND TEST PITS REFERENCED FROM "GEOTECHNICAL INVESTIGATION INERT DEBRIS LANDFILL CLOSURE, NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED JANUARY 28, 2022.
4. PRIOR BORINGS AND TEST PITS REFERENCED FROM "PRELIMINARY GEOTECHNICAL INVESTIGATION PROPOSED EAST CAMPUS EXPANSION NEC CLAREMONT BOULEVARD AND WEST ARROW ROUTE, UPLAND AND CLAREMONT CALIFORNIA", PREPARED BY GEOTECHNICAL PROFESSIONALS INC., DATED DECEMBER 23, 2022.

LANGAN Langan Engineering & Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project **PROPOSED ROBERTS CAMPUS SPORTS BOWL** CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	Figure Title **SCENARIO 2B CONCEPTUAL SITE PLAN**	Project No. 700114101 Date JANUARY 2024 Scale AS SHOWN Drawn By CR	Figure No. **3B**

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:21 User: crangel Style Table: Langan.stb Layout: FIG 3B- SCENARIO 2B 24X36



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

— —?— — APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

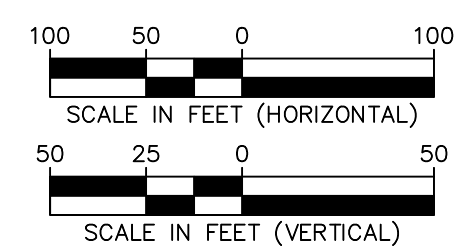
YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.



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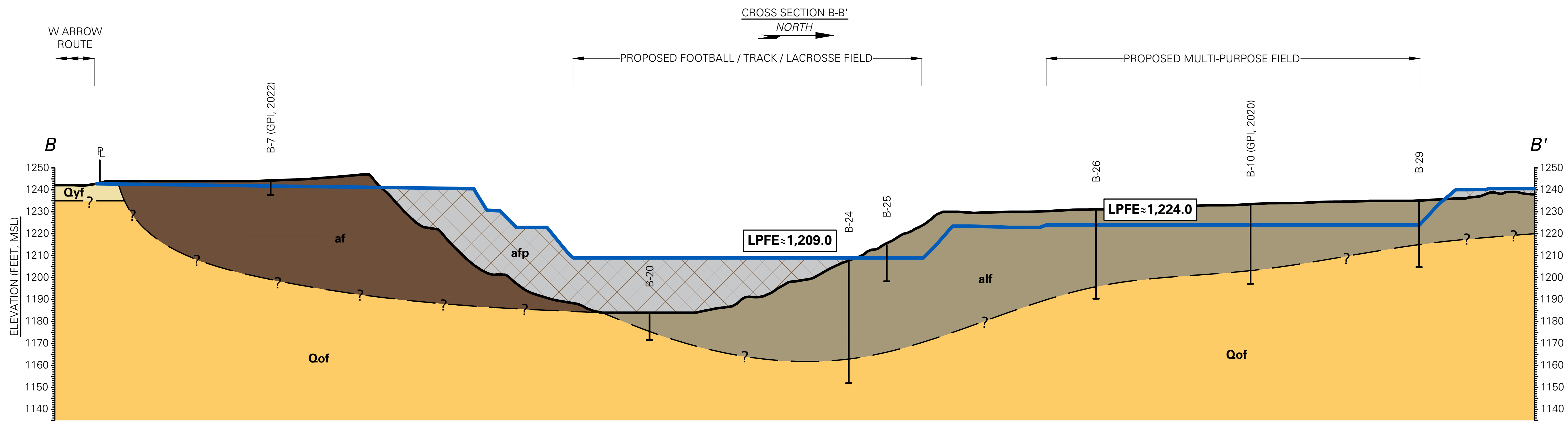
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	SCENARIO 1 CROSS SECTION A-A'	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: CR	4A

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:22 User: crangel Style Table: Langan.stb Layout: FIG 4A S1 XSA

LANGAN



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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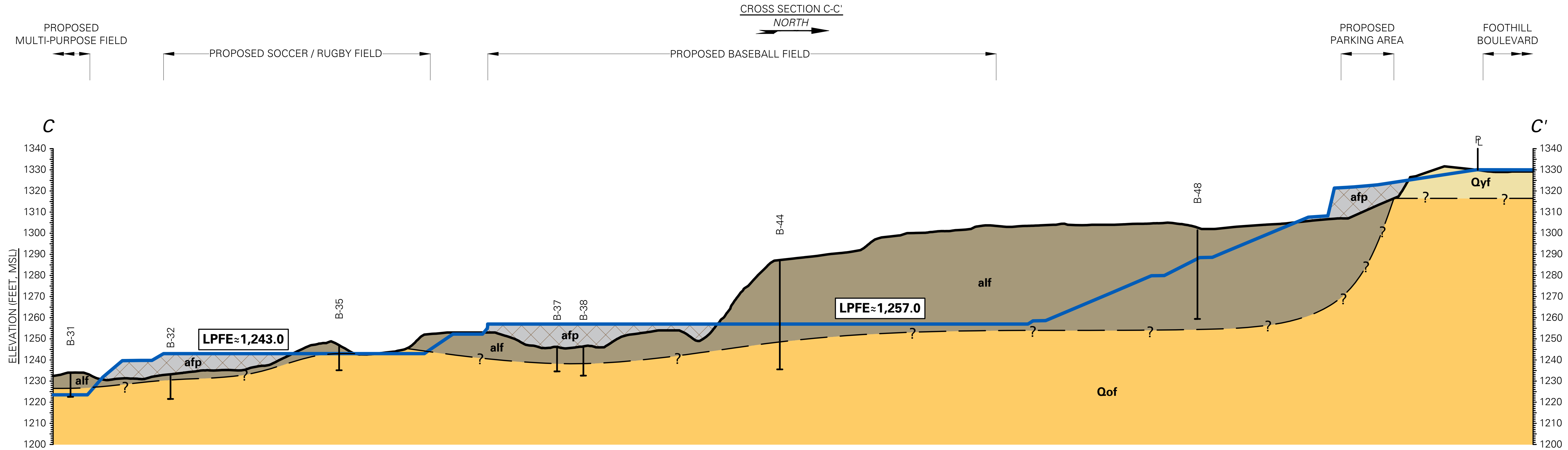
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	SCENARIO 1 CROSS SECTION B-B'	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: CR	4B

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:22 User: crangel Style Table: Langan.stb Layout: FIG 4B S1 XSB



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

— —?— — APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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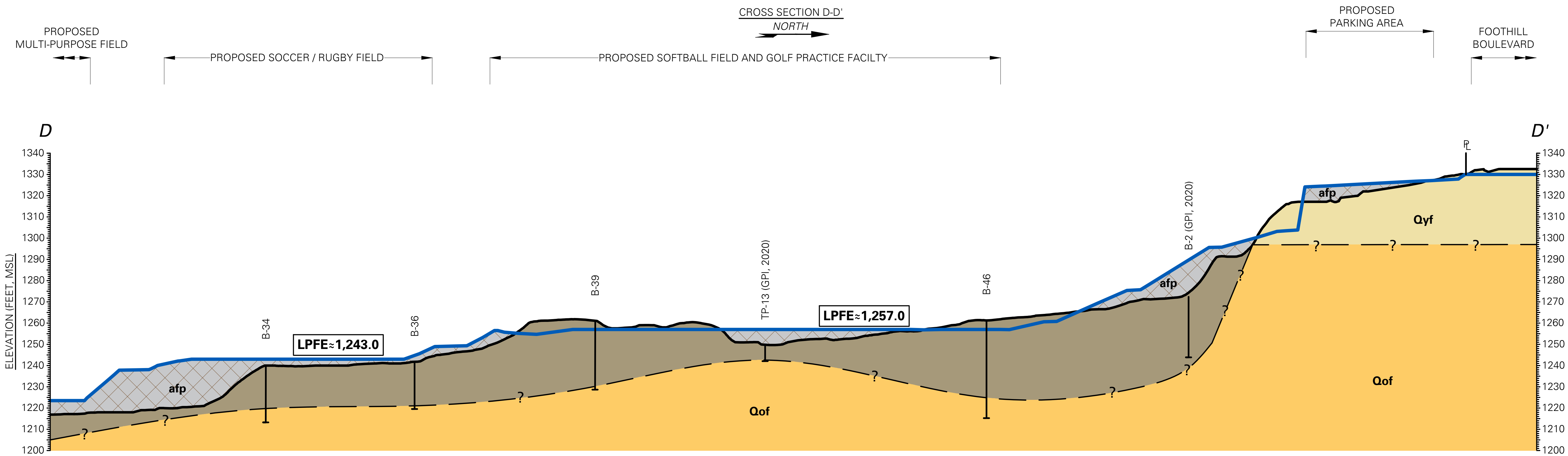
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	**SCENARIO 1 CROSS SECTION C-C'**	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: CR	**4C**

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 11:49 User: crangel Style Table: Langan.stb Layout: FIG 4C S1 XSC



LEGEND:

	PROPOSED GROUND SURFACE
	EXISTING GROUND SURFACE
— —?— —	APPROXIMATE GEOLOGIC CONTACT
	PROPOSED FILL (afp)
	ARTIFICIAL FILL (af)
	UNDOCUMENTED INERT DEBRIS (alf)
	YOUNG ALLUVIAL FAN DEPOSITS (Qyf) PREDOMINATELY COARSE GRAINED MATERIAL
	OLDER ALLUVIAL FAN DEPOSITS (Qof) PREDOMINATELY COARSE GRAINED MATERIAL
LPFE≈1,208.5	LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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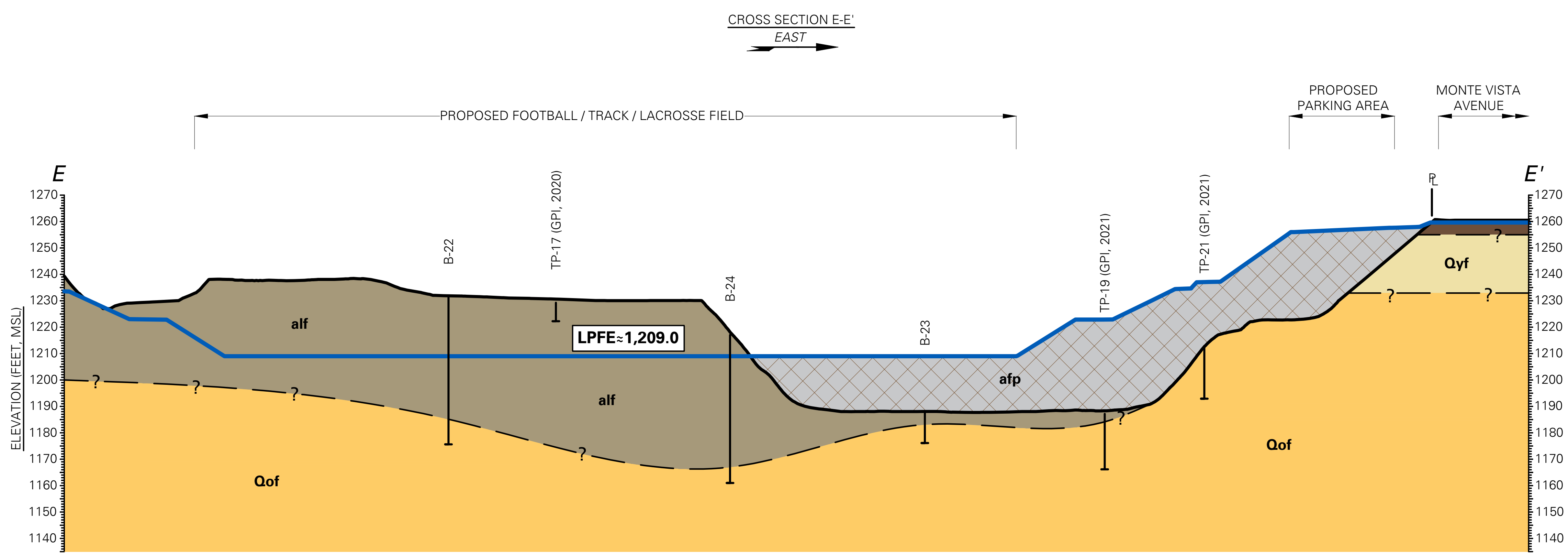
Project
PROPOSED ROBERTS CAMPUS SPORTS BOWL
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 1 CROSS SECTION D-D'

Project No. 700114101	Figure No.
Date JANUARY 2024	**4D**
Scale AS SHOWN	
Drawn By CR	

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 11:53 User: crangel Style Table: Langan.stb Layout: FIG 4D S1 XSD

LANGAN



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- — —?— — APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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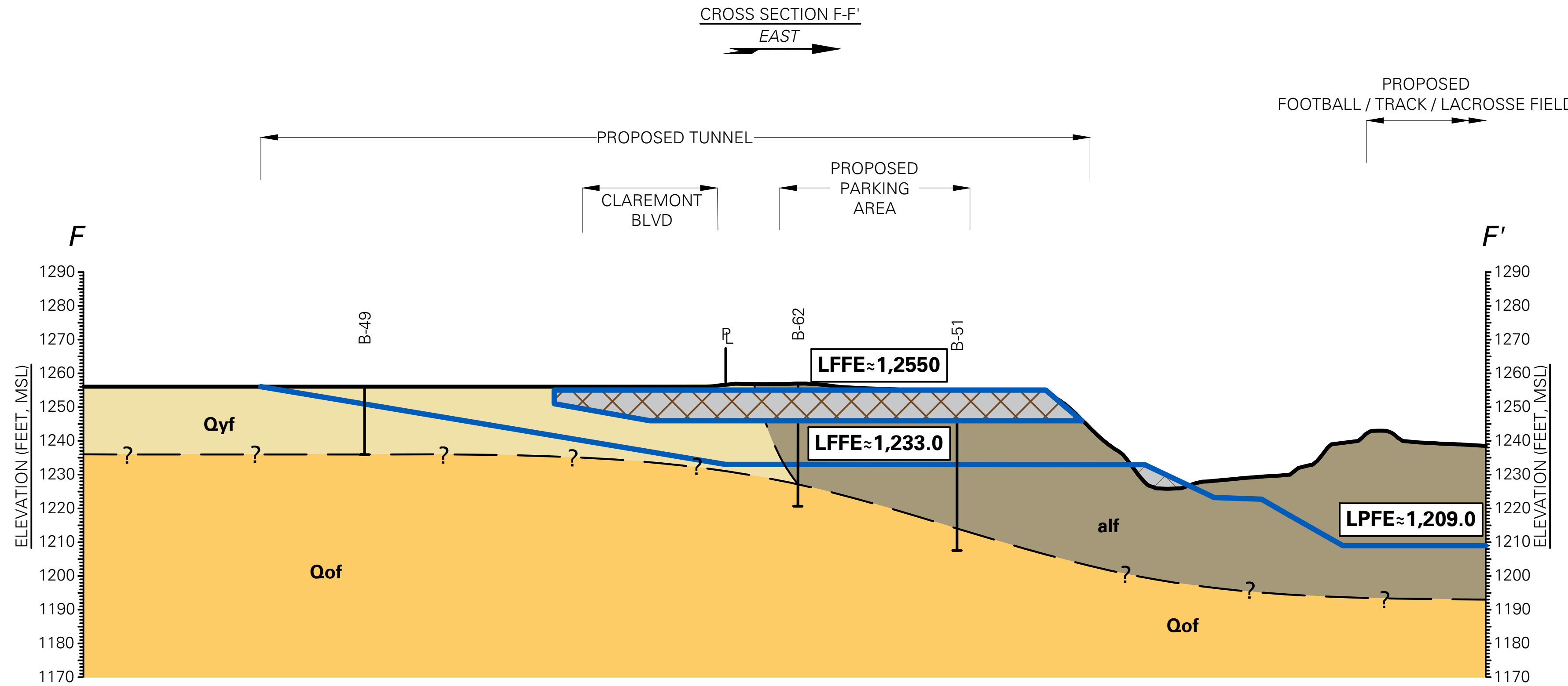
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	**SCENARIO 1 CROSS SECTION E-E'**	700114101	**4E**
		Date: JANUARY 2024	
		Scale: AS SHOWN	
		Drawn By: CR	

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:24 User: crangel Style Table: Langan.stb Layout: FIG 4E S1 XSE



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)
- LFFE≈1,233.0 LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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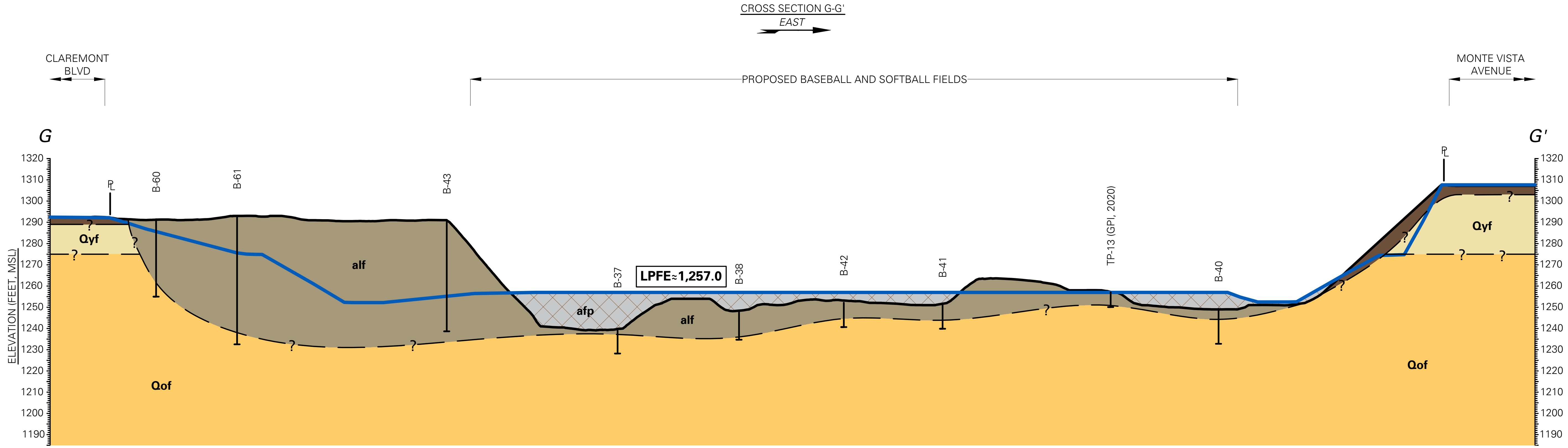
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	SCENARIO 1 CROSS SECTION F-F'	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: CR	4F

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:24 User: crangel Style Table: Langan.stb Layout: FIG 4F S1 XSF



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,208.5 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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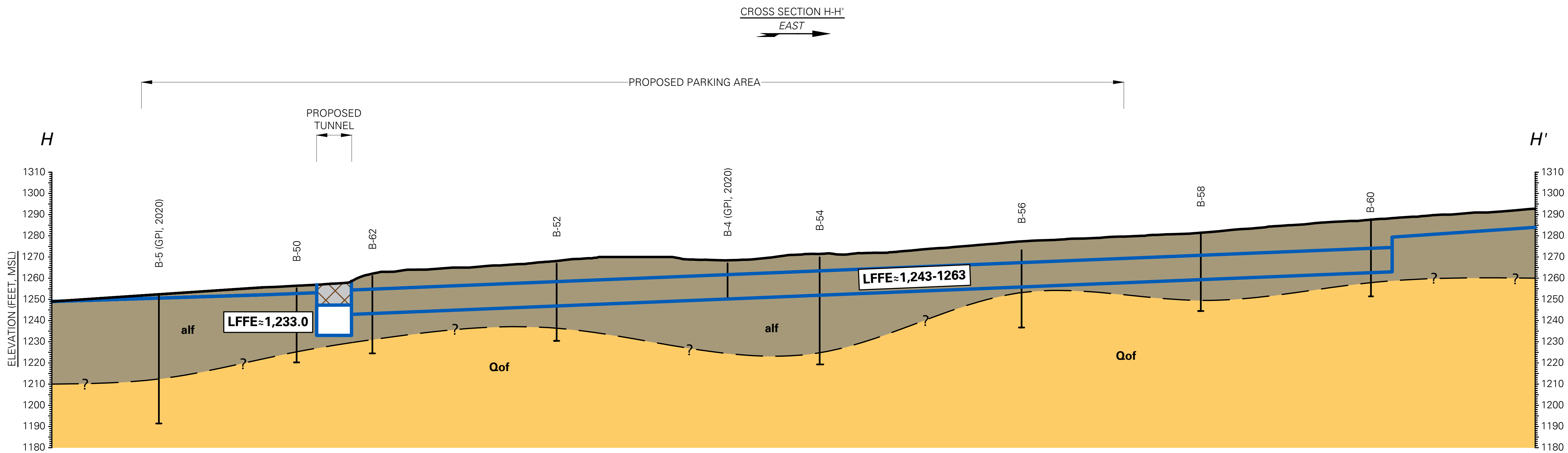
Project
PROPOSED ROBERTS CAMPUS SPORTS BOWL
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 1 CROSS SECTION G-G'

Project No. 700114101	Figure No.
Date JANUARY 2024	**4G**
Scale AS SHOWN	
Drawn By CR	

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 11:57 User: crangel Style Table: Langan.stb Layout: FIG 4G S1 XSG



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

— —?— — APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LFFE≈1,233.0 LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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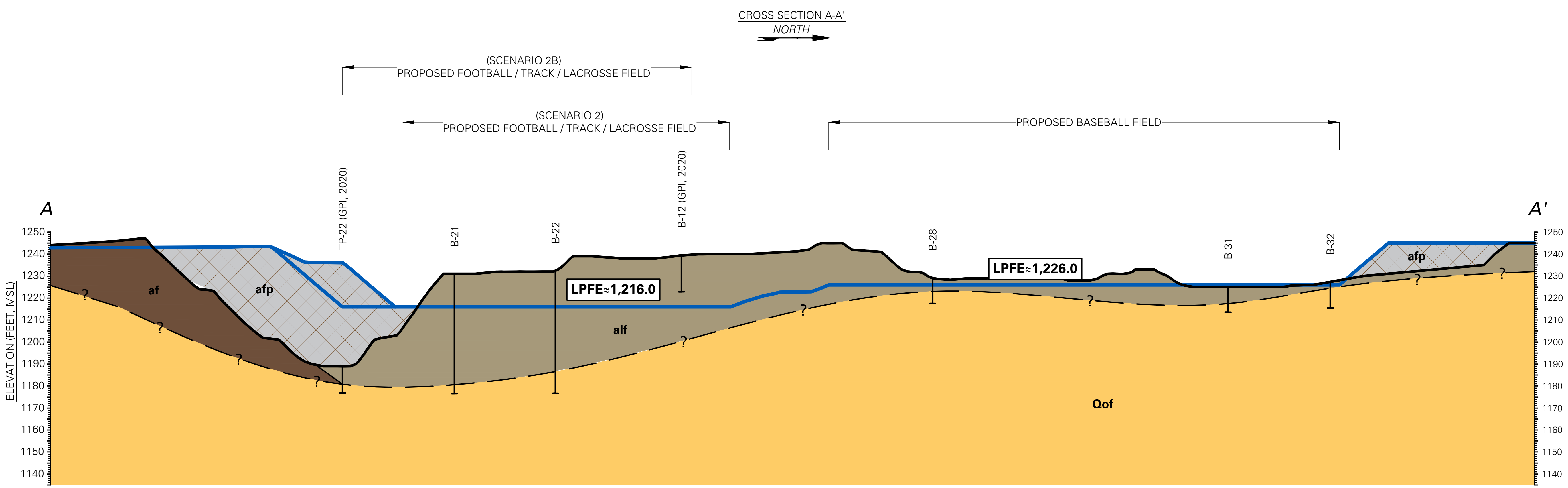
LANGAN

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 11:59 User: crangel Style Table: Langan.stb Layout: FIG 4H S1 XSH



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- — —?— — APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,215.8 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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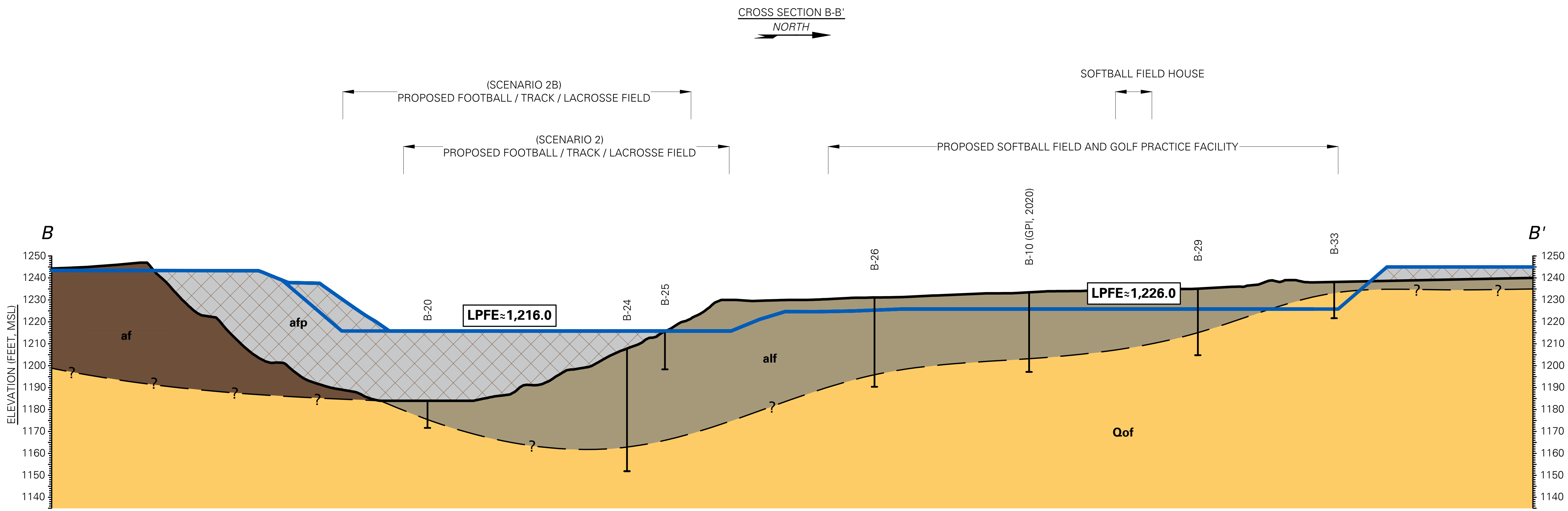

LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LPFE≈1,215.8 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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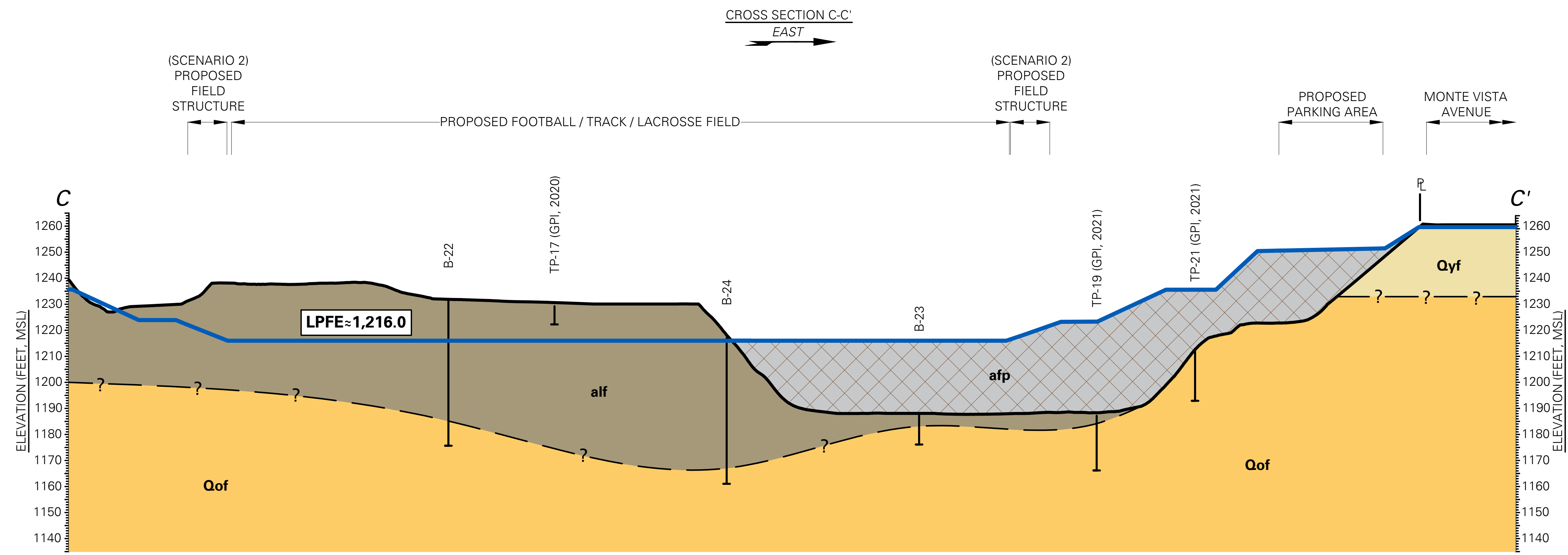
Project
PROPOSED ROBERTS CAMPUS SPORTS BOWL
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 2 & 2B CROSS SECTION B-B'

Project No. 700114101	Figure No. **5B**
Date JANUARY 2024	
Scale AS SHOWN	
Drawn By CR	



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- — —?— — APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,215.8 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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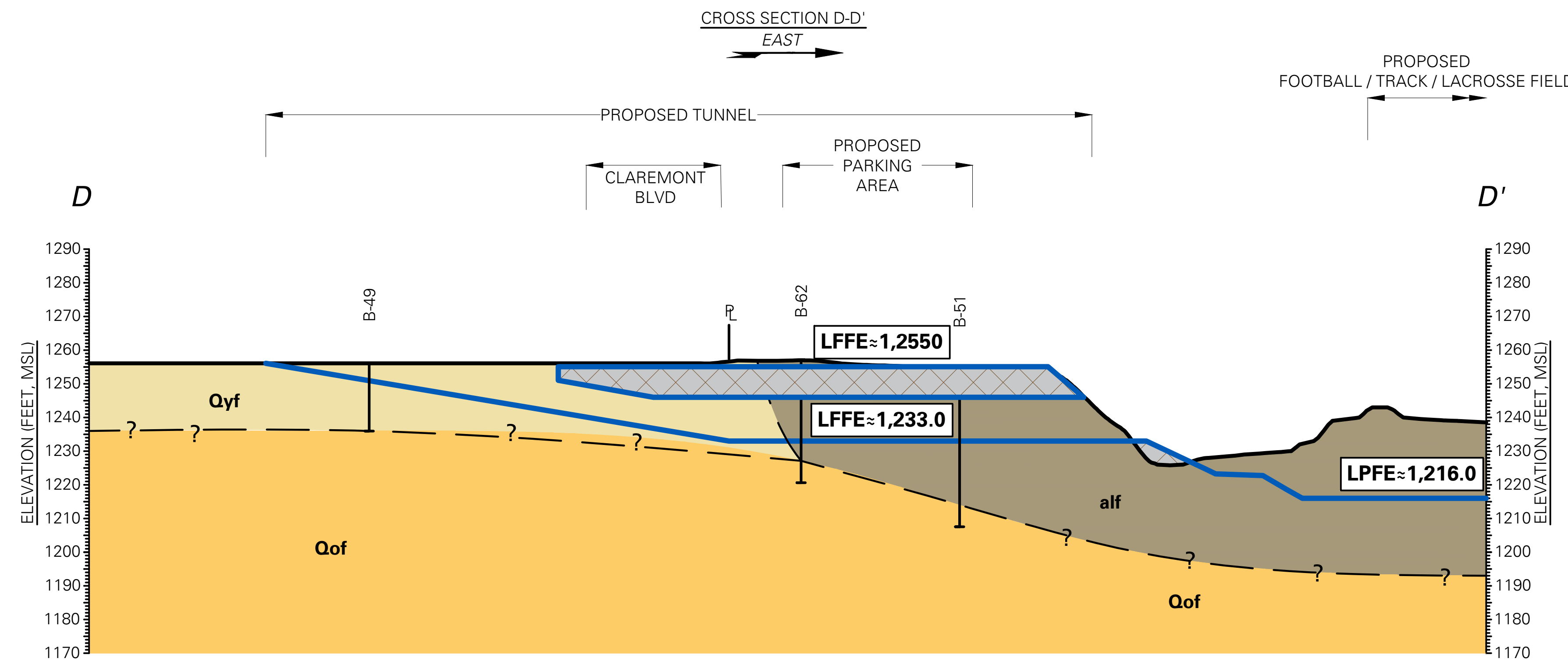
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE, LOS ANGELES COUNTY & SAN BERNARDINO COUNTY, CALIFORNIA	**SCENARIO 2 & 2B CROSS SECTION C-C'**	700114101	**5C**
		Date: JANUARY 2024	
		Scale: AS SHOWN	
		Drawn By: CR	

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:27 User: crangel Style Table: Langan.stb Layout: FIG 5C S2 XSC



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

— —?— — APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LPFE≈1,215.8 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)

LFFE≈1,233.0 LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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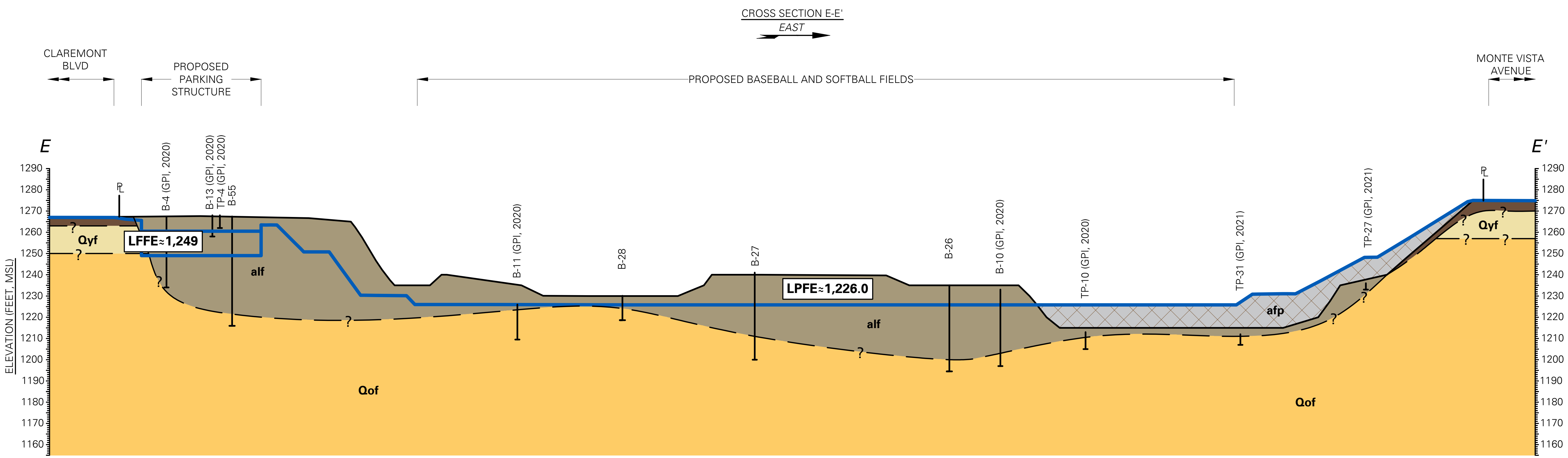
Project	Figure Title	Project No.	Figure No.
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	SCENARIO 2 & 2B CROSS SECTION D-D'	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: CR	5D

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 17:27 User: crangel Style Table: Langan.stb Layout: FIG 5D S2 XSD



LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LPFE≈1,225.8 LOWEST PLAYING FIELD ELEVATION (FEET, NAVD88)
- LPFE≈1,249 LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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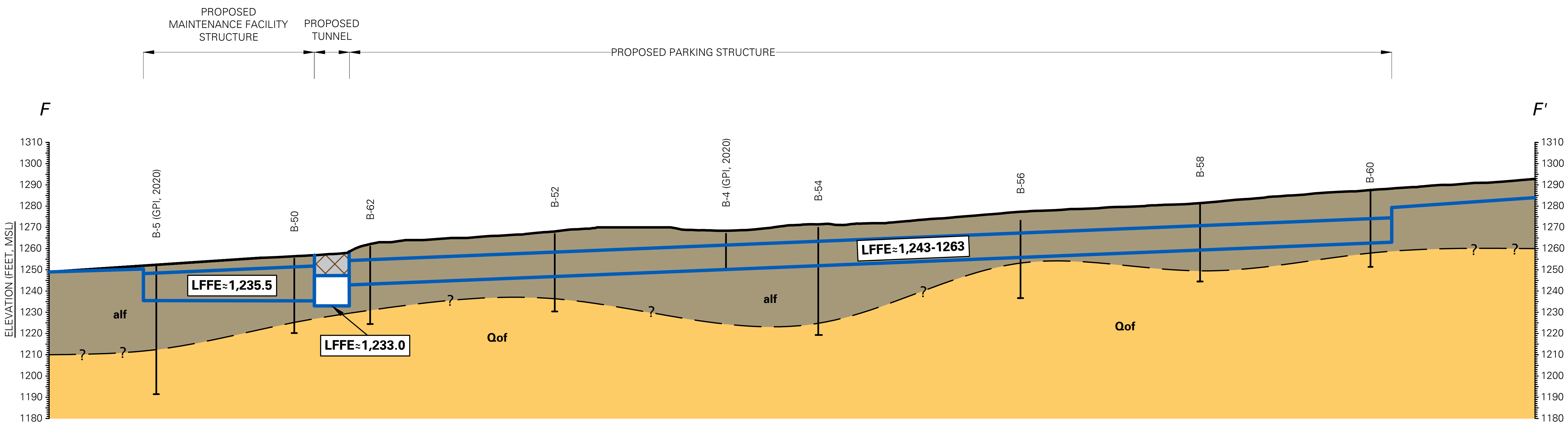
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 2 & 2B CROSS SECTION E-E'

Project No.	700114101
Date	JANUARY 2024
Scale	AS SHOWN
Drawn By	CR
Figure No.	5E

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 12:09 User: crangel Style Table: Langan.stb Layout: FIG 5E S2 XSE

CROSS SECTION F-F'
NORTH



LEGEND:

	PROPOSED GROUND SURFACE
	EXISTING GROUND SURFACE
— —?— —	APPROXIMATE GEOLOGIC CONTACT
	PROPOSED FILL (afp)
	ARTIFICIAL FILL (af)
	UNDOCUMENTED INERT DEBRIS (alf)
	YOUNG ALLUVIAL FAN DEPOSITS (Qyf) PREDOMINATELY COARSE GRAINED MATERIAL
	OLDER ALLUVIAL FAN DEPOSITS (Qof) PREDOMINATELY COARSE GRAINED MATERIAL
LFFE≈1,233.0	LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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Project
PROPOSED ROBERTS CAMPUS SPORTS BOWL
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 2 & 2B CROSS SECTION F-F'

Project No.	700114101
Date	JANUARY 2024
Scale	AS SHOWN
Drawn By	CR
Figure No.	5F

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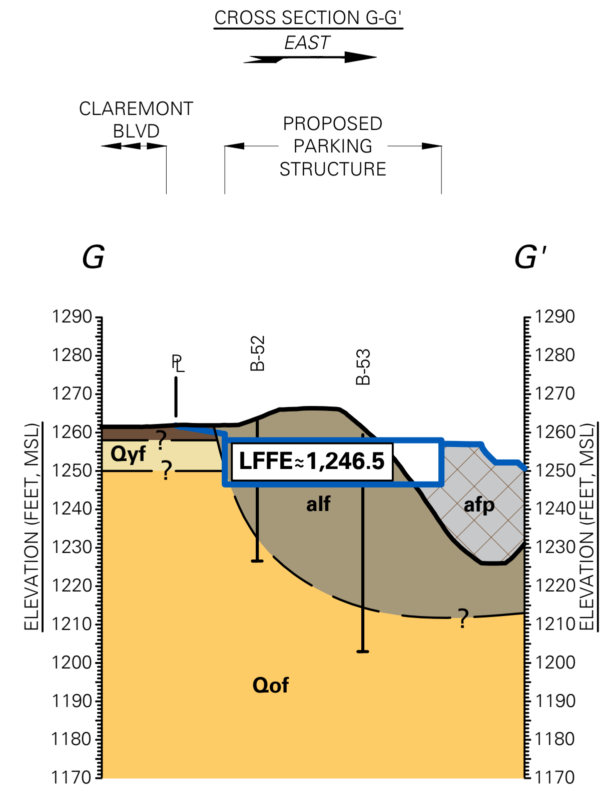
Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 12:10 User: crangel Style Table: Langan.stb Layout: FIG 5F S2 XSF



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LEGEND:

- PROPOSED GROUND SURFACE
- EXISTING GROUND SURFACE
- APPROXIMATE GEOLOGIC CONTACT
- PROPOSED FILL (afp)
- ARTIFICIAL FILL (af)
- UNDOCUMENTED INERT DEBRIS (alf)
- **YOUNG ALLUVIAL FAN DEPOSITS (Qyf)** PREDOMINATELY COARSE GRAINED MATERIAL
- **OLDER ALLUVIAL FAN DEPOSITS (Qof)** PREDOMINATELY COARSE GRAINED MATERIAL
- LFFE≈1,244.5 FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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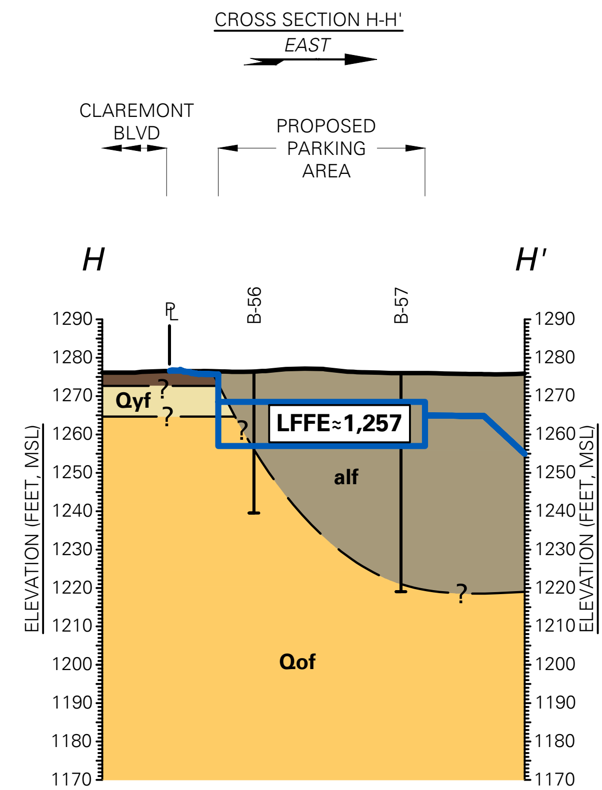
Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 12:10 User: crangel Style Table: Langan.stb Layout: FIG 5G S2 XSG



LEGEND:

PROPOSED GROUND SURFACE

EXISTING GROUND SURFACE

APPROXIMATE GEOLOGIC CONTACT

PROPOSED FILL (afp)

ARTIFICIAL FILL (af)

UNDOCUMENTED INERT DEBRIS (alf)

YOUNG ALLUVIAL FAN DEPOSITS (Qyf)
PREDOMINATELY COARSE GRAINED MATERIAL

OLDER ALLUVIAL FAN DEPOSITS (Qof)
PREDOMINATELY COARSE GRAINED MATERIAL

LFFE≈1,255 LOWEST FINISHED FLOOR ELEVATION (FEET, NAVD88)

NOTES:

1. CROSS SECTION DISPLAYS GENERALIZED SUBSURFACE CONDITIONS; FOR A DETAILED DESCRIPTION OF CONDITIONS ENCOUNTERED REFER TO BORING AND TEST PIT LOGS.
2. GROUND SURFACE ELEVATIONS REFERENCED FROM AERIAL TOPOGRAPHIC SURVEY FROM CONCEPTUAL GRADING PLANS PROVIDED BY ATLAS CIVIL DESIGN.
3. REFER TO SITE PLAN FOR LOCATION OF CROSS SECTION.

100 50 0 100
SCALE IN FEET (HORIZONTAL)

50 25 0 50
SCALE IN FEET (VERTICAL)

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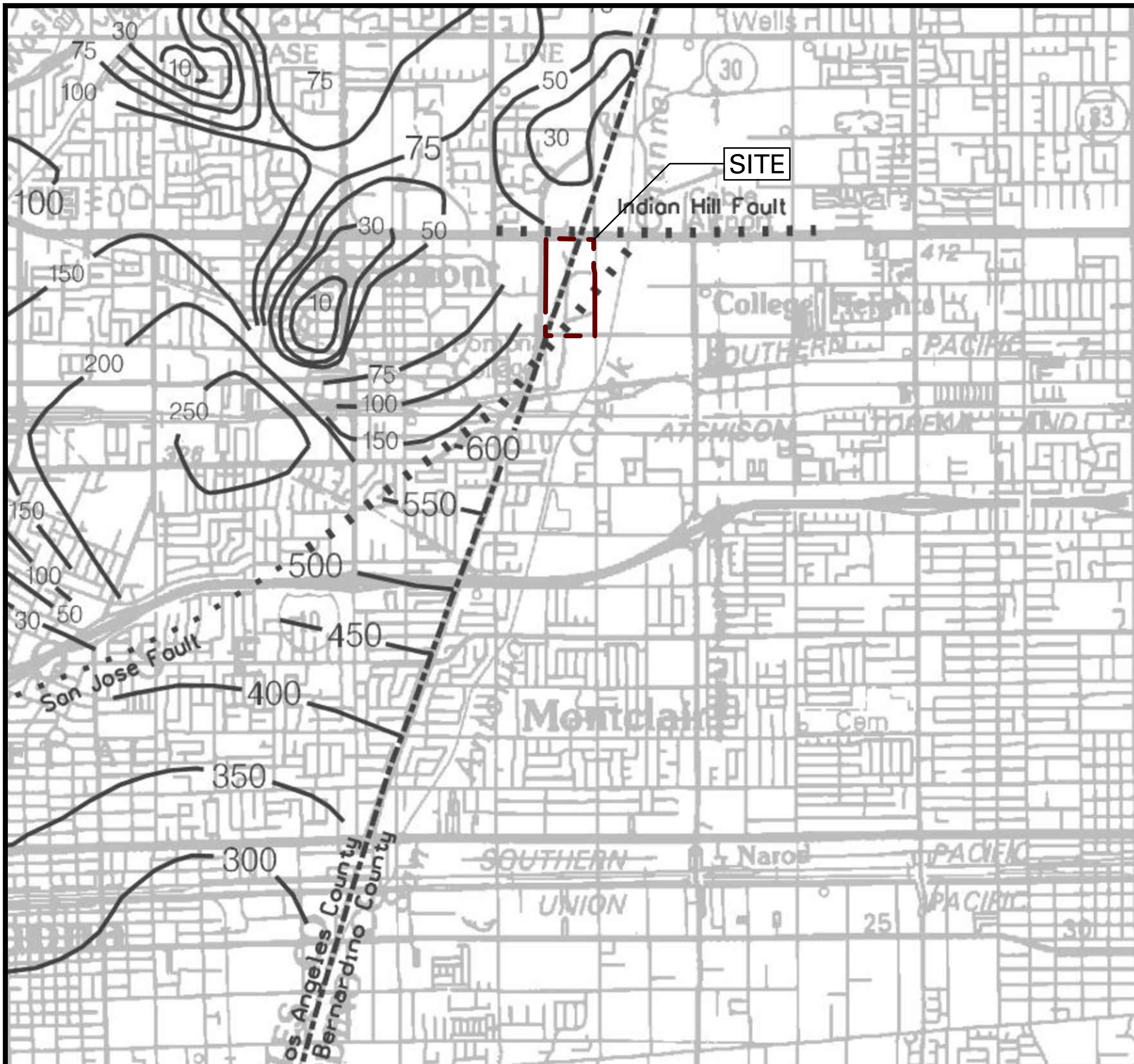
Project
PROPOSED ROBERTS CAMPUS SPORTS BOWL
CLAREMONT MCKENNA COLLEGE
LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA

Figure Title
SCENARIO 2 & 2B CROSS SECTION H-H'

Project No. 700114101
Date JANUARY 2024
Scale AS SHOWN
Drawn By CR
Figure No. **5H**

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\700114101 - SITE PLAN AND CROSS SECTIONS.dwg Date: 1/12/2024 Time: 12:11 User: crangel Style Table: Langan.stb Layout: FIG 5H S2 XSH



LEGEND:

SITE LIMITS

BOREHOLE SITE

30 DEPTH TO GROUNDWATER (IN FEET)

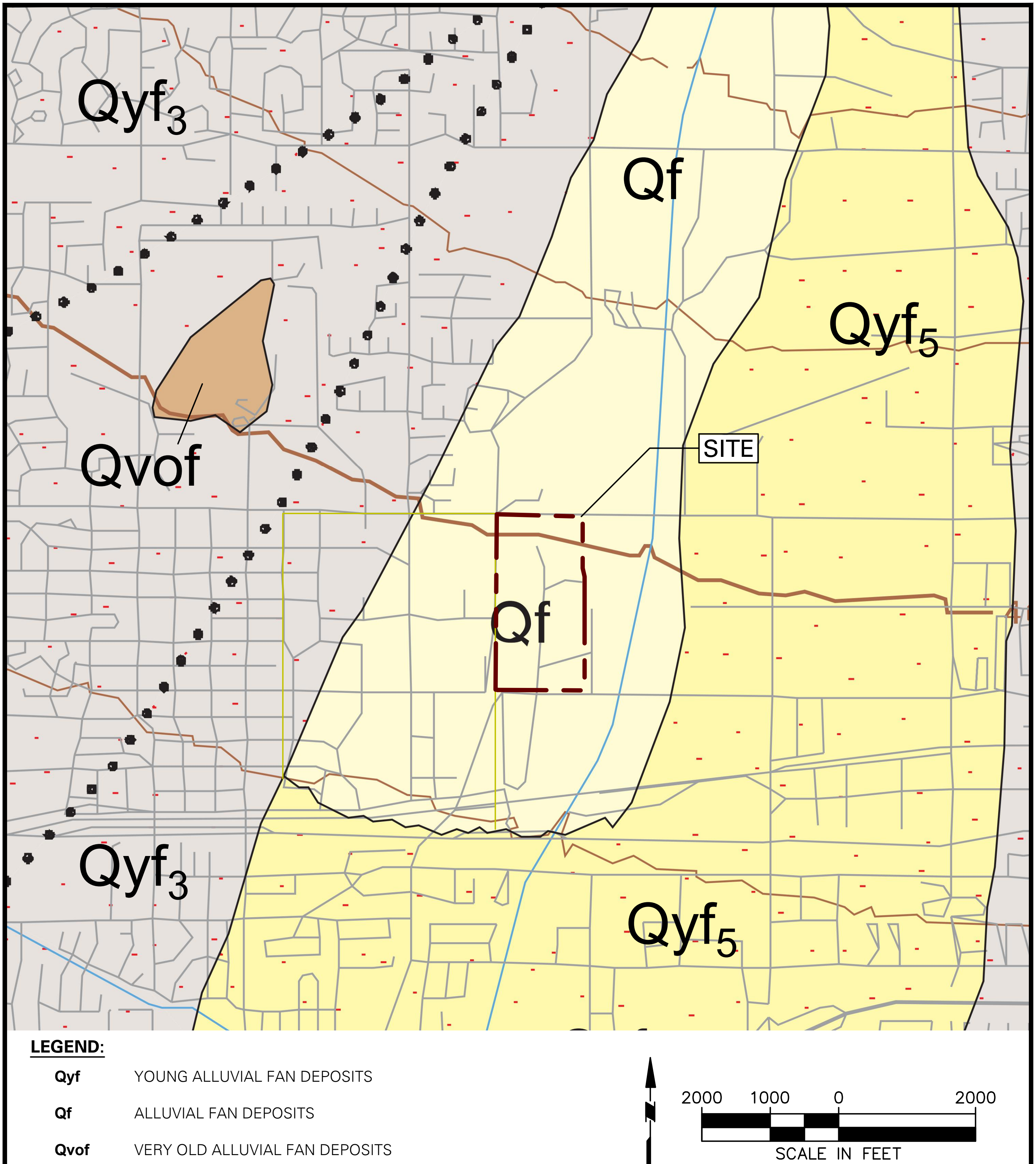
4000 2000 0 4000

SCALE IN FEET

REFERENCE: SEISMIC HAZARD ZONE REPORT OF THE ONTARIO 7.5-MINUTE QUADRANGLE, CALIFORNIA (2000)

LANGAN	Project	Figure Title	Project No.	Figure No.
Langan Engineering & Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T:949.561.9200 F: 949.561.9201 www.langan.com	**PROPOSED ROBERTS CAMPUS SPORTS BOWL** CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY CALIFORNIA	**HISTORICAL HIGH GROUND WATER MAP**	700114101 Date: JANUARY 2024 Scale: AS SHOWN Drawn By: EB	**6**

Filename: \\langan.com\data\IRV\Data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\GEOTECHNICAL FIGURES.dwg Date: 7/8/2022 Time: 15:48 User: ebalassa Style Table: Langan.stb Layout: HHGWL



LEGEND:

Qyf YOUNG ALLUVIAL FAN DEPOSITS

Qf ALLUVIAL FAN DEPOSITS

Qvof VERY OLD ALLUVIAL FAN DEPOSITS

REFERENCE: USGS GEOLOGIC MAP OF THE SAN BERNARDINO AND SANTA ANA 30' x 60' QUADRANGLES, CALIFORNIA (MORTON AND MILLER, 2006).

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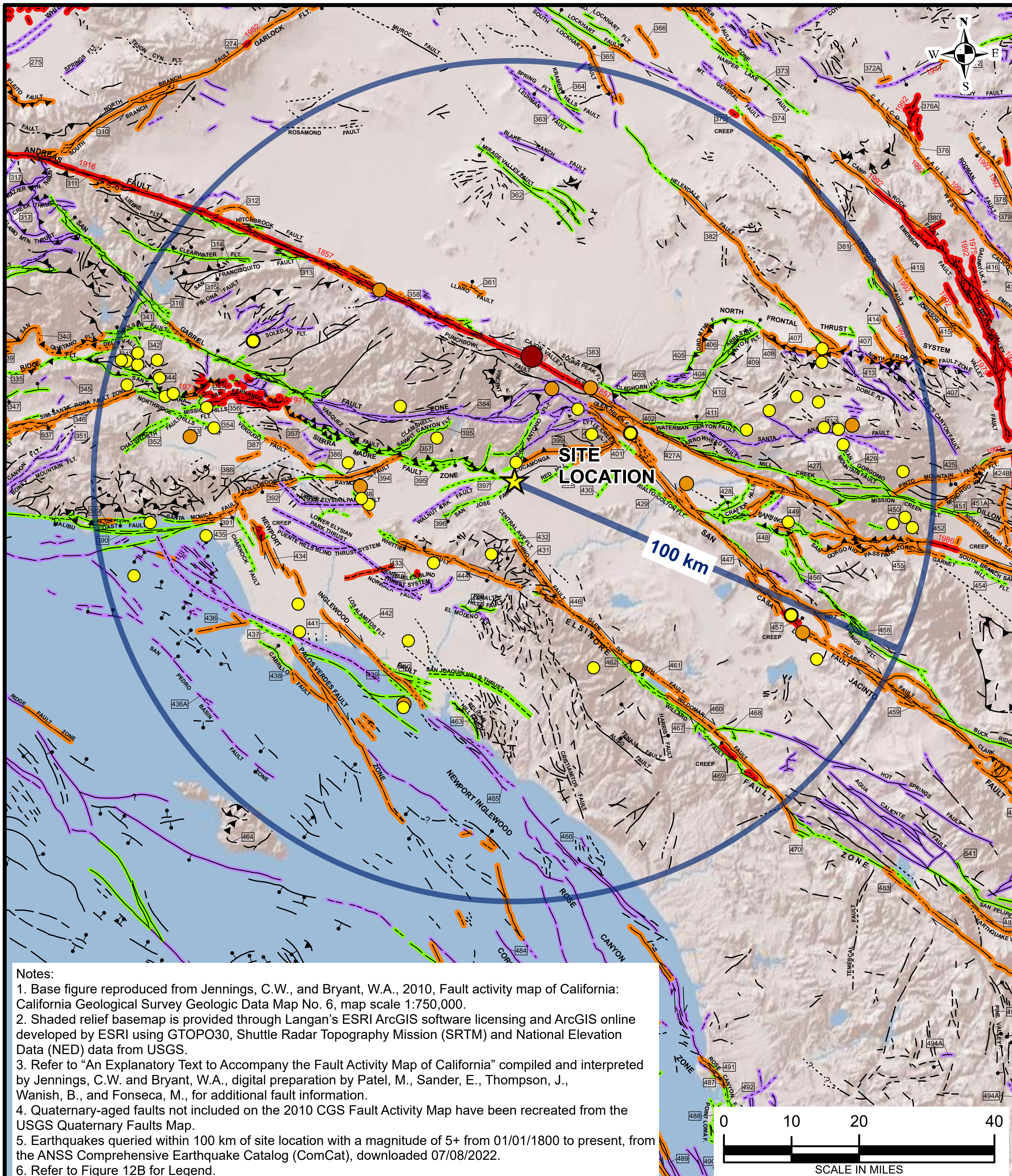

Notes:
1. Base figure reproduced from Jennings, C.W., and Bryant, W.A., 2010, Fault activity map of California: California Geological Survey Geologic Data Map No. 6, map scale 1:750,000.
2. Shaded relief basemap is provided through Langan's ESRI ArcGIS software licensing and ArcGIS online developed by ESRI using GTOPO30, Shuttle Radar Topography Mission (SRTM) and National Elevation Data (NED) data from USGS.
3. Refer to "An Explanatory Text to Accompany the Fault Activity Map of California" compiled and interpreted by Jennings, C.W. and Bryant, W.A., digital preparation by Patel, M., Sander, E., Thompson, J., Wanish, B., and Fonseca, M., for additional fault information.
4. Quaternary-aged faults not included on the 2010 CGS Fault Activity Map have been recreated from the USGS Quaternary Faults Map.
5. Earthquakes queried within 100 km of site location with a magnitude of 5+ from 01/01/1800 to present, from the ANSS Comprehensive Earthquake Catalog (ComCat), downloaded 07/08/2022.
6. Refer to Figure 12B for Legend.

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Project	Figure Title	Project No.	Figure
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY CALIFORNIA	MAP OF MAJOR FAULTS AND EARTHQUAKE EPICENTERS	700114101 Date: JANUARY 2024 Scale: 1 inch = 20 miles Drawn By: TO	8A

LEGEND:

Site Location

Fault Age

Historic

Holocene

Late Quaternary

Early Quaternary

Pre-Quaternary Fault

100 km Search Radius

Earthquake Epicenter

Magnitude 5.0 to 5.9

Magnitude 6.0 to 6.9

Magnitude 7.0 to 7.4

Magnitude 7.5 to 8.0

Fault Symbols

Bar and ball on downthrown side (relative or apparent).

Relative or apparent direction of lateral movement.

Direction of dip.

Low angle fault (barbs on upper plate). Fault surface generally dips less than 45° but locally may have been subsequently steepened.

491 Numbers refer to annotations listed in the appendices of the accompanying report.

Structural discontinuity (offshore) separating differing Neogene structural domains.

Brawley Seismic Zone.

Fault Classification

Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following:
(a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks.
(b) fault creep slippage - slow ground displacement usually without accompanying earthquakes.
(c) displaced survey lines.

1906 1906 A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.

1906 Date bracketed by triangles indicates local fault break.

1906 No triangle by date indicates an intermediate point along fault break.

CREEP Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.

1906 1906 Square on fault indicates where fault creep slippage has occurred that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).

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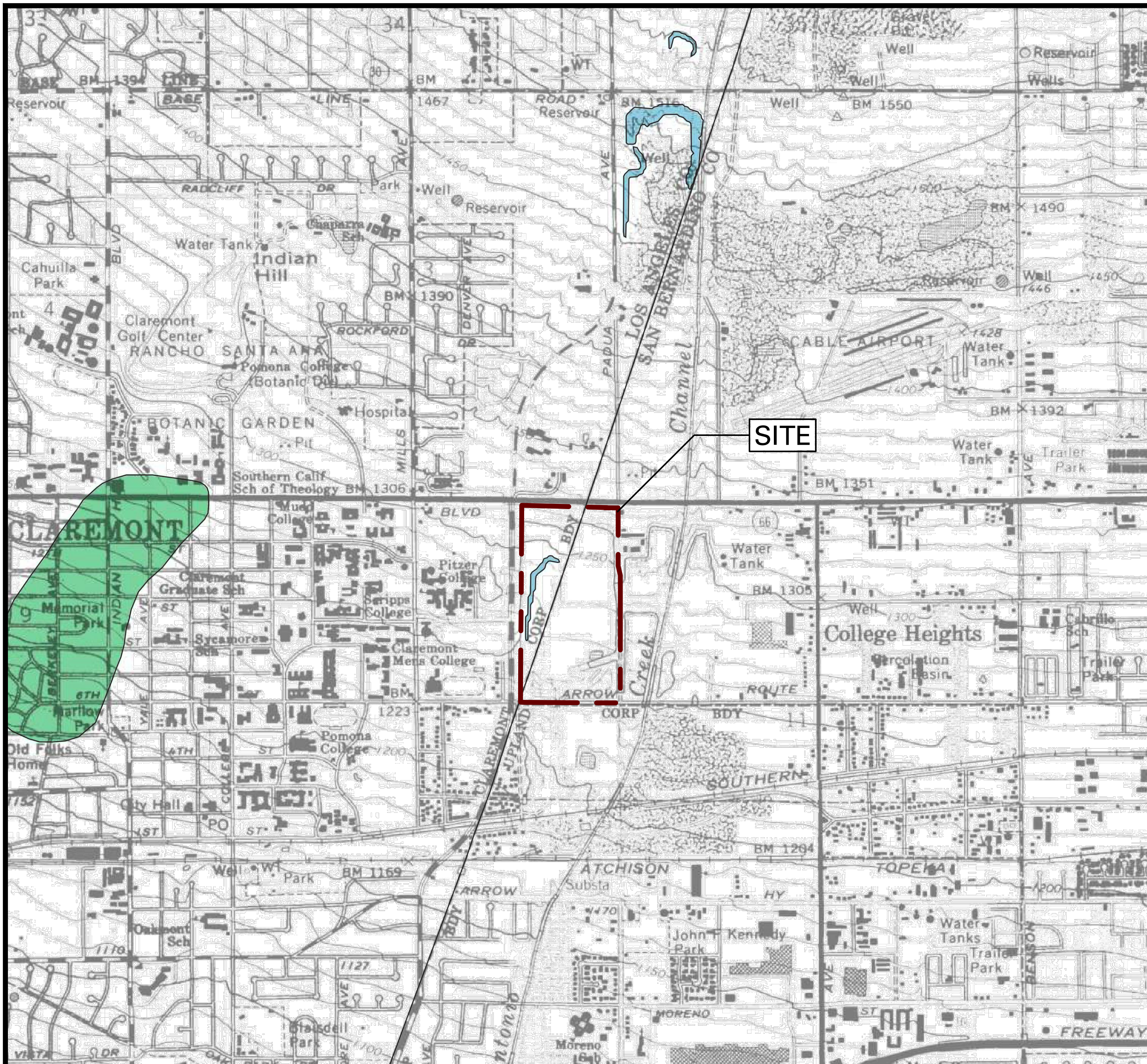
Project	Figure Title	Project No.	Figure
PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY CALIFORNIA	MAP OF MAJOR FAULTS AND EARTHQUAKE EPICENTERS	700114101 Date: JANUARY 2024 Scale: NOT TO SCALE Drawn By: TO	8B



LEGEND:

Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

2000 1000 0 2000

SCALE IN FEET

REFERENCE: CGS EARTHQUAKE ZONES OF REQUIRED INVESTIGATION FOR THE ONTARIO, CALIFORNIA 7.5-MINUTE QUADRANGLE (2000).

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Project

PROPOSED ROBERTS CAMPUS SPORTS BOWL

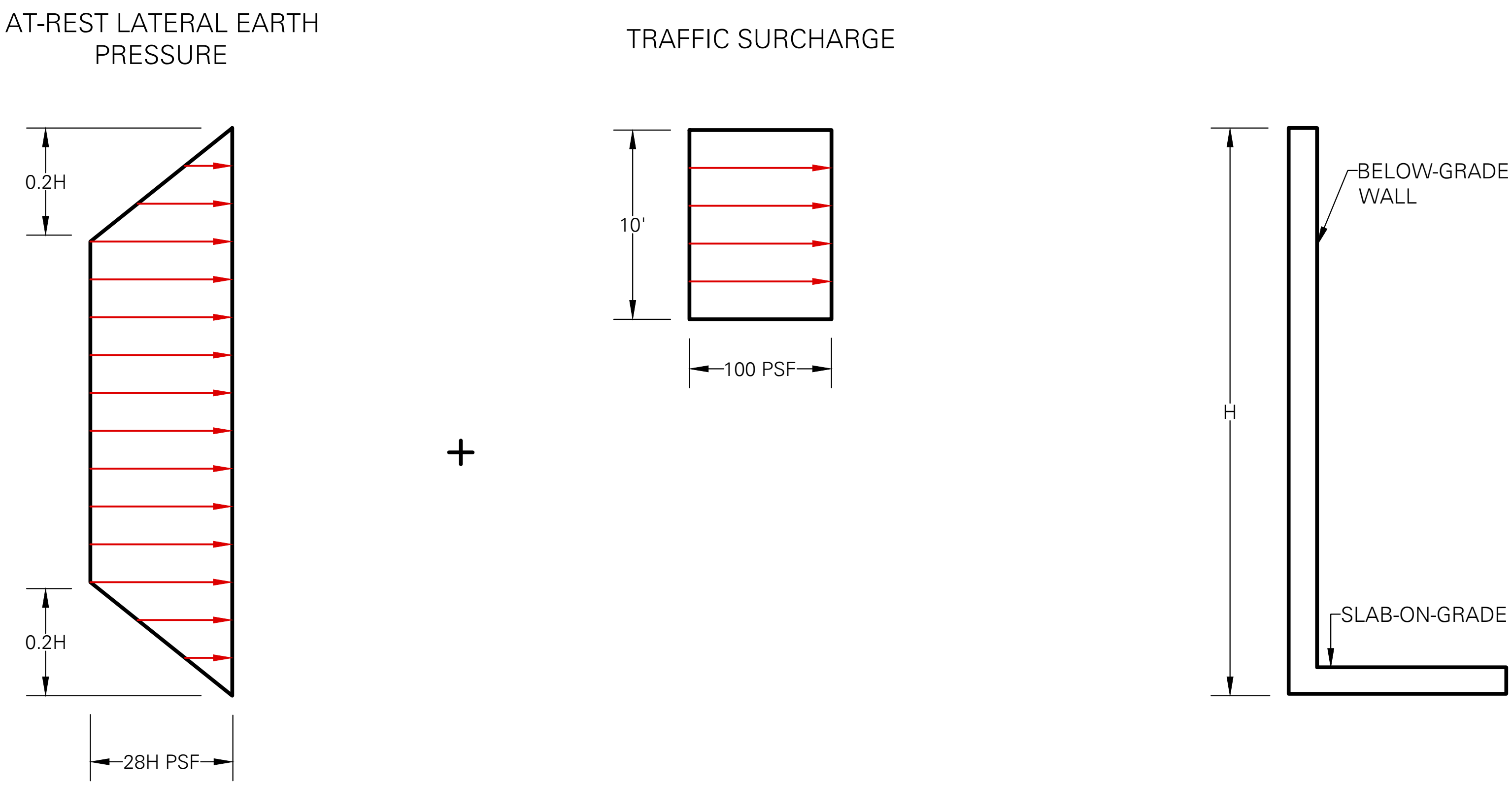
CLAREMONT MCKENNA COLLEGE

LOS ANGELES COUNTY CALIFORNIA

Figure Title

SEISMIC HAZARD ZONES MAP

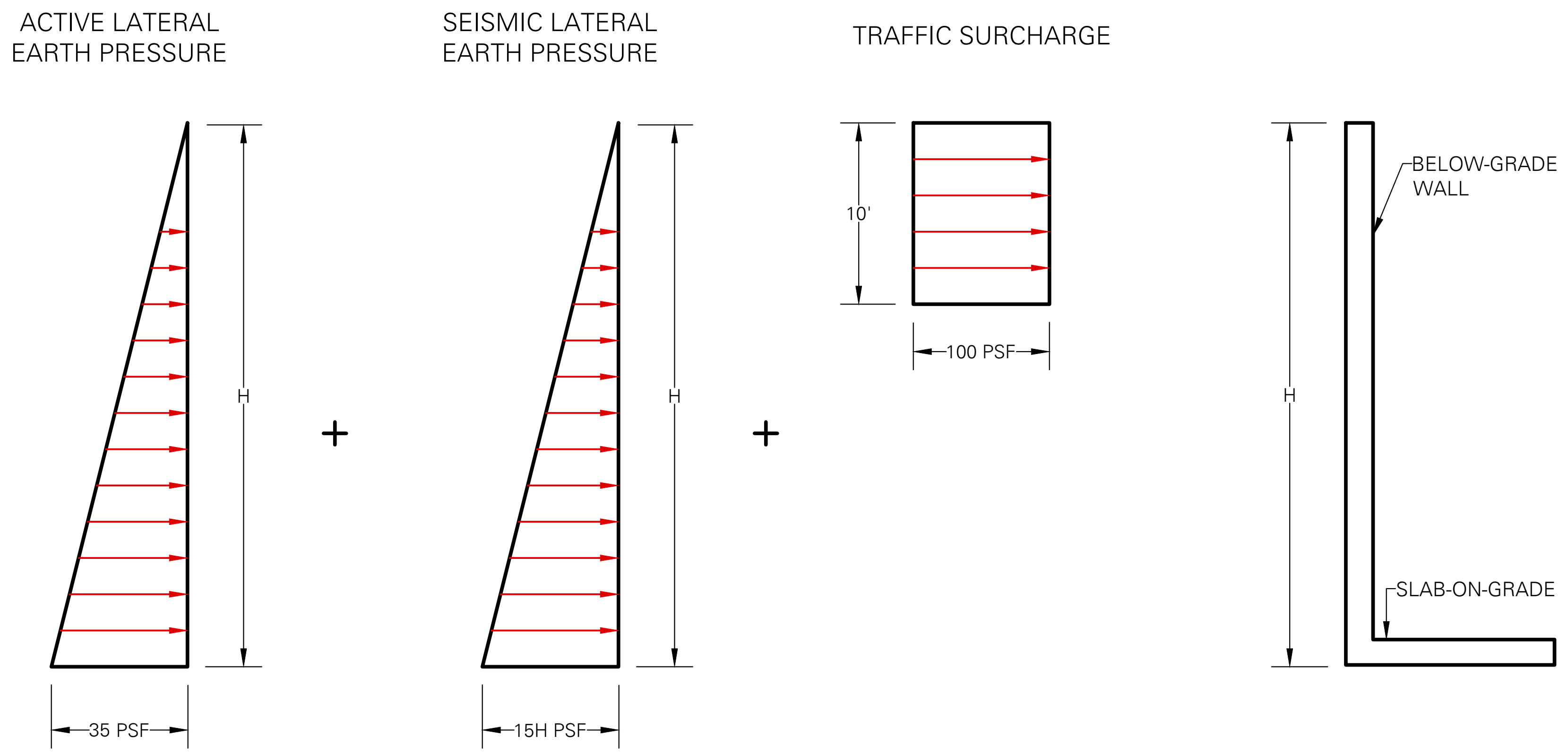
Project No.	700114101
Date	JANUARY 2024
Scale	AS SHOWN
Drawn By	EB
Figure No.	9



NOT TO SCALE

LANGAN	Project	Figure Title	Project No.	Figure No.
Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	PROPOSED ROBERTS CAMPUS SPORTS BOWL CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	AT-REST LATERAL EARTH PRESSURE	700114101 Date: JANUARY 2024 Scale: N.T.S. Drawn By: CR	10

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\- LATERAL EARTH PRESSURES\LATERAL EARTH PRESSURE.dwg Date: 1/20/2023 Time: 18:02 User: crangel Style Table: Langan.stb Layout: 01



NOT TO SCALE

LANGAN	Project	Figure Title	Project No.	Figure No.
Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	**PROPOSED ROBERTS CAMPUS SPORTS BOWL** CLAREMONT MCKENNA COLLEGE LOS ANGELES COUNTY & SAN BERNARDINO COUNTY CALIFORNIA	**DYNAMIC LATERAL EARTH PRESSURE**	700114101 Date: JANUARY 2024 Scale: N.T.S. Drawn By: CR	**11**

Filename: \\langan.com\data\IRV\data1\700114101\Project Data_Discipline\Geotechnical\CAD\01\2D-DesignFiles\- LATERAL EARTH PRESSURES\LATERAL EARTH PRESSURE.dwg Date: 1/20/2023 Time: 18:02 User: crangel Style Table: Langan.stb Layout: 02

APPENDIX A
Current Field Explorations and Laboratory Testing

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Log of Boring **B-14** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1245 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/10/2022	Date Finished: 10/10/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig		Completion Depth: 17 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 4; Undisturbed 1; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeff	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0		0						
+1244.8	Dirt lot, minor vegetation, very cobbly.							
	Artificial Fill - Compacted (afc) Silty SAND with Gravel (SM), light brown, hard, dry.							
		3	S-1	SPT	3	15, 50/6"	50/6"	Cobble in sampler shoe; Heavy auger chatter.
		5	S-2	CR	0	50/5"	50/5"	
+1237.5	Gravelly Silty SAND (SM), brown, hard, dry, fine to coarse sand, medium gravel.	7.5						
		8	S-3	SPT	10	36, 50/6"	50/6"	
+1235.0	SAND with Silt and Gravel (SP-SM), brown, hard, slightly moist, fine to coarse sand and gravel.	10	S-4	SPT	5	20, 50/4"	50/4"	
		13						Refusal. Boring was moved 5 feet and redrilled.
+1230.0	Gravelly SAND (SW), brown, hard, moist, fine to coarse sand, fine to medium gravel.	15	S-5	SPT	5	50/5"	50/5"	Cobble in sampler shoe.
+1228.0	Total depth = 17 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	17						

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Log of Boring **B-15** Sheet 1 of 1

Field	Value	Field	Value
Project	Proposed Athletic Complex	Project No.	700114101
Location	Claremont Mckenna College	Elevation and Datum	Approx. 1245 (feet, MSL)
Drilling Company	2R Drilling	Date Started / Date Finished	10/10/2022 / 10/10/2022
Drilling Equipment	CME-75 Track-mounted Drill Rig	Completion Depth / Rock Depth	14 ft / -
Size and Type of Bit	8-inch O.D. Hollow Stem Auger	Number of Samples	Disturbed 3; Undisturbed 1; Core -
Casing Diameter (in) / Casing Depth (ft)	- / -	Water Level (ft.)	First -; Completion -; 24 HR. -
Casing Hammer / Weight (lbs) / Drop (in)	- / - / -	Drilling Foreman	Jeff
Sampler	2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer	A. Nieblas
Sampler Hammer / Weight (lbs) / Drop (in)	Automatic / 140 / 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0 / +1244.8	Dirt lot, some vegetation, abundant gravel and cobbles.	0						
	Artificial Fill - Compacted (afc) Silty SAND with Gravel (SM), light brown, very dense, dry.	1						Heavy auger chatter.
		3	S-1	SPT	6	50/6"	50/6"	Refusal. Boring was moved 5 feet and redrilled.
+1240.0	Silty SAND with Gravel (SM) to Sandy SILT with Gravel (ML), light brown, hard to very dense, dry.	5	S-2	CR	3	50/5"	50/5"	Sample disturbed. WC = 0.9%
+1237.5	Silty SAND with Gravel (SM), brown, very dense, slightly moist, medium sand, fine to medium gravel.	8	S-3	SPT	18	22 34 45	79	
+1235.0	Silty SAND (SM), light brown, very dense.	10	S-4	SPT	2	50/5"	50/5"	
		12						Very heavy auger chatter.
+1231.0	Total depth = 14 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	14						

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Log of Boring **B-16** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1245 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/10/2022 / Date Finished: 10/10/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig	Completion Depth: 16 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 3 / Undisturbed 2 / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First - / Completion - / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Jeff
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	Field Engineer: A. Nieblas

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0		0						
+1244.8	Dirt lot, occasional vegetation, abundant cobbles and gravel.							
	Artificial Fill - Compacted (afc) Silty SAND (SM), light brown, dry.	1						Heavy auger chatter.
		2–3	S-1	CR	0	50/4"	50/4"	No sample recovery; Cobble in sampler shoe.
+1240.0	Silty SAND with Gravel and Cobbles (SM), light brown, very dense, dry to slightly moist.	5–6	S-2	SPT	8	40 32 37	69	
	Light brown and gray, dry.	7–8	S-3	CR	3	50/5"	50/5"	Sample disturbed. WC = 3.9%
	Increase in silt content.	10–11	S-4	SPT	10	25 28 50/2"	50/2"	
		13						Refusal. Boring was moved 5 feet and redrilled.
+1230.0	Gravelly Silty SAND (SM), brown, very dense, moist, well graded.	15–16	S-5	SPT	13	35 35 50/1"	50/1"	Very difficult to drill; Broken cobbles in sampler.
+1229.0	Total depth = 16 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	16–20						

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Log of Boring **B-17** Sheet 1 of 3

Project: Proposed Athletic Complex	Project No.: 700114101		
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1245 (feet, MSL)		
Drilling Company: 2R Drilling	Date Started: 10/10/2022	Date Finished: 10/10/2022	
Drilling Equipment: CME-75 Track-mounted Drill Rig	Completion Depth: 51.5 ft	Rock Depth: -	
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples	Disturbed: 11	Undisturbed: 1 / Core: -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.)	First: -	Completion: - / 24 HR.: -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Jeff		
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas		
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0		0						
+1244.8	Dirt lot, minor vegetation, abundant cobbles and gravel.							
	Artificial Fill (af) Silty SAND with Gravel (SM), light brown, very dense, dry.	1						
		2.5	S-1	SPT	1	50/3"	50/3"	
	Brown, slightly moist, fine to coarse sand, fine to medium gravel.	5	S-2	SPT	10	27, 50/5"	50/5"	
		7.5	S-3	SPT	10	30, 50/4"	50/4"	
+1235.0	Silty SAND (SM) to SAND with Silt (SP-SM), brown, very dense, slightly moist.	10	S-4	SPT	6	50/6"	50/6"	
+1230.0	Silty SAND with Gravel (SM), brown, very dense, moist.	15	S-5	SPT	15	15, 33, 50/5"	50/5"	
+1225.0		20						

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Log of Boring **B-17** Sheet 2 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1245 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1225.0	Gravelly Silty SAND (SM), brown to gray brown, very dense, slightly moist.	20	S-6	SPT	6	50/6"	50/6"	
		21						
		22						
		23						
		24						
+1220.0	Silty SAND with Gravel (SM), some cobbles.	25	S-7	SPT	1	50/2"	50/2"	Silt and cobble fragments in sampler.
		26						
		27						
		28						
		29						
	Brown, very dense, slightly moist to moist.	30	S-8	SPT	5	50/5.5"	50/5.5"	
		31						
		32						
		33						
		34						
+1210.0	SAND with Silt (SP-SM), brown, hard, moist, fine sand.	35	S-9	SPT	11	27 50/5"	50/5"	
		36						
		37						
		38						
		39						
+1205.0	SAND with Silt and Gravel (SP-SM), brown, very dense, moist, fine sand, angular gravel.	40	S-10	SPT	6	50/6"	50/6"	
		41						
		42						
		43						
		44						
+1200.0		45						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1245 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1200.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel and Cobbles (SM), reddish brown, very dense, moist, fine to coarse sand, angular gravel.	45–46.5	S-11	SPT	18	23 / 26 / 27	53	
		48						Auger chatter.
+1195.0	Silty SAND with Gravel (SM), reddish brown, very dense, moist, fine gravel, manganese oxide staining.	50–51.5	S-12	CR	18	24 / 28 / 35	63	WC = 11.0% DD = 119.0 pcf
+1193.5	Total depth = 51.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	51.5						

Depth scale: 45 – 70

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Log of Boring **B-20** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1188 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 11.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Adrian	
Sampler: Bulk, 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1188.0		0						
+1187.8	Dirt lot, minor vegetation, abundant cobbles and gravel.							
	Undocumented Surficial Fill (asf) SAND with Silt and Gravel (SP-SM), brown, slightly moist, medium dense, fine to coarse sand, fine to medium gravel.	1						Bulk sample collected from 1 to 5 feet bgs. Heavy auger chatter. Chemical Test.
		3	S-1	SPT	10	5 / 5 / 5	10	
	Some gravel.	5	S-2	CR	3	11 / 9 / 6	15	WC = 5.0% DD = 102.0 pcf
+1180.5	**Old Alluviual Fan Deposits (Qof)** SAND with Silt and Gravel (SP-SM), orangish brown, medium dense, slightly moist, medium sand, fine subrounded gravel.	7.5	S-3	SPT	10	7 / 8 / 8	16	
	Moist.	10	S-4	CR	18	7 / 13 / 23	36	WC = 2.9% DD = 110.7 pcf Consolidation Test. Direct Shear Test.
+1176.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-21**

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1232 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/18/2022 / Date Finished: 10/18/2022
Drilling Equipment: ODEX Truck-mounted Drill Rig	Completion Depth: 54 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 8 / Undisturbed 5 / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First - / Completion - / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Juan
Sampler: Bulk, 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1232.0	**Undocumented Artificial Fill (afu)** Silty SAND (SM), grayish brown, dry.	0						
+1229.5	Silty SAND (SM), brown, dense, dry to slightly moist, scattered gravel and cobbles.	2.5	S-1	CR	18	13 32 37	69	Sampler bouncing on cobble. WC = 4.8% DD = 115.4 pcf Direct Shear Test.
	Dry.	5	S-2	SPT	15	14 23 24	47	
+1224.5	SAND with Silt and Gravel (SP-SM), brown, very dense, dry to slightly moist.	7.5	S-3	CR	3	42 50/3"	50/3"	Sample disturbed. WC = 4.1% Sampler bouncing on cobble.
+1222.0	Gravelly Silty SAND (SM), brown, very dense, slightly moist, fine to medium sand and gravel.	10	S-4	SPT	15	17 27 34	61	Bulk sample collected from 10-15 feet bgs. Chemical Test.
		15	S-5	CR	0	50/1"	50/1"	No sample recovery.
		20						

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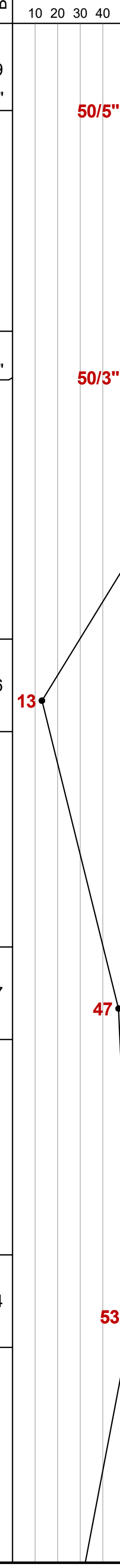
Log of Boring **B-21** Sheet 2 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1232 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1212.0	Gravelly Silty SAND (SM), brown, very dense, dry to slightly moist, fine to medium sand and gravel.	20	S-6	SPT	17	12 / 29 / 50/5"	50/5"	Sampler bouncing on cobble.
+1207.0	Silty SAND with Gravel (SM), dark brown, very dense, slightly moist, fine to medium sand and gravel, some brick clasts.	25	S-7	CR	9	23 / 50/3"	50/3"	WC = 3.4% DD = 117.9 pcf
+1202.0	SAND with Silt and Gravel (SP-SM), brown, medium dense, slightly moist, some asphalt clasts.	30	S-8	SPT	15	5 / 6 / 7	13	
+1197.0	Silty SAND (SM), organish brown, medium dense, slighty moist, fine to medium sand and gravel, some asphalt and concrete clasts.	35	S-9	CR	18	16 / 27 / 20	47	
	Very dense.	40	S-10	SPT	18	15 / 44 / 9	53	Added drilling fluid (H2O). WC = 5.3% DD = 106.3 pcf
+1187.0		45						



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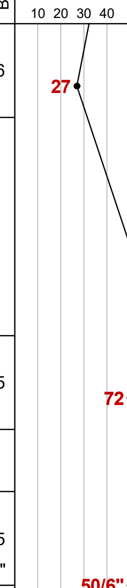
Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1232 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1187.0	Gravelly Silty SAND (SM), brown, medium dense, moist, with concrete clast.	45	S-11	SPT	6	6 / 6 / 21	27	Refusal at 45 feet. Boring was moved 10 feet and redrilled.
+1182.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), orangish brown, very dense, slightly moist to moist, fine gravel, manganese oxide staining, some clay rinds around gravel	50	S-12	SPT	6	16 / 35 / 37	72	
		53	S-13	SPT	10	25 / 45 / 50/6"	50/6"	
+1178.0	Total depth = 54.0 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings. Drilling fluids (H2O) added at 40 feet.	54						

Depth scale: 45 – 70



Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1234 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/19/2022	Date Finished: 10/19/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 55.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 9; Undisturbed 1; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod			
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30	Field Engineer: N. Ghanta	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1234.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), dark grayish brown, dry, cobble clasts.	0						
+1224.0	Silty SAND with Gravel (SM), dark brown, dense, slightly moist, some concrete fragments.	10	S-1	SPT	12	19 / 23 / 22	45	

Depth Scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1234 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1214.0	Silty SAND with Gravel (SM), dark brown, dense, slightly moist, crushed cobbles, some clay.	20	S-2	SPT	18	11 / 13 / 18	31	
+1209.0	SAND with Clay and Gravel (SP-SC), dark brown, very dense, slightly moist, crushed cobbles.	25	S-3	SPT	8	24 / 50/2"	50/2"	
		27						Heavy auger chatter; Possible cobbles encountered; Slow drilling.
	Medium dense.	30	S-4	SPT	3	21 / 12 / 18	30	Sampler bouncing on cobbles. Gravel stuck in sampler shoe. Poor sample recovery.
+1199.0	Clayey SAND with Gravel (SC), dark brown, medium dense, slightly moist, some asphalt clasts and crushed cobbles.	35	S-5	SPT	10	5 / 5 / 6	11	
+1194.0	SAND with Clay and Gravel (SP-SC), grayish brown, dense, dry, some concrete and brick clasts, some crushed cobbles.	40	S-6	SPT	12	22 / 17 / 25	42	
+1189.0		45						

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Log of Boring **B-22** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1234 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
1189.0	Clayey SAND with Gravel (SC), dark brown, medium dense, slightly moist.	45	S-7	SPT	0	20 / 8 / 8	16	No sample recovery.
1188.0	**Old Alluviual Fan Deposits (Qof)** Clayey SAND with Gravel (SC), brown to orangish brown, very dense, slightly moist to moist, fine to medium gravel, manganese oxide staining, weathered gravel clasts.	46	S-8	SPT	8	9 / 7 / 10	17	
		50	S-9	SPT	13	9 / 10 / 14	24	
		55	S-10	CR	6	50/6"	50/6"	WC = 10.9% DD = 122.5 pcf
1178.5	Total depth = 55.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	55.5						

Depth scale: 45 – 70 ft

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Log of Boring **B-23** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1190 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 11.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Adrian	
Sampler: Bulk, 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1190.0		0						
+1189.8	Dirt lot, minor vegetation, abundant cobbles.							
	Undocumented Surficial Fill (asf) SAND with Some Gravel (SP), orangish brown, very dense, dry to slightly moist, fine gravel.	1–3	S-1	CR	4	15, 50/4"	50/4"	WC = 3.6%; DD = 109.2 pcf; Consolidation Test.
+1185.5	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Some Gravel (SM), orangish brown, very dense, slightly moist.	5–6	S-2	SPT	18	32, 37, 44	81	Bulk sample collected from 5 to 10 feet bgs. Chemical Test.
	Manganese oxide staining.	8	S-3	CR	3	50/6"	50/6"	Sample disturbed. WC = 3.9%
		10–11	S-4	SPT	18	20, 26, 29	55	WC = 2.9%; DD = 109.2 pcf; Consolidation Test.
+1178.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	12–20						

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Log of Boring **B-24** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1230 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/19/2022	Date Finished: 10/19/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 56 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 8; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): -	Drop (in): -	Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic Weight (lbs): 140	Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1230.0	**Undocumented Artificial Fill (afu)** Silty to Clayey SAND with Gravel (SC-SM), dark brown, dry, cobble clasts.	0						
+1220.0	Silty SAND (SM), brown, loose, dry, fine to medium sand and gravel.	10	S-1	SPT	6	3 / 2 / 3	5	Sampler bouncing on cobbles; slow drilling.
		20						

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1230 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1210.0	Silty SAND with Gravel and Cobble clasts (SM), brown, dry.	20	~~S-2~~	~~SPT~~	~~3~~	~~50/2.5"~~	50/2.5"	Sampler bouncing on cobbles; slow drilling. No sample recovery. Very little soil in cuttings, nested cobbles.
+1200.0	Silty SAND with Gravel (SM), dark brown, dense, moist, some brick and cobble clasts.	30	S-3	SPT	18	21 18 21	39	
+1195.0	Silty Clayey SAND (SC-SM), dark brown, medium dense, moist, some gravel and cobbles.	35	S-4	SPT	15	10 12 8	20	
+1190.0	Clayey SAND with Gravel (SC), dark brown, medium dense, moist, some gravel and cobbles, occasional brick clasts.	40	S-5	SPT	12	10 13 9	22	

Depth Scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

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Log of Boring **B-24** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1230 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks
+1185.0	Clayey SAND with Gravel (SC), dark brown, very loose, moist.	45	S-6	SPT	3	8 / 1 / 3	4	Sampler hit nested rock; less sampler recovery.
+1180.0	**Old Alluviual Fan Deposits (Qof)** Clayey SAND with Gravel (SC), brown to orangish brown, medium dense, slightly moist.	50	S-7	SPT	3	11 / 11 / 11	22	Cobble stuck in sampler shoe; less sample recovery.
	Very dense, fine to coarse gravel.	55	S-8	SPT	12	39 / 50/6"	50/6"	
+1174.0	Total depth = 56 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	56						

Depth scale: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

N-Value axis: 10 20 30 40

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Log of Boring **B-25** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1200 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/20/2022 — Date Finished: 10/20/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig	Completion Depth: 16.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples — Disturbed: 4 — Undisturbed: 1 — Core: -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.) — First: - — Completion: - — 24 HR.: -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Jeff
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: N. Ghanta
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1200.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry, cobble clasts.	0						
+1197.5	Silty SAND with Gravel (SM), brown to orangish brown, medium dense, dry, fine to medium sand.	2.5–4	S-1	SPT	8	5, 8, 5	13	Abundant gravel and cobble clasts in auger cuttings.
	Brown to dark brown, slightly moist, fine to coarse gravel.	5–6.5	S-2	CR	10	6, 11, 12	23	Sample disturbed. WC = 3.4%
	Very dense, slightly moist.	7.5–8						
+1192.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), brown, very dense, dry to slightly moist, manganese oxide staining, fine to coarse gravel.	7.5–9	S-3	SPT	12	14, 30, 28	58	
	Brown to orangish brown.	10–11.5	S-4	SPT	18	21, 35, 45	80	
	Fine sand.	15–16.5	S-5	SPT	18	16, 18, 15	33	
+1183.5	Total depth = 16.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	16.5–20						

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Log of Boring **B-26** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1233 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/19/2022	Date Finished: 10/19/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 40.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 5; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1233.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry, cobble clasts.	0						
	Loose, cobble and gravel clasts.	5	S-1	SPT	6	4 / 3 / 3	6	
	Brown to orange brown.	10						
+1218.0	Gravelly SAND (SP), brown, loose, dry.	15	S-2	SPT	2	3 / 3 / 2	5	Sampler bouncing on cobbles. Poor recovery. Abundant gravel and cobble clasts in auger cuttings.
		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1233 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1213.0	Gravelly SAND (SP), brown, loose, dry.	20						Abundant gravel and cobble clasts in auger cuttings.
1208.0	Clayey SAND with Gravel (SC), brown, very dense, dry, with cobble and rock clasts.	25	S-3	SPT	2	50/2"	50/2"	Sampler bouncing on cobbles. Poor recovery.
		30	S-4	SPT	3.5	50/3.5"	50/3.5"	Heavy auger chatter; slow drilling.
1198.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), brown to orange brown, very dense, slightly moist, manganese oxide staining, fine to coarse gravel.	35	S-5	SPT	4	50/4"	50/4"	
		40	S-6	SPT	5	50/5"	50/5"	
1192.5	Total depth = 40.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	45						

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Log of Boring **B-27** Sheet 1 of 2

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1241 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/20/2022 / Date Finished: 10/20/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig	Completion Depth: 41 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 6 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First - / Completion - / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Jeff
Sampler: 2-inch O.D. SPT Split-Barrel	
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	Field Engineer: N. Ghanta

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1241.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry, fine to coarse sand and gravel, some cobble clasts.	0						
		8						Heavy auger chatter; slow drilling.
	Very dense.	10–11.5	S-1	SPT	12	14 / 38 / 44	82	
+1221.0		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1241 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1221.0	SAND with Silt and Gravel (SP-SM), dark brown, loose, moist, fine to medium sand, fine to coarse gravel.	20–21	S-2	SPT	12	5 / 5 / 4	9	
	Medium dense, cobble clasts.	25–26	S-3	SPT	6	4 / 10 / 20	30	
+1211.0	**Old Alluviual Fan Deposits (Qof)** Gravelly SAND with Silt (SP-SM), brown to orange brown, very dense, slightly moist, cobble clasts.	30–31	S-4	SPT	18	40 / 40 / 42	82	
		35–36	S-5	SPT	11	40 / 50/5"	50/5"	
		40–41	S-6	SPT	12	28 / 50/6"	50/6"	
+1200.0	Total depth = 41 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	41–45						

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Log of Boring **B-28** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1230 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/11/2022 — Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig	Completion Depth: 11.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 — Undisturbed 2 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First - — Completion - — 24 HR. -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Adrian
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	Field Engineer: A. Nieblas

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1230.0		0						
+1229.8	Dirt lot, scattered vegetation, abundant cobbles.							
	Undocumented Artificial Fill (afu) Silty SAND with Gravel (SM), grayish brown, dense, slightly moist.	1–2						
+1227.5	Gravelly SAND with Silt (SP-SM), grayish brown, dense, moist.	3	S-1	SPT	10	36 / 18 / 22	40	Refusal. Boring was moved and redrilled.
		5–6	S-2	CR	18	16 / 20 / 26	46	WC = 5.4% DD = 119.3 pcf Direct Shear Test.
+1224.0	**Old Alluviual Fan Deposits (Qof)** SAND with Clay (SP-SC), dark reddish brown, dense, moist.	6						
+1223.0	Clayey SAND with Gravel (SC), dark reddish brown, medium dense, moist, fine gravel.	7–8	S-3	SPT	18	5 / 6 / 8	14	
+1220.5	Silty SAND (SM), dark reddish brown and brown, dense, moist.	10–11	S-4	CR	18	16 / 20 / 20	40	WC = 3.9% DD = 97.5 pcf % Passing #200 = 18 Consolidation Test. Direct Shear Test.
+1218.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	12–20						

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Log of Boring **B-29** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1235 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/19/2022	Date Finished: 10/19/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 30.3 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 1; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): - Drop (in): -		Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod			
Sampler Hammer: Automatic Weight (lbs): 140 Drop (in): 30		Field Engineer: N. Ghanta	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1235.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), dark brown, dry, some cobble clasts.	0						
+1225.0	Clayey SAND with Gravel (SC), dark brown, loose, slightly moist, some cobble clasts.	10	S-1	SPT	12	3 / 3 / 3	6	
+1215.0		20						

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1235 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1215.0	**Old Alluviual Fan Deposits (Qof)** Clayey SAND with Gravel (SC), brown to orange brown, dense, slightly moist, manganese oxide staining, fine gravel.	20	S-2	SPT	10	7 / 13 / 10	23	
			25	S-3	SPT	18	26 / 20 / 20	40	
	+1205.0		30	S-4	CR	3	50/3"	50/3"	WC = 3.5% DD = 110.6 pcf Consolidation Test.
	+1204.8	Silty SAND with Gravel (SM), orange brown, very dense, slightly moist, manganese oxide staining, fine gravel.							
		Total depth = 30.25 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.							

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1240 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/20/2022	Date Finished: 10/20/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig		Completion Depth: 35.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 6; Undisturbed 0; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeff	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1240.0	**Undocumented Artificial Fill (afu)** Gravelly Silty SAND (SM), brown.	0						
		3						Heavy auger chatter; possible cobble/bouldes.
	Gravelly Silty SAND (SM), orangish brown, medium dense, dry, fine to coarse sand and gravel, some cobble clasts.	10–11.5	S-1	SPT	6	9, 7, 7	14	
	Moist.	15–16.5	S-2	SPT	8	15, 10, 10	20	
+1220.0		20						

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Log of Boring **B-30** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1240 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1220.0	Silty SAND (SM), brown to dark brown, medium dense, moist, cobble clasts.	20–21	S-3	SPT	10	10, 9, 6	15	
+1215.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), orangish brown, very dense, dry to slightly moist, fine to coarse sand and gravel.	25–26	S-4	SPT	12	8, 10, 12	22	
		30–30.8	S-5	SPT	10	35, 50/4"	50/4"	
		35–35.5	S-6	SPT	5	50/5"	50/5"	
+1204.5	Total depth = 35.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	35.5						

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Log of Boring **B-31** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1234 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 11.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - ; Weight (lbs): -	Drop (in): -	Drilling Foreman: Adrian	
Sampler: Bulk, 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic; Weight (lbs): 140	Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1234.0		0						
+1233.8	Dirt lot, scattered cobbles and gravel.							
1233.0	Coarse gravel.							
	Undocumented Artificial Fill (afu) Silty SAND and Gravel (SM), light brown, very dense, dry.	1						Bulk sample collected from 1 to 5 feet bgs.
		3	S-1	CR	0	26 50/6"	50/6"	No sample recovery.
+1229.0	SAND with Silt and Gravel (SW-SM), light orangish brown, very dense, dry, fine gravel.	5	S-2	SPT	18	16 25 27	52	
+1226.5	**Old Alluvial Fan Deposits (Qof)** SAND with Silt and Gravel (SP-SM), orangish brown, very dense, slightly moist, manganese oxide staining.	7.5	S-3	CR	4	50/4"	50/4"	Poor sample recovery. WC = 5.1% DD = 102.1 pcf Heavy auger chatter.
+1224.0	SAND with Gravel (SP), orangish brown, very dense, slightly moist.	10	S-4	SPT	18	21 23 39	62	
+1222.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-32** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1228 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/11/2022 — Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig	Completion Depth: 11.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples — Disturbed: 3 — Undisturbed: 1 — Core: -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.) — First: - — Completion: - — 24 HR.: -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Adrian
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1228.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry.	0						
+1225.5	**Old Alluviual Fan Deposits (Qof)** Clayey SAND with Gravel (SC), orangish brown, medium dense, moist, fine gravel, manganese oxide staining.	2.5	S-1	SPT	18	7 9 11	20	
+1223.0	Silty SAND (SM) to Clayey SAND (SC) with Gravel, orangish brown mottled, very dense, moist, manganese oxide staining.	5	S-2	CR	11	30 50/5"	50/5"	WC = 4.7% DD = 128.6 pcf Consolidation Test.
	SAND with Gravel (SP), orangish brown, very dense, slightly moist, fine gravel.	7.5	S-3	SPT	12	17 50/6"	50/6"	
		10	S-4	SPT	18	26 40 50	90	
+1216.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-33** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1240 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/11/2022 — Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig	Completion Depth: 16.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 3 — Undisturbed 2 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First - — Completion - — 24 HR. -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Adrian
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	Field Engineer: A. Nieblas

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1240.0	Abundant cobbles.	0						
+1239.0	**Undocumented Artificial Fill (afu)** Silty SAND (SM), light brown, dense, dry, scattered gravel.	1						Heavy auger chatter.
		3	S-1	SPT	15	12 / 14 / 16	30	
+1235.0	**Old Alluvial Fan Deposits (Qof)** SAND with Silt and Gravel (SP-SM), light reddish brown, dense, dry to slightly moist.	5	S-2	CR	18	12 / 20 / 37	57	WC = 2.8% DD = 113.2 pcf Consolidation Test. Direct Shear Test.
		7						Refusal due to cobble layer. Boring moved and redrilled.
		8	S-3	SPT	12	21 / 50/6"	50/6"	
	Very dense, slightly moist, manganese oxide staining, fine to medium gravel.	10	S-4	CR	1.33	27 / 39 / 50/4"	50/4"	WC = 2.9% DD = 128.6 pcf
+1225.0	Silty SAND (SM), dark reddish brown, medium dense, moist, manganese oxide staining, fine sand and gravel.	15	S-5	SPT	18	7 / 7 / 9	16	% Passing #200 = 32
+1223.5	Total depth = 16.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	16.5						

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Log of Boring **B-34** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1239 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/18/2022	Date Finished: 10/18/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 26.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 1; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): - Drop (in): -		Drilling Foreman: Juan	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic Weight (lbs): 140 Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1239.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry, cobble clasts.	0						
+1229.0	Silty SAND with Gravel (SM), brown, dry, medium dense.	10	S-1	SPT	10	8, 7, 6	13	
	Abundant cobbles.	15	S-2	CR	0	19, 17, 15	32	No sample recovery; Cobbles in sampler.
+1219.0		20						

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Log of Boring **B-34** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1239 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1219.0	**Old Alluviual Fan Deposits (Qof)** SAND with Silt and Gravel (SP-SM), brown, loose, slightly moist.	20–21.5	S-3	SPT	18	5 / 5 / 3	8	
	Orangish brown, dry to slightly moist.	25–26.5	S-4	SPT	18	29 / 37 / 42	79	
+1212.5	Total depth = 26.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	26.5						

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Log of Boring **B-35** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1245 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 11.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 2; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): -	Drop (in): -	Drilling Foreman: Adrian	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod			
Sampler Hammer: Automatic Weight (lbs): 140	Drop (in): 30	Field Engineer: A. Nieblas	

Elev. (ft)	Sample Description	Depth Scale (ft)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry.	0						
+1242.5	**Old Alluvial Fan Deposits (Qof)** SAND with Silt and Gravel (SP-SM), dark orangish brown, medium dense, slightly moist.	2.5	S-1	SPT	10	4, 5, 21	26	
+1240.0	Silty SAND with Gravel (SM), dark orangish brown, very dense, moist, manganese oxide staining, fine to medium gravel.	5	S-2	CR	2	31, 50/3"	50/3"	Very poor sample recovery. WC = 2.8%
+1237.5	SAND with Gravel (SP), orangish brown, very dense, dry to slightly moist.	7.5	S-3	SPT	10	27, 50/6"	50/6"	
+1235.0	SAND (SP) and Silty SAND (SM) with Gravel, orangish brown, dense, slightly moist to moist.	10	S-4	CR	18	30, 23, 23	46	WC = 8.2% DD = 108.0 pcf
+1233.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-36** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1245 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/18/2022	Date Finished: 10/18/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 21.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 4; Undisturbed 0; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): - Drop (in): -		Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic Weight (lbs): 140 Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1245.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry, cobbles.	0						
+1235.0	SAND with Silt (SP-SM), brown, loose, slightly moist, gravel & small cobble in sampler shoe.	10	S-1	SPT	6	5 / 4 / 4	8	
		15	S-2	SPT	0	5 / 2 / 2	4	No sample recovery; sampler bouncing on cobble/boulder. Heavy auger chatter; slow drilling.
	SAND with Silt and Gravel (SP-SM), brown, dry to slightly moist.	16.5	S-3	SPT	0	3 / 8 / 12	20	
+1225.0		20						

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Log of Boring **B-36** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1245 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
1225.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), orangish brown, dense, slightly moist, manganese oxide staining, fine gravel.	20	S-4	SPT	12	13 / 18 / 31	49	
1223.5	Total depth = 21.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	21.5						Refusal at 21.5 feet.

Depth scale: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

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Log of Boring **B-37** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1240 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 11.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 2; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): -	Drop (in): -	Drilling Foreman: Adrian	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic Weight (lbs): 140	Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1240.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown, dry.	0						
+1237.5	**Old Alluvial Fan Deposits (Qof)** Silty SAND with Gravel (SM), orangish brown, very dense, slightly moist.	2.5	S-1	CR	6	50/6"	50/6"	WC = 4.4% DD = 119.7 pcf
	Dry to slightly moist, manganese oxide staining, fine gravel.	5	S-2	SPT	18	11 31 39	70	
	Very silty, moist, scattered gravel.	7.5	S-3	CR	9	24 50/3"	50/3"	WC = 3.5% DD = 123.7 pcf Consolidation Test. Direct Shear Test.
	Dense.	10	S-4	SPT	12	22 22 18	40	
+1228.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-38** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1255 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/20/2022 — Date Finished: 10/20/2022
Drilling Equipment: CME-75 Track-mounted Drill Rig	Completion Depth: 13.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 5 — Undisturbed 1 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First - — Completion - — 24 HR. -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Jeff
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: N. Ghanta
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1255.0		0						
+1254.9	Scattered asphalt and vegitation on surface.							
	Undocumented Artificial Fill (afu) Silty SAND with Gravel (SM), light brown, dry.	1						
	Dense, dry, occasional brick clast, some asphalt.	3	S-1	SPT	8	14 / 12 / 24	36	
	Very dense, crushed cobbles.	5	S-2	SPT	8	9 / 50/4"	50/4"	
		8	S-3	CR	0	27 / 24 / 28	52	No sample recovery.
+1246.5	Gravelly SAND with Silt (SP-SM), dark brown, very dense, dry, some rock and cobble clasts.	9	S-4	SPT	6	27 / 50/4"	50/4"	Sampler bouncing on cobble; slow drilling.
+1245.0	Gravelly Silty SAND (SM), brown, very dense, dry, cobble and rock clasts.	10	S-5	SPT	6	25 / 50/6"	50/6"	Sampler bouncing on cobble; slow drilling.
+1242.5	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), orangish brown, very dense, dry to slightly moist, fine to coarse gravel, manganese oxide staining.	13	S-6	SPT	6	40 / 50/5"	50/5"	
+1241.5	Total depth = 13.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	14–20						

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Log of Boring **B-39** Sheet 1 of 2

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1262 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/18/2022 / Date Finished: 10/18/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig	Completion Depth: 31.5 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 6 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First - / Completion - / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Juan
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	Field Engineer: A. Nieblas

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1262.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel and Cobbles (SM), brown, scattered vegetation.	0						
+1252.0	SAND with Silt and Gravel (SP-SM), grayish brown, medium dense, slightly moist.	10	S-1A/B	SPT	9	10 / 9 / 17	26	
+1250.5	Silty SAND (SM), orangish brown, medium dense, moist.	11.5						
+1247.0	Silty SAND with Gravel (SM), orangish brown, dense, moist.	15	S-2	SPT	10	13 / 15 / 15	30	Chemical odor.

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Log of Boring **B-39** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1262 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1242.0	Silty SAND with Gravel (SM), orangish brown, very dense, slightly moist, some clay and gravel clasts.	20	S-3	SPT	10	30 / 19 / 50/1"	50/1"	
		23						Heavy auger chatter - very cobbly.
		25	S-4	CR	0	50/1"	50/1"	No sample recovery; sampler bouncing on cobble.
		27	S-5	SPT	0	50/1"	50/1"	No sample recovery; sampler bouncing on cobble.
+1232.0	**Old Alluviual Fan Deposits (Qof)** SAND with Silt (SP-SM), orangish brown, very dense, slightly moist, manganese oxide staining, gravel clasts.	30	S-6	SPT	10	21 / 29 / 38	67	
+1230.5	Total depth = 31.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	31.5						

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Log of Boring **B-40** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1250 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/11/2022	Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig		Completion Depth: 16.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -; Weight (lbs): -; Drop (in): -		Drilling Foreman: Adrian	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic; Weight (lbs): 140; Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale
1250.0	**Undocumented Artificial Fill (afu)** Silty SAND (SM), grayish brown, dry, fine to medium sand, occasional fine gravel.	0
	Medium dense.	3
1245.0	**Old Alluviual Fan Deposits (Qof)** Silty SAND with Gravel (SM), dark reddish brown, dense, moist, fine to medium gravel.	5
	Medium dense.	8
1240.0	Sandy SILT (ML), reddish brown, very stiff, moist, scattered gravel.	10
1235.0	SAND with Silt (SP-SM), dark reddish brown, dense, slightly moist, fine to coarse sand, some gravel.	15
1233.5	Total depth = 16.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	16.5

Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
S-1	SPT	18	6 / 7 / 7	14	
S-2	CR	18	25 / 29 / 24	53	WC = 10.0% DD = 127.9 pcf
S-3	SPT	18	4 / 6 / 8	14	% Passing #200 = 41
S-4	CR	18	15 / 18 / 25	43	WC = 10.7% DD = 123.4 pcf Consolidation Test. Direct Shear Test.
S-5	SPT	18	8 / 12 / 28	40	

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Log of Boring B-41 Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1252 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/11/2022 — Date Finished: 10/11/2022
Drilling Equipment: SIMCO Truck-mounted Drill Rig	Completion Depth: 11.5 ft — Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 — Undisturbed 2 — Core -
Casing Diameter (in): - — Casing Depth (ft): -	Water Level (ft.): First - — Completion - — 24 HR. -
Casing Hammer: - — Weight (lbs): - — Drop (in): -	Drilling Foreman: Adrian
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	Field Engineer: A. Nieblas
Sampler Hammer: Automatic — Weight (lbs): 140 — Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1252.0		0						
+1251.8	Dirt lot, minor vegetation, scattered cobbles.							
	Undocumented Artificial Fill (afu) Silty SAND with Gravel (SM), grayish brown, slightly moist.	1						
	Loose.	3	S-1	CR	18	6 / 7 / 6	13	WC = 2.3% DD = 114.7 pcf Direct Shear Test.
+1247.0	SAND with Silt and Gravel (SP-SM), grayish brown, dense, dry to slightly moist.	5	S-2	SPT	12	4 / 18 / 27	45	
+1244.5	**Old Alluviual Fan Deposits (Qof)** Silty SAND (SM), orangish brown, very dense, slightly moist, manganese oxide staining, occasional fine gravel.	7.5	S-3	CR	16	15 / 27 / 50/4"	50/4"	WC = 3.7% DD = 119.1 pcf
	Slightly moist to moist.	10	S-4	SPT	18	20 / 24 / 30	54	
+1240.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-42** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1253 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/18/2022 ; Date Finished: 10/18/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig	Completion Depth: 11.5 ft ; Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 ; Undisturbed 2 ; Core -
Casing Diameter (in): - ; Casing Depth (ft): -	Water Level (ft.): First - ; Completion - ; 24 HR. -
Casing Hammer: - ; Weight (lbs): - ; Drop (in): -	Drilling Foreman: Jeorge
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod	
Sampler Hammer: Automatic ; Weight (lbs): 140 ; Drop (in): 30	Field Engineer: A. Nieblas

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1253.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), brown.	0						
+1250.5	Silty SAND with Gravel (SM), grayish brown to orangish brown, dense, slightly moist.	2.5	S-1	SPT	6	4 / 14 / 28	42	
	Brown, very dense, dry, concrete clasts.	5	S-2	CR	5	50/5"	50/5"	WC = 3.3% DD = 117.2 pcf
+1245.5	**Old Alluviual Fan Deposits (Qof)** Silty SAND (SM), orangish brown, medium dense, moist.	7.5	S-3	SPT	18	7 / 7 / 9	16	
	Dense.	10	S-4	CR	18	10 / 15 / 17	32	WC = 14.5% DD = 120.2 pcf % Passing #200 = 44
+1241.5	Total depth = 11.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	11.5						

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Log of Boring **B-43** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1292 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 52 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 10; Undisturbed 0; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Nick	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1292.0	**Undocumented Inert Debris Fill(alf)** Silty SAND with Gravel & Cobbles (SM), brown, dry.	0						Heavy auger chatter; slow drilling.
+1287.0	Gravelly Silty SAND (SM), brown, dense, slightly moist.	5	S-1	SPT	4	12 / 16 / 14	30	Rock fragments stuck in sampler shoe; poor sample recovery.
		10	S-2	SPT	6	12 / 8 / 8	16	No sample recovery.
		15	S-3	SPT	0	8 / 7 / 5	12	No sample recovery.
+1272.0		20						

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Log of Boring **B-43** Sheet 2 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1292 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1272.0	Gravelly Silty SAND (SM), brown, medium dense, slightly moist to moist.	20	S-4	SPT	6	5 / 5 / 9	14	Poor sample recovery; Cobble stuck in sampler shoe.
+1267.0	Silty SAND with Gravel (SM), brown, medium dense, moist, some asphalt, manganese oxide staining, gravel.	25	S-5	SPT	6	10 / 19 / 9	28	
	Brown to orangish brown, fine gravel, glass and asphalt fragments.	30	S-6	SPT	12	7 / 9 / 10	19	
		35	S-7	SPT	0	50/2"	50/2"	No sample recovery. Sampler bouncing on cobble.
+1252.0	Silty SAND with asphalt (SM), dark brown, medium dense, moist.	40	S-8	SPT	10	5 / 5 / 11	16	
		43						Cobble; slow drilling.
+1247.0		45						

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Log of Boring **B-43** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1292 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1247.0	Silty SAND with asphalt (SM), dark brown to orangish brown, medium dense, moist, asphalt and fabric debris, some oxidized metal.	45	S-9	SPT	10	50/5"	50/5"	
			50	S-10	SPT	3	50/5"	50/5"	No sample recovery. Refusal on cobble/boulder.
	+1240.0	Total depth = 52.0 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	52						

Depth scale: 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

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Log of Boring **B-44** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1289 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 51 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 5; Undisturbed 1; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): -	Drop (in): -	Drilling Foreman: Nick	
Sampler: 2-inch O.D. SPT Split-Barrel			
Sampler Hammer: Automatic Weight (lbs): 140	Drop (in): 30	Field Engineer: A. Nieblas	

Material Symbol	Elev. (ft) +1289.0	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Undocumented Inert Debris Fill(alf) Silty SAND with Gravel and Cobbles (SM), brown, scattered vegetation at surface.	0						
			1						Chemical Test.
		Loose, moist, some asphalt and brick.	10	S-1	SPT	15	5 / 4 / 3	7	
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1289 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1269.0	Silty SAND with Gravel (SM), brown, dense, slightly moist, some asphalt clasts.	20	S-2	SPT	10	22 / 24 / 19	43	
	Brown, medium dense, dry to slightly moist, abundant gravel, concrete clasts.	30	S-3	SPT	10	37 / 10 / 11	21	
		37						Heavy auger chatter; slow drilling.
+1251.0	**Old Alluvial Fan Deposits (Qof)** SAND with Silt & Gravel (SP-SM), brown to orangish brown, slightly moist.	38						
	Very dense, weathered fine gravel.	40	S-4	SPT	18	15 / 50/6"	50/6"	
		45						

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1289 (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1244.0	SAND with Silt & Gravel (SP-SM), orangish brown, very dense, slightly moist, weathered gravel clasts.	45	S-5	SPT	18	12 / 33 / 50/6"	50/6"	
	+1239.0	Silty SAND with Gravel (SM), orangish brown, very dense, moist.	50	S-6	CR	10	12 / 50/4"	50/4"	WC = 7.2% DD = 115.6 pcf
	+1238.0	Total depth = 51.0 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	51						

Depth scale: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70

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Log of Boring **B-45** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1287 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 46 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 6; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: - Weight (lbs): - Drop (in): -		Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic Weight (lbs): 140 Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1287.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel (SM), dark brown, rock and cobble clasts, scattered vegetation at surface.	0						
		6						Heavy auger chatter on cobbles.
	Dense, slightly moist, fine to coarse gravel, crushed cobble.	10–11.5	S-1	SPT	18	5 / 17 / 17	34	Heavy auger chatter on cobbles.
		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1287 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1267.0	Brown to dark brown, very dense, dry to slightly moist, brick clasts.	20	S-2	SPT	6	50/6"	50/6"	Sampler bouncing on cobbles. Heavy auger chatter on cobbles.
	Dark brown, loose, moist, asphalt and crushed cobbles.	30	S-3	SPT	5	22, 3, 6	9	
+1252.0	Gravelly SAND with Silt (SP-SM), blackish brown, dense, moist, fine to coarse gravel and cobble clasts, asphalt and concrete fragments.	35	S-4	SPT	5	8, 20, 16	36	
+1247.0	**Young Alluvial Fan Deposits (Qya)** Silty SAND (SM), brown to orangish brown, dense, slightly moist, manganese oxide staining, gravel.	40	S-5	SPT	18	22, 24, 36	60	% Passing #200 = 30
		45						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1287 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1242.0	Silty SAND (SM), brown to orangish brown, very dense, slightly moist, fine to coarse sand and gravel, manganese oxide staining.	45	S-6	SPT	12	40 50/6"	50/6"	
	+1241.0	Total depth = 46.0 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	46						

Depth scale: 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

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Log of Boring **B-46** Sheet 1 of 3

Project: Proposed Athletic Complex			Project No.: 700114101		
Location: Claremont Mckenna College			Elevation and Datum: Approx. 1292 (feet, MSL)		
Drilling Company: 2R Drilling			Date Started: 10/21/2022	Date Finished: 10/21/2022	
Drilling Equipment: CME-75 Truck-mounted Drill Rig			Completion Depth: 45.5 ft	Rock Depth: -	
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger			Number of Samples	Disturbed: 6	Undisturbed: - / Core: -
Casing Diameter (in): -	Casing Depth (ft): -		Water Level (ft.)	First: -	Completion: - / 24 HR.: -
Casing Hammer: -	Weight (lbs): -	Drop (in): -	Drilling Foreman: Jeorge		
Sampler: 2-inch O.D. SPT Split-Barrel					
Sampler Hammer: Automatic	Weight (lbs): 140	Drop (in): 30	Field Engineer: N. Ghanta		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1292.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel (SM), dark brown, rock and cobble clasts, scattered vegetation at surface.	0						
		2						Heavy auger chatter on cobbles.
+1282.0	Silty SAND with Gravel (SM), grayish brown, very dense, dry, concrete clasts.	10	S-1	SPT	5	19 50/2"	50/2"	Sampler bouncing on cobble.
+1272.0		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1292 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1272.0	Clayey SAND with Gravel (SC), dark brown, loose, slightly moist, rock and cobble clasts, trace asphalt fragments.	20	S-2	SPT	8	9 / 5 / 4	9	
+1262.0	Silty SAND with Gravel (SM), black and dark brown, very dense, slightly moist, asphalt, fine to coarse gravel.	30	S-3	SPT	6	14 / 50/3"	50/3"	
		35	S-4	SPT	3	10 / 24 / 6	30	Cobble stuck in sampler shoe; poor recovery.
+1252.0	**<u>Old Alluviual Fan Deposits (Qof)</u>** Silty Clayey SAND with Gravel (SC-SM), brown to orangish brown, medium dense, slightly moist, fine to coarse sand.	40	S-5	SPT	18	13 / 10 / 16	26	
+1247.0		45						

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Log of Boring B-46 Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1292 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1247.0		45						
	+1246.5	Silty SAND with Gravel (SM), brown to orangish brown, very dense, slightly moist, fine to coarse sand and gravel.		S-6	SPT	6	50/6"	50/6"	Sampler bouncing on cobble.
		Total depth = 45.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	46 – 70						

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Log of Boring **B-47** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1313 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 12/27/2022	Date Finished: 12/27/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 51.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 6; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Nick	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1313.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel and Cobbles (SM), brown, slightly moist, minor vegetation, small boulders.	0						
+1309.0	Gravelly SAND with Silt (SP-SM), brown and dark brown.	4						Heavy auger chatter; sampler bouncing on cobble.
+1298.0	Silty SAND with Gravel (SM), brown, very dense, slightly moist, medium sand and gravel.	15	S-1	SPT	6	5 50/5"	50/5"	Sampler bouncing on cobble.
+1293.0		20						

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1313 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1293.0	Clayey SAND with Gravel (SC), grayish brown, moist.	20						
1288.0	Silty SAND with Gravel (SM), brown, dense, slightly moist.	25	S-2	SPT	10	9 / 10 / 22	32	
	Gravel-sized brick clasts.	27						
1278.0	Silty to Clayey SAND with Gravel (SM to SC), brown, medium dense, moist, medium gravel.	35	S-3	SPT	10	6 / 8 / 13	21	
1273.0	Silty SAND with Gravel (SM), brown, medium dense, moist, fine gravel.	40	S-4	SPT	5	8 / 5 / 8	13	
		45						

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Log of Boring **B-47** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1313 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1268.0	Slightly moist.	45	S-5	SPT	3	18 5 17	22	
		Very dense, moist.	50	S-6	SPT	0	7 40 28	68	No sample recovery.
	+1261.5	Total depth = 51.5 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	52						

Depth Scale: 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

N-Value scale: 10 20 30 40

Project: Proposed Athletic Complex			Project No.: 700114101		
Location: Claremont Mckenna College			Elevation and Datum: Approx. 1303 (feet, MSL)		
Drilling Company: 2R Drilling			Date Started: 12/27/2022	Date Finished: 12/27/2022	
Drilling Equipment: CME-75 Truck-mounted Drill Rig			Completion Depth: 42 ft	Rock Depth: -	
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger			Number of Samples	Disturbed: 3	Undisturbed: - / Core: -
Casing Diameter (in): -		Casing Depth (ft): -	Water Level (ft.)	First: -	Completion: - / 24 HR.: -
Casing Hammer: -	Weight (lbs): -	Drop (in): -	Drilling Foreman: Nick		
Sampler: 2-inch O.D. SPT Split-Barrel					
Sampler Hammer: Automatic	Weight (lbs): 140	Drop (in): 30	Field Engineer: A. Nieblas		

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1303.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel, Cobbles, and Boulders (SM), brown, dry, scattered vegetation.	0						
		Dark brown and brown.	4						Heavy auger chatter.
	+1283.0		20						

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Log of Boring **B-48** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1303 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1283.0	Silty to Clayey SAND with Gravel (SM to SC), brown, very dense, slightly moist, medium gravel.	20–21.5	S-1	SPT	10	10, 23, 43	66	
	Cobbles.	23						
+1273.0	Silty SAND with Gravel (SM), brown, loose, moist, small brick gravel clast.	30–31.5	S-2	SPT	12	7, 4, 5	9	
		35						Driller added water.
	Dark brown, medium dense.	40–41.5	S-3	SPT	5	9, 12, 5	17	Sampler hit piece of metal.
+1261.0	Total depth = 42 feet bgs. Groundwater not encountered. Borehole backfilled with soil cuttings.	42						Refusal; piece of metal broke sampler.

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1253 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 03/03/2023	Date Finished: 03/03/2023
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 20.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 2; Undisturbed 2; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1253.0	**Artificial Fill** SAND with Silt and Gravel (SP-SM), gray, slightly moist, fine to coarse sand, coarse gravel, some cobbles.	0						
+1248.0	Gray and brown, moist, fine to coarse sand, some cobble fragments.	5	S-1	SPT	14	18 38 25	63	
+1246.5	**Young Alluvial Fan Deposit (Qya)** Silty SAND (SM), orangish brown, slightly moist to moist, fine to coarse sand, fine to coarse gravel, some cobbles.	6.5						
		10	S-2	CR	17	33 40 50/5"	50/5"	
		15	S-3	SPT	9	27 50/3"	50/3"	Auger chattering due to possible cobbles
+1233.0		20						

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Log of Boring B-49 Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	Elevation and Datum
Claremont Mckenna College	Approx. 1253 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1233.0	Total Depth = 20 feet. No groundwater encountered. Boring terminated at 20 feet due to rig breakdown. Boring backfilled with auger cuttings.	20	S-4	CR	0	50/1"	50/1"	Sampler bouncing on possible cobbles. No sample recovery.
			21						
			22						
			23						
			24						
			25						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
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			37						
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			41						
			42						
			43						
			44						
			45						

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Project: Proposed Athletic Complex			Project No.: 700114101			
Location: Claremont Mckenna College			Elevation and Datum: Approx. 1254 (feet, MSL)			
Drilling Company: 2R Drilling			Date Started: 03/15/2023		Date Finished: 03/15/2023	
Drilling Equipment: GT8 Gtech Drill			Completion Depth: 35.2 ft		Rock Depth: -	
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger			Number of Samples	Disturbed: 8	Undisturbed: 1	Core: -
Casing Diameter (in): -		Casing Depth (ft): -	Water Level (ft.)	First: -	Completion: -	24 HR.: -
Casing Hammer: -	Weight (lbs): -	Drop (in): -	Drilling Foreman: Juan			
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod						
Sampler Hammer: Automatic	Weight (lbs): 140	Drop (in): 30	Field Engineer: N. Ghanta			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1254.0	**Artificial Fill** Silty SAND (SM), blackish brown and light brown, slighlty moist.	0						
	Medium dense, fine to coarse sand, rock fragments present.	5	S-1	SPT	15	44 18 10	28	
+1246.0	**Young Alluvial Fan Deposit (Qya)** Silty SAND (SM), dark gray, dense, slightly moist to moist, fine to coarse sand, rock fragements present.	8	S-2A	CR	0	20 50/1"	50/1"	No sample recovery
		8.5	S-2B	SPT	10	14 26 22	48	
	Gray and mottled orangish brown, very dense, dry to slightly moist, fine to coarse sand, cobble fragments present.	10	S-3	SPT	4	50/4"	50/4"	
		12						Drill rig grinding slowly and loud rig chatter. Possible cobbles encountered.
+1239.0	SAND with Gravel and Silt (SP-SM), gray and orangish brown, very dense, dry, fine to coarse sand, cobble fragments present.	15	S-4	SPT	3	50/3"	50/3"	Sampler bouncing on a possible cobble
		20						

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Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1254 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
1234.0	Orangish brown, slightly moist, fine to coarse sand, sine to coarse gravel	20	S-5	SPT	6	50/6"	50/6"	
		25	S-6	SPT	5	50/5"	50/5"	
1224.0	Sandy SILT (ML), orangish brown, stiff, moist, fine to coarse sand, trace gravel.	30	S-7	SPT	18	14 11 12	23	
1218.8	Total depth = 35.2 feet. No groundwater encountered. Borehole backfilled with on-site fill soils.	35	S-8	SPT	1	50/1"	50/1"	

Depth scale: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

N-Value scale: 10 20 30 40

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Log of Boring **B-51**

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 08/10/2023 / Date Finished: 08/10/2023
Drilling Equipment: GT-8 Truck-mounted Drill	Completion Depth: 46.5 ft / Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 5 / Undisturbed / Core
Casing Diameter (in): / Casing Depth (ft):	Water Level (ft.): First / Completion / 24 HR.
Casing Hammer: / Weight (lbs): / Drop (in):	Drilling Foreman: Juan
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: A. Nieblas
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Sandy SILT (ML) to Silty SAND (SM): light brown, dry, scattered cobbles, gravel, and vegetation.	0						
		Silty to Sandy GRAVEL (GM): light gray, dry, dense, predominantly crushed concrete.	10	S-1	SPT	3	20 / 20 / 10	30	
			12						Heavy auger chatter-cobbles/boulders, slow drilling.
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Depth Scale	Sample Description	Elev. (ft)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20	Cuttings are Silty to Gravely SAND (SP): brown, slightly moist, cobbles, medium to coarse gravel.		S-2	SPT	0	50/1"	50/1"	No sample recovery; sampled on rock.
30	Silty SAND with Gravel (SM): brown, slightly moist, medium dense, coarse gravel, abundant concrete clasts-pulverized, some asphalt.		S-3	SPT	8	10 / 11 / 16	27	
40	**Young Alluvial Fan Deposit (Qya)** Silty SAND (SM): orangish brown, slightly moist, dense, fine to medium sand, occasional rounded to subrounded fine to medium gravel.		S-4	SPT	12	19 / 20 / 12	32	Easier drilling.

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

N-Value axis: 10 20 30 40

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Log of Boring B-51 Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Orangish brown to brown mottled, medium dense, some limonite staining.	45–46.5	S-5	SPT	18	11 / 12 / 12	24	
		Total Depth = 46.5 feet No groundwater encountered. Boring backfilled with cuttings.							

Depth Scale: 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

N-Value scale: 10 20 30 40

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Log of Boring **B-52** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/07/2023	Date Finished: 08/08/2023
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 36.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 4; Undisturbed 0; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First; Completion; 24 HR.	
Casing Hammer: Weight (lbs): Drop (in):		Drilling Foreman: Juan, Jorge, & Eddie	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta & A. Nieblas	
Sampler Hammer: Automatic; Weight (lbs): 140; Drop (in): 30			

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Artificial Fill Silty SAND with Gravel (SM): dark gray, dry to slightly moist, rock fragments.	0						
		3						Rocky from 3-10 feet, heavy auger chatter.
	Dark gray and black, medium dense, fine to coarse sand, fine to coarse gravel, cobble and asphaltic fragments.	10–11.5	S-1	SPT	14	14 / 9 / 7	16	
		15						Slow drilling, heavy auger chatter.
		20						

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Log of Boring **B-52** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Dark brown, slightly moist, occasional asphalt and concrete clasts.	20–21.5	S-2	SPT	18	22 / 19 / 9	28	
		Very dense, abundant asphalt, some concrete clasts.	25–26	S-3	SPT	13	12 / 50/1"	50/1"	
		SAA	30						
		Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): light orangish brown to yellowish brown, slightly moist, medium dense, fine to medium sand and gravel.	30–31.5	S-4	SPT	18	9 / 9 / 11	20	
		Orangish brown, dense, fine to medium sand with occarional coarse sand, some limonite/iron oxide staining.	35–36.5	S-5	SPT	0	20 / 27 / 12	39	
		Total Depth = 36.5 feet No groundwater encountered. Boring backfilled with cuttings.	36.5						

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Log of Boring **B-53** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/11/2023	Date Finished: 08/11/2023
Drilling Equipment: Track-mounted Drill		Completion Depth: 56.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 7; Undisturbed 0; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First ▽; Completion ▼; 24 HR. ▼	
Casing Hammer:	Weight (lbs): ; Drop (in):	Drilling Foreman: Jerry	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND with Gravel (SM): light brown, dry, scattered vegetation, scattered cobbles and small boulders.	0						
			5						Heavy auger chatter from 0-23 feet.
		Cuttings are Silty SAND (SM): light brown, dry to slightly moist.	10	S-1	SPT	0	50/4"	50/4"	No sample recovery; sampled on a rock.
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	Elevation and Datum
Claremont Mckenna College	Approx. (feet, MSL)

Depth (ft)	Sample Description	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20	Silty SAND with Gravel (SM): brown and light brown, very dense, slightly moist.	S-2	SPT	10	16 / 32 / 30	62	
23							Easier drilling from 23-27 feet.
30	Silty SAND (SM): dark brown, dense, moist, scattered asphalt clasts.	S-3	SPT	13	14 / 9 / 29	38	
40	Silty to Gravelly SAND (SM): dark brown with some orangish brown, very dense, moist, scattered asphalt, occasional concrete clast.	S-4	SPT	15	19 / 30 / 47	77	

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Log of Boring **B-53** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Depth Scale (ft)	Sample Description	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
45	**Young Alluvial Fan Deposit (Qya)** Silty SAND with Gravel (SM): light orangish brown, dry to slightly moist, fine to medium sand.	S-5	SPT	4	50/5"	50/5"	
50	Silty SAND (SM): orangish brown, very dense, dry to slightly moist, occasional fine to medium gravel, fine to medium sand with occasional coarse sand.	S-6	SPT	10	50/4"	50/4"	
55	Silty SAND (SM) to Sandy SILT (MLS): orangish brown, medium dense to very stiff, moist, limonite staining.	S-7	SPT	10	9 9 10	19	
56.5	Total Depth = 56.5 feet No groundwater encountered. Boring backfilled with cuttings.						

Project	Proposed Athletic Complex	Project No.	700114101
Location	Claremont Mckenna College	Elevation and Datum	Approx. (feet, MSL)
Drilling Company	2R Drilling	Date Started / Date Finished	08/08/2023 / 08/08/2023
Drilling Equipment	CME-75 Truck-mounted Drill Rig	Completion Depth / Rock Depth	50.5 ft /
Size and Type of Bit	8-inch O.D. Hollow Stem Auger	Number of Samples	Disturbed: 8; Undisturbed: 0; Core:
Casing Diameter (in) / Casing Depth (ft)		Water Level (ft.)	First: ; Completion: ; 24 HR.:
Casing Hammer / Weight (lbs) / Drop (in)		Drilling Foreman	Jorge & Eddie
Sampler	2-inch O.D. SPT Split-Barrel	Field Engineer	A. Nieblas
Sampler Hammer	Automatic; Weight (lbs): 140; Drop (in): 30		

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND with Cobbles (SM): medium to coarse gravel and broken cobbles in cuttings, scattered vegetation.	0						
			5						Heavy auger chatter.
		Gravelly SAND with Silt (SW): brown, slightly moist, medium dense, crushed concrete clast in sampler shoe.	10	S-1	SPT	8	9 17 12	29	
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Cuttings are Silty SAND with Gravel (SM) to Gravelly SAND with silt (SW): brown, slightly moist, very dense.	20	S-2	SPT	0	50/1"	50/1"	No sample recovery; sampled on a rock.
		Gravelly SAND with Silt (SW): brown and dark brown, medium dense, slightly moist, medium to coarse gravel, some dark brown to black asphalt.	25	S-3	SPT	12	13 13 13	26	
		Very dense.	30	S-4	SPT	0	50/0"	50/0"	No sample recovery; sampled on a rock.
		Silty SAND with Gravel (SM): yellowish brown, slightly moist, dense, some limonite staining, some asphalt.	35	S-5	SPT	16	18 10 24	34	
		Very dense.	40	S-6	SPT	0	50/1.5"	50/1.5"	No sample recovery; sampled on a rock.
			45						

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Log of Boring B-54

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): orangish brown, slightly moist, very dense, medium to fine sand, medium to coarse gravel.	45	S-7	SPT	6	50/6"	50/6"	
		Medium gravel.	50	S-8	SPT	5	50/5"	50/5"	
		Total Depth = 50.5 feet No groundwater encountered. Boring backfilled with cuttings.	51–70						

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Project: Proposed Athletic Complex			Project No.: 700114101			
Location: Claremont Mckenna College			Elevation and Datum: Approx. (feet, MSL)			
Drilling Company: 2R Drilling			Date Started: 08/10/2023		Date Finished: 08/10/2023	
Drilling Equipment: GT-8 Truck-mounted Drill			Completion Depth: 51.5 ft		Rock Depth:	
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger			Number of Samples	Disturbed: 8	Undisturbed: 0	Core:
Casing Diameter (in):		Casing Depth (ft):	Water Level (ft.)	First: ▽	Completion: ▼	24 HR.: ▽
Casing Hammer:	Weight (lbs):	Drop (in):	Drilling Foreman: Juan			
Sampler: 2-inch O.D. SPT Split-Barrel						
Sampler Hammer: Automatic	Weight (lbs): 140	Drop (in): 30	Field Engineer: A. Nieblas			

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill SIlty SAND with Gravel (SM): brown, dry, scattered gravel, cobbles, and vegetation.	0						
		Dark brown, slightly moist, loose, medium gravel, medium to fine sand, scattered asphalt.	10	S-1	SPT	12	6, 3, 4	7	
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Depth (ft)	Sample Description	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20	Brown to dark brown, concrete and asphalt clasts.	S-2	SPT	15	5 / 4 / 3	7	
30	Orangish brown, medium dense, fine to medium gravel and sand.	S-3	SPT	10	6 / 7 / 8	15	
35	Brown with some orangish brown mottle.	S-4	SPT	12	6 / 6 / 11	17	
40	Sampler pushing rock.	S-5	SPT	1	9 / 9 / 9	18	

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Log of Boring **B-55** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Silty SAND with Asphalt (SM): black, very dense, slightly moist.	45	S-6A	SPT	18	18 / 31 / 37	68	
	Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): orangish brown, very dense, slightly moist, fine to medium sand and gravel.	46–50						
	Silty SAND (SM) and Sandy SILT with Gravel (ML): orangish brown, medium dense to stiff, moist, limonite staining, manganese oxide staining.	50	S-7	SPT	128	8 / 8 / 10	18	
	Total Depth = 51.5 feet No groundwater encountered. Boring backfilled with cuttings.	51.5						

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Log of Boring **B-56** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/08/2023	Date Finished: 08/08/2023
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 36.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 5; Undisturbed 0; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First ▽; Completion ▼; 24 HR. ▼	
Casing Hammer:	Weight (lbs): Drop (in):	Drilling Foreman: Jorge & Eddie	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140 Drop (in): 30		

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND (SM): light brown, dry, scattered vegetation, abundant cobbles.	0						
		Silty SAND with Gravel (SM): brown and dark brown, medium dense, slightly moist, scattered asphalt clasts, occasional concrete clast.	10	S-1	SPT	18	12 10 12	22	
			20						

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Log of Boring **B-56** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): orangish brown, slightly moist, medium dense, fine to medium gravel.	20–21.5	S-2	SPT	18	5 / 6 / 8	14	
		Brown to orangish brown.	25–26.5	S-3	SPT	10	10 / 7 / 7	14	
		Brown, dense, fine to medium subrounded and subangular gravel.	30–31.5	S-4	SPT	14	7 / 17 / 16	33	
		Cuttings are brown to orangish brown, medium dense.	35–36.5	S-5	SPT	0	41 / 8 / 14	22	No sample recovery; sampled on a rock.
		Total Depth: 36.5 feet No groundwater encountered. Boring backfilled with cuttings.	36.5						

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Log of Boring **B-57** Sheet 1 of 3

Field	Value	Field	Value
Project	Proposed Athletic Complex	Project No.	700114101
Location	Claremont Mckenna College	Elevation and Datum	Approx. (feet, MSL)
Drilling Company	2R Drilling	Date Started	08/09/2023
		Date Finished	08/09/2023
Drilling Equipment	CME-75 Track-mounted Drill Rig	Completion Depth	57 ft
		Rock Depth	
Size and Type of Bit	8-inch O.D. Hollow Stem Auger	Number of Samples	Disturbed: 7; Undisturbed: 0; Core:
Casing Diameter (in)		Casing Depth (ft)	
Casing Hammer		Water Level (ft.)	First: ▽; Completion: ▼; 24 HR.: ▼
Weight (lbs)		Drop (in)	
Sampler	2-inch O.D. SPT Split-Barrel	Drilling Foreman	Jeff
Sampler Hammer	Automatic	Field Engineer	A. Nieblas
Weight (lbs)	140	Drop (in)	30

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND with Gravel (SM): light brown, dry, abundant cobbles, scattered vegetation.	0						
		Brown, slightly moist, medium dense, fine to coarse gravel, fine to medium sand.	10–11.5	S-1	SPT	8	12 6 5	11	
			20						

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Log of Boring **B-57** Sheet 2 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Sandy to Silty Gravel (GM): gray, dry, medium dense.	20	S-2	SPT	2	30 / 15 / 8	23	Poor recovery; sampled on a rock.
	Silty SAND with Gravel (SM): brown with some orange brown, moist, medium dense, may be native.	30	S-3	SPT	5	13 / 10 / 8	18	Refusal, moved over 5 feet and redrilled to 30 feet.
	Silty SAND (SM): brown with some orangish brown, medium dense, occasional fine subrounded gravel.	40	S-4	SPT	3	12 / 11 / 7	18	Slow drilling from 40-50 feet, heavy auger chatter.

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

N-Value scale: 10 20 30 40

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			45						
			50	S-5	SPT	0	50/2"	50/2"	No sample recovery; sampled on a rock. Slightly easier drilling, less rocky.
		Young Alluvial Fan Deposit (Qya) Sandy SILT with Gravel (ML): yellowish brown, dry, hard, occasional weathered/angular gravel, sample pulverized.	55	S-6	SPT	4	50/6"	50/6"	Bent sampler.
		No Recovery, sampler shoe contained yellowish brown sluff. Total depth = 57 feet No groundwater encountered. Boring backfilled with cuttings. Note: Native at 55 feet (possibly as early as 30 feet).	57	S-7	SPT	0	50/1"	50/1"	Driller added water to borehole, no foward progress.
			70						

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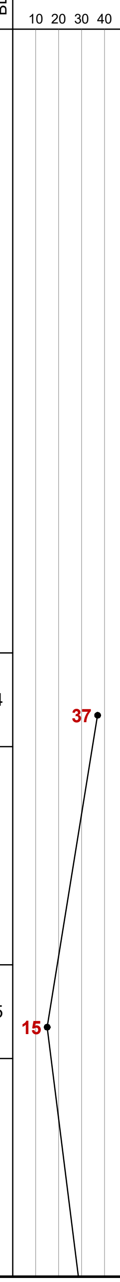
Log of Boring **B-58** Sheet 1 of 2

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 08/08/2023 / Date Finished: 08/08/2023
Drilling Equipment: CME-75 Truck-mounted Drill Rig	Completion Depth: 36.5 ft / Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 6 / Undisturbed 0 / Core
Casing Diameter (in): / Casing Depth (ft):	Water Level (ft.): First ▽ / Completion ▼ / 24 HR. ▼
Casing Hammer: / Weight (lbs): / Drop (in):	Drilling Foreman: Jorge & Eddie
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: A. Nieblas
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND with Gravel and Cobbles (SM): scattered vegetation and weeds.	0						
		Silty SAND with Gravel (SM): brown and dark brown, dense, slightly moist, scattered asphalt clasts and sand.	10	S-1	SPT	10	16 / 14 / 23	37	
		Brown, medium dense, occasional asphalt clast, fine to medium gravel.	15	S-2	SPT	12	2 / 5 / 10	15	
			20						



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Log of Boring **B-58** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Depth (ft)	Sample Description	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20	Brown and dark brown, dense, occasional asphalt clast.	S-3	SPT	15	2 / 8 / 24	32	
23	Orangish brown sand in cuttings.						
25	Dark brown, medium dense, very few brick pieces (medium sand sized), glass in sampler shoe.	S-4	SPT	12	11 / 12 / 17	29	
30	Brown and dark brown, occasional bricks and asphalt pieces; native in sampler shoe.	S-5	SPT	15	11 / 10 / 12	22	
31.5	**Young Alluvial Fan Deposit (Qya)** SAND (SP): orangish brown, medium dense, slightly moist.						
35	SIlty SAND with Gravel (SM): orangish brown, medium dense, slightly moist, fine to medium gravel, limonite staining around gravel clasts.	S-6	SPT		11 / 10 / 10	20	
36.5	Total Depth = 36.5 feet No groundwater encountered. Boring backfilled with cuttings.						

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Log of Boring **B-59** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/10/2023	Date Finished: 08/10/2023
Drilling Equipment: GT-8 Truck-mounted Drill		Completion Depth: 56.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 7; Undisturbed 0; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First ▽; Completion ▼; 24 HR. ▼	
Casing Hammer: Weight (lbs): Drop (in):		Drilling Foreman: Juan	
Sampler: 2-inch O.D. SPT Split-Barrel			
Sampler Hammer: Automatic; Weight (lbs): 140; Drop (in): 30		Field Engineer: A. Nieblas	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Artificial Fill Silty SAND (SM): brown, dry, scattered cobbles, gravel, and vegetation.	0						
	Sandy SILT (MLS) and Silty SAND with Gravel (SM): black and orangish brown, medium dense to stiff, moist, abundant asphalt.	10	S-1	SPT	12	5 / 8 / 8	16	
		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	Elevation and Datum
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Silty SAND (SM): brown, medium dense, occasional coarse gravel, pieces of clay brick.	20	S-2	SPT	11	37 6 9	15	
	Silty SAND with Gravel (SM): brown, medium dense, slightly moist.	30	S-3	SPT	2	7 12 12	24	
	Concrete gravel clasts.	40	S-4	SPT	7	10 10 10	20	
		45						

LANGAN

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Gray brown and dark brown, dense, some asphalt, oxidized and corroded metal.	45	S-5	SPT	15	27 / 20 / 16	36	
		Young Alluvial Fan Deposit (Qya) Sandy SILT (ML): orangish brown, very stiff, moist, scattered weathered gravel, limonite staining.	50	S-6	SPT	18	9 / 8 / 21	29	
		Silty SAND with Gravel (SM): orangish brown, very dense, slightly moist, fine to medium sand and gravel, very weathered gravel clasts.	55	S-7	SPT	15	17 / 45 / 50/4"	50/4"	

Total Depth = 56.5 feet
No groundwater encountered.
Boring backfilled with cuttings.

LANGAN

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 08/08/2023 / Date Finished: 08/08/2023
Drilling Equipment: CME-75 Truck-mounted Drill Rig	Completion Depth: 36.5 ft / Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 7 / Undisturbed 0 / Core
Casing Diameter (in): / Casing Depth (ft):	Water Level (ft.): First / Completion / 24 HR.
Casing Hammer: / Weight (lbs): / Drop (in):	Drilling Foreman: Jorge & Eddie
Sampler: 2-inch O.D. SPT Split-Barrel	Field Engineer: A. Nieblas
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Artificial Fill Silty SAND (SM): light brown, dry, abundant cobbles.	0						
	Silty SAND with Gravel (SM): light grayish brown, medium dense, dry.	10	S-1	SPT	1	15 / 10 / 10	20	Sampler pushed a rock.
	Dark brown, dry to slightly moist, predominately asphalt.	15	S-2	SPT	6	8 / 8 / 10	18	
		20						

LANGAN

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Orangish brown and medium to dark brown, loose to medium dense, slightly moist and moist, rare brick pieces.	20–21.5	S-3A/B	SPT	18	5 / 4 / 4	8	
	Dark brown, very dense, slightly moist, occasional brick pieces.	25	S-4	SPT	3	50/3"	50/3"	Heavy auger chatter, very slow drilling. Less chatter, faster drilling.
	Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): orangish brown, medium dense, slightly moist, medium to fine sand and gravel.	30–31.5	S-5	SPT	6	9 / 7 / 7	14	
	Brown to slightly orangish brown, fine gravel, minor limonite staining.	35–36.5	S-6	SPT	15	12 / 12 / 11	23	
	Total Depth = 36.5 feet No groundwater encountered. Borings backfilled with cuttings.	36.5						

LANGAN

Log of Boring **B-61** Sheet 1 of 3

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/09/2023	Date Finished: 08/09/2023
Drilling Equipment: Track-mounted Drill		Completion Depth: 60.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 6; Undisturbed 1; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First ▽; Completion ▼; 24 HR. ▽	
Casing Hammer: Weight (lbs): Drop (in):		Drilling Foreman: Jeff	
Sampler: 2-inch O.D. SPT Split-Barrel, 2.5-inch I.D. Cal Mod		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic; Weight (lbs): 140; Drop (in): 30			

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND (SM): light brown, dry, abundant gravel, cobbles, concrete and asphalt clasts, scattered vegetation.	0						
		Silty SAND with Gravel (SM): dark brown to brown, medium dense, slightly moist, occasional concrete clasts.	10	S-1	SPT	10	8 / 11 / 8	19	
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Dark brown, abundant asphalt clasts/gravel.	20	S-2	SPT	14	7 / 12 / 12	24	
	Dark brown and black, very dense, moist, abundant asphalt.	30	S-3	CR	18	18 / 34 / 32	66	Easy drilling from 30-34 feet, rocky at 34 feet.
	Silty SAND (SM): dark brown and brown, dense, slightly moist, abundant asphalt.	40	S-4	SPT	15	9 / 16 / 33	49	Easy drilling from 40-44.5 feet, dark brown asphalt sand in cuttings, likely nested asphalt at depth, rocky at 45-50 feet.

LANGAN

Log of Boring **B-61** Sheet 3 of 3

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			50	S-5	SPT	0	50/4"	50/4"	No sample recovery; sampled on a rock.
		Young Alluvial Fan Deposit (Qya) Silty SAND with Gravel (SM): orangish brown and gray, very dense, slightly moist, fine to very coarse gravel (potentially cobble).	55	S-6	SPT	5	50/5"	50/5"	Rocky from 50-55 feet, heavy auger chatter, slow drilling.
		Silty SAND with some Gravel (SM): orangish brown, very dense, slightly moist, iron oxide or limonite staining, some fine to medium gravel, manganese oxide stained gravel.	60	S-7	SPT	5	50/2"	50/2"	
		Total Depth = 60.5 feet No groundwater encountered. Boring backfilled with cuttings.							

LANGAN

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/11/2023	Date Finished: 08/11/2023
Drilling Equipment: Track-mounted Drill		Completion Depth: 35.5 ft	Rock Depth:
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 5; Undisturbed 0; Core	
Casing Diameter (in):	Casing Depth (ft):	Water Level (ft.): First; Completion; 24 HR.	
Casing Hammer:	Weight (lbs): Drop (in):	Drilling Foreman: Jerry	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: A. Nieblas	
Sampler Hammer: Automatic	Weight (lbs): 140 Drop (in): 30		

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Artificial Fill Silty SAND (SM): light brown, dry, scattered cobbles, gravel, and vegetation.	0						
		Silty SAND with Gravel (SM): light gray and dark brown, very dense, dry to slightly moist, some asphalt.	10	S-1	SPT	14	29 43 35	78	
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Light brown to orangish brown.	20	S-2	SPT	10	36 50/3"	50/3"	
	Light brown.	25	S-3	SPT	8	29 50/5"	50/5"	
	Young Alluvial Fan Deposit (Qya) Silty SAND (SM): orangish brown, very dense, slightly moist, very weatherd gravel, limonite staining.	30	S-4	SPT	10	33 50/5"	50/5"	
	Silty SAND with Gravel (SM): orangish brown, very dense, slightly moist, limonite and manganese oxide staining, very weathered fine to medium gravel.	35	S-5	SPT	0	50/6"	50/6"	
	Total Depth = 36.5 feet No groundwater encountered. Boring backfilled with cuttings.	36.5						

Depth scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

MOISTURE DENSITY TESTS

PROJECT Langan # 700114101 JOB NO. 2012-0057 BY LD DATE 11/15/22

Sample No.	B-15 / S-8	B-16 / S-3	B-17 / S-12	B-20 / S-2	B-21 / S-1	B-21 / S-3	B-21 / S-7	B-21 / S-9
Depth (ft)	5.0	7.5	50.0	5.0	2.5	7.5	25.0	35.0
Testing								
Soil Type	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel
Wet+Tare	Disturbed	Disturbed	980.2	498.7	913.9	Disturbed	551.8	515.9
Tare			5	3	5		3	3
Wet Weight	304.2	160.0	167.9	84.0	173.7	228.7	186.8	123.9
Dry Weight	301.5	154.0	151.3	80.0	165.7	219.7	180.6	117.7
Wet density			132.0	107.1	121.0		121.9	111.9
% Water	0.9	3.9	11.0	5.0	4.8	4.1	3.4	5.3
Dry Density			119.0	102.0	115.4		117.9	106.3
O.B.Press(psf)								
Sample No.	B-22 / S-10	B-23 / S-1	B-23 / S-3	B-25 / S-2	B-28 / S-2	B-31 / S-3	B-33 / S-4	B-35 / S-2
Depth (ft)	55.0	2.5	7.5	5.0	5.0	7.5	10.0	5.0
Testing			SPT					
Soil Type	Brown, Clayey Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel
Wet+Tare	1003.4	346.7	Disturbed	Disturbed	942.4	665.8	589.1	Disturbed
No. Ring	5	2			5	4	3	
Wet Weight	216.2	138.0	254.6	127.5	148.5	150.5	208.5	123.0
Dry Weight	194.9	133.2	245.1	123.3	140.9	143.2	202.7	119.7
Wet density	135.9	113.1			125.7	107.3	132.3	
% Water	10.9	3.6	3.9	3.4	5.4	5.1	2.9	2.8
Dry Density	122.5	109.2			119.3	102.1	128.6	
O.B.Press(psf)								

Geo-Logic ASSOCIATES

MOISTURE DENSITY TESTS

PROJECT Langan # 700114101 **JOB NO.** 2012-0057 **BY** LD **DATE** 11/15/22

Sample No.	B-35 / S-4	B-37 / S-1	B-40 / S-2	B-41 / S-1	B-41 / S-3	B-42 / S-2	B-42 / S-4	B-44 / S-6
Depth (ft)	10.0	2.5	5.0	2.5	7.5	5.0	10.0	50.0
Testing								
Soil Type	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Clayey Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel	Brown, Silty Sand w. Gravel
Wet+Tare	889.8	750.7	1238.3	713.8	1115.0	548.7	810.8	931.3
Tare	5	4	6	4	6	3	4	5
Wet Weight	144.6	108.4	126.9	114.8	150.9	253.1	312.4	145.3
Dry Weight	133.6	103.8	115.4	112.2	145.5	245.0	272.8	135.6
Wet density	116.9	125.1	140.7	117.3	123.5	121.1	137.6	123.9
% Water	8.2	4.4	10.0	2.3	3.7	3.3	14.5	7.2
Dry Density	108.0	119.7	127.9	114.7	119.1	117.2	120.2	115.6
O.B.Press(psf)								

Sample No.								
Depth (ft)								
Testing								
Soil Type								
Wet+Tare								
No. Ring								
Wet Weight								
Dry Weight								
Wet density								
% Water								
Dry Density								
O.B.Press(psf)								

Geo-Logic ASSOCIATES

WASH #200 SIEVE - ASTM D 1140-92

Job Name	Langan # 700114101	Date	11-15-22
Job No.	2012-0057	By	LD

Sample	B-28/S-4	**Sample**	B-33/S-5	**Sample**	B-40/S-3
Soil Type		Soil Type		Soil Type	
% water		% water		% water	
Wet weight		Wet weight		Wet weight	
Dry weight	238.3	Dry weight	210.5	Dry weight	234.2
+ 200 sieve	196.3	+ 200 sieve	143.6	+ 200 sieve	139.3
% Retained	82.4	% Retained	68.2	% Retained	59.5
%Pass. #200	**18**	**%Pass. #200**	**32**	**%Pass. #200**	**41**

Sample	B-42/S-4	**Sample**	B-45/S-5	**Sample**	
Soil Type		Soil Type		Soil Type	
% water		% water		% water	
Wet weight		Wet weight		Wet weight	
Dry weight	272.8	Dry weight	317.5	Dry weight	
+ 200 sieve	153.2	+ 200 sieve	222.8	+ 200 sieve	
% Retained	56.2	% Retained	70.2	% Retained	
%Pass. #200	**44**	**%Pass. #200**	**30**	**%Pass. #200**	

Sample		**Sample**		**Sample**	
Soil Type		Soil Type		Soil Type	
% water		% water		% water	
Wet weight		Wet weight		Wet weight	
Dry weight		Dry weight		Dry weight	
+ 200 sieve		+ 200 sieve		+ 200 sieve	
% Retained		% Retained		% Retained	
%Pass. #200		**%Pass. #200**		**%Pass. #200**	

Sample		**Sample**		**Sample**	
Soil Type		Soil Type		Soil Type	
% water		% water		% water	
Wet weight		Wet weight		Wet weight	
Dry weight		Dry weight		Dry weight	
+ 200 sieve		+ 200 sieve		+ 200 sieve	
% Retained		% Retained		% Retained	
%Pass. #200		**%Pass. #200**		**%Pass. #200**	

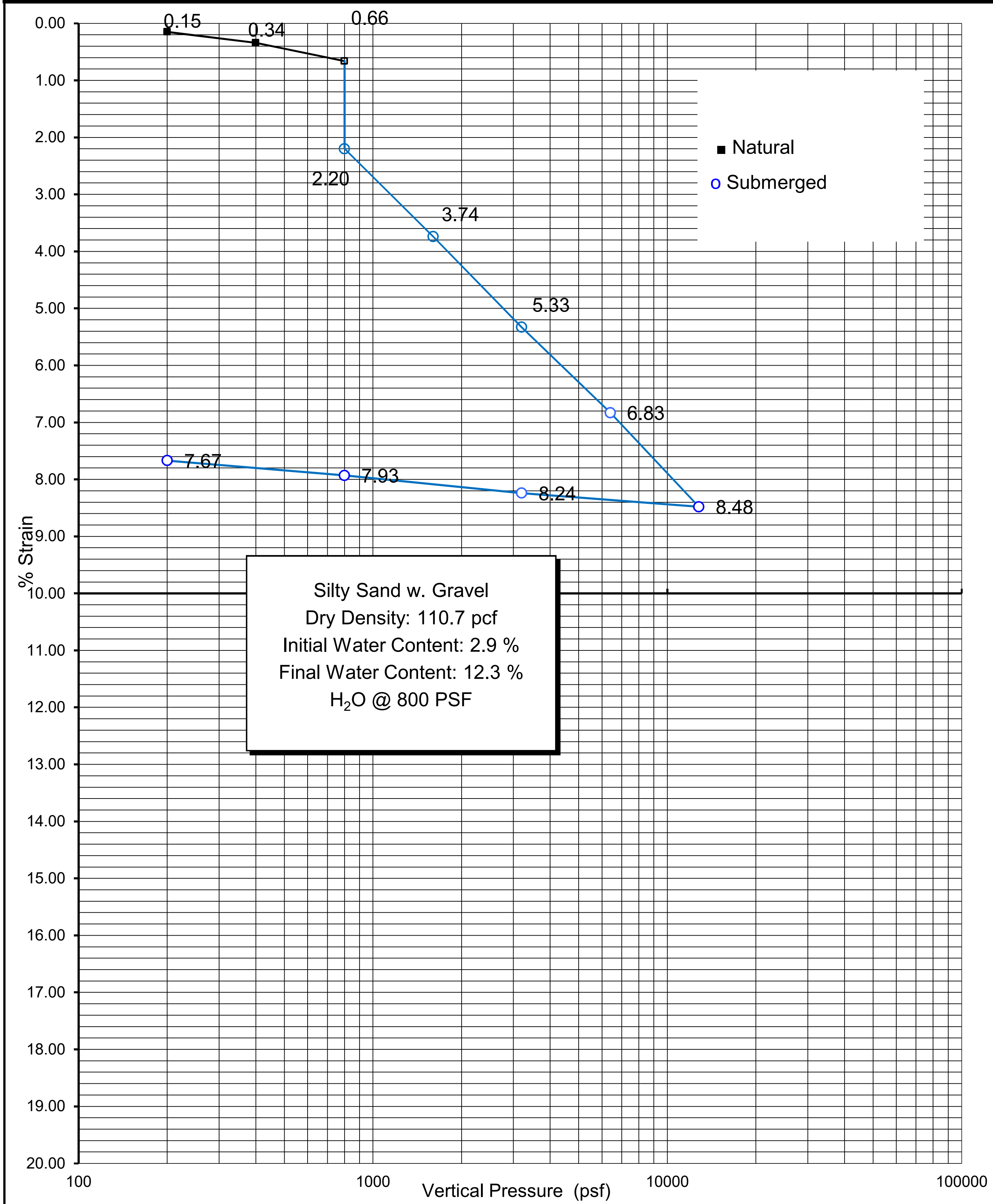
Geo-Logic ASSOCIATES

SOIL TEST RESULTS

SAMPLE NO.:	B-20 / Bulk	B-21A / Bulk	B-23 / Bulk	B-44 / Bulk	
Depth:	1' - 5'	10' - 15'	5' - 10'	1' - 10'	
DIRECT SHEAR TEST (type)					
Initial Moisture Content %					
Dry Density (pcf)					
Normal Stress (psf)					
Peak Shear Stress (psf)					
Ultimate Shear Stress (psf)					
Cohesion (psf)					
Internal Friction Angle (degrees)					
EXPANSION TEST UBC STD 18-2					
Initial Dry Density (pcf)					
Initial Moisture Content %					
Final Moisture Content %					
Pressure (psf)					
Expansion Index / Swell %					
CORROSIVITY TEST					
Resistivity (CTM643) (ohm-cm)	750	1800	7700	7100	
pH (CTM643)	7.6	7.2	7.3	7.4	
CHEMICAL TESTS					
Soluble Sulfate (CTM 417) (ppm)	189	4267	197	234	
Chloride Content (CTM 422) (ppm)	41	126	89	27	
Wash #200 Sieve (ASTM-1140) %					
Sand Equivalent (ASTM D2419)					

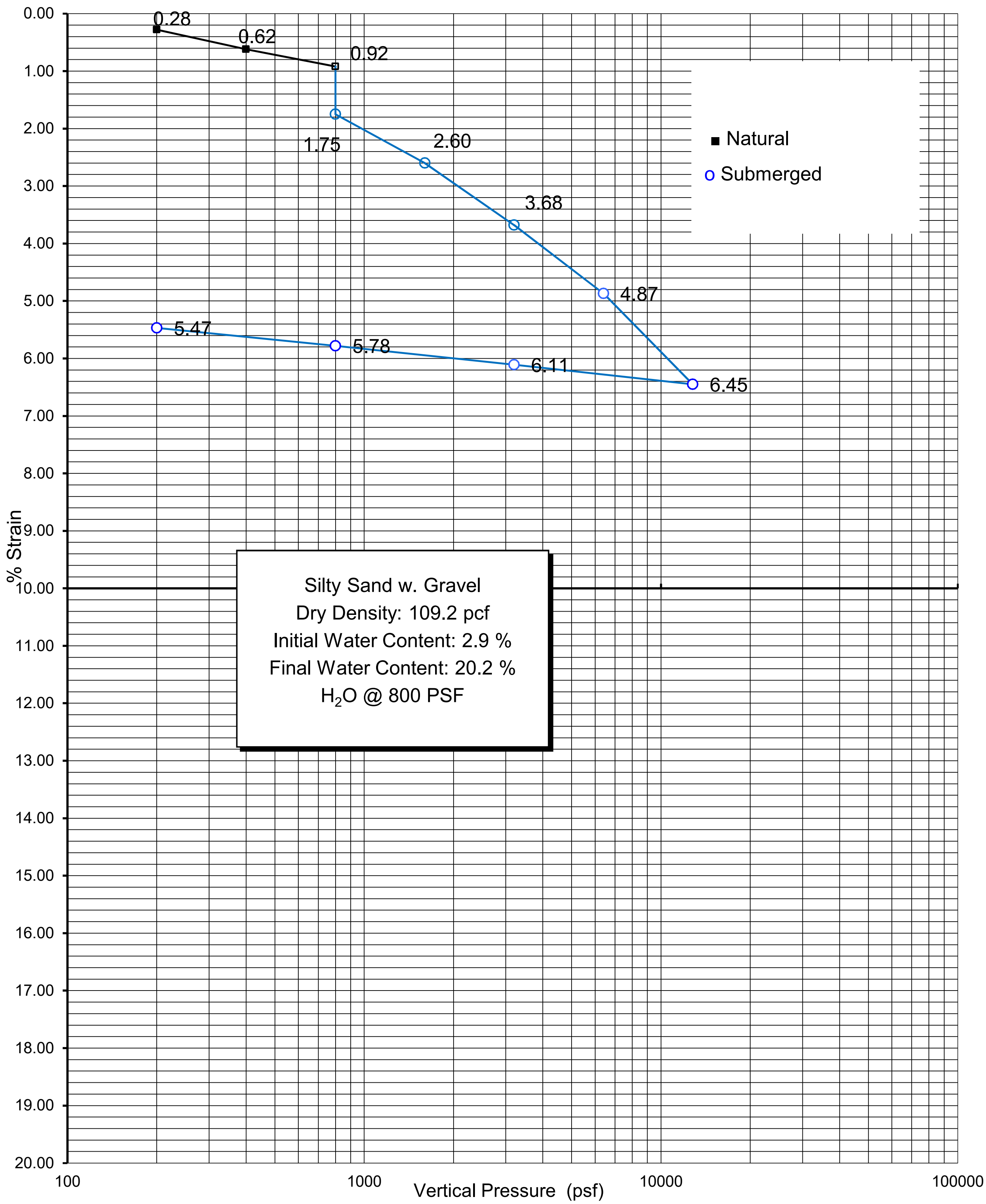
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	B-20 / S-4	Depth:	10'	Date	11-09-22



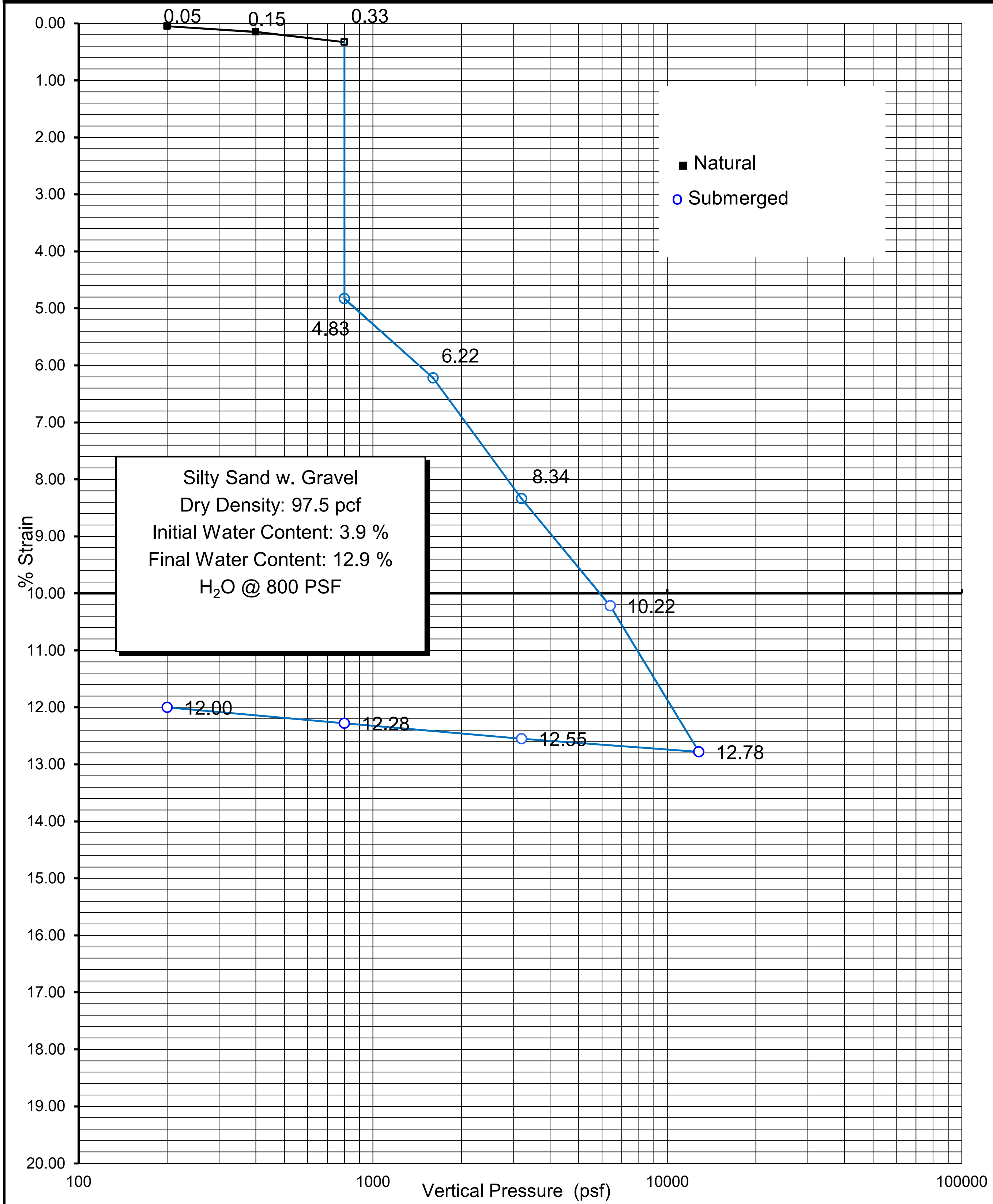
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No. B-23 / S-1	Depth: 10'	Date 11-26-22



Langan # 700114101 | CONSOLIDATION TEST - ASTM D2435 | Job No. 2012-0057

Boring / Sample No. B-28 / S-4	Depth: 10'	Date 11-09-22



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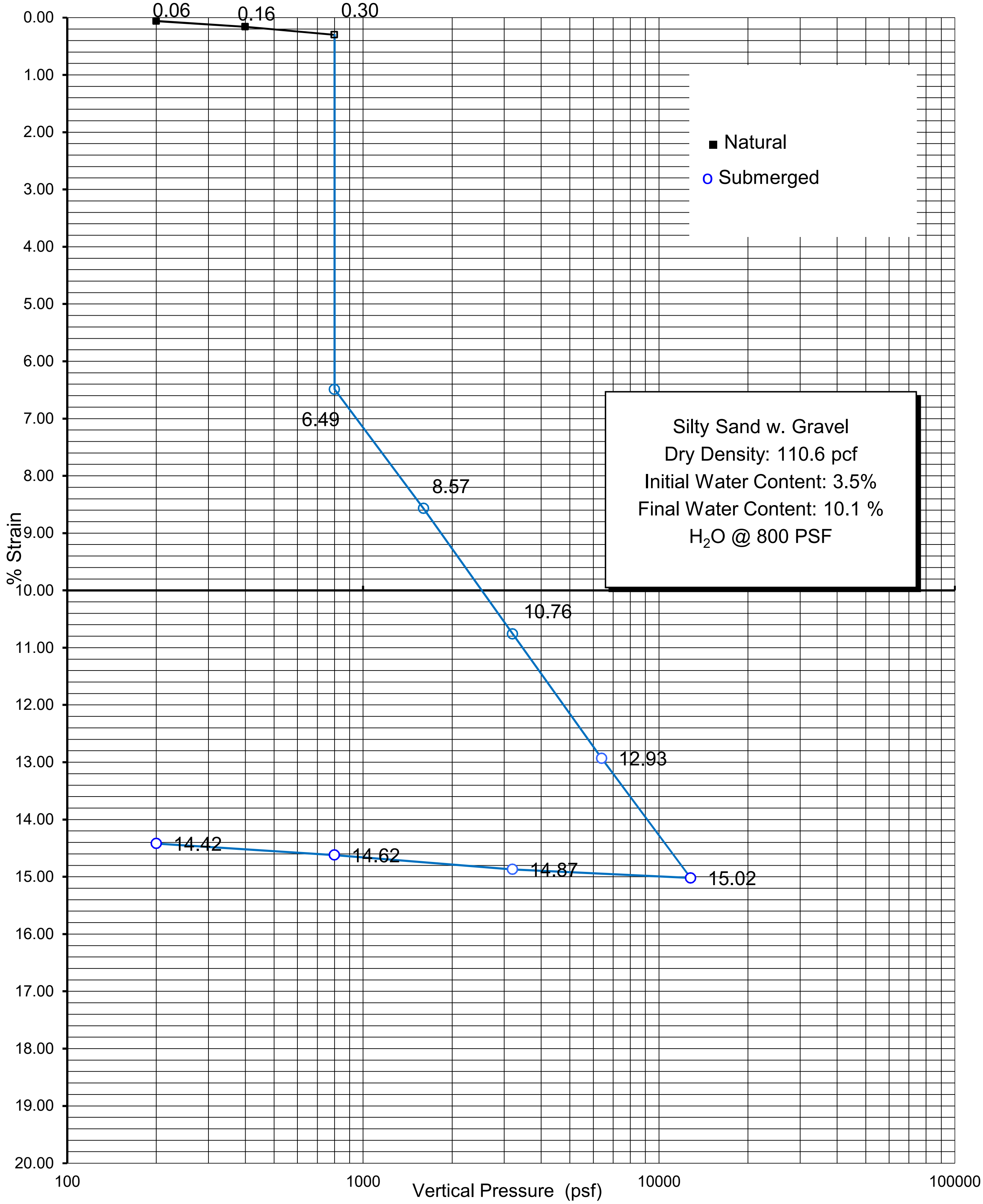
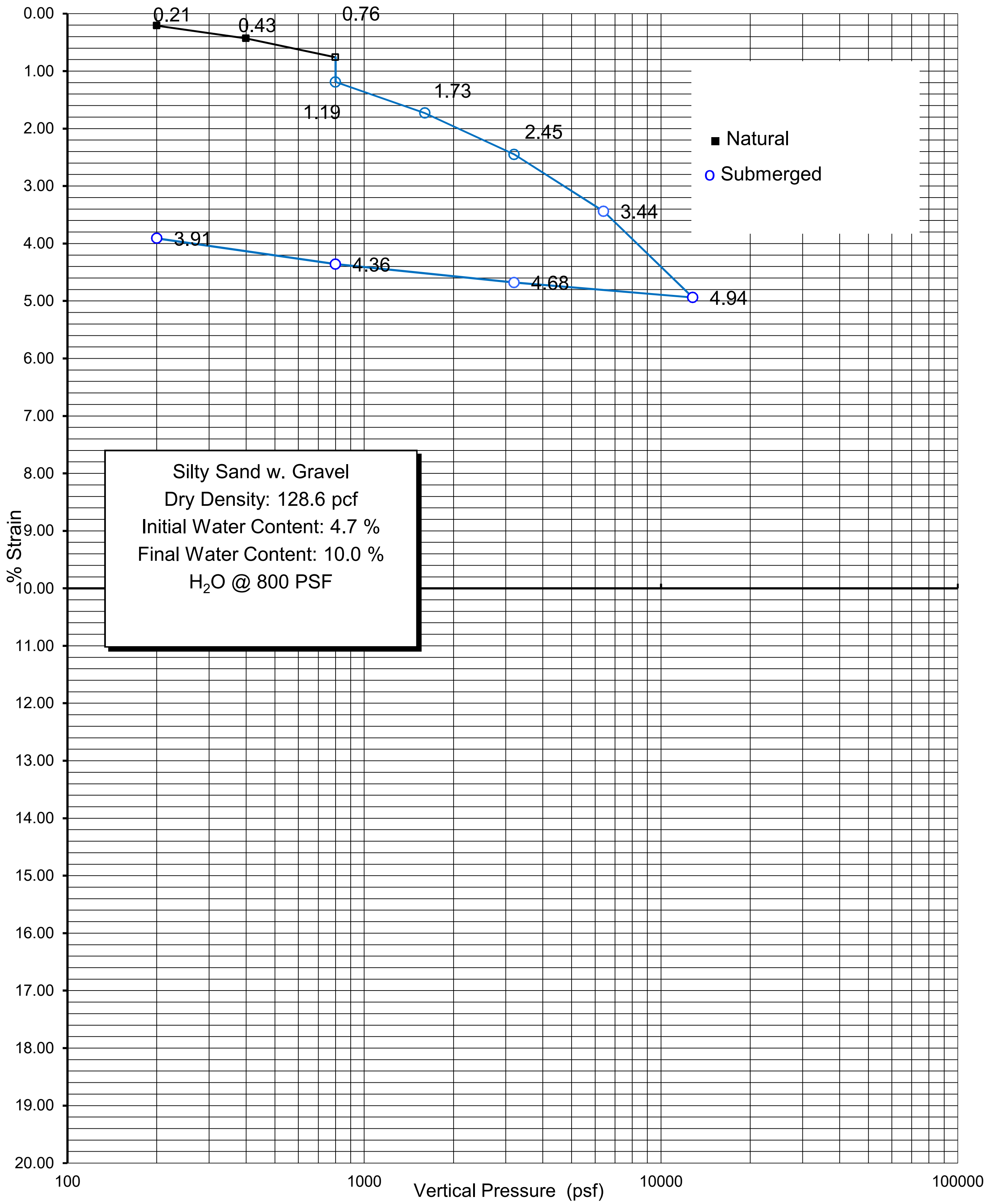
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	B-29 / S-4	Depth:	30'	Date	11-09-22



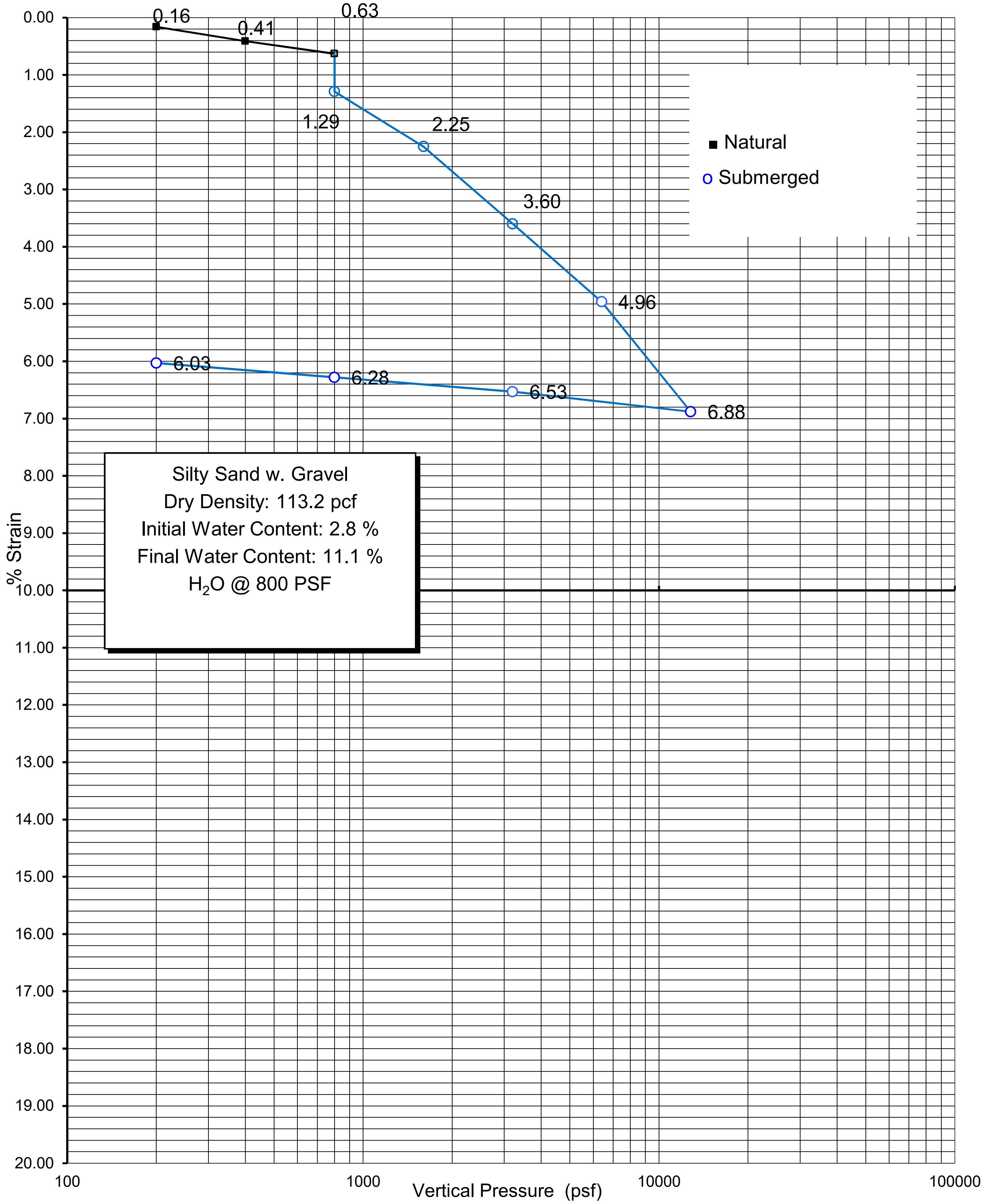
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No. B-32 / S-2	Depth: 5'	Date 11-09-22



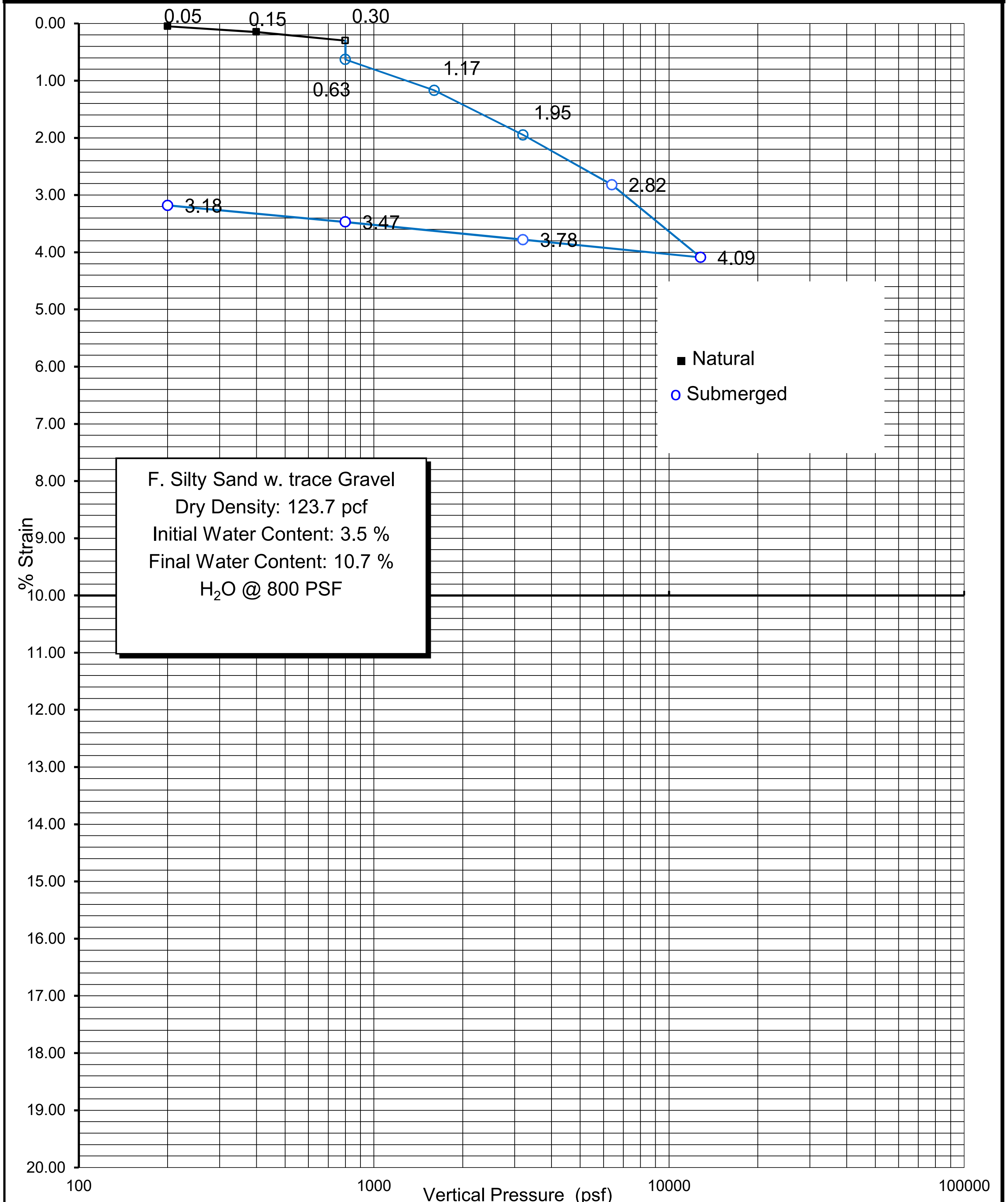
CONSOLIDATION TEST - ASTM D2435

Boring / Sample No. B-33 / S-2	Depth: 5'	Date 11-09-22



CONSOLIDATION TEST - ASTM D2435

Boring / Sample No.	B-37 / S-3	Depth:	7.5'	Date	11-09-22



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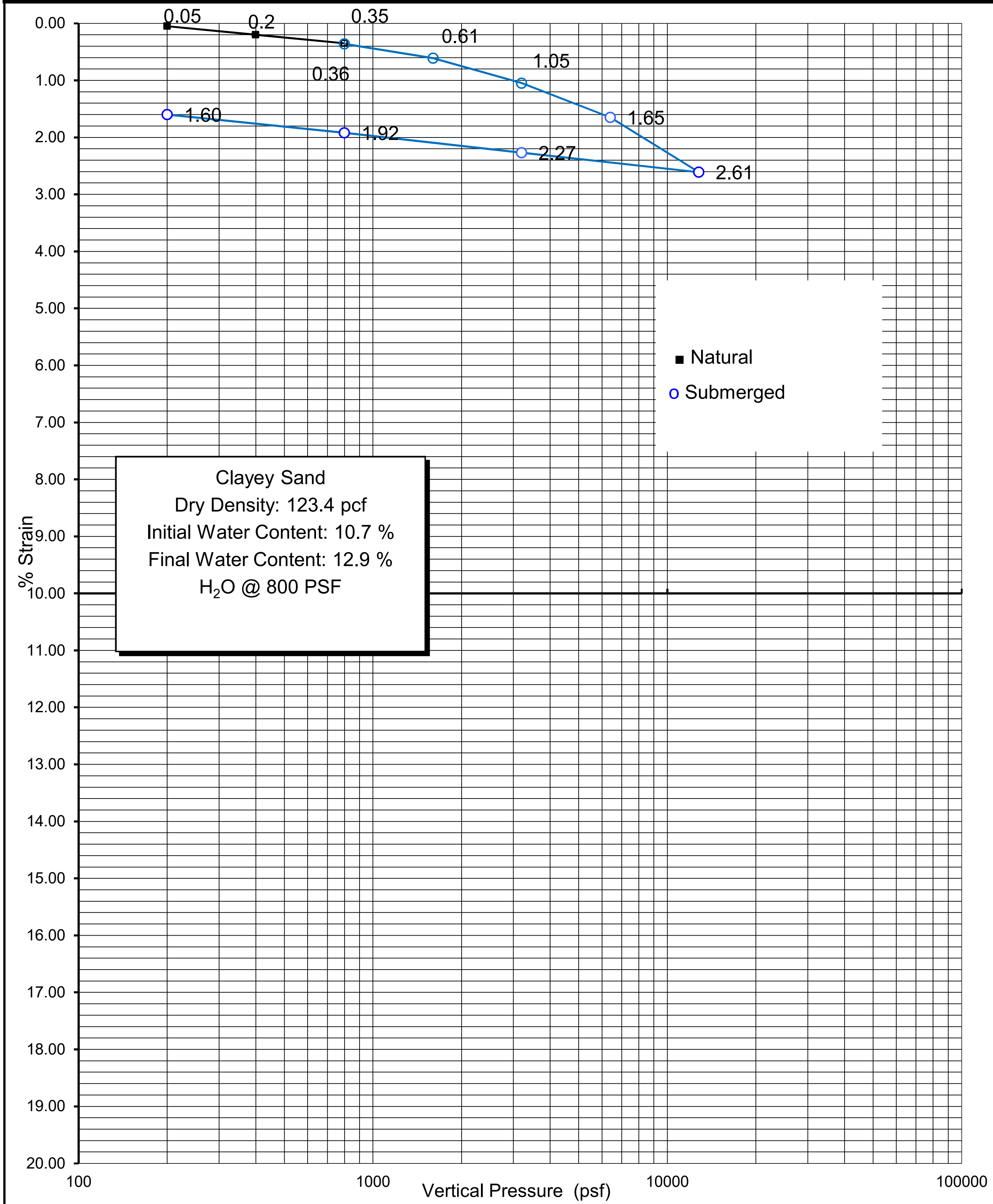
CONSOLIDATION TEST - ASTM D2435

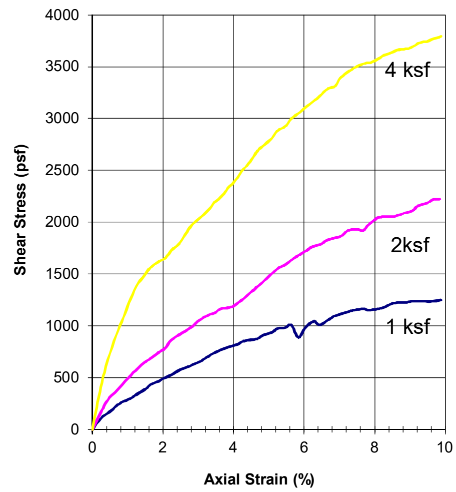
Boring / Sample No. B-40 / S-4	Depth: 10'	Date 11-09-22

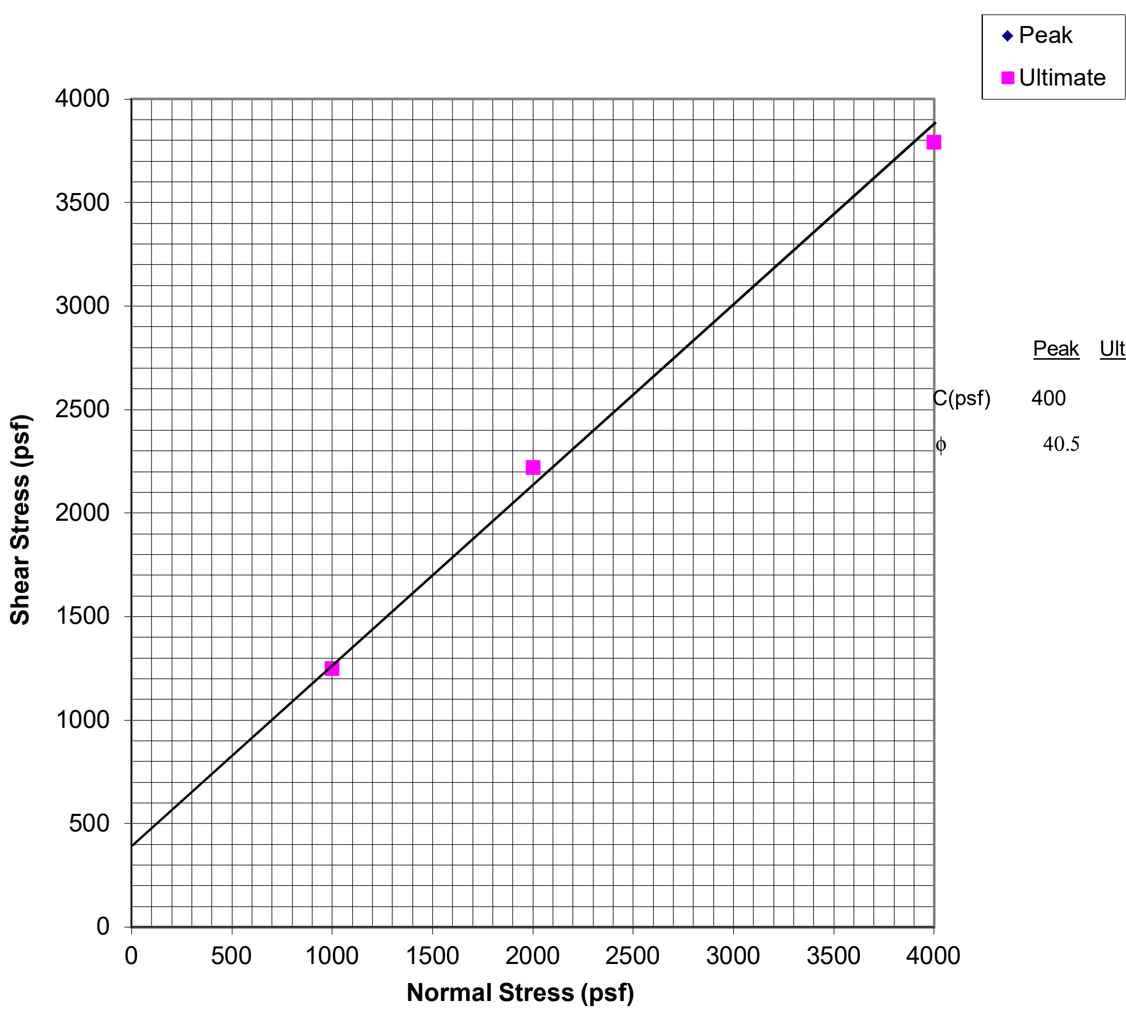


DIRECT SHEAR
ASTM D3080

PROJECT: Langan # 700114101 Date: 11/14/2022
GLA JOB NO.: 2012-0057
SAMPLE : B-20 / S-4
SAMPLE TYPE: Undisturbed
DESCRIPTION: Silty Sandy w. Gravel

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	1248	2220	3792
Displacement, % strain	9.88	9.84	9.88
Ultimate Stress, psf	1248	2220	3792
Displacement, % strain	9.88	9.84	9.88
Initial Dry Density, pcf	110.7	110.7	110.7
Initial Water Content,%	2.9	2.9	2.9
Final Water Content,%	9.0	9.0	9.0
Strain Rate, in/min.	0.025	0.025	0.025





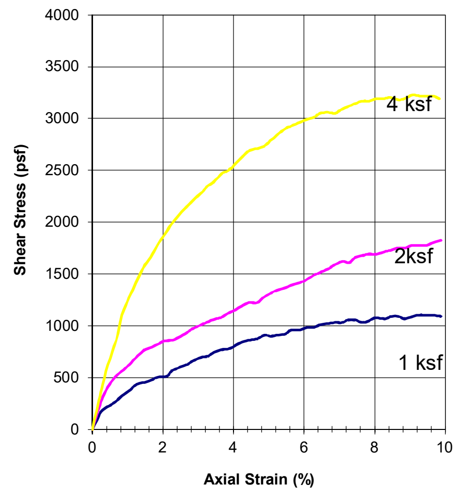
	Peak	Ultimate
C(psf)	400	400
φ	40.5	40.5

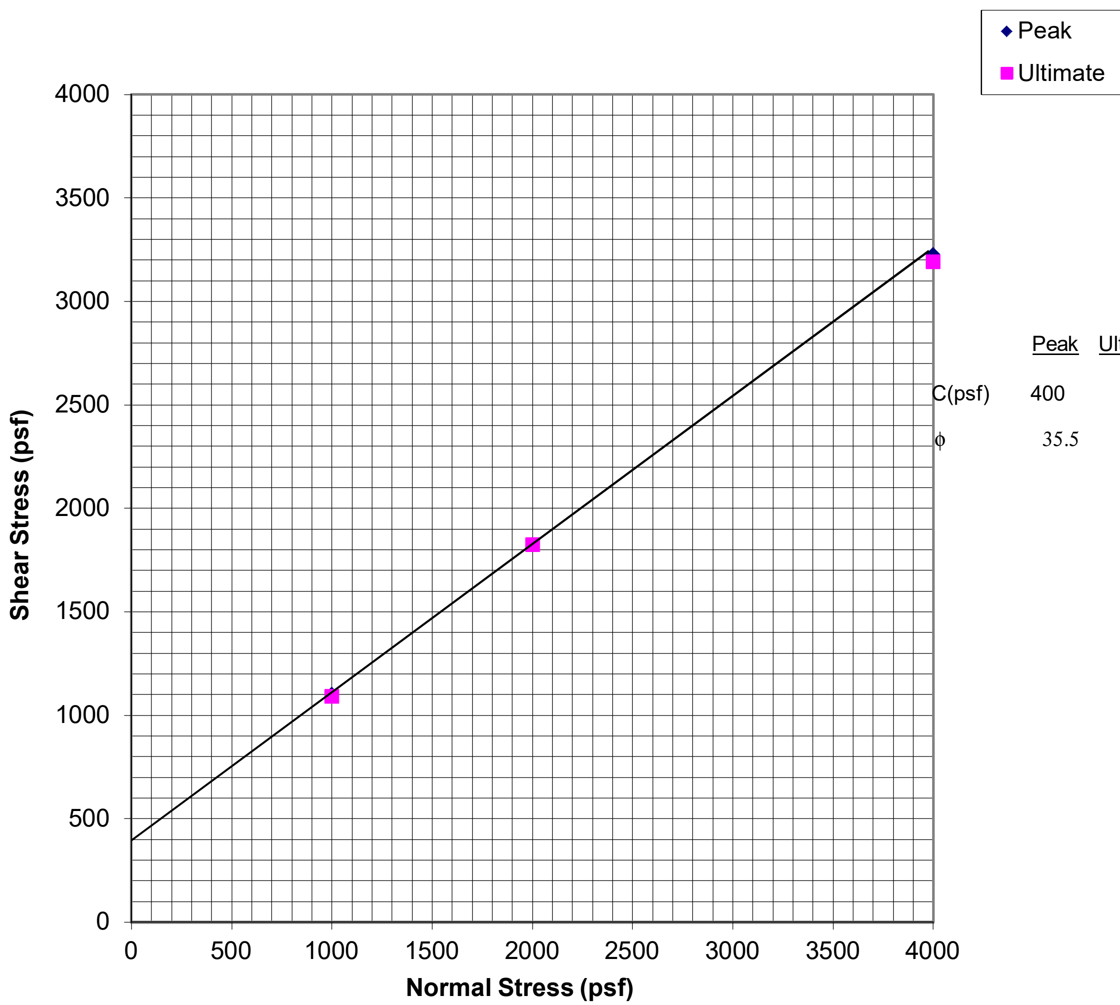
GeoLogic Associates

DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	12/5/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-21 / S-1		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	Silty Sand w. Gravel		

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	1104	1824	3228
Displacement, % strain	9.64	9.88	9.08
Ultimate Stress, psf	1092	1824	3192
Displacement, % strain	9.88	9.88	9.84
Initial Dry Density, pcf	115.4	115.4	115.4
Initial Water Content,%	4.8	4.8	4.8
Final Water Content,%	14.1	14.1	14.1
Strain Rate, in/min.	0.025	0.025	0.025



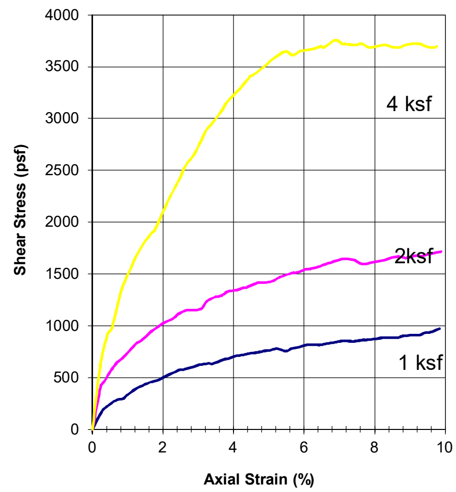


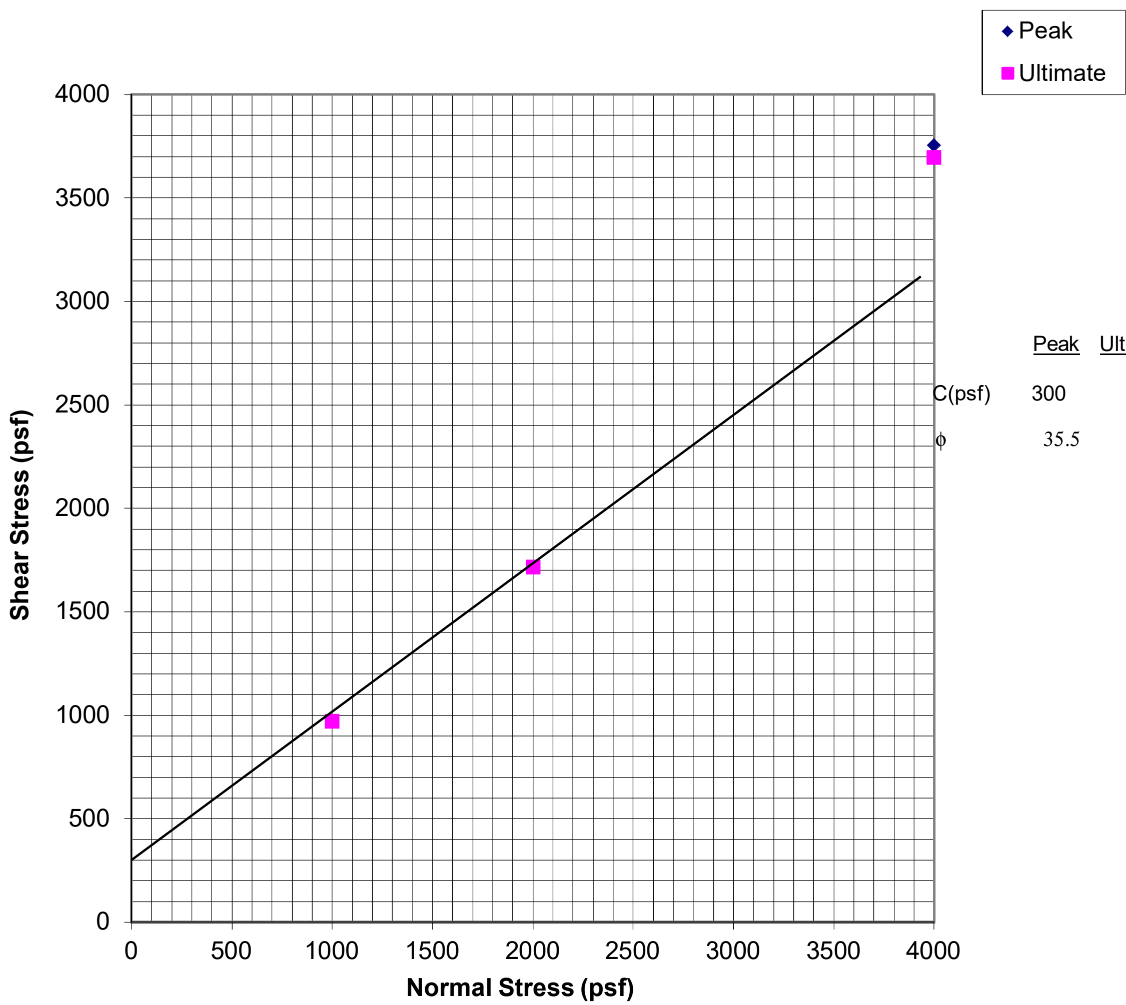
	Peak	Ultimate
C(psf)	400	400
φ	35.5	35.5

DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	12/5/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-28 / S-2		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	Silty Sand w. Gravel		

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	972	1716	3756
Displacement, % strain	9.84	9.88	6.56
Ultimate Stress, psf	972	1716	3696
Displacement, % strain	9.84	9.88	9.76
Initial Dry Density, pcf	119.3	119.3	119.3
Initial Water Content,%	5.4	5.4	5.4
Final Water Content,%	13.4	13.4	13.4
Strain Rate, in/min.	0.025	0.025	0.025





	Peak	Ultimate
C(psf)	300	300
ϕ	35.5	35.5

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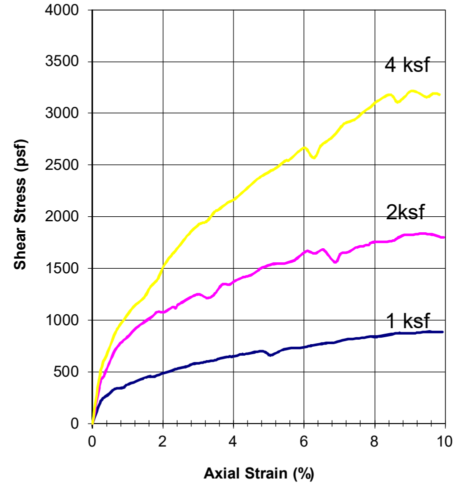
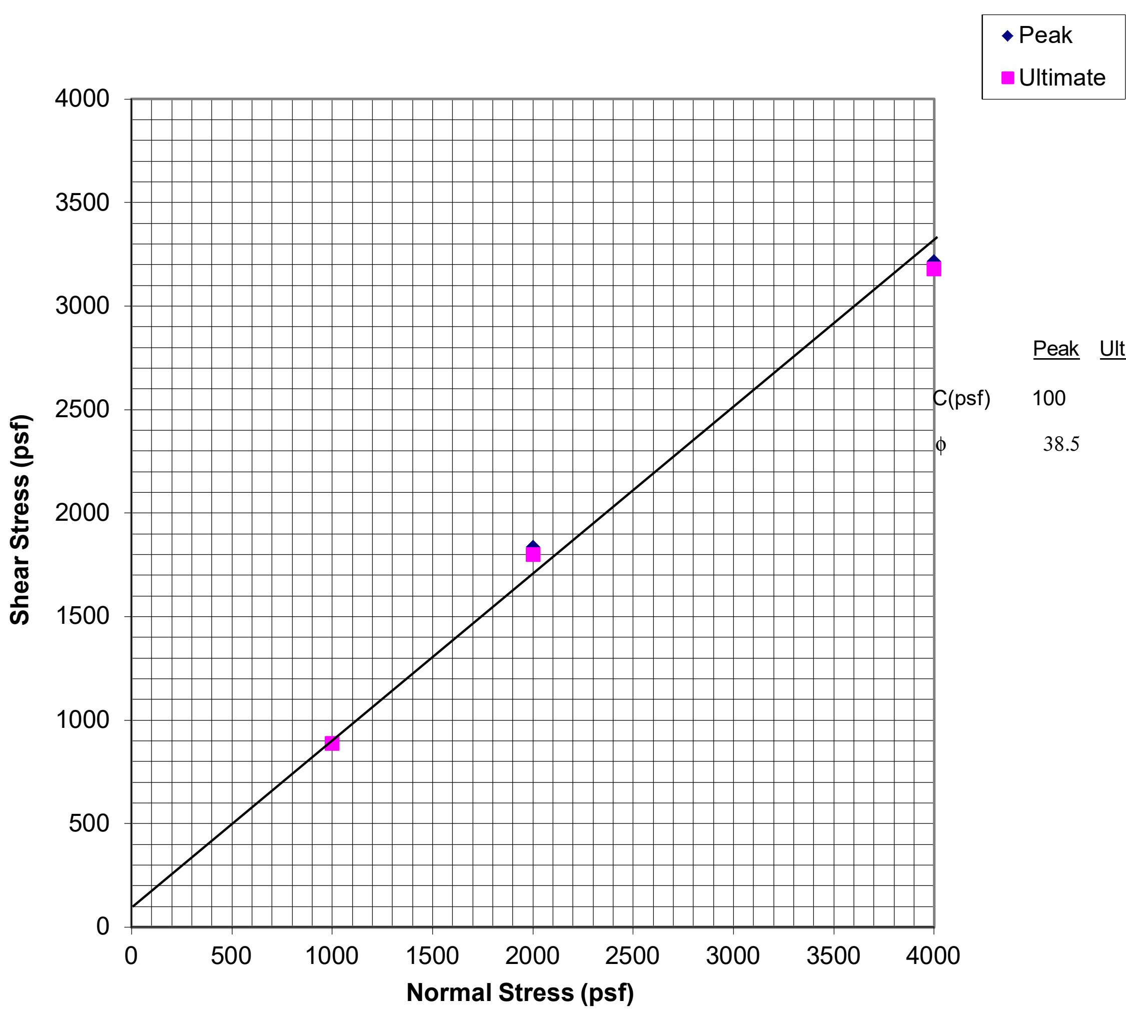
DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	11/14/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-28 / S-4		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	Silty Sandy w. Gravel		



Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	888	1836	3216
Displacement, % strain	9.92	9.44	9.04
Ultimate Stress, psf	888	1800	3180
Displacement, % strain	9.92	9.96	9.84
Initial Dry Density, pcf	97.5	97.5	97.5
Initial Water Content,%	2.9	2.9	2.9
Final Water Content,%	11.7	11.7	11.7
Strain Rate, in/min.	0.025	0.025	0.025



	Peak	Ultimate
C(psf)	100	100
ϕ	38.5	38.5

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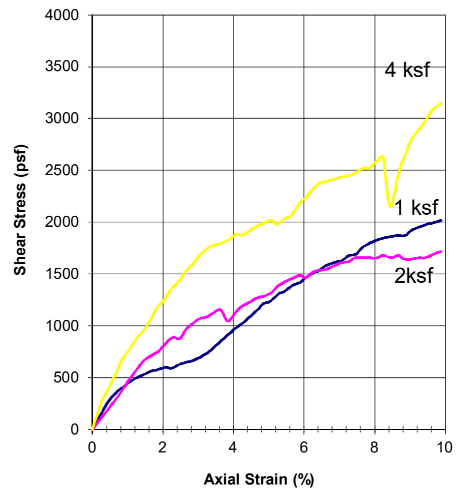
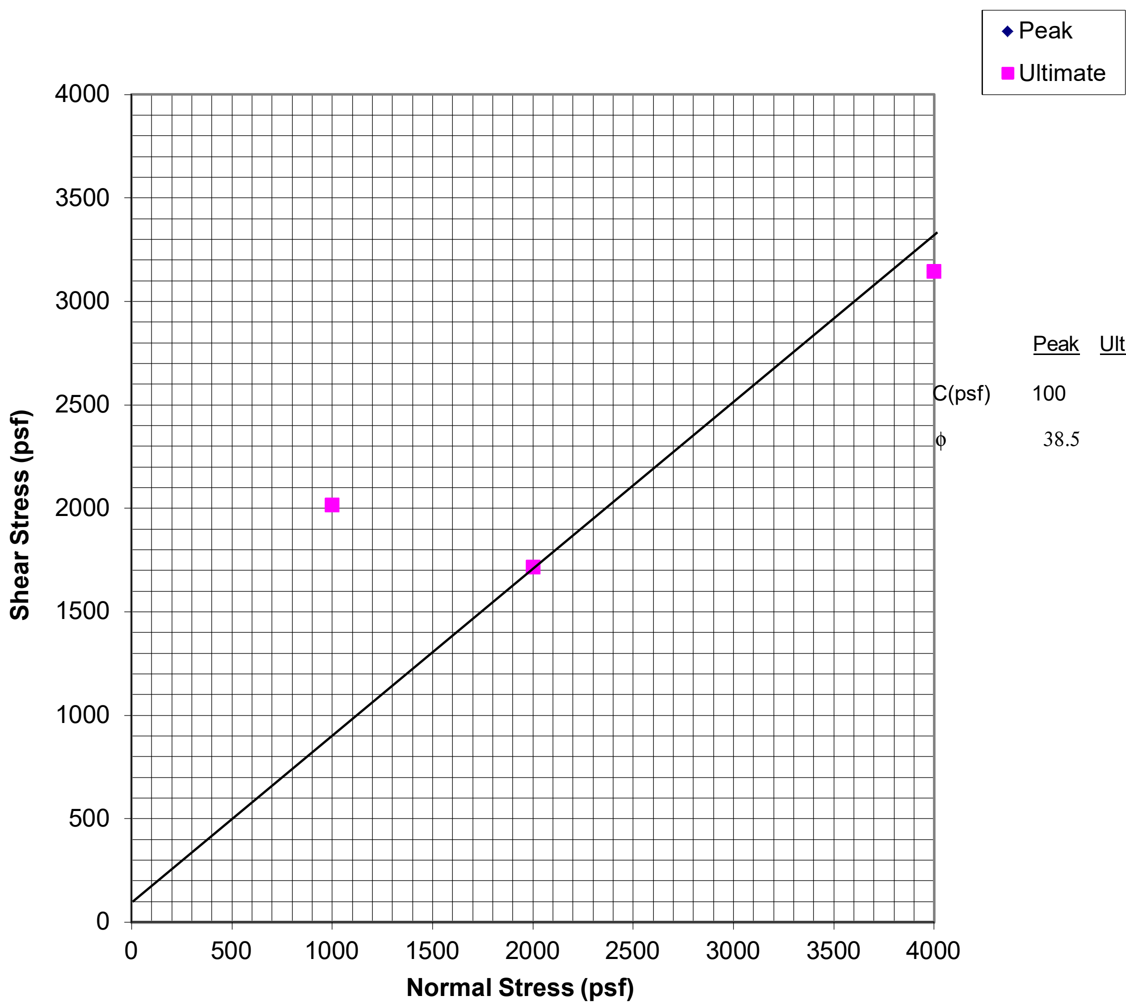
DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101
GLA JOB NO.:	2012-0057
SAMPLE :	B-33 / S-2
SAMPLE TYPE:	Undisturbed
DESCRIPTION:	Silty Sandy w. Gravel

Date: 11/14/2022

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	2016	1716	3144
Displacement, % strain	9.88	9.88	9.88
Ultimate Stress, psf	2016	1716	3144
Displacement, % strain	9.88	9.88	9.88
Initial Dry Density, pcf	113.2	113.2	113.2
Initial Water Content,%	2.8	2.8	2.8
Final Water Content,%	11.6	11.6	11.6
Strain Rate, in/min.	0.025	0.025	0.025



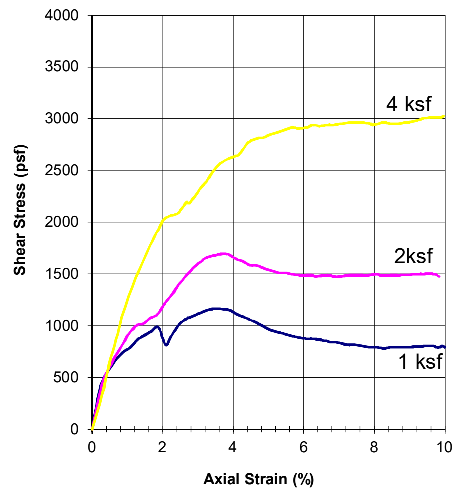


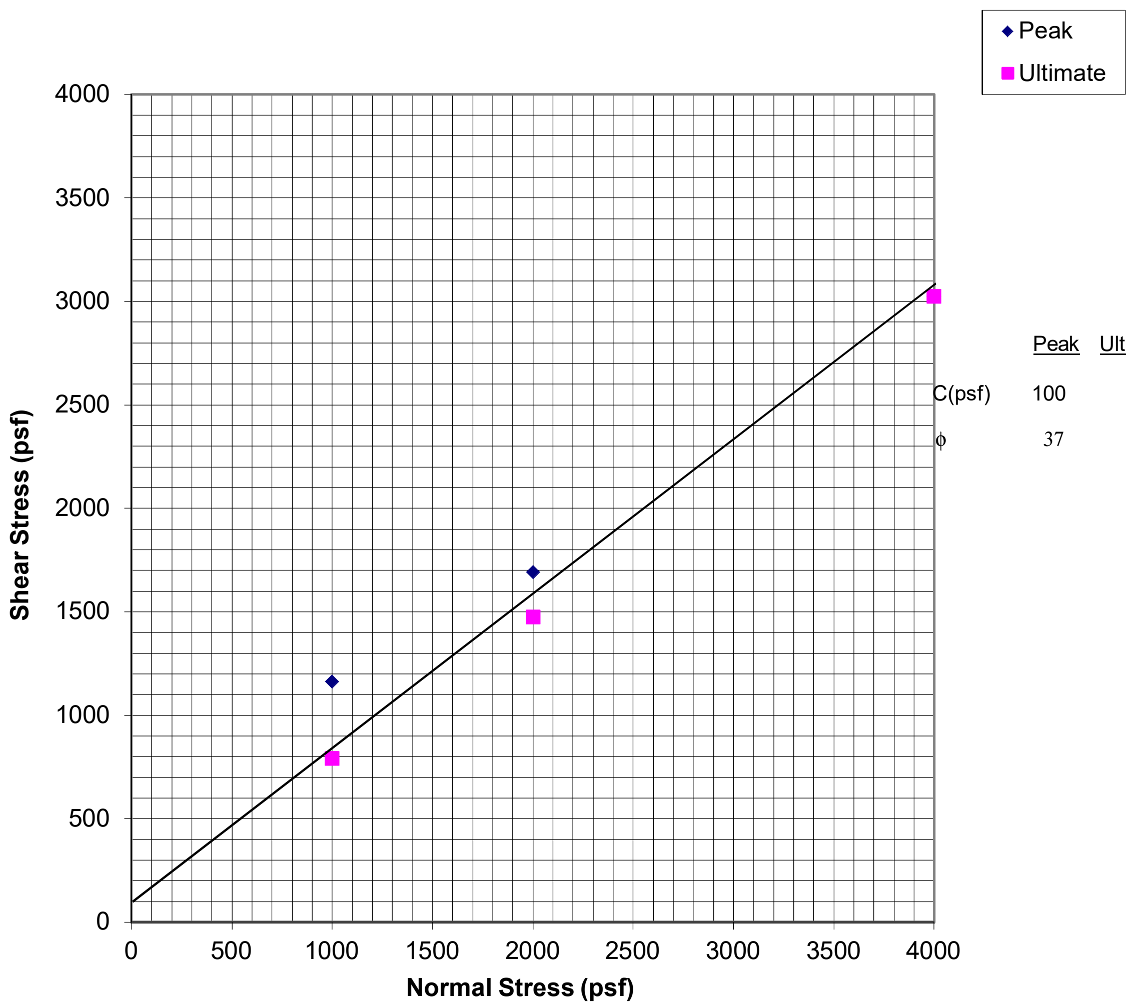
	Peak	Ultimate
C(psf)	100	100
ϕ	38.5	38.5

DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	11/14/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-37 / S-3		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	F. Silty Sandy w. trace Gravel		

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	1164	1692	3024
Displacement, % strain	3.28	3.64	9.96
Ultimate Stress, psf	792	1476	3024
Displacement, % strain	10	9.84	9.96
Initial Dry Density, pcf	123.7	123.7	123.7
Initial Water Content,%	3.5	3.5	3.5
Final Water Content,%	17.7	17.7	17.7
Strain Rate, in/min.	0.025	0.025	0.025





	Peak	Ultimate
C(psf)	100	100
ϕ	37	37

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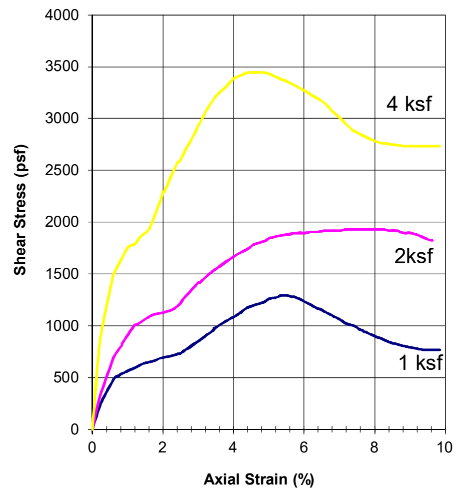
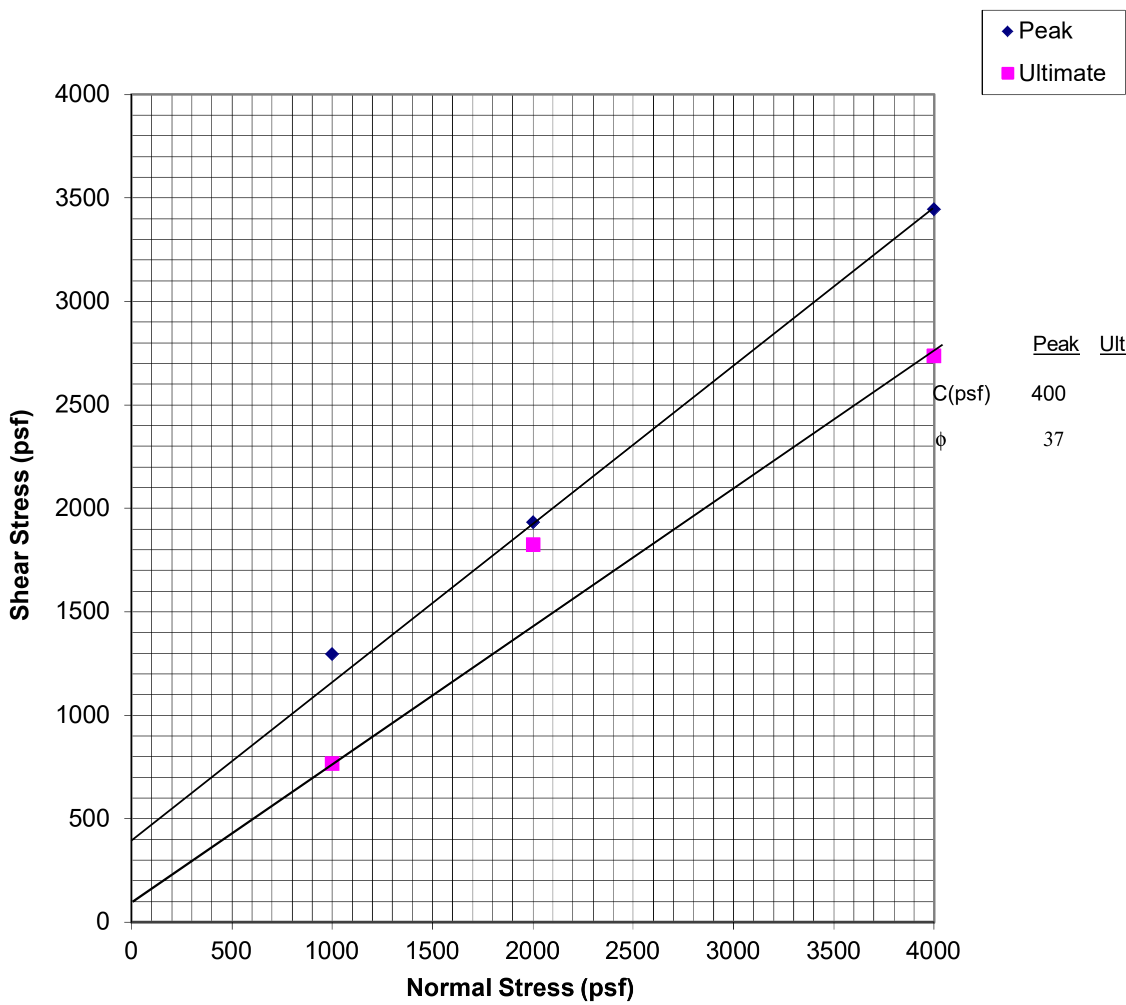
DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	11/14/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-40 / S-4		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	Clayey Sand		

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	1296	1932	3444
Displacement, % strain	5.4	7.2	4.4
Ultimate Stress, psf	768	1824	2736
Displacement, % strain	9.84	9.64	9.84
Initial Dry Density, pcf	123.4	123.4	123.4
Initial Water Content,%	10.7	10.7	10.7
Final Water Content,%	17.1	17.1	17.1
Strain Rate, in/min.	0.0084	0.0084	0.0084





	Peak	Ultimate
C(psf)	400	100
ϕ	37	33.5

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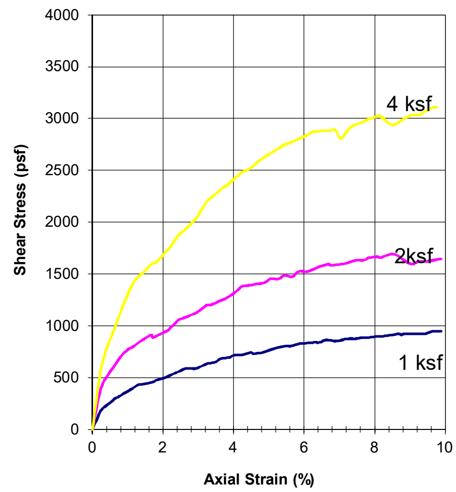
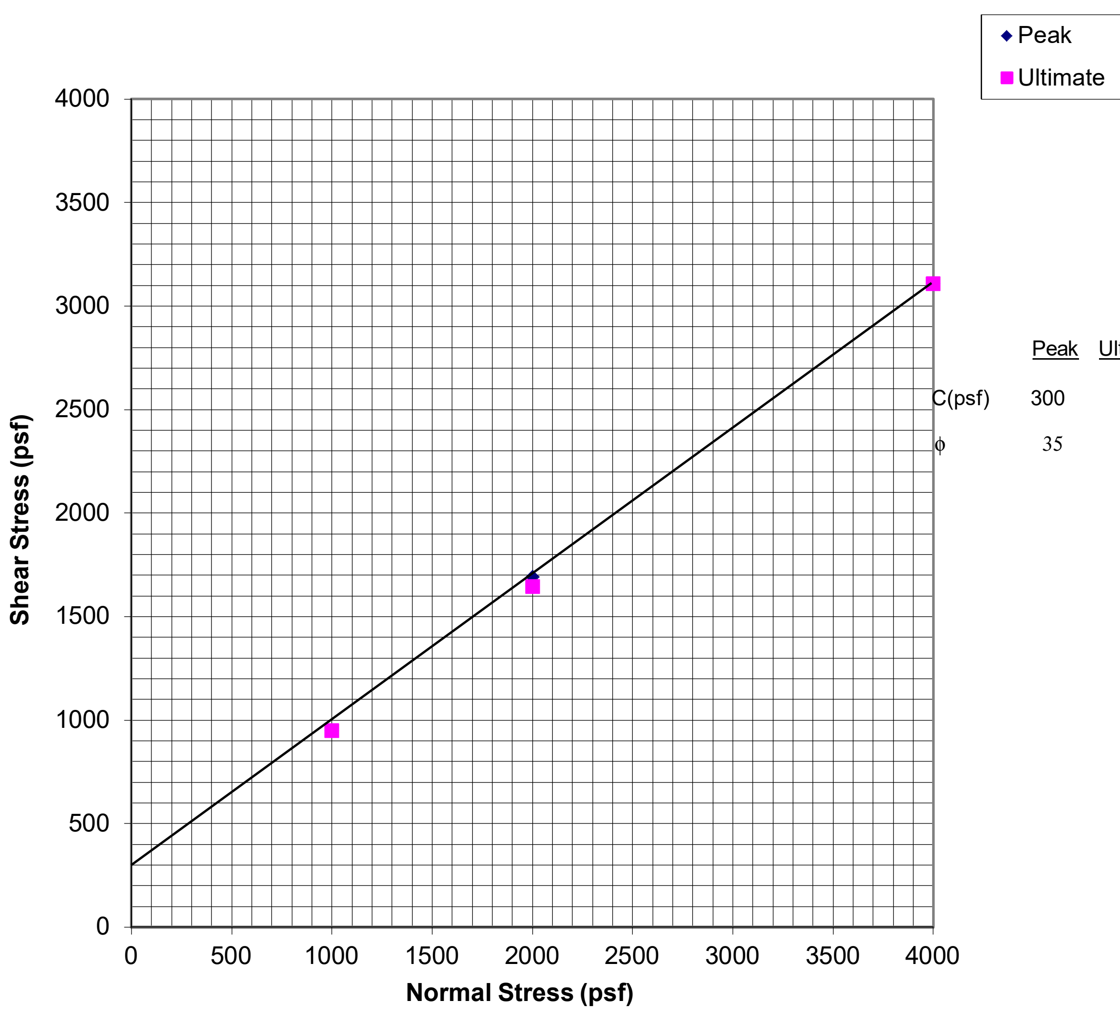
DIRECT SHEAR
ASTM D3080

PROJECT:	Langan # 700114101	Date:	12/5/2022
GLA JOB NO.:	2012-0057		
SAMPLE :	B-41 / S-1		
SAMPLE TYPE:	Undisturbed		
DESCRIPTION:	Silty Sand w. Gravel		

Specimen No.	1	2	3
Normal Stress, psf	1000	2000	4000
Peak Stress, psf	948	1692	3108
Displacement, % strain	9.88	8.44	10
Ultimate Stress, psf	948	1644	3108
Displacement, % strain	9.88	9.88	10
Initial Dry Density, pcf	114.7	114.7	114.7
Initial Water Content,%	2.3	2.3	2.3
Final Water Content,%	12.2	12.2	12.2
Strain Rate, in/min.	0.025	0.025	0.025

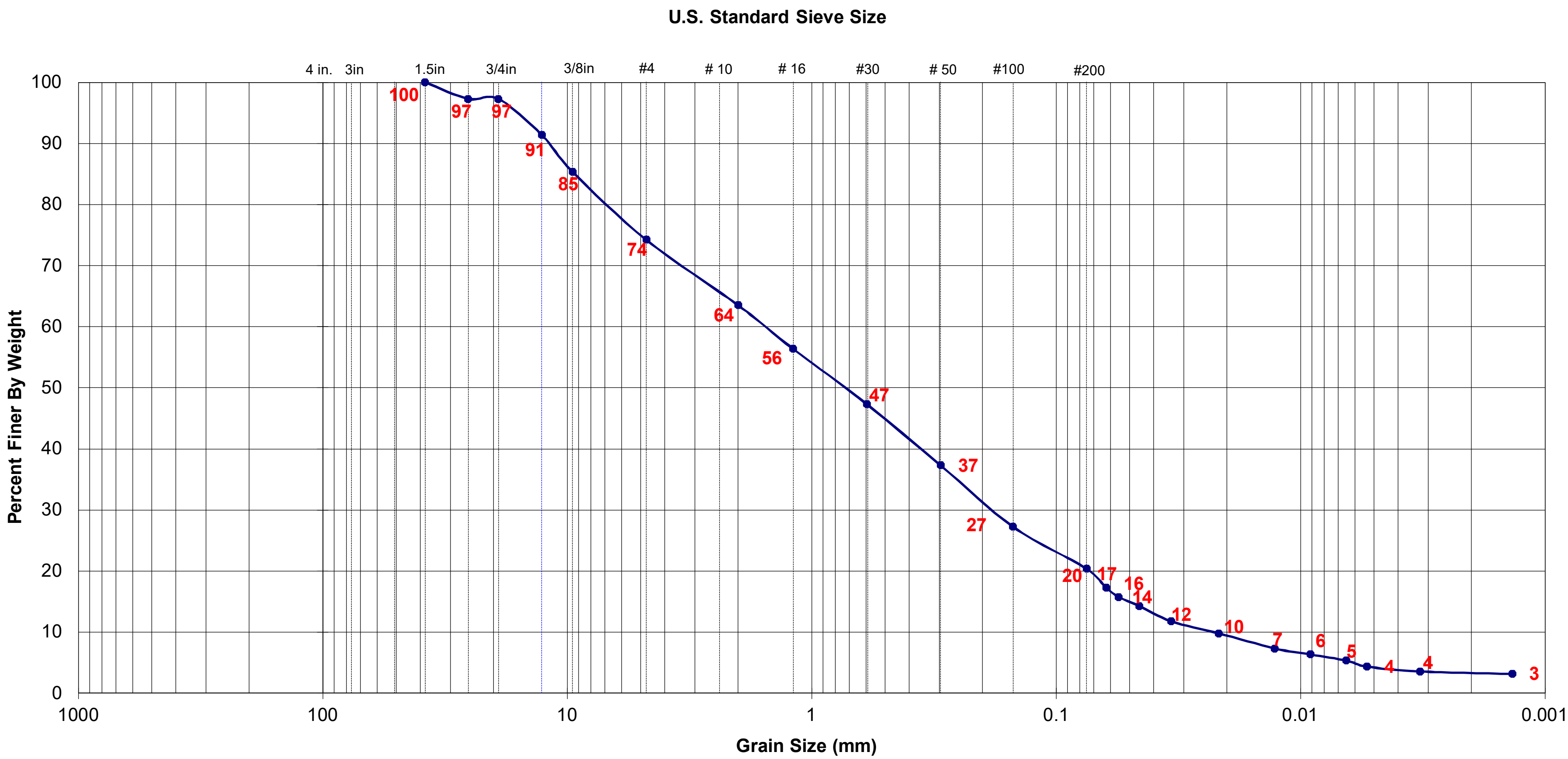




	Peak	Ultimate
C(psf)	300	300
ϕ	35	35

Langan # 700114101 GRAIN SIZE ANALYSIS - ASTM D 422 *Job No.2012-0057*

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-1 / S-2									SM	

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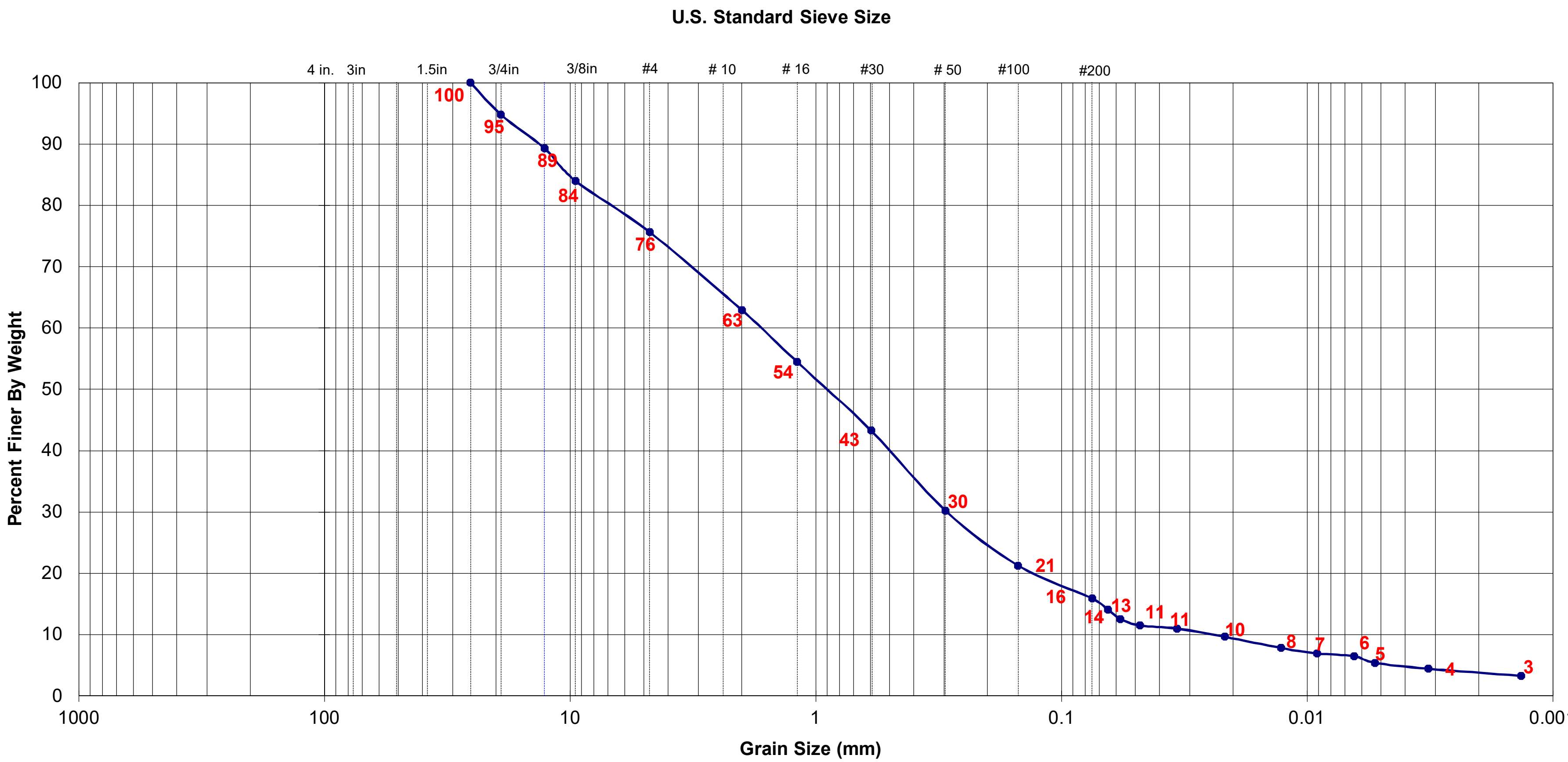
GRAIN SIZE ANALYSIS - ASTM D 422

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-2 / S-2									SM	

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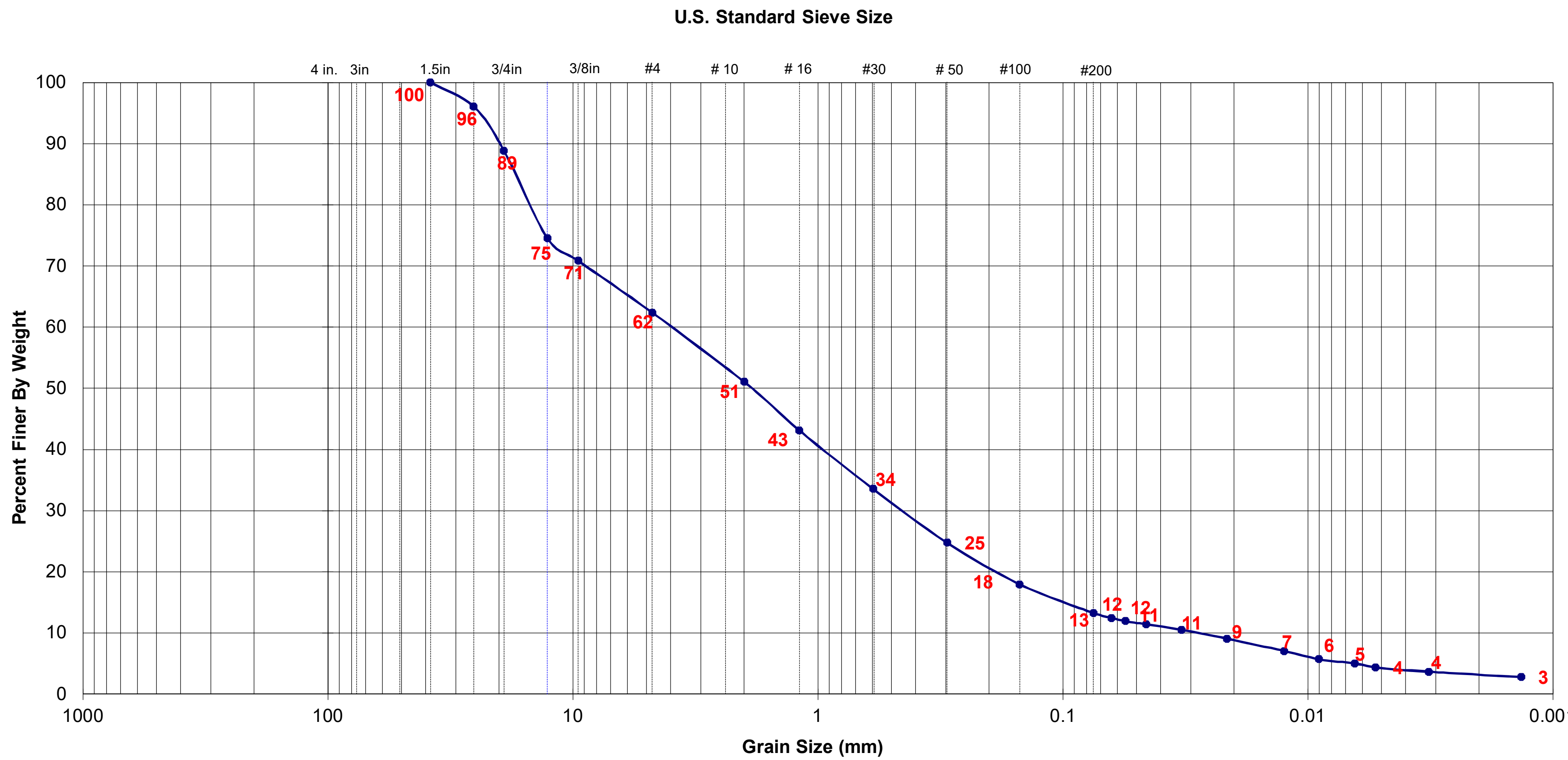
Langan # 700114101 GRAIN SIZE ANALYSIS - ASTM D 422 *Job No.2012-0057*

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-3 / S-3									SM	

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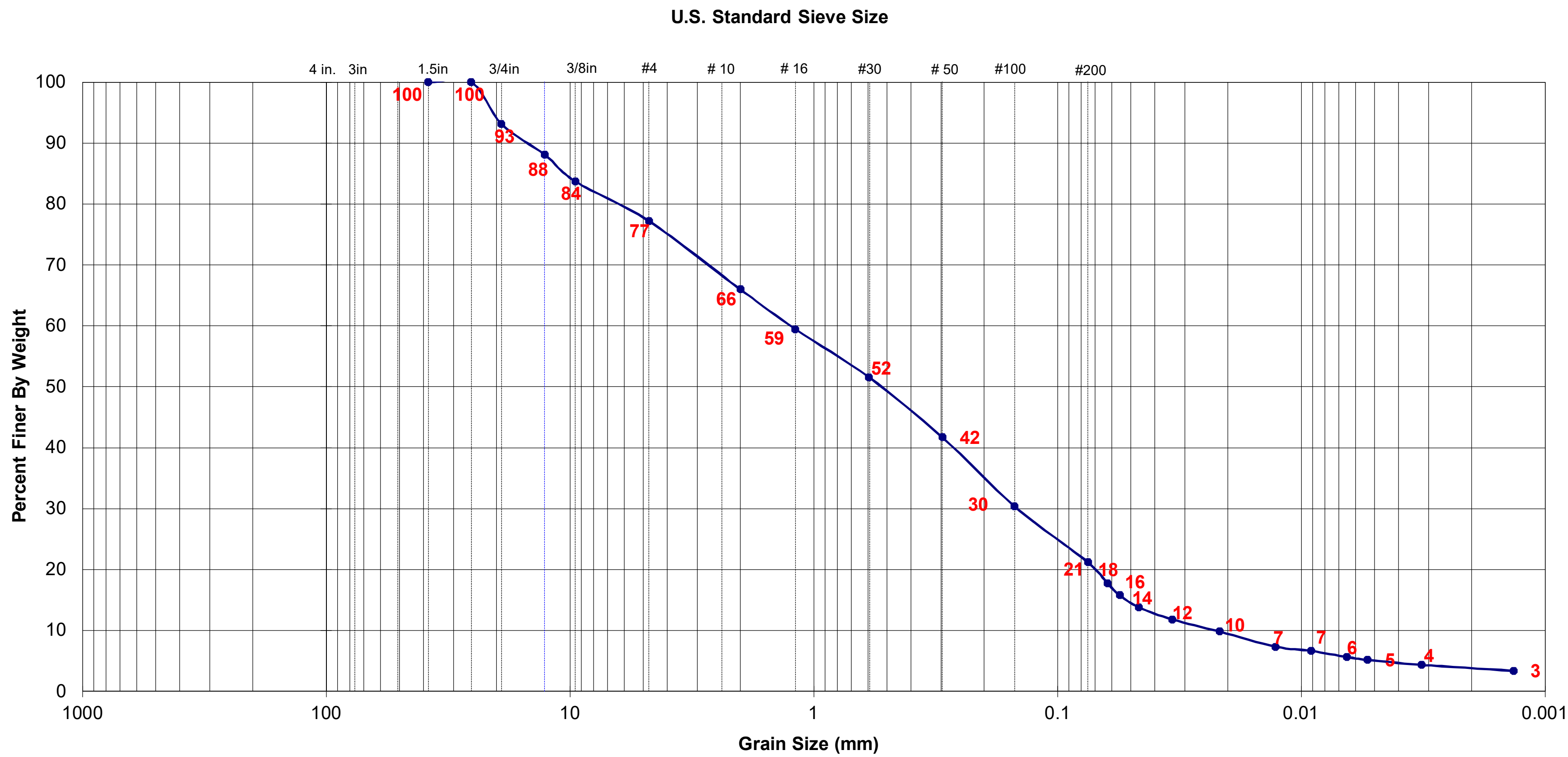
GRAIN SIZE ANALYSIS - ASTM D 422

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-4 / S-2									SM	

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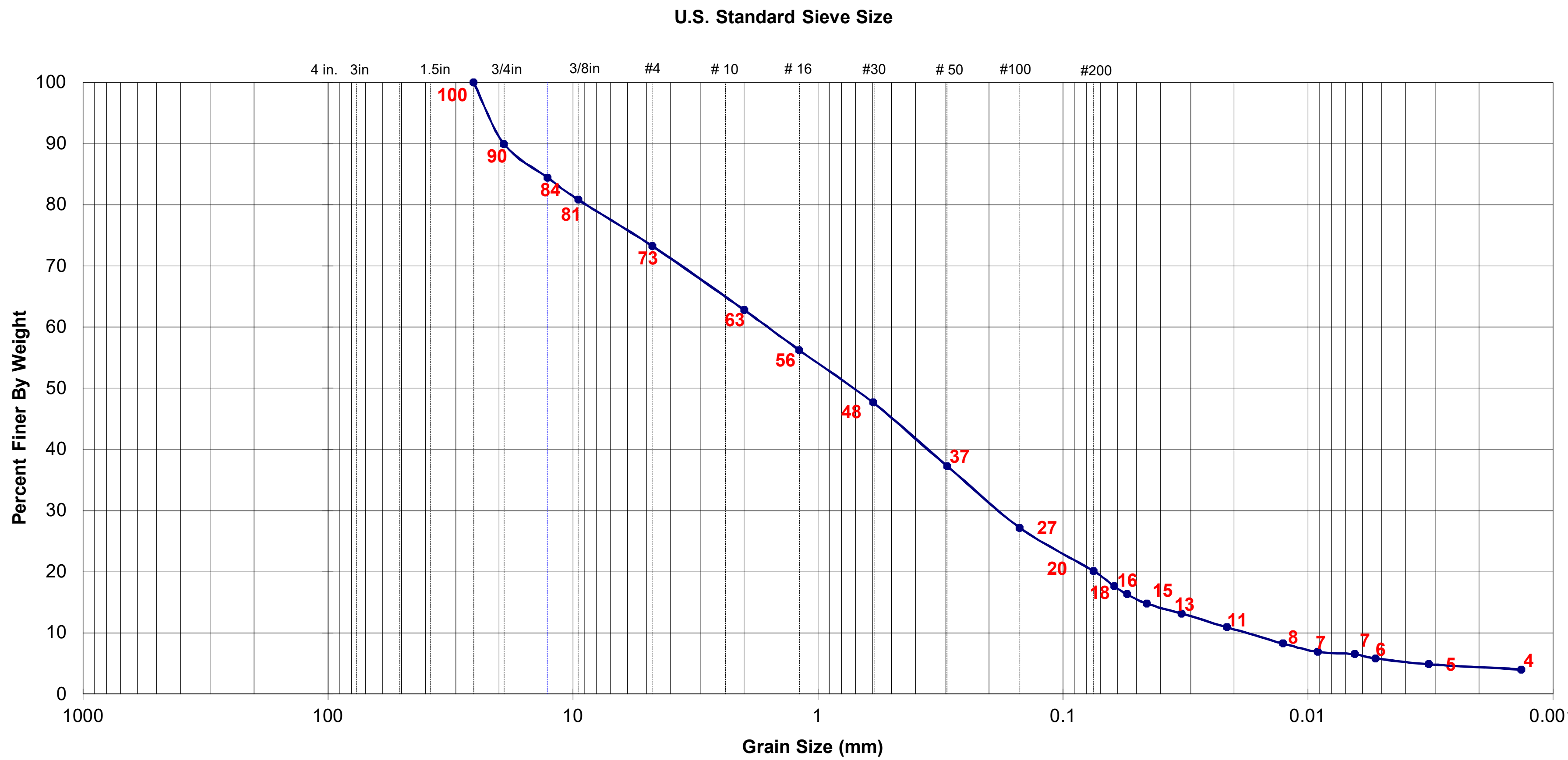
Langan # 700114101

GRAIN SIZE ANALYSIS - ASTM D 422

Job No.2012-0057

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-5 / S-11									SM	

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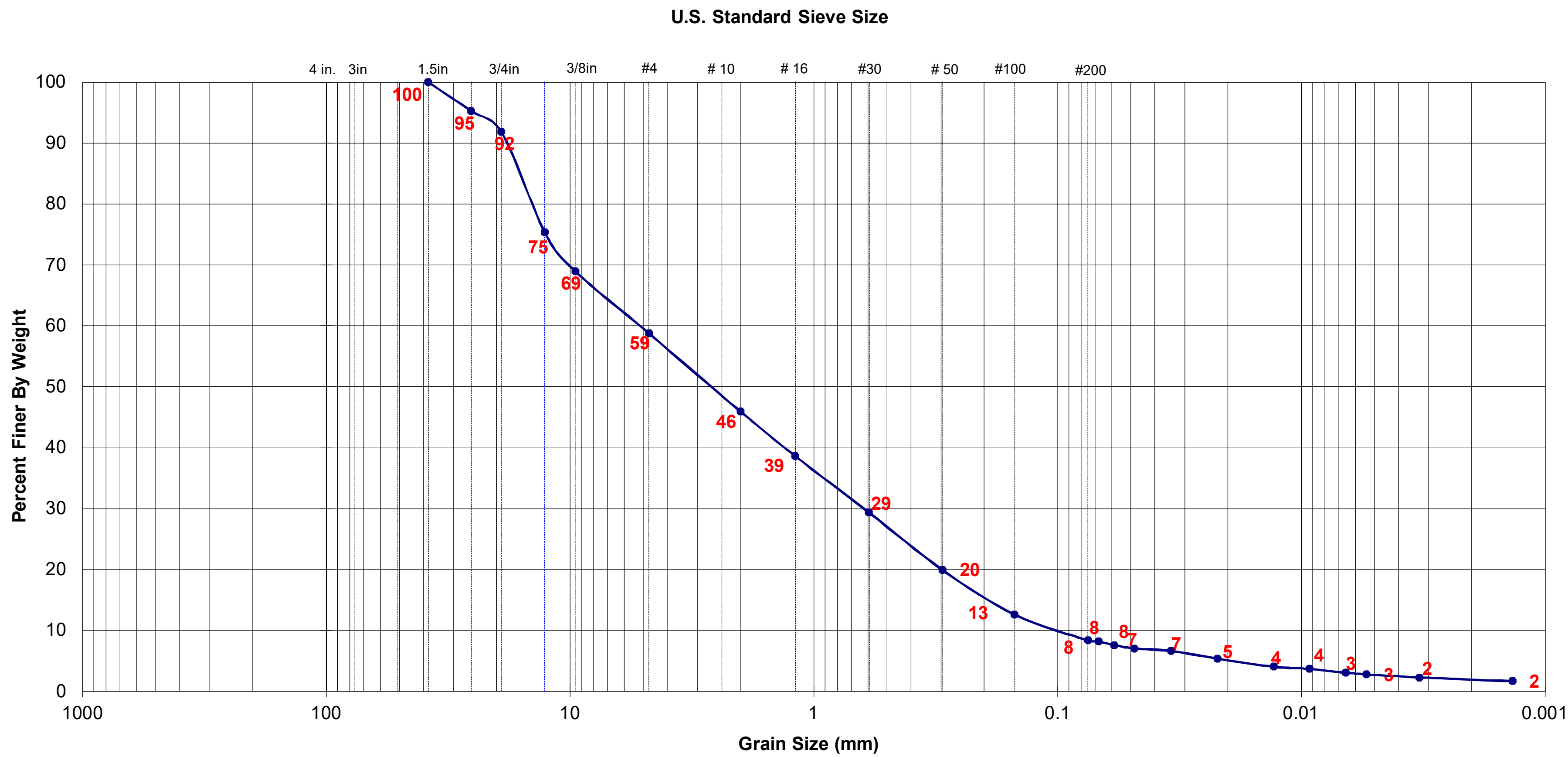
Langan # 700114101

GRAIN SIZE ANALYSIS - ASTM D 422

Job No.2012-0057

Date: 12/10/22



Boring / Sample No.	Initial Dry Density (pcf)	Initial Moist. (%)	Test Dry Density (pcf)	Test Moist. (%)	Permeabilty, k (cm/sec)	LL	PL	PI	Unified Soil Class.	Description
FP-6 / S-8									SM	

Geo-Logic ASSOCIATES

APPENDIX B
Prior Explorations and Laboratory Testing

EXPLORATORY BORINGS

We investigated the subsurface conditions at the site by drilling and sampling a total of 13 exploratory borings. Borings B-1 and B-3 through B-12 were drilled on August 24 and 25, 2020 using hollow-stem auger drilling equipment. Borings B-2 and B-13 were drilled on September 8, 2020 using bucket auger drilling equipment. The approximate locations of the explorations are shown on Figure 2.

The borings were advanced to depths of 6 to 61 feet below the existing ground surface. The borings were drilled to their target depths unless natural soils or refusal conditions were encountered at shallower depths. Multiple attempts were made a few feet away from the original boring location if shallow refusal conditions were encountered. Refusal conditions were commonly caused by cobbles, boulders, and inert debris (concrete, asphalt, etc.) being encountered.

The field explorations discussed herein were performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed and bulk samples for examination and laboratory testing. The soils encountered in the borings were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures A-1 to A-13 in this appendix.

The locations of the borings were laid out in the field by measuring from existing site features. Ground surface elevations at the exploration locations were estimated from a topographic survey plan prepared by Andreasen Engineering dated March 15, 2018 and should be considered approximate.

<u>Hollow-Stem Auger Borings</u>

Borings B-1 and B-3 through B-12 were drilled using truck-mounted hollow-stem auger drill equipment. An 8-inch outside diameter auger was used. Relatively undisturbed samples were obtained using a brass ring lined sampler (ASTM D 3550). The brass rings have an inside diameter of 2.4 2 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing the “free-fall” hammer described above. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches or portion thereof was recorded as the penetration resistance. These values are the raw uncorrected blow counts.

After completion, the borings were backfilled with the drill cuttings. Groundwater was not encountered.

<u>Bucket Auger Borings</u>

Borings B-2 and B-13 were drilled using truck mounted bucket auger drilling equipment. A 36-inch outside diameter bucket was used. Relatively undisturbed samples were obtained using a brass ring lined sampler as described above. The ring samples were driven into the soil by using the Kelly bar as a hammer. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

After completion, the borings were backfilled with the drill cuttings. Groundwater was not encountered.

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Landfill Material: À ! "#ÃÀ$%&ÃÀ() with gravel and cobbles, light brown, dry	
	3.6	119	98/8"	D		@ 2.5 feet, brown, slightly moist to moist, very dense, drilling rig chattering, debris likely	
	1.2		79	D	5	@ 5 feet, trace cobbles	1305
	4.8		15	S	10	@ 10 feet, slightly moist, cobble and boulder fragments	1300
			75	D	15	@ 15 feet, no recovery	1295
	4.9		17	S		@ 16 feet, medium dense, brown, slightly moist	
	3.1	119	50/6"	D	20	@ 20 feet, trace granitic rock fragments	1290
	3.7		41	S	25		1285
	2.7		26	S	30		1280
					35		1275
							1270

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

INERT DEBRIS LANDFILL

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FIGURE A-1

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
			90/11"	D	40	@ 40 feet, trace cobbles (cobble fragment in sampler tip)	
	7.9		39	S		Possible Natural: **À ! "#ÀÀ$%&ÀÀ()** brown, moist, very dense, with gravel, trace cobbles	
						Refusal @ 42.5 feet 1st Attempt had refusal @ 6 feet 2nd Attempt had refusal @ 6 feet 3rd Attempt had refusal @ 42.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

INERT DEBRIS LANDFILL

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FIGURE A-1

DESCRIPTION OF SUBSURFACE MATERIALS

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 actual conditions encountered.

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	Landfill Material: Ä ! "#ÄÄ$%&ÄÄ() light brown, dry with gravel and cobbles	
					@ 2 feet, some asphalt debris	
4.1	124		D		@ 3 feet, rebar strand	1295
					@ 4 feet, concrete debris, cored through, 4-5 inches thick	
2.5	116		D	5	@ 5 feet, brown, slightly moist	
					@ 6 feet, concrete debris, cored through 4-5 inches thick	
					@ 8 feet, dark brown, moist	1290
					@ 9 feet, concrete debris, cored through 4-5 inches thick	
				10	@ 10 feet, cobble and possible boulder fragments	
						1285
					@ 14 feet, trace gravel	
2.7	115		D	15	@ 15 feet, sand bag debris	
						1280
				20		
1.9	109		D		@ 21 to 24 feet, some asphalt debris	
						1275
				25		
					@ 28 feet, some concrete debris, coring attempted	1270
					Refusal @ 28.5 feet 1st Attempt had refusal @ 8 feet 2nd Attempt had refusal @ 9 feet 3rd Attempt had refusal @ 28.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
9-8-20

EQUIPMENT USED:
36 " Bucket Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE A-2

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						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 actual conditions encountered.	
				B	0	Landfill Material: **À ! "#ĀÀ$%&ĀÀ()** light brown, dry, with gravel and cobbles	
	2.3	114	60	D		@ 2.5 feet, brown, slightly moist, dense, trace gravel @ 3 feet, drill rig chattering	
							1295
	2.7		36	D	5	@ 5 feet, cobble fragments, disturbed sample	
							1290
	3.9		18	S	10	@ 10 feet, with gravel	
							1285
					15		
							1280
	4.9	114	21	D	20	@ 20 feet, medium dense, slightly moist	
							1275
					25	Refusal @ 25 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

INERT DEBRIS LANDFILL

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FIGURE A-3

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
					0	Landfill Material: **Ā ! "#ĀĀ$%&ĀĀ()** light brown, dry, with gravel and cobbles 0 to 4 feet, drill rig chattering	
	1.7		50/5"	D			1265
	3.5		21	S	5	@ 5 feet, brown, moist, medium dense, trace cobbles	
							1260
	4.3		50/3"	D	10	@ 10 feet, some concrete debris, granitic rock fragments	
							1255
					15		
							1250
	6.4		17	S	20	@ 20 feet, medium dense, slightly moist, gravel and cobble fragments	
							1245
					25		
							1240
	4.8	110	28	D	30	@ 30 feet, slightly moist, some concrete debris	
						Refusal @ 33 feet	1235

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE A-4

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* 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 actual conditions encountered.	ELEVATION (FEET)
			B	0	1-Inch AGGREGATE BASE	
					Landfill Material: **À ! "#ÃÀ$%&ÃÀ()** brown, slightly moist, with gravel	1250
7.3	104	64	D		@ 2.5 feet, moist, dense	
1.9	106	30	D	5	@ 5 feet, dry, some asphalt debris	
						1245
10.3		10	S	10	@ 10 feet, medium dense, moist, cobble fragments	
					@ 10 to 15 feet, drill rig chattering	
						1240
				15		
						1235
		50/6"	D	20	@ 20 feet, no recovery	
2.6		52	S		@ 21 feet, dry, trace asphalt debris	
					@ 20 to 30 feet, drill rig chattering	1230
				25		
						1225
1.2		50/5"	S	30	@ 30 feet, dry, trace cobbles, some gravel, light greyish brown	
						1220
				35		
						1215

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

INERT DEBRIS LANDFILL

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FIGURE A-5

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* 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 actual conditions encountered.	ELEVATION (FEET)
	5.0		50/6"	D	40	Natural: **À ! "#ÃÀ$%&ÃÀ()** with gravel, reddish brown, slightly moist, disturbed sample	1210
					45		1205
	6.2		29	S	50	**À ! "#ÃÀ$%&ÃÀ()** reddish brown, slightly moist, medium dense, trace porosity, trace gravel	1200
					55		1195
			50/6"	D	60	@ 60 feet, some clay, disturbed sample	
						Total Depth 61 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-24-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

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FIGURE A-5

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
				0	Landfill Material: À ! "#ÃÀ$%&ÃÀ() brown, slightly moist, with gravel and cobbles	
3.3	114	35	D		@ 0 to 3 feet, dry, drill rig chattering @ 2.5 feet, medium dense, pieces of asphalt	1240
1.0	111	15	D	5	@ 5 feet, trace cobbles, grayish brown, less silt	
						1235
2.9		14	S	10	@ 10 feet, slightly moist, cobble fragments in sample tip	
						1230
				15		
						1225
6.3	97	22	D	20	@ 20 feet, slightly moist, piece of glass in sampler tip	
						1220
				25	@ 25 to 30 feet: strong organic odor	
						1215
5.6		50/5"	D	30	À ! "#ÃÀ$%&ÃÀ() dark brown, slightly moist, trace wood chips	
					@ 32.5 Refusal	

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 actual conditions encountered.

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I

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FIGURE A-6

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Compacted Fill: **7* * . !#Ā+ .$ &8&Ā+ . $98!Ā: ";** **À !"Ā$%&Ā$%&Ā+ 70+ ( )Ā**greyish brown, dry, with cobbles	
			90/11"	D		@ 2.5 feet, very dense, cobble fragments in sampler tip	
							1240
	3.6		69	S	5	@ 5 feet, very dense	
							1235
	6.0	118	50/5"	D	10	@ 10 feet, slightly moist	
						Refusal @ 13 feet 1st Attempt had refusal @ 4 feet 2nd Attempt had refusal @ 13 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

PROJECT NO.: 2993.04I

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FIGURE A-7

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Fill: À ! "#ÃÀ$%&ÃÀ() light brown, dry, with gravel and cobbles	
	0.5		93/10"	D		@ 2.5 feet, trace cobbles	1255
	4.0	114	95/9"	D	5	Natural: À ! "#ÃÀ$%&ÃÀ() orange brown, dry to slightly moist, very dense, with gravel, some cobbles	
	4.5		92	S			
						Total Depth 7.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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FIGURE A-8

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* 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 actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **À ! "#ÃÀ$%&ÃÀ()** light brown, dry, with gravel	
						Natural: **À ! "#ÃÀ$%&ÃÀ()** orange brown, slightly moist, very dense, with gravel	
	7.4	114	68	D			1230
	2.8	119	68	D	5	@ 5 feet, dry, very dense, trace clay, some gravel	
						Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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FIGURE A-9

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **À ! "#ÀÀ$%&ÀÀ()** light brown, dry, with gravel and cobbles	
							1230
	2.5	110	25	D		@ 2.5 feet, slightly moist, medium dense	
						@ 4 to 10 feet, drill rig chattering	
			32	D	5	@ 5 feet, no recovery	
	1.1		21	S			
							1225
	2.0		14	S	10		
						@ 12 feet, drill rig chattering	1220
					15		
							1215
	2.5	112	50/5"	D	20	@ 20 feet, very dense, pieces of cobble in sampler tip	
							1210
					25		
							1205
	11.8		44	S	30	Natural: **À ! "#ÀÀ$%&ÀÀ()** reddish brown, moist, dense to very dense, trace clay, some gravel	
							1200
	11.6	116	25	D	35		
						Total Depth 36 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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FIGURE A-10

MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				0	Fill: **Ä ! "#ĀÄ$%&ĀÄ()** light brown, moist, with gravel and cobbles	
6.2		76	D		Natural: **Ä$%&Ā "; ĀÄ ! "ĀÄ70Ä()** orange brown, slightly moist, very dense, trace gravel and cobbles	
						1220
5.9		79/11"	D	5		
		50/6"	S			
		50/3"	D		@ 7.5 feet, no recovery	
						1215
6.1	108	61	D	10	@ 10 feet, trace cobble fragments in sampler	
						1210
6.9		32	S	15	**Ä ! "#ĀÄ$%&ĀÄ()** reddish brown, slightly moist, dense, trace clay	

Total Depth 16.5 feet
1st Attempt had refusal @ 2 feet
2nd Attempt had refusal @ 2 feet
3rd Attempt had refusal @ 16.5 feet

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

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FIGURE A-12

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Fill: Ā ! "#ĀĀ$%&ĀĀ() dark brown and greyish brown, dry, with gravel and cobbles	
						@ 0 to 4 feet, drill rig chattering	
	2.8	113					
							1235
	3.1	117	46	S	5	@ 5 feet, brown, some concrete debris, slightly moist, dense	
							1230
	2.2	122	52	D	10	@ 10 feet, dark grey, some rootlets	
							1225
	10.3		28	S	15	@ 15 feet, dark brown, moist, medium dense, some brick debris	
						Total Depth 16.5 feet 1st Attempt had refusal @ 4 feet 2nd Attempt had refusal @ 16.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-25-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

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FIGURE A-11

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **À ! "#ÃÀ$%&ÃÀ()** light brown, dry, with gravel	
						@ 0.5 feet, 6 inch asphalt debris (to 3 feet in size)	
						@ 2 feet, some cobbles	
						@ 3 feet, some brick and concrete debris	1265
						@ 4 feet, slightly moist	
					5		
						@ 6 feet, drill rig chattering	
						@ 7 feet, brown, slightly moist to moist	1260
						@ 9 feet, brick pieces, some cobbles, some metal debris	
					10	Refusal @ 10 feet (boulder) 1st Attempt had refusal @ 10 feet 2nd Attempt had rig break down @ 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
9-8-20

EQUIPMENT USED:
36 " Bucket Auger

GROUNDWATER LEVEL (ft):
Not Encountered

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FIGURE A-13

APPENDIX B

APPENDIX B

TEST PITS

Test Pits (TP-1 through TP-18)

We investigated the subsurface conditions at the site by excavating eighteen test pits (TP-1 through TP-18) using a backhoe on August 26 and 27, 2020. These test pits were excavated to depths of approximately 3 to 10 feet below the existing ground surface. The approximate locations of the pits are shown Figure 3. Bulk samples of the materials encountered were obtained for examination and testing in our laboratory.

The test pits were performed under the continuous technical supervision of GPI's representative, who maintained detailed logs of the test pits, classified the soils encountered, and obtained bulk samples of the soils encountered for examination and laboratory testing. The soils encountered in the test pits were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. After completion, the test pits were backfilled with the soil cuttings with only limited compaction. Detailed logs of the test pits TP-1 through TP-18 test pits are presented in Figures B-1 to B-18 in this appendix.

Test Pits (TP-19 through TP-32):

On November 5, 2021, an Engineering Geologist from GPI observed and logged 14 exploratory test pits excavated with a track mounted excavator operated by Arcadia Reclamation Inc. (ARI). The approximate locations of test pits TP-19 though TP-32 are shown on Figure 2. The materials encountered in each test pit are summarized in Table B-1 included in this appendix.

Test Pit Location and Elevation

The locations of the test pits were laid out in the field by measuring from existing site features. Ground surface elevations at the exploration locations were estimated from a topographic survey plan prepared by Andreasen Engineering dated March 15, 2018 and should be considered approximate.

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Landfill Material: **Ā! "#ĀĀ$%&ĀĀ()** light brown, dry, with gravel and cobbles @ 2.5 feet, clay pipe debris @ 3 feet, boulders	
					5	Total Depth 5 feet	1305

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-1

					0	Landfill Material: **Ā! "#ĀĀ$%&ĀĀ()** light brown, dry, with cobbles, gravel, and rubble @ 2 feet, concrete debris (pieces to 2 feet in size), cobbles, few boulders @ 3 feet, asphalt debris, (pieces to 3 feet in size and 6 to 8 inches thick)	1295
					5	@ 4 feet, concrete debris (pieces to 3 feet in size, 3-5 inches thick) **.* * 2!#Ā+ 2$ &-&Ā+ 2$3-!Ā4 "5ĀĀ$%&Ā+ .) Ā**light brown, dry, with cobbles	1290
					10	@ 6 feet, some asphalt and concrete debris, piece of pipe (possible transite) Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-2

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
				B	0	Landfill Material: À ! "#ÃÀ$%&ÃÀ() light brown, dry, with gravel and cobbles @ 2.5 feet, slightly moist to moist @ 3 feet, some brick and asphalt debris (pieces to 1 foot in size)	
					5	Total depth 5 feet	1295

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-3

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Landfill Material: À ! "#ÃÀ$%&ÃÀ() light brown, dry, with gravel and cobbles @ 2 feet, concrete debris (1.5 feet in size, 5 to 6 inches thick), some asphalt debris	1265
					5	@ 2.5 feet, slightly moist @ 3 feet, oxidized iron pipe, 1 inch in diameter @ 5 feet, concrete debris (2 feet by 2.5 feet, 4 inches thick) @ 7.5 feet, moist @ 8 feet, some asphalt debris	1260
					10	Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-4

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	*DESCRIPTION OF SUBSURFACE MATERIALS* 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 actual conditions encountered.	ELEVATION (FEET)
	8.5	118		B	0	1 inch AGGREGATE BASE	
	8.5	118				Landfill Material: À ! "#ĀÀ$%&ĀÀ() light brown, dry, with gravel and cobbles	1250
						@ 2 feet, brown, slightly moist, concrete debris (1 foot by 2 feet, 3 to 4 inches thick), rebar	
					5	@ 3 feet, some brick debris	
						@ 4 feet, some asphalt debris	
						Total Depth 6 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-5

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Landfill Material: À ! "#ĀÀ$%&ĀÀ() light brown, dry, with gravel, trace cobbles	
						@ 2 feet, some asphalt debris	1240
						@ 3 feet, some asphalt debris	
						@ 3.5 feet, slightly moist	
					5		
						Total Depth 7 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

GPI

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FIGURE B-6

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						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 actual conditions encountered.	
					0	Compacted Fill: **Ȁ ! "#ȀȀ$%&ȀȀ()** light brown, dry, with gravel and cobbles @ 1.5 feet, slightly moist @ 3 feet, claystone pipe @ 4 feet, pieces of brick and asphalt (6 inch in size)	1240
	9.0 9.0	119 119		B	5	@4.5 feet, slightly moist to moist, less cobbles	1235
					10	Total Depth 10 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-7

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: **Ȁ ! "#ȀȀ$%&ȀȀ()** light brown, dry, with gravel and cobbles @ 3 feet, some asphalt debris @ 4 feet, concrete debris (2 feet by 2 feet)	1255
				B	5	Natural: **+2$ 3-! ! #ȀȀ$%&ȀȀ.)** orange brown, moist, trace cobbles Total Depth 5.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-8

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **À ! "#ĀÀ$%&ĀÀ()** light brown, dry, with gravel	
						Natural: **À ! "#ĀÀ$%&ĀÀ()** orange brown, moist, very dense, some gravel and cobbles	
						Total Depth 3 feet @ 3 feet, probes firm and unyielding, very dense	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-26-20
EQUIPMENT USED:
24Backhoe
GROUNDWATER LEVEL (ft):
Not Encountered

GPI

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FIGURE B-9

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: **À ! "#ĀÀ$%&ĀÀ()** light brown, dry, with gravel and cobbles	1210
				B	5	Natural: **À$%&Ā "5ĀÀ ! "ĀÀ.0À()** light brown, slightly moist, with gravel	1205
						Total Depth 8 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED:
8-26-20
EQUIPMENT USED:
24Backhoe
GROUNDWATER LEVEL (ft):
Not Encountered

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FIGURE B-10

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: **À ! "#ĀÀ$%&ĀÀ()** light brown, dry, with cobbles	
						@ 2 feet, brick debris, rebar, boulders (1 to 2 feet in size)	
						Natural: **À$%&Ā "5ĀÀ ! "ĀÀ.0À()** orange brown, slightly moist, with gravel and cobbles	1220
					5		
						Total Depth 8 feet	

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 actual conditions encountered.

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-11

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: **À ! "#ĀÀ$%&ĀÀ()** light brown, dry, with gravel and cobbles	
						@ 2 feet, concrete debris (1 foot by 2 feet, 3 to 4 inches thick)	
						@ 2.5 feet, slightly moist, some brick debris	1235
					5	@ 3 feet, boulders	
						@ 4 feet, slightly moist to moist	
						@ 4. 5 feet, metal stake	
						@ 5 feet, brown, moist	
						Total Depth 7.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-26-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE B-12

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						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 actual conditions encountered.	
				B	0	Fill: À ! "#ÃÀ$%&ÃÀ() light brown, dry, with gravel and cobbles @ 2 to 4 feet, boulders, 1 to 4 feet in diameter	1250
					5		1245
						Natural: À ! "#ÃÀ$%&ÃÀ() reddish brown, slightly moist, very dense, trace gravel	
						Total Depth 7 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-27-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE B-13

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: À ! "#ÃÀ$%&ÃÀ() light brown, dry, with gravel and cobbles @ 0.5 feet, slightly moist @ 1 foot, some asphalt debris @ 2 feet, some boulders	1240
					5		1235
						Total Depth 7.5 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-27-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

GPI

PROJECT NO.: 2993.04I
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FIGURE B-14

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS 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 actual conditions encountered.	ELEVATION (FEET)
					0	Fill: **À ! "#ÃÀ$%&ÃÀ()** light brown, dry, with gravel and cobbles @ 1 foot, slightly moist @ 2 feet, boulders (12 inches in diameter)	1240
	9.0 9.0	120 120		B	5	Natural: **4 - ! ! Ā+2$ &-&Ā+ 2$ 3-! Ā4 "5ĀÀ$%&Ā+ 4)Ā** light brown, slightly moist, with cobbles, few boulders	1235
						Total Depth 7 feet	

SAMPLE TYPES
C Rock Core
S Standard Split Spoon
D Drive Sample
B Bulk Sample
T Tube Sample

DATE DRILLED:
8-27-20
EQUIPMENT USED:
24Backhoe
GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE B-15

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: **À ! "#ÃÀ$%&ÃÀ()** light brown, dry, with gravel and cobbles	
					5	Natural: **À$%&Ā "5ÃÀ ! "ĀÀ.0 À()** light brown, slightly moist, some gravel and cobbles @ 4 feet, boulder (12 inches in diameter)	1210
						Total Depth 6.5 feet	

SAMPLE TYPES
C Rock Core
S Standard Split Spoon
D Drive Sample
B Bulk Sample
T Tube Sample

DATE DRILLED:
8-27-20
EQUIPMENT USED:
24Backhoe
GROUNDWATER LEVEL (ft):
Not Encountered

GPI

PROJECT NO.: 2993.04I
INERT DEBRIS LANDFILL

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FIGURE B-16

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: À ! "#ĀÀ$%&ĀÀ() light brown, dry, with gravel with cobbles	1230
						Rubble Fill: Pieces of concrete (to 12 inch in size) with pieces of asphalt and brick. Mixed with approximately 30 percent of sand and gravel, dry @ 3 feet, some concrete debris @ 4 feet, some concrete and asphalt debris, with cobbles @ 6 feet, some concrete and brick debris	
					5		1225
						Total Depth 7 feet	

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 actual conditions encountered.

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-27-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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INERT DEBRIS LANDFILL

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FIGURE B-17

POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
					0	Fill: À ! "#ĀÀ$%&ĀÀ() light brown, dry, with gravel and cobbles	
						À$%&Ā "5ĀÀ ! "ĀÀ.0À() light brown, slightly moist, with gravel and cobbles	1185
				B	5	Natural: À ! "#ĀÀ$%&ĀÀ() orange brown, slightly moist to moist, trace porosity	
						Total Depth 8 feet	

SAMPLE TYPES
- C Rock Core
- S Standard Split Spoon
- D Drive Sample
- B Bulk Sample
- T Tube Sample

DATE DRILLED: 8-27-20
EQUIPMENT USED: 24Backhoe
GROUNDWATER LEVEL (ft): Not Encountered

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FIGURE B-18

Table B-1: Summary of Test Pits TP19-TP32 Excavated 11/5/2021; Logged TGH		
TEST PIT	**FILL**	**NATIVE**
TP-19	0-3’ Fill: Gray sand and gravel w/well stratified sand & silt deposits from 0-12”	3-21’: Interbedded reddish brown silty sand/sandy silt with beds and lenticular channels of sand and gravel.
TP-20	No Fill, Test pit excavated on steep natural slope	0-21’±: Existing near vertical embankment (old quarry wall?), scrapped with excavator. Older Alluvium: gray and reddish brown, interbedded sandy gravel, gravelly sand and silty sand. Horizontally stratified slightly moist, dense.
TP-21	No Fill, Test pit excavated on steep natural slope	20’±: Existing near vertical embankment (old quarry wall?), scrapped with excavator. Older Alluvium: Interbedded sand and gravel bed. Silty sand beds and dark reddish brown, silty sand/sandy silt, massive dense/stiff.
TP-22	0-8’ Fill: Brown sand, gravel, and oversize asphalt fragments at alluvial contact	8-12’: Older Alluvium: Brown silty sand fine to coarse sand w/gravel, cobbles, boulders, moist, and dense.
TP-23	0-9’ Fill: (Old Access Road Fill): Gray, silty, fine to coarse sand, with zones of gravel, cobble/boulders, dry, loose caving. 4” iron pipe observed in fill	9-12’: At 9’, vegetation line above yellow brown, native alluvium consisting of silty, fine to coarse sand, with gravel, cobbles, and boulders.
TP-24	0-12’ Fill: Brown silty sand with gravel, cobbles and boulders 18-24”, concrete rubble to 36”, dry, loose, and moderately caving. Steel railroad rail observed in bottom of excavation.	Native materials were not encountered
TP-25	0-4’ Fill: Brown silty sand w/gravel, some plastic, sandbags, other debris	4-12’: Older Alluvium: Dark reddish brown, silty sand/sandy silt. Moist stiff/dense, few thin beds and lenses of sand and gravel
TP-26	0-2’ Fill: Brown, sand and gravel, little oversize, dry, loose	2-8’: Older Alluvium: Horizontally stratified sand and gravel, slightly moist, dense
TP-27	0-2’ Fill: Brown and gray sand and gravel, dry, loose	2-3’: Older Alluvium: Dark reddish brown, sandy silt/silty sand, dry to slightly moist, dense/stiff
TP-28	0-5’ Fill: Brown sand, gravel, and cobbles with few boulders, dry, loose	5-7.5’ Older alluvium: Gray, horizontally stratified sand and gravel, slightly moist, dense
TP-29	0-2’, Fill: Brown, sand, gravel, and cobbles, dry, loose	2-4’: Older Alluvium: Yellow brown, horizontally stratified sand, gravel and cobbles, slightly moist, dense.
TP-30	0-2’ Fill: Brown sand, gravel and cobbles, loose	2-5’: Older Alluvium: Brown and reddish brown, horizontally stratified sand and gravel and reddish brown, sandy silt/silty sand, slightly moist, dense/stiff.
TP-31	0-1’ Fill: Brown sand and gravel, loose	1-5’: Older Alluvium: Yellow brown, horizontally stratified sand and gravel, with cobbles, slightly moist, dense.
TP-32	0-2.5” Fill: Gray sand, gravel and cobble. Trace concrete rubble and plastic debris.	2.5-5’: Older Alluvium: Yellow brown, horizontally stratified sand, gravel, and cobbles, slight moist, dense.

APPENDIX D

INTRODUCTION

Representative relatively undisturbed soil samples and bulk samples from the explorations conducted in August 2020 and September 2020 were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office and laboratory for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content tests were also conducted on bulk/disturbed soil samples. Moisture content and dry density values are presented on the boring logs in Appendix A.

GRAIN SIZE DISTRIBUTION

Seven samples from the soil borings and test pits were dried and run through a standard set of sieves in accordance with ASTM D422. The portion of the sample passing the No. 4 sieve was then soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. That portion of the material retained on the No. 200 sieve was oven-dried and weighed to determine the percentage of the material passing the No. 200 sieve. The grain size distribution obtained from the full sieve analysis and the percentages passing the No. 200 sieve (%Silt and %Clay) for the samples tested are presented in Figures D-1 and D-2.

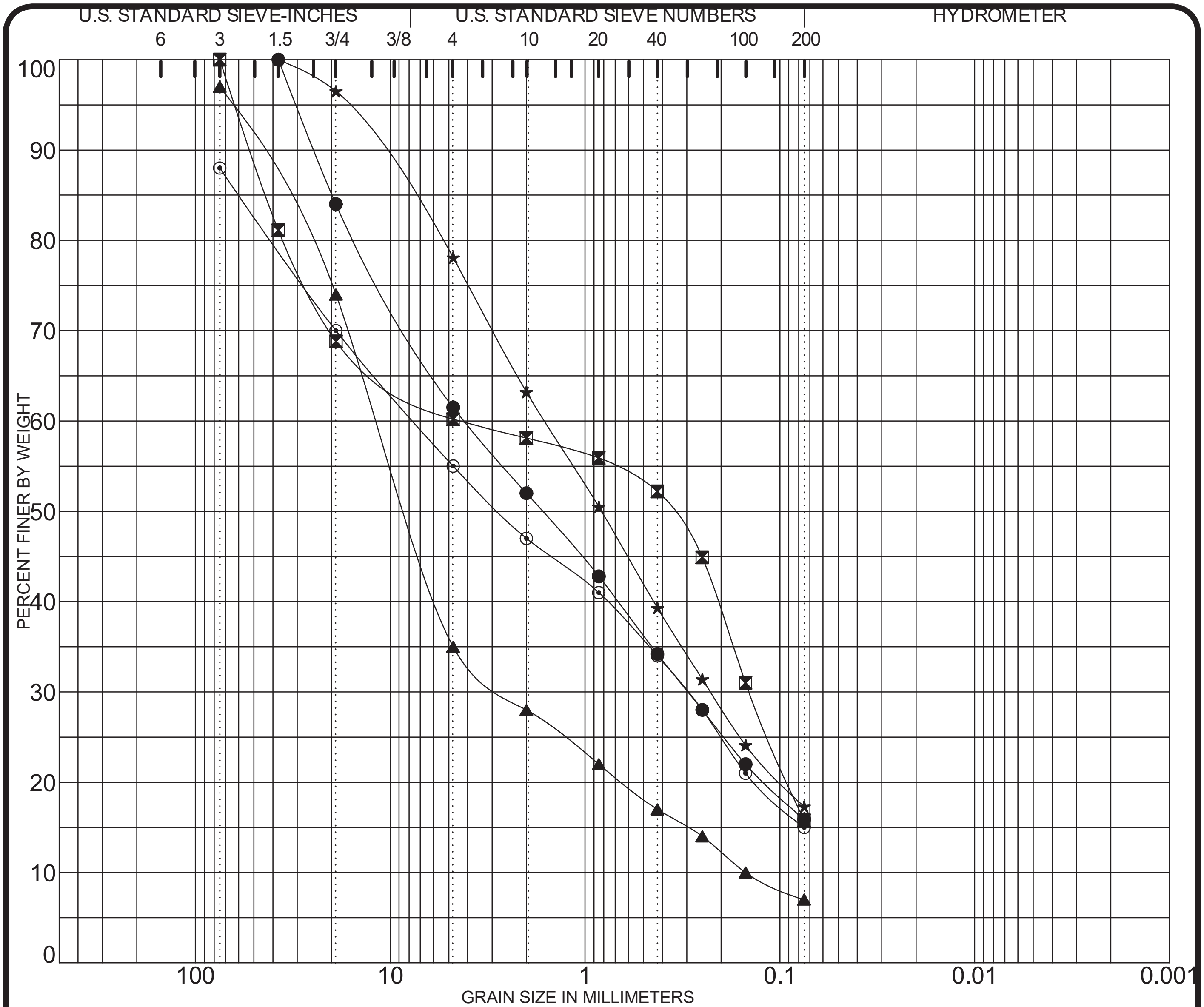
COMPACTION TEST

Maximum dry density/optimum moisture tests were performed in accordance with ASTM D1557 on representative bulk samples of the surficial soils. The test results are as follows. Because the maximum density curves were used to prepare remolded test samples for direct shear testing, the samples were screened through a No. 4 Sieve prior to conducting the test.

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
B-7	0-4	Poorly Graded Gravel with Silt and Sand (GP-GM)	7.5	134
TP-5	0-5	Silty Sand with Gravel (SM)	8.5	131
TP-7	5-10	Poorly Graded Sand with Silt and Gravel (SP-SM)	9.0	132
TP-15	4-7	Well Graded Gravel with Sand (GW)	9.0	133

DIRECT SHEAR

Direct shear tests were performed on three undisturbed and five remolded samples in accordance with ASTM D3080. The remolded samples were compacted to a dry density of 90% of the maximum dry density for the material. The samples were placed in the shear machine, and a normal load comparable to the in-situ overburden stress was applied. The samples were inundated, allowed to consolidate, and then was sheared to failure. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the test. The results of the direct shear tests are presented in Figures D-3 to D-10.



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	$28 <5Ä'"=>27 9=6			Ä52@8 9>27 9=6	AÄ0	""	B"	B+	Ä>	Ä:
●	B-01	@	16-25	SILTY SAND w/ GRAVEL (SM)						
⧗	B-06	@	20	SILTY SAND w/ GRAVEL (SM)						
▲	B-07	@	0-4	Poorly Graded GRAVEL w/ SILT and SAND (GP-GM)					3.78	77.0
★	B-08	@	6.0	SILTY SAND w/ GRAVEL (SM)						
⊙	TP-05	@	0-5	SILTY SAND w/ GRAVEL (SM)						

	$28 <5Ä'"=>27 9=6			*. / /	*C /	*F /	* . /	0 %12345	0 $267	0$ 95?	0 Ä52G
●	B-01	@	16-25	37.50	4.14	0.297		38.5	45.6	15.9	
⧗	B-06	@	20	75.00	4.37	0.143		39.8	44.4	15.8	
▲	B-07	@	0-4	75.00	11.55	2.561	0.1500	62.0	28.0	7.0	
★	B-08	@	6.0	37.50	1.61	0.227		21.9	60.8	17.3	
⊙	TP-05	@	0-5	75.00	7.54	0.298		33.0	40.0	15.0	

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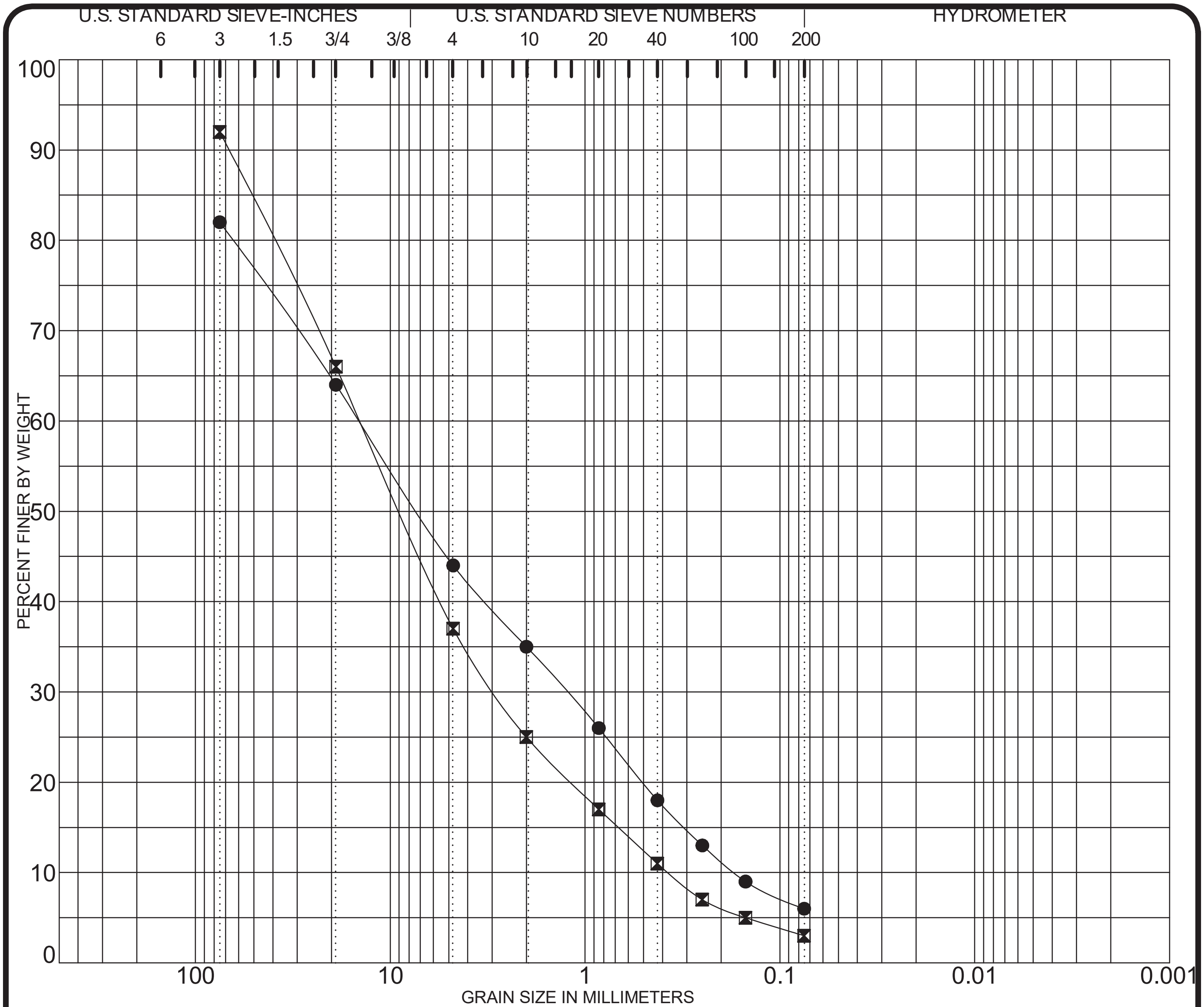
FIGURE D-1



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	>=21@4	;9&4	>=21@4	84 79:8	;9&4	

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● TP-07	@	5-10	Poorly Graded SAND w/ SILT and GRAVEL (SP-SM)					0.63	84.5
⧗ TP-15	@	4-7	Well Graded GRAVEL w/ SAND (GW)					1.55	38.3

$28 <5ÄĀ=>2?9=6			*. / /	*C /	*F /	* . /	0 %12345	0 $267	0$ 95? / 0 Ä52G
● TP-07	@	5-10	75.00	14.40	1.243	0.1704	38.0	38.0	6.0
⧗ TP-15	@	4-7	75.00	14.26	2.868	0.3722	55.0	34.0	3.0

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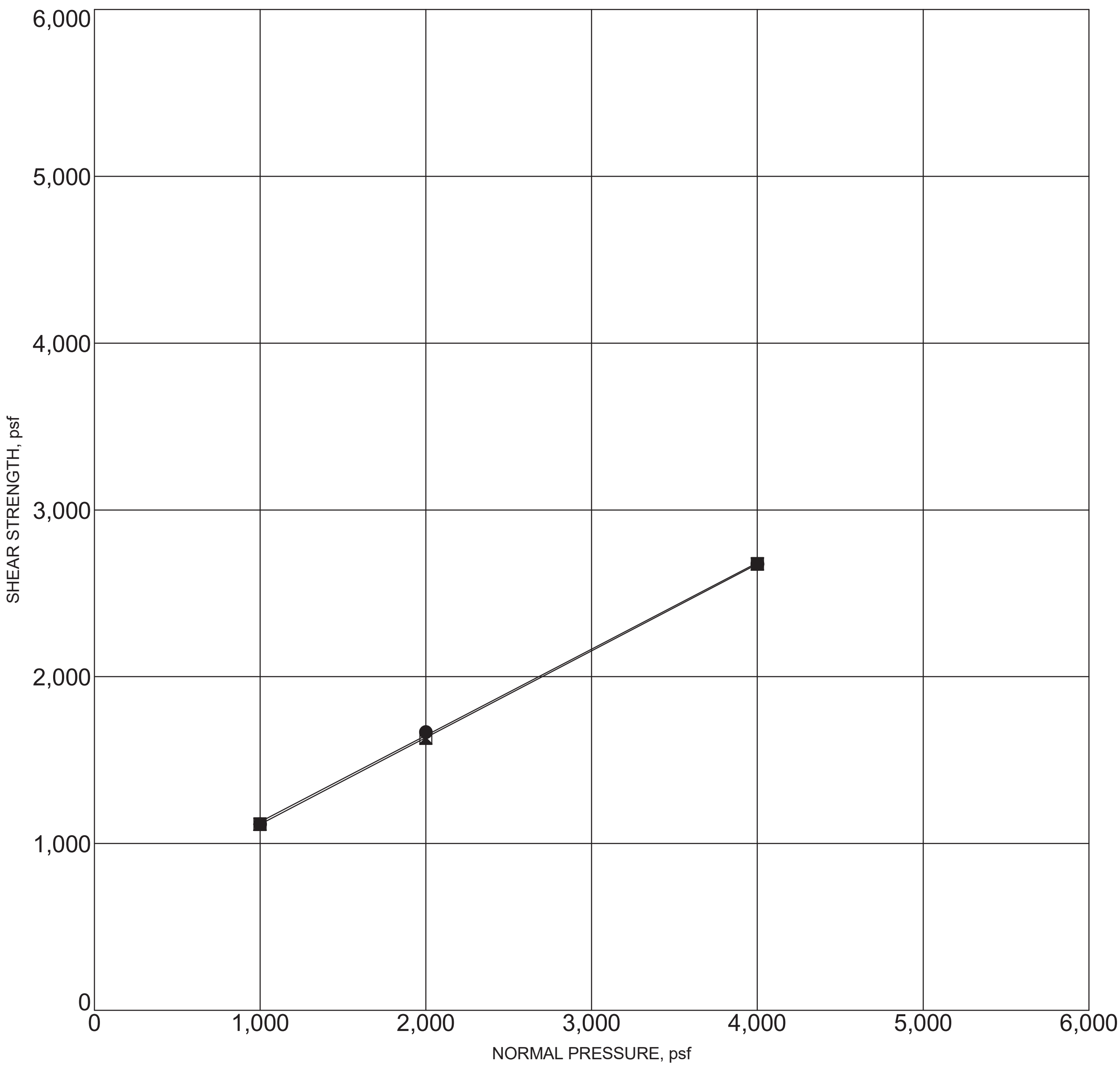
FIGURE D-2



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B-2 @ 14.0	SILTY SAND (SM)	115	2.7

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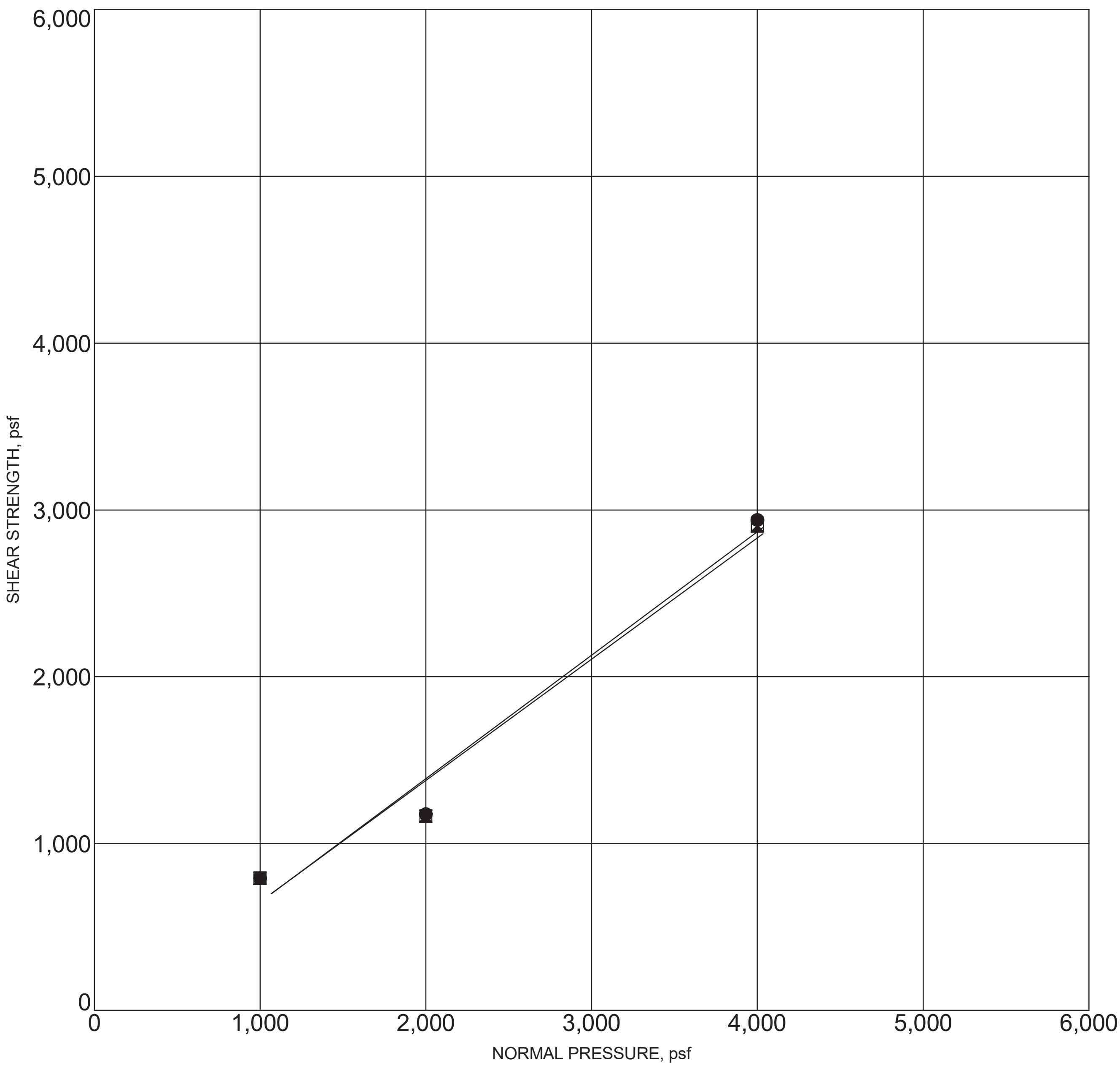
FIGURE D-3



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Ā !"#$ %&Ā8Ā*#+

&+, - ./ Ā 01+2304			8. +<<;31+2304	779- 1;	#89 :
B-3	@	20.0	SILTY SAND (SM)	114	4.9

PROJECT: INERT DEBRIS LANDFILL

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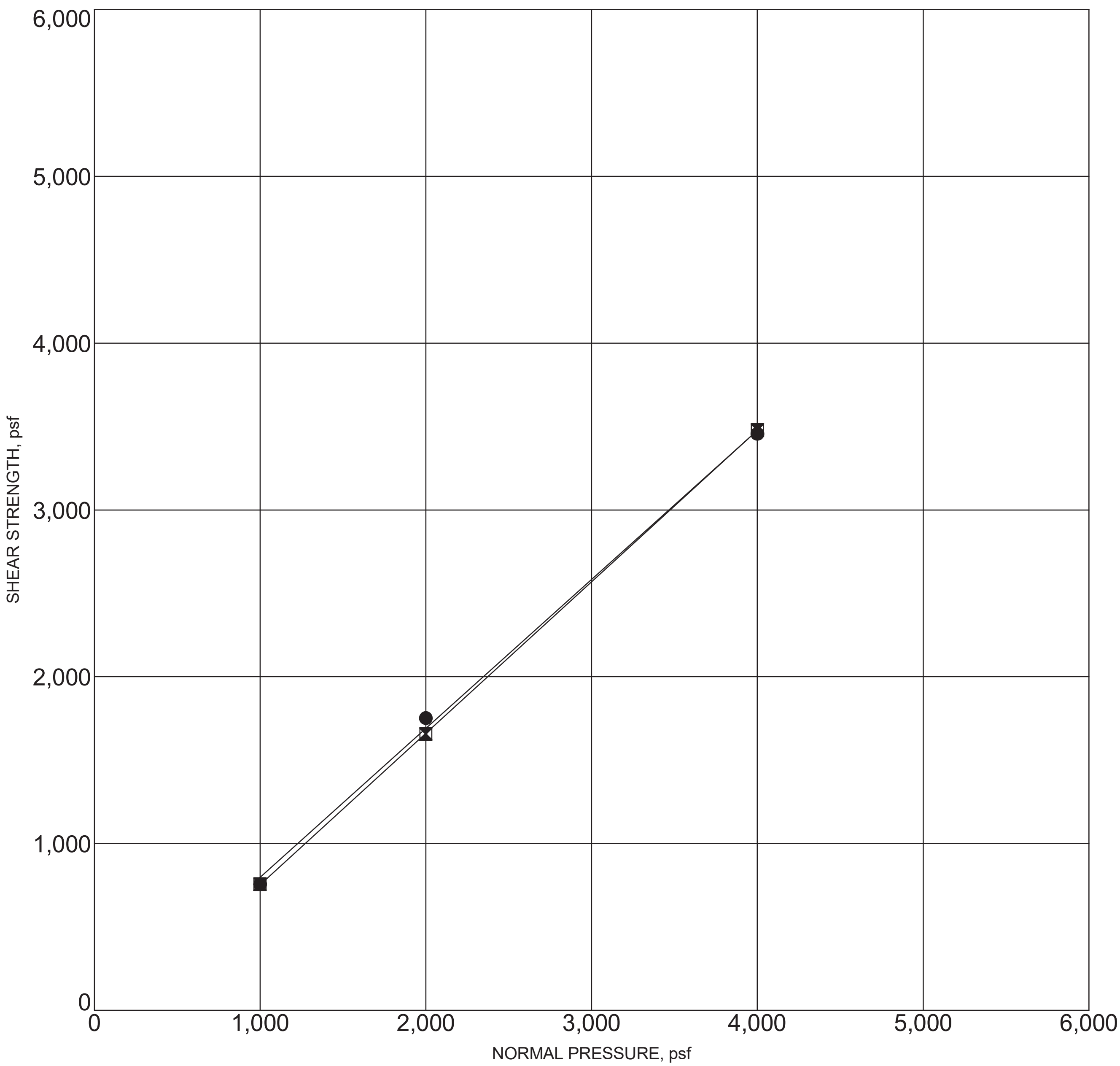
FIGURE D-4



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Ā !"#$ %&Ā8Ā*#+

Ā !" # $!%Ā&!"% ( ) ! *
,-$./$ %Ā0%12"&Ā7(Ā4"1-""#
Ā !"#$ %&Ā8Ā*#+

&+, - ./ Ā 01+2304	8. +<<;31+2304	779- 1;	#89 :
B-6 @ 5.0	SILTY SAND (SM)	111	1.0

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PROJECT NO.: 2993.04I

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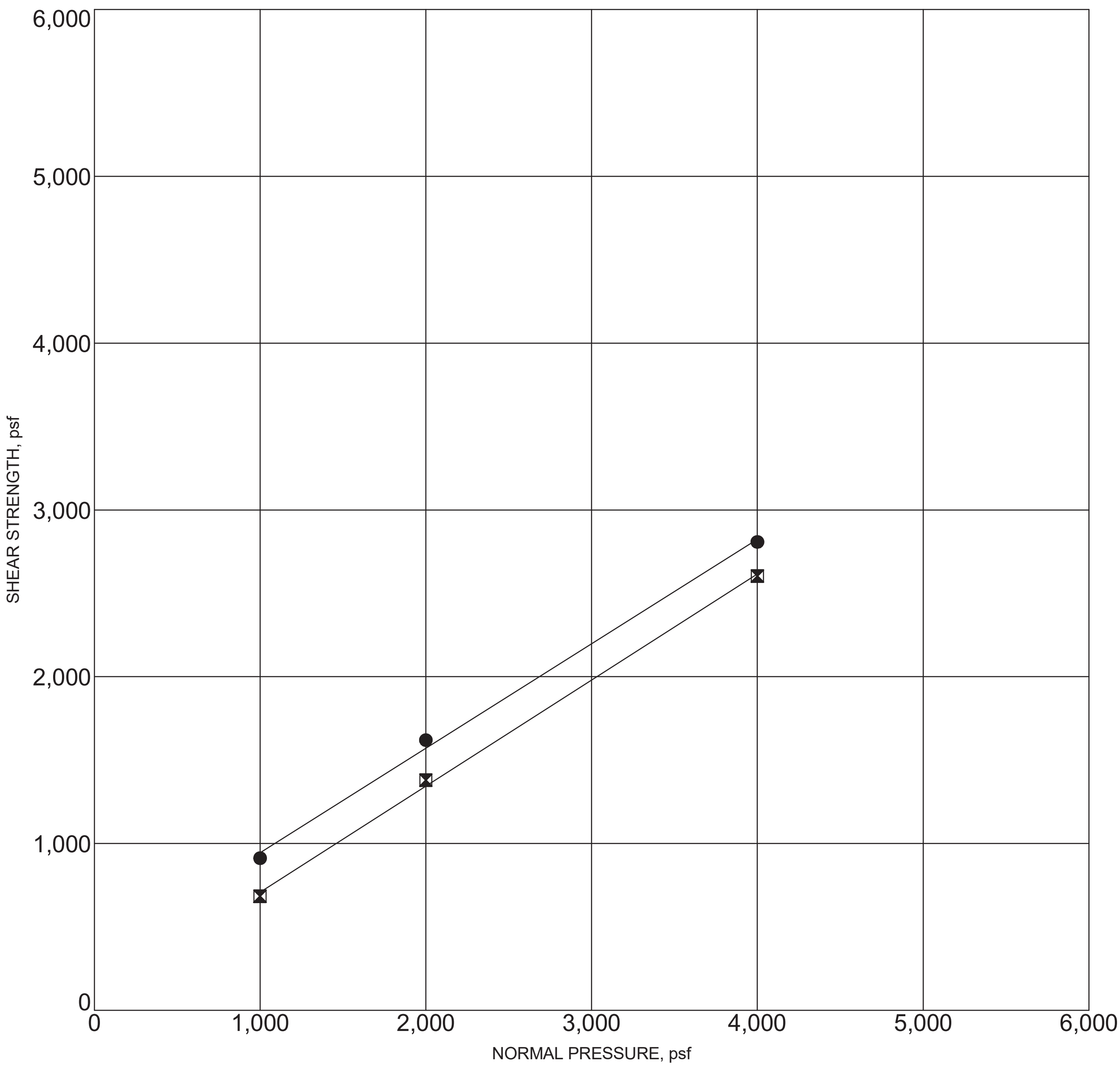
FIGURE D-5



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- ! 9 8 : Ā6 % 1 &#"(			Ȁ !""#$#%!&#(	3378%$	;Ȁ7 <
B-7	@	0-5	Poorly Graded GRAVEL w/ SILT and SAND (GP-GM)	121	7.5

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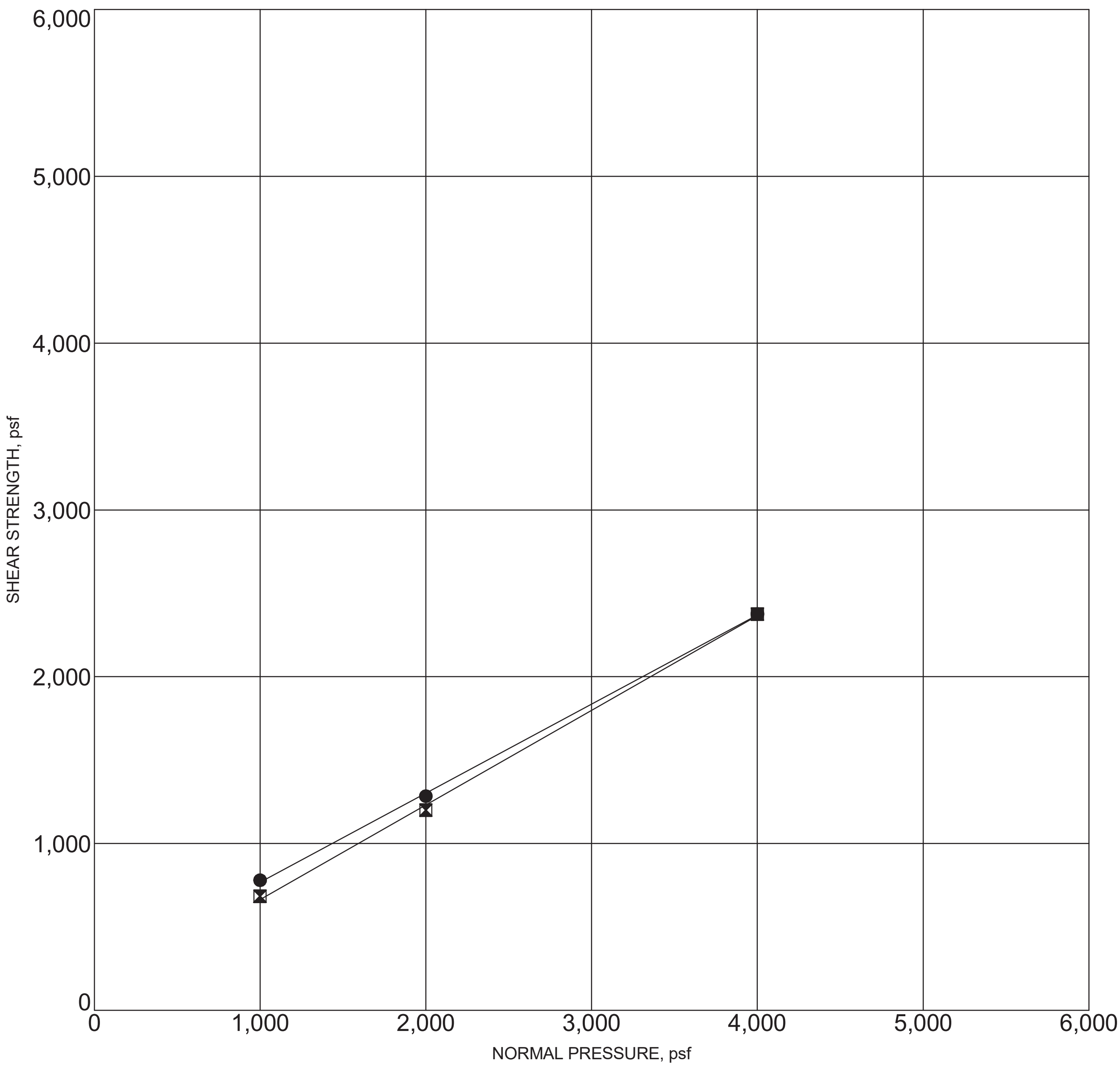
FIGURE D-6



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TP-5 @ 0-5	SILTY SAND (SM)	118	8.5

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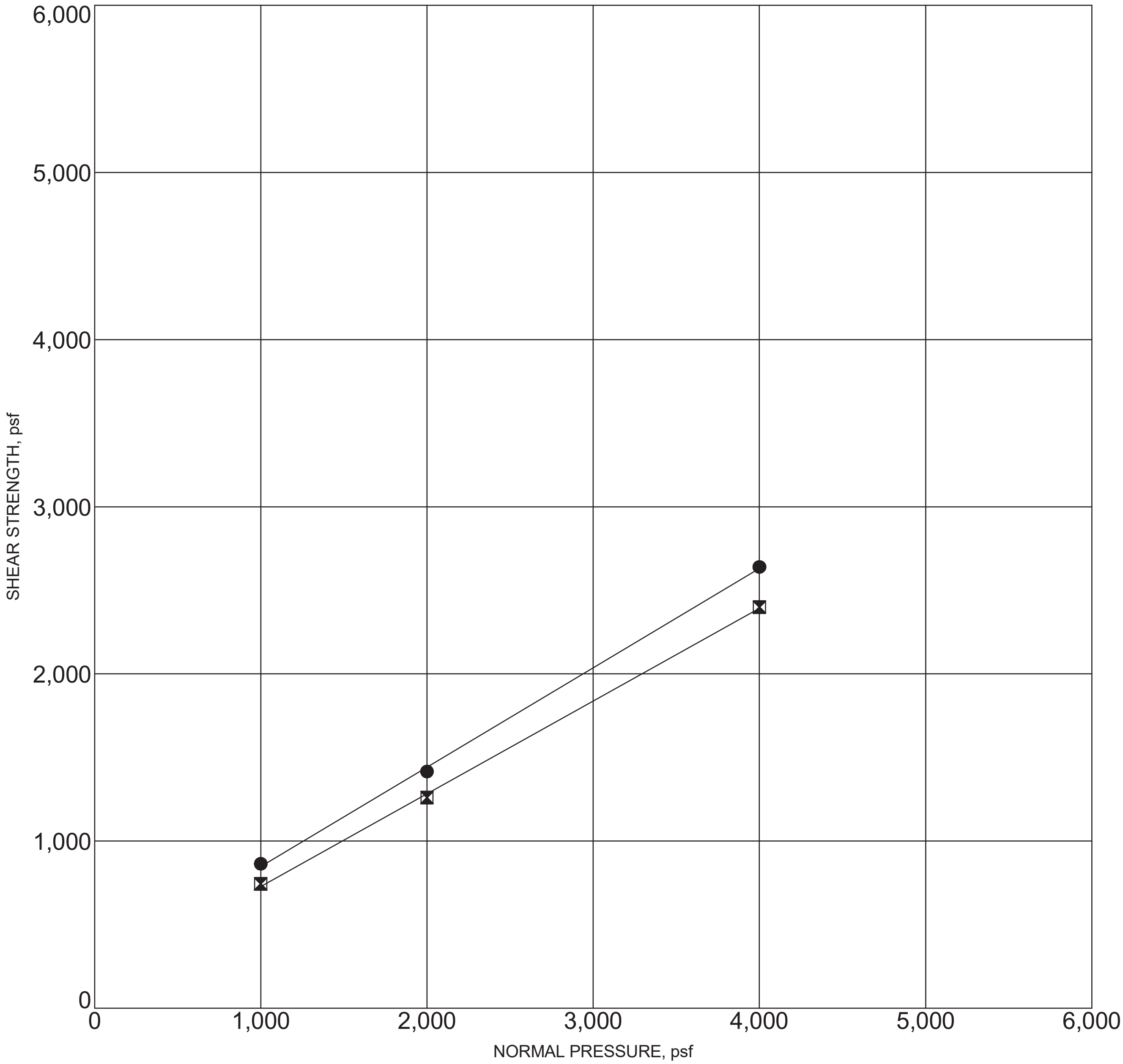
FIGURE D-7



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TP-7 @ 5-10	Poorly Graded SAND w/ SILT and GRAVEL (SP-SM)	119	9.0

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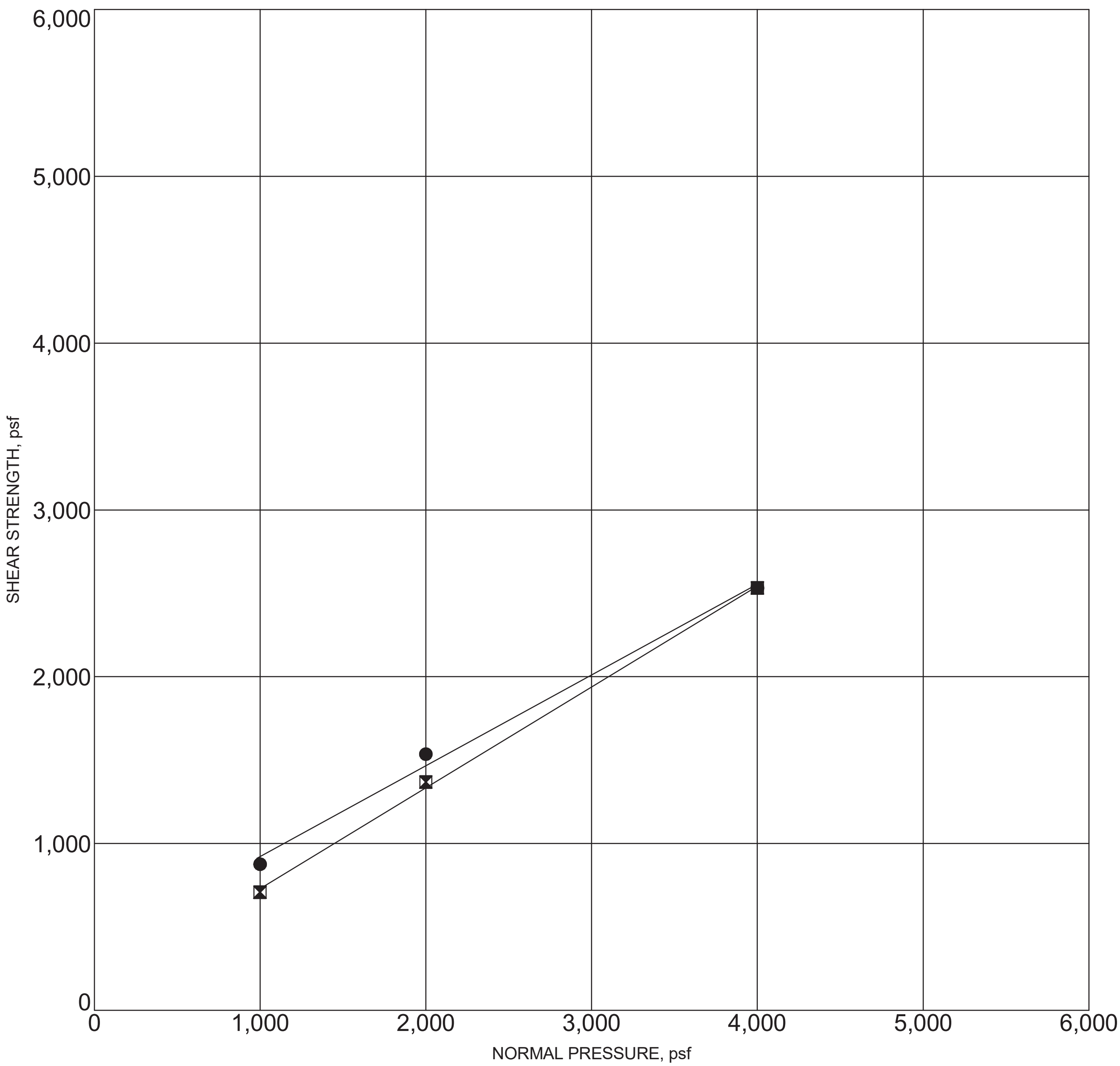
FIGURE D-8



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92$:,$ %Ā;%<1"&Ā'CĀ3"<2""#
Ā !"#$ %&ĀC=@Ā)#*

+ ,"-Ā./0)1"#Ā2"0 13"3 Ā, Ā4(5Ā0/ 6$070 Ā328Ā3"%#$,8

- ! 9 8 : Ā6 % & #"(	Ā !""# $#%!&(	3378%$	;Ā7 <
TP-15 @ 4-7	Well Graded GRAVEL w/ SAND (GW)	120	9.0

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PROJECT NO.: 2993.04I

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FIGURE D-9

APPENDIX C

GEOPHYSICAL SURVEY

Terra Geosciences conducted a seismic refraction survey at the subject site on August 25, 26 and 28, 2020. Eleven refraction survey lines were performed (Seismic Lines S-1 through S-11). Details of the seismic refraction survey and the results of the survey are presented in the report dated August 31, 2020, by Terra Geosciences, which is included in this appendix.

The traverses were located in the field by use of Google™ Earth imagery (2020) and GPS coordinates and ranged from 125 to 250 feet in length. The approximate locations or the refraction survey lines are shown on Figure 2 and in the August 31, 2020 report by Terra Geosciences.

TERRA GEOSCIENCES

SEISMIC REFRACTION SURVEY

INERT DEBRIS LANDFILL PROJECT

NWC OF MONTE VISTA AVENUE AND ARROW ROUTE

CITIES OF UPLAND AND CLAREMONT

SAN BERNARDINO AND LOS ANGELES COUNTIES, CALIFORNIA

Project No. 203485-3

August 31, 2020

Prepared for:

Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, CA 90630

Geotechnical Professionals Inc.
5736 Corporate Avenue
Cypress, CA 90630

Attention: Mr. Justin J. Kempton, GE

Regarding: Seismic Refraction Survey
Inert Debris Landfill Project
NWC of Monte Vista Avenue and Arrow Route
Cities of Upland and Claremont
San Bernardino and Los Angeles Counties, California
GPI Project No. 2993.02I

INTRODUCTION

In accordance with your request, we have completed a non-invasive geophysical survey using the seismic refraction method along selected portions of the subject site as referenced above. We understand that the subject site was previously used a sand and gravel quarry that has been partially backfilled with both compacted and uncompacted fill, of which the limits and depth are unknown at this time. This report describes in further detail the seismic refraction methodology, field procedures used, data processing of the various seismic modeling programs utilized, and the results of this survey, along with presentation of the subsurface seismic models, associated data, and representative survey line photographs. As authorized by you, the following services were performed:

- ***Review of available pertinent published and unpublished geologic and geotechnical data in our files pertaining to the site, along with a field reconnaissance.***
- ***Conducting a geophysical survey using the seismic refraction method, which consisted of eleven survey traverses, to aid in evaluating the deeper subsurface lithology and geologic structure present beneath the subject site. The field survey and the data analysis were performed by a licensed State of California Professional Geophysicist.***
- ***Preparation of representative geologic seismic models and associated data, created from a compilation of various computer data analytical programs.***
- ***Preparation of this report, presenting the results of our interpretation of the geophysical data.***

Accompanying Map and Appendices

Plate 1 - Seismic Line Location Map
Appendix A - Layer Velocity Models
Appendix B - References

PROJECT SUMMARY

As requested, we have performed a geophysical survey using the seismic refraction method along selected portions of the subject site as directed by you. The subject study area is located at the northwest corner of Monte Vista Avenue and Arrow Route, which straddles the cities of both Upland (San Bernardino County) to the east and Claremont (Los Angeles County) to the west. We understand that the subject site was previously occupied by a gravel quarry which had subsequently been partially filled both with undocumented and engineered fill materials. Additionally, the exact composition, limits, and depth of the fill materials are not known at this time.

The purpose of this geophysical study therefore, was to provide both a qualitative and quantified geophysical analysis of the subsurface earth materials, using the seismic refraction method, in order to ascertain the approximate contact boundaries between the native earth materials at depth, where practical, and the overlying landfill materials. The premise is that there may be a discernable seismic velocity differential between the presumed higher-velocity native earth materials at depth and the overlying lower-velocity uncontrolled landfill materials.

Our study involved using various seismic refraction computer modeling programs for both quality control and comparative purposes, which allowed for an unbiased and more thorough analysis. Each of these modeling programs, as described in more detail further in this report, have both strengths and limitations and it was our intention to compile these models to form a more coherent representation of the interpreted subsurface geologic structure. The traverses were located by your firm and are approximated on the Seismic Line Location Map, Plate 1, of which the base map is a captured Google™ Earth (2020) image.

SUMMARY OF SEISMIC REFRACTION SURVEY

Methodology

The seismic refraction method is well suited to identify whether there is a distinct velocity change at depth which could represent a possible subsurface structural differential. The seismic refraction method consists of measuring (at known points along the surface of the ground) the travel times of compressional waves generated by an impulsive energy source and can be used to estimate the layering, structure, and seismic acoustic velocities of subsurface horizons. Seismic waves travel down and through the soils and rocks, and when the wave encounters a contact between two earth materials having different velocities, some of the wave's energy travels along the contact at the velocity of the lower layer. The fundamental assumption is that each successively deeper layer has a velocity greater than the layer immediately above it. As the wave travels along the contact, some of the wave's energy is refracted toward the surface where it is detected by a series of motion-sensitive transducers (geophones).

The arrival time of the seismic wave at each of the geophone locations can be related to the relative seismic velocities of the subsurface layers in feet per second (fps), which can then be used to aid in interpreting both the depth and type of materials encountered.

Field Procedures

Eleven refraction survey lines were performed (Seismic Lines S-1 through S-11) along various portions of the subject site as directed. The traverses were located in the field by use of Google™ Earth imagery (2020) and GPS coordinates and have been delineated on the Seismic Line Location Map, as presented on Plate 1. The survey traverses ranged from 125 to 250 feet in length (depending of the local depth of interest), which consisted of a total of twenty-four 14-Hertz geophones, spaced at regular five- to ten-foot intervals, in order to detect both the direct and refracted waves. A 16-pound sledge-hammer was used as the energy source to produce the seismic waves at seven locations along each survey traverse. Multiple hammer impacts were utilized at each shot point in order to increase the signal to noise ratio, which enhanced the primary seismic "P"-waves.

The seismic wave arrivals were digitally recorded in SEG-2 format on a Geometrics StrataVisor™ NZXP model signal enhancement refraction seismograph. Seven shot points were utilized along each spread using forward, reverse, and several intermediate locations in order to obtain high resolution survey data for velocity analysis and depth modeling purposes. The data was acquired using a sampling rate of 0.0625 milliseconds having a record length of 0.08 to 0.220 seconds. No acquisition filters were used during data collection.

During acquisition, the seismograph displays the seismic wave arrivals on the computer screen which were used to analyze the arrival time of the primary seismic "P"-waves at each geophone station, in the form of a wiggle trace for quality control purposes in the field. If spurious "noise" was observed, the shot location was resampled during relatively quieter periods. Each geophone and seismic shot location were surveyed using a hand level and ruler for topographic correction, with "0" being the lowest point along each survey line.

Data Reduction

All of the recorded seismic data was subsequently transferred to our office computer for further processing and analyzing, using the computer programs **SIPwin** (**S**eismic Refraction **I**nterpretation **P**rogram for **Win**dows) developed by Rimrock Geophysics, Inc. (2004) and **Refractor** (Geogiga, 2001-2019), and are summarized below.

- **SIPwin** is a ray-trace modeling program that evaluates the subsurface using layer assignments based on time-distance curves and is better suited for layered media, using the "Seismic Refraction Modeling by Computer" method (Scott, 1973). The first step in the modeling procedure is to compute layer velocities by least-squares techniques. Then the program uses the delay-time method to estimate depths to the top of layer-2. A forward modeling routine traces rays from the shot points to each geophone that received a first-arrival ray refracted along the top of layer-2. The travel time of each such ray is compared with the travel time recorded in the field by the seismic system.

The program then adjusts the layer-2 depths so as to minimize discrepancies between the computed ray-trace travel times and the first arrival times picked from the seismic waveform record. The process of ray tracing and model adjustment is repeated a total of three times to improve the accuracy of depths to the top of layer-2. The layers that were used for the analysis have been established by the creation of a Time-Distance Plot which displays the curve derived from the arrival times of the first P-wave impulse for each geophone receiver in reference to its respective shot point.

- **Refractor** is seismic refraction software that also evaluates the subsurface using selected layer assignments from the Time-Distance Plots (see Appendix A) utilizing interactive and interchangeable analytical methods that include the Delay-Time method, the ABC method, and the Generalized Reciprocal Method (GRM). These methods are used for defining irregular non-planar refractors and are briefly described below.

  1. The *Delay-Time* method will measure the delay time depth to a refractor beneath each geophone rather than at shot points. Delay-time is the time spent by a wave to travel up or down through the layer (slant path) compared to the time the wave would spend if traveling along the projection of the slant path on the refractor.

  2. The *ABC* (intercept time) method makes use of critically refracted rays converging on a common surface position. This method involves using three surface to surface travel times between three geophones and the velocity of the first layer in an equation to calculate depth under the central geophone and is applied to all other geophones on the survey line.

  3. The *GRM* method is a technique for delineating undulating refractors at any depth from in-line seismic refraction data consisting of forward and reverse travel-times and is capable of resolving dips of up to 20% and does not over-smooth or average the subsurface refracting layers. In addition, the technique provides an approach for recognizing and compensating for hidden layer conditions.

The combined use of these computer programs provided a more thorough analysis of the subsurface structure and velocity characteristics with respect to evaluating the contact boundary between the landfill materials and the underlying native alluvial deposits. All of the computer programs perform their analysis using exactly the same input data which includes first-arrival “P”-waves and survey line geometry.

SUMMARY OF DATA ANALYSIS

As previously discussed, the primary purpose of the seismic refraction survey was to attempt to discern the approximate contact boundaries between the native earth materials at depth and the overlying fill materials. In general, the site where locally surveyed, was noted to be characterized by two major subsurface layers (Layers V1 and V2) with respect to seismic velocities.

The following velocity layer summaries have been prepared using the **SIPwin** and **Refractor computer** analysis, with the representative Layer Velocity Models (Seismic Line S-1 through S-11) presented within Appendix A along with their respective Time-Distance Plots. The Time-Distance plots, also referred to as “travel-time curves”, display the time it takes (in milliseconds) for the induced seismic waves (shot points) to arrive at each of the seismic receivers (geophones), with respect to their location along the survey line (distance, in feet).

Velocity Layer V1:

The predominance of the uppermost velocity layer (V1) is most likely comprised of uncompacted fill and/or landfill debris, having an average weighted velocity of 1,940 to 2,608 fps, which is typical for these types of unconsolidated surficial earth materials. This velocity range is consistent with some landfill velocities, which can vary widely due to both the composition of the materials and the compactive effort (if any) during disposal.

The V1 velocity layer(s) for Seismic Line S-7 (noted as V1a and V1b in Appendix A) were found to be 2,801 fps and 4,177 fps, respectively, and are comprised of compacted engineered fill. The relatively lower velocity for the upper layer V1a may be due to the use of finer-grained fill materials when approaching final grade.

Locally along Seismic Line S-10, a relatively lower-velocity of 1,802 fps was obtained, which is most likely comprised of recent and active alluvial sedimentation along the lower portion of the quarry bottom in the east.

Velocity Layer V2:

The second layer (V2) predominantly yielded a seismic velocity range of 3,285 to 3,960 fps, which is typical for native, deeper undisturbed and more consolidated older alluvial sediments. Locally along Seismic Line S-10, a relatively lower-velocity of 2,416 fps was obtained, which may be comprised of a localized finer-grained (i.e., lacking significant cobbles and/or boulders) older alluvial deposit at depth. Locally along Seismic Line S-11, there was not overlying lower-velocity V1 layer.

The following table summarizes the results of the survey lines with respect to the “weighted average” seismic velocities for each layer, as indicated on the Layer Velocity Models, as presented within Appendix A.

TABLE 1- VELOCITY SUMMARY OF SEISMIC SURVEY LINES

Seismic Line	V1 Layer (fps)	V2 Layer (fps)
S-1	**2,608**	**3,926**
S-2	**2,233**	**3,867**
S-3	**2,111**	**3,689**
S-4	**2,071**	**3,849**
S-5	**2,164**	**3,285**
S-6	**1,940**	**3,587**
S-7	**V1a- 2,801**	**------**
	V1b- 4,177	**------**
S-8	**2,480**	**3,507**
S-9	**2,209**	**3,622**
S-10	**1,802**	**2,416**
S-11	**------**	**3,960**

SUMMARY OF FINDINGS AND CONCLUSIONS

The raw field data was considered to be of fair to good quality with minor to moderate amounts of ambient "noise" that was introduced during our survey. The noise sources most likely were produced by a combination of vehicular traffic originating along the adjacent roadways, air traffic, and local high-frequency communication noise (possibly from the nearby airport to the northeast of the subject site. Analysis of the data and picking of the primary "P"-wave arrivals was therefore performed with some difficulty, with minor to moderate amounts of interpolation of the data being necessary. Application of both high- and low-frequency filters were partially necessary during processing as the raw first-wave distant arrivals were generally masked by the noise.

The Time-Distance Plots, as presented within Appendix A, have been included to present the results of the data picks of the first-arrivals of the “P”-Waves recorded during our survey. It can be seen that the data points vary somewhat both in linearity and slope, suggesting the heterogenous nature of the underlying landfill materials. There may be many inconsistencies in the landfill, which could include dense pockets from local compactive effort, loose areas of fill including decomposing organics, large areas of concrete debris, etc. Wave-path travel through these conditions can be very complicated and convoluted, which most likely added to the difficulty in interpretation of the data.

It was noted that the seismic velocities recorded in both the fill/landfill materials (V1) and the native older alluvial deposits (V2) were fairly consistent across the site where locally surveyed, suggesting a good correlation, with a higher confidence level in the resultant data and models as a result.

We understand that there are documented compacted fill materials present along the southern portion of the site (locally along Seismic Line S-7). The contact between the native older alluvial materials and the documented compacted fill materials at depth may be difficult to differentiate, especially if the velocities are similar. It is generally considered to be a “rule-of-thumb” that a seismic velocity differential of around 50 percent is needed to produce another velocity layer boundary at depth. If the two earth materials are similar with respect to seismic velocities, then it is not possible to detect the contact between them.

Additionally, if the seismic velocities of the native alluvial materials are less than the overlying compacted fill, this would create a “blind zone” wherein the sound waves would be refracted downward at the contact, being undetectable at the surface, rendering this contact boundary unidentifiable. Noting that the seismic velocity of the deeper compacted fill materials was greater than 4,000 fps and that the velocities of the native older alluvial materials were less than 4,000 fps, this condition would be expected and therefore, the contact and conversely the depth between the two materials cannot be discerned.

In summary, despite the challenges in the data processing, the final seismic models appear to have close similarities with respect to seismic velocities, indicating the reliability of the data. Additionally, the average of the seismic velocities for both velocity layers appear to be within the typical range for their respective materials types. The only variance across the site, with respect to the undocumented fill and native materials, was found along Seismic Line S-10, wherein it is possible that a localized finer-grained lens of alluvial materials is present (lacking significant cobbles and/or boulders), resulting in a relatively lower seismic velocity, with the upper layer consisting of recent alluvial deposition. The compacted engineered fill locally found along the southern portion of the site (Seismic Line S-7) appears to have a high relative seismic velocity, most likely due to the addition of water and the compactive effort during the grading process.

CLOSURE

The field survey was performed by the undersigned during August 2020 using "state of the art" geophysical equipment and techniques along selected portions of the subject site as directed by you. It should be noted that our data was obtained along only eleven specific locations therefore other areas in the local vicinity beyond the limits of our seismic lines may contain different velocity layers, depths, and structures not encountered during this field survey. As a rule-of-thumb, the estimates of the layer velocity boundaries are generally considered to be within 10± percent of the total depth of the contact.

It is important to understand that the fundamental limitation for seismic refraction surveys is known as nonuniqueness, wherein a specific seismic refraction data set does not provide sufficient information to determine a single “true” earth model. Therefore, the interpretation of any seismic data set uses “best-fit” approximations along with the geologic models that appear to be most reasonable for the local area being surveyed. Client should also understand that when using the theoretical geophysical principles and techniques discussed in this report, sources of error are possible in both the data obtained and in the interpretation and that the results of this survey may not represent actual subsurface conditions.

These are all factors beyond **Terra Geosciences** control and no guarantees as to the results of this survey can be made. We make no warranty, either express or implied. If the client does not understand the limitations of this geophysical survey, additional input should be sought from the consultant.

This opportunity to be of service is sincerely appreciated. If you should have any questions regarding this report or do not understand the limitations of this study or the data that is presented, please do not hesitate to contact our office at your earliest convenience.

Respectfully submitted,
TERRA GEOSCIENCES

Donn C. Schwartzkopf
Professional Geophysicist
PGP 1002

SEISMIC LINE LOCATION MAP

Base Map: Google™ Earth imagery (2020); Seismic traverses shown as yellow lines.

PROJECT NO. 203485-3

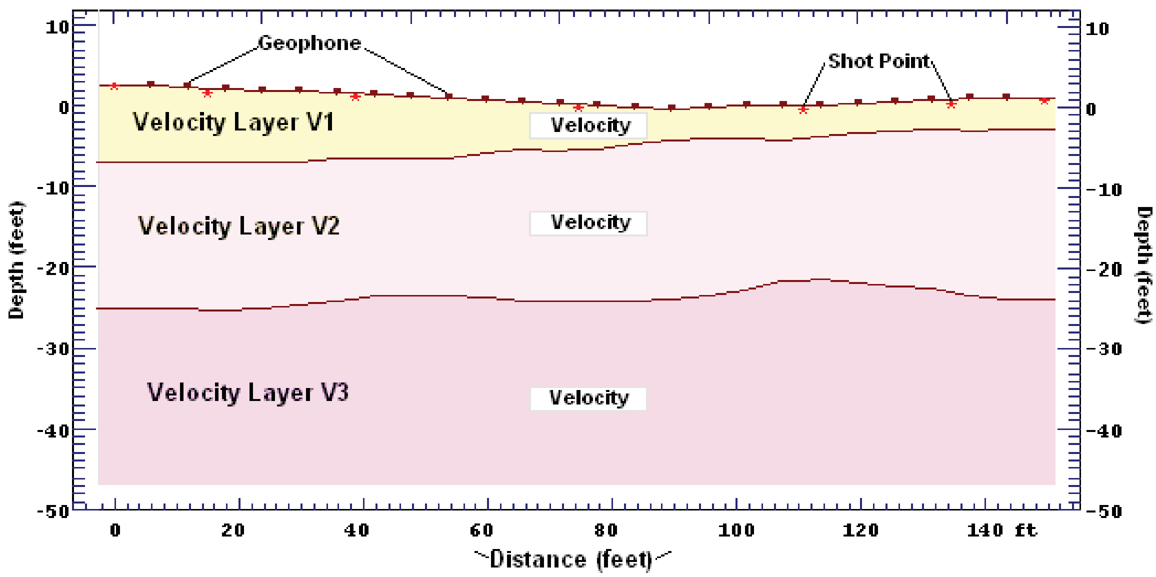
PLATE 1

APPENDIX A

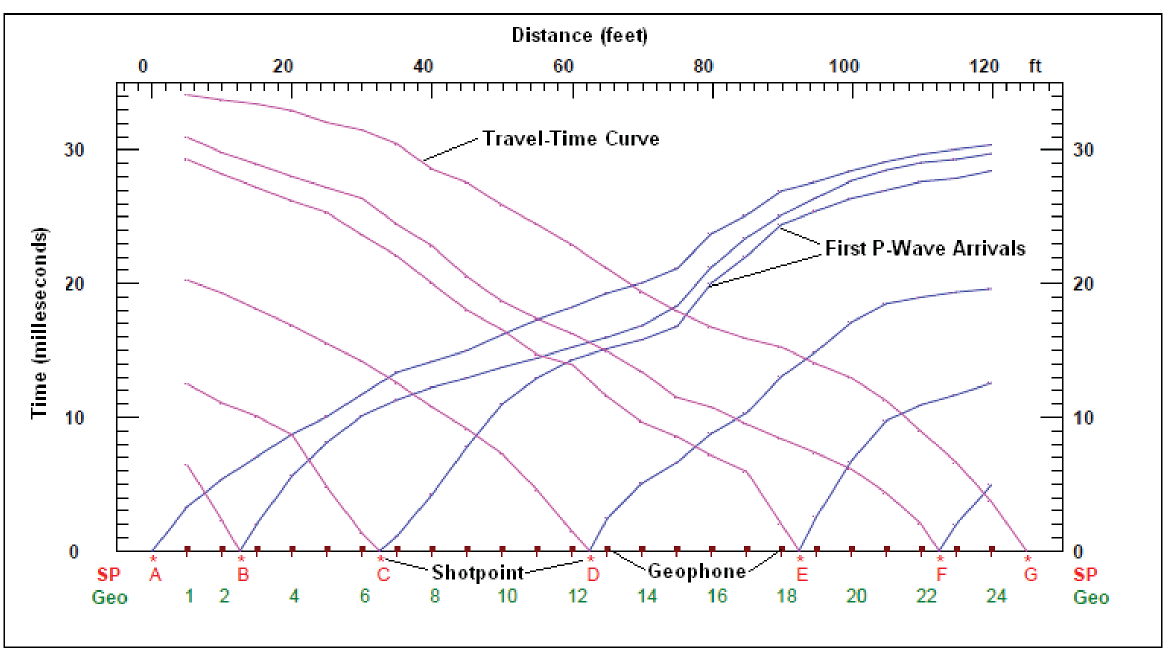
LAYER VELOCITY MODELS

LAYER VELOCITY MODEL LEGEND

LAYER VELOCITY MODEL



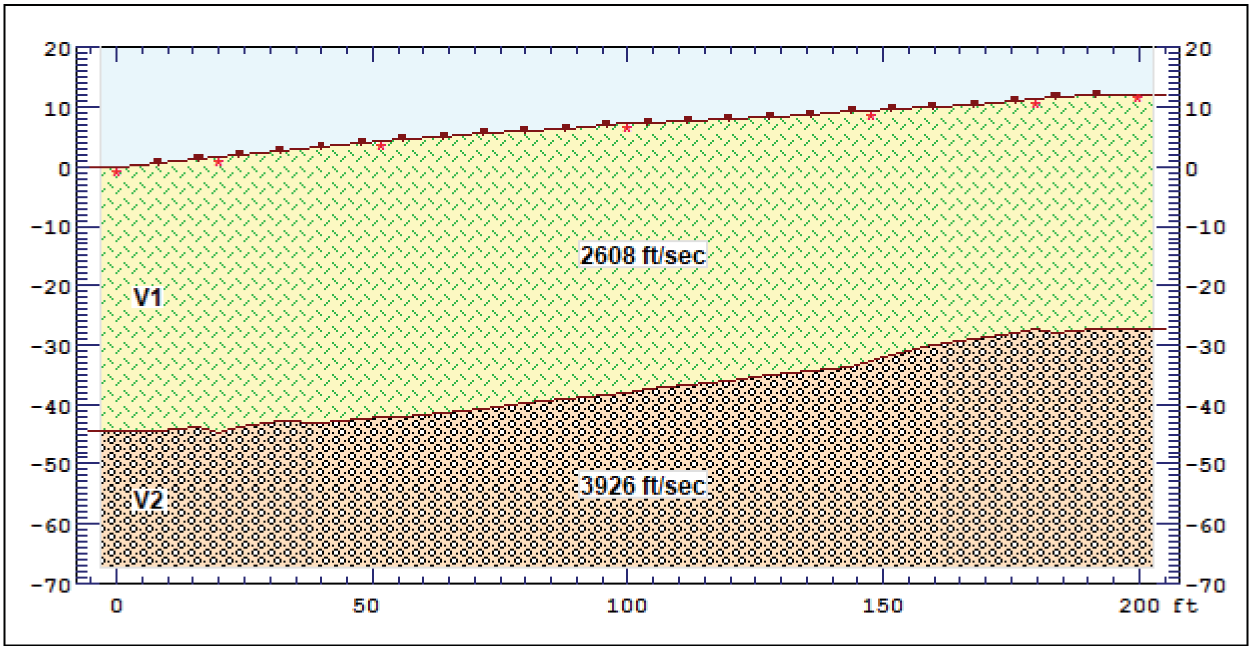
TIME-DISTANCE PLOT



SEISMIC LINE S-1

North 9° West >

LAYER VELOCITY MODEL



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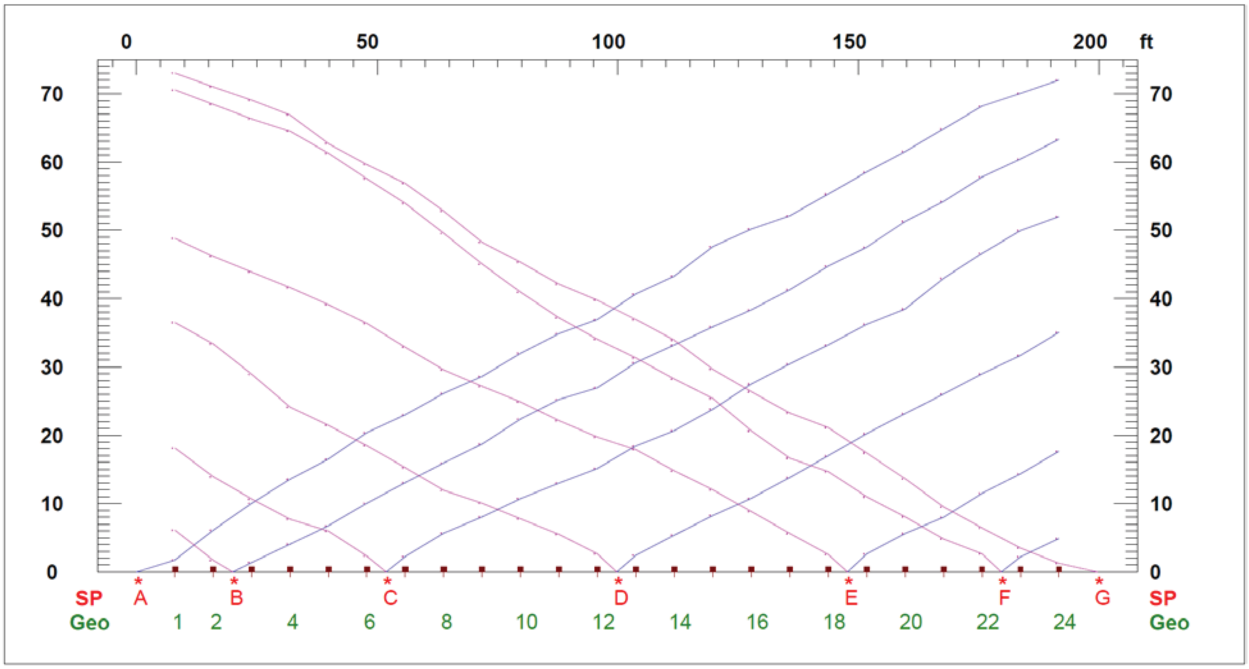
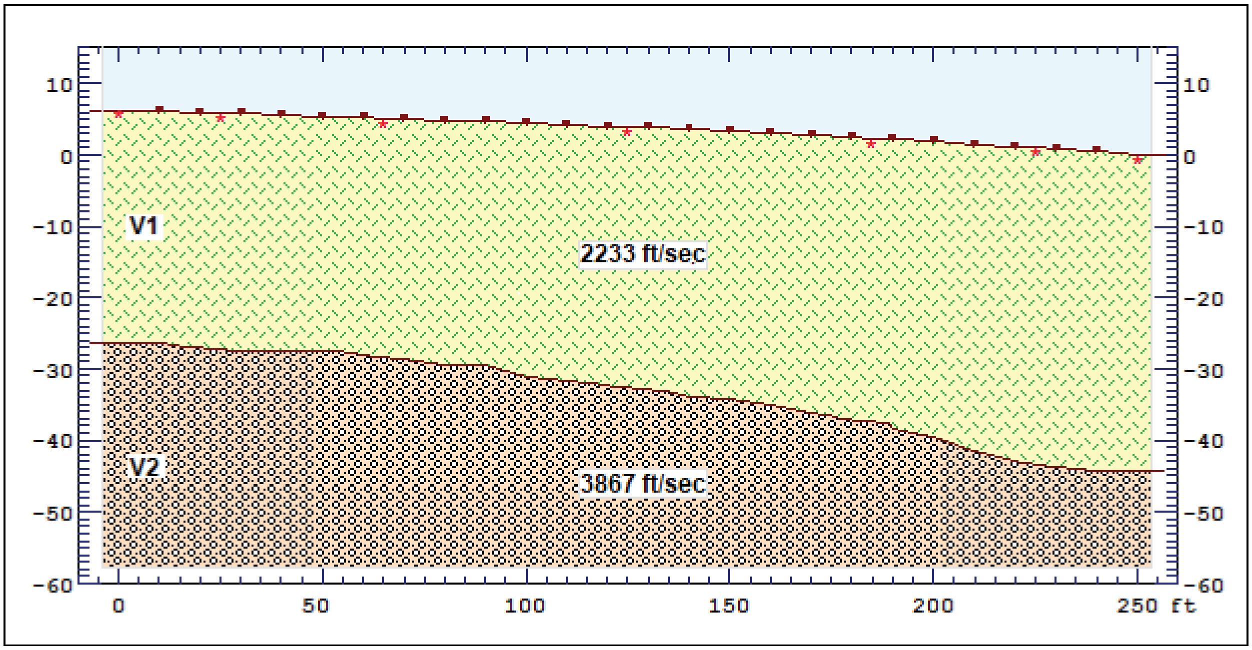


SEISMIC LINE S-2

South 78° East >

LAYER VELOCITY MODEL



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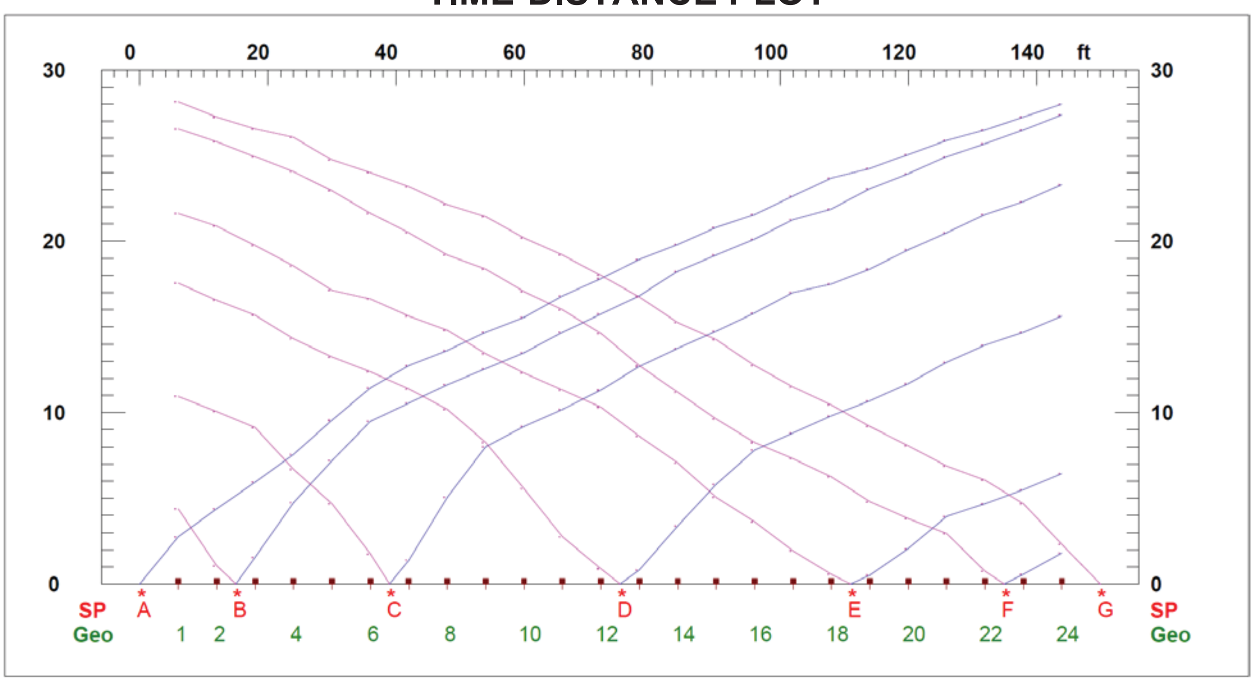
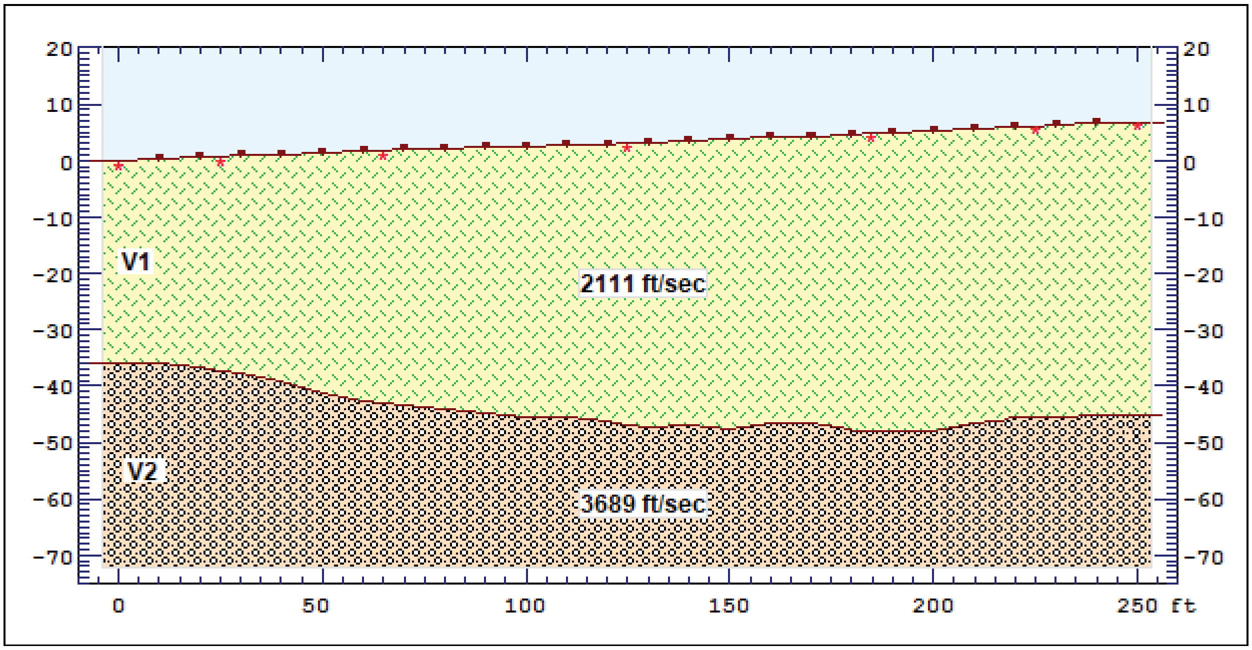


SEISMIC LINE S-3

North 8° West >

LAYER VELOCITY MODEL



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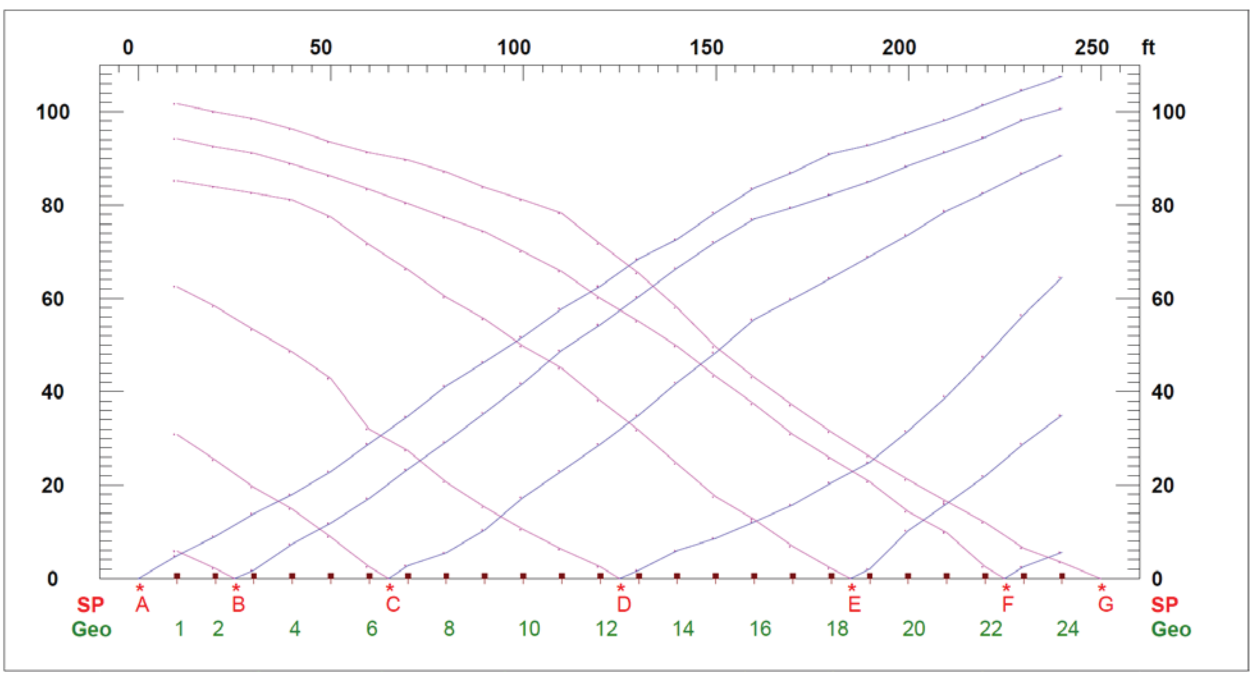
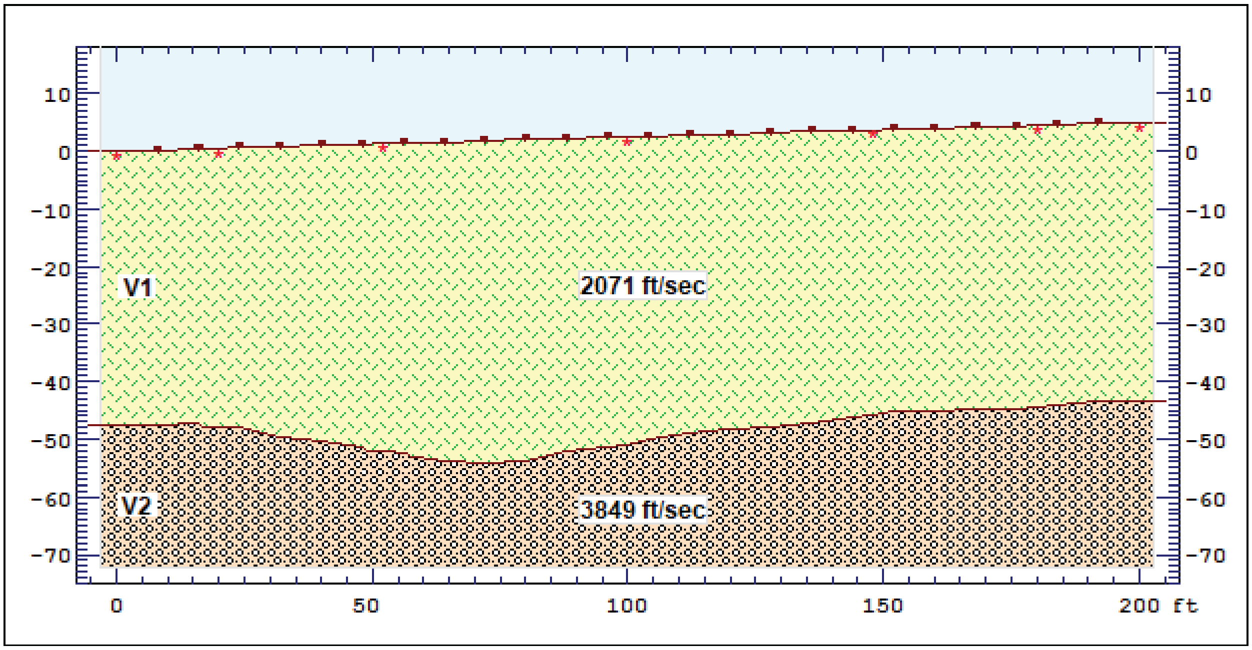


SEISMIC LINE S-4

North 7° East >

LAYER VELOCITY MODEL



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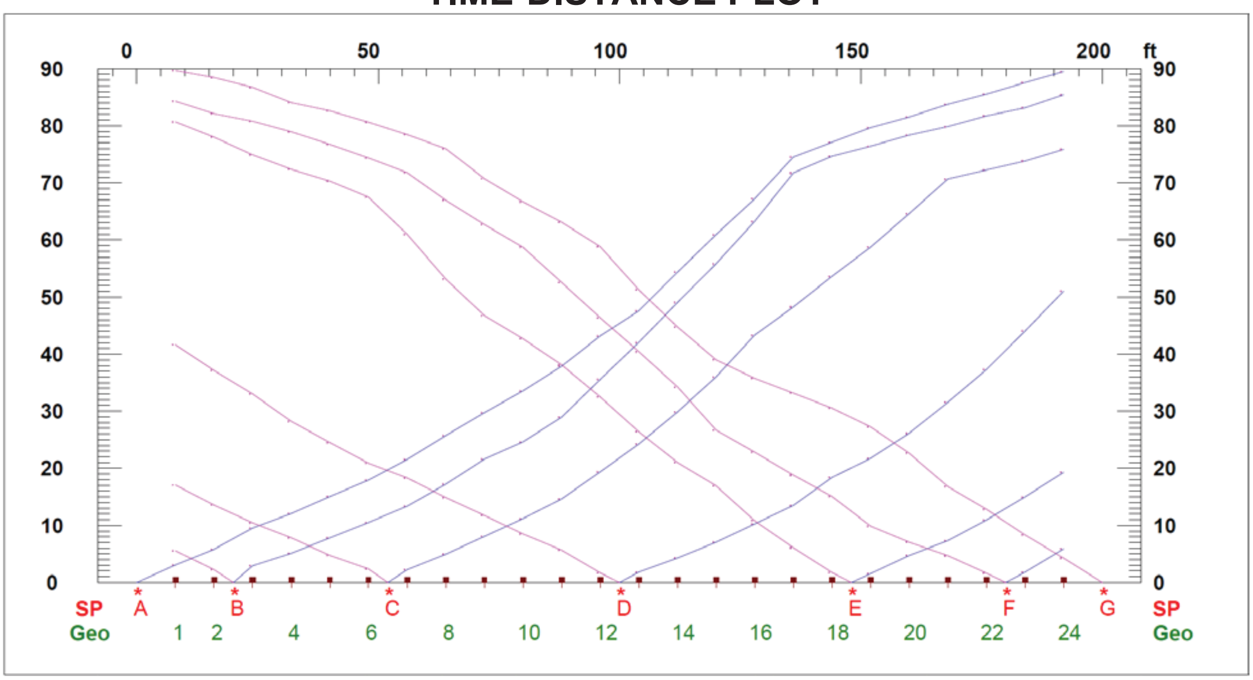
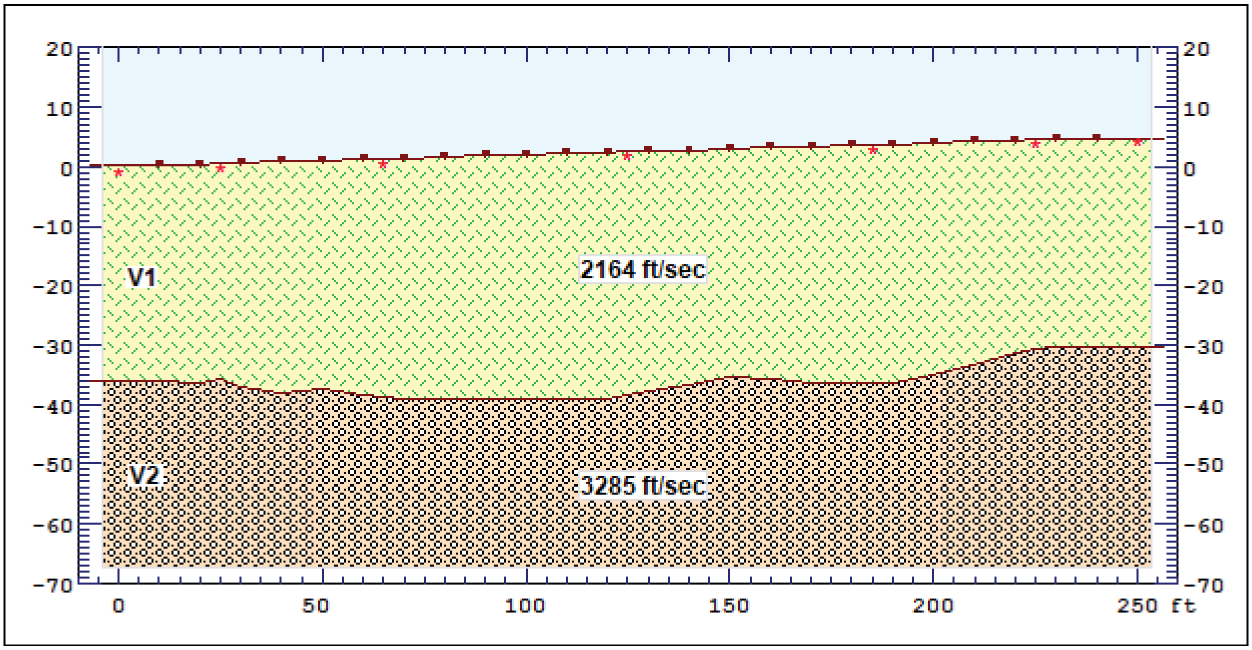


SEISMIC LINE S-5

< South - North >

LAYER VELOCITY MODEL



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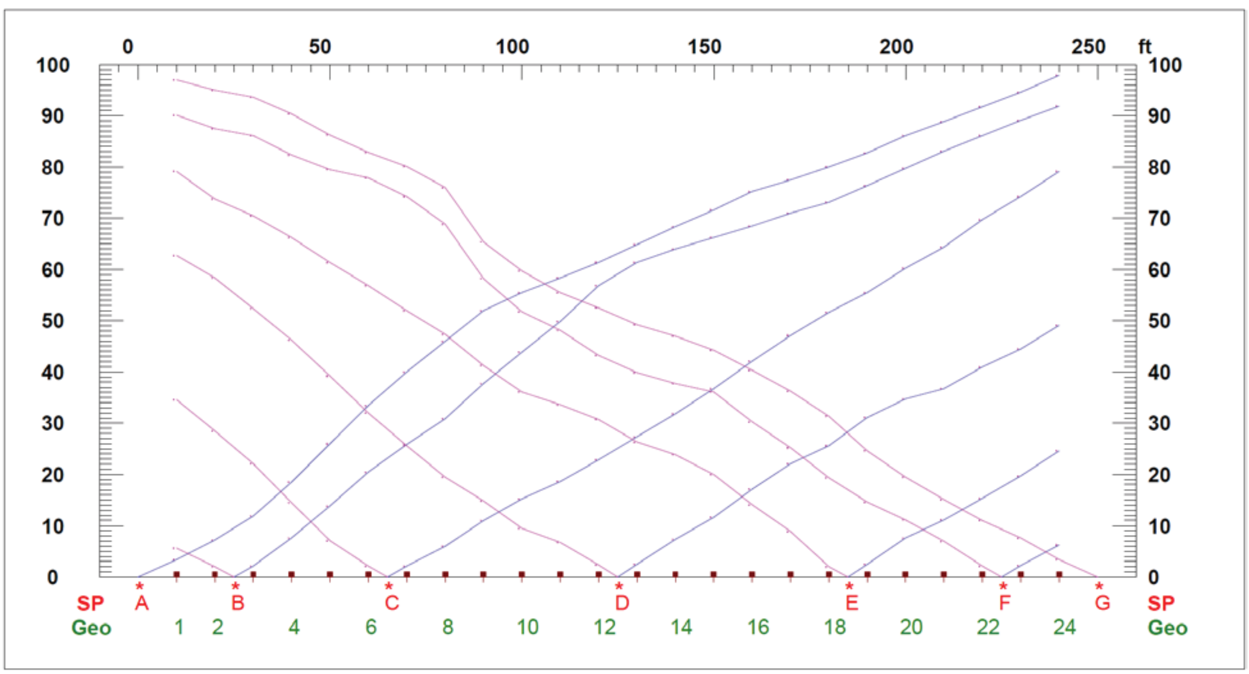
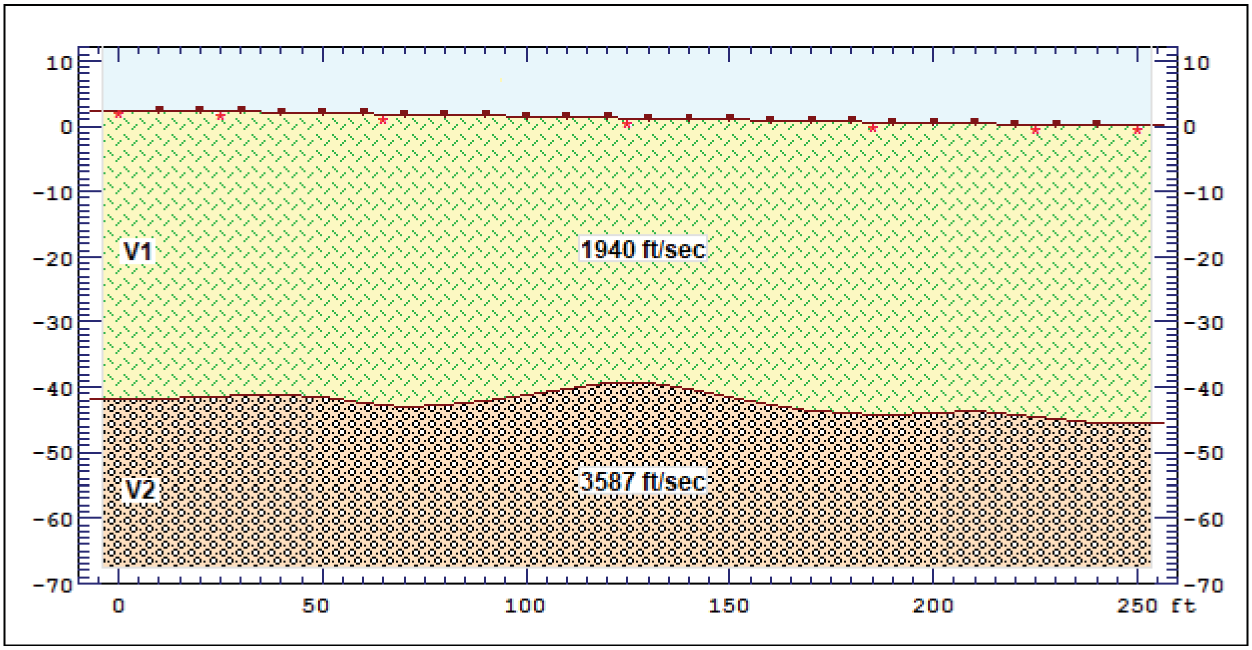


SEISMIC LINE S-6

< South - North >

LAYER VELOCITY MODEL



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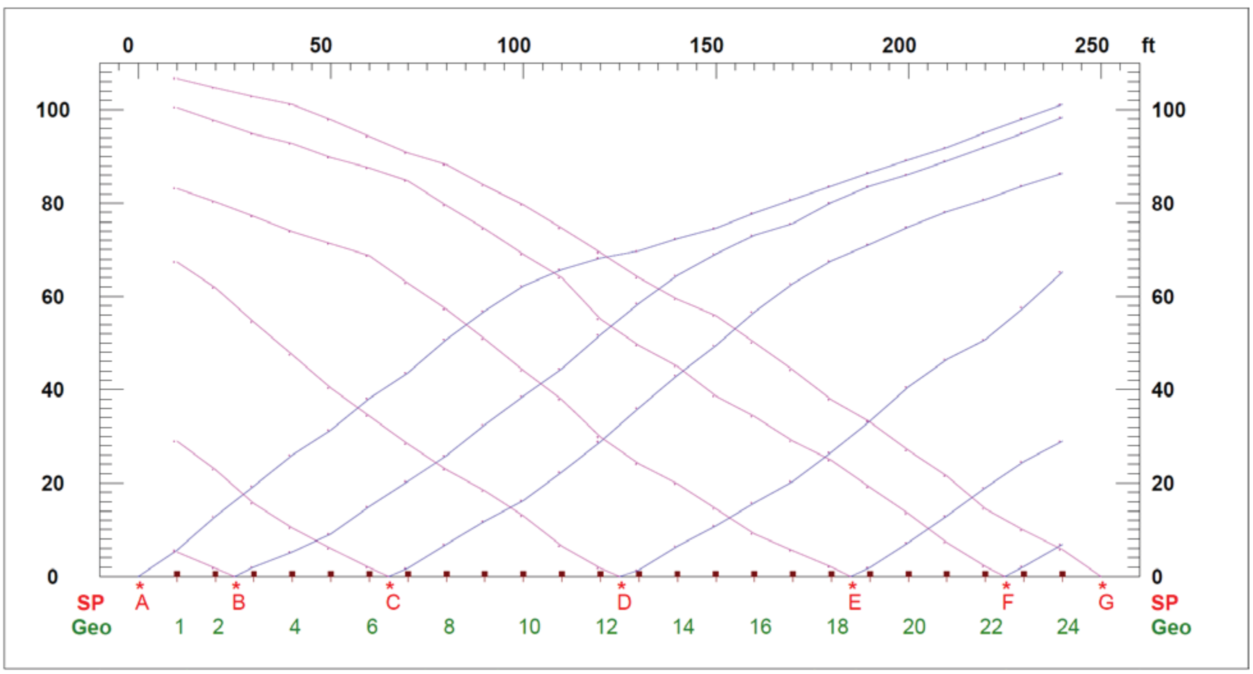
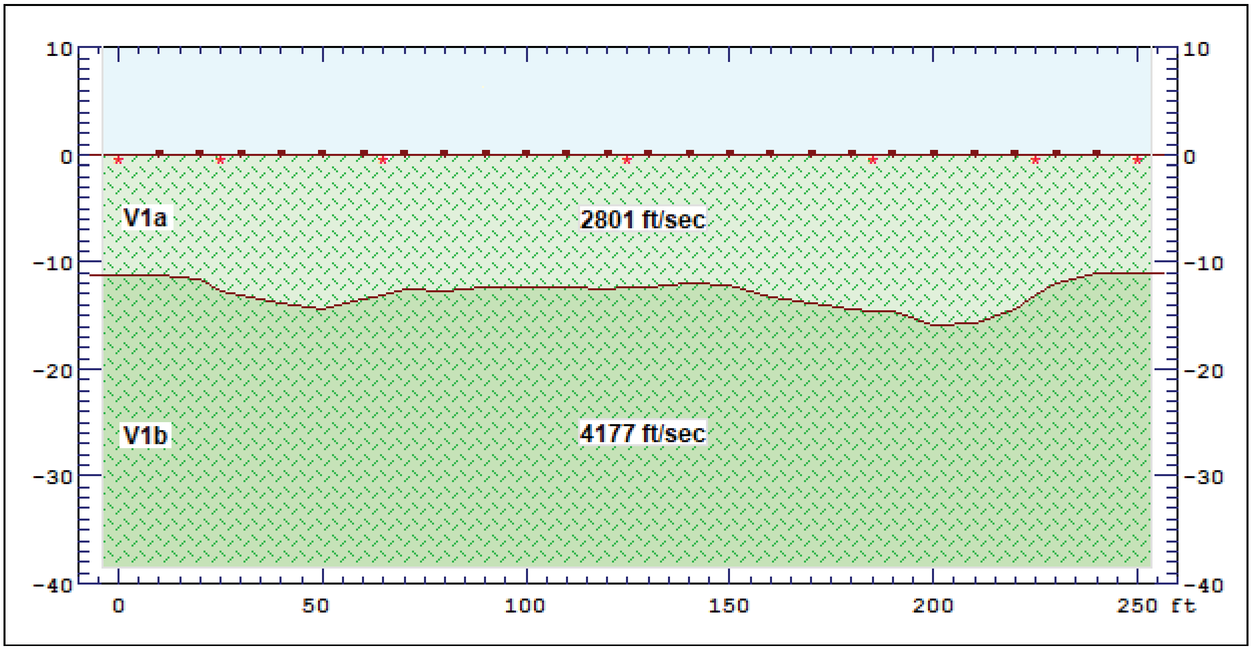


SEISMIC LINE S-7

< West - East >

LAYER VELOCITY MODEL



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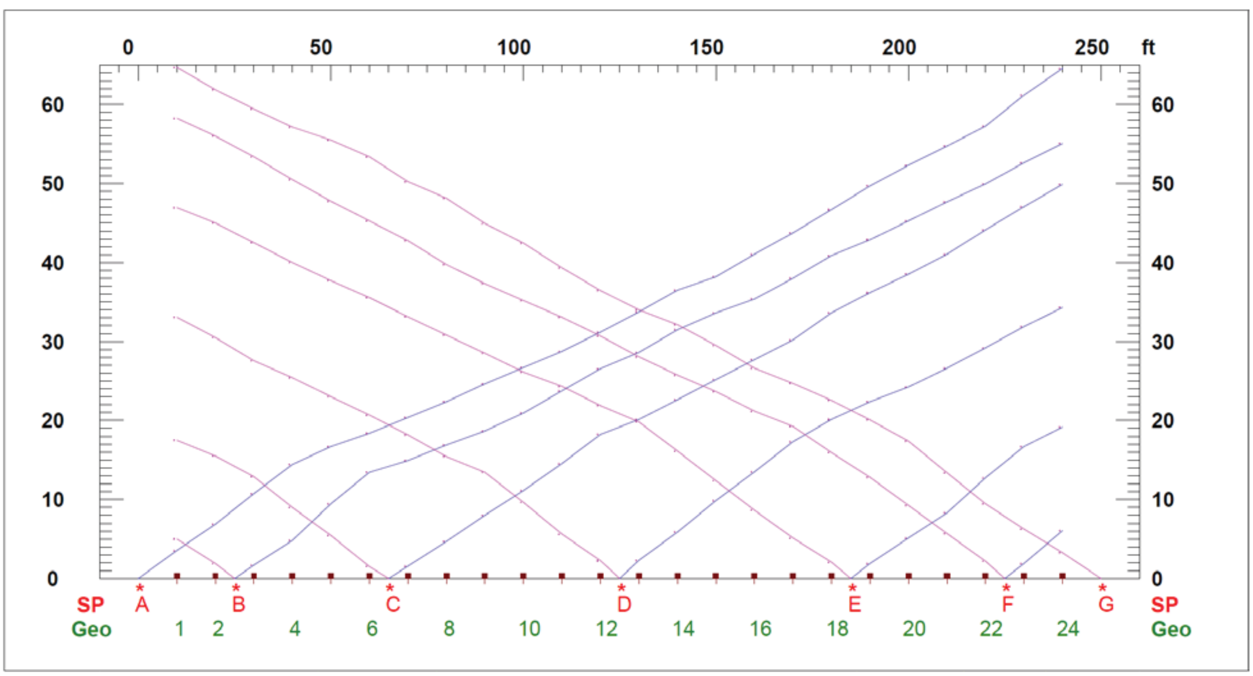
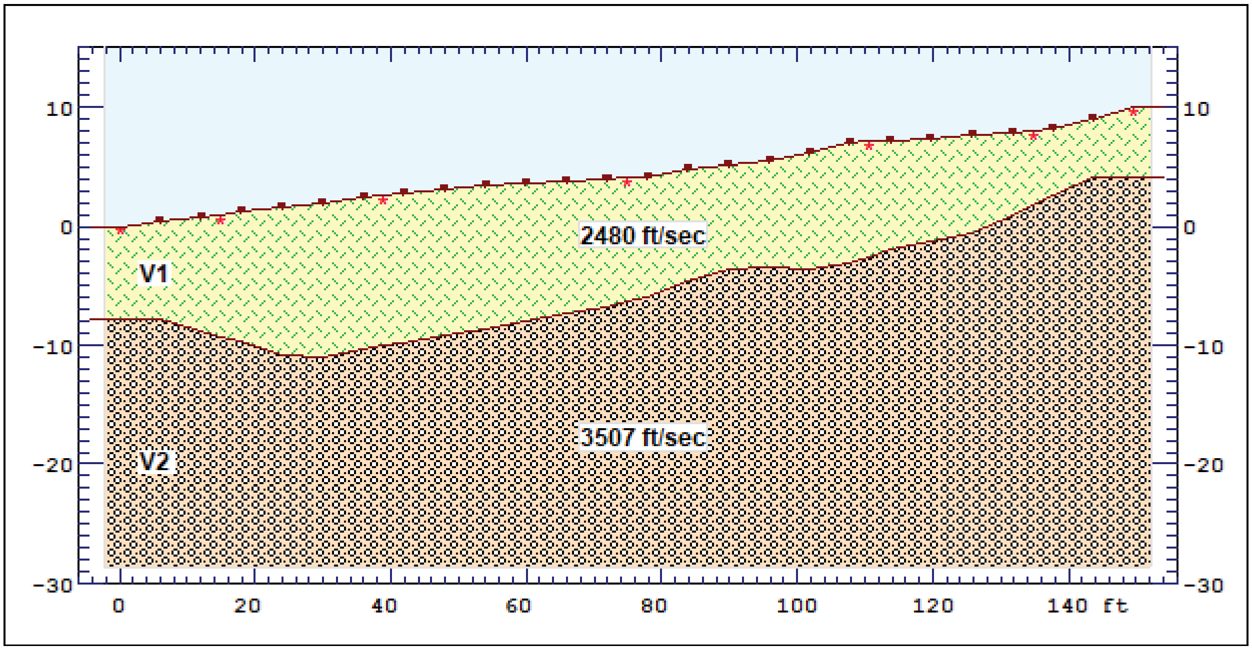


SEISMIC LINE S-8

North 3° West >

LAYER VELOCITY MODEL



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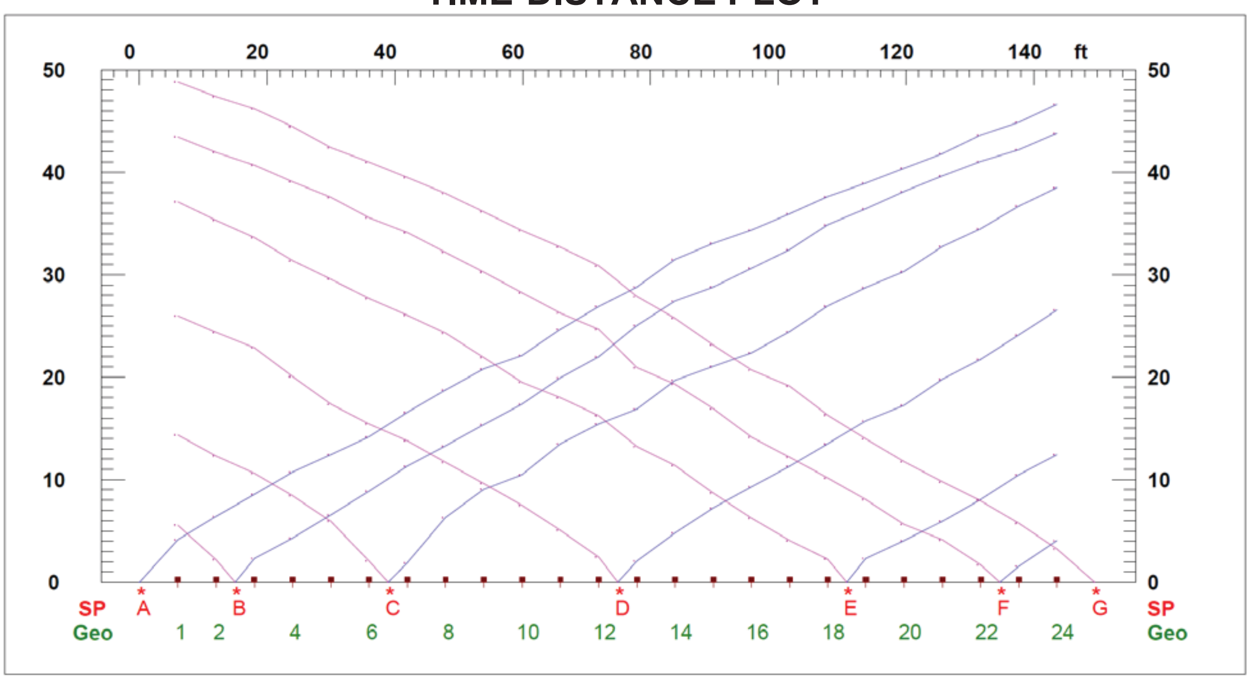
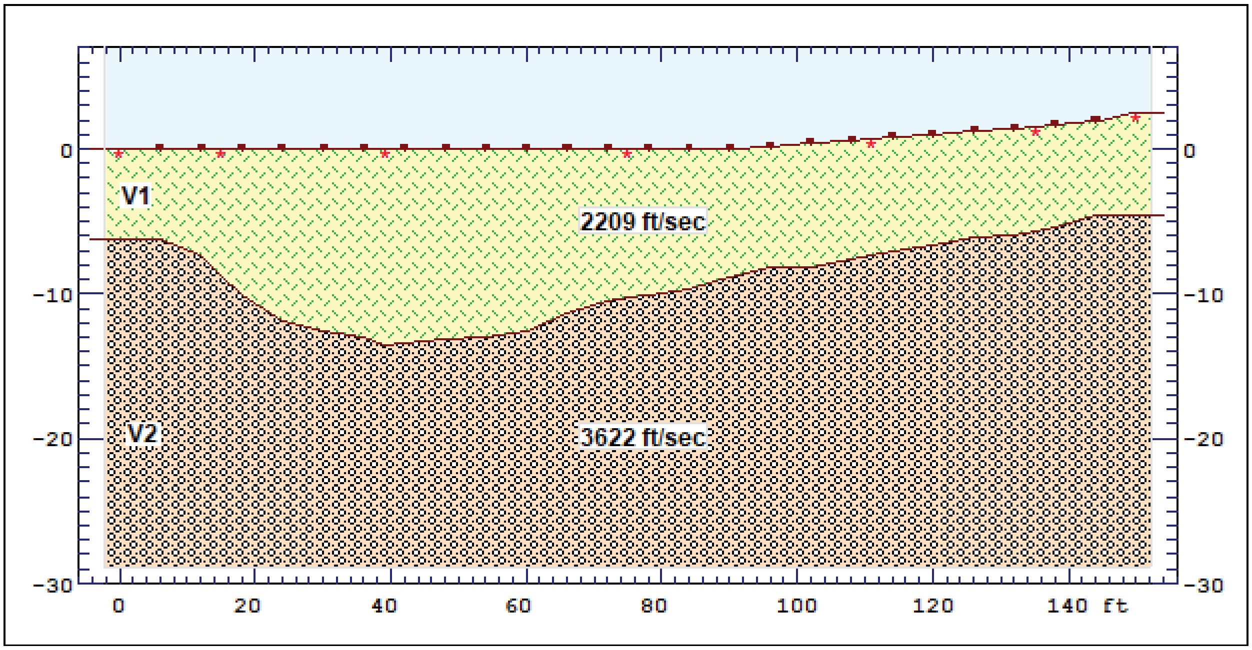


SEISMIC LINE S-9

North 28° East >

LAYER VELOCITY MODEL



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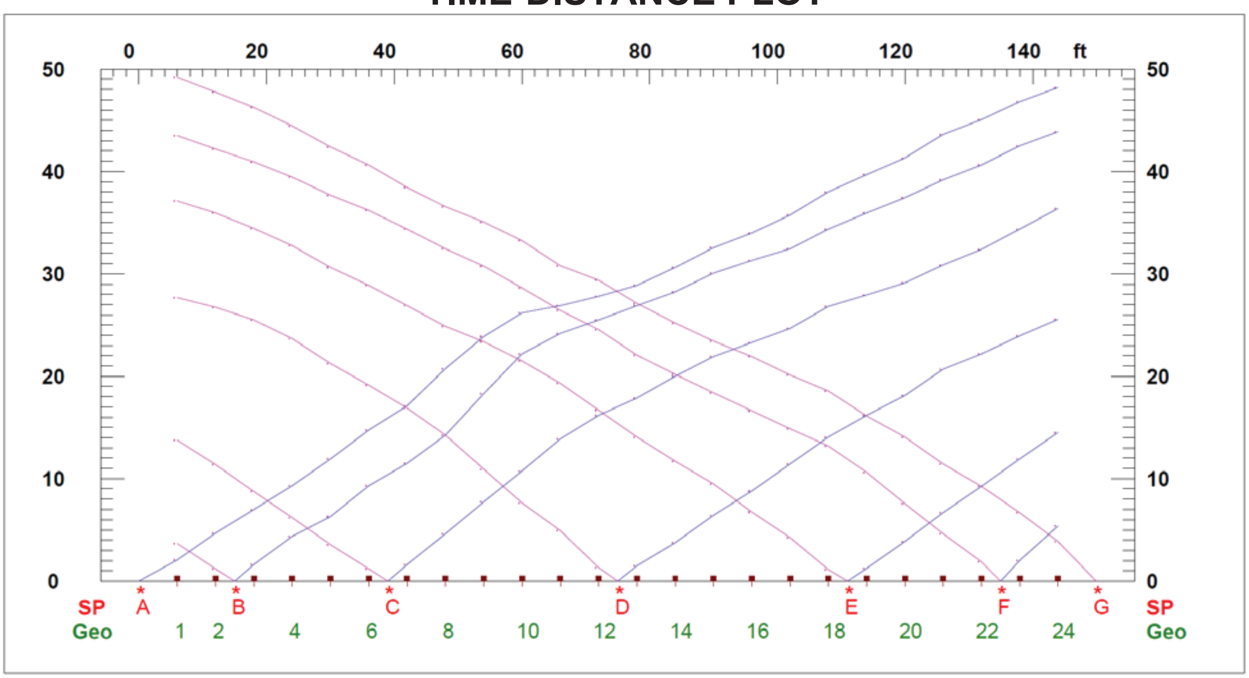
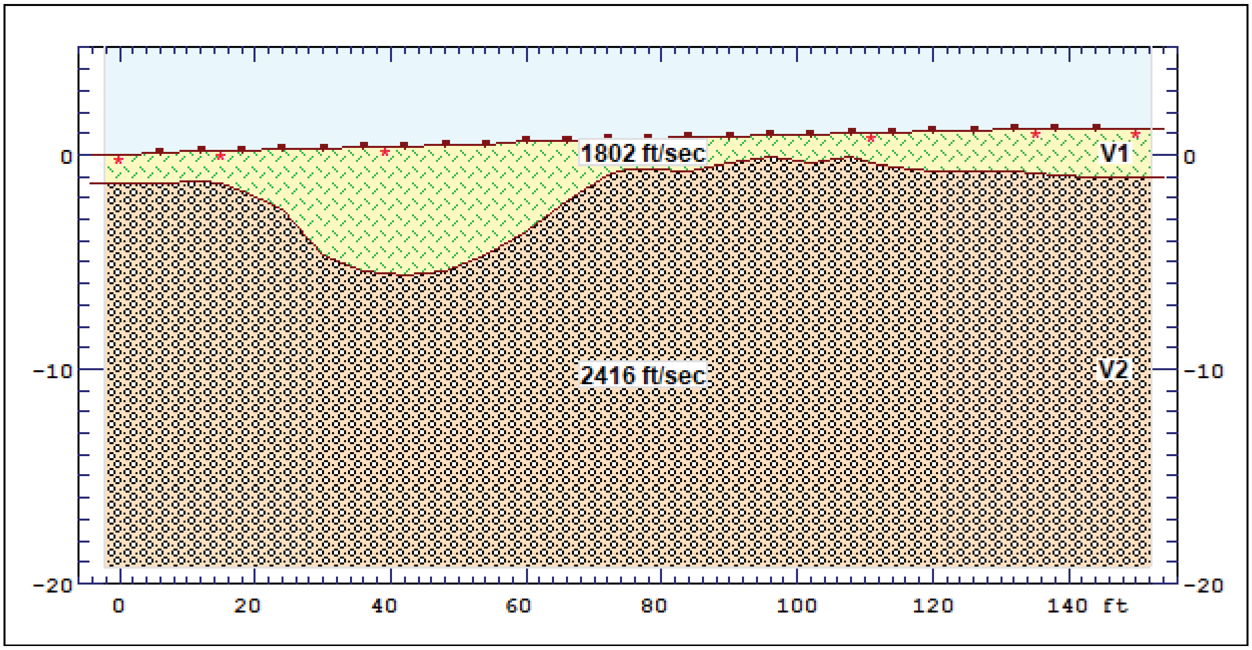


SEISMIC LINE S-10

North 23° West >

LAYER VELOCITY MODEL



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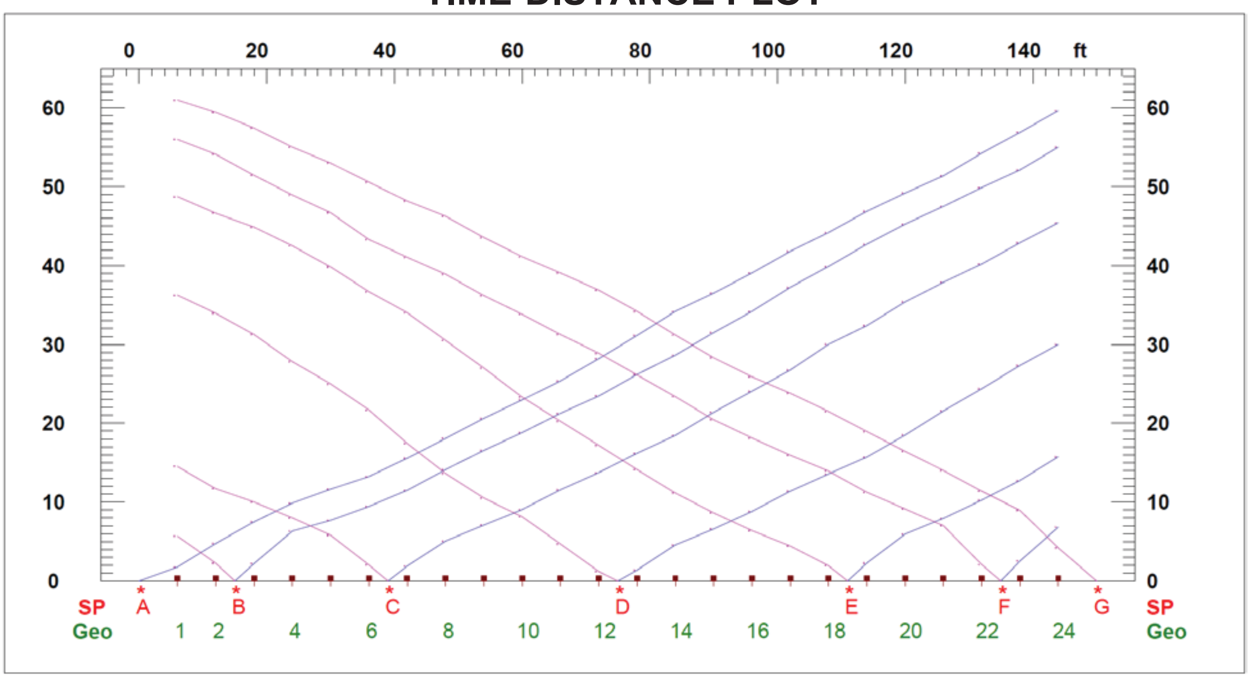
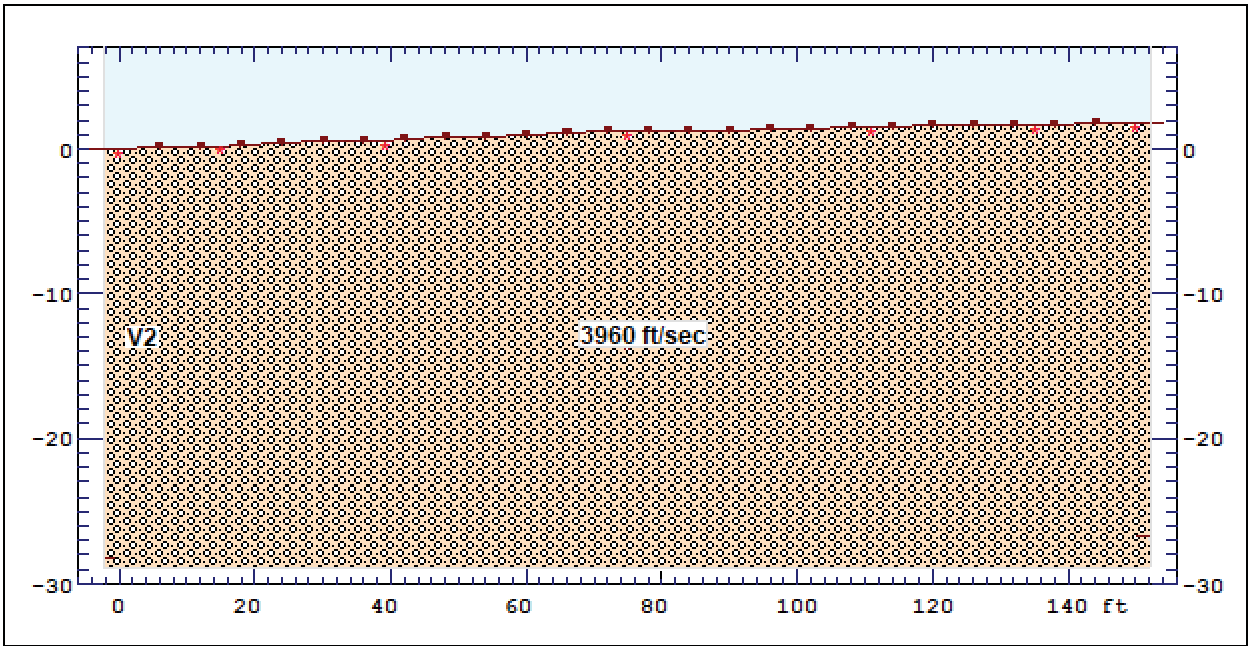


SEISMIC LINE S-11

North 19° East >

LAYER VELOCITY MODEL



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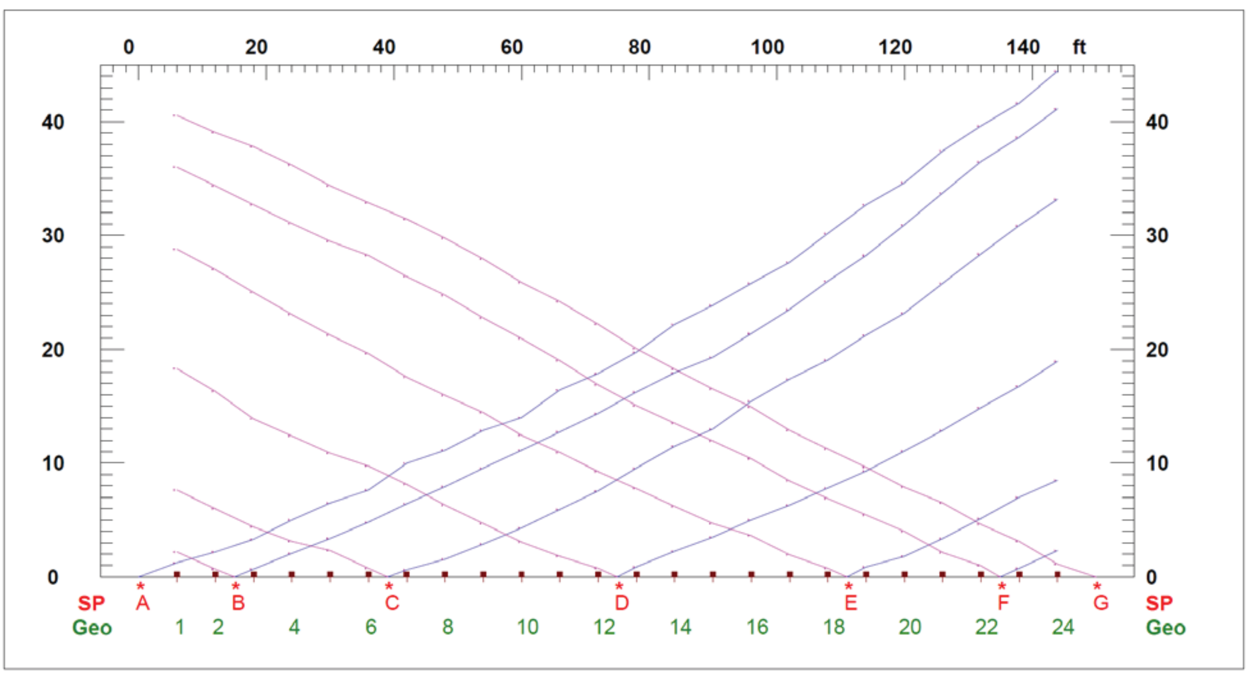

APPENDIX B

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REFERENCES

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APPENDIX C
Field Percolation Testing

LANGAN

Log of Boring **FP-1** Sheet 1 of 1

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1235 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 10/21/2022 / Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig	Completion Depth: 10 ft / Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed 2 / Undisturbed - / Core -
Casing Diameter (in): - / Casing Depth (ft): -	Water Level (ft.): First - / Completion - / 24 HR. -
Casing Hammer: - / Weight (lbs): - / Drop (in): -	Drilling Foreman: Jeorge
Sampler: 2-inch O.D. SPT Split-Barrel	
Sampler Hammer: Automatic / Weight (lbs): 140 / Drop (in): 30	Field Engineer: N. Ghanta

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1235.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), dark brown, cushed cobbles and gravel.	0						
+1234.0	**Old Alluvial Fan Deposits (Qof)** Gravelly SAND with Silt (SP-SM), brown to orangish brown, dense, dry to slightly moist, manganese oxide (MnO) stained gravel.	1						
		3	S-1	SPT	18	27 / 30 / 22	52	
+1226.5	Silty SAND with Gravel (SM), brown to orange brown, dense, slightly moist, fine to coarse sand. Sandy SILT (ML) lense observed at 9 feet.	8.5						
		9	S-2	SPT	18	15 / 17 / 32	49	Grain Size Analysis
+1225.0	Total depth = 10 feet bgs. Groundwater not encountered. Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	10						

LANGAN

Log of Boring **FP-2** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1215 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 10 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 2; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1215.0	**Undocumented Surficial Fill (asf)** Silty SAND with Gravel (SM), brown, dry, rock and cobble clasts.	0						
+1211.0	**Old Alluvial Fan Deposits (Qof)** Silty SAND with Gravel (SM), brown to orange brown, dense, slightly moist, fine to coarse sand, manganese oxide (MnO) stained gravel.	4						
		4–5.5	S-1	SPT	18	21 / 24 / 24	48	
		8.5–10	S-2	SPT	18	21 / 22 / 26	48	Grain Size Analysis
+1205.0	Total depth = 10 feet bgs. Groundwater not encountered. Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	10						

LANGAN Log of Boring **FP-3** Sheet 1 of 1

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1229 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 10 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 3; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -; Weight (lbs): -; Drop (in): -		Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel			
Sampler Hammer: Automatic; Weight (lbs): 140; Drop (in): 30		Field Engineer: N. Ghanta	

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1229.0	**Undocumented Artificial Fill (afu)** Silty SAND with Gravel (SM), dark brown, dry, crushed cobble clasts.	0						
	Very dense, dry to slightly moist.	2.5–3	S-1	SPT	18	50/3"	50/3"	Sampler bouncing on cobble; poor recovery. Heavy auger chattering; slow drilling.
+1225.0	**Old Alluvial Fan Deposits (Qof)** Silty SAND with Gravel (SM), brown to orangish brown, dense, slightly moist, fine to coarse sand, manganese oxide (MnO) stained gravel.	4						
		5–6.5	S-2	SPT	18	9 / 8 / 8	16	
+1220.5	Gravelly SAND with Clay & Silt (SP-SC), brown to orangish brown, very dense, dry to slightly moist, cobble clasts, fine to coarse gravel.	8.5–10	S-3	SPT	17	21 / 38 / 50/5"	50/5"	Grain Size Analysis
+1219.0	Total depth = 10 feet bgs. Groundwater not encountered. Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	10						

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Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1195 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 10/21/2022	Date Finished: 10/21/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 20 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 2; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman: Jeorge	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: N. Ghanta	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1195.0	**Undocumented Surficial Fill (asf)** Silty SAND (SM), dark brown, dry to slightly moist, trace gravel.	0						
±1186.0	**Old Alluvial Fan Deposits (Qof)** Silty SAND with Gravel (SM), brown to orangish brown, very dense, slightly moist.	9						
		10	S-1	SPT	18	29 / 39 / 50/6"	50/6"	
	Fine to coarse sand, manganese oxide (MnO) stained gravel.	18.5	S-2	SPT	5	50/5"	50/5"	Grain Size Analysis
±1176.0	Total depth = 19 feet bgs. Groundwater not encountered.	19						

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Log of Boring **FP-4** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	Elevation and Datum
Claremont Mckenna College	Approx. 1195 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1175.0	Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	20						
			21						
			22						
			23						
			24						
			25						
			26						
			27						
			28						
			29						
			30						
			31						
			32						
			33						
			34						
			35						
			36						
			37						
			38						
			39						
			40						
			41						
			42						
			43						
			44						
			45						

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1247 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 11/29/2022	Date Finished: 11/29/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 70.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 14; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman:	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: S. Wilkins	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1247.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel (SM), light yellowish brown, slightly moist, fine to coarse sand, abundant gravel, and cobbles to 6-inches.	0						
	Brown.	2						
		5	S-1	SPT	0	50/1"	50/1"	No sample recovery; sampled on a rock.
+1239.5	**Older Alluvial Fan Deposits (Qof)** Silty SAND with Gravel (SM), reddish brown, medium dense, moist, fine to coarse sand, some fine to coarse gravel.	7.5						
+1237.0	Sandy SILT (ML) to Silty SAND (SM), reddish brown, hard to very dense, moist, fine gravel, few clay.	10	S-2	SPT	15	11, 13, 18	31	
+1233.0	Silty SAND with Gravel (SM), orangish brown, very dense, slightly moist to moist, fine to coarse sand, some fine gravel.	14						
		15	S-3	SPT	18	30, 39, 50	89	
		20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1247 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1227.0		20	S-4	SPT	15	30 / 38 / 50	88	
+1224.0	SAND with Silt and Gravel (SP-SM), orangish brown and gray mottled, very dense, moist, fine to coarse sand and gravel, some silt.	23						
		25	S-5	SPT	5.5	50/5.5"	50/5.5"	
	Cobbles.	26						Drill rig chatter.
		30	S-6	SPT	3	50/3"	50/3"	
		31						Refusal on oversized material. Moved, attempted, and re-drilled 5, 10 and 15 feet southwest.
+1214.0	Silty SAND with Gravel (SM), orangish brown, medium dense, moist, fine to coarse sand, some fine to coarse gravel.	33						
		35	S-7	SPT	18	20 / 25 / 18	43	
		40	S-8	SPT	0	50/0"	50/0"	No sample recovery.
		45						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1247 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1202.0		45	S-9	SPT	0	50/4"	50/4"	Poor sample recovery; sampled on a rock.
+1199.0	SAND with Silt (SP-SM), olive gray to yellowish brown, very dense, moist, fine to coarse sand, few fine gravel.	48						
		50	S-10	SPT	15	40 40 49	89	
+1195.0	Silty SAND with Gravel (SM), orangish brown, very dense, moist, fine to coarse sand, some fine to coarse gravel.	52						
		55	S-11	SPT	6	50		Grain Size Analysis
	Increased gravel content and decreased silt content.	60	S-12	SPT	5	50/5"	50/5"	
	Increased silt content.	65	S-13	SPT	18	31 33 50	83	
+1179.0	SAND with Silt and Gravel (SP-SM), orangish brown to grayish brown, very dense, slightly moist, fine to coarse sand, some fine to coarse gravel.	68						
		70						

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Log of Boring **FP-5** Sheet 4 of 4

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1247 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	+1177.0		70						
	+1176.5			S-14	SPT	6	50		
		Total depth = 70.5 feet bgs. Groundwater not encountered. Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	71						
			72						
			73						
			74						
			75						
			76						
			77						
			78						
			79						
			80						
			81						
			82						
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			89						
			90						
			91						
			92						
			93						
			94						
			95						

LANGAN

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1185 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 11/29/2022	Date Finished: 11/29/2022
Drilling Equipment: CME-75 Truck-mounted Drill Rig		Completion Depth: 40.3 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed 8; Undisturbed -; Core -	
Casing Diameter (in): -	Casing Depth (ft): -	Water Level (ft.): First -; Completion -; 24 HR. -	
Casing Hammer: -	Weight (lbs): -; Drop (in): -	Drilling Foreman:	
Sampler: 2-inch O.D. SPT Split-Barrel		Field Engineer: S. Wilkins	
Sampler Hammer: Automatic	Weight (lbs): 140; Drop (in): 30		

Elev. (ft)	Sample Description	Depth (ft)
+1185.0	**Undocumented Inert Debris Fill (alf)** Silty SAND with Gravel (SM), light yellowish brown, moist, fine to coarse sand, some fine to coarse gravel.	0
±1181.0	**Old Alluvial Fan Deposits (Qof)** Silty SAND with Clay and Gravel (SM), reddish brown, very moist, fine to coarse sand, some gravel and clay.	4
±1179.5	Sandy SILT with Clay and Gravel (ML), orangish brown, very stiff, fine to medium sand, few fine gravel, some clay.	5.5
±1177.0	SAND with Silt and Gravel (SP-SM), orangish brown to grayish brown, dense, slightly moist, fine to coarse sand, some fine to coarse gravel.	8
±1169.0	Sandy SILT (ML), orangish brown, hard, moist, fine sand.	16
±1168.0	SAND with Silt and Gravel (SP-SM), grayish brown, dense, moist, fine to coarse sand and gravel, some silt, thin lenses of sandy silt.	17

Sample Data

Depth (ft)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
5–6.5	S-1	SPT	18	8, 9, 10	19	
10–11.5	S-2	SPT	18	34, 34, 37	71	
15–16.5	S-3	SPT	18	29, 18, 15	33	

LANGAN

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1185 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Number	Sample Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
+1165.0		20	S-4	SPT	18	28 / 16 / 50	66	
		22						Drill rig chatter.
	Olive gray to olive brown.	25	S-5	SPT	12	40 / 50		
		27						Drill rig chatter.
		30	S-6	SPT	4	50/4"	50/4"	Drill rig chatter; sampled on a rock.
		35	S-7	SPT	4	50/4"	50/4"	
		38						Drill rig chatter.
+1144.7	Total depth = 40.3 feet bgs. Groundwater not encountered. Percolation well installed and tested per county guidelines. Borehole backfilled with cuttings subsequent testing.	40	S-8	SPT	4	50/4"	50/4"	Grain Size Analysis

PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College	Project No.:	700114101	Date:	10/21/2022
Test Hole No.:	FP-1	Tested By:	S. Wilkins		
Depth of Test Hole (ft):	10	USCS Soil Classification:	SM		
PVC Pipe Dimension:	3-in I.D. Perforated by 10 Feet	Test Hole Diameter (in):	8		

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Inflitration Rate (in/hr)
#1 (Refill)	10/21/2022	1:16 PM	5.00	1:46 PM	6.56	941	1558	30	1.21
#2 (Refill)	10/21/2022	1:48 PM	5.00	2:18 PM	6.47	887	1558	30	1.14
#3 (Refill)	10/21/2022	2:20 PM	5.00	2:50 PM	6.38	832	1558	30	1.07
#4 (Refill)	10/21/2022	2:55 PM	5.00	3:25 PM	6.44	869	1558	30	1.11
#5 (Refill)	10/21/2022	3:26 PM	5.00	3:56 PM	6.40	844	1558	30	1.08
#6 (Refill)	10/21/2022	3:58 PM	5.00	4:28 PM	6.36	820	1558	30	1.05

Comments:	1. Percolation test was performed in accordance with the Boring Percolation Test Procedure provided in the "Guidelines for Design, Investigation, and Reporting - Low Impact Development Stormwater Infiltration," prepared by County of Los Angeles Department of Public Works, dated 30 June 2021. 2. Weather: Sunny and warm.	Average Stabilized Rate	1.08
		Reduction Factors RF_t=1, RF_v=1, RF_s=1	3
		Design Infiltration Rate (in/hr)	0.36

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PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College	Project No.:	700114101	Date:	10/21/2022
Test Hole No.:	FP - 2	Tested By:	shaun wilkins	Updated:	11/11/2022
Depth of Test Hole (ft):	10	USCS Soil Classification:		SP-SM	
PVP Pipe Dimension:	2-in I.D. x 10 ft long (10 ft slotted) with 10 ft screen	Test Hole Diameter (in):		8	

SANDY SOIL CRITERIA TEST*

Trial No.	Date	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (in.)	Greater than or Equal to 6" (Y/N)
1	10/21/2022	11:10 AM	11:12 AM	2.0	5	5.5	6	Y
2	10/21/2022	11:12 AM	11:15 AM	3.0	5.5	6	6	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches.

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Infiltration Rate (in/hr)
#1 (Refill)	10/21/2022	11:15 AM	5.00	11:25 AM	6.50	905	1332	10.0	4.08
#2 (Refill)	10/21/2022	11:26 AM	5.00	11:36 AM	6.42	857	1344	10.0	3.82
#3 (Refill)	10/21/2022	11:37 AM	5.00	11:48 AM	6.43	863	1343	10.0	3.85
#4 (Refill)	10/21/2022	11:50 AM	5.00	12:00 PM	6.43	863	1343	10.0	3.85
#5 (Refill)	10/21/2022	12:01 PM	5.00	12:11 PM	6.42	857	1344	10.0	3.82
#6 (Refill)	10/21/2022	12:12 PM	5.00	12:22 PM	6.41	850	1346	10.0	3.79

Comments:	1. Percolation test was performed in accordance with the Technical Guidance Document Appendices provided on San Bernardino Gov. website. *(https://www.sbcounty.gov/uploads/DPW/docs/AppendixD-OCInfiltrationRateEvaluationProtocol.pdf)* 2. Infiltration Rate is caluclated based on Porchet Method (Inverse Borehole method). 3. Weather: Sunny and warm.	Stabilized Infiltration Rate (in/hr)	3.79
		Combined Safety Factor, $S_{TOT}=S_A \times S_B$ ($S_A=2$, $S_B=2$)	4.00
		Design Infiltration Rate (in/hr)	0.95

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PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College	Project No.:	700114101	Date:	10/21/2022
Test Hole No.:	FP - 3	Tested By:	shaun wilkins	Updated:	11/11/2022
Depth of Test Hole (ft):	10	USCS Soil Classification:		SP-SM	
PVP Pipe Dimension:	2-in I.D. x 10 ft long (5 ft solid and 5 ft slotted) with 10 ft screen	Test Hole Diameter (in):		8	

SANDY SOIL CRITERIA TEST*

Trial No.	Date	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (in.)	Greater than or Equal to 6" (Y/N)
1	10/21/2022	1:26 PM	1:30 PM	4.0	3.5	4	6	Y
2	10/21/2022	1:30 PM	1:34 PM	4.0	4	4.5	6	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches.

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Infiltration Rate (in/hr)
#1 (Refill)	10/21/2022	1:38 PM	5.00	1:48 PM	6.46	881	1338	10.0	3.95
#2 (Refill)	10/21/2022	1:54 PM	5.00	2:04 PM	5.47	283	1487	10.0	1.14
#3 (Refill)	10/21/2022	2:06 PM	5.00	2:16 PM	6.23	742	1373	10.0	3.24
#4 (Refill)	10/21/2022	2:16 PM	5.00	2:26 PM	6.22	736	1374	10.0	3.21
#5 (Refill)	10/21/2022	2:27 PM	5.00	2:37 PM	6.22	736	1374	10.0	3.21
#6 (Refill)	10/21/2022	2:38 PM	5.00	2:48 PM	6.21	730	1376	10.0	3.18

Comments:	1. Percolation test was performed in accordance with the Technical Guidance Document Appendices provided on San Bernardino Gov. website. *(https://www.sbcounty.gov/uploads/DPW/docs/AppendixD-OCInfiltrationRateEvaluationProtocol.pdf)* 2. Infiltration Rate is caluclated based on Porchet Method (Inverse Borehole method). 3. Weather: Sunny and warm.	Stabilized Infiltration Rate (in/hr)	3.18
		Combined Safety Factor, $S_{TOT}=S_A \times S_B$ (S_A=2, S_B=2)	4.00
		Design Infiltration Rate (in/hr)	0.80

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PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College	Project No.:	700114101	Date:	10/21/2022
Test Hole No.:	FP - 4	Tested By:	shaun wilkins	Updated:	11/11/2022
Depth of Test Hole (ft):	19	USCS Soil Classification:		SP-SM	
PVP Pipe Dimension:	2-in I.D. x 20 ft long (5 ft solid and 15 ft slotted) with 20 ft screen	Test Hole Diameter (in):		8	

SANDY SOIL CRITERIA TEST*

Trial No.	Date	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (in.)	Greater than or Equal to 6" (Y/N)
1	10/21/2022	12:17 PM	12:21 PM	4.0	8.5	9	6	Y
2	10/21/2022	12:21 PM	12:24 PM	3.0	9.05	9.55	6	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches.

Trial No.	Date	Time of Measurement	Initial Depth to Water (ft)	Time of Measurement	Final Depth to Water (ft)	Volume of Water Infiltrated (cu.in.)	Surface Area (sq.in.)	Time Interval (min)	Infiltration Rate (in/hr)
#1 (Refill)	10/21/2022	12:28 PM	10.00	12:38 PM	10.68	410	2662	10.0	0.92
#2 (Refill)	10/21/2022	12:40 PM	10.00	12:50 PM	10.87	525	2633	10.0	1.20
#3 (Refill)	10/21/2022	12:51 PM	10.00	1:01 AM	10.88	531	2632	10.0	1.21
#4 (Refill)	10/21/2022	1:02 AM	10.00	1:12 AM	10.85	513	2636	10.0	1.17
#5 (Refill)	10/21/2022	1:13 AM	10.00	1:23 AM	10.84	507	2638	10.0	1.15
#6 (Refill)	10/21/2022	1:24 AM	10.00	1:34 AM	10.83	501	2639	10.0	1.14

Comments:	1. Percolation test was performed in accordance with the Technical Guidance Document Appendices provided on San Bernardino Gov. website. *(https://www.sbcounty.gov/uploads/DPW/docs/AppendixD-OCInfiltrationRateEvaluationProtocol.pdf)* 2. Infiltration Rate is caluclated based on Porchet Method (Inverse Borehole method). 3. Weather: Sunny and warm.	Stabilized Infiltration Rate (in/hr)	1.14
		Combined Safety Factor, $S_{TOT}=S_A \times S_B$ ($S_A=2$, $S_B=2$)	4.00
		Design Infiltration Rate (in/hr)	0.28

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PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College Sports Complex	Project No.:	700114101	Date Tested:	11/29/2022
Test Hole No.:	FP - 5	Tested By:	SHW	Updated:	12/15/2023
Depth of Test Hole (ft):	70	USCS Soil Classification:		SP-SM	
PVP Pipe Dimension:	3-in I.D. x 70 ft long (20 ft perforated and 50 ft solid)	Test Hole Diameter (in):		8	

SANDY SOIL CRITERIA TEST*

Trial No.	Start Time	Stop Time	Time Interval (sec)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (in.)	Greater than or Equal to 6" (Y/N)
1	4:50 PM	4:50 PM	22	55.00	55.50	6	Y
2	4:51 PM	4:51 PM	28	55.50	56.00	6	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches.

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (ft)	Percolation Rate (min/in)	Infiltration Rate (in/hr)
#1 (Refill)	4:55 PM	5:05 PM	10.0	60.00	63.90	3.90	0.21	5.70
#2 (Refill)	5:16 PM	5:26 PM	10.0	60.00	63.87	3.87	0.22	5.64
#3 (Refill)	5:27 PM	5:37 PM	10.0	60.00	63.78	3.78	0.22	5.48
#4 (Refill)	5:39 PM	5:49 PM	10.0	60.00	63.75	3.75	0.22	5.43
#5 (Refill)	5:50 PM	6:00 PM	10.0	60.00	63.74	3.74	0.22	5.41
#6 (Refill)	6:02 PM	6:12 PM	10.0	60.00	63.72	3.72	0.22	5.37

Comments:	1. Percolation test was performed in accordance with the Technical Guidance Document Appendices provided on San Bernardino Gov. website. *(https://www.sbcounty.gov/uploads/DPW/docs/AppendixD-OCInfiltrationRateEvaluationProtocol.pdf)* 2. Infiltration Rate is caluclated based on Porchet Method (aka inverse borehole method) 3. Weather: Partly cloudy and cool	Tested Infiltration Rate (in/hr)	5.37
		Combined Safety Factor, $S_{TOT}=S_A \times S_B$ (S_A=1, S_B=2)	2
		Design Infiltration Rate (in/hr)	2.69

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PERCOLATION TEST DATA SHEET

Project:	Claremont McKenna College Sports Complex	Project No.:	700114101	Date Tested:	11/29/2022
Test Hole No.:	FP - 6	Tested By:	SHW	Updated:	12/15/2023
Depth of Test Hole (ft):	40	USCS Soil Classification:		SP-SM	
PVP Pipe Dimension:	3-in I.D. x 40 ft long (20 ft perforated and 20 ft solid)	Test Hole Diameter (in):		8	

SANDY SOIL CRITERIA TEST*

Trial No.	Start Time	Stop Time	Time Interval (sec)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in water Level (in.)	Greater than or Equal to 6" (Y/N)
1	3:30 PM	3:30 PM	9	29.00	29.50	6	Y
2	3:30 PM	3:30 PM	11	29.50	30.00	6	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25 inches.

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (ft)	Final Depth to Water (ft)	Change in Water Level (ft)	Percolation Rate (min/in)	Infiltration Rate (in/hr)
#1 (Refill)	3:30 AM	3:40 AM	10.0	30.00	37.40	7.40	0.11	13.73
#2 (Refill)	5:16 PM	5:26 PM	10.0	30.00	34.90	4.90	0.17	7.62
#3 (Refill)	5:27 PM	5:37 PM	10.0	30.00	36.22	6.30	0.13	10.58
#4 (Refill)	5:39 PM	5:49 PM	10.0	30.00	36.19	6.28	0.13	10.50
#5 (Refill)	5:50 PM	6:00 PM	10.0	30.00	35.90	6.12	0.14	9.81
#6 (Refill)	6:02 PM	6:12 PM	10.0	30.00	35.85	5.85	0.14	9.69

Comments:	1. Percolation test was performed in accordance with the Technical Guidance Document Appendices provided on San Bernardino Gov. website. *(https://www.sbcounty.gov/uploads/DPW/docs/AppendixD-OCInfiltrationRateEvaluationProtocol.pdf)* 2. Infiltration Rate is caluclated based on Porchet Method (aka inverse borehole method) 3. Weather: Partly cloudy and cool	Tested Infiltration Rate (in/hr)	9.69
		Combined Safety Factor, $S_{TOT}=S_A \times S_B$ (S_A=1, S_B=2)	2
		Design Infiltration Rate (in/hr)	4.85

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APPENDIX D
Soil-gas (Methane) Testing

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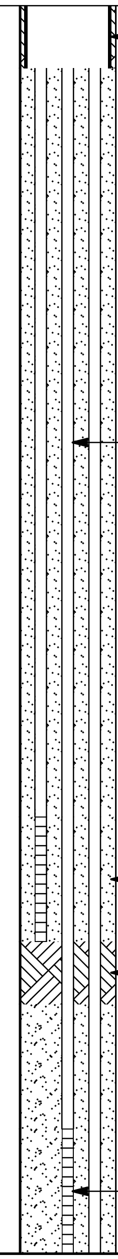
Log of Boring **MW-1** Sheet 1 of 2

Project: Proposed Athletic Complex	Project No.: 700114101
Location: Claremont Mckenna College	Elevation and Datum: Approx. 1260 (feet, MSL)
Drilling Company: 2R Drilling	Date Started: 08/14/2023 ; Date Finished: 08/14/2023
Drilling Equipment: LAR - CME	Completion Depth: 30.5 ft ; Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger	Number of Samples: Disturbed - ; Undisturbed - ; Core
Casing Diameter (in) ; Casing Depth (ft)	Water Level (ft.): First ; Completion - ; 24 HR. -
Casing Hammer ; Weight (lbs) - ; Drop (in) -	Drilling Foreman: Jerry
Sampler: -	
Sampler Hammer - ; Weight (lbs) - ; Drop (in) -	Field Engineer: B. Watkins

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+1260.0	**Artificial Fill** Silty SAND with Gravel and Cobbles (SM): light brown, dry, fine to coarse sand, fine to coarse gravel, cobbles of less than 5inches in size.	0					
	+1255.0	Silty GRAVEL with Sand (GM): brown, slightly moist to moist, fine to coarse sand, fine to coarse gravel, cobbles of less than 4inches in size.	5					
		Light brown	15					
			20					

Well Diagram



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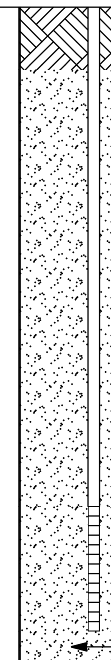
Log of Boring **MW-1** Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1260 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
+1240.0	Light brown to brown, moist	20					
+1229.5	Total Depth = 30.5 feet No groundwater encountered Boring converted to methane test well.	30.5					

Depth Scale: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

Well Diagram



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Log of Boring **MW-2A** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1273.5 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/14/2023	Date Finished: 08/15/2023
Drilling Equipment: LAR - CME		Completion Depth: 33.5 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed - ; Undisturbed - ; Core	
Casing Diameter (in)	Casing Depth (ft)	Water Level (ft.): First ; Completion - ; 24 HR. -	
Casing Hammer: Weight (lbs) - ; Drop (in) -		Drilling Foreman: Jerry	
Sampler: -		Field Engineer: B. Watkins	
Sampler Hammer: - ; Weight (lbs) - ; Drop (in) -			

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
	+1273.5	**Artificial Fill** Silty SAND with Gravel and Cobbles (SM): light brown, dry to sightly moist, fine to coarse sand, fine to coarse gravel, cobbles of less than 6inches in size.	0					
	+1270.5	Silty GRAVEL with Sand (GM): brown, slightly moist to moist, fine to coarse sand, fine to coarse gravel, cobbles of less than 4inches in size.	3					
		Light brown	10					
			20					

\\LANGAN.COM\DATA\IRV\DATA1\700114101\PROJECT DATA_DISCIPLINE\GEOTECHNICAL\GINTLOGS\700114101 - METHANE WELLS GINT LOGS.GPJ ... 8/24/2023 2:43:07 PM ... Report: Log - LANGAN

LANGAN

Log of Boring MW-2A Sheet 2 of 2

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1273.5 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale (ft)	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
+1253.5		20					
+1248.5	Silty SAND with Gravel (SM): light brown, moist, fine to coarse sand, fine to coarse gravel.	25					
+1240.0	Total Depth = 33.5 feet No groundwater encountered Backfilled with augur cuttings.	33.5					
		45					

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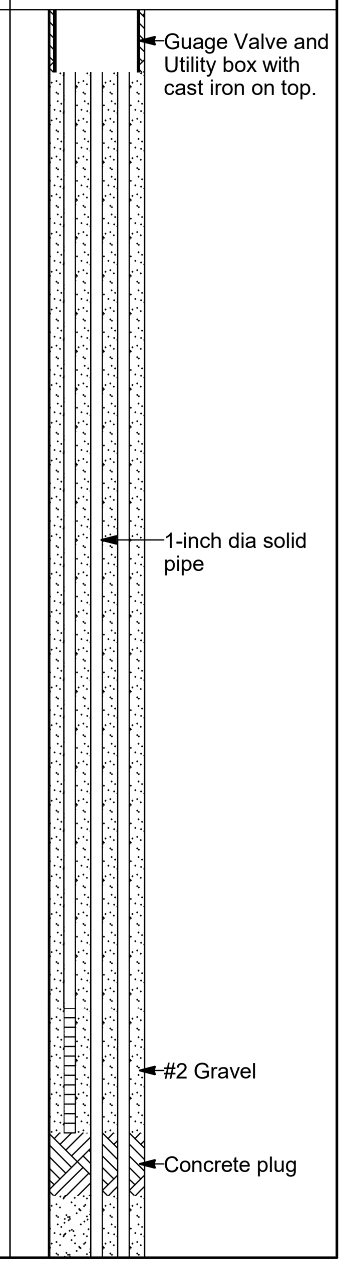
Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1273.5 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/15/2023	Date Finished: 08/15/2023
Drilling Equipment: LAR - CME		Completion Depth: 34 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed - / Undisturbed - / Core	
Casing Diameter (in)	Casing Depth (ft)	Water Level (ft.): First / Completion - / 24 HR. -	
Casing Hammer / Weight (lbs) - / Drop (in) -		Drilling Foreman: Jerry	
Sampler: -		Field Engineer: B. Watkins	
Sampler Hammer - / Weight (lbs) - / Drop (in) -			

MATERIAL SYMBOL	Elev. (ft) +1273.5	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
		Artificial Fill Silty GRAVEL with Sand (GM): brown, dry to slightly moist, fine to coarse sand, fine to coarse gravel, cobbles of less than 4inches in size.	0					
			1					
			2					
			3					
			4					
			5					
			6					
			7					
			8					
			9					
		Brown	10					
			11					
			12					
			13					
			14					
			15					
			16					
			17					
			18					
			19					
			20					

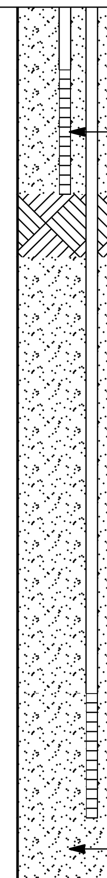
Well Diagram



Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1273.5 (feet, MSL)

Elev. (ft)	Sample Description	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40
+1253.5		20					
	Large cobble between 23 to 24 feet	23					
+1248.5	Silty SAND with Gravel (SM): light brown to brown, moist, fine to coarse sand, fine to coarse gravel.	25					
+1239.5	Total Depth = 34.0 feet No groundwater encountered Boring converted to methane test well.	34					
		45					

Well Diagram



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Log of Boring **MW-3** Sheet 1 of 2

Project: Proposed Athletic Complex		Project No.: 700114101	
Location: Claremont Mckenna College		Elevation and Datum: Approx. 1287 (feet, MSL)	
Drilling Company: 2R Drilling		Date Started: 08/15/2023	Date Finished: 08/15/2023
Drilling Equipment: LAR - CME		Completion Depth: 34 ft	Rock Depth: -
Size and Type of Bit: 8-inch O.D. Hollow Stem Auger		Number of Samples: Disturbed: - / Undisturbed: - / Core	
Casing Diameter (in)	Casing Depth (ft)	Water Level (ft.): First ▽ / Completion ▼ - / 24 HR. ▼ -	
Casing Hammer: Weight (lbs) -	Drop (in) -	Drilling Foreman: Jerry	
Sampler: -		Field Engineer: B. Watkins	
Sampler Hammer: - Weight (lbs) -	Drop (in) -		

Material Symbol	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Well Diagram
	+1287.0	**Artificial Fill** Silty GRAVEL with Sand (GM): brown, dry to slightly moist, fine to coarse sand, fine to coarse gravel.	0						Guage Valve and Utility box with cast iron on top.
		Moist	5						
		Less than 7inch dia cobbles between 5 to 10 feet.	8						1-inch dia solid pipe
	+1272.0	Silty SAND with Gravel (SM): brown, moist, fine to coarse sand, fine to coarse gravel.	15						
			17						#2 Gravel
			18						Concrete plug
			20						

Project	Project No.
Proposed Athletic Complex	700114101
Location	**Elevation and Datum**
Claremont Mckenna College	Approx. 1287 (feet, MSL)

MATERIAL SYMBOL	Elev. (ft)	Sample Description	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Well Diagram
	+1267.0	Light brown to brown, moist	20						1-inch dia slotted pipe. A gas probe attached to a flexible tubing extending from surface to center of the slotted pipe.
	+1253.0	Total Depth = 34 feet No groundwater encountered Boring converted to methane test well.	34						1 feet of #2 gravel at the bottom

FORM 1 (CONTINUED) - CERTIFICATE OF COMPLIANCE FOR METHANE TEST DATA

Part 2: Test Data - Shallow Soil Gas Test and Gas Probe Test

Site Address: Claremont McKenna

Description of Gas Analysis Instrument(s):

Instrument Name and Model: Landtec GEM5000   Instrument Accuracy: ± 20 ppmv.

City of Los Angeles Testing License #:

	Date	Time	Probe Set #	Concentration (ppmv)	Pressure (inches water column)	Probe Depth (feet)	Description / Probe Location
MW1 1st reading	8/15/23	≈1130AM	MW1-#1	0.0	0.02	29	south side of bldg
	"	"	" #2	0.0	0.04	19	"
	"	"	" #3	0.0	0.02	14	"
MW1 2nd reading	8/16/23	≈1200PM	MW1-#1	0.0	0.01	29	south side of bldg
	"	"	" #2	0.0	0.04	19	
	"	"	" #3	0.0	0.03	14	
MW2 1st reading	8/16/23	≈1230PM	MW2-#1	0.0	0.03	32	center of bldg
	"	"	#2	0.0	0.06	22	
	"	"	#3	0.0	0.04	17	
MW3 1st reading	8/16/23	≈130PM	MW3-#1	0.0	0.03	32	north side of bldg
	"	"	#2	0.0	0.05	22	
	"	"	#3	0.0	0.04	17	
MW2 2nd reading	8/17/23	≈1230PM	MW2-#1	0.0	0.02	32	center
	"		#2	0.0	0.01	22	
	"	"	#3	0.0	0.02	17	
MW3 2nd reading	8/17/23	≈130PM	MW3-#1	0.0	0.07	32	north side
	"	"	#2	0.0	0.07	22	
	"	"	#3	0.0	0.06	17	

APPENDIX E

Historical Aerial Photographs

Notes:
1. Aerial imagery provided by HistoricalAerials.com.

LANGAN
Langan Engineering and Environmental Services, Inc.
18575 Jamboree Road, Suite 150
Irvine, CA 92612
T: 949.561.9200 F: 949.561.9201 www.langan.com

Project	Figure Title	Project No.	Figure
CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	HISTORICAL AERIAL 1938	700114101 Date: NOVEMBER 2022 Scale: 1 inch = 500 ft Drawn By: MG	C-1

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:37 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

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Project	Figure Title	Project No.	Figure
CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	HISTORICAL AERIAL 1948	700114101 Date: NOVEMBER 2022 Scale: 1 inch = 500 ft Drawn By: MG	C-2

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:38 PM

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project **CLAREMONT MCKENNA COLLEGE** UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title **HISTORICAL AERIAL 1952**	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-3

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:48 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

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Project	Figure Title	Project No.	Figure
CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	HISTORICAL AERIAL 1954	700114101 Date: NOVEMBER 2022 Scale: 1 inch = 500 ft Drawn By: MG	C-4

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:50 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title HISTORICAL AERIAL 1956	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-5

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:50 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title HISTORICAL AERIAL 1964	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-6

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:51 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

LANGAN	Project	Figure Title	Project No.	Figure
Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	HISTORICAL AERIAL 1972	700114101 Date: NOVEMBER 2022 Scale: 1 inch = 500 ft Drawn By: MG	C-7

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:52 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title HISTORICAL AERIAL 1980	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-8

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:53 PM

Notes:
1. Aerial imagery provided by the United States Geological Survey.

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title HISTORICAL AERIAL 1994	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-9

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/11/2022 User: mgeorgalas Time: 4:54 PM

Notes:
1. Aerial imagery provided by the California Department of Fish and Wildlife.

LANGAN Langan Engineering and Environmental Services, Inc. 18575 Jamboree Road, Suite 150 Irvine, CA 92612 T: 949.561.9200 F: 949.561.9201 www.langan.com	Project CLAREMONT MCKENNA COLLEGE UPLAND SAN BERNARDINO COUNTY CALIFORNIA	Figure Title HISTORICAL AERIAL 2005	Project No. 700114101 Date NOVEMBER 2022 Scale 1 inch = 500 ft Drawn By MG	Figure C-10

Path: \\langan.com\data\NYC\other\GIS\Projects\IRV\700114101\700114101.aprx Date: 11/13/2022 User: mgeorgalas Time: 4:41 PM

APPENDIX F
Estimate of Landfill Materials Debris Type

Summary of Reclamation Fill Units

Relative Location	Boring	Fill Unit	Fill Thickness	Approximate Percentage of Generalized Fill Units					
				>50% Soil	>50% Oversize	>50% Concrete	>50% Asphalt	>50% Brick	Misc. Debris
Eastern Edge of Site, East of Proposed Fields/Sediment Pond	B-20	asf	7.5	75	25				
	B-23	asf	5	90	10				
	B-40	asf	5	85	15				
	B-8	asf	5	95	5				
	FP-2	asf	4	85	15				
	TP-13	asf	6.5	60	40				
	TP-16	asf	2	85	15				
	TP-18	asf	4.5	85	15				
	TP-19	asf	3	100					
	TP-22	asf	8	90			10		
	TP-25	asf	4	90					10
	TP-26	asf	2	95	5				
	TP-27	asf	2	100					
	TP-28	asf	5	85	15				
	TP-29	asf	2	85	15				
	TP-30	asf	2	85	15				
	TP-31	asf	1	100					
	TP-32	asf	2.5	75	15	5			5
	TP-8	asf	4.5	75	15	5	5		
Weighted Average %				**86%**	**12%**	**1%**	**1%**	**0%**	**1%**
South of Proposed Track and Football Field	B-14	afc	>17	75	25				
	B-15	afc	>14	75	25				
	B-16	afc	>15	75	25				
	B-17	afc	45	75	25				
	B-7	afc	13	50	50				
	TP-7	afc	>10	70	15		5	5	5
Weighted Average %				**70%**	**28%**	**0%**	**1%**	**1%**	**1%**
South Central and Central Portion of the Site, South of G-G'	B-10	afu	30	75	25				
	B-11	afu	2.5	85	15				
	B-12	afu	16.5	75	15	5		5	
	B-21	afu	50	55	20	15	5	5	
	B-22	afu	46	55	25	10	5	5	
	B-24	afu	50	65	30			5	
	B-25	afu	8	85	15				
	B-26	afu	35	85	15				
	B-27	afu	30	85	15				
	B-28	afu	6	80	20				
	B-29	afu	20	85	15				
	B-30	afu	26.5	85	15				

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South Central and Central Portion of the Site, South of G-G'	B-31	afu	7.5	85	15				
	B-32	afu	2.5	100					
	B-33	afu	5	100					
	B-34	afu	20	85	15				
	B-35	afu	2.5	100					
	B-36	afu	20	85	15				
	B-37	afu	2.5	85	15				
	B-38	afu	12.5	75	15		5	5	
	B-39	afu	30	80	20				
	B-41	afu	7.5	85	15				
	B-42	afu	7.5	80	15	5			
	B-9	afu	1.5	100					
	FP-1	afu	1	85	15				
	TP-10	afu	>8	85	15				
	TP-11	afu	3	75	15			5	5
	TP-12	afu	>7.5	70	15	5		5	5
	TP-14	afu	>7.5	80	15		5		
	TP-15	afu	2.5	85	15				
	TP-17	afu	>7	25	5	35	30	5	
	TP-9	afu	1	100					
Weighted Average %				**81%**	**14%**	**2%**	**2%**	**1%**	**0%**
Western Edge of Site near Proposed Tunnel and Parking	B-1	alf	41	80	15	5			
	B-13	alf	10	60	15	5	10	5	5
	B-3	alf	>25	80	20				
	B-4	alf	>33	70	20	10			
	B-43	alf	>52	55	15		25		5
	B-5	alf	40	90			10		
	B-50	alf	30	80	20				
	B-51	alf	40	80	15	5			
	B-52	alf	30	75	15	5	5		
	B-53	alf	45	80	10		10		
	B-54	alf	35	80	15		5		
	B-55	alf	46	75	10	5	10		
	B-56	alf	20	80	10	5	5		
	B-57	alf	55	95	5				
	B-58	alf	31	75	15		5	5	
	B-59	alf	50	75	5	5	5	5	5
	B-6	alf	30	80	15		5		
	B-60	alf	28	75	10		10	5	
	B-61	alf	55	70	15	5	10		
	B-62	alf	30	85	10		5		
	TP-1	alf	>5	60	35				5

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	TP-24	alf	>12	55	15	25			5
	TP-3	alf	>5	80	10		5	5	
	TP-4	alf	>10	55	20	15	5		5
	TP-5	alf	>6	55	25	5	5	5	5
	TP-6	alf	>7	75	15		10		
Weighted Average %				**74%**	**14%**	**4%**	**5%**	**1%**	**1%**
North Central and Northern Portion of the Site, Near and N of G-G'	TP-2	alf	>10	50	17	15	15		3
	B-43	alf	>52	55	15		25		5
	B-2	alf	>28.5	50	20	10	15		5
	TP-1	alf	>5	60	35				5
	B-2	alf	>28.5	50	20	10	15		5
	TP-23	arf	9	80	15				5
	B-46	alf	20	65	15	10	10		
	B-41	afu	7.5	85	15				
	B-42	afu	7.5	80	15	5			
	B-44	alf	38	65	10	5	15	5	
	B-45	alf	35	70	15	5	5	5	
	B-46	alf	20	65	15	10	10		
	B-1	alf	41	80	15	5			
	B-3	alf	>25	80	20				
	TP-3	alf	>5	80	10		5	5	
	B-8	asf	5	95	5				
Weighted Average %				**69%**	**16%**	**4%**	**7%**	**1%**	**2%**