

APPENDIX D1

Draft Geotechnical Investigation Report

DRAFT GEOTECHNICAL INVESTIGATION REPORT
PROPOSED TOPGOLF REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

March 13, 2019



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1 INTRODUCTION

Geo-Logic Associates, Inc. (GLA) prepared this report to provide preliminary geotechnical recommendations for the proposed Topgolf USA Burlingame Golf Center Redevelopment Project that will be constructed on top of the closed Burlingame Landfill at 1001 Airport Boulevard in Burlingame, California (Figure 1). The landfill is owned by the City of Burlingame (City) and is bounded to the north by Airport Boulevard and the San Francisco Bay beyond that; the Doubletree Hotel on the east; and marsh and the Burlingame Lagoon (a tributary to San Francisco Bay) on the south. The landfill covers approximately 50 acres of a larger 91-acre tract owned by the City. Facilities on the 91-acre tract include the City's Bayside Park and Wastewater Treatment Facility.

Improvements currently present on the closed landfill include a baseball field, driving range and putting area, soccer field, clubhouse, parking area, and access roads (Figure 2). The driving range, putting area, soccer field, clubhouse, parking lot, and maintenance area were constructed on the top deck of the closed landfill and are surrounded by final slopes that are inclined about 3:1 (horizontal: vertical) and are a maximum of about 40 feet high. The soccer field, putting area, parking lot, baseball field, and maintenance area relatively flat; the driving range slopes downward about 30 vertical feet over a horizontal distance of about 840 feet from the southwest end of the range towards the tee boxes to the northeast.

The Topgolf project will cover an area of about 15 acres and incorporate a two-story structure located at the southwest end of the existing range. The structure will include a restaurant, bar, event spaces, meeting rooms, and hitting bays. Based on the current concept drawings, the project will incorporate relatively large targets in the range area of the site, net poles and netting, new parking areas, and a new access road on the north side of the site from Airport Boulevard.

1.1 SITE BACKGROUND

The Burlingame Landfill operated between 1957 and 1987 and accepted construction debris, concrete rubble, roofing shingles, gardening debris, wood, metal, cloth, plastic, and anaerobic digester sludge. Hazardous wastes and commercially-collected household wastes were not accepted at the site. Early fill methods are not documented, but refuse was reportedly bulldozed into the tidal flats bordering San Francisco Bay. The approximate quantity of debris within the landfill footprint is estimated to be about 2.5 million tons that consists of about 50 percent soil, 20 to 30 percent inert material (concrete rubble, construction debris, metal, and plastic), and 20 to 30 percent non-inert debris. A landfill gas (LFG) collection system was installed at the site in

1995 and a permanent flare was installed in 1996. The approximate limits of waste in the landfill are shown in the City of Burlingame/URS Record Drawings for the closed landfill.

The facility Waste Discharge Requirements (WDRs) suggest the maximum thickness of waste in the landfill is about 30 feet.¹ The facilities on top of the closed landfill were designed to mitigate infiltration of storm water into the landfill. Eight groundwater wells, two surface water stations, and two leachate wells are sampled as part of the postclosure self-monitoring program for the landfill.

Existing (pre-current field investigation) soil borings for the site are included in Appendix A and indicate the in-place waste is underlain by a soft, organics-rich, and variably thick marine clay variously identified in the boring logs as soft clay, silty clay, and Bay Mud.² The stratigraphic sequence below the Bay Mud consists of an upper clay, upper sand, lower clay, and lower sand unit. The geologic units present at the site are water-bearing and leachate is present in the refuse fill. Two aquifers have been identified at the site including:

- An upper aquifer that extends from a few feet below the ground surface to a depth of about -70 feet (National Geodetic Vertical Datum, NGVD). The upper aquifer consists predominantly of silt and clay alluvial and estuarine sediments with discontinuous lenses of sand and a trace of gravel. The upper aquifer is saline and is not a source of drinking or irrigation water; and
- A lower aquifer that is separated from the upper aquifer by an aquitard consisting of about 80 feet of silt and clay with occasional discontinuous, thin beds or lenses of sand. The lower aquifer is a source of drinking water further inland and upgradient of the landfill.

The landfill was closed in three phases with a final cover that incorporated either a 1-foot-thick compacted clay or geosynthetic clay liner (GCL) low hydraulic conductivity barrier layer. Various fill, drainage, and protective soil layers overlie the compacted clay and GCL. Most of the drainage system, LFG components, and a portion of the utility lines were installed during closure construction. Postclosure development of the landfill was performed in four phases and included installation of fencing, paving, structures, irrigation systems, a dog park, and landscaping. The drainage and utility systems were completed during this phase of work. The different cover sections and their respective locations at the site are shown in the 2005 Landfill Closure Record Drawings that were prepared by the City of Burlingame and URS Consultants. These drawings are included in Appendix A and also show the locations of utilities and site improvements and represent a compilation of record drawings and information from the three closure projects and four postclosure development projects implemented at the site.

¹ As described in more detail below, the borings advanced for the geotechnical investigation indicated the refuse averaged about 40 feet thick to a maximum of 53 feet thick at the boring locations.

² This layer is likely similar in composition to a widespread, shallow clay layer located at the margins of San Francisco Bay and known locally as Young Bay Mud.

1.2 PROPOSED DEVELOPMENT

Based on the March 2017 ARCO/Murray Concept Plan (Appendix B) and the August 2018 Conceptual Grading and Drainage Plan, Cross Sections, and Conceptual Earthwork Plan (Appendix C), the proposed project will cover an area of about 15 acres and incorporate a two-story structure located at the southwest end of the existing range that will include a restaurant, bar, event spaces, meeting rooms, and hitting bays. The range area will include targets, will be surrounded by netting, and will slope to the northeast.

The Concept Plan for the project indicates that the targets will be up to 75 feet in diameter; these targets are typically flush with the ground surface around the perimeter and depressed about 6 feet below the ground surface at the center. Typical Topgolf facilities require cuts and fills of 3 to 5 feet in depth/thickness; the Conceptual Drawings in Appendix C indicate cuts as deep as about 5 feet below existing grade and fills that are up to 8-feet-thick. The facility will be surrounded by netting that will be secured to net poles that will be up to 170 feet high. The building and net poles will be founded on piles or piers.

1.3 SUMMARY OF FINDINGS AND RECOMMENDATIONS

1.3.1 Site Conditions

The proposed project will be located on an active driving range that is generally flat and open with the exception of several low, irregular shaped mounds that are meant to simulate golf course features such as greens and sand traps. In addition, there is a closed depression located near the south edge of the range that resulted from an unknown cause. Within the footprint of the proposed development, the ground surface rises over a distance of about 865 feet from an elevation of about 34 feet at the golf tees on the east side to about 66 feet at the west end of the range.

The landfill was constructed on former San Francisco Bay tidelands. The landfill was operated from 1957 to 1987 and was used for disposal of inorganic construction debris, clean soil, concrete rubble, landscape debris, clean soil, and dried sludge from the City wastewater treatment plant. Reportedly, no household garbage or hazardous wastes were accepted at the site. The waste samples obtained from the borings completed for this investigation consisted primarily of clayey soil with lesser amounts of soil-like material that may be biosolids. The solid waste recovered in the samples appeared to be inert materials such as wood, carpet, ash, concrete, and miscellaneous debris. Putrescible waste materials and significant thicknesses of inert waste were not observed.

The geologic materials below the landfill are characterized by a series of unconsolidated sand, silt, and clay that were primarily alluvial fan, stream, and outwash plain deposits that occur as interfingering layers. The Young Bay Mud below the site consists of gray to greenish gray clay deposited during marine interglacial periods. Although site documents indicate the Young Bay Mud was originally continuous across the site, reworking in the southeastern area of the site during landfill development has removed some of the Bay Mud. The borings for this investigation

indicate the materials below the Young Bay Mud (where present) consisted predominantly of relatively thin layers of sandy clay, clayey sand, and clay, with occasional thin layers of sand.

Data from the investigations completed to date indicate the site could reasonably be considered Site Class F in accordance with the 2016 Edition of the California Building Code (CBC, 2016). Site Class F requires a site response analysis. Therefore, a supplemental investigation was performed to assess subsurface shear wave velocity, develop a subsurface model, and complete a seismic response analysis (SRA) for the site.

1.3.2 Site Conditions and Design

Principal potential geologic hazards and geotechnical considerations for design include slope instability, surface fault rupture, strong ground shaking associated with an earthquake on one of the faults close to the site, liquefaction and lateral spreading, and differential settlement. However, as described in the main body of this report, it is our opinion that these hazards are either not significant or that they can be addressed during design and mitigated.

The Topgolf facility building and net poles should incorporate deep foundations such as piles to minimize the effects of differential settlement. The piles will extend through heterogeneous waste materials and variable underlying soils and predrilling the waste will be required before driving piles or continuing the boring for cast-in-place piles into the underlying soils. The results of the field investigation indicate total pile lengths of about 70 to 90 feet will be required depending on location and loads. Predrilling through the refuse will likely require casing to maintain an open boring, isolate the waste materials, and minimize the potential for leachate migration to the subsurface. Potential drilling hazards, such as oversize materials, landfill gas, and or difficult drilling conditions should be anticipated. The refuse removed during drilling will require temporary onsite storage, waste profiling, and subsequent offsite disposal. Leachate or mixed leachate and groundwater from the borings will also require special handling and disposal. Open and cased borings through the waste materials should be backfilled with neat cement-bentonite grout by tremie methods following installation of the piles.

Although the building and net poles will be constructed on deep foundations, potentially significant differential settlement of the surrounding ground could occur due to the heterogeneous and variably thick subsurface materials and the non-uniform loading resulting from the targets being placed at separate locations across the outfield of the driving range. This differential settlement could adversely affect target alignments and tilt, surface and subsurface drainage patterns and structures, pavements, and/or utility connections. In addition, settlement will likely result in vertical offsets between the pile-supported structures and the surrounding areas that will require periodic maintenance.

Possible alternatives to mitigate differential settlement include pre-construction ground improvements such a pre-loading, optimizing the grading plan to minimize the placement of soil fill, using light-weight materials for fill, and/or excavating existing soils in the target areas to reduce net loads. Flexible utility connections should be incorporated into the project to address the settlement between the pile-supported structures and surrounding project elements. Although landscaping can be used to mask vertical offset of the pile-supported building from settlement of the surrounding ground, ongoing maintenance to relevel targets and/or to address

the effects of settlement on project pavements, hardscapes, and non-attached structural elements should be anticipated.

1.3.3 Landfill Environmental Considerations

The Burlingame Landfill has been closed in accordance with regulations and requirements implemented by different agencies that require engineered improvements primarily to limit infiltration, promote drainage, and prevent migration of landfill gas to the environment. These improvements generally include final grades to promote surface water drainage, internal drainage to convey water from the final cover, the final cover itself to minimize infiltration to the underlying waste, and the landfill gas collection and destruction system to capture emissions from the landfill.

Design of the project should consider these features and include measures to maintain or replace them with alternatives that comply with applicable regulations and provide equal or better performance. In some cases, regulatory agency concurrence with the design may be required. Design of the project structures should also consider the presence of LFG migration and include design features such as flexible utility connections to accommodate settlements.

Project construction may expose and/or require excavation of the existing waste. The test performed on a four-point composite sample of the drill cuttings did not provide evidence of constituents present at concentrations that are hazardous in accordance with federal or state requirements and monitoring during drilling did not indicate significant air emissions associated with the work. These results notwithstanding, future work that exposes waste should be performed by qualified personnel working under an appropriate Health, Safety, and Monitoring Plan.

2 PURPOSE AND SCOPE OF WORK

2.1 OBJECTIVE

The project will be located on the final cover of a closed landfill that was constructed on top of soft, compressible sediments (Young Bay Mud). Based on the Record Drawings in Appendix A, the final cover of the landfill varies in thickness from about 3-1/2 to 4-1/2 feet thick. Existing site boring logs (Appendix D) indicate the Young Bay Mud varies in thickness from about several to more than 20 feet thick below the site. Site documents also note that the Young Bay Mud was originally continuous across the site but that excavations during fill placement may have removed this unit at various locations under the in-place waste and that it is not continuous. Based on this information, principal geotechnical and landfill-related factors important for design and construction of the facility were judged to include:

- Total and differential settlement associated with consolidation of the existing refuse and underlying Young Bay Mud;
- Maintenance of the structural integrity of the landfill final cover during construction and operation of the facility;
- Maintenance of the ancillary landfill cover facilities such as LFG piping and drainage structures during construction and operation of the facility; and
- Minimizing the potential for preferential migration pathways from the bottom of the landfill into the underlying sediments due to site improvements such as pile foundations.

Data needed to address these factors and provide geotechnical design recommendations include (but are not limited to): (i) the thickness, characteristics, and continuity of the waste materials underlying the site; (ii) the thickness, characteristics, and continuity of the Young Bay Mud underlying the waste materials; (iii) the characteristics of the geologic units underlying the Young Bay Mud; and (iv) the occurrence of leachate and groundwater within the waste and geologic materials. The scope of work implemented for this project is summarized below and was performed to address these items and to develop geotechnical recommendations for design and construction of the planned facility.

2.2 SCOPE OF WORK

2.2.1 Geophysical Survey

As summarized above, the refuse fill and Young Bay Mud that underlies the site probably varies in thickness and/or may not be present in some locations. The thickness and distribution of these layers were judged to be important because the soil borings would need to extend below the bottom of the Young Bay Mud and the presence or absence of Young Bay Mud was a consideration in selecting boring locations. Therefore, the field investigation included completion of a surface (non-invasive) electrical resistivity (ER) geophysical survey to assess the approximate

thicknesses of the in-place waste and the underlying Young Bay Mud. The ER survey was performed on April 16, 2018, along two crossing transects positioned on the existing driving range; one transect was oriented along the long axis of the range and measured approximately 850-feet-long and the second transect was oriented perpendicular to the first near the center of the driving range and was about 650 feet in length. A description of the ER survey methods, the locations of the transects, and the result of the survey are included in Appendix E.

2.2.2 Soil Borings

Soil borings were advanced within the limits of the existing driving range at the site at the approximate locations shown in Figure 2. The driving range was closed during the field investigation program that was performed over a one-week period between April 16 and April 20, 2018. Drilling permits for the work are included with boring logs in Appendix F. The borings were advanced using 6-inch diameter sonic drilling techniques and representative samples of subsurface materials were collected from the borings using a driven split spoon sampler or Shelby tube sampler (Shelby tubes were used in the Young Bay Mud).³ Ambient air monitoring was performed using a combustible gas monitor and multi-gas meter to assess the presence of explosive gasses as methane (CH₄), volatile organic compounds, and hydrogen sulfide (H₂S) during drilling. No potentially hazardous or explosive concentrations were measured in the ambient air in the work area or immediately above the annulus of the open boring. The borings were grouted with cement-bentonite grout immediately on completion. General drilling procedures included:

- Each drilling location was cleared to a depth of 4 to 7 feet by using a hand-auger and air knife to verify that no utilities were present at the drilling location.
- The borings were advanced using truck-mounted sonic drilling equipment and the drill cuttings were containerized for subsequent offsite disposal at a permitted landfill. The drill casing and tools were steam-cleaned between borings. The soil cuttings were transported from each drilling location to 40-yard bins that were placed along the fence at the upper west end of the driving range.
- Sonic drilling returns a relatively continuous core sample that can be used for characterizing subsurface materials and obtaining disturbed samples for laboratory testing. Relatively undisturbed subsurface samples for strength and compressibility testing were collected at selected location by lowering a split spoon or Shelby tube sampler through the drill string. The Modified California split spoon sampler used for this purpose was driven using a hydraulic slide-hammer that weighs 140 pounds and falls 30 inches. Blow counts were recorded while driving the sampler and are shown on the boring logs.

³ Sonic drilling was used because it is relatively fast (a one-week closure of the existing driving range was allowed for the field work), generates fewer cuttings than other drilling techniques, and returns a continuous core of subsurface materials.

The borings were observed by professional geologists who maintained logs of the borings, collected the samples for laboratory analysis, verified that soil and waste cuttings were properly contained for disposal, and confirmed that the drilling areas are returned to pre-drilling conditions. The borings were approximately located in the field using a hand-held GPS unit. The coordinated and elevations of the borings, boring depths, and principal landfill and geologic units encountered in each boring are summarized in Table 1 and logs of the borings are included in Appendix F.

Following completion of the field work, a four-point composite sample of the containerized drill cuttings was collected and submitted to BC Analytical Laboratory (BC) and tested for: Organochlorine Pesticides; PCBs; Volatile Organic Compounds; Base Neutral and Acid Extractable Organics, Total Petroleum Hydrocarbons; Total Threshold Limit Concentrations (TTLC), and leachability by STLC and TCLP procedures. The results of these analyses are included in Appendix G and showed that the materials tested did not exceed federal or state hazardous waste thresholds. Following laboratory testing, the cuttings were transported and disposed at the nearby Ox Mountain Sanitary Landfill.

2.2.3 Laboratory Testing

Selected samples collected in the field were delivered to the GLA Grass Valley laboratory and the Cooper Geotechnical Testing laboratory for geotechnical testing in accordance with the following suite of tests:

- Moisture content (ASTM D2216);
- Dry density and moisture content (AST D7263);
- Atterberg limits (ASTM D4318);
- Particle size analysis (ASTM D6913);
- Percent passing the No. 200 sieve (ASTM D1140 or C117);
- Consolidated-undrained (CU) triaxial shear (ASTM D4767);
- Unconsolidated-undrained (UU) triaxial shear tests (ASTM D2850); and
- Consolidation (ASTM D2435).

The results of the laboratory tests are included in Appendix H and applicable test results are plotted on the boring logs in Appendix F. The results of laboratory tests are summarized in Table 2.

2.2.4 Seismic Response Analysis

American Society of Civil Engineers (ASCE) and Structural Engineering Institute (SEI) Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-16) provides procedures and requirements for site-response work and seismic demands for building code-

based designs. In accordance with ASCE/SEI Section 21, seismic design parameters are based on Site Classes that depend on the materials underlying the project area. As described in Sections 3 and 4 of this report, data from the investigations completed to date indicate the site could reasonably be considered Site Class F.⁴ Section 21.1 of ASCE 7-16 (a reference code within the CBC) requires a site-specific response analysis for Class F sites that includes the following steps:

- Development of a probabilistic bedrock spectrum for the 2,475-year, mean ground motion and a deterministic spectrum for the 84th percentile maximum credible earthquake (MCE). These spectra are then enveloped to characterize a lower-bound bedrock spectrum that includes corrections for the largest rotated component and near-fault effects;
- Development of ground motion time histories that conform to the adjusted bedrock spectrum;
- Development of a site response model based on the measured shear wave velocity from the CPT program and run the model using each of the time histories and compare the results to the 80 percent Site Class E spectrum; and
- Correction of the model as needed and development a site-specific earthquake risk-adjusted spectrum to identify the seismic parameters required for structural design.

Completion of this work required an assessment of the shear wave velocity (v_s) of the subsurface materials and seismic cone penetration testing (SCPT) was performed to collect this information. The SCPT logs are included in with the boring logs in Appendix F and SRA is included in Appendix I.

2.3 ADDITIONAL GEOTECHNICAL ANALYSIS

2.3.1 Additional Settlement Evaluation

As summarized above and described in more detail in Section 4, the Topgolf facility will be founded on a closed landfill on top of variably thick and variably continuous compressible clay deposits. The potential magnitude of settlement of these deposits includes relatively rapid response to loading and time-dependent secondary settlement that results from mechanical creep and biological decomposition over a period of years.

Waste settlement calculations are uncertain because the materials are usually heterogeneous, and the load, creep, and biological decay coefficients used to calculate waste settlement can vary over wide ranges. To address these limitations, additional evaluation to “calibrate” the estimates described in this report is recommended to compare the current survey information for the site

⁴ The ASCE/SCE 7-16 Section 21.1, site classes are: Site Class A Hard Rock ($v_s > 5,000$ ft/sec); Site Class B Rock (v_s 2,500 to 5,000 ft/sec); Site Class C Very Dense Soil and Soft Rock (v_s 1,200 to 2,500 ft/sec); Site Class D Stiff Soil (v_s 600 to 1,200 ft/sec); Site Class E Soft Clay Soil ($v_s < 600$ ft/sec); and Site Class F Soils Requiring Site Response Analysis in Accordance with Section 21.1.

with past survey data if applicable past survey information is available (this work will not be practicable if the available information does not allow representative comparisons to be completed).

2.3.2 Access Road

The August 2018 concept drawings included in Appendix C show an access road may be constructed up the northern side slope of the landfill. Assessing potential impacts associated with this roadway on stability and the integrity of final cover of the landfill at this location was outside the scope of this study. Additional evaluation will be required to provide geotechnical recommendations for this roadway.

3 SUMMARY OF FINDINGS

3.1 GEOLOGIC SETTING

3.1.1 Regional Geologic Conditions

San Francisco Bay and the alluvial, colluvial, and estuarine deposits that underlie much of the project site and surrounding areas occupy a structurally controlled basin in California's Coast Ranges province, which consists of 500 miles of northwest-trending ridges and valleys. Late Pleistocene and Holocene sediments (less than 1.0 million years old) were deposited in the basin as it subsided. In the project site, these sediments consist primarily of estuarine deposits of Old Bay Clay, undifferentiated sedimentary deposits, Young Bay Mud, and alluvial/colluvial deposits, all of which rest on a variety of bedrock types associated with the Franciscan Complex. The Franciscan Complex makes up much of the basement rock of the Coast Ranges and consists of an assemblage of deformed and metamorphosed rock units that formed in association with continuous east-dipping subduction at the margin of the North American and Pacific plates.

The principal near-surface geologic units in the project area include Bay Mud, alluvial deposits, and bedrock on the Franciscan Formation. General characteristics of these units include:

- **Bay Mud.** Bay Mud is the uppermost (youngest) geologic unit around much of the San Francisco Bay margin and is divided into younger and older deposits. Depending on location, the Young Bay Mud ranges in thickness from approximately 1 to 70 feet and consists predominantly of high plasticity clay with minor layers of lean to sandy clay, silt to clayey silt, and clayey sand, with some peat interbeds and lenses.⁵ The Young Bay Mud typically is olive to dark greenish gray to blue gray, very soft to medium stiff, and contains abundant shell fragments. It generally is normally consolidated and moderately to highly compressible, although it can have moderate shear strength if consolidated. Locally, the deeper units of older Bay Mud, also known as Old Bay Clay, are overconsolidated and are composed of stiff to very stiff, silty to sandy clay, clayey silt, and clayey to silty sand.
- **Alluvial Deposits.** The alluvial deposits in the site area typically consist of interbedded alluvial and marine soils that underlie the Younger Bay Mud and that overlie and interfinger with older Bay Mud deposits. The alluvium typically contains some shell fragments and is mostly composed of light brown to yellowish brown, fine to medium grained, poorly graded, medium dense to very dense, clean sand to clayey sand layers that are interbedded with stiff to very stiff, lean clay.
- **Bedrock.** Bedrock is not exposed in the project area. However, Franciscan Formation bedrock is exposed north of the project site and is reported to be encountered at a depth of about 100 feet below the San Francisco Airport (about 2 miles north of the proposed project site). The Franciscan Complex is a mixed assemblage of distinct rock types that are

⁵ In general, the Young Bay Mud thins inland and thickens towards the San Francisco Bay.

interbedded and tectonically disturbed. The predominant Franciscan Complex rock types in the project area are serpentinite, sandstone, chert, shale, and greenstone

3.1.2 Hydrogeologic Setting

The project site lies within the San Francisco Bay hydrologic region and covers the southeasternmost part of the California Department of Water Resources (DWR) designated Westside Groundwater Basin (Number 2-35) and the northwestern-most part of the Santa Clara Valley Groundwater basin, San Mateo subbasin (Number 2-9.03). Water bearing formations in both basins are divided in two groups: unconsolidated Plio-Pleistocene materials overlying bedrock and Quaternary alluvial deposits. Aquifer storage coefficients typically indicate unconfined conditions at depths less than 100 feet. Natural recharge occurs by infiltration of water from streams emanating from the upland areas and rainfall percolation. Mean annual precipitation is in the range of 20 to 24 inches. Additionally, artificial recharge includes infiltration of irrigation water and leakage from water and sewer pipes.

3.1.3 Regional Seismicity

The San Francisco Bay Area is in a seismically active region near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. Strain produced by the relative motions of these plates is relieved by right lateral strike slip faulting on the San Andreas and related faults, and by vertical reverse-slip displacement on the Great Valley and other thrust faults in the central California area. The relatively numerous geologically young faults in the project area are classified as historically active, active, sufficiently active, or inactive, in accordance with the following:

- Faults that have generated earthquakes accompanied by surface rupture during historic time (approximately the last 200 years) and faults that exhibit a seismic fault creep are classified as historically active;
- Faults that show geologic evidence of movement within Holocene time (approximately the last 11,000 years) are classified as active;
- Faults that show geologic evidence of movement during the Holocene along one or more of their segments or branches and if their traces may be identified by direct or indirect methods are classified as sufficiently active and well defined; and
- Faults that show direct geologic evidence of inactivity or lack of offset, during all of Quaternary time or longer are classified as inactive.

The California Geological Survey (CGS) does not attempt to quantify the probability that an earthquake will occur on any specific fault; instead, this classification assumes that if a fault moved during the last 11,000 years, it is likely to produce earthquakes in the future. Active faults within 100 kilometers of the proposed Topgolf Redevelopment Project are summarized in Table 3. A site-specific SRA was performed to evaluate potential ground shaking at the site was performed in accordance with the 2016 Edition of the California Building Code (CBC), and its reference codes, including IBC 2015 and ASCE 7-10 (codes). In particular, GLA followed the ASCE

7-10 Chapter 21 “Site-Specific Ground Motion Procedures for Seismic Design.” This evaluation is included in Appendix I.

3.2 SITE CONDITIONS

3.2.1 Topography and Surface Conditions

The proposed project will be located on an active driving range that is generally flat and open with the exception of several low, irregular shaped mounds that are meant to simulate golf course features such as greens and sand traps. In addition, there is a closed depression located near the south edge of the range that resulted from an unknown cause. At the time of both field investigations, the depression was partially filled by water from recent rainfall. The surface of the driving range is covered by artificial turf over a layer of very dense gravel. Within the footprint of the proposed development, the ground surface rises over a distance of about 865 feet from an elevation of about 34 feet at the golf tees on the east side to about 66 feet at the west end of the range.

3.2.2 Landfill Characteristics

The site WDRs indicate that the Landfill was constructed on former San Francisco Bay tidelands. The landfill was operated from 1957 to 1987 and was used for disposal of inorganic construction debris, clean soil, concrete rubble, landscape debris, clean soil, and dried sludge from the City wastewater treatment plant. Reportedly, no household garbage or hazardous wastes were accepted at the site. Although the site boring logs are consistent with this information and showed that limited amounts of inert debris are present within the landfill, the SCPTs encountered refusal at relatively shallow depths at all test locations. No municipal solid waste was encountered in any of the borings.

The site WDRs indicate the landfill soil and refuse fill had reached a maximum thickness of approximately 30 feet when the facility stopped accepting waste in 1987. However, the borings advanced for this investigation indicate the waste is as thick as 52 feet at some locations (see Table 1) and the geophysical survey (Appendix E) indicates the waste may be as much as 60-feet thick. The geophysical survey further indicates:

- Beneath Line 1, the refuse ranges in thickness from about 30- to 60-feet. It is generally about 30-feet thick beneath the northeast half of the profile and it thickens to the southwest. The depth to the top of the refuse ranges from very shallow at the northeast end of the profile to about 50-feet near the southwest end. This information suggests that the increasing depth of the refuse to the southwest is related to the landfill ending in that direction. Along most of the profile the clay cap is relatively thin (2.5 to 3.5-ft thick, about 10-ft thick with foundation layer included) and not well defined (intermittent blue and green colors). However, at the southwest end of the profile there is a very well-defined zone of low resistivity (purple to blue colors) that is interpreted as clay cap. This zone is about 15-feet deep, about 20-feet thick and it extends from the beginning of the profile (Station 0-ft) to about Station 150-feet. The moderate resistivity zone shown in green colors above is interpreted as fill that was put in to extend the surface of the driving range.

- Beneath Line 2, the refuse ranges in thickness from about 10- to 55-ft. It is generally 10- to 20-ft thick beneath the southeast half of the profile but it thickens to the northwest. The refuse is thinnest at about Station 450-ft and thickest at about Station 130-ft. The top of the refuse is very shallow at both ends of the profile but reaches a maximum depth of about 20-ft at Station 470-ft. The surface depression located at Stations 590- to 620-ft coincides with an area where the refuse is very close to the surface.

The refuse samples obtained from the borings consisted primarily of clayey soil with lesser amounts of soil-like material that may be biosolids. The solid waste recovered in the samples appeared to be inert materials such as wood, carpet, ash, concrete, and miscellaneous debris. Putrescible waste materials and significant thicknesses of inert waste were not observed. The consistency of the refuse based on observation and limited Modified California sampler blow counts varied from stiff to very hard and dense.

As shown by the record drawings in Appendix B, the final cover for the driving range consisted of an approximately 2-feet thick foundation layer, 1-foot thick clay liner, a 6-inch thick layer of miscellaneous fill, a 6-inch thick layer of aggregate base, a 1- to 2-inch thick layer of sand, and artificial turf.⁶ The boring logs verified the presence of these layers in the final cover, although the final cover thicknesses was greater than shown in the record drawings at some locations (see Table 1).

3.2.3 Geologic Conditions

As summarized above, the subsurface geology below the landfill is characterized by a series of interfingering sand, silt, and clay lenses that are primarily alluvial fan, stream, and outwash plain deposits. The Young Bay Mud below the site consists of gray to greenish gray clay deposited during marine interglacial periods. The WDRs indicate the Bay Mud was originally continuous across the site although reworking in the southeastern area of the site may have resulted in discontinuities. The conditions encountered during drilling support an interpretation that the Young Bay Mud is not continuous. Based on data from the borings (Table 1), the Young Bay Mud varied in thickness from 0 feet to as much as 10 feet thick at Boring TG-02. The Young Bay Mud is classified by laboratory tests as a high plasticity clay (or CH in accordance with the Unified Soil Classification System [USCS]). The Young Bay Mud was typically soft to stiff.

The WDRs indicate that the stratigraphic sequence below the Young Bay Mud consists of an upper clay, upper sand, lower clay, and lower sand unit. This stratigraphic sequence was not identified in the borings advanced for this investigation. Rather, the borings indicate the materials below the Young Bay Mud (where present) consisted predominantly of relatively thin layers of sandy clay, clayey sand, and clay, with occasional thin layers of sand. The WDRs indicate the upper sand unit is discontinuous and was removed along the southern portion of the site along with the upper clay. The WDRs also indicate the lower sand consists of sandy gravel and clayey sand that varies in thickness from about 12 to 21 feet and appears to be continuous across the site. This unit was not identified in the soil borings. Because of the apparent inconsistency

⁶ Some portions of the landfill were closed with alternative cover sections that included a thin geomembrane and/or a geosynthetic clay liner (GCL). Neither of these cover sections were encountered in the borings and neither cover section is believed to present within the limits of the proposed Topgolf facility.

with the information included in the WDRs, the soils below the Young Bay Mud are identified in the boring logs as Older Bay Alluvium.

Field and laboratory data indicate the Older Bay Alluvium is classified predominantly as low plasticity clay (CL) with occasional layers of sandy clay and clayey sand (SC). Lesser amounts of gravelly clay and silty clay were also identified in the samples. The blow counts indicate the material is stiff to hard and dense. Grain size data indicate the silt and clay fraction of the soil varies from about 10 to 54 percent.

3.2.4 Leachate and Groundwater

The depths to first encountered groundwater during drilling are shown in the boring logs in Appendix F and are summarized in Table 1. These depths are uncertain because the sonic drilling procedure can mask the presence of low-yield water-bearing strata due to its solid casing and relatively rapid speed of advance. Fluid (leachate) was observed in the refuse in Borings TG-03 and TG-17 but was not noted in any of the other borings advanced for this study. The borings were abandoned by grouting on completion and stabilized water levels were not recorded. SCS Engineers (SCS, 2018) indicates the elevation of groundwater in the area of the existing driving range is about 5 feet NGVD and that it is estimated to flow in a west-northwest and northeast direction from what has previously been identified as a groundwater divide or ridge running across the site in an estimated north-south direction. SCS also notes that groundwater under the site is tidally influenced.

4 GEOLOGIC AND GEOTECHNICAL DESIGN CONSIDERATIONS

Principal potential geologic hazards at the site include slope instability, surface fault rupture, strong ground shaking associated with an earthquake on one of the faults close to the site, liquefaction and lateral spreading, and differential settlement. As summarized below, it is our opinion that these hazards are either not significant or that they can be addressed during design and mitigated. Therefore, it is also our opinion that the proposed project is feasible with respect to geologic hazards. However, because the project will be constructed on a closed landfill, special construction methods may be warranted to isolate the building or persons from the in-place waste or waste by-products (such as landfill gas). Special construction methods may similarly be necessary to maintain the integrity and/or the function of the landfill cover and to minimize the potential of introducing waste, leachate, or landfill gas into the above-ground environment or by cross-contamination to the subsurface.

4.1 SLOPE INSTABILITY

The Topgolf project will be located on the flat top deck of the closed landfill and will be set back sufficiently from the approximately 3:1 side slopes of the landfill that the potential for adverse slope stability impacts associated with the building, net poles, and targets is low. There are no natural slopes adjacent to the project and the potential for natural slope instability affecting the site is negligible. As noted in Section 2, the August 2018 concept drawings included in Appendix C show an access road may be constructed up the northern side slope of the landfill. Assessing potential impacts associated with this roadway on stability and the integrity of final cover of the landfill at this location was outside the scope of this study.

4.2 SEISMIC CONSIDERATIONS

4.2.1 Ground Shaking and Fault Rupture

The Topgolf project is in the seismically active San Francisco area and strong ground shaking should be expected during the lifetime of the project. It is our opinion that the effects of strong ground motions can be mitigated by design and construction in accordance with current and applicable building codes and standards of practice. The site is not located within an Alquist-Priolo Earthquake Fault Zone and the potential for surface fault rupture affecting the site is low.⁷

4.2.2 Liquefaction

The CGS Seismic Hazard Zoning Map for San Mateo was published in January 2018 and shows the project site is in a liquefaction hazard zone. The results of the field investigation program implemented for this project indicate the subsurface materials below the landfill are clayey and predominantly hard to very hard to the depths explored. Where sands are encountered, they

⁷ The Alquist-Priolo Earthquake Fault Zoning Act of 1972 (formerly the Special Studies Zoning Act) regulates development and construction of buildings intended for human occupation to avoid the hazard of surface fault rupture.

typically occur in thin layers that do not appear to be continuous, have more than 10 percent silt and clay and are relatively dense. The site boring logs from previous studies (Appendix A), show similar conditions. Based on this information, it is our opinion that the potential for liquefaction and lateral spreading affecting the site is low.

It should be noted, however, that the Seismic Hazards Mapping Act requires a geotechnical investigation of the site in accordance with the requirements of CGS Special Publication 117 must be conducted and appropriate mitigation measures incorporated into the project design before a development permit is granted for a site within a Seismic Hazard Zone. Although the current investigation indicates the potential for liquefaction affecting the project is low, the investigation was not intended to address the specific requirements of Special Publication 117.

4.2.3 Site Class

ASCE and SEI Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7-16) provides procedures and requirements for site-response work and seismic demands for building code-based designs. In accordance with ASCE/SEI Section 21, seismic design parameters are based on Site Classes that depend on the materials underlying the project area. The ASCE/SCE 7-16 Section 21.1, site classes are:

- Site Class A Hard Rock ($v_s > 5,000$ ft/sec);
- Site Class B Rock (v_s 2,500 to 5,000 ft/sec);
- Site Class C Very Dense Soil and Soft Rock (v_s 1,200 to 2,500 ft/sec);
- Site Class D Stiff Soil (v_s 600 to 1,200 ft/sec);
- Site Class E Soft Clay Soil ($v_s < 600$ ft/sec); and
- Site Class F Soils Requiring Site Response Analysis in Accordance with Section 21.1.

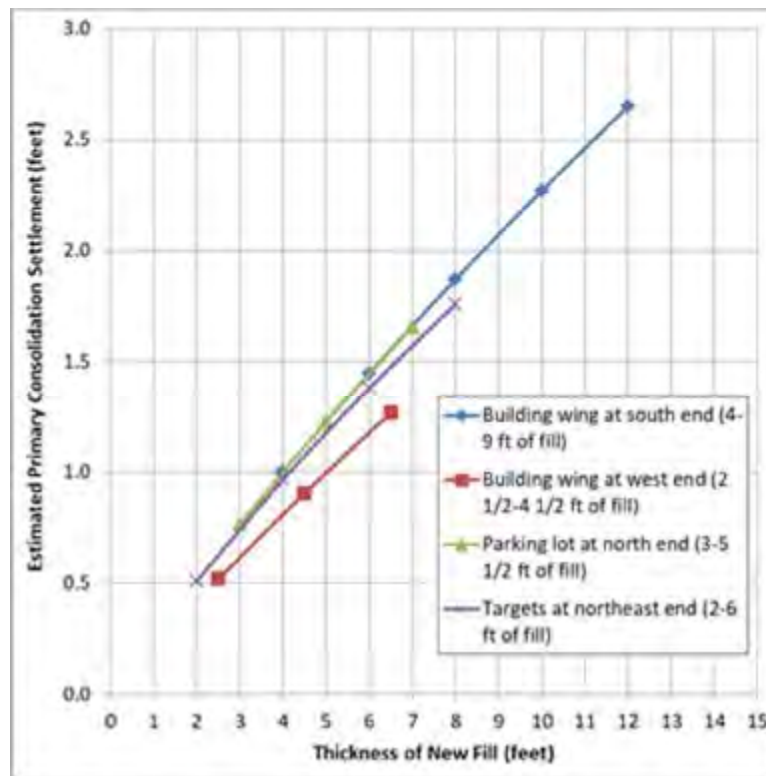
Data from the investigations completed to date indicate the site is underlain by relatively soft waste materials (primarily biosolids), compressible soft clay, and potentially liquefiable soils. Although assigning a classification for this site is relatively subjective, the Topgolf project site could reasonably be considered Site Class F and the SRA included in Appendix I was completed in accordance with ASCE/SCE 7-16 requirements.

4.3 SETTLEMENT

The results of the field investigation indicate the project will be constructed on top of 30 to as much as 60 feet of waste materials over 0 to about 10 feet of relatively soft and compressible Young Bay Mud. Although the waste appears to be primarily soil and soil-like biosolids with lesser amounts of refuse, its consistency is variable and differential settlement under the loads of the proposed buildings, net poles, and outfield targets is likely (the potential for differential settlement, even in absence of significant loading, is shown by a depression in the existing driving range near Boring TG-03). Based on these conditions, it is assumed that the building and net poles

will be founded on deep foundations such as driven or drilled piles or piers. The outfield targets associated with the facility will be founded at grade on footings or mat foundations.

The August 2018 concept drawings for the site (Appendix C) indicate as much as about 8-1/2 feet of soil fill may be placed on the site. As shown below, calculations based on these drawings indicate primary settlements associated with the fills and targets range from about 0.5 feet to about 2 feet depending on the amount of fill placed at each location. These primary settlements would be expected to occur within several months of construction. Secondary settlement of the waste materials due to long-term creep deformation and biological degradation could increase the long-term settlements by an additional 1 to 2 feet. Secondary settlement of waste materials does not depend on load and will depend largely on waste thicknesses and material variability.⁸



Settlement Estimate as a Function of New Fill Thickness

Although the deep foundations should limit settlements of the building and net poles, potentially significant differential settlement could result from the heterogeneous and variably thick subsurface materials and the non-uniform loading resulting from the targets being placed at

⁸ The secondary settlement estimate summarized above may be conservative because the landfill has been closed for more than 10 years and we understand that little significant settlement has been observed at the site since closure. We also understand that the existing paved areas of the site have not experienced significant distress in the form of cracking, subsidence, or altered drainage patterns. Additionally, the secondary settlement estimate assumed the waste profile was 50 feet thick across the entire site and relatively lesser settlement would be calculated for a thinner waste profile.

separate locations across the outfield of the driving range. This differential settlement could adversely affect target alignments and tilt, surface and subsurface drainage patterns and structures, pavements, and/or utility connections. In addition, settlement will likely result in vertical offsets between the pile-supported structures and the surrounding areas that will require periodic maintenance.

Possible alternatives to mitigate differential settlement include pre-construction ground improvement, optimizing the grading plan to minimize the placement of soil fill, using light-weight materials for fill, and/or excavating existing soils in the target areas to reduce net loads. A potentially feasible pre-construction ground improvement technique to mitigate relatively rapid primary settlement (noting that longer-term secondary settlement would be relatively unaffected) could include overbuilding the final grading plan by about 1 to 2 feet (depending on the planned fill thickness), leaving the fill in place for about three months while monitoring primary settlement, and then regrading the site to the design grades.

Because some differential settlement is likely even assuming pre-construction ground-improvement, flexible utility connections should be incorporated into the project to address the settlement between the pile-supported structures and surrounding project elements. Although landscaping can be used to mask vertical offset of the pile-supported building from settlement of the surrounding ground, ongoing maintenance to relevel targets and/or to address the effects of settlement on project pavements, hardscapes, and non-attached structural elements should be anticipated.

5 GEOTECHNICAL RECOMMENDATIONS

Based on the field exploration, laboratory testing, and geotechnical analyses conducted for this study, it is our opinion the site, from a geotechnical viewpoint, is feasible for construction of the proposed Topgolf facility provided the recommendations presented in this report are incorporated into the project design and construction. The primary geotechnical considerations for development at the project site include potential settlement of the refuse material and the underlying Young Bay Mud; and the relatively low foundation support capability capacity the refuse material.

5.1 EARTHWORK

5.1.1 Site Clearing and Stripping

Prior to grading, construction areas should be cleared of all obstructions and potentially deleterious materials. Stumps and primary roots of trees and brush (roots over 1 inch in diameter or longer than about 3 feet in length) should be removed. Stripped material may be stockpiled for use in landscape areas if approved by the project landscape architect, or otherwise removed from the site. For planning purposes, stripping depth of 3 to 6 inches may be assumed in vegetated areas. Depressions, excavations, and holes that extend below the planned finished grades should be cleaned and backfilled with engineered fill compacted to the requirements given under the section of "Engineered Fill Placement and Compaction."

5.1.2 Excavations

Excavations will be necessary to make cuts to design grades, construct underground utilities, and construct foundations. Excavations should be constructed in accordance with the current Cal-OSHA safety standards and local authority requirements. If steep excavations in excess of 5 feet deep are necessary, the sidewalls should be adequately shored in accordance with OSHA standards to provide trench stability during construction. The contractors are responsible for the design, installation, maintenance, and removal of temporary shoring and bracing systems.

5.1.3 Wet Soils and Dewatering

Wet and soft soils, if encountered at the bottom of the excavations, should be over-excavated and replaced with $\frac{3}{4}$ -inch by No. 4, clean, crushed rock to create a stable working surface. The depth of over-excavations would be a function of the depth of wet and soft soils and should be determined by the Geotechnical Engineer based on field conditions. A geotextile fabric may be necessary to help stabilize the wet and soft soil subgrade. Although not expected, dewatering may be required for deep excavations. If these excavations are within the limits of the landfill, the water will be leachate that will require special handling. The design, installation, permitting, maintenance, and removal of the dewatering system are the responsibility of the contractors.

5.1.4 Subgrade Preparation

Soil subgrades to receive engineered fills, concrete slabs-on-grade, foundations, and pavements should be scarified to a depth of 12 inches below the bottom of the foundation. The scarified subgrade should be moisture conditioned and compacted as recommended under the section of

"Engineered Fill Placement and Compaction." In structure areas to receive concrete slabs-on-grade or foundations, subgrade preparation should extend a minimum of 5 feet beyond the limits of the proposed structures and any adjoining flatwork, unless it is restricted by existing improvements. In proposed pavement areas and for exterior flatwork not connected to buildings, subgrade preparation should extend a minimum of 3 feet beyond the back of the curbs or outside limits of flatwork.

Prepared soil subgrades should be non-yielding when proof-rolled by a fully loaded water truck or similarly weighted piece of equipment. Moisture conditioning of subgrade soils should consist of adding water if the soils are too dry and allowing the soils to dry if the soils are too wet. After the subgrades are properly prepared, the areas may be raised to design grades by placement of engineered fill.

Soil with moisture content above optimum value should be anticipated during and shortly after rainy months. Where unstable wet or soft soil is encountered, the soil will require processing before compaction can be achieved. When construction schedule does not allow time for air-drying, other means such as lime treatment of the soil or excavation and replacement may be considered. Geotextile fabrics may also be used to help stabilize the subgrade. The method to be used should be evaluated at the time of construction based on the actual site conditions.

5.1.5 Materials for Fill

In general, the existing on-site soils with an organic content of less than 3 percent by weight and free of deleterious materials or hazardous substances may be used as engineered fill except where special material (such as capillary break material) is recommended. Import fill materials should be predominantly granular, should not contain any rocks or lumps larger than 3 inches in greatest dimension, should not contain more than 15 percent of material larger than 1-1/2 inches, and should have a plasticity index of 12 or less or an expansion index of 20 or less. The material should contain sufficient fines to allow excavations to be made without caving.

5.1.6 Engineered Fill Placement and Compaction

Fill materials should be placed and compacted by mechanical methods in horizontal lifts each not exceeding 8 inches in uncompacted thickness. Water jetting or flooding for compaction should not be permitted. Due to equipment limitations, thinner lifts may be necessary to achieve the recommended degree of compaction. "Relative compaction" or "compaction" is defined as the in-place dry density of the compacted soil divided by the laboratory-compacted maximum dry density as evaluated by ASTM D 1557, latest edition, expressed as a percentage.

Fills consisting of on-site or imported soils should be compacted to a minimum of 90 percent relative compaction, at a soil moisture content of between 1 and 3 percent above the laboratory optimum moisture content. In pavement areas, the upper 8 inches of subgrade soil should be compacted to a minimum of 95 percent relative compaction at soil moisture content slightly above the optimum value. Aggregate base materials in pavement areas should be compacted at slightly above the optimum moisture content to a minimum of 95 percent relative compaction.

5.1.7 Utility Trench Backfill

Pipe zone backfill, extending from the bottom of the trench to 1 foot above the top of pipe, should consist of free-draining sand unless concrete or sand-cement slurry is specified. The sand should be compacted to a minimum of 90 percent relative compaction. Above the pipe zone, utility trenches should be backfilled with on-site soil or imported soil. Trench backfill should be capped with a minimum of 12 inches of compacted soil similar to that of the adjoining subgrade. The upper 12 inches of trench backfill in areas to be paved should be compacted to a minimum of 95 percent relative compaction. The backfill material should be placed in lifts not exceeding 6 inches in un-compacted thickness (equipment limitations may require thinner lifts).

5.1.8 Seepage Control

Where utility lines extend through or beneath perimeter foundations or curbs at pavement areas, permeable backfill should be terminated at least 1 foot from the foundations or curbs. Concrete or compacted clayey soil should be used around the pipes to act as a seepage cutoff. Beneath foundations, the pipes should be "sleeved" through concrete cutoffs, and the annular space around the pipes should be filled with waterproof caulk. Where slabs or pavements abut against landscaped areas, the base rock and subgrade soil should be protected against saturation.

Subdrains behind curbs in landscape areas or vertical cut-off structures may be considered to reduce lateral seepage under pavements or slabs from adjacent landscaped areas. Vertical cut-off structures may consist of deepened curb sections, or equivalent, extending at least 3 inches below the base rock/subgrade interface. Subdrains should discharge to a proper outlet as determined by the project Civil Engineer. Cut-off structures should be continuous and carefully constructed such that they extend below the base section and are poured neat against undisturbed native soil or compacted clayey fill. Utility trenches (irrigation lines, electrical conduit, etc.) that extend through or under the curbs should be sealed with compacted clayey soil or poured in-place concrete.

5.2 FOUNDATIONS

5.2.1 Deep Foundations

The proposed building and net poles may be supported on deep foundation extending through the refuse into the underlying bearing soils. Pile foundations may consist of driven, precast prestressed concrete (PPC) piles or cast-in-drilled-hole (CIDH) piles. The preliminary compression load capacity with depth curves of 14-in x14-in PPC and 24, 36, 48, and 60-inch diameter CIDH piles are shown in Figure 3 for the proposed building and in Figures 4 through 7 for the proposed net poles. The preliminary compression load capacities were based on friction resistance along the pile shafts with zero end-bearing capacity and a factor of safety of 2 should be applied to obtain the allowable pile capacity. A one-third increase to the pile capacity may be applied for transient loads (e.g. wind and seismic loads). Uplift friction capacity of the piles should not exceed two-thirds of the downward friction capacity.

Piles should be structurally connected with grade beams to form one structural element. The bottom of grade beams should be at least 12 inches below pad grade or lowest adjacent finish grade, whichever provides a deeper embedment. The grade beams should be designed to span

between piles with no support from the underlying soils. Piles should be spaced at least three pile diameters apart, center to center. If this minimum pile spacing is met, a pile group efficiency value of 1.0 is recommended for axial capacity. Settlement of the pile foundations will be due to elastic shortening of the piles and compression of the soils supporting the piles. The estimated post-construction total settlement of a PPC or CIDH pile is less than 1 inch, with an estimated differential settlement of 1/2-inch between adjacent supports.

The lateral load resistance of a pile is a function of the stiffness of the surrounding soil, the stiffness of the pile, the allowable deflection at the top of the pile, the allowable moment capacity of the pile cross section. For the purposes of this project, preliminary lateral loads and displacements were evaluated separately for the net poles and building using the computer LPile. Results of the preliminary evaluations follow:

PRELIMINARY LATERAL LOAD CAPACITY EVALUATION - NET POLES						
BORING	48" CIDH PILE			60" CIDH PILE		
	Length (ft) ⁽⁶⁾	Reinforcement Ratio	Head Deflection (in.)	Length (ft) ⁽⁶⁾	Reinforcement Ratio	Head Deflection (in.)
TG-01	40	1.5%	3.4	40	1.0%	1.2
TG-03	39	1.5%	3.2	40	1.0%	1.2
TG-04	38	1.5%	3.2	40	1.0%	1.2
TG-16	40	1.5%	3.6	40	1.0%	1.3
TG-17	38	1.5%	3.2	40	1.0%	1.2
Notes: 1. Loading assumed based on preliminary estimate of wind load on 170-ft-high net poles spaced at 55 ft O.C. 2. Cyclic loading assumed, with 5,000 cycles applied. 3. Axial load of 250 kips and 350 kips assumed for 48" and 60" CIDH piles, respectively. 4. Assumes no interaction effect (i.e., p-multiplier of 1). 5. Assumes relatively short duration of loading (i.e., creep effects are negligible). 6. Estimated CIDH pile length beyond which additional length does not significantly affect estimated head deflection.						

PRELIMINARY LATERAL LOAD CAPACITY EVALUATION - BUILDING			
CIDH PILE DIAMETER (in)	LENGTH (ft) ⁽⁶⁾	LATERAL LOAD FOR 1" HEAD DEFLECTION (kips)	
		Free Head	Fixed Head
36	90	64	128
48	90	110	225
60	90	162	333
Notes: 1. Assumes 1 % reinforcement ratio 2. Cyclic loading assumed, with 5,000 cycles applied. 3. Axial load of 150 kips, 250 kips, and 350 kips assumed for 36-in, 48-in, and 60-in CIDH piles, respectively. 4. Assumes no interaction effect (i.e., p-multiplier of 1). 5. Assumes relatively short duration of loading (i.e., creep effects are negligible).			

6. Length assumed based on results of preliminary axial capacity evaluation.
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5.2.2 Spread Footings

Site conditions indicate deep foundations will be required for the building and net poles and spread footings are not expected to be incorporated into the project unless a pre-construction ground improvement program is implemented to mitigate the potential effects of settlement. In this event, and if spread footings are planned, the following geotechnical parameters are recommended for footings on non-expansive fill:

PARAMETER	RECOMMENDATION
Minimum Depth	18 inches
Allowable Bearing Pressure	2,000 lb/ft ² static; this value may be increased by 1/3 for wind and seismic forces
Coefficient of Friction	0.35
Passive Equivalent Fluid Weight	300 lb/ft ³ beginning 1 foot below the ground surface at the front of the toe of the footing

5.2.3 Building Floor and Concrete Slabs

Concrete slabs-on-grade should only be considered in areas where differential ground settlement is not a concern and/or if the potential settlements can be mitigated. In absence of these conditions, the building ground floor should be designed as a structural floor system to span between foundation piles to reduce the potential effects of differential settlement between the pile-supported building and the floor.

If slabs-on-grade are planned, the soil subgrade should be maintained in a moist condition prior to pouring the concrete slab. If vapor transmission through a slab is undesirable, the concrete should be underlain by a capillary break consisting of at least 4 inches of clean drain rock such as 3/8-inch pea gravel. A visqueen barrier at least 15-mil thick should be placed over the drainage layer and covered with sand before pouring the concrete.⁹

5.2.4 Targets

Vertical loading from the proposed targets may be simulated as 1-foot thick concrete slabs, with vertical pressure of about 150 lb/ft² on the underlying materials. To reduce the potential for settlement under this added load in the underlying material, consideration should be given to use of light weight material for construction of the targets. The soil under the targets may also be over-excavated and replaced with cellular concrete such the total weight of cellular concrete and the targets is similar to the weight of soil being over-excavated, resulting in a zero (or negative) net increase in vertical pressure.

⁹Typically, the membrane and the slab are separated by 2 inches of sand although the use of sand is usually at the discretion of the project Structural Engineer. It should be understood that the recommended plastic membrane is not intended to waterproof the concrete slab floor. If waterproofing is desired, the project designers and/or a flooring expert should be contacted. Exterior flatwork that is not sensitive to moisture transmission through the slabs may be constructed directly on properly prepared soil subgrade. Design of reinforcement, joint spacing, etc. is the responsibility of the design engineer.

5.3 SEISMIC PARAMETERS FOR STRUCTURAL DESIGN

This Design Spectrum shown in Figure 13 of Appendix I is recommended for structural design for the proposed Topgolf Burlingame Golf Center. This design acceleration response spectrum was developed by multiplying the “smoothed” spectrum from Figures 11 and 12 by two-thirds. Tabulated discrete values of spectral ordinates, along with other information, are presented in Figure 13 as well. Note that the design spectrum is representative of the maximum rotated horizontal component of ground motion and is applicable for Risk Categories I, II, or III (risk-adjustment factors for these three categories are assumed herein to equal to unity).

5.4 SURFACE DRAINAGE

Engineering design of grading and drainage at the site is the responsibility of the project Civil Engineer and we recommend the following be incorporated into the project plans where appropriate:

- Surface water runoff should be directed away from building foundations, concrete slabs-on-grade and pavements, and towards suitable collection and discharge facilities;
- Ponding of surface water should be avoided by establishing positive drainage away from all improvements;
- Water collected from roof downspouts should be discharged into a closed pipe or towards drainage structures, and the water carried to a suitable discharge point.
- Over-watering, especially near building, slab and pavement areas, could result in saturation of the soil and subsequent distress to site improvements. Trees should be planted away from building, concrete slabs, pavements, etc. because tree roots could cause distress to those improvements.

5.5 GENERAL CONSTRUCTION RECOMMENDATIONS

5.5.1 Existing Landfill Considerations

The landfill was closed in accordance with regulations and requirements implemented by different agencies that require engineered improvements primarily to limit infiltration, promote drainage, and prevent migration of landfill gas to the environment. At the Burlingame Landfill these improvements generally include final grades to promote surface water drainage, internal drainage to convey water from the final cover, the final cover itself to mitigate infiltration to the underlying waste, and the landfill gas collection and destruction system to capture emissions from the landfill. Design of the project should consider these features and include measures to maintain or replace them with alternatives that comply with applicable regulations and provide equal or better performance. In some cases, regulatory agency concurrence with the design may be required.

Project construction may expose and/or require excavation of the existing waste. The test performed on a four-point composite sample of the drill cuttings did not provide evidence of constituents present at concentrations that are hazardous in accordance with federal or state requirements and monitoring during drilling did not indicate significant air emissions associated with the work. These results notwithstanding, future work that exposes waste should be performed by qualified personnel working under an appropriate Health, Safety, and Monitoring Plan.

5.5.2 Foundation Construction

The PPC or CIDH piles will extend through heterogeneous waste materials and variable underlying soils. Predrilling the waste will be required before driving PPC piles or continuing the boring for CIDH piles into the underlying soils. Predrilling through the refuse will likely require casing to maintain an open boring, isolate the waste materials, and minimize the potential for leachate migration to the subsurface. The refuse removed during drilling will require temporary onsite storage, waste profiling, and subsequent offsite disposal. Leachate or mixed leachate and groundwater from the borings will also require special handling and disposal. Open and cased borings through the waste materials should be backfilled with neat cement-bentonite grout by tremie methods following installation of the PPC or CIDH piles. Borings into the materials underlying the landfill for CIDH piles may require temporary casing and slurry construction to maintain an open hole. We recommend that cross-hole sonic logging tubes be cast in the concrete for construction quality assurance testing and that the concrete be placed through a tremie from bottom to top and not be allowed to free-fall through water or slurry.

We recommend that GLA be retained to review the foundation plans to assess whether the foundation recommendations have been adequately incorporated in the design. We also recommend that foundation excavations should be observed by GLA representative prior to placement of reinforcing steel and concrete. Unsuitable soils encountered in the foundation excavations should be removed as recommended by the Geotechnical Engineer and replaced with approved material such as compacted engineered fill or lean concrete. Foundation excavations should not be allowed to dry before placement of concrete and if visible cracks appear in the foundation excavations, the excavations should be thoroughly moisture conditioned prior to placement of concrete to close all cracks. Water should not be allowed to pond in the bottom of the excavations and areas that become water-damaged, should be over-excavated to a firm base.

5.5.3 Wet Weather Construction

If site grading and construction is to be performed during the winter rainy months, the owner and contractors should be fully aware of the potential impact of wet weather. Because rainstorms can cause delay to construction and damage previously completed work by saturating compacted surfaces or flooding excavations, we recommend wet weather conditions be addressed in the project construction bid documents and/or specifications and that the contractor be required to submit a wet weather construction plan.

6 LIMITATIONS AND CLOSURE

The preceding report provides a preliminary summary of findings from the recently completed field and laboratory testing program at the closed Burlingame Landfill. Additional information and geotechnical design recommendations will be included in the Geotechnical Design Report that will be submitted separately. Subsurface exploration is necessarily confined to selected locations and conditions may, and often do, vary between these locations. Should conditions different from those described in this report be encountered during project development, we should be consulted to review the conditions and determine whether our findings and conclusions remain valid. Additional exploration, testing, and analysis may be required for such evaluation. We have employed accepted geotechnical engineering and engineering geologic procedures and our professional opinions and conclusions are made in accordance with these principles and practices; this report has been internally peer reviewed in accordance with GLA's peer review policy. This standard is in lieu of all warranties, either expressed or implied.

7 REFERENCES

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Table 1 SUMMARY OF SOIL BORINGS Topgolf Burlingame Golf Center Redevelopment Project										
BORING	GS ELEVATION (ft MSL)	COORDINATES		TOTAL DEPTH (ft)	FINAL COVER THICKNESS (ft)	FIRST ENCOUNTERED GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft MSL)	REFUSE THICKNESS (ft)	YOUNG BAY MUD THICKNESS (ft)	ALLUVIUM PENETRATION (ft)
		Northing	Easting							
TG-01	37.0	2042914.7	6024997.3	68.5	8	47	-10.0	29	3	28.5
TG-02	39.5	2042942.0	6024488.3	89.5	5	69	-29.5	29	10	45.5
TG-03	48.5	2042636.8	6024439.4	78.5	7	18	30.5	37	6	28.5
TG-04	48.2	2042939.8	6024266.0	70.2	7	Not Encountered	NA	50	Not Encountered	13.2
TG-06	58.4	2042720.6	6024028.6	88.5	6	75	-16.6	53	Not Encountered	29.5
TG-07	58.8	2042671.0	6024057.6	91.0	9	71	-12.2	50	3.5	28.5
TG-08	59.5	2042585.5	6024105.8	88.5	6	Not Encountered	NA	51	5	26.5
TG-09	55.3	2042504.9	6024252.0	90.5	6	70	-14.7	46	5	33.5
TG-10	54.5	2042708.1	6024158.8	80.5	6	69	-14.5	44.5	6	24.0
TG-14	45.8	2042706.1	6024158.8	80.5	15	67	-21.2	31.5	3.5	30.5
TG-16	39.9	2042810.5	6024341.5	78.5	10	52	-12.1	28.5	5.5	34.5
TG-17	34.9	2042825.8	6024567.4	68.5	7	17	17.9	29	1	31.5

Table 2
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS
Topgolf Burlingame Golf Center Redevelopment Project

LAB	BORING	DEPTH (ft)	DESCRIPTION	WATER CONTENT (%)	DRY DENSITY (lb/ft ³)	GRAIN SIZE		PLASTICITY			
						Percent Minus #200	Percent Sand & Gravel	Liquid Limit	Plastic Limit	Plasticity Index	USCS
GLA	TG-01	44	Light Brown Clayey Gravel with Sand	15.7		15.6	84.4				
GLA	TG-01	58		25.3	100.4						
GLA	TG-01	68	Brown Lean Clay with Sand	22.4	106.5			42	17	25	CL
Cooper	TG-02	39	Greenish Gray Sandy Lean Clay	37.2	85.4			46	18	28	CL
Cooper	TG-03	47	Greenish Gray Elstic Silt w/Shell Fragments (Bay Mud)	60.0	64.1			75	36	39	MH
GLA	TG-03	68		22.4	105.6						
GLA	TG-03	78	Brown Gravel with Sand and Clay	11.0	127.6						
GLA	TG-06	62	Brown Clayey Sand with Gravel	16.3							
GLA	TG-06	68	Blueish Brown Clayey Sand	31.1	96.0	24.6	75.4				
GLA	TG-06	72	Light Brown Clayey Sand	19.6							
GLA	TG-06	77.5	Brown Clayey Sand with Gravel	15.0		12.8	87.2				
GLA	TG-06	88	Brown Clayey Sand	18.0	115.2						
GLA	TG-07	70	Light Brown Clay	25.9	103.5						
GLA	TG-07	80	Light Brown Gravel with Sand and Clay	13.2	123.9	11.1	88.9				
GLA	TG-07	90	Gray Sand with Silty Clay	18.7		9.9	90.1				
GLA	TG-08	73	Brown Clayey Sand	17.0		14.3	85.7				
GLA	TG-08	78	Brown Clayey Sand with Gravel	14.0							
GLA	TG-08	88	Light Brown Sandy Clay	17.9	112.9						
GLA	TG-09	57	Brown Clayey Sand with Gravel	12.3							
GLA	TG-09	59.5	Brown Sandy Clay	16.2		50.7	49.3				
GLA	TG-09	67	Brown Clay	21.7							
GLA	TG-09	69.5	Brown Sandy Clay	22.1	103.9	54.3	45.7				
GLA	TG-09	70	Light Brown Sandy Clay	19.1	113.1						
GLA	TG-09	80	Blueish Brown Clayey Sand	19.8	119.8	22.7	77.3				
GLA	TG-09	90	Brown Sand with Clay & Gravel	14.8	123.0						
GLA	TG-14	50	Blue Gray Silty Clayey Sand	35.7	84.6						
GLA	TG-14	80	Light Brown Clay with Sand	25.0	109.3						
GLA	TG-16	28.5	Gray Sandy Clay w/Gravel & Organics	27.7	76.4						
GLA	TG-16	38.5	Very Dark Brown Gravelly Clay w/Organics (Oily)	59.6	54.5						
GLA	TG-16	48	Light Brown Lean Clay with Sand	19.5	110.6			30	14	16	CL

Table 2
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS
Topgolf Burlingame Golf Center Redevelopment Project

LAB	BORING	DEPTH (ft)	DESCRIPTION	WATER CONTENT (%)	DRY DENSITY (lb/ft ³)	GRAIN SIZE		PLASTICITY			
						Percent Minus #200	Percent Sand & Gravel	Liquid Limit	Plastic Limit	Plasticity Index	USCS
GLA	TG-16	58	Brown Clayey Sand	15.6	119.3	49.5	50.5				
GLA	TG-16	68		38.3	82.5						
GLA	TG-16	78		27.7	96.8						
GLA	TG-17	48	Light Brown Lean Clay	20.9	109.5			44	16	28	CL
GLA	TG-17	68		37.6	82.2						

NOTES:

1. See Appendix F for complete laboratory results.
2. Unconsolidated-undrained triaxial test, consolidated-undrained triaxial, and consolidation test results not shown in this table (see Appendix F).



FIGURE 2

SOIL BORING LOCATIONS

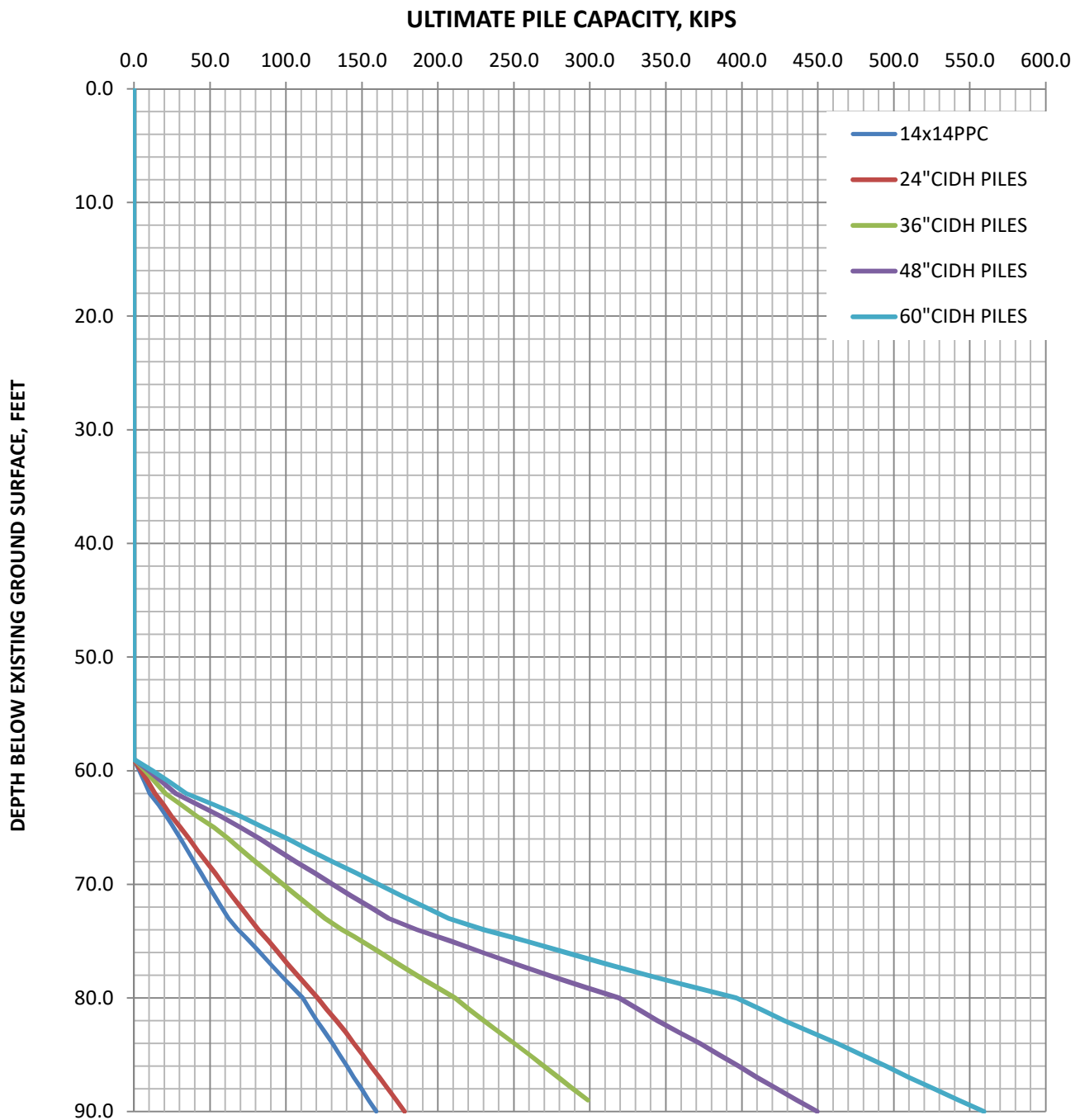
PROPOSED TOPGOLF PROJECT

BURLINGAME

SAN MATEO COUNTY, CALIFORNIA

Geo-Logic
ASSOCIATES

DRAWN BY: RM DATE: APRIL 2018 JOB NO. RM18.1038



Notes:

1. Vertical compression pile capacities assume zero settlement and downdrag associated with refuse and Young Bay Mud after pile installation.
2. Bottom of refuse at approximately 59 feet below existing ground surface.
3. A factor of safety of at least 2.0 should be applied to obtain allowable pile capacity.

Geo-Logic
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Phone 408-778-2818
Fax 408-779-6879

**ULTIMATE PILE CAPACITY
PROPOSED BUILDING
TOPGOLF - BURLINGAME
Burlingame, California**

FIGURE

3

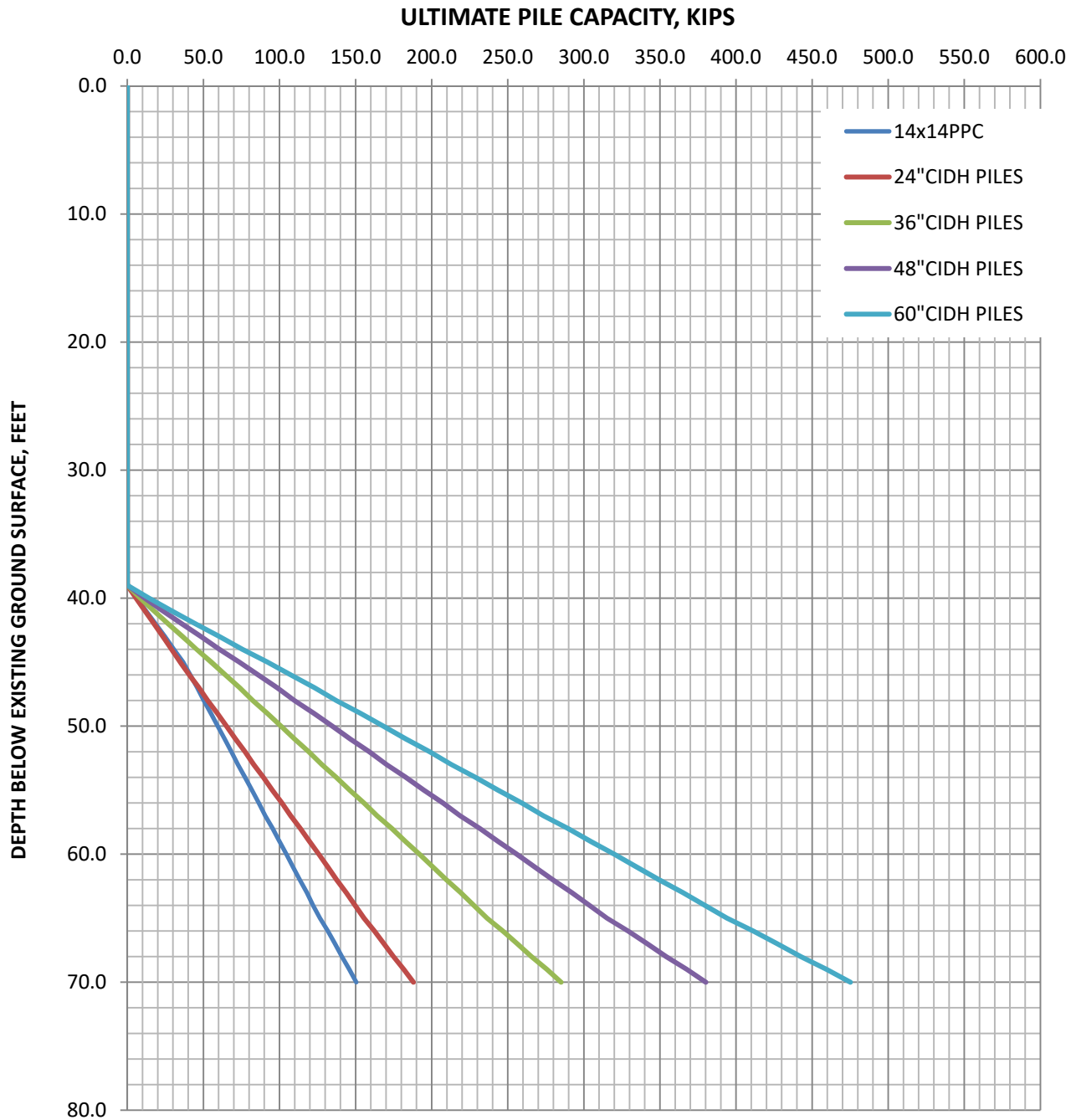
**PROJECT
RM18.1038**

Drafted by:

Date:

Review by:

Revision:



Notes:

1. Vertical compression pile capacities assume zero settlement and downdrag associated with refuse and Young Bay Mud after pile installation.
2. Bottom of refuse at approximately 39 feet below existing ground surface.
3. A factor of safety of at least 2.0 should be applied to obtain allowable pile capacity.

Geo-Logic
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**ULTIMATE PILE CAPACITY
NET POLES (TG17)
TOPGOLF - BURLINGAME
Burlingame, California**

FIGURE

4

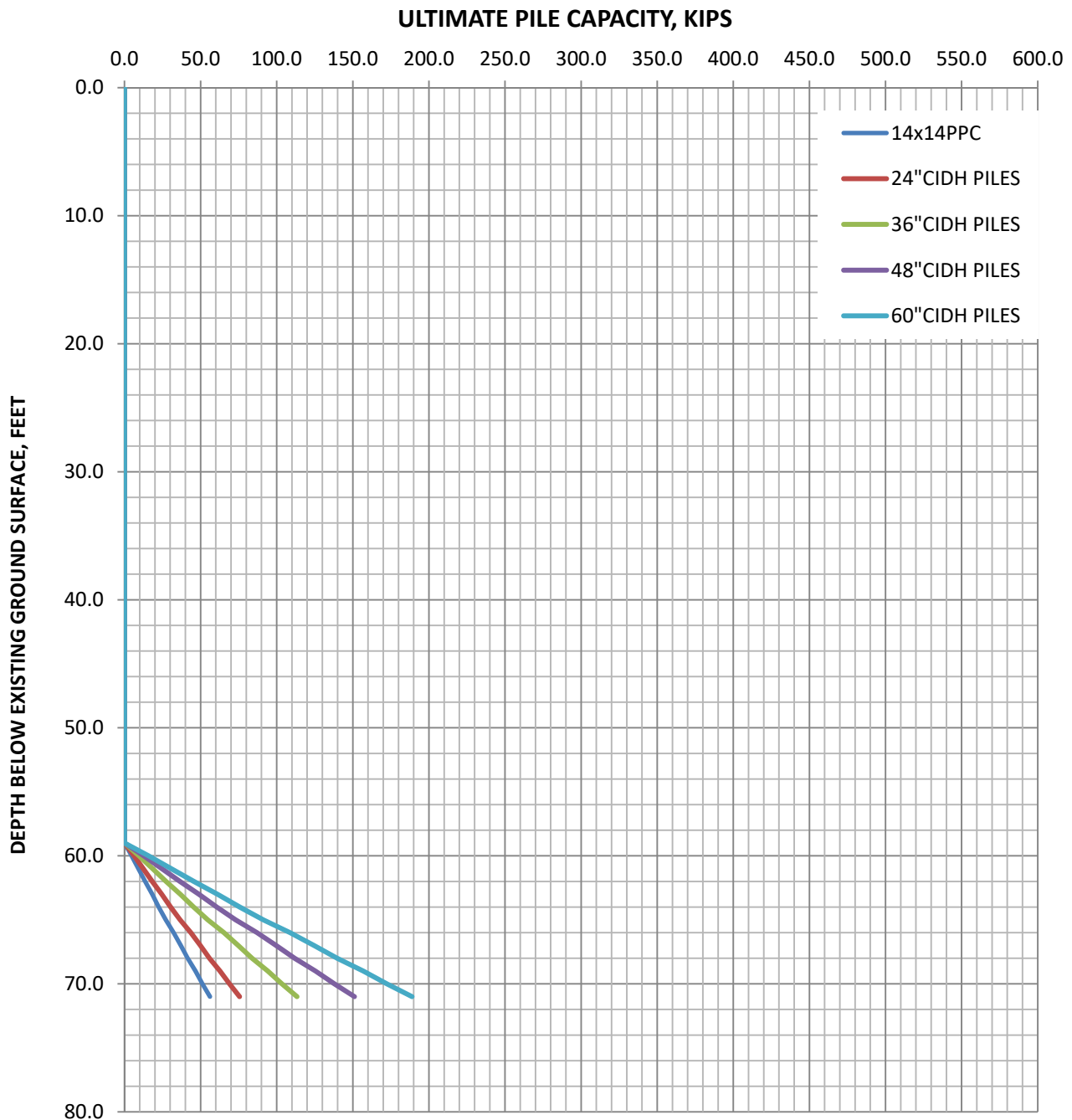
**PROJECT
RM18.1038**

Drafted by:

Date:

Review by:

Revision:



Notes:

1. Vertical compression pile capacities assume zero settlement and downdrag associated with refuse and Yound Bay Mud after pile installation.
2. Bottom of refuse at approximately 59 feet below existing ground surface.
3. A factor of safety of at least 2.0 should be applied to obtain allowable pile capacity.

Geo-Logic
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**ULTIMATE PILE CAPACITY
NET POLES (TG04)
TOPGOLF - BURLINGAME
Burlingame, California**

FIGURE

5

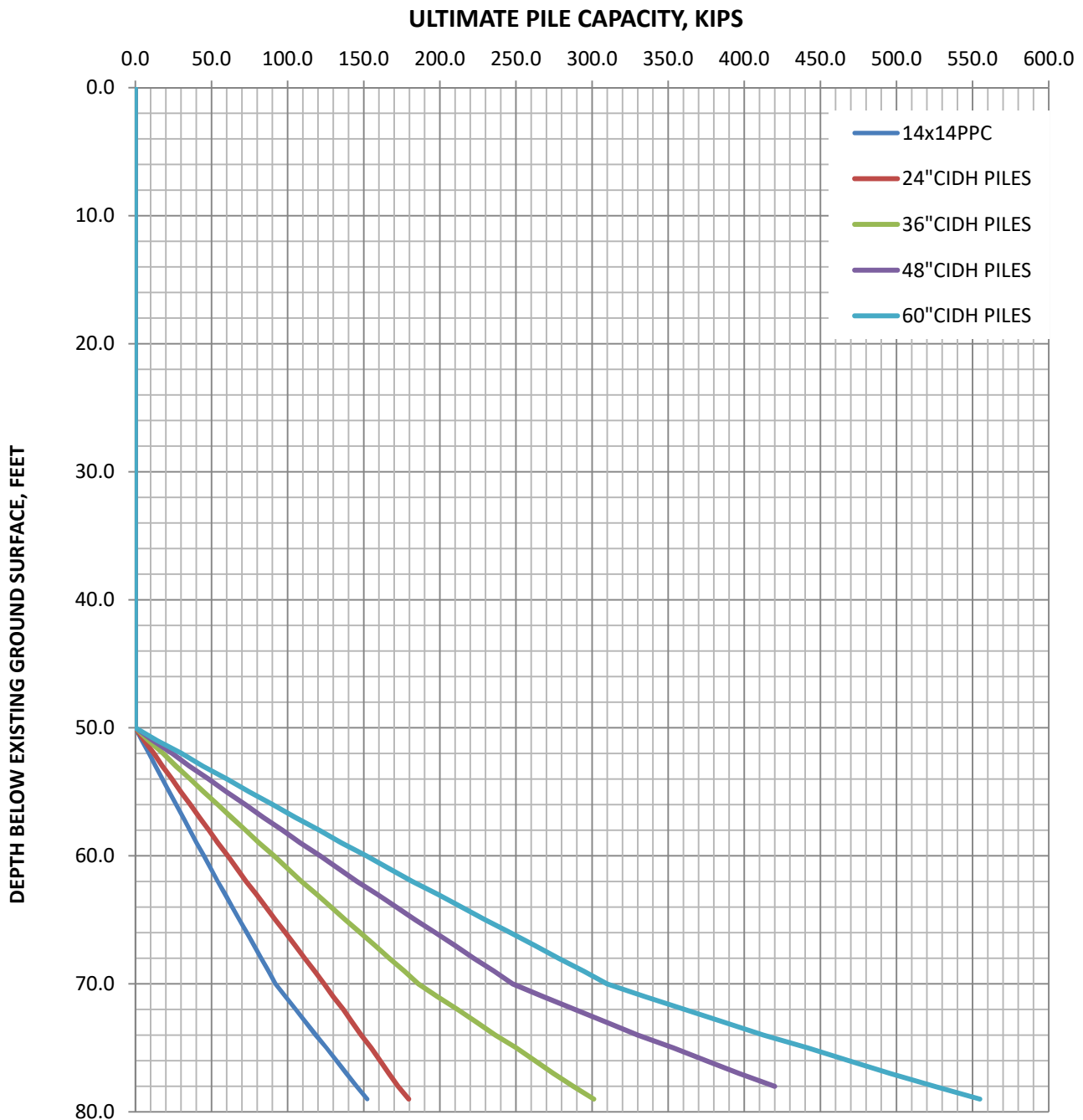
**PROJECT
RM18.1038**

Drafted by:

Date:

Review by:

Revision:



Notes:

1. Vertical compression pile capacities assume zero settlement and downdrag associated with refuse and Yound Bay Mud after pile installation.
2. Bottom of refuse at approximately 50 feet below existing ground surface.
3. A factor of safety of at least 2.0 should be applied to obtain allowable pile capacity.

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**ULTIMATE PILE CAPACITY
NET POLES (TG03)
TOPGOLF - BURLINGAME
Burlingame, California**

FIGURE

6

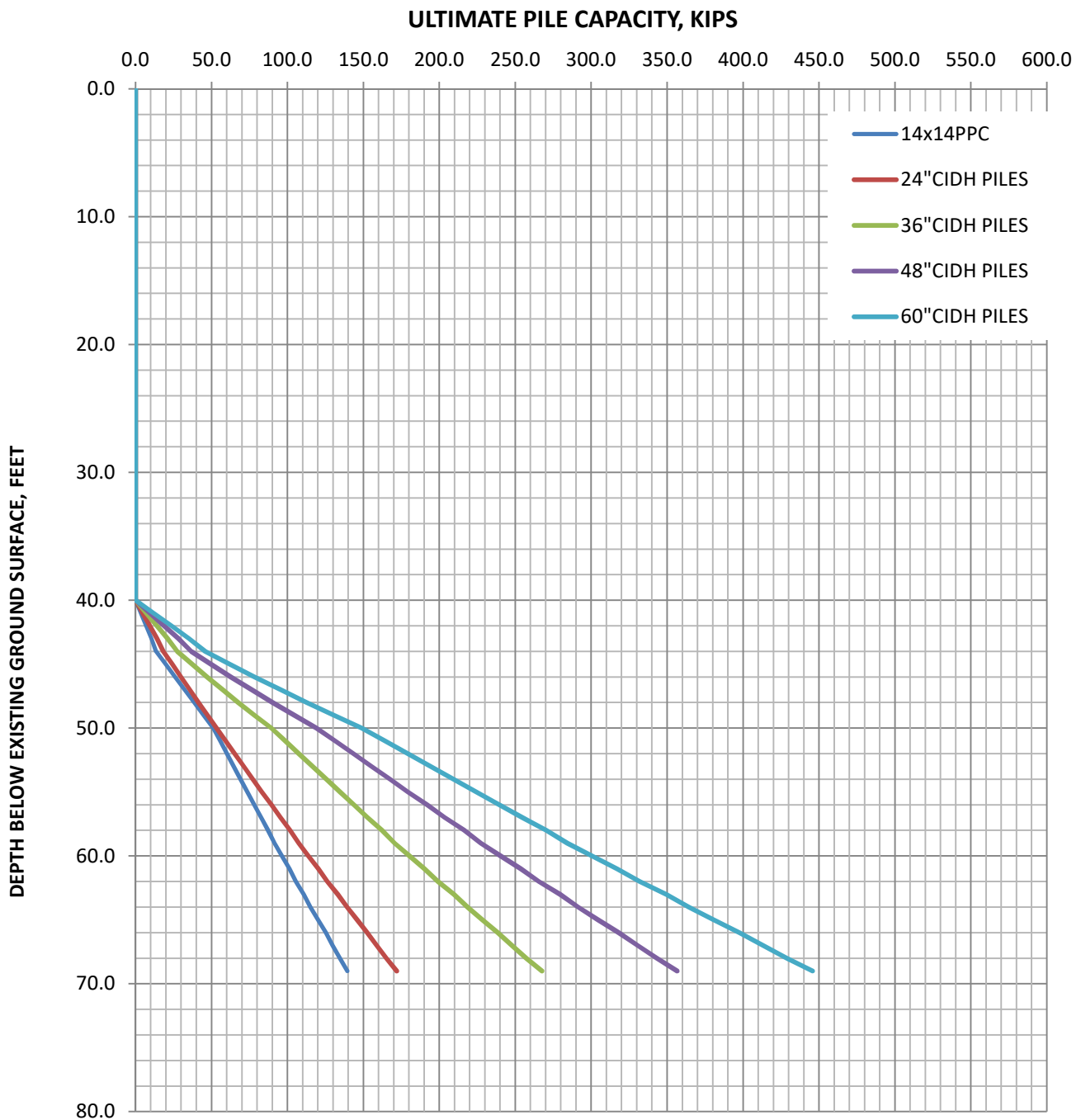
**PROJECT
RM18.1038**

Drafted by:

Date:

Review by:

Revision:



Notes:

1. Vertical compression pile capacities assume zero settlement and downdrag associated with refuse and Yound Bay Mud after pile installation.
2. Bottom of refuse at approximately 40 feet below existing ground surface.
3. A factor of safety of at least 2.0 should be applied to obtain allowable pile capacity.

Geo-Logic
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**ULTIMATE PILE CAPACITY
NET POLES (TG01)
TOPGOLF - BURLINGAME
Burlingame, California**

FIGURE

7

**PROJECT
RM18.1038**

Drafted by:

Date:

Review by:

Revision:

Appendix A
BURLINGAME LANDFILL CLOSURE RECORD DRAWINGS

CITY OF BURLINGAME LANDFILL

CITY PROJECT NO's. 9117, 9117(1), 9117(2)

Burlingame, San Mateo County, California

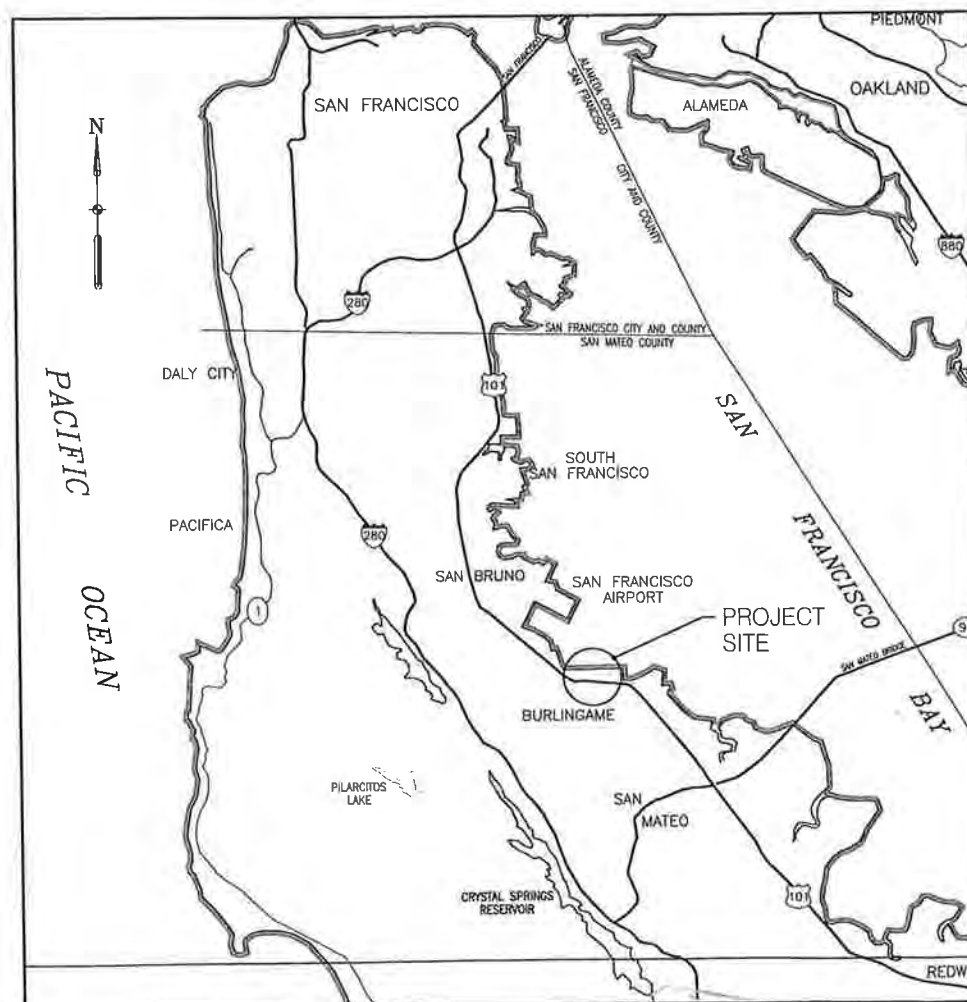


DESIGN ENGINEER APPROVAL

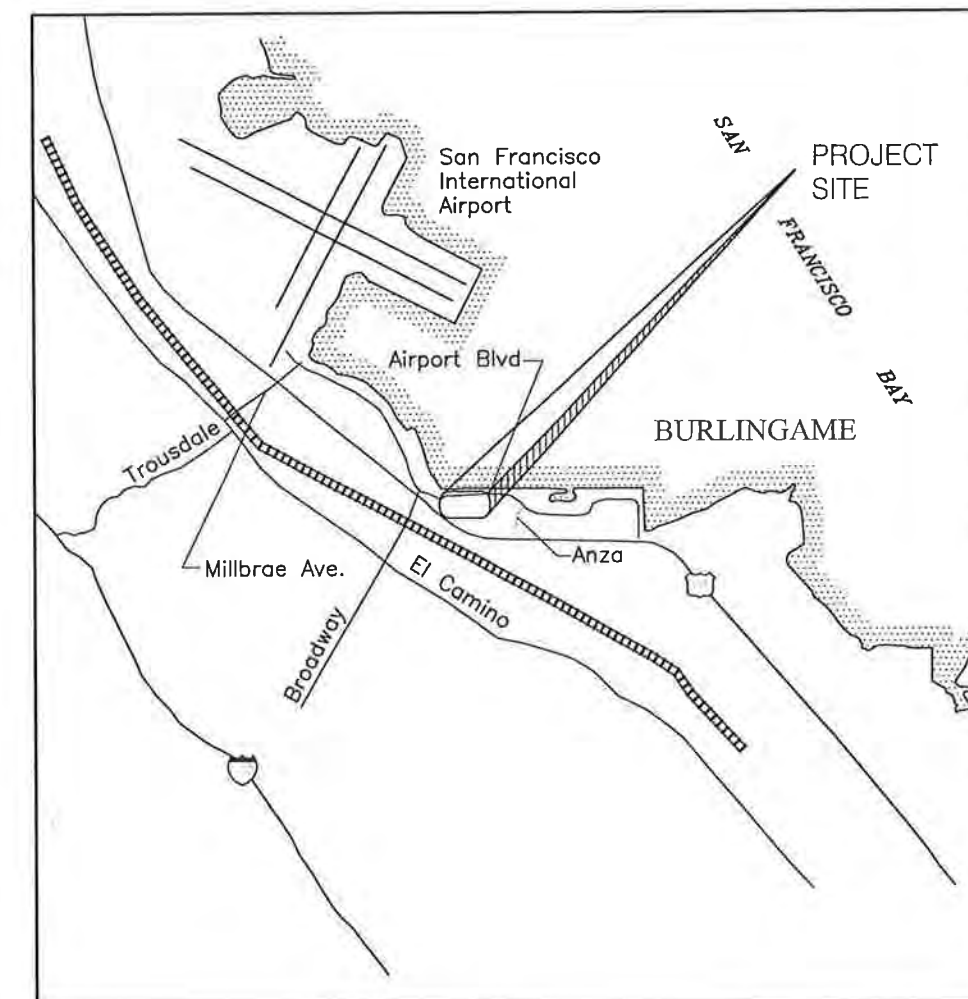
Lusk / Loh

02-15-05

DATE _____



LIST OF DRAWINGS	
SHEET NO.	DESCRIPTION
G-1	TITLE SHEET, LIST OF DRAWINGS, SITE LOCATION AND VICINITY MAP
G-2	GENERAL NOTES, LEGEND, ABBREVIATIONS AND KEY MAP
C-1	CAP EXTENT PLAN - ENTIRE LANDFILL
C-2	CAP EXTENT PLAN - SHEET 1 OF 5
C-3	CAP EXTENT PLAN - SHEET 2 OF 5
C-4	CAP EXTENT PLAN - SHEET 3 OF 5
C-5	CAP EXTENT PLAN - SHEET 4 OF 5
C-6	CAP EXTENT PLAN - SHEET 5 OF 5
C-7	UTILITY EXTENT PLAN - ENTIRE LANDFILL
C-8	UTILITY EXTENT PLAN - SHEET 1 OF 5
C-9	UTILITY EXTENT PLAN - SHEET 2 OF 5
C-10	UTILITY EXTENT PLAN - SHEET 3 OF 5
C-11	UTILITY EXTENT PLAN - SHEET 4 OF 5
C-12	UTILITY EXTENT PLAN - SHEET 5 OF 5
C-13	CAP DETAILS - SHEET 1 OF 2
C-14	CAP DETAILS - SHEET 2 OF 2
C-15	MISCELLANEOUS DETAILS - SHEET 1 OF 5
C-16	MISCELLANEOUS DETAILS - SHEET 2 OF 5
C-17	MISCELLANEOUS DETAILS - SHEET 3 OF 5
C-18	MISCELLANEOUS DETAILS - SHEET 4 OF 5
C-19	MISCELLANEOUS DETAILS - SHEET 5 OF 5



SITE LOCATION MAP

▲			
▲			
▲			
▲			
▲			
▲	ISSUED FOR RECORD	LJL/SKS	BML 12/05/03
BSA	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY DATE



The City of Burlingame
CITY HALL - 301 PRIMROSE ROAD
BURLINGAME, CALIFORNIA 94010



500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3268



IF THIS BAR DOES
NOT MEASURE 1"
THEN DRAWING IS
NOT TO SCALE

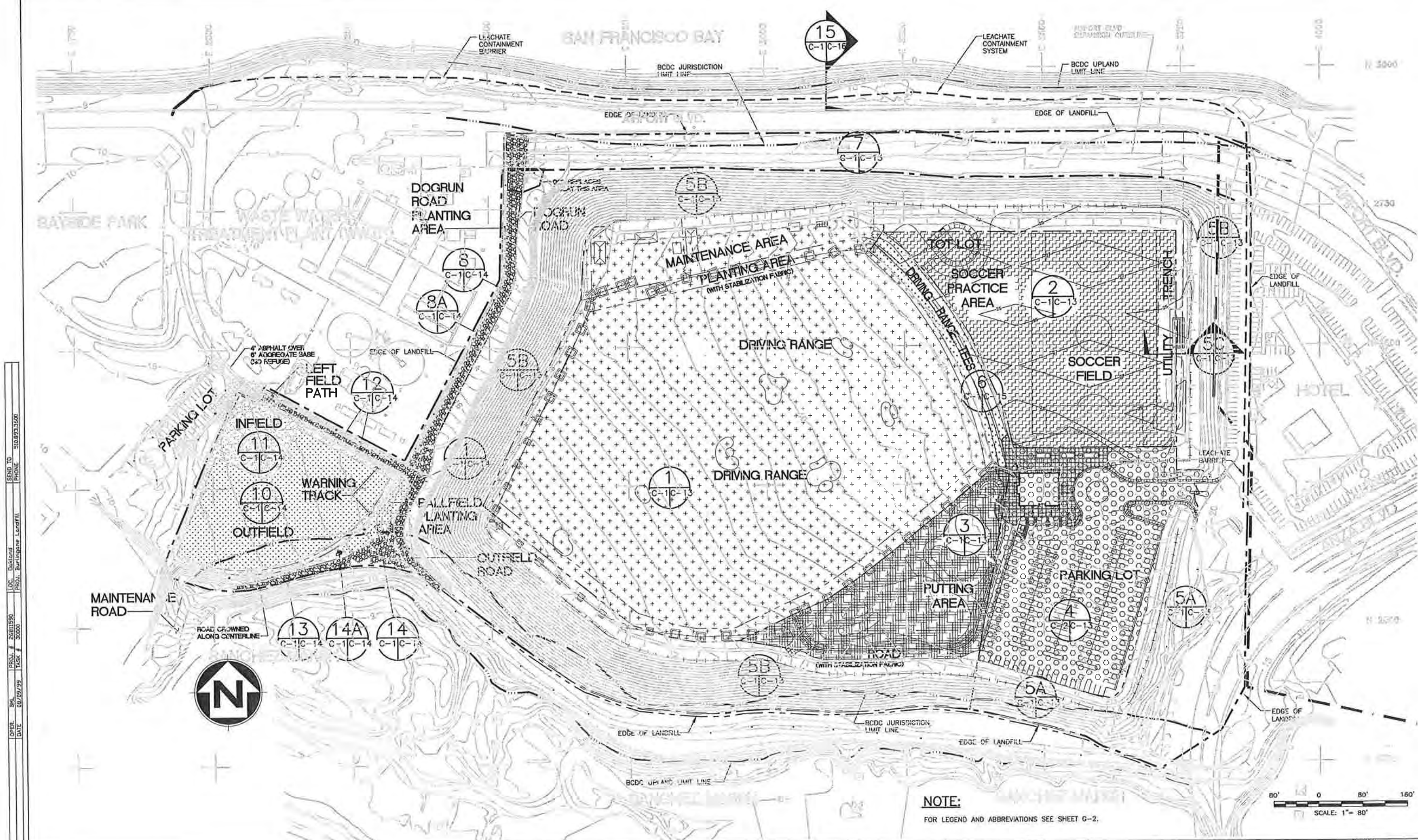
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DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE – RECORD DRAWINGS
Burlingame, California

TITLE SHEET, LIST OF DRAWINGS,
SITE LOCATION AND VICINITY MAP

REVISION	
PROJECT	26811590
DRAWING	G-1
SHEET	1 OF 2

REVISION	
PROJECT	26811590
DRAWING	G-2
SHEET	2 OF 2



FILE	26811590	LOC	26811590	PRJ	26811590	SEND TO	3600
SCALE	1/4"	TASK	3600	PROJ	Burlingame Landfill	PHONE	510.893.3600
REV		DATE	09/09/99	CHK			
				OPR			

REV	DESCRIPTION OF REVISION	DATE
1	ISSUED FOR RECORD	12/05/03



The City of Burlingame
CITY HALL - 301 PINEHURST ROAD
BURLINGAME, CALIFORNIA 94010



500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING

0 1/2 1

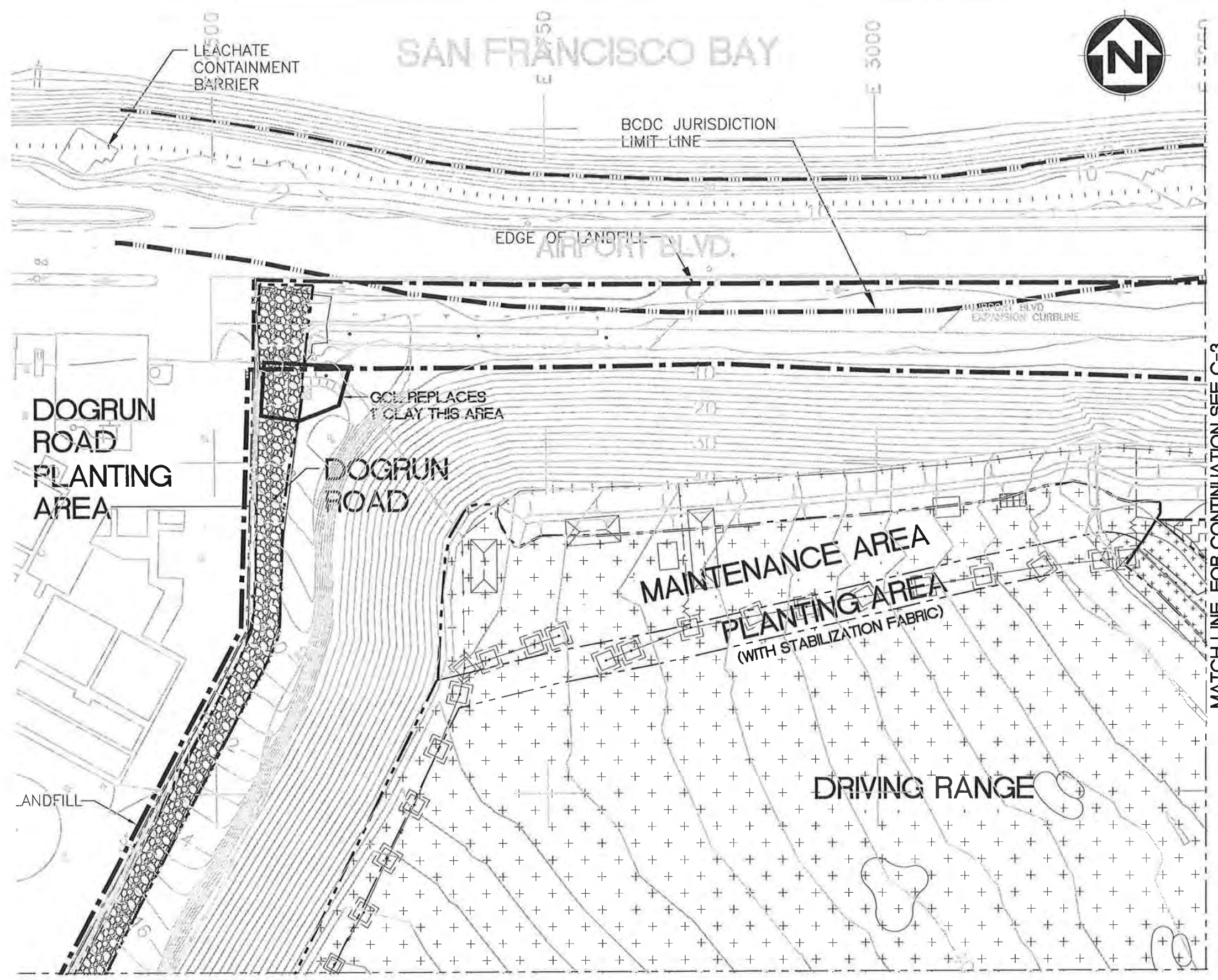
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED BML
DRAWN BML
CHECKED SKS
PEER REVIEWED HJB
PROJECT MANAGER LUL
DATE 12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California

CAP EXTENT PLAN
ENTIRE LANDFILL

REVISION	0
PROJECT	26811590
DRAWING	C-1
SHEET	3 OF 21



MATCH LINE, FOR CONTINUATION SEE C-3

MATCH LINE, FOR CONTINUATION SEE C-5

NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE #	DATE	BY	CHKD	PROJ. #	PROJ. NAME	LOC.	DATE	SEND TO
11	08/09/99	BML	SKS	26811590	Landfill	Burlingame	08/09/99	PHONE 510.892.3600
SCALE	11							

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISOR	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03



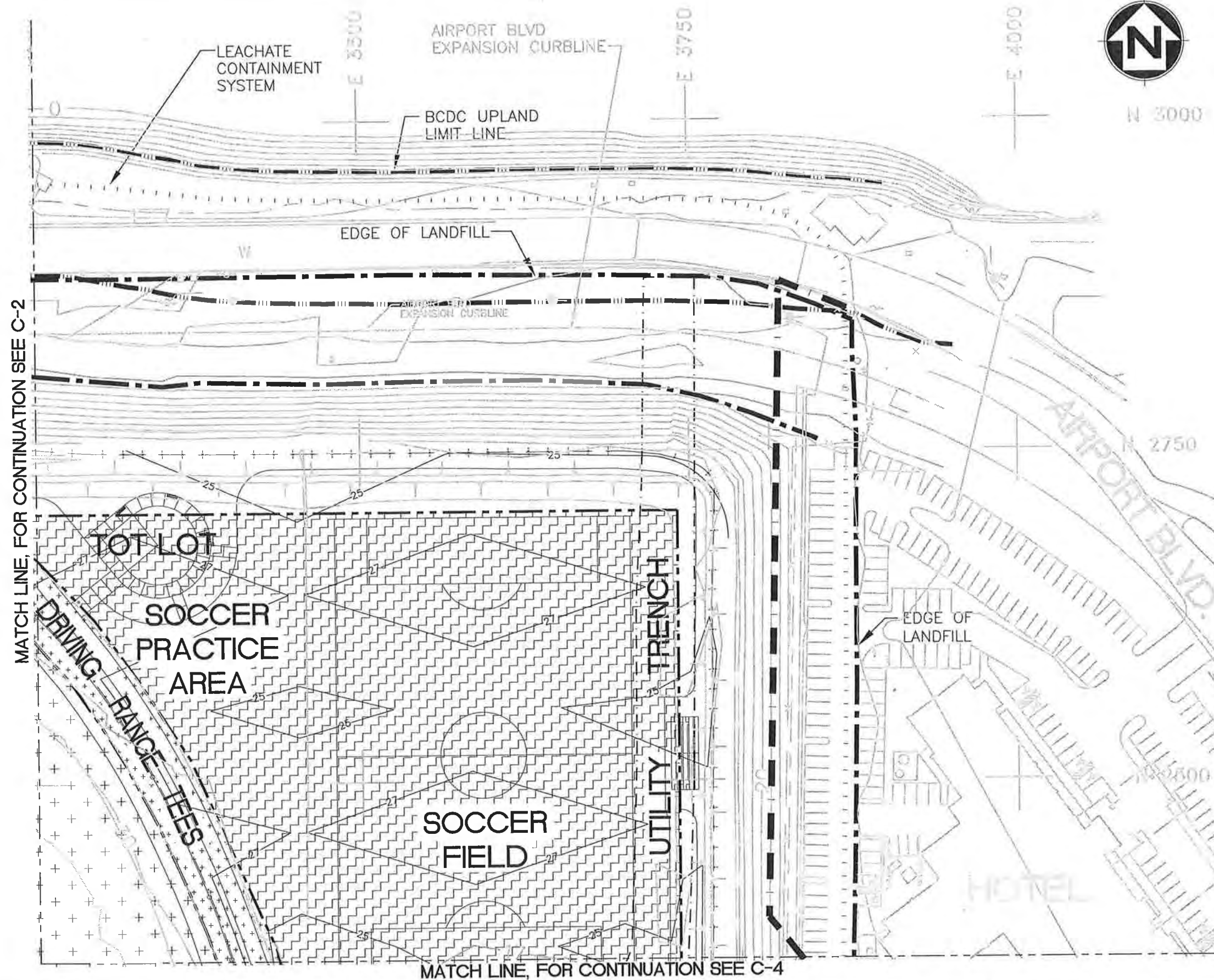
URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

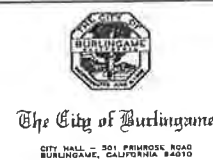
LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California
CAP EXTENT PLAN
SHEET 1 OF 5

REVISION	0
PROJECT	26811590
DRAWING	C-2
SHEET	4 OF 21



FILE #	SCALE	1/1
DATE	08/09/99	
BY	BML	
CHKD	SKS	
PROJ.	26811590	
LOC.	Oakland	
PROJ.	Burlingame Landfill	
PHONE	510.893.3500	
SEND TO		

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
1	ISSUED FOR RECORD	LIL/SKS	BML	12/05/03



500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3500
Fax: (510) 874-3268



IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LIL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS

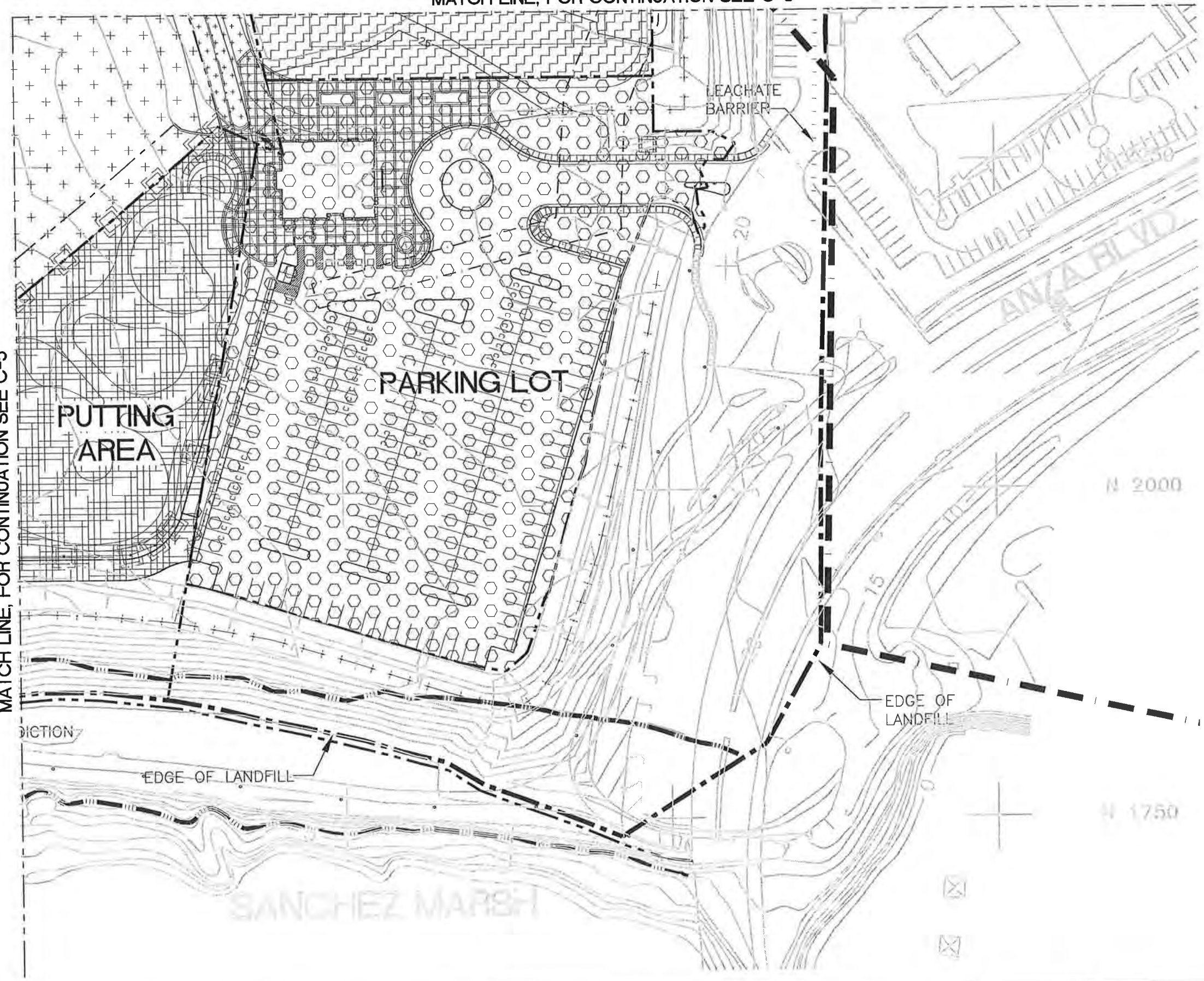
Burlingame, California

CAP EXTENT PLAN
SHEET 2 OF 5

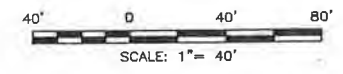
REVISION	0
PROJECT	26811590
DRAWING	C-3
SHEET	5 OF 21

MATCH LINE, FOR CONTINUATION SEE C-3

MATCH LINE, FOR CONTINUATION SEE C-5



NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE # 101
SCALE 1/4"= 40'
OPER. DATE 08/09/99
B.M. 26811590
PROJ. TASK 30000
LCC. PROJ. Burlingame Landfill
SEND TO PHONE 510.893.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVIEWED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03



URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3268

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

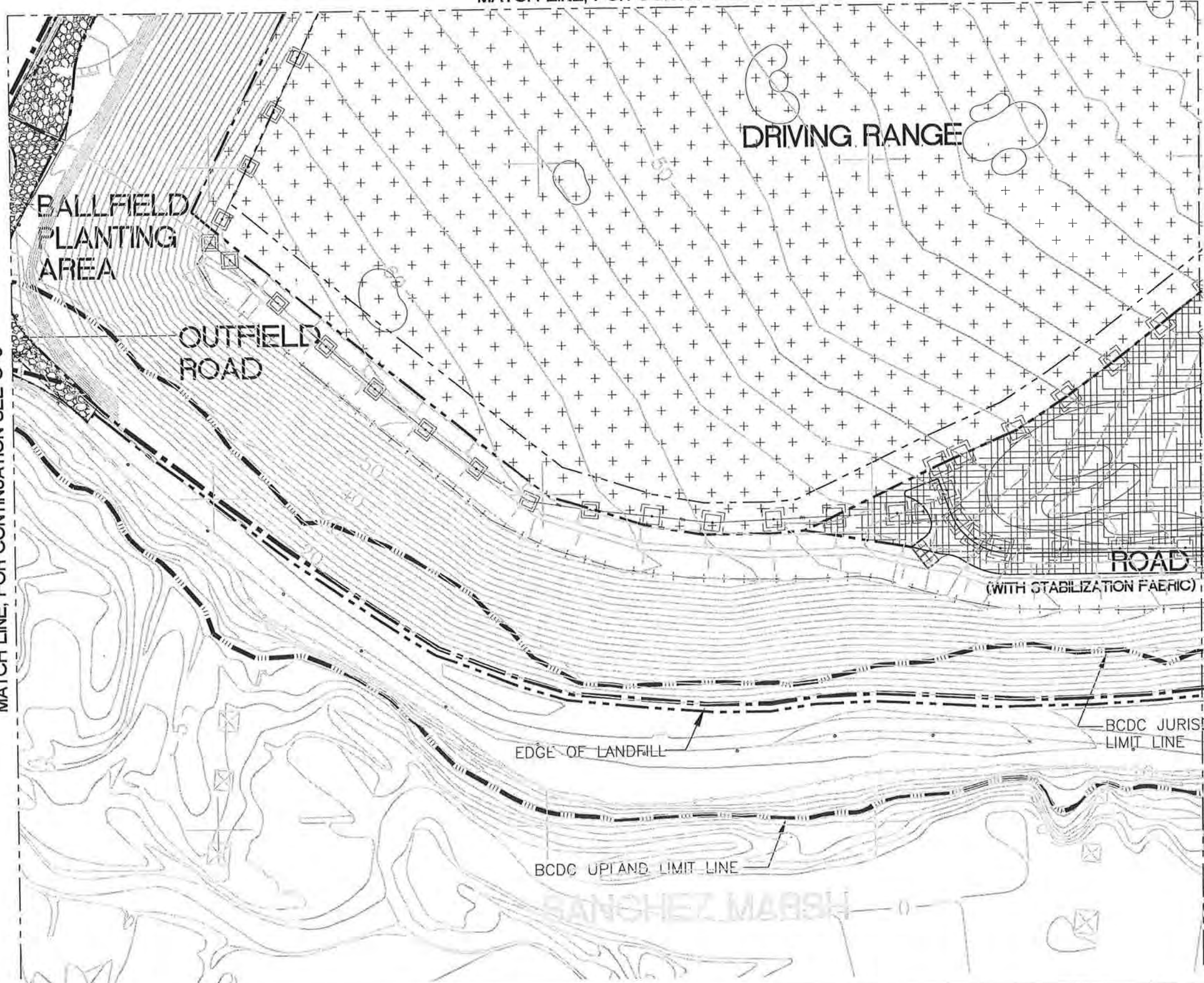
LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California
CAP EXTENT PLAN
SHEET 3 OF 5

REVISION	0
PROJECT	26811590
DRAWING	C-4
SHEET	6 OF 21

MATCH LINE, FOR CONTINUATION SEE C-2

MATCH LINE, FOR CONTINUATION SEE C-6

MATCH LINE, FOR CONTINUATION SEE C-4



NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE #	SCALE	1:1
DATE	08/09/99	
BY	BML	
PROJECT	26811590	
TASK	30000	
LOCATION	Ballfield, Burlingame Landfill	
PHONE	510.893.3600	

REV	DESCRIPTION OF REVISION	DATE
1	ISSUED FOR RECORD	12/05/03



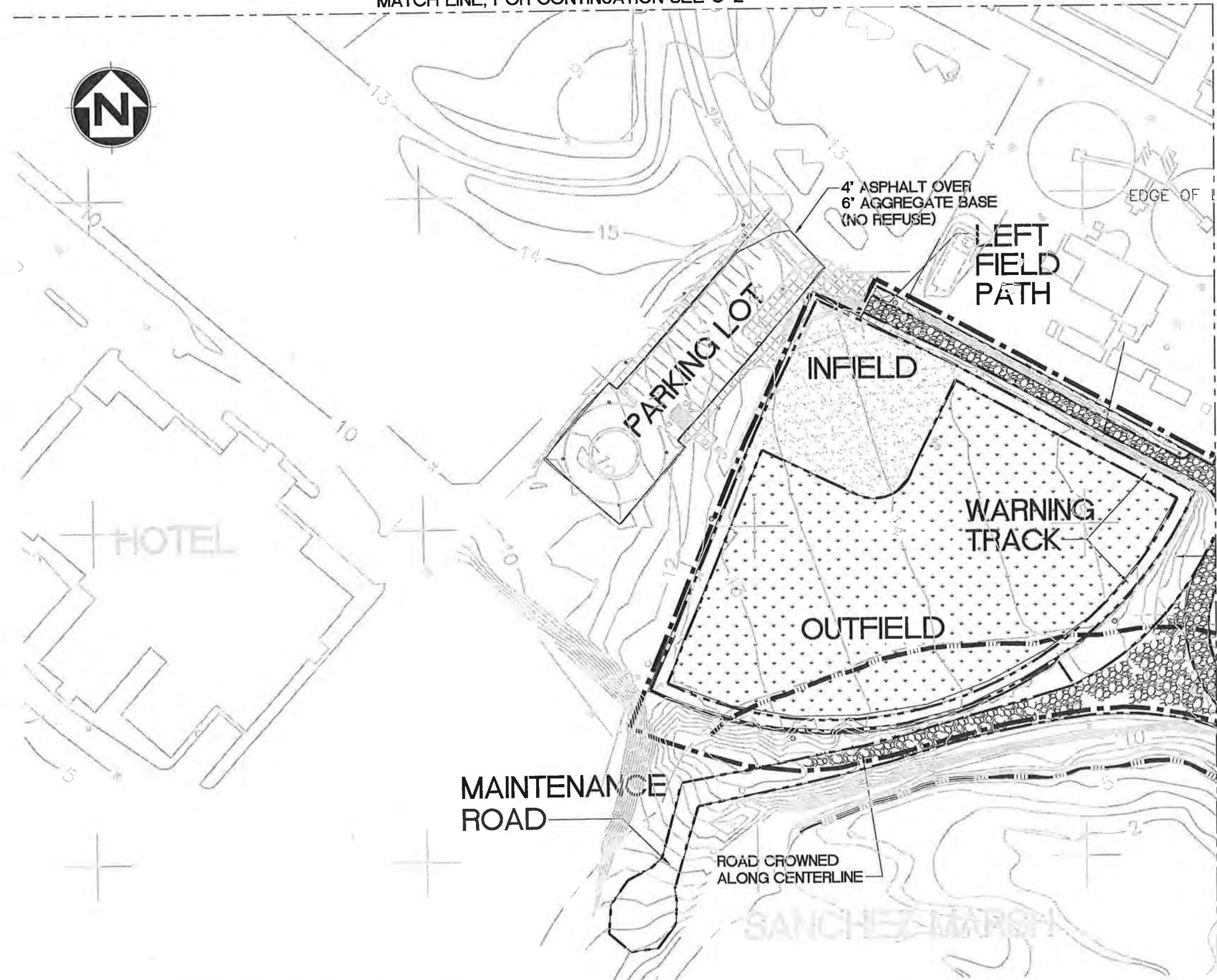
URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HUB
PROJECT MANAGER	LJL
DATE	12/05/03

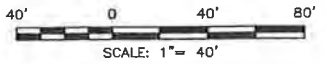
LANDFILL CLOSURE - RECORD DRAWINGS	REVISION
Burlingame, California	0
PROJECT 26811590	
DRAWING C-5	
SHEET 7 OF 21	

MATCH LINE, FOR CONTINUATION SEE C-2



MATCH LINE, FOR CONTINUATION SEE C-5

NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE	SCALE	DATE	BY	CHK	PROJ.	LOC.	SEND TO
		08/05/99	BML		26811590	Oakland	PHONE 510.893.3600
					Task	Burlingame Landfill	

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03



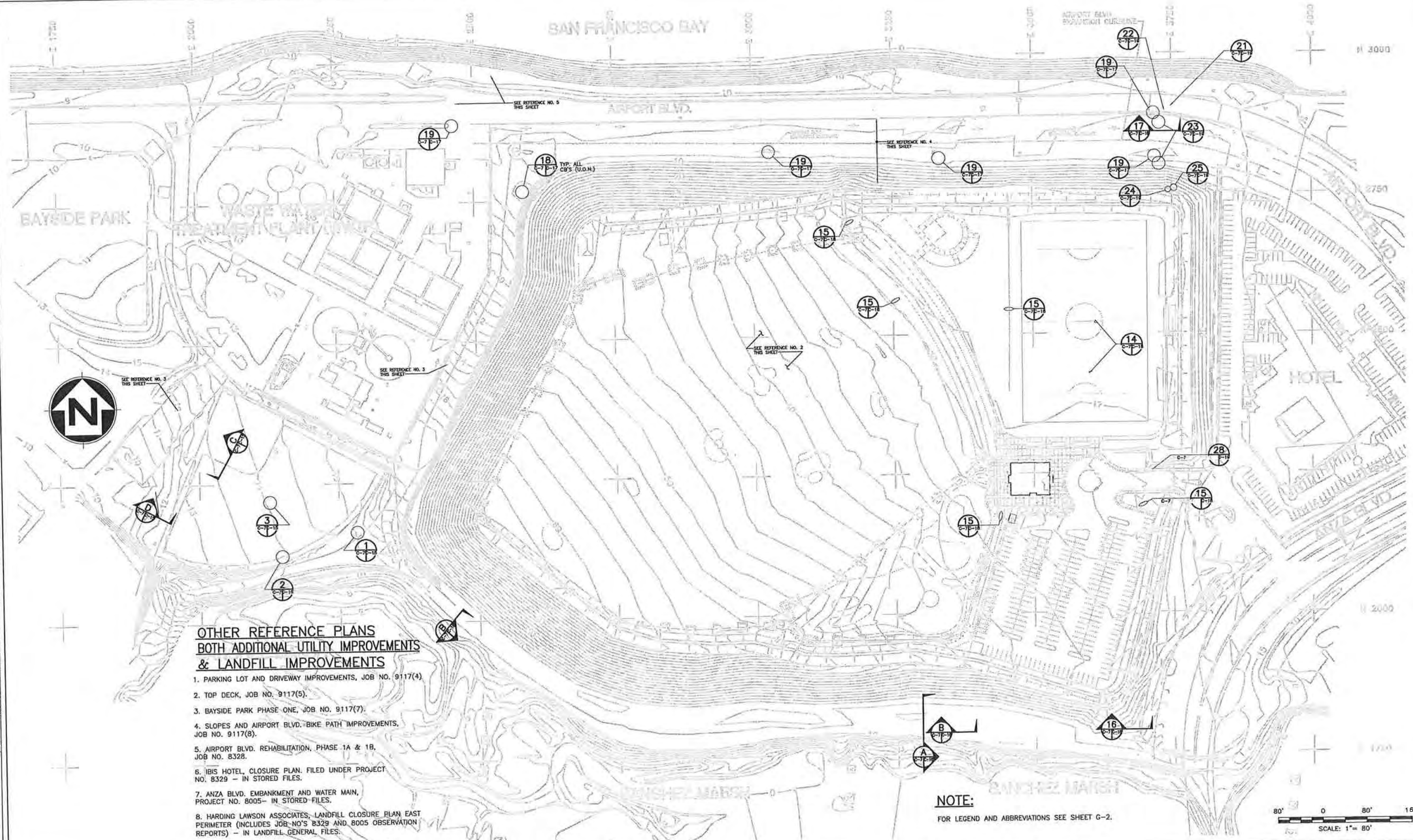
URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3288

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California
CAP EXTENT PLAN
SHEET 5 OF 5

REVISION	0
PROJECT	26811590
DRAWING	C-6
SHEET	8 OF 21



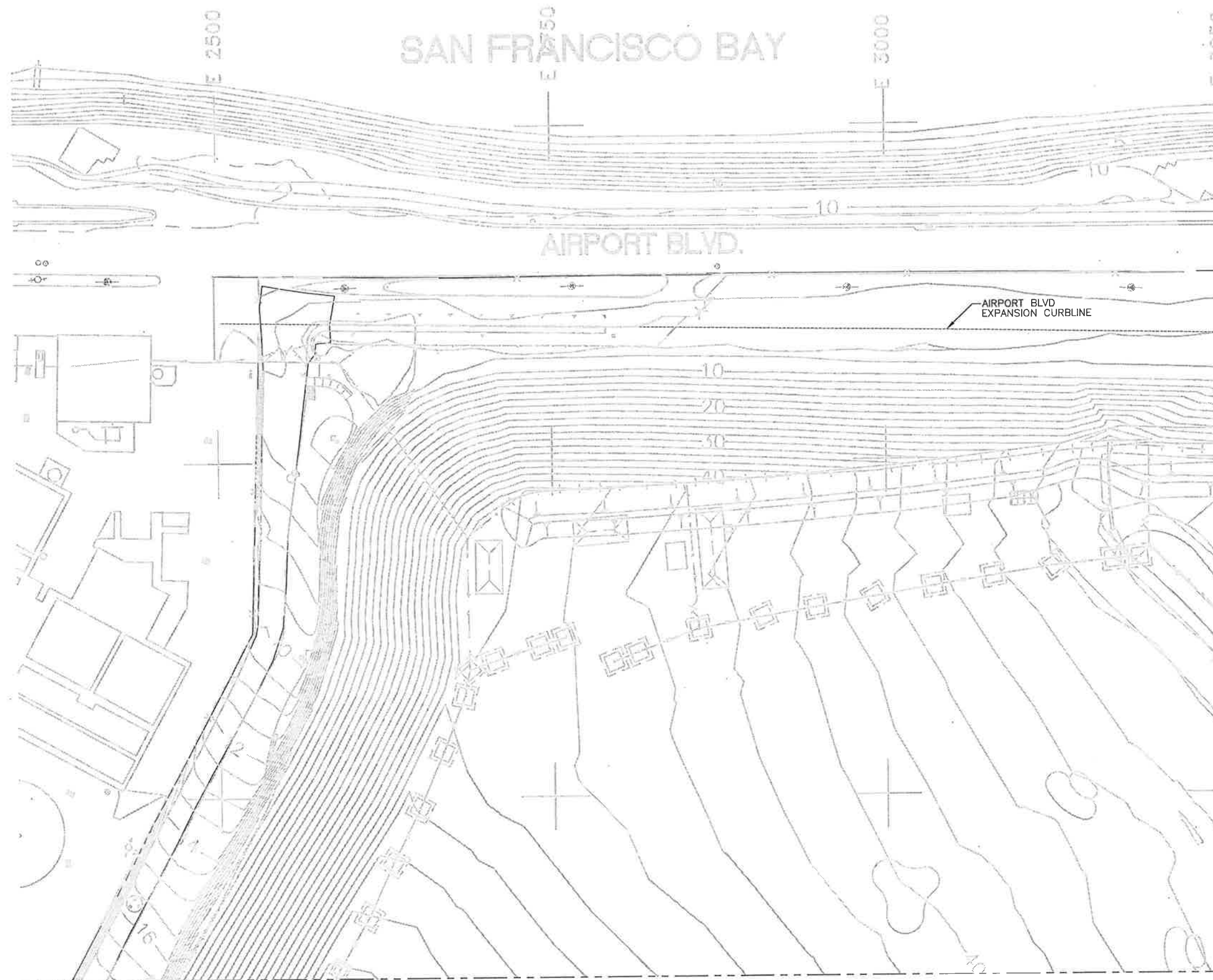
9. SOCCER FIELD DRAINAGE-ADDITIONS, JOB NO. 91171				
△				
△				
△				
△				
△	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03
REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE



URS
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Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3268

NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.

WARNING  IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE	DESIGNED BML DRAWN BML CHECKED SKS	LANDFILL CLOSURE - RECORD DRAWINGS Burlingame, California UTILITIES EXTENT PLAN ENTIRE LANDFILL	REVISION 
	PEER REVIEWED HJB PROJECT MANAGER LJJ DATE 12/05/03		PROJECT 26811590 DRAWING C-7 SHEET 9 OF 21



MATCH LINE, FOR CONTINUATION SEE C-9

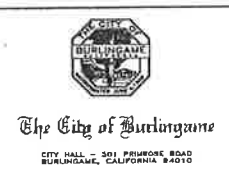
NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



MATCH LINE, FOR CONTINUATION SEE C-11

FILE / SCALE 1:1
OPER. DATE 08/09/99
BML
PROJ. # 26811590
TASK 3000
LOC. Oakland
PROJ. Burlingame Landfill
SEND TO PHONE 310.893.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISOR	DATE
1	ISSUED FOR RECORD	LIL/SKS	BML	12/05/03



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Fax: (510) 874-3268

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LIL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California
UTILITY EXTENT PLAN
SHEET 1 OF 5

REVISION	PROJECT	DRAWING
0	26811590	C-8
		SHEET 10 OF 21



MATCH LINE, FOR CONTINUATION SEE C-8

AIRPORT BLVD
EXPANSION CURBLINE

2750
AIRPORT BLVD

2750

NOTE:

FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.

MATCH LINE, FOR CONTINUATION SEE C-10



The City of Burlingame
CITY HALL - 501 FREMONT ROAD
BURLINGAME, CALIFORNIA 94010



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Fax: (510) 874-3268



IF THIS BAR DOES
NOT MEASURE 1"
THEN DRAWING IS
NOT TO SCALE

WARNING

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS

Burlingame, California

UTILITY EXTENT PLAN
SHEET 2 OF 5

REVISION



PROJECT	26811590
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DRAWING C-9

SHEET 11 OF 21



△			
△			
△			
△			
△			
△	ISSUED FOR RECORD	LJL/SKS	12/05/03
REV	DESCRIPTION OF REVISION	REVIEWED BY	DATE

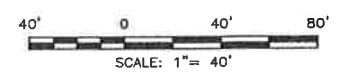
MATCH LINE, FOR CONTINUATION SEE C-9



MATCH LINE, FOR CONTINUATION SEE C-11



NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE #	SCALE	DATE	OPER.	DATE	PROJ. #	PROJ. #	LOC.	SEND TO
24	1/4"	08/09/99	08/09/99	08/09/99	24011590	24011590	PROJ. Burlingame Landfill	PHONE 510.893.3600

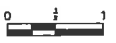
REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03



The City of Burlingame
CITY HALL - 501 PRINCETON ROAD
BURLINGAME, CALIFORNIA 94010



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Fax: (510) 874-3268



WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE -- RECORD DRAWINGS
Burlingame, California

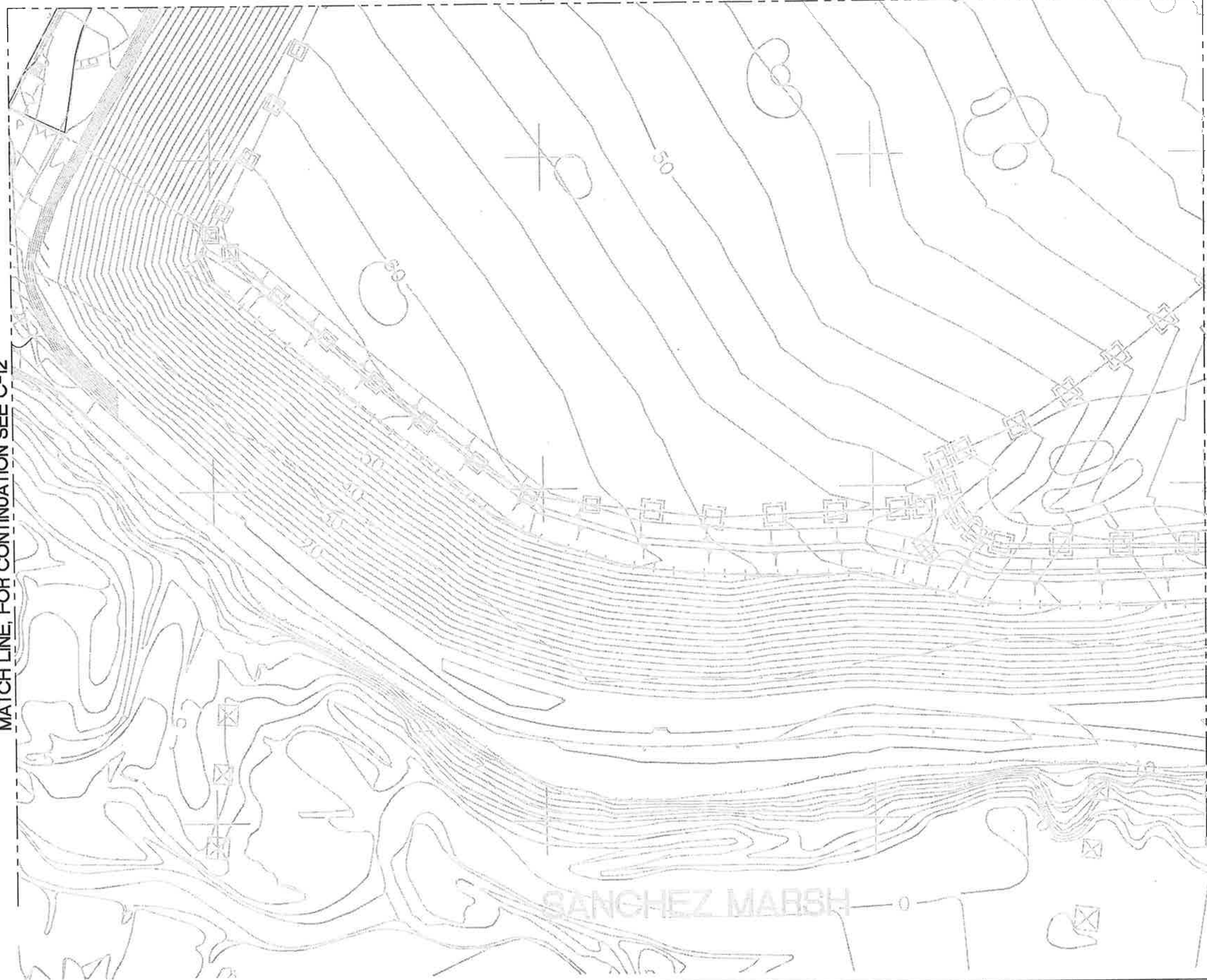
UTILITY EXTENT PLAN
SHEET 3 OF 5

REVISION	PROJECT	DRAWING
0	26811590	C-10
		SHEET 12 OF 21

MATCH LINE, FOR CONTINUATION SEE C-8

MATCH LINE, FOR CONTINUATION SEE C-12

MATCH LINE, FOR CONTINUATION SEE C-10



NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE #	SCALE	10
OPER. DATE	DATE	08/09/99
BK. TASK	DATE	08/09/99
PROJ. TASK	DATE	08/09/99
LOC. Oakland	PROJ. Burlingame Landfill	SEND TO PHONE 510.893.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISOR	DATE
1	ISSUED FOR RECORD	LIL/SKS	BML	12/05/03



URS
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Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California
UTILITY EXTENT PLAN
SHEET 4 OF 5

REVISION	PROJECT	DRAWING
1	26811590	C-11
SHEET		13 OF 21

MATCH LINE, FOR CONTINUATION SEE C-8



MATCH LINE, FOR CONTINUATION SEE C-11

NOTE:
FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.



FILE # 101
SCALE 1/4"= 40'
OPER. DATE 08/09/99
BML 08/09/99
PROJ. TASK 26811590
LOC. Oakland
PROJ. Burlingame Landfill
SEND TO PHONE 510.893.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03

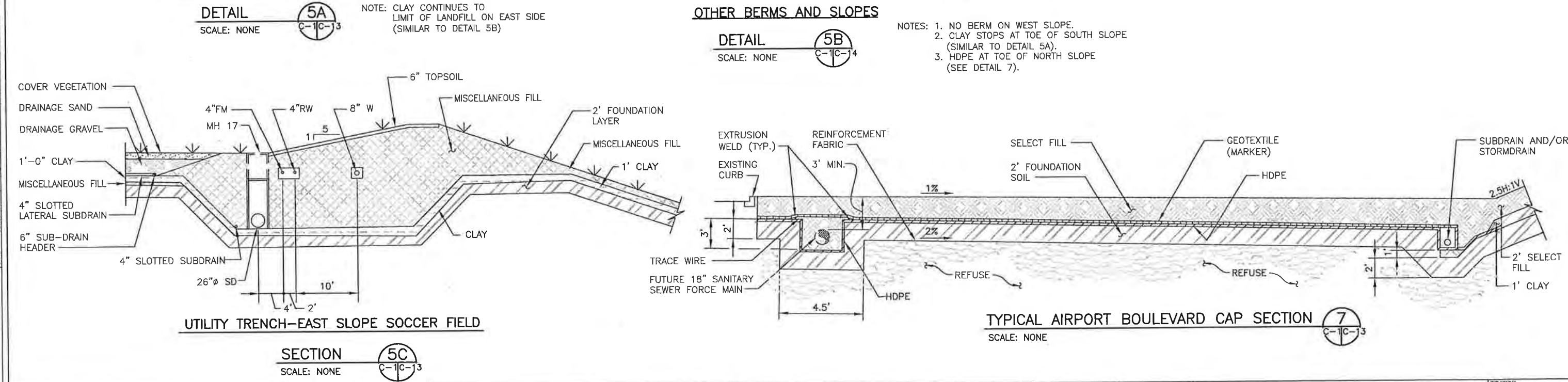
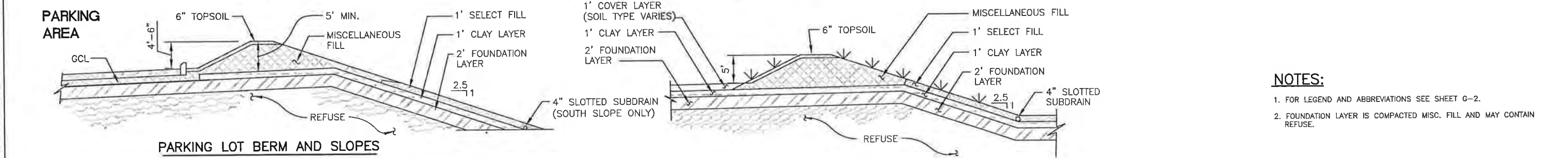
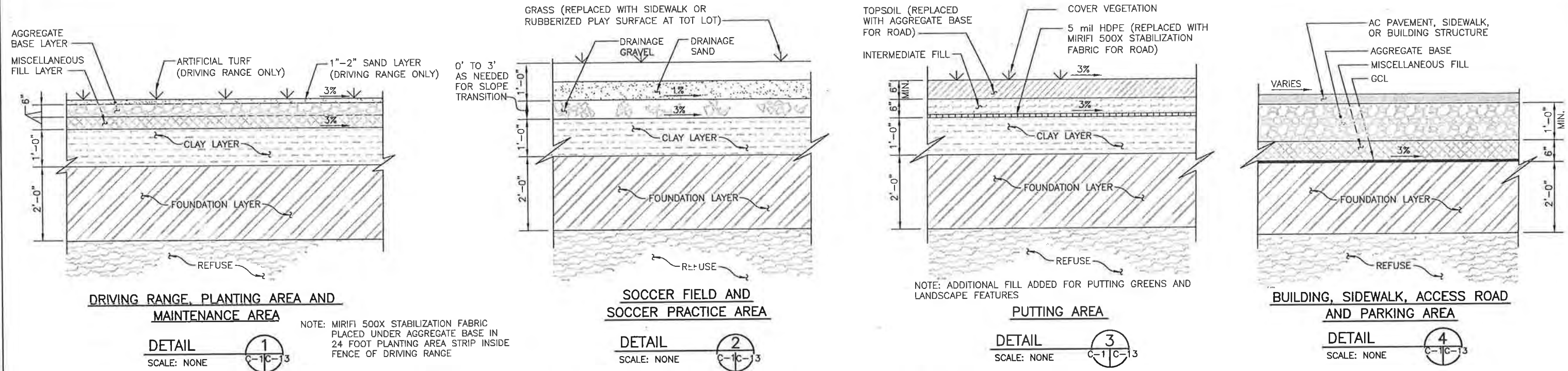


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Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS		REVISION
Burlingame, California		PROJECT 26811590
UTILITY EXTENT PLAN		DRAWING C-12
SHEET 5 OF 5		SHEET 14 OF 21



- NOTES:**
- 1. FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.
 - 2. FOUNDATION LAYER IS COMPACTED MISC. FILL AND MAY CONTAIN REFUSE.

FILE # 26811590
SCALE 1"=10'-0"

OPER. DATE 09/09/99
BML

PROJ. # 26811590
TASK # 30000
LOC. Burlingame Landfill

SEND TO PHONE 510.893.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISOR	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03

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CITY HALL - 501 FARMER ROAD
BURLINGAME, CALIFORNIA 94010

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Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3268

WARNING

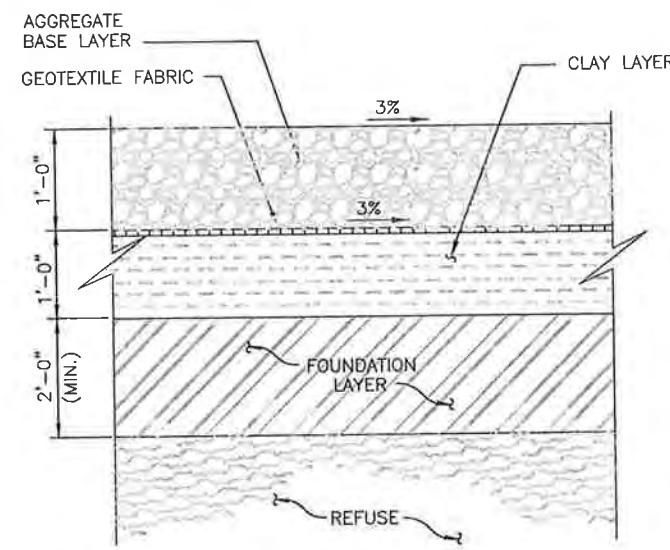
0 1 2

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

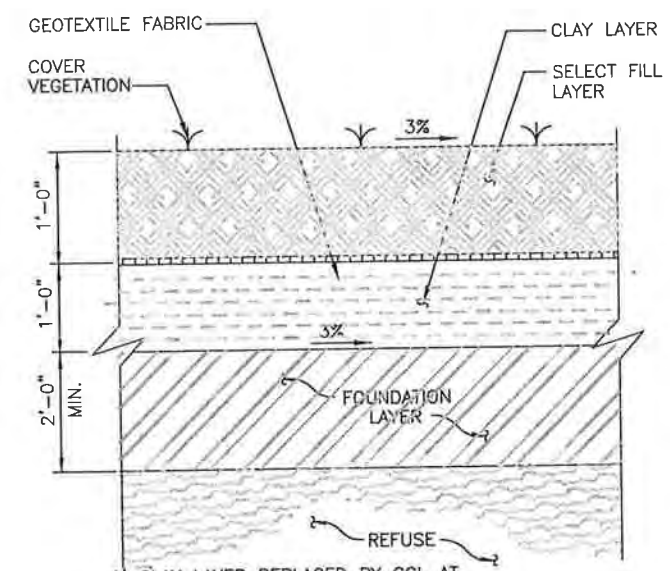
DESIGNED BML	LANDFILL CLOSURE -- RECORD DRAWINGS Burlingame, California	REVISION 0
DRAWN BML		PROJECT 26811590
CHECKED SKS		DRAWING C-13
PEER REVIEWED FJB		SHEET 15 OF 21
PROJECT MANAGER LJL		

DATE 12/05/03

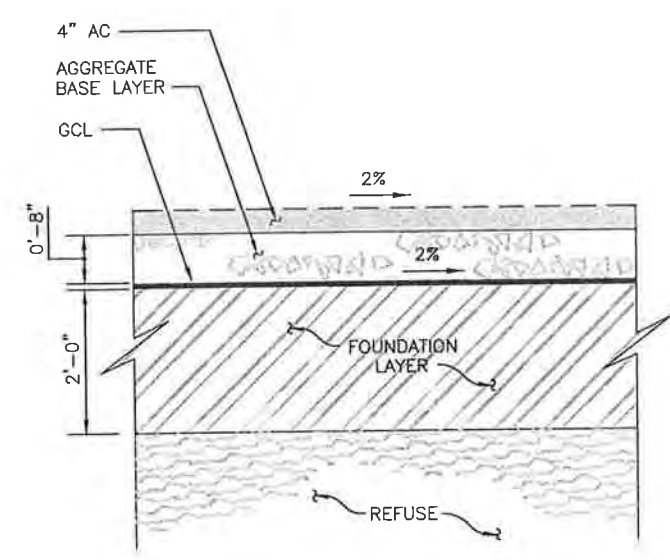
DATE 12/05/03



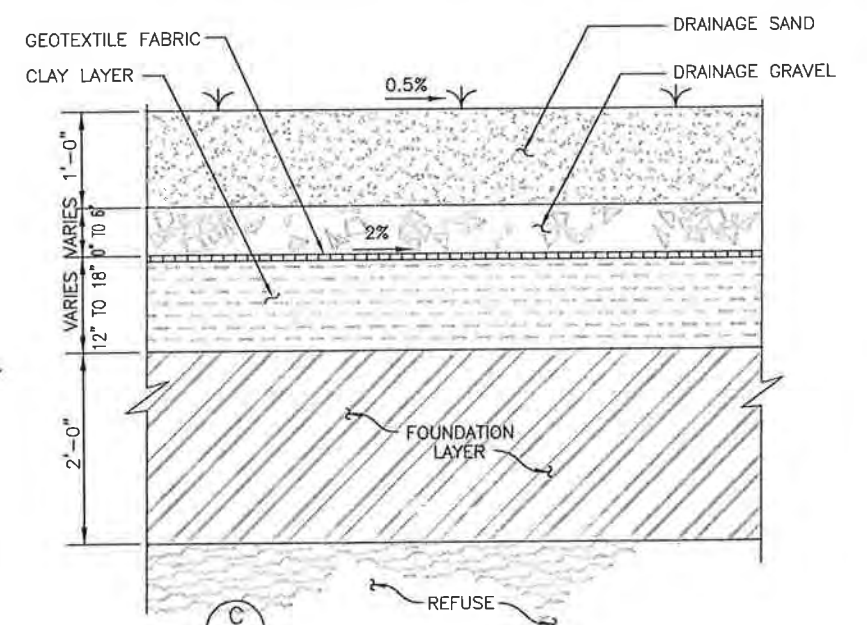
DOGRUN ROAD
DETAIL 8
SCALE: NONE



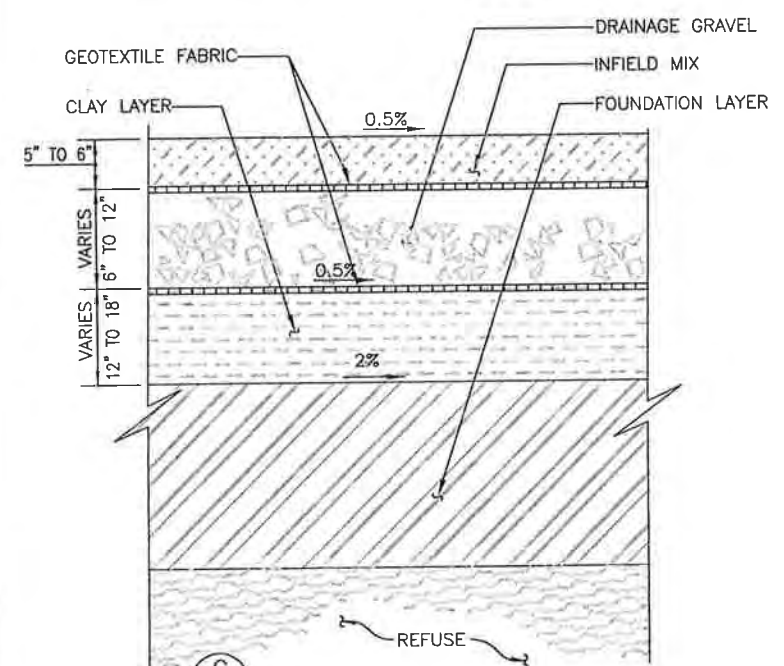
NOTE: 1" CLAY LAYER REPLACED BY GCL AT NORTH END. SEE DWG. C-2 FOR LOCATION
DOGRUN PLANTING AREA
DETAIL 8A
SCALE: NONE



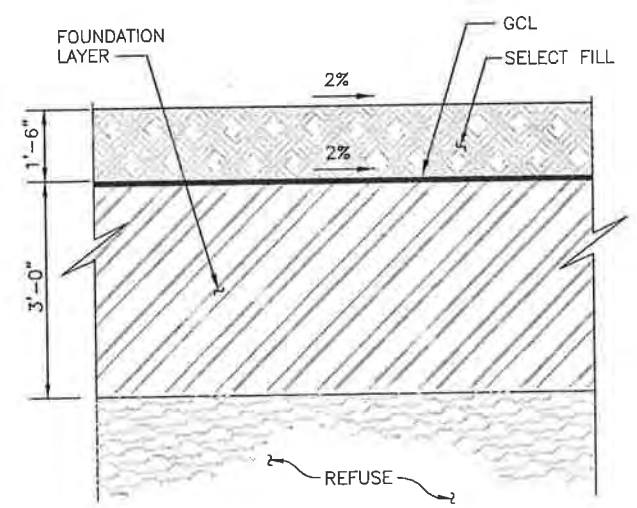
OUTFIELD ROAD AND LEFT FIELD PATH
DETAIL 9
SCALE: NONE



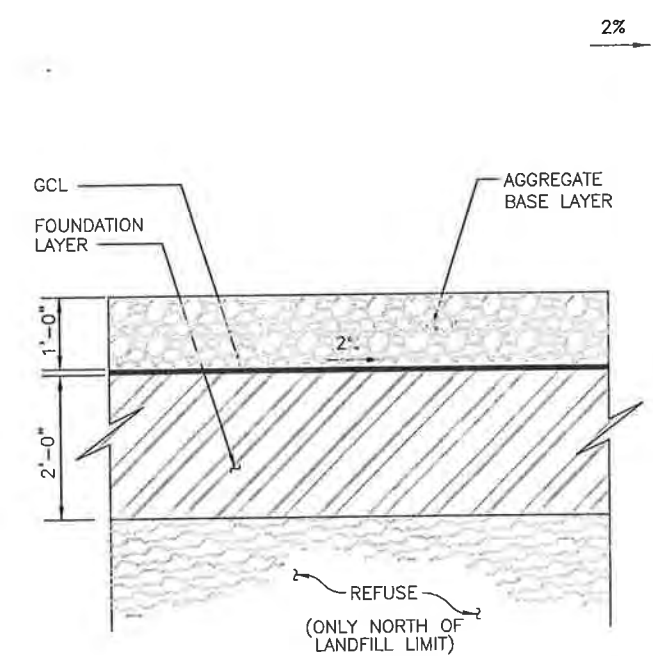
NOTE: SEE C-12C-15 FOR CLAY/DRAINAGE GRAVEL CONFIGURATION
OUTFIELD
DETAIL 10
SCALE: NONE



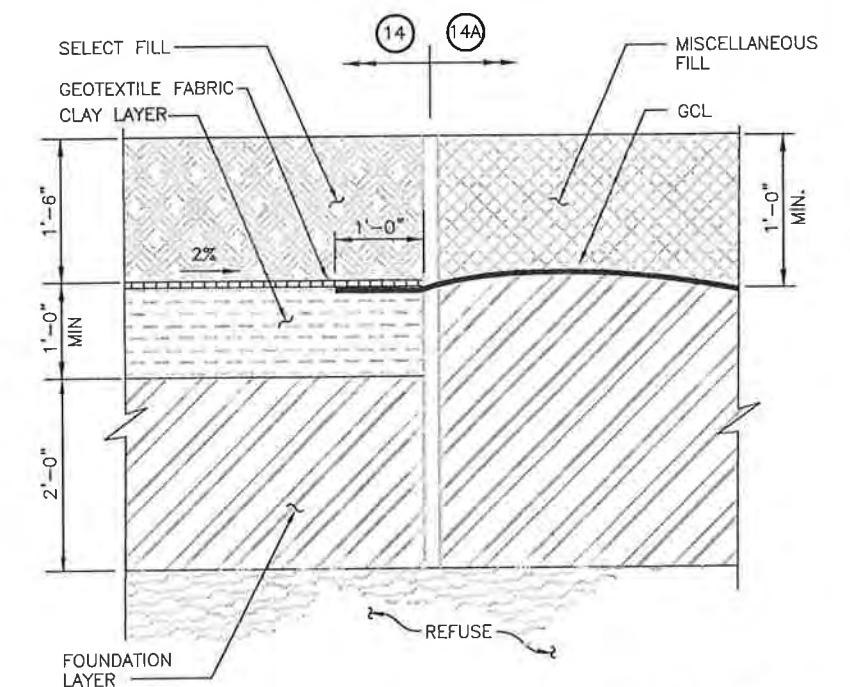
NOTE: SEE C-12C-15 FOR CLAY/DRAINAGE GRAVEL CONFIGURATION
INFIELD AND WARNING TRACK
DETAIL 11
SCALE: NONE



PLANTING AREA AT LEFT FIELD PATH
DETAIL 12
SCALE: NONE



MAINTENANCE ROAD
DETAIL 13
SCALE: NONE



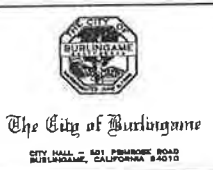
BALLFIELD PLANTING AREA
DETAIL 14 14A
SCALE: NONE

NOTES:
1. FOR LEGEND AND ABBREVIATIONS SEE SHEET G-2.
2. FOUNDATION LAYER IS COMPACTED MISC. FILL AND MAY CONTAIN REFUSE.

FILE # 11
SCALE 1/8" = 1'-0"

SEND TO	BURLINGAME	PHONE	510.893.3600
LOC.	Oakland	PROJ.	26811590
PROJ.	Burlingame Landfill	TASK	30000
OPER.	BML	DATE	08/09/99
DATE	08/09/99	DATE	08/09/99

REV	DESCRIPTION OF REVISION	REVIEWED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	12/05/03



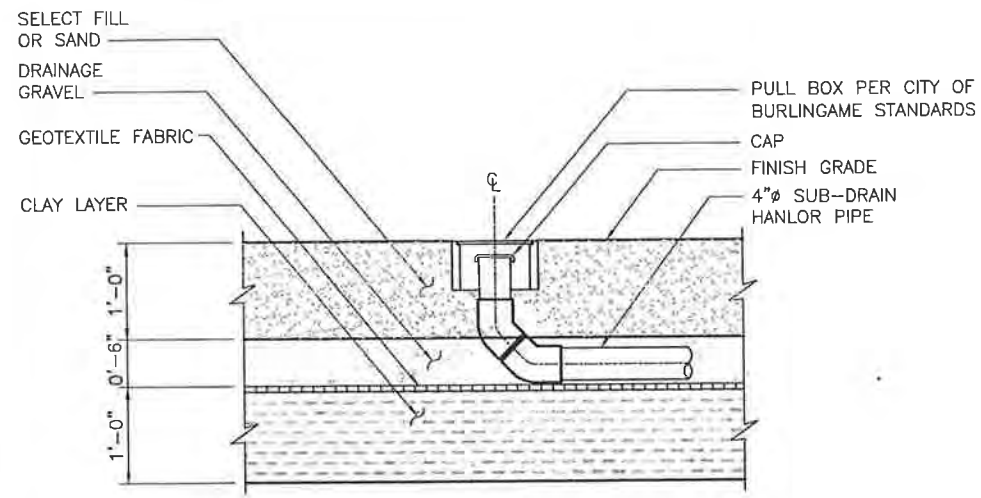
URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

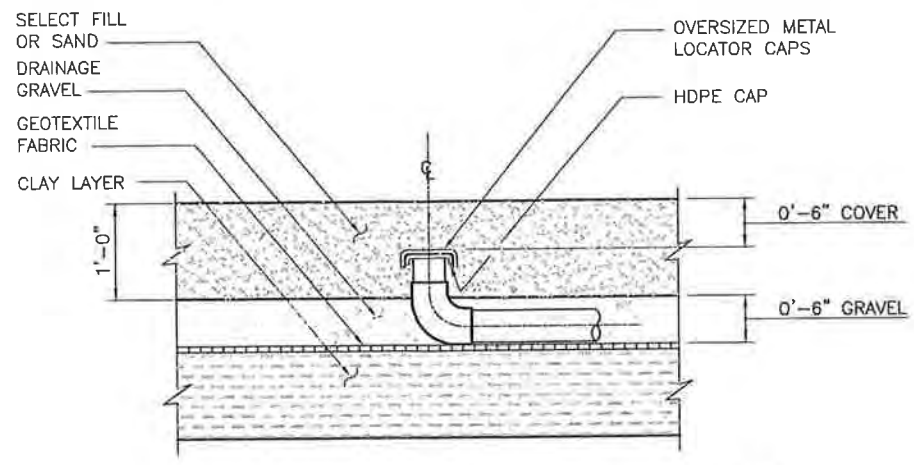
DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE -- RECORD DRAWINGS
Burlingame, California
CAP DETAILS
SHEET 2 OF 2

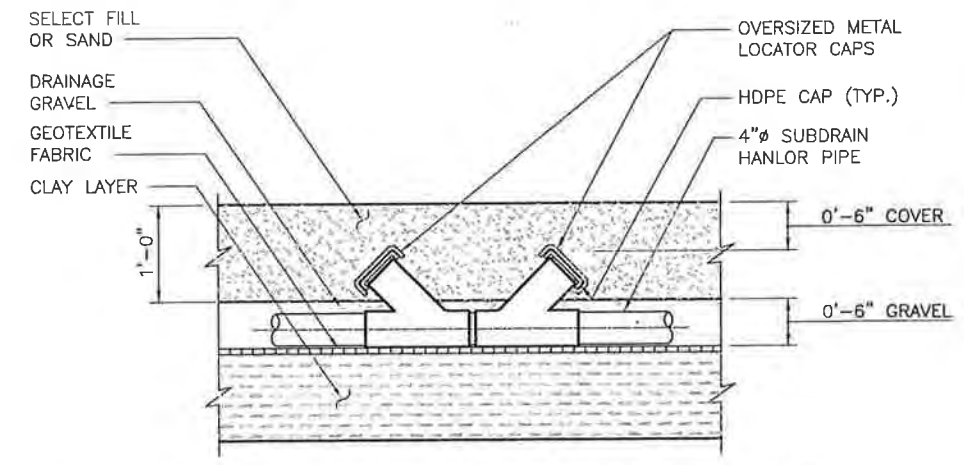
REVISION	0
PROJECT	26811590
DRAWING	C-14
SHEET	16 OF 21



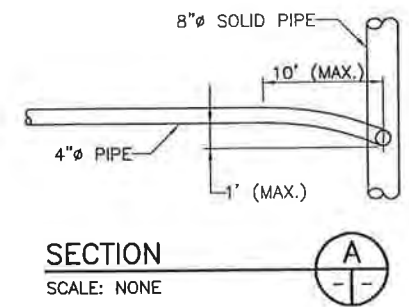
TYPE 1 CLEANOUT (AT GRADE)
SIMILAR TO TERMINAL RISER CALTRANS D87C
SCALE: 1" = 1'-0"



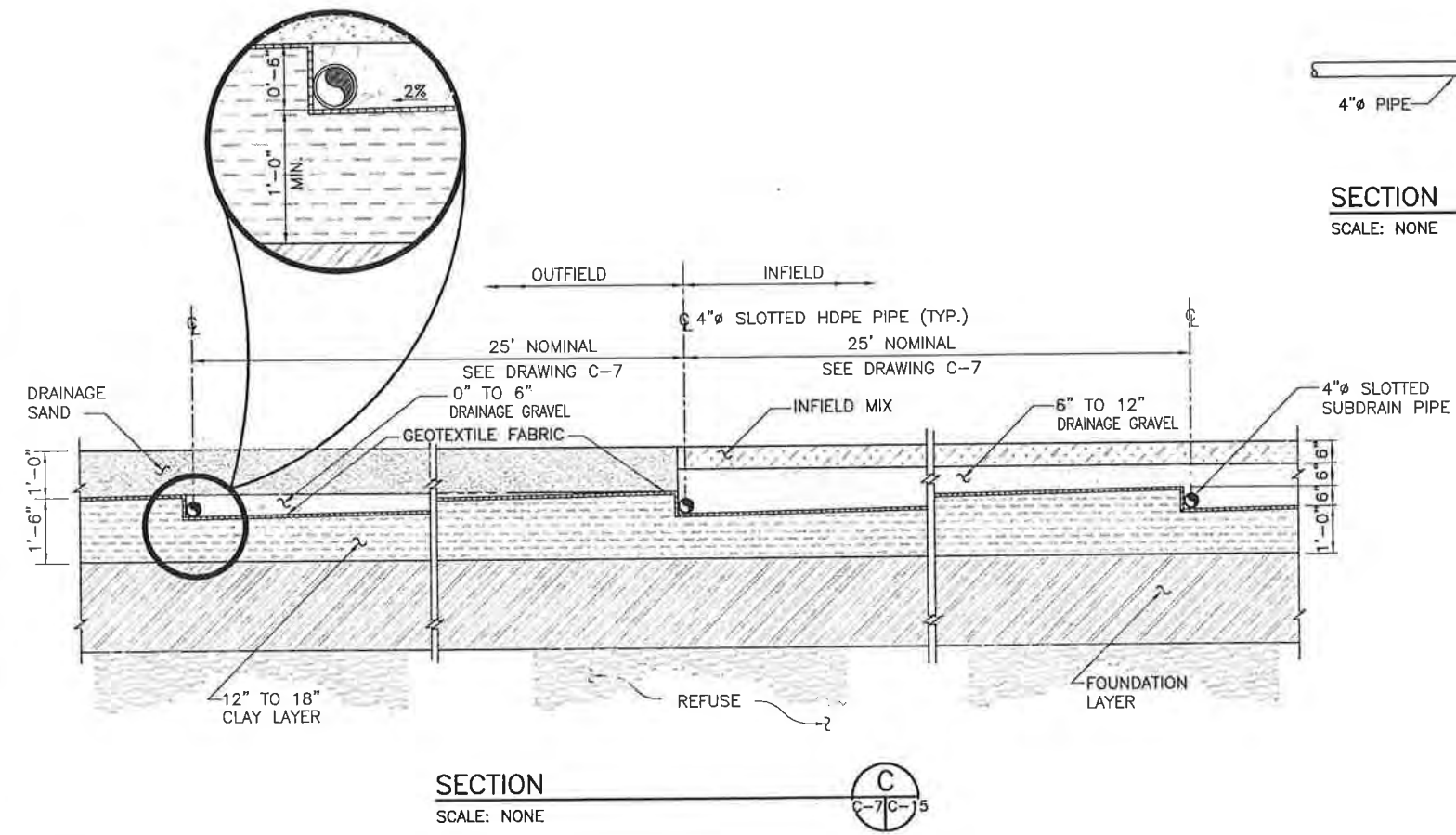
TYPE 2 CLEANOUT (BELOW GRADE)
SIMILAR TO TERMINAL RISER CALTRANS D87C
SCALE: 1" = 1'-0"



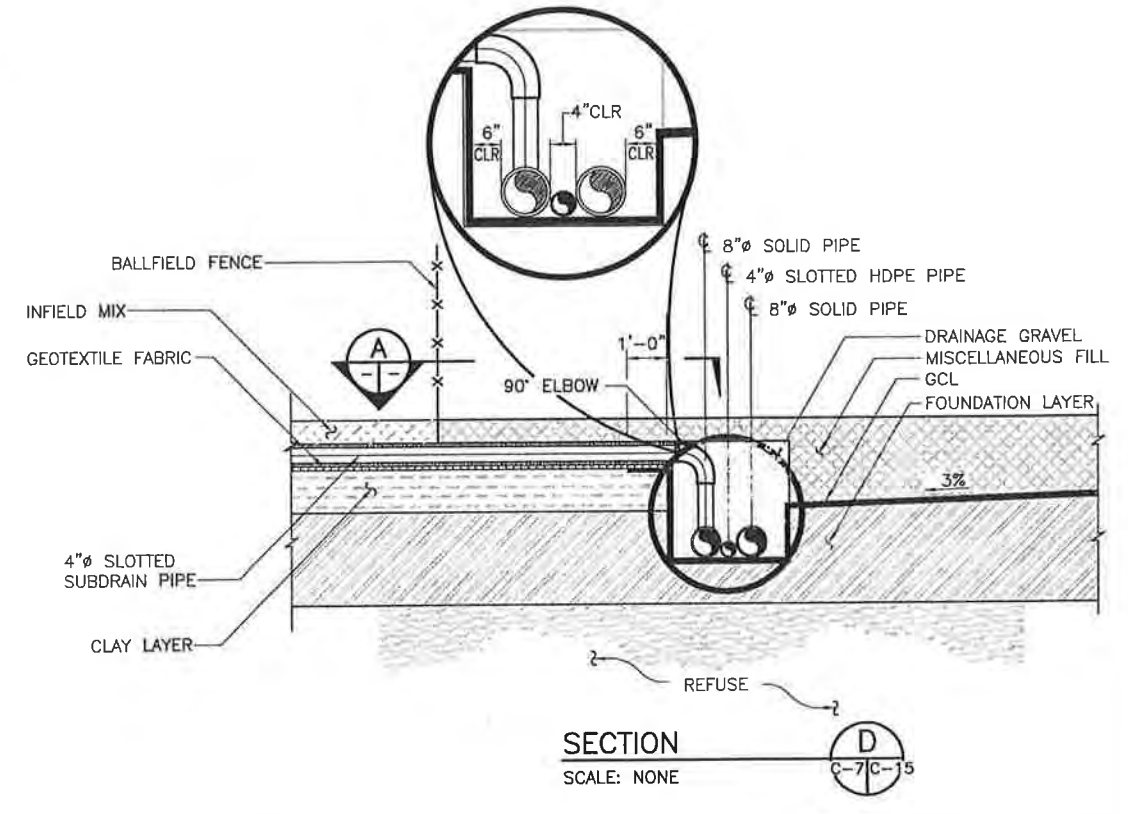
TYPE 3 CLEANOUT (BELOW GRADE)
SIMILAR TO 45' UNDERDRAIN RISER CALTRANS D87C
SCALE: 1" = 1'-0"



SECTION A
SCALE: NONE



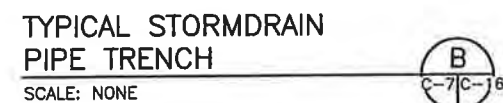
SECTION C
SCALE: NONE



SECTION D
SCALE: NONE

NOTE:
REFER TO SPECIFICATION SECTION 02200 FOR TEST FILL REQUIREMENTS

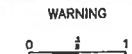
FILE / SCALE: 1/4" = 1'-0" OPER. DATE: 08/09/99 DESIGNED: BML DRAWN: BML CHECKED: SKS PEER REVIEWED: HJB PROJECT MANAGER: LJJL DATE: 12/05/03				LOC: Oakland PRG: Burlingame Landfill PROJ. / TASK: 26811590 / 3000 SEND TO PHONE: 510.893.3600				REV ISSUED FOR RECORD DESCRIPTION OF REVISION REVIEWED BY REVISOR DATE				THE CITY OF BURLINGAME 500 12th Street, Suite 200 Oakland, CA 94607-4014 Tel: (510) 893-3600 Fax: (510) 874-3268				WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE				DESIGNED: BML DRAWN: BML CHECKED: SKS PEER REVIEWED: HJB PROJECT MANAGER: LJJL DATE: 12/05/03				LANDFILL CLOSURE -- RECORD DRAWINGS Burlingame, California MISCELLANEOUS DETAILS SHEET 1 OF 3				REVISION 0 PROJECT: 26811590 DRAWING: C-15 SHEET 17 OF 21			
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△			
△	ISSUED FOR RECORD	LJL/SKS	BML 12/05/03
REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY DATE

**URS**

500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3288



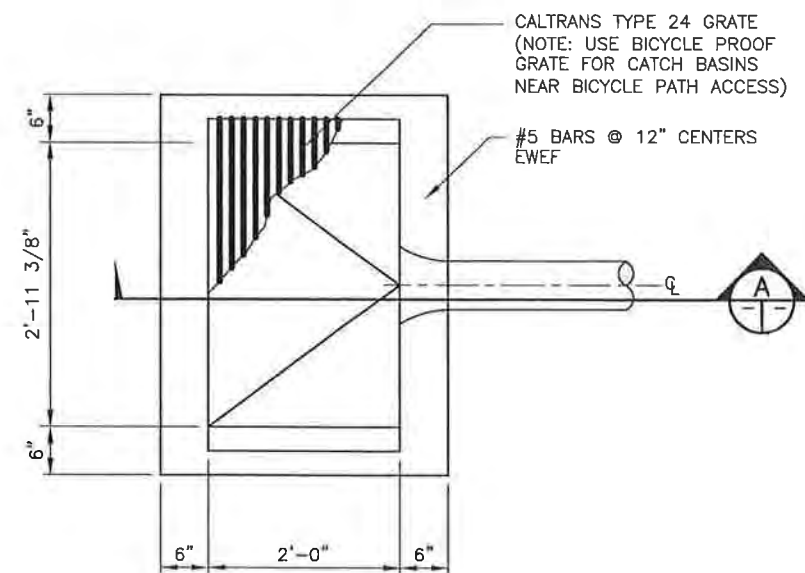
IF THIS BAR DOES
NOT MEASURE 1"
THEN DRAWING IS
NOT TO SCALE

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS
Burlingame, California

MISCELLANEOUS DETAILS
SHEET 2 OF 5

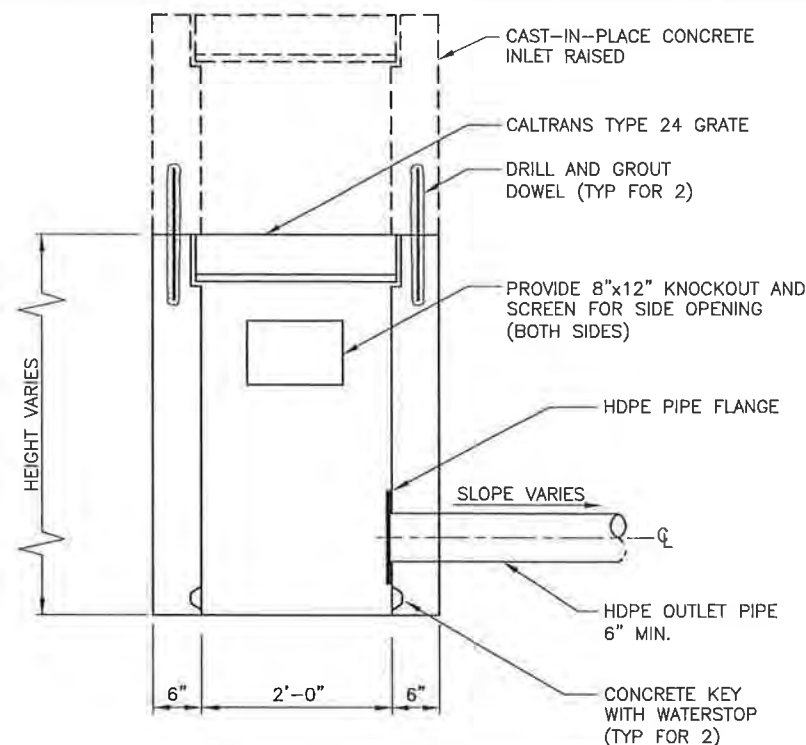
REVISION	
PROJECT	26811590
DRAWING	C-16
SHEET	18 OF 21



TYPICAL CATCH BASIN DETAIL -
CALTRANS TYPE "G1"

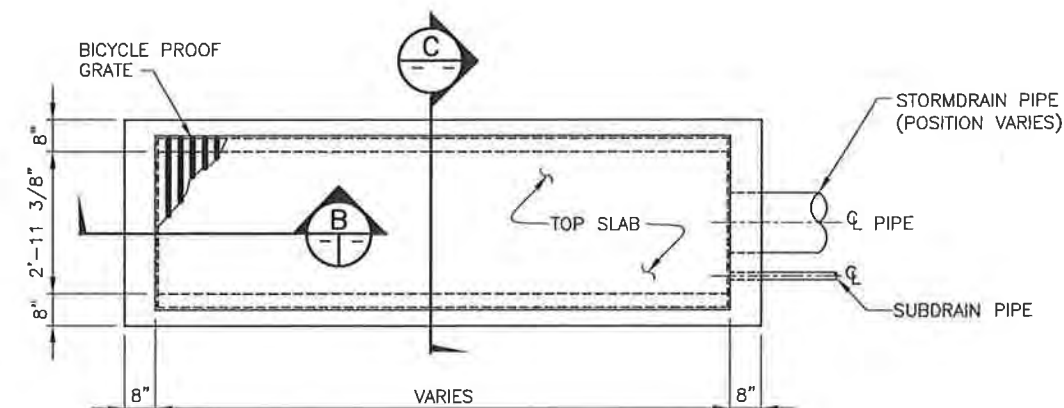
SCALE: NONE PLAN VIEW

18
C-7C-17



SECTION
SCALE: NONE

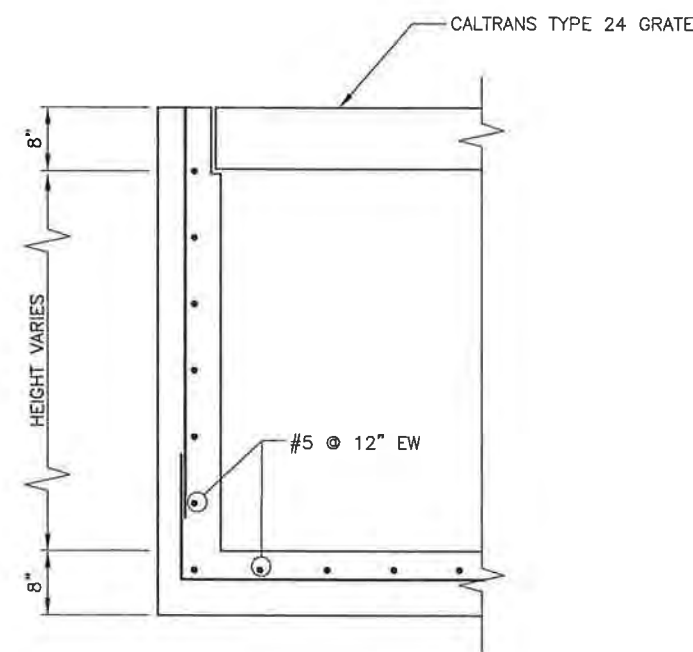
A
C-7C-17



TYPICAL OVERSIZE CATCH BASIN

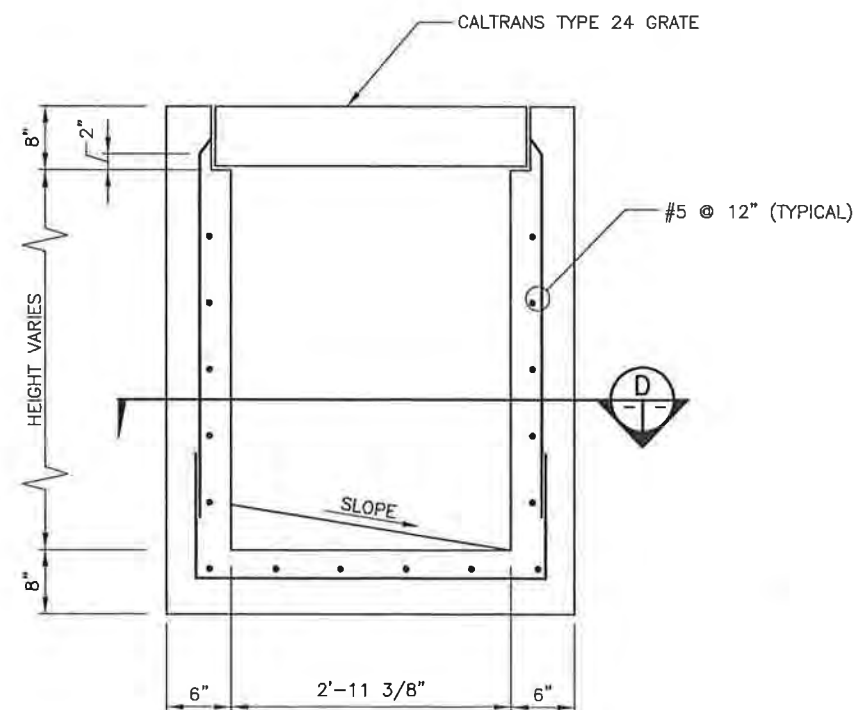
SCALE: NONE PLAN VIEW

19
C-7C-17



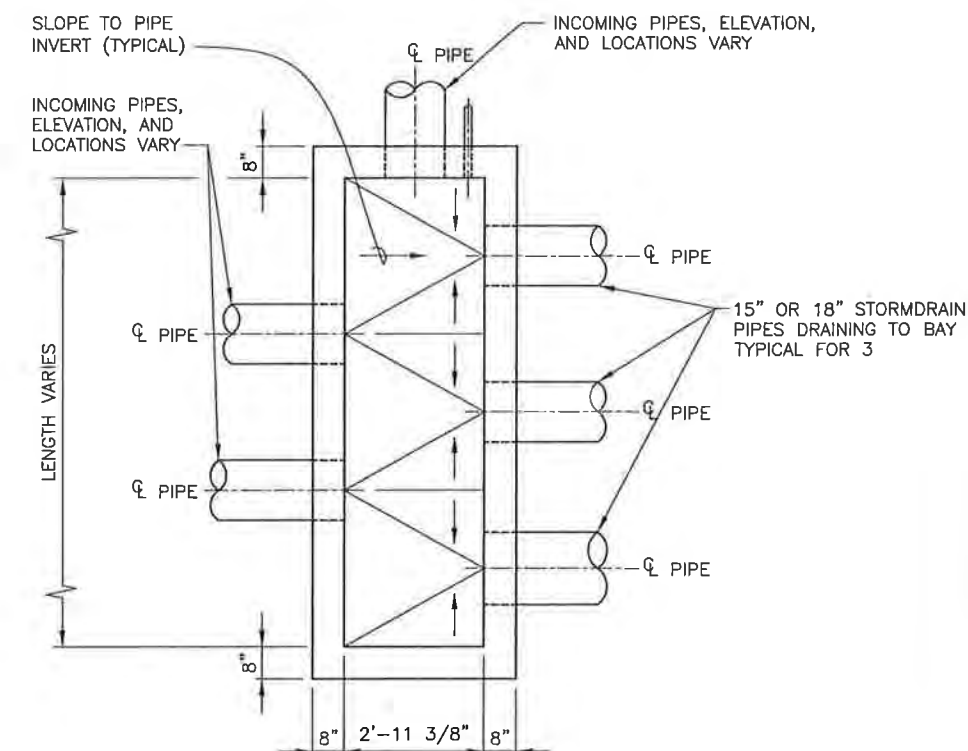
SECTION
SCALE: NONE

B
C-7C-17



SECTION
SCALE: NONE

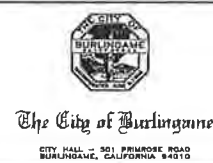
C
C-7C-17



SECTION
SCALE: NONE

D
C-7C-17

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISOR	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03



URS

500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel. (510) 893-3600
Fax: (510) 874-3268

WARNING
IF THIS BAR DOES
NOT MEASURE 1"
THEN DRAWING IS
NOT TO SCALE

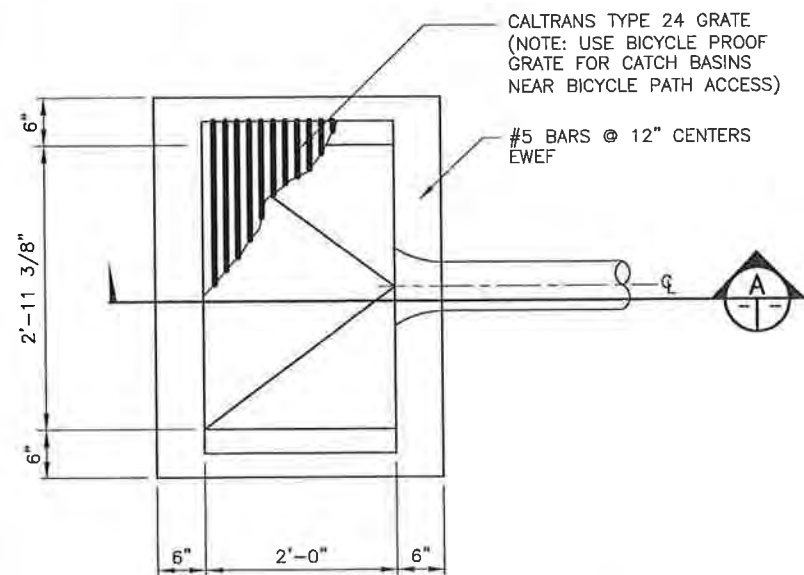
DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE - RECORD DRAWINGS

Burlingame, California

MISCELLANEOUS DETAILS
SHEET 3 OF 5

REVISION	0
PROJECT	26811590
DRAWING	C-17
SHEET	19 OF 21

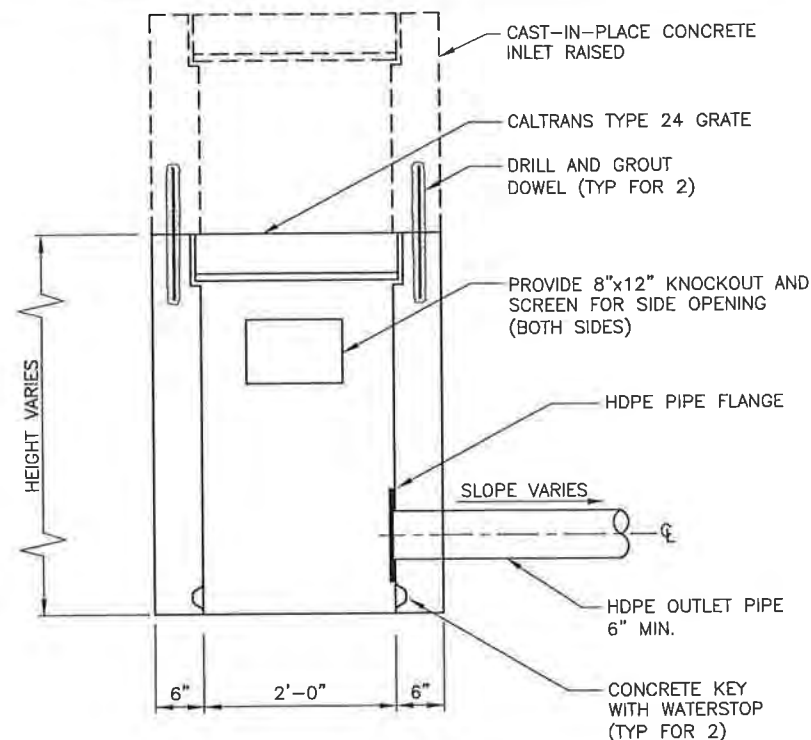


TYPICAL CATCH BASIN DETAIL -
CALTRANS TYPE "G1"

SCALE: NONE

PLAN VIEW

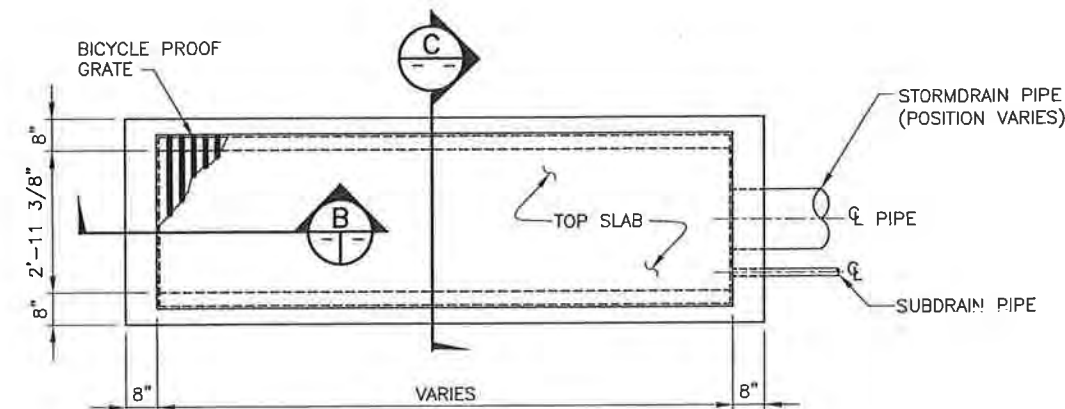
18
C-7C-17



SECTION

SCALE: NONE

A
T

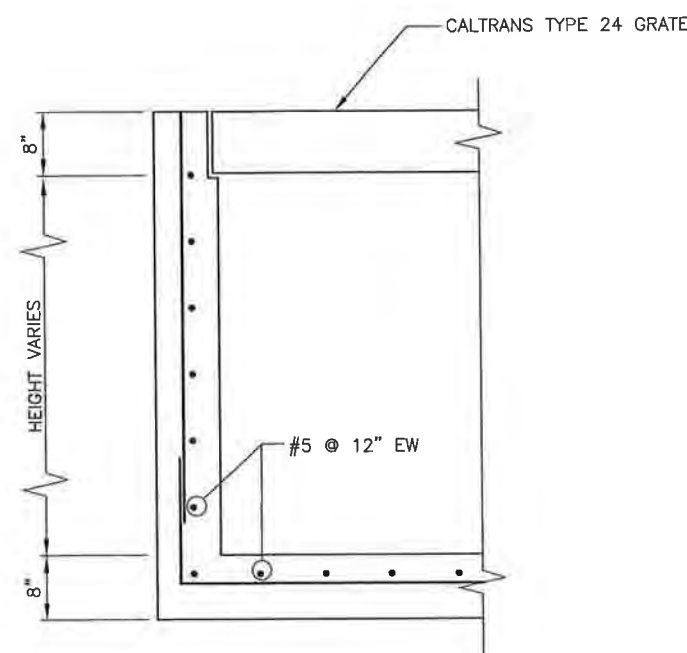


TYPICAL OVERSIZE CATCH BASIN

SCALE: NONE

PLAN VIEW

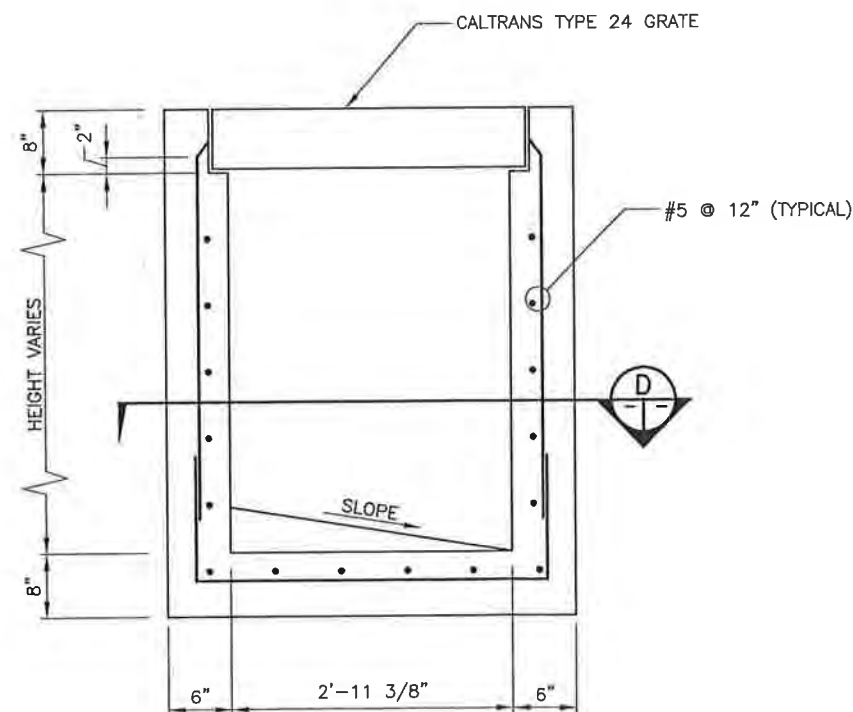
19
C-7C-17



SECTION

SCALE: NONE

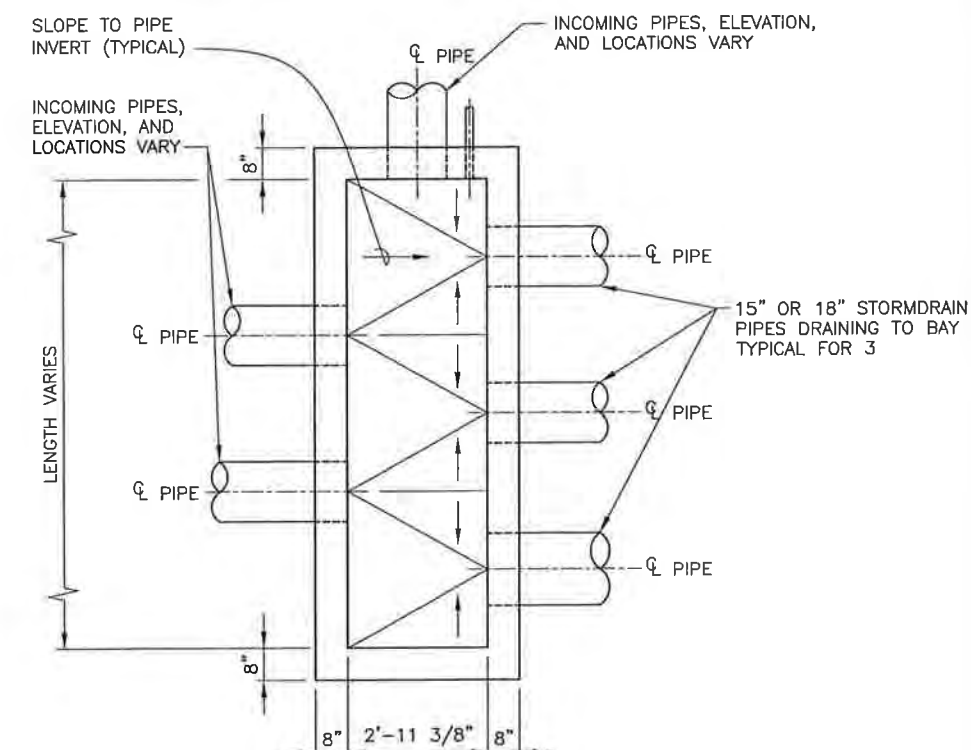
B
T



SECTION

SCALE: NONE

C
T



SECTION

SCALE: NONE

D
T

FILE # 11
SCALE 1/4"

DATE 09/09/99
OFFER 09/09/99
TASK 30000
PROJ. 26811590
LOC. Burlingame Landfill
SEND TO 510.891.3600
PHONE 510.891.3600

REV	DESCRIPTION OF REVISION	REVIEWED BY	REVISED BY	DATE
1	ISSUED FOR RECORD	LJL/SKS	BML	12/05/03

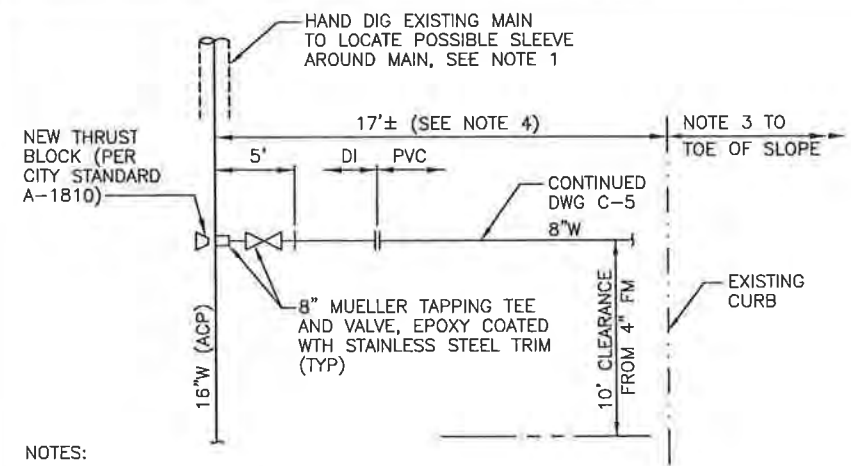


URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3268

DESIGNED	BML
DRAWN	BML
CHECKED	SKS
PEER REVIEWED	HJB
PROJECT MANAGER	LJL
DATE	12/05/03

LANDFILL CLOSURE -- RECORD DRAWINGS
Burlingame, California
MISCELLANEOUS DETAILS
SHEET 3 OF 5

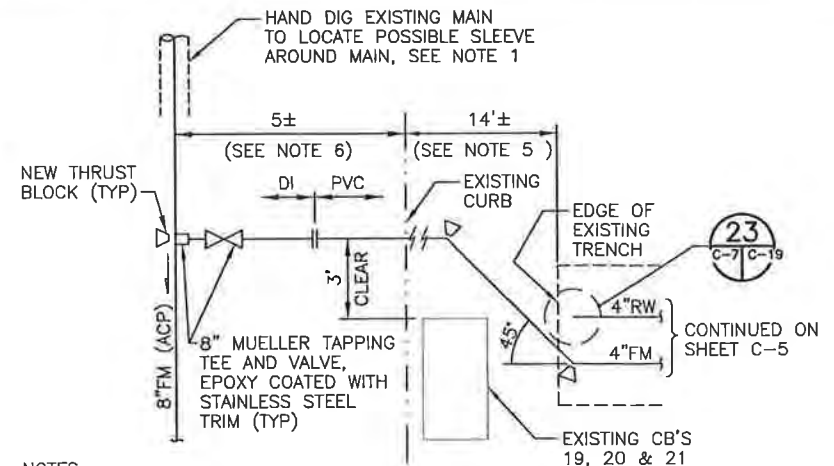
REVISION	PROJECT	DRAWING
0	26811590	C-17
		SHEET 19 OF 21



- NOTES:
1. RESTORE AIRPORT BLVD PER CITY STANDARD A-2608.
 2. REPAIR EXISTING TRACER WIRE OVER 16" WATER MAIN. PLACE NEW WIRE ALONG BOTH 4" AND 8" PIPES. CONNECT ALL WIRES TO VALVE BOX.
 3. LINED TRENCH SIMILAR TO DETAIL 15.
 4. TRENCH PER CITY STANDARD A-2608.

CONNECTION TO EXISTING WATER MAIN

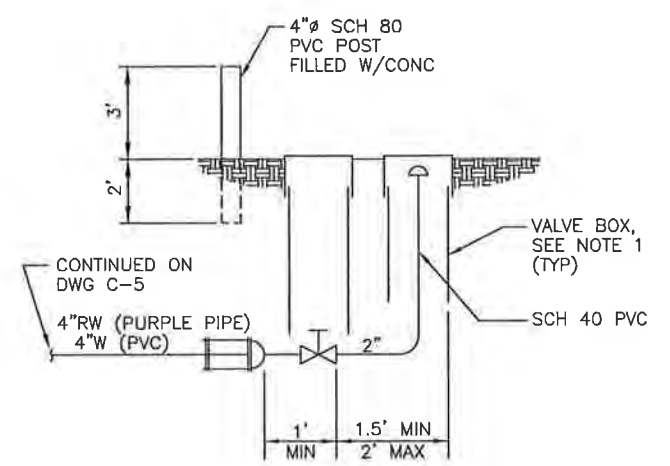
DETAIL 21
SCALE: NONE
C-7/C-19



- NOTES:
1. RESTORE AIRPORT BLVD PER CITY STANDARD A-2608.
 2. CONTRACTOR SHALL INFORM CITY OF BURLINGAME SEWER DEPARTMENT 48 HOURS PRIOR TO TAPPING EXISTING MAIN.
 3. REPAIR EXISTING TRACER WIRE OVER 8" FORCE MAIN. PLACE NEW WIRE ALONG BOTH 4" PIPES. CONNECT ALL WIRES TO VALVE BOX.
 4. WILL REQUIRE EXTENSION OF EXISTING LINED TRENCH.
 5. LINED TRENCH SIMILAR TO DETAIL 15.
 6. TRENCH PER CITY STANDARD A-2608.
 7. THRUST BLOCKS PER CITY STANDARD A-1810.

CONNECTION TO EXISTING FORCE MAIN

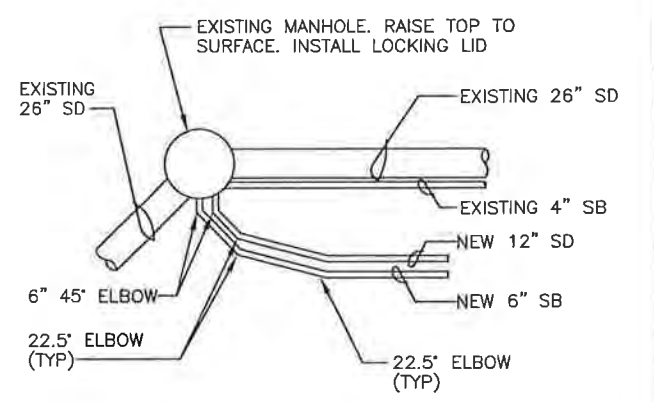
DETAIL 22
SCALE: NONE
C-7/C-19



- NOTES:
1. ALL WORK PER CITY STANDARDS A-1111.
 2. RW MID-LINE BLOWOFF SIMILAR DETAIL.
 3. COVERS MARKED "WATER" AND "RECLAIMED WATER" AS APPROPRIATE.

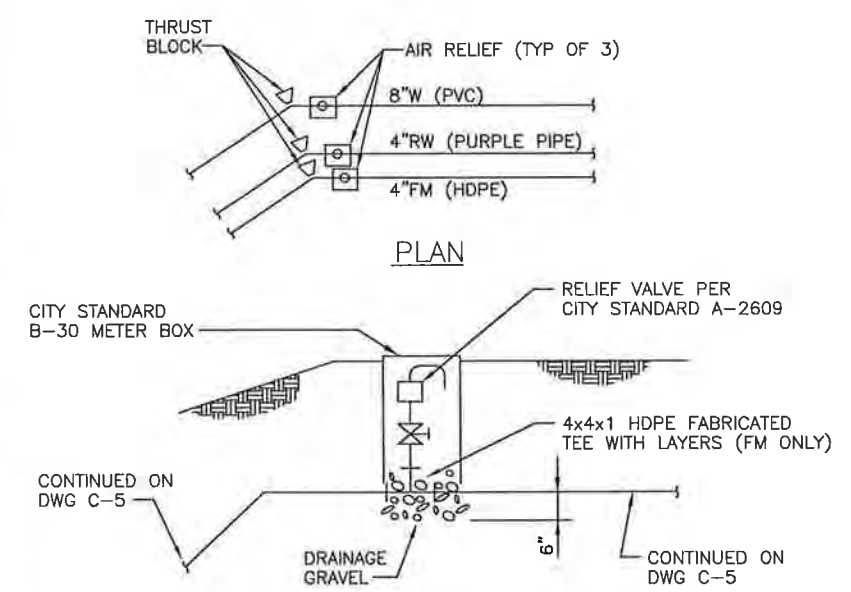
RECLAIMED WATER AND WATER BLOWOFF

DETAIL 23
SCALE: NONE
C-7/C-19



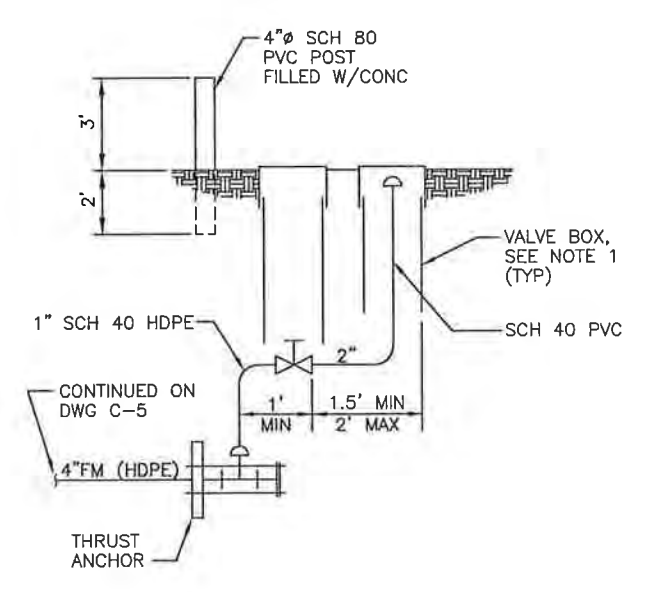
SUBDRAIN CONNECTION

DETAIL 24
SCALE: NONE
C-7/C-19



- NOTES:
1. FOR FORCE MAIN SERVICE, INSTALL AIR RELIEF VALVE MANUFACTURED FOR SEWER SERVICE.
 2. PER CITY STANDARD A-1810 FOR THRUST BLOCKS.
 3. ALL FITTINGS EPOXY COATED WITH STAINLESS STEEL TRIM. SEE SPECIFICATIONS.

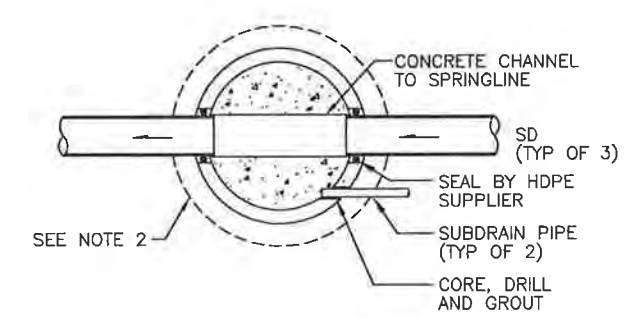
DETAIL 25
SCALE: NONE
C-7/C-19



- NOTES:
1. VALVE BOX COVER TO BE MARKED WITH THE WORD "SEWER".
 2. FITTING PER CITY STANDARD A-1111 EXCEPT AS NOTED.

FORCEMAIN BLOWOFF

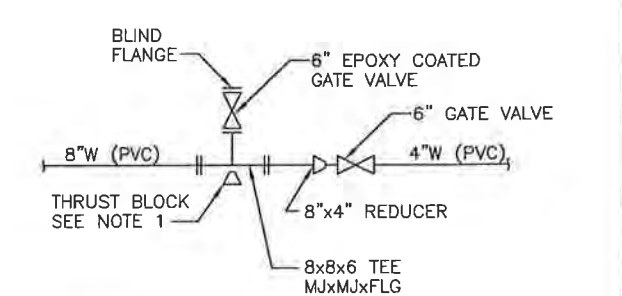
DETAIL 26
SCALE: NONE
C-7/C-19



- NOTES:
1. 96" ID PRECAST CONCRETE MANHOLE WITH TOP SLAB (WITH 36" DIAMETER OPENING)
 2. CAST IN PLACE 8 INCH BASE SLAB, REINFORCED WITH 6x6 WWF. SET ON 6 INCH DRAINAGE GRAVEL.

MANHOLE

DETAIL 27
SCALE: NONE
C-7/C-19



FIRE HYDRANT CONNECTION

DETAIL 28
SCALE: NONE
C-7/C-19

FILE # 26811590
SCALE 1/8" = 1'-0"

LOC. Burlingame Landfill
PROJ. Burlingame Landfill
DATE 08/05/99
REV. 1

DESIGNED BML
DRAWN BML
CHECKED SKS
PEER REVIEWED HJB
PROJECT MANAGER LIL
DATE 12/05/03

ISSUED FOR RECORD
REVIEWED BY LIL/SKS
REVISOR BML
DATE 12/05/03

DESCRIPTION OF REVISION

REVISION

REVISION

REVISION

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REVISION



The City of Burlingame
CITY HALL - 501 PIERCE ROAD
BURLINGAME, CALIFORNIA 94010



500 12th Street, Suite 200
Oakland, CA 94607-4014
Tel: (510) 893-3600
Fax: (510) 874-3288

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED BML
DRAWN BML
CHECKED SKS
PEER REVIEWED HJB
PROJECT MANAGER LIL
DATE 12/05/03

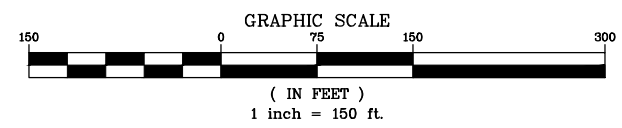
LANDFILL CLOSURE - RECORD DRAWINGS

Burlingame, California

MISCELLANEOUS DETAILS
SHEET 5 OF 5

REVISION
PROJECT 26811590
DRAWING C-19
SHEET 21 OF 21

Appendix B
MARCH 2017 ARCO/MURRAY CONCEPT PLAN



SITE AREA = 653,694 SF (15.01 ACRES)

SOCCER FIELD AREA = 199,201 SF (4.57 ACRES)

TOPGOLF

STANDARD PARKING = 783 SPACES

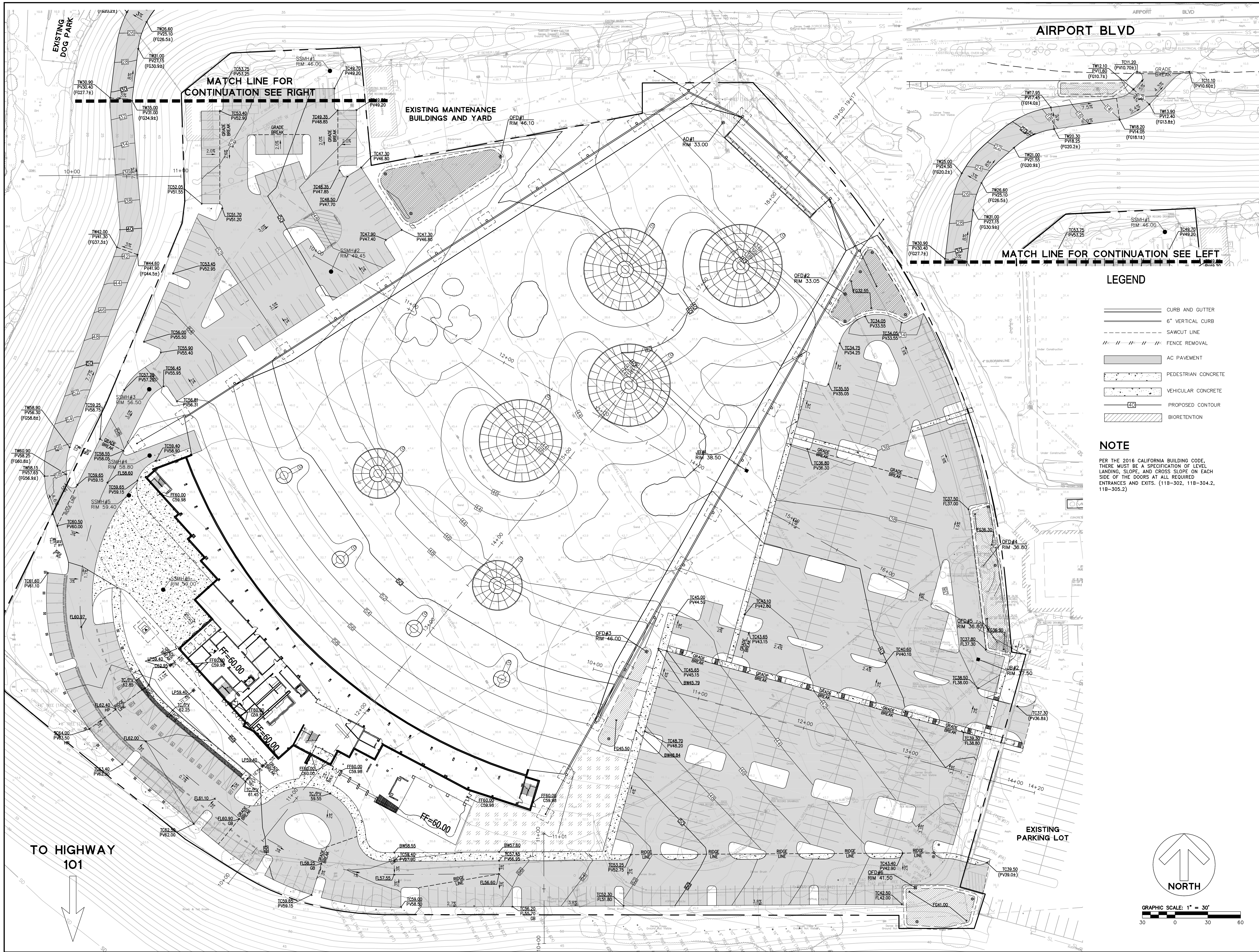
ACCESSIBLE PARKING = 16 SPACES

TOTAL PARKING PROVIDED = 799 SPACES

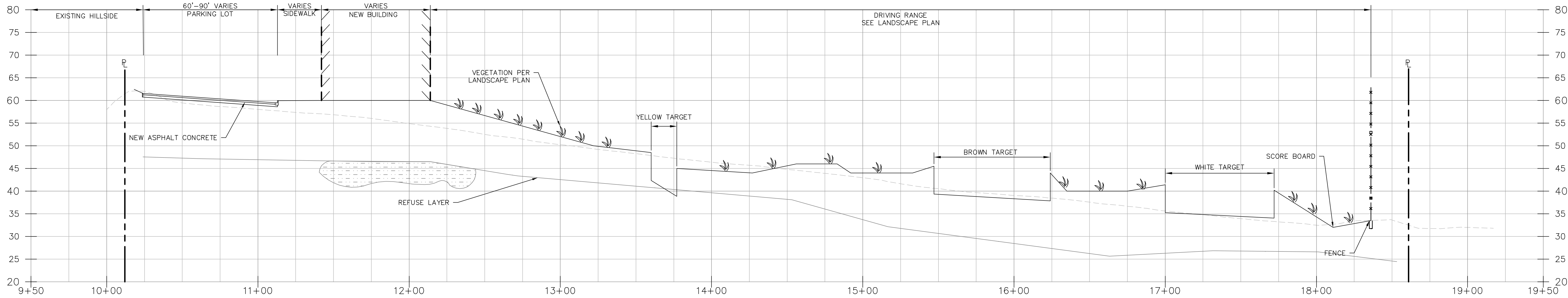


TOPGOLF - BURLINGAME			
BURLINGAME, CALIFORNIA			
CONCEPT PLAN			
DRAWN BY:	DATE:	SCALE:	
DEM3	3/15/17	1"=150'	

Appendix C
AUGUST 2018 CONCEPTUAL GRADING AND DRAINAGE PLAN, CROSS SECTIONS,
AND CONCEPTUAL EARTHWORK PLAN

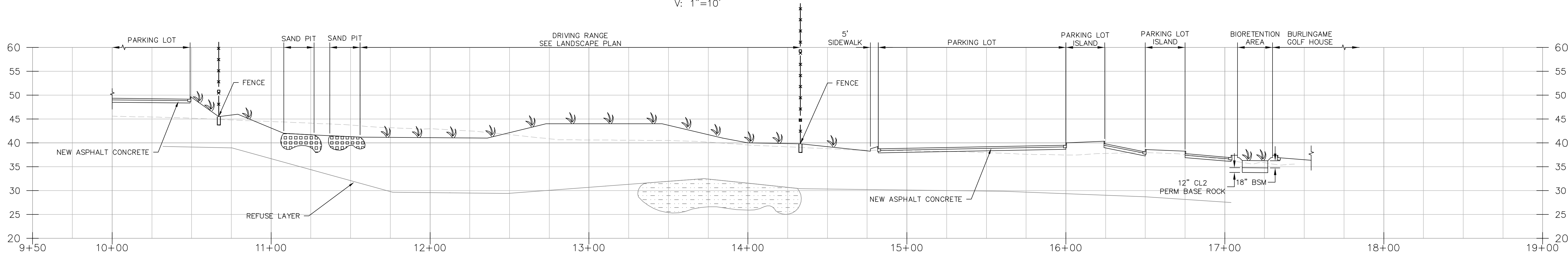


DRAWING NAME: \\BKF-SJ\4\2018\180968_TG_Bur1\ingame\ENG\PLANNING\C3-GRAD.dwg
PLOT DATE: 10-26-18
PLOTTER BY: chou



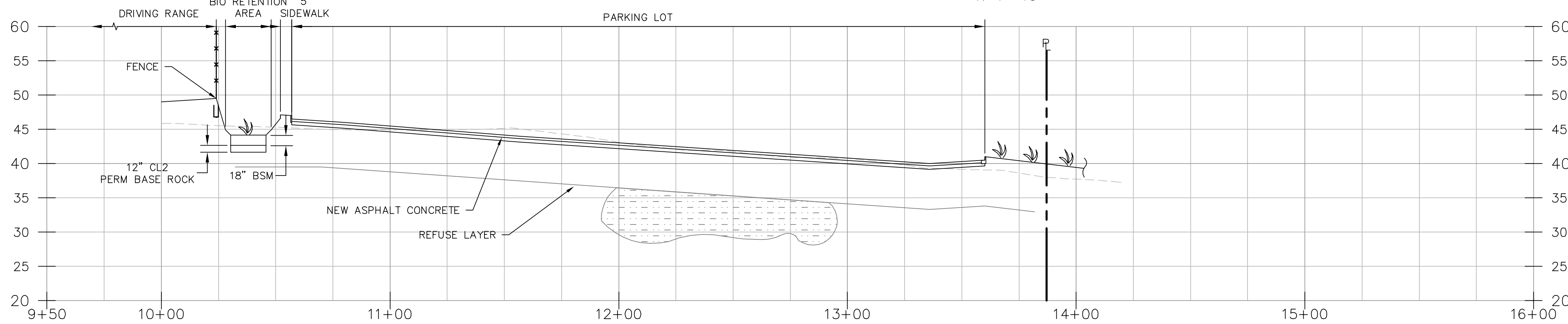
SECTION A-A

SCALE
H: 1"=30'
V: 1"=10'



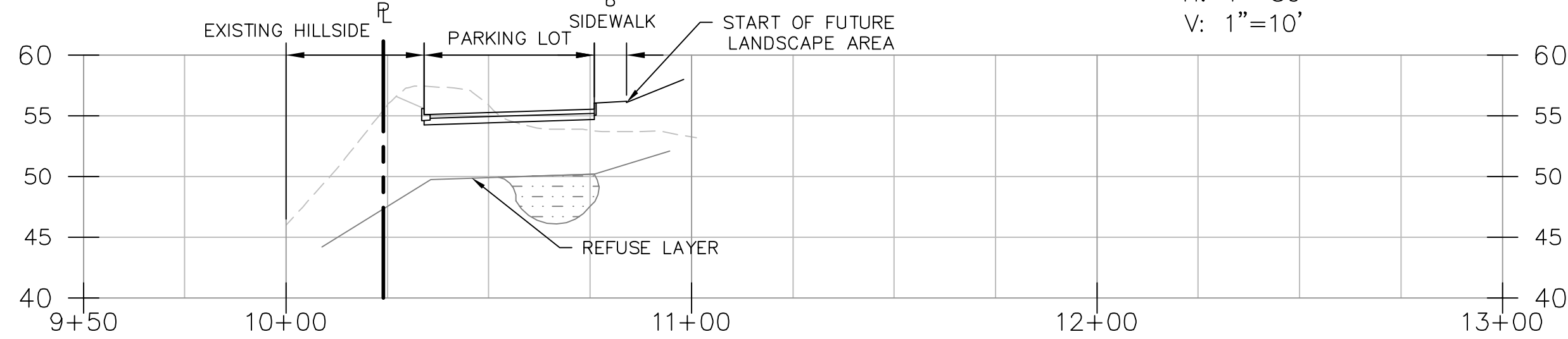
SECTION B-B

SCALE
H: 1"=30'
V: 1"=10'



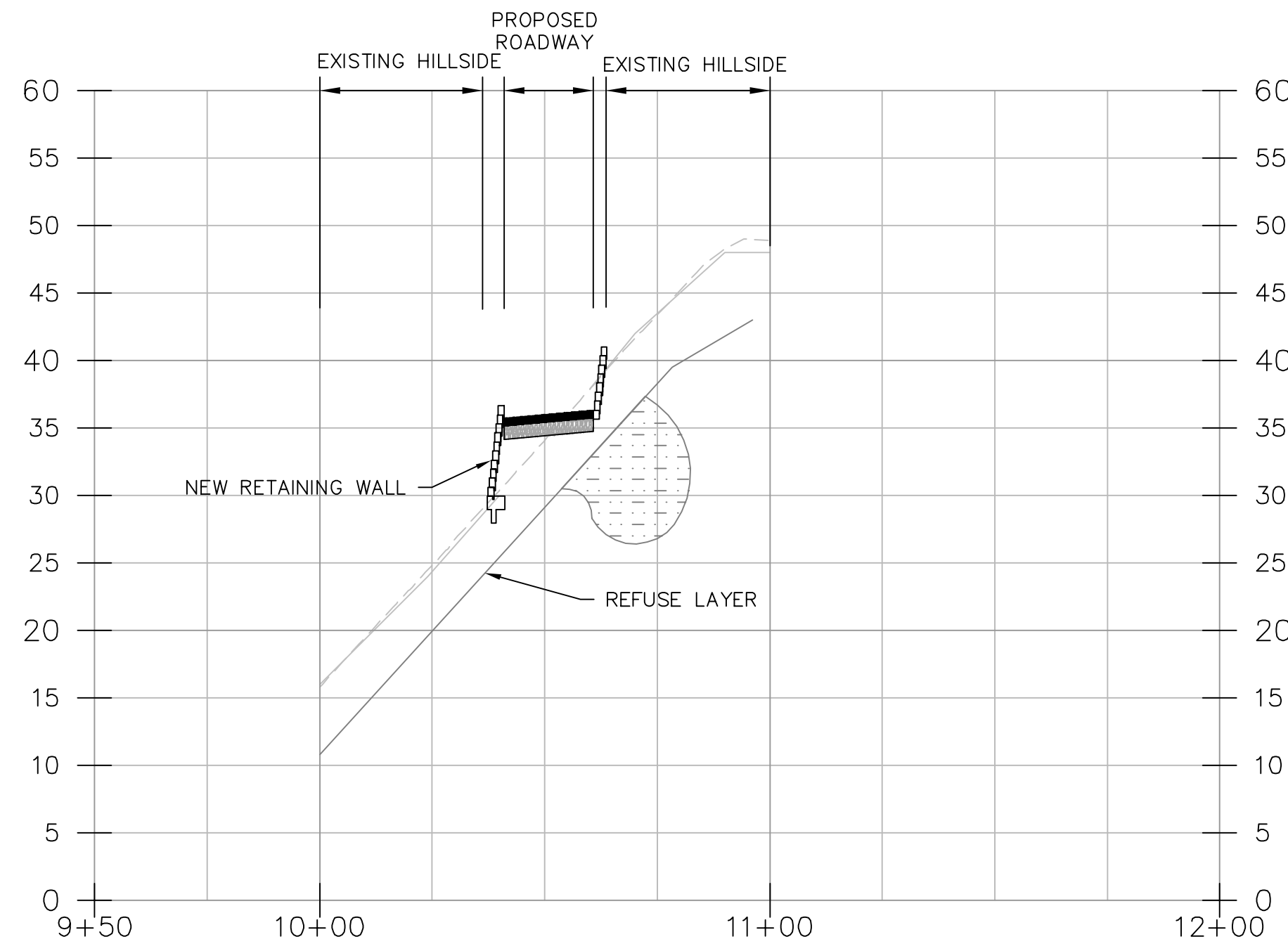
SECTION C-C

SCALE
H: 1"=30'
V: 1"=10'



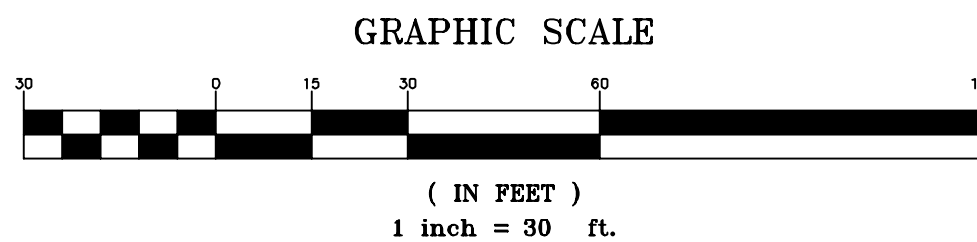
SECTION E-E

SCALE
H: 1"=30'
V: 1"=10'



SECTION D-D

SCALE
H: 1"=30'
V: 1"=10'



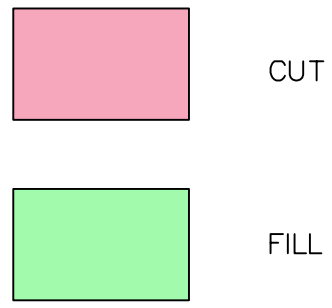
Date	No.	Revisions
09/03/18		
Scale AS SHOWN		
Design FCG		
Drawn FCG		
Approved FCG		
Job No. 20180968		
Drawing Number:		
C2.2		
5 OF 10		

DRAWING NAME: \\BKF-SJA\vol14\2018\180968.TG.Bur1\Ingame\ENVO\PLANNING\3.1-CUT/FILL.dwg
PLOT DATE: 10-26-18
PLOT BY: chou



TO HIGHWAY
101

LEGEND



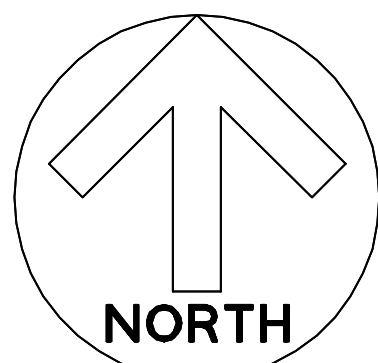
CUT/FILL SUMMARY

SECTION	CUT (CU.YD.)	FILL (CU.YD.)
DRIVING RANGE	5,422.10	15,791.05 FOAM*
BUILDING, LANDSCAPE, PARKING	4,409.44	14,789.64
TOTAL	9,831.54	30,580.69

MAX CUT: 4.3'
MAX FILL: 9.0'

ASSUMPTIONS

1. EARTHWORK NUMBERS DOES NOT FACTOR IN ANY SHRINKAGE ADJUSTMENTS.
2. EARTHWORK NUMBERS ARE SHOWN FOR PLANNING PURPOSES ONLY.
3. IT IS ASSUMED THAT THE SITE IS PRIMARILY LANDSCAPING.
4. IT IS ASSUMED THAT THE NEW ROADWAY SECTION WILL BE 4" ASPHALT CONCRETE AND 8" OF AGGREGATE BASE.



GRAPHIC SCALE: 1" = 30'
30 0 30 60

TOPGOLF BURLINGAME
250 ANZA BOULEVARD
CONCEPTUAL EARTHWORK CUT FILL PLAN
BURLINGAME
COUNTY OF SAN MATEO
CALIFORNIA

Date	No.	Revisions
09/03/18		
Scale AS SHOWN		
Design FCG		
Drawn FCG		
Approved FCG		
Job No. 20180868		
Drawing Number:		

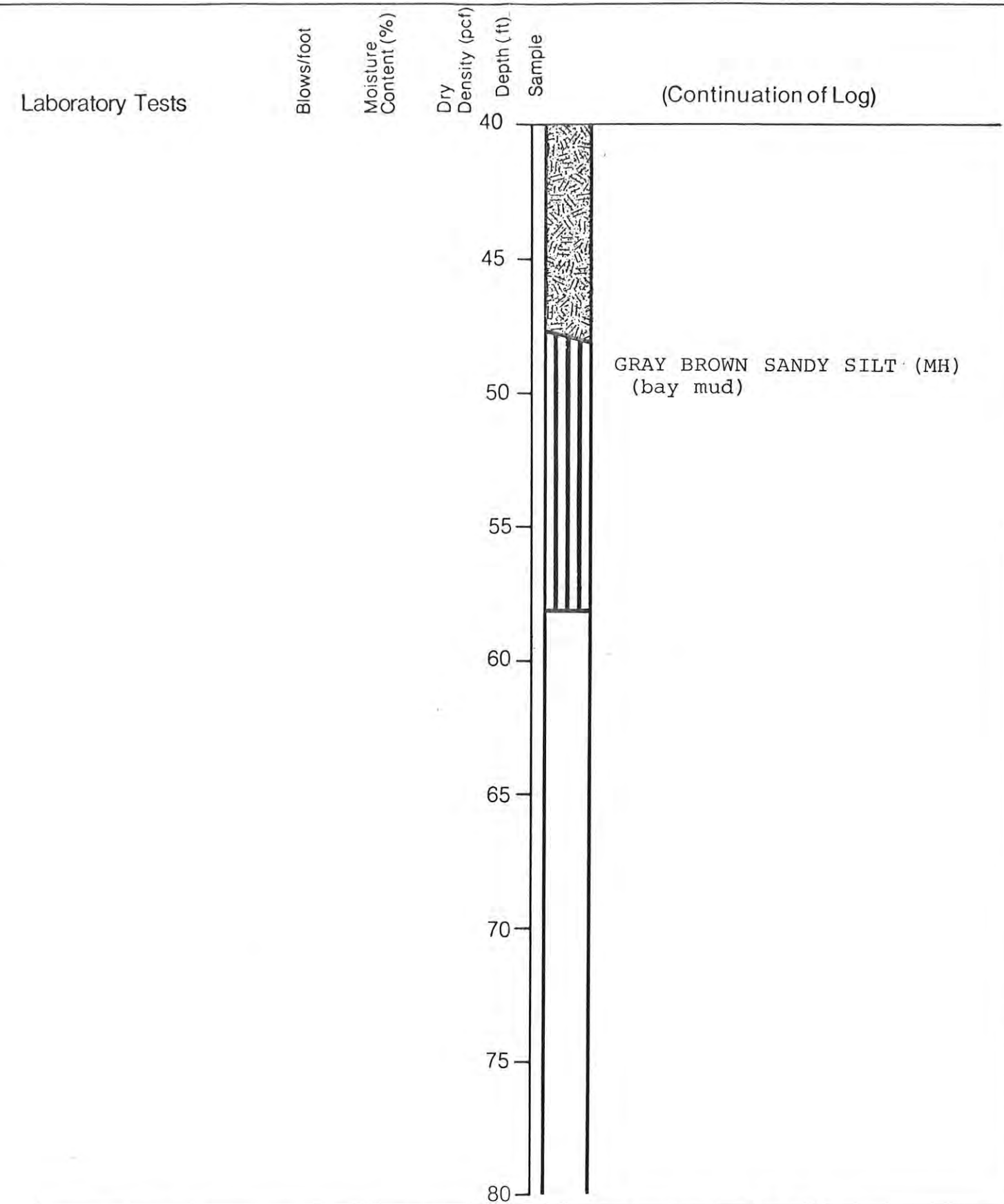
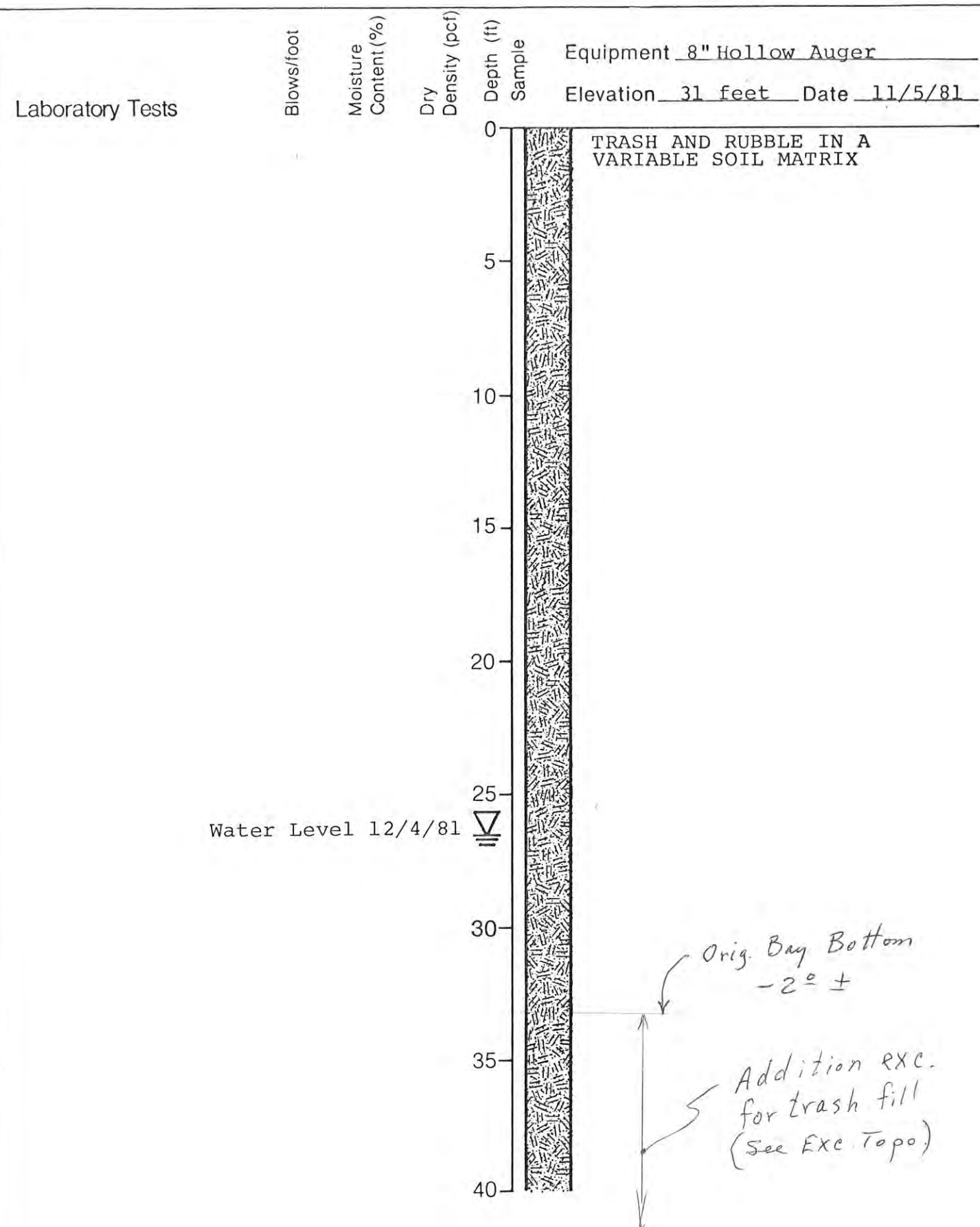
C3.1
7 OF 10

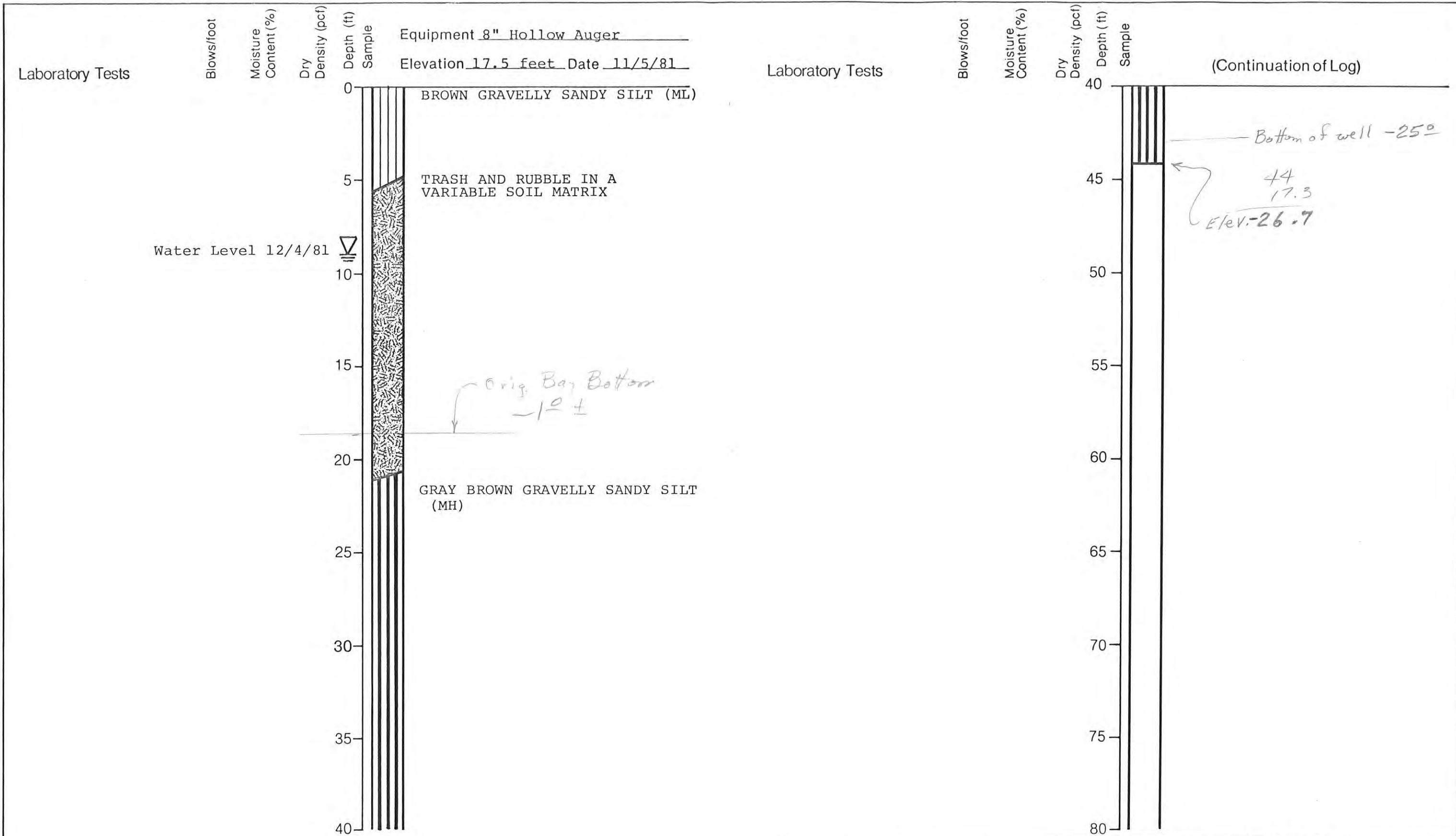
PLANNING SUBMITTAL - NOT FOR CONSTRUCTION

ARCO MURRAY
DESIGN BUILD
ENGINEERS . SURVEYORS . PLANNERS
BKFI00+
YEARS
DRAFT

© BKF Engineers

Appendix D
EXISTING BORING LOGS





Top of Casing
Elev. 9.20 ft. MSL

GROUND SURFACE (GS)

10 INCH DIA.
BOREHOLE: 0
to 48.5 ft.

4 INCH DIA
SCH. 40
BLANK PVC: 0
to 37 ft

BENTONITE
- CEMENT
SEAL: 0.4 to
33.1 ft.

Blows/foot	Recovery (inches)	OVA Reading (ppm)	Odor
16	18	ND	none
NA	24	ND	none
NA	12	ND	none
NA	12	300	sulfur
NA	0		
31	18	100	sulfur
44	16	ND	none

Depth (ft.)
Sample

Equipment CME 75

10"-O.D. Hollow-Stem Auger

GS Elevation 9.53 ft. MSL

Date 4-9-92

DARK BROWN SILTY SAND (SM) (FILL) (10YR 3/3); loose, medium dense, moist, medium to fine sand, 15-20% silt

BROWN SANDY SILTY CLAY WITH GRAVEL (CL) (FILL) (10YR 4/3); medium stiff, moist, 20% silt, 15-20% medium fine sand, 5-10% gravel

OLIVE BROWN CLAYEY GRAVEL WITH SAND (GC) (FILL) (2.5Y 4/3); stiff, wet, 25-30% clay, 15-20% medium to fine sand

DARK GREENISH GRAY SANDY FAT CLAY (CH) (5GY 4/1); soft, wet, 30-35% fine sand (bay mud)

GREENISH GRAY TO YELLOWISH BROWN SANDY LEAN CLAY (CL) (5GY 5/1 - 10YR 3/6); medium stiff, wet, 35-40% fine sand

@ 22.5': dark greenish gray (5G 4/1), medium stiff to stiff, 25-30% fine sand

PLATE

A2

Log of Boring and Well Completion US-1A
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California



Harding Lawson Associates
Engineering and
Environmental Services

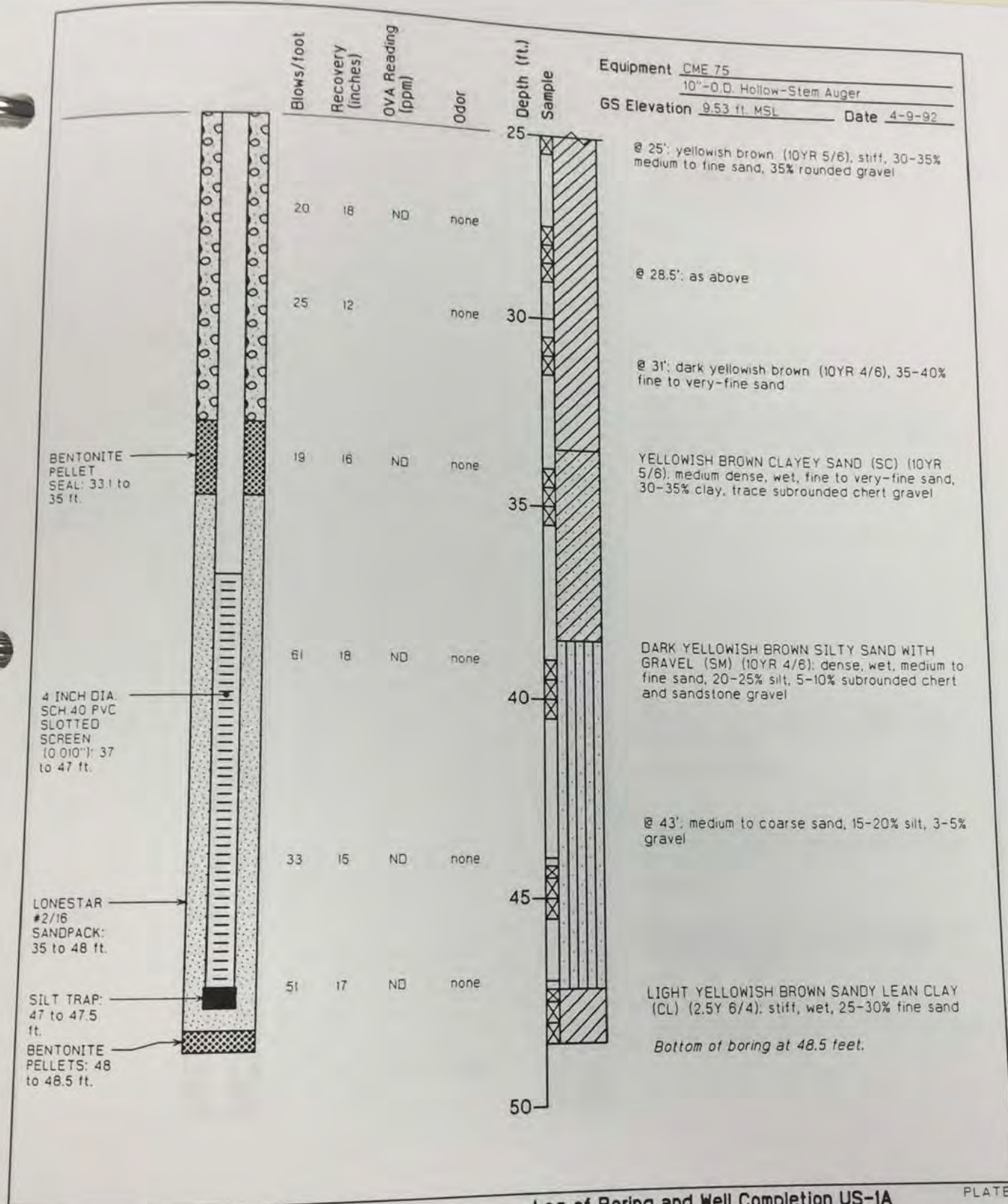
DRAWN
CEG

JOB NUMBER
10881 041

APPROVED

DATE
07/92

REVISED DATE



Log of Boring and Well Completion US-1A
 SWAT/Amendments to Interim ROWD
 Burlingame Landfill
 Burlingame, California

PLATE

A2

Harding Lawson Associates
 Engineering and
 Environmental Services

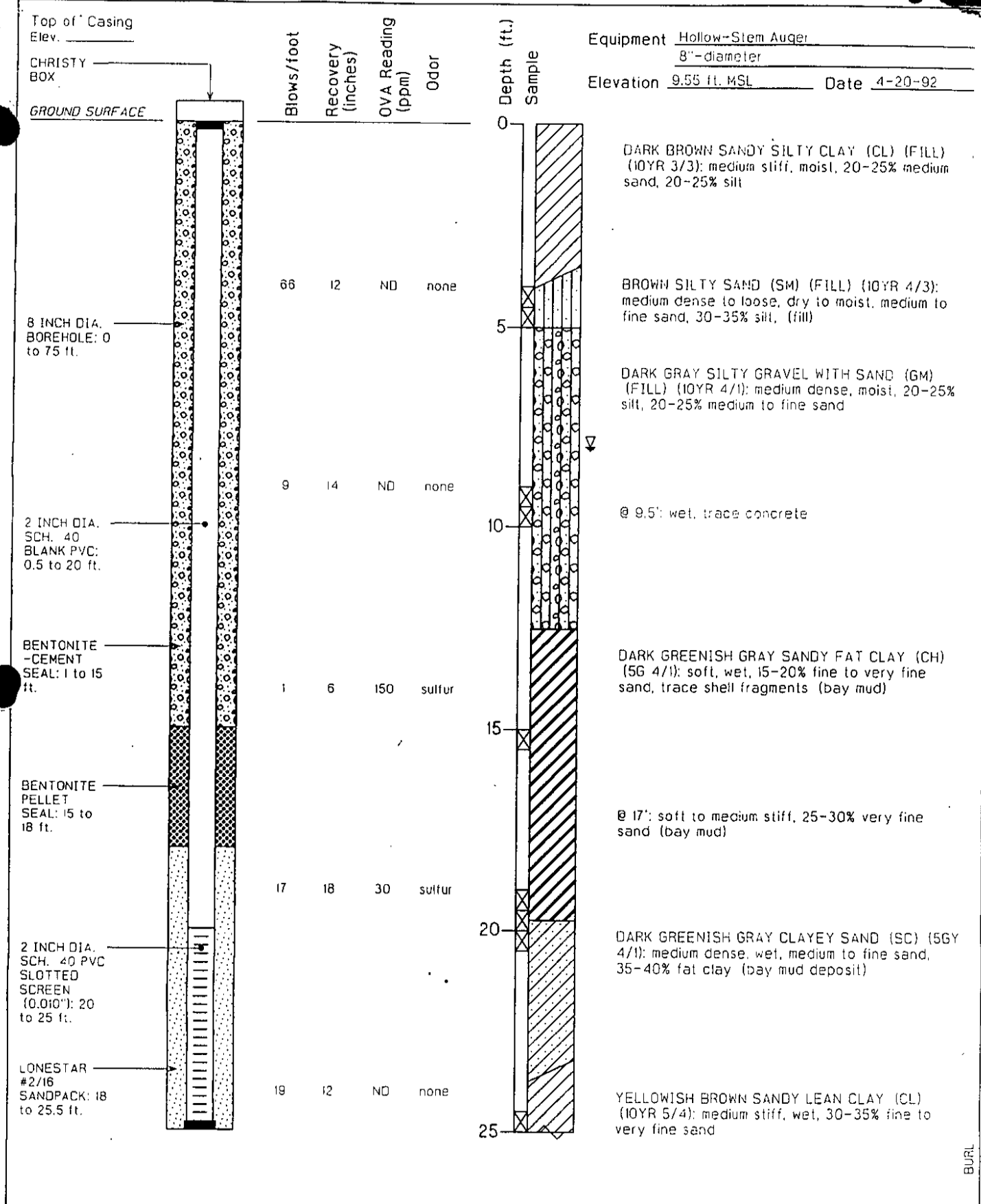
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JOB NUMBER
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APPROVED

DATE
 07/92

REVISED DATE



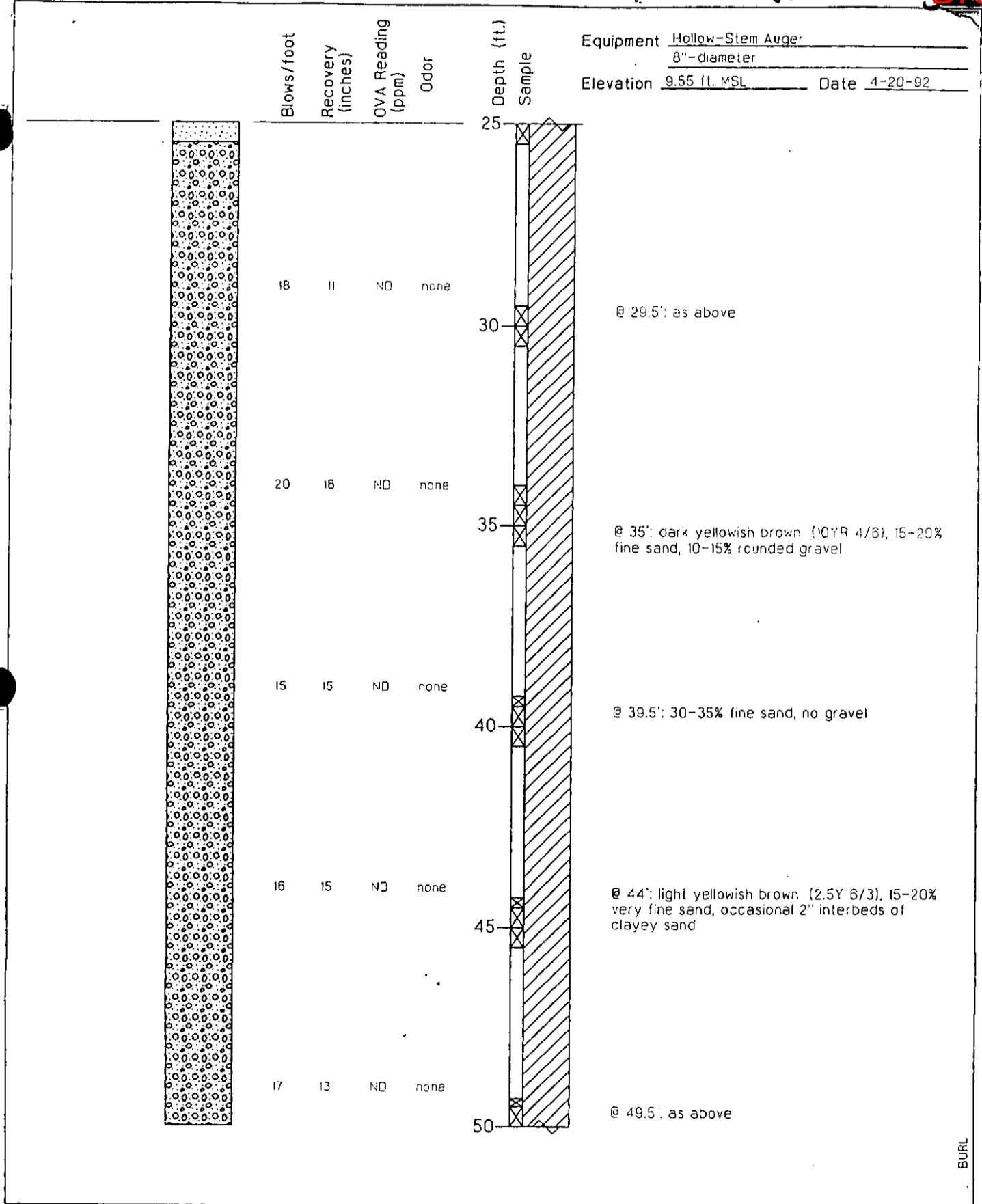
Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion US-2A
Well reinstalled 8-23-95
(formerly constructed as Well LS-2A)
Burlingame Landfill
Burlingame, California

PLATE

C1

DRAWN CEG	JOB NUMBER 27883 6	APPROVED	DATE 7/92	REVISED DATE 9/95
--------------	-----------------------	----------	--------------	----------------------



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-2A
Well reinstalled 8-23-95
(formerly constructed as Well LS-2A)
Burlingame Landfill
Burlingame, California

PLATE

C1

DRAWN
CEG

JOB NUMBER
27883 6

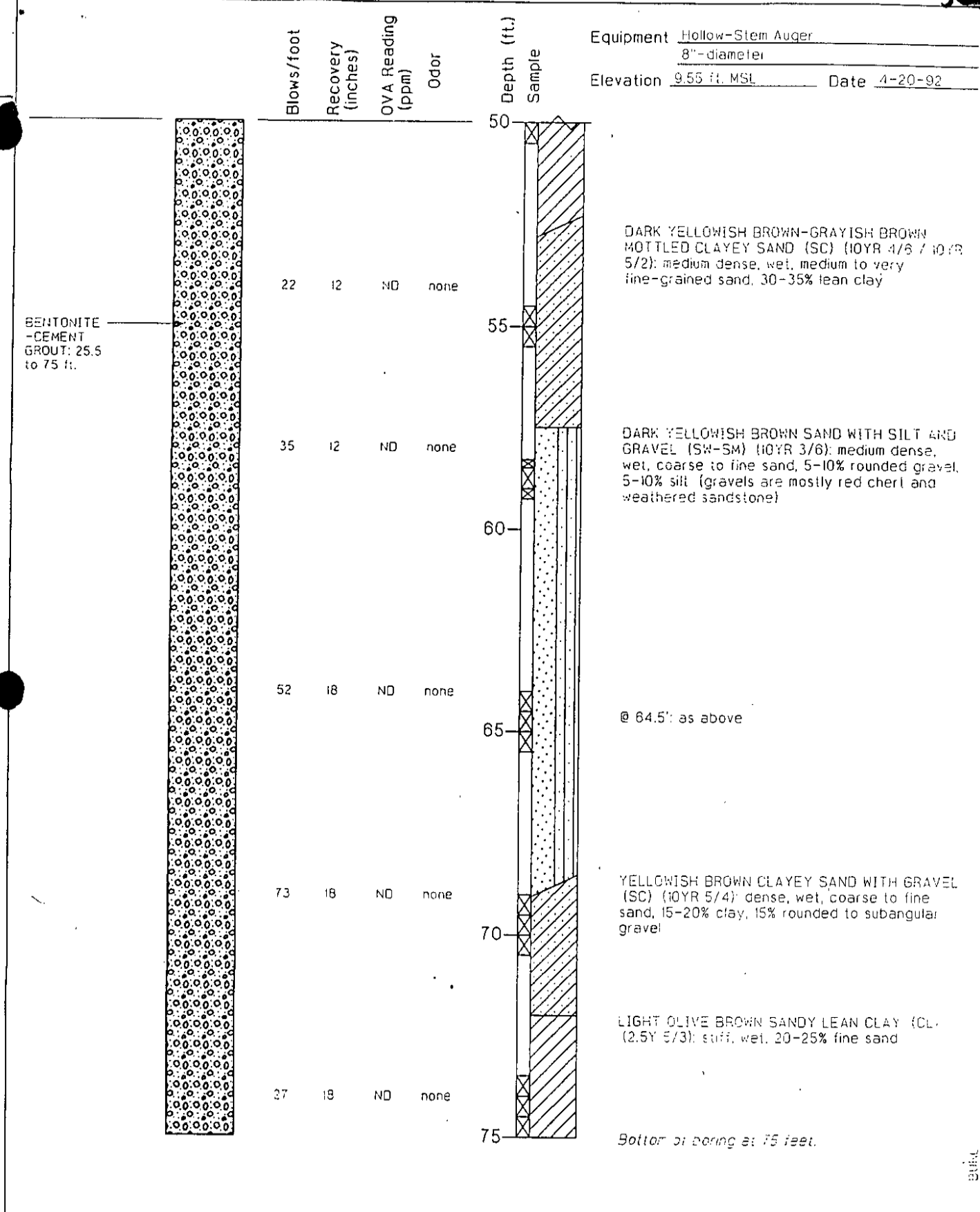
APPROVED

DATE
7/92

REVISED DATE
9/95

56726, A

DRAFT



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-2A
Well reinstalled 8-23-95
(formerly constructed as Well LS-2A)
Burlingame Landfill
Burlingame, California

PLATE

C 1

DRAWN CEG	JOB NUMBER 27883 6	APPROVED	DATE 7/92	REVISED DATE 9/95
--------------	-----------------------	----------	--------------	----------------------

Top of Casing
Elev. 17.98 ft. MSL

MORRISON
BOX

GROUND SURFACE (GS)

Blows/foot
Recovery
(inches)
OVA Reading
(ppm)
Odor

Equipment CME 75

10"-O.D. Hollow-Stem Auger

GS Elevation 18.20 ft. MSL

Date 4-21-92

Depth (ft.)
Sample

10 INCH DIA.
BOREHOLE: 0
to 44 ft.

4 INCH DIA.
SCH.40
BLANK PVC: 0
to 30 ft.

BENTONITE
- CEMENT
SEAL: 0.3 to
26.8 ft.

10 10 NO none

3 12 100 none

10 0

18 12 NO none

DARK BROWN SILTY GRAVEL WITH SAND (GM)
(FILL) (7.5YR 3/3); medium dense, dry to moist,
25% fine sand, 20-25% silt

BLACK SANDY SILTY CLAY (CL) (FILL) (5YR
2.5/1); soft to medium stiff, moist, lean clay,
20-25% medium sand, 20-25% silt, brick and tile
fragments

@ 13.5': as above

BLACK SANDY FAT CLAY (CH) (FILL) (2.5Y
2/0); soft, wet, 30-35% fine sand, 3-5% gravel,
abundant organics

RUBBLE, CONCRETE

BLACK SANDY FAT CLAY (CH) (FILL) (2.5Y
2/0); soft, saturated, 30-35% fine sand, 3-5%
gravel, abundant organics

RUBBLE

BLACK SANDY FAT CLAY (CH) (2.5Y 2/0); soft,
saturated, 30-35% fine sand, 3-5% gravel,
abundant organics

YELLOWISH BROWN SANDY LEAN CLAY (CL)
(10YR 5/6); medium stiff, wet, 35-40% fine sand,
trace rounded gravel



Harding Lawson Associates
Engineering and
Environmental Services

DRAWN
CEG

JOB NUMBER
10881 041

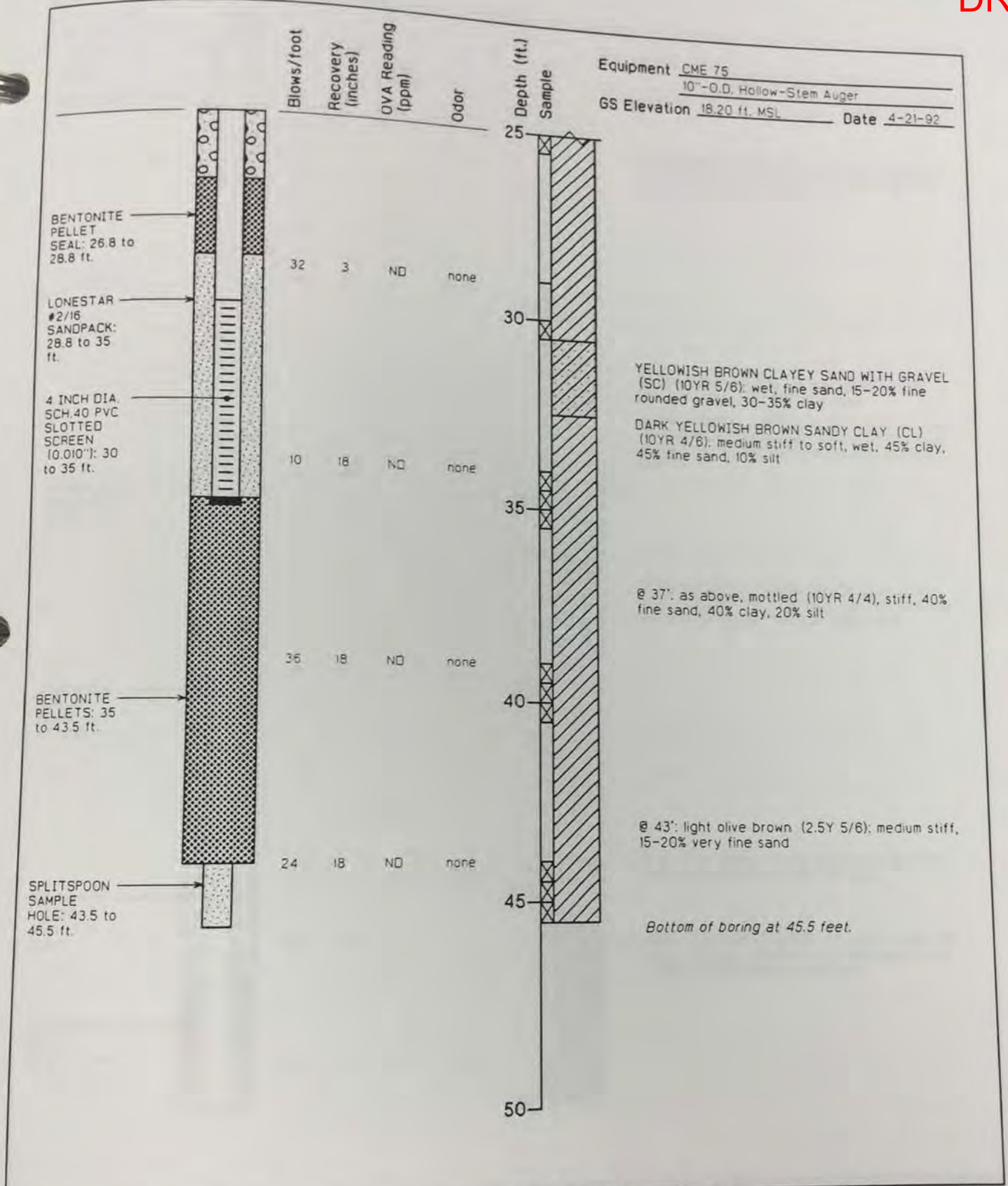
Log of Boring and Well Completion US-3A
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

APPROVED

DATE
07/92

REVISED DATE

A3



Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion US-3A
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A3

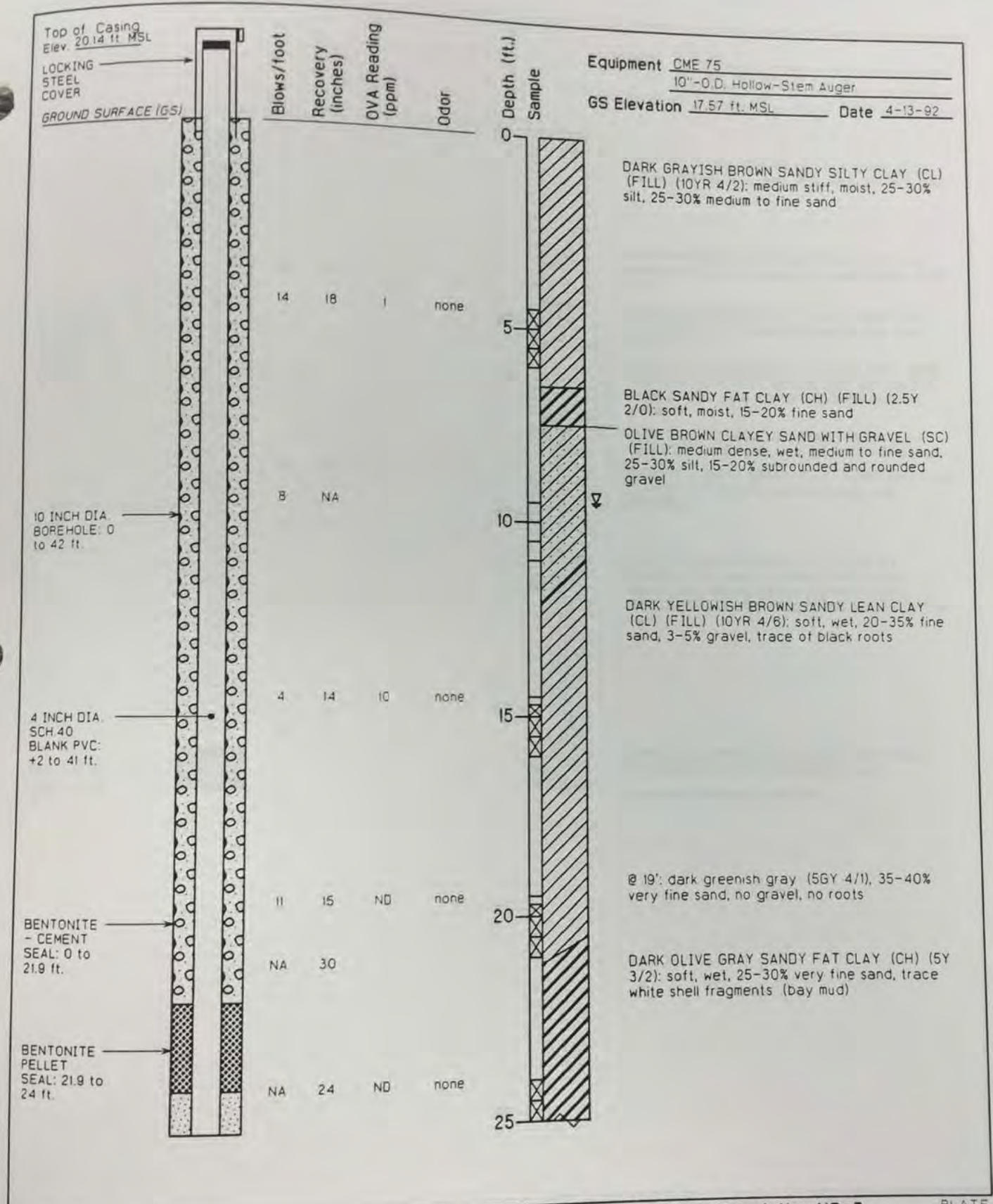
DRAWN
CEG

JOB NUMBER
10881041

APPROVED
[Signature]

DATE
07/92

REVISED DATE



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-5
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A4

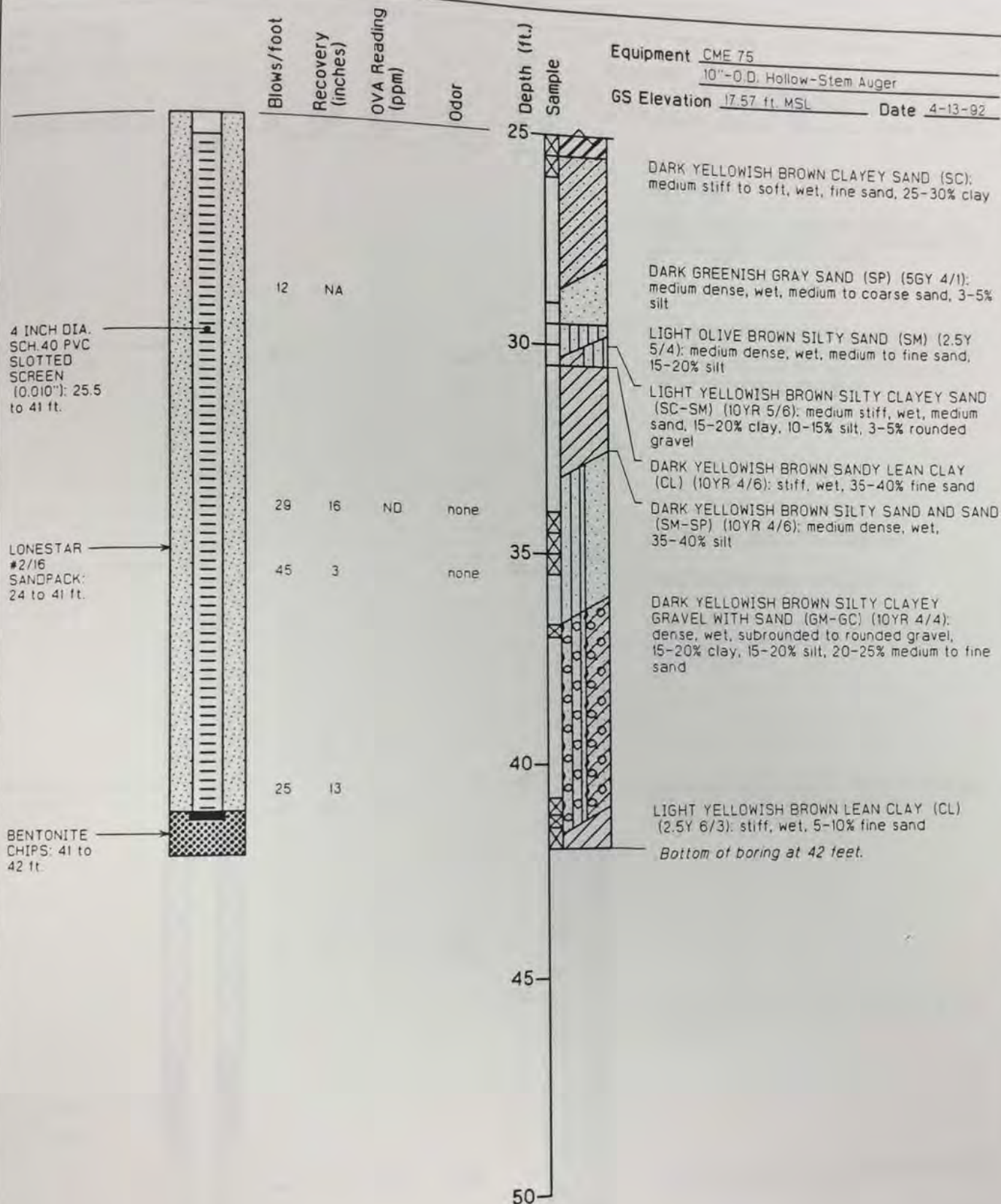
DRAWN
CEG

JOB NUMBER
10881 041

APPROVED
[Signature]

DATE
07/92

REVISED DATE



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-5
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A4

DRAWN
CEG

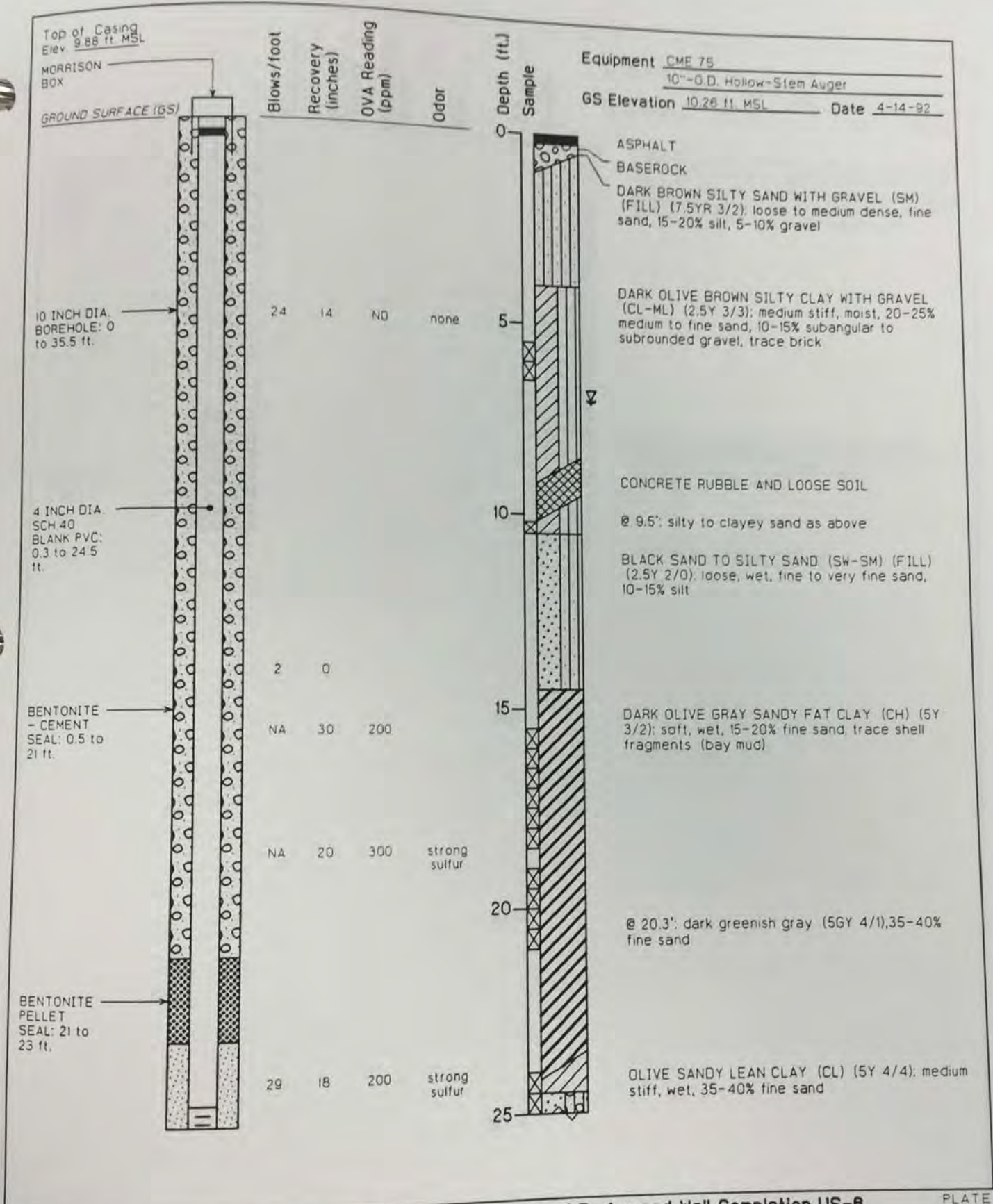
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10881 041

APPROVED

[Signature]

DATE
07/92

REVISED DATE



Log of Boring and Well Completion US-8
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A5

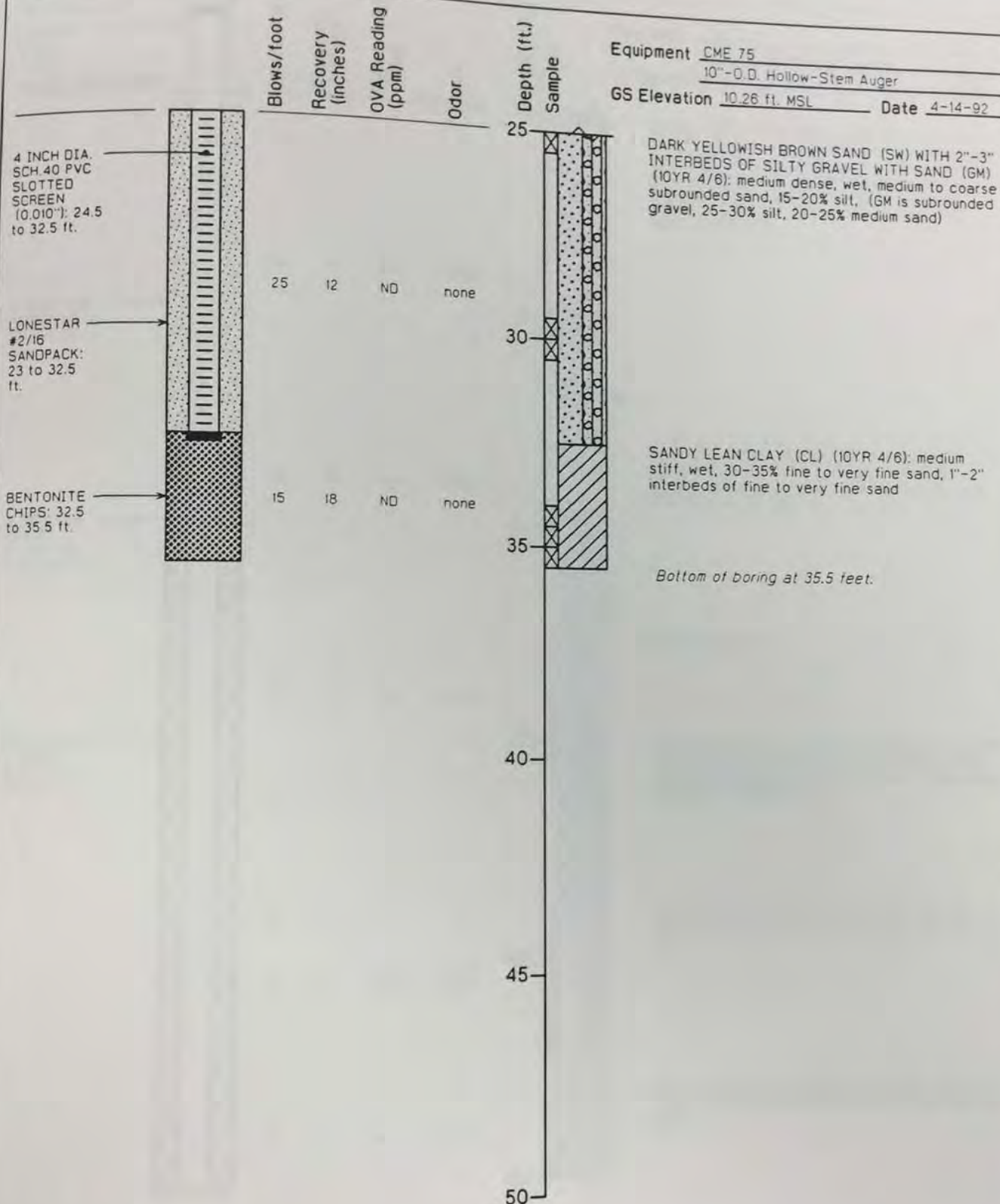
Harding Lawson Associates
Engineering and
Environmental Services

DRAWN CEG
JOB NUMBER 10881 041

APPROVED
[Signature]

DATE 07/92

REVISED DATE



Harding Lawson Associates
Engineering and
Environmental Services

DRAWN
CEG

JOB NUMBER
10881 041

Log of Boring and Well Completion US-8
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

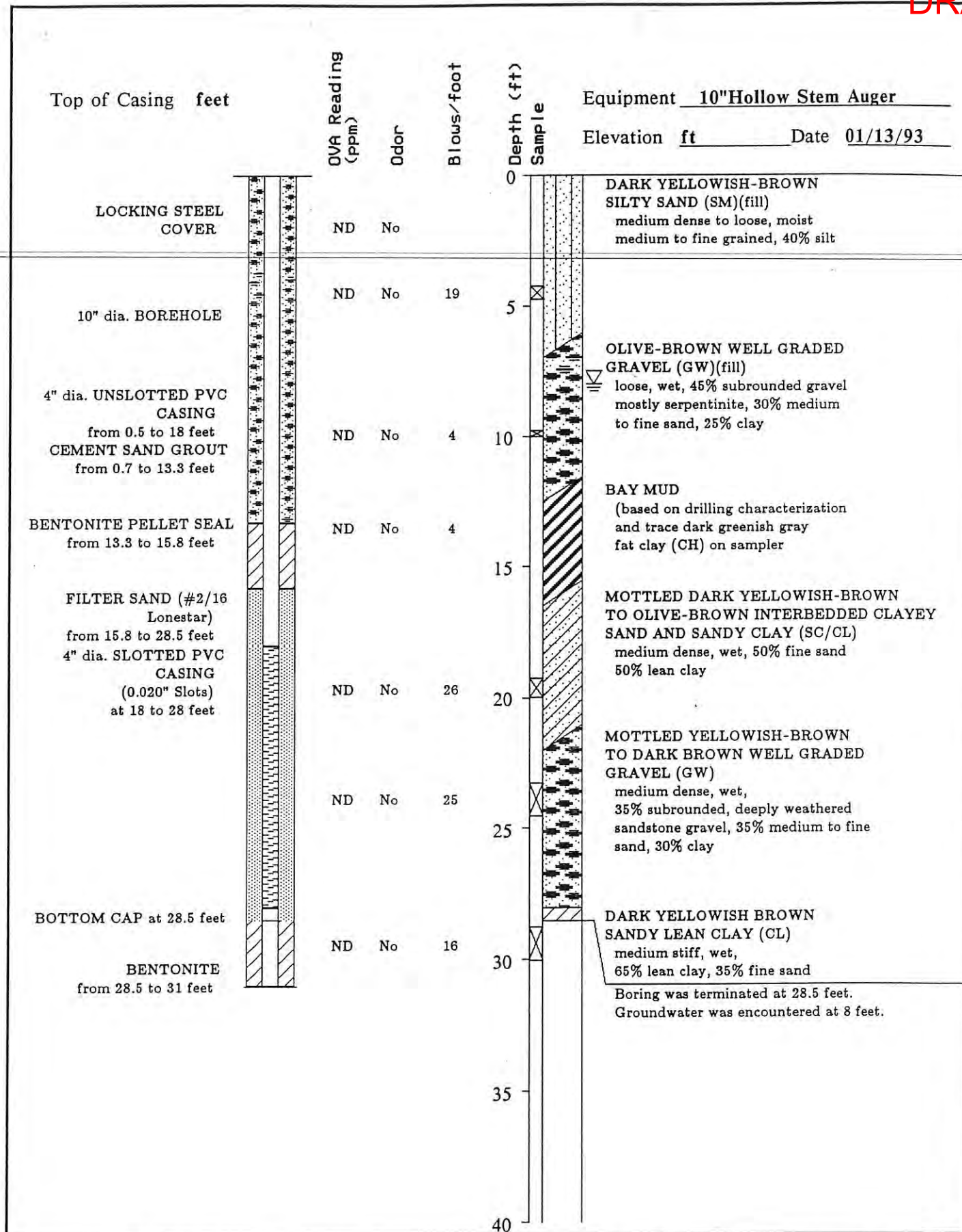
APPROVED

[Signature]

DATE
07/92

REVISED DATE

A5



Harding Lawson Associates
Engineering and
Environmental Services

Log of Monitoring Well US-7
Burlingame Landfill
Burlingame, California

(Sheet 1 of 1)

PLATE

DRAWN

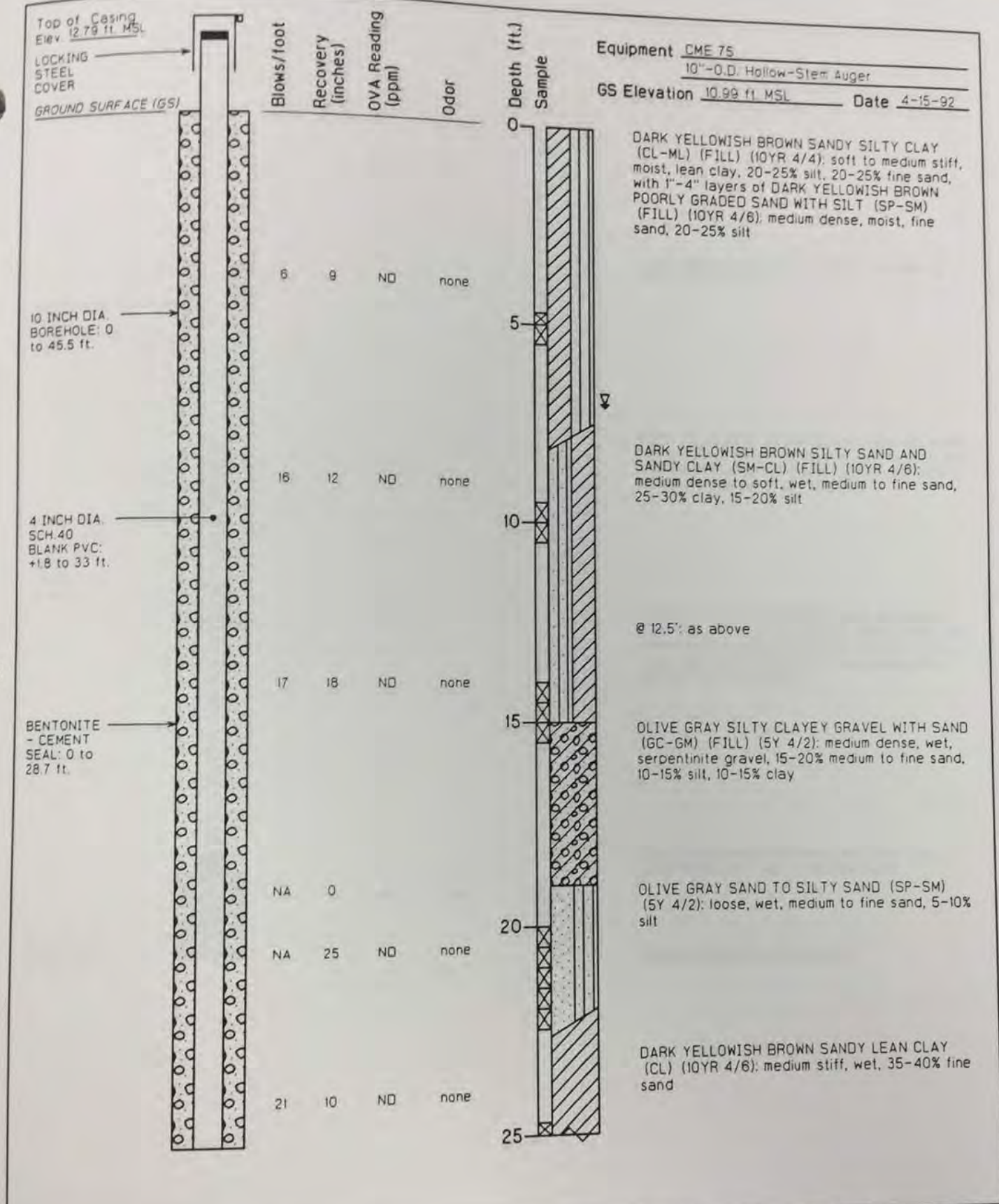
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JOB NUMBER
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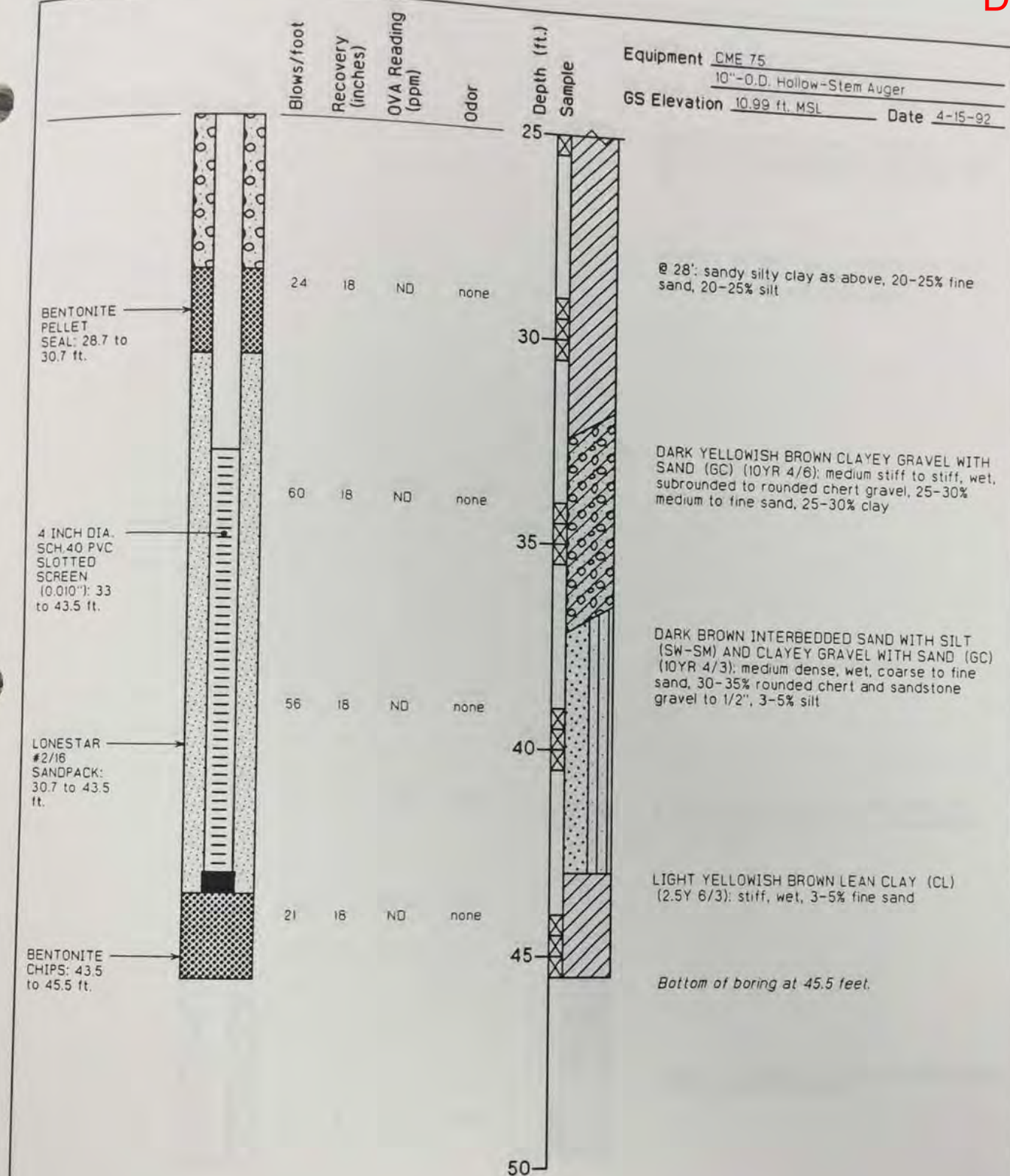
Log of Boring and Well Completion US-8
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

APPROVED
[Signature]

DATE
07/92

REVISED DATE

A6



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 Environmental Services

Log of Boring and Well Completion US-8
 SWAT/Amendments to Interim ROWD
 Burlingame Landfill
 Burlingame, California

PLATE

A6

DRAWN CEG JOB NUMBER 10881 041

APPROVED [Signature]

DATE 07/92

REVISED DATE

Top of Casing
Elev. 18.51 ft. MSL

LOCKING
STEEL
COVER

GROUND SURFACE (GS)

10 INCH DIA.
BOREHOLE: 0
to 45.5 ft.

4 INCH DIA.
SCH 40
BLANK PVC: 0
to 33 ft.

BENTONITE
- CEMENT
SEAL: 0 to
28.8 ft.

Blows/foot	Recovery (inches)	OVA Reading (ppm)	Odor
4	0	500	none
4	0	>1000	strong sulfur
NA	0	>1000	none
NA	0	>1000	none
NA	0	>1000	none
36	18	60	none

Depth (ft.)
Sample



Equipment CME 75

10"-O.D. Hollow-Stem Auger

GS Elevation 16.45 ft. MSL

Date 4-16-92

BLACK SANDY SILTY CLAY WITH GRAVEL
(CL-ML) (FILL): medium dense, dry to moist, 50%
clay, 20% subrounded gravel, 15% fine sand, 15%
silt

LANDFILL DEPOSIT: BLACK DEBRIS WITH SILTY
SANDY CLAY (CL-ML) (5Y 2.5/1): very soft, wet,
wood, metal, concrete, rubble, glass

@ 9': as above

@ 13': as above, strong sulfuric odor

@ 16.5': debris as above with black sand (SP)
(2.5Y 2/0): very loose, wet, very fine-grained

OLIVE GRAY SANDY CLAY (CL) (5Y 4/2): medium
stiff, wet, 40-45% fine sand



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-9
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A7

DRAWN
CEG

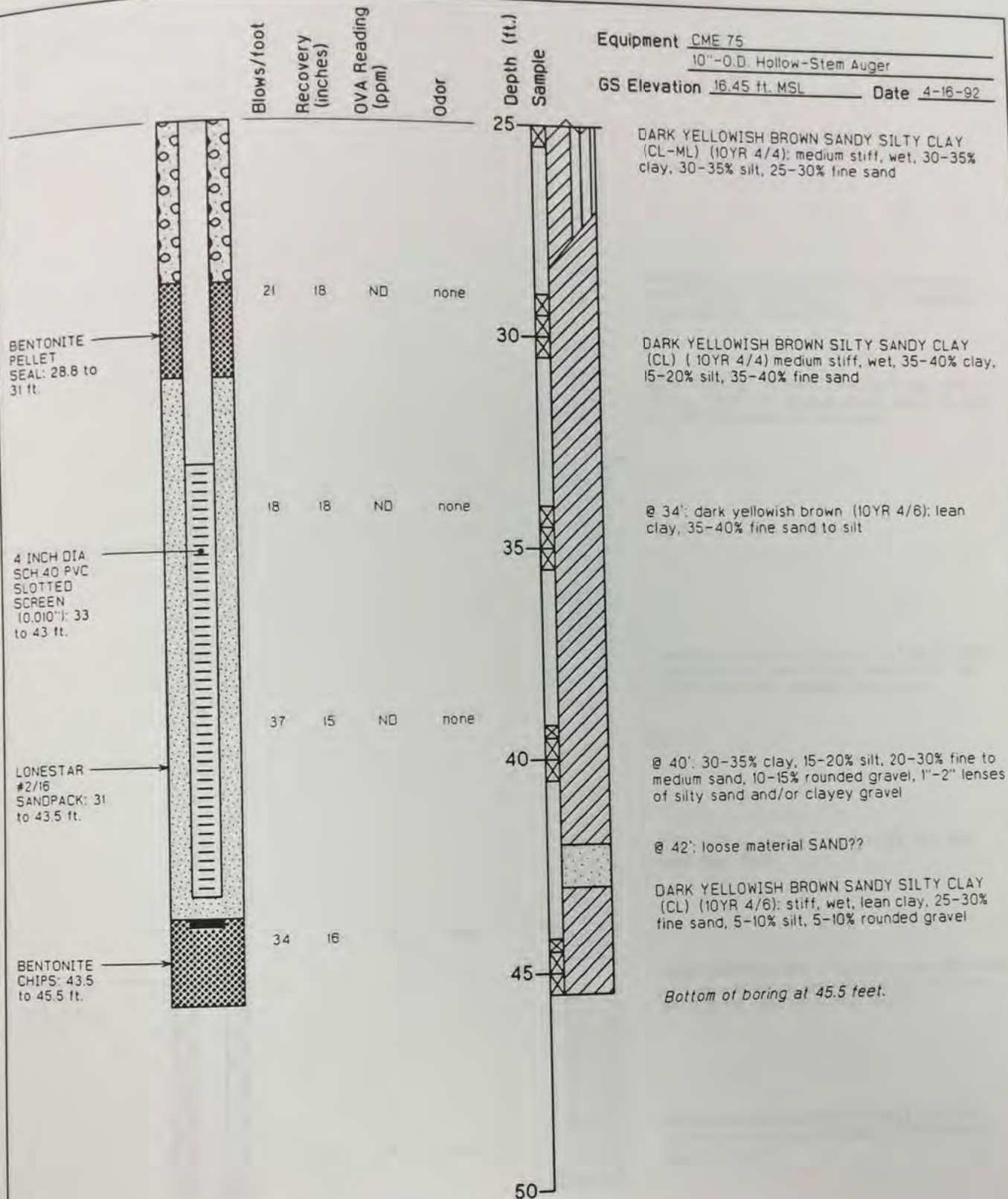
JOB NUMBER
10881 041

APPROVED

L. Horne

DATE
07/92

REVISED DATE

Equipment CME 7510"-O.D. Hollow-Stem AugerGS Elevation 16.45 ft. MSLDate 4-16-92

APPENDIX B



Harding Lawson Associates
Engineering and
Environmental Services

Log of Boring and Well Completion US-9
SWAT/Amendments to Interim ROWD
Burlingame Landfill
Burlingame, California

PLATE

A7DRAWN
CEGJOB NUMBER
10881 041

APPROVED

DATE
07/92

REVISED DATE

Page 2 of 2

Appendix E
GEOPHYSICAL SURVEY



April 26, 2018

RMC Geoscience, Inc.
405 East D Street, Suite N
Petaluma, California 94952

Subject: Electrical Resistivity Imaging Survey
Burlingame Landfill
Burlingame, California
NORCAL Job No. NS187008

Attention: Mr. Richard Mitchell

This report presents the findings of an electrical resistivity imaging (ERI) survey performed by NORCAL Geophysical Consultants, Inc. for RMC Geoscience, Inc. at the subject location. The survey was authorized under NORCAL Agreement for Services, Reference No. NS187008, dated March 4, 2018. NORCAL California Professional Geophysicists William E. Black (PGP No. 843), Donald J. Kirker (PGP No. 997) and David J. Bissiri (PGP No. 1009) conducted the field work on April 16, 2018. RMC Principal Engineering Geologist Richard Mitchell provided background information and site logistical support.

1.0 SITE DESCRIPTION

The project site is a golf driving range located 0.2-miles west of the intersection of Anza Boulevard and Airport Boulevard in Burlingame, California, as shown on the Vicinity Map included on Plate 1. The driving range covers an area of approximately 10-acres and is bordered by Airport Boulevard and San Francisco Bay on the north, a hotel and Anza Boulevard on the east, a slough on the south and a solid waste treatment plant on the west. The surface of the driving range is generally flat and open with the exception of several low, irregular shaped mounds that are meant to simulate golf course features such as greens and sand traps. In addition, there is a small depression located near the south edge of the range. It is speculated that this depression may be caused by a sinkhole. At the time of the ERI survey the depression was partially filled by water left from recent rainfall, as shown in Figure 1.

The surface of the driving range is covered by artificial turf over a layer of very dense gravel. The turf has the appearance of a grassy rope mesh. The ground surface rises gently to the west, from an elevation of about 34-ft above mean sea level (msl) at the golf tees on the east side of the range to about 66-ft at the west end. This rise is over a distance of 865-ft. The

RMC Geoscience, Inc.
April 26, 2018
Page 2

interior of the driving range was accessed through a locked gate from a service road on the south side of the range.



Figure 1: Driving range interior viewed from the southeast side looking northwest along Line 2. Resistivity cable (yellow) connects 56-electrodes (metal stakes) to instrumentation housed in the vehicle in the distance. The area with standing water is a surface depression that may be caused by a sinkhole.



RMC Geoscience, Inc.
April 26, 2018
Page 3

2.0 PURPOSE

Information provided by RMC indicates that the driving range is situated above the abandoned Burlingame Landfill. Apparently, the subsurface below the range consists of a clay cap over landfill over Bay Mud. The purpose of the geophysical investigation is to estimate the approximate thickness of the landfill.

3.0 GEOPHYSICAL APPROACH

Electrical resistivity (ER) is a measure of the resistance of a volume of material to the flow of electrical current. In unconsolidated materials, physical properties such as grain size, porosity, permeability and moisture content affect ER values. Fine-grained materials such as silts and clays tend to have the lowest ER values. Coarse-grained materials such as sands and gravels tend to have the highest. This is because ER generally increases with increasing grain size. Rock tends to have higher ER values than unconsolidated materials, especially when the degree of weathering is low.

Electrical Resistivity Imaging (ERI) provides a contoured cross-section (profile) depicting variations in ER versus depth and distance beneath a traverse (line). These images are often valuable as an indication of subsurface conditions. We selected ERI for this survey because our experience indicates that the clay cap and underlying bay mud should have ER values that are significantly lower than that of the landfill refuse. Detailed descriptions of the ERI methodology, our data acquisition and analysis procedures, the instrumentation we used and the limitations of the ERI method are provided in Appendix A.

4.0 SCOPE OF WORK

The scope of work for the ERI survey consisted of collecting ERI data along two mutually perpendicular lines traversing the full width of the driving range. One line was oriented approximately east-west and the other approximately north-south. The ERI traverses, labeled Line 1 and Line 2, are depicted by solid red lines shown on Plate 1. Line 1 was 830-ft long and Line 2 was 690-ft in length. Our scope of work also consisted of processing and interpreting the ERI data and presenting our findings in a written report.



RMC Geoscience, Inc.
April 26, 2018
Page 4

5.0 RESULTS

The results of the ERI survey are illustrated by the profiles shown on Plate 2. The profiles depict variations in electrical resistivity both laterally and with depth beneath each line. On each profile, the black line at the top of the contoured area represents the ground surface. The horizontal axis represents the distance (Station) in feet from the beginning of the line and the vertical axis represents elevation in feet (above msl). The ER values are in ohm-ft and are represented by color shading according to the color bar shown at the bottom of the plate.

6.0 INTERPRETATION

The electrical resistivity values range from about 5- to 50 ohm-ft. We interpret the low end of the range, as represented by purple to blue colors (5- to 13 ohm-ft) as clay cap near the surface and bay mud at depth. We interpret the green to yellow to red colors (13 to 50 ohm-ft) as landfill. Herein we will refer to the landfill material as refuse in order to distinguish it from ordinary fill that comprises part of the cap. The interpreted boundary of the refuse is depicted by a dark dashed line. The variation in ER within the refuse, as indicated by the various colors probably relates to the nature of the refuse. The higher resistivity areas (yellow to red) probably indicate the presence of materials such as wood, concrete, paper, plastics, etc. The lower resistivity areas (green) probably indicate metallic materials, bio-waste, etc. The bay mud underlying the refuse (purple to blue colors) is very continuous and well defined. Our interpretation of each profile is described in the following sections.

6.1 LINE 1

Beneath Line 1, the refuse ranges in thickness from about 30- to 60-ft. It is generally about 30-ft thick beneath the northeast half of the profile but it thickens to the southwest. The refuse is thinnest at about Station 700-ft and thickest at Station 250-ft. The depth to the top of the refuse ranges from very shallow at the northeast end of the profile to about 50-ft near the southwest end. We assume that the increasing depth of the refuse to the southwest is related to the landfill coming to an end in that direction. Along most of the profile the clay cap is relatively thin (about 10-ft thick) and not well defined (intermittent blue and green colors). However, at the southwest end of the profile there is a very well defined zone of low resistivity (purple to blue colors) that we interpret as clay cap. This zone is about 15-ft deep, about 20-ft thick and it extends from the beginning of the profile (Station 0-ft) to about Station 150-ft. We interpret the moderate resistivity zone above it (green colors) as fill that was put in to extend the surface of the driving range.



RMC Geoscience, Inc.
April 26, 2018
Page 5

6.2 LINE 2

Beneath Line 2, the refuse ranges in thickness from about 10- to 55-ft. It is generally 10- to 20-ft thick beneath the southeast half of the profile but it thickens to the northwest. The refuse is thinnest at about Station 450-ft and thickest at about Station 130-ft. The top of the refuse is very shallow at both ends of the profile but reaches a maximum depth of about 20-ft at Station 470-ft. The surface depression located at Stations 590- to 620-ft coincides with an area where the refuse is very close to the surface.

7.0 STANDARD CARE

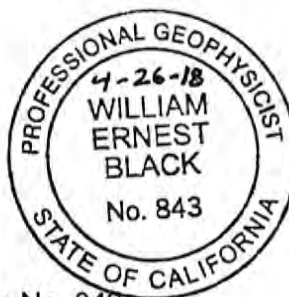
The scope of NORCAL's services for this project consisted of using the electrical resistivity imaging (ERI) method to characterize the shallow subsurface. The accuracy of our findings is subject to specific site conditions and limitations inherent to this technique. We performed our services in a manner consistent with the level of skill ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

We appreciate the opportunity to provide our services to RMC Geoscience, Inc. for this project. Should you require additional geophysical services or have questions regarding this survey, please do not hesitate to reach out to us.

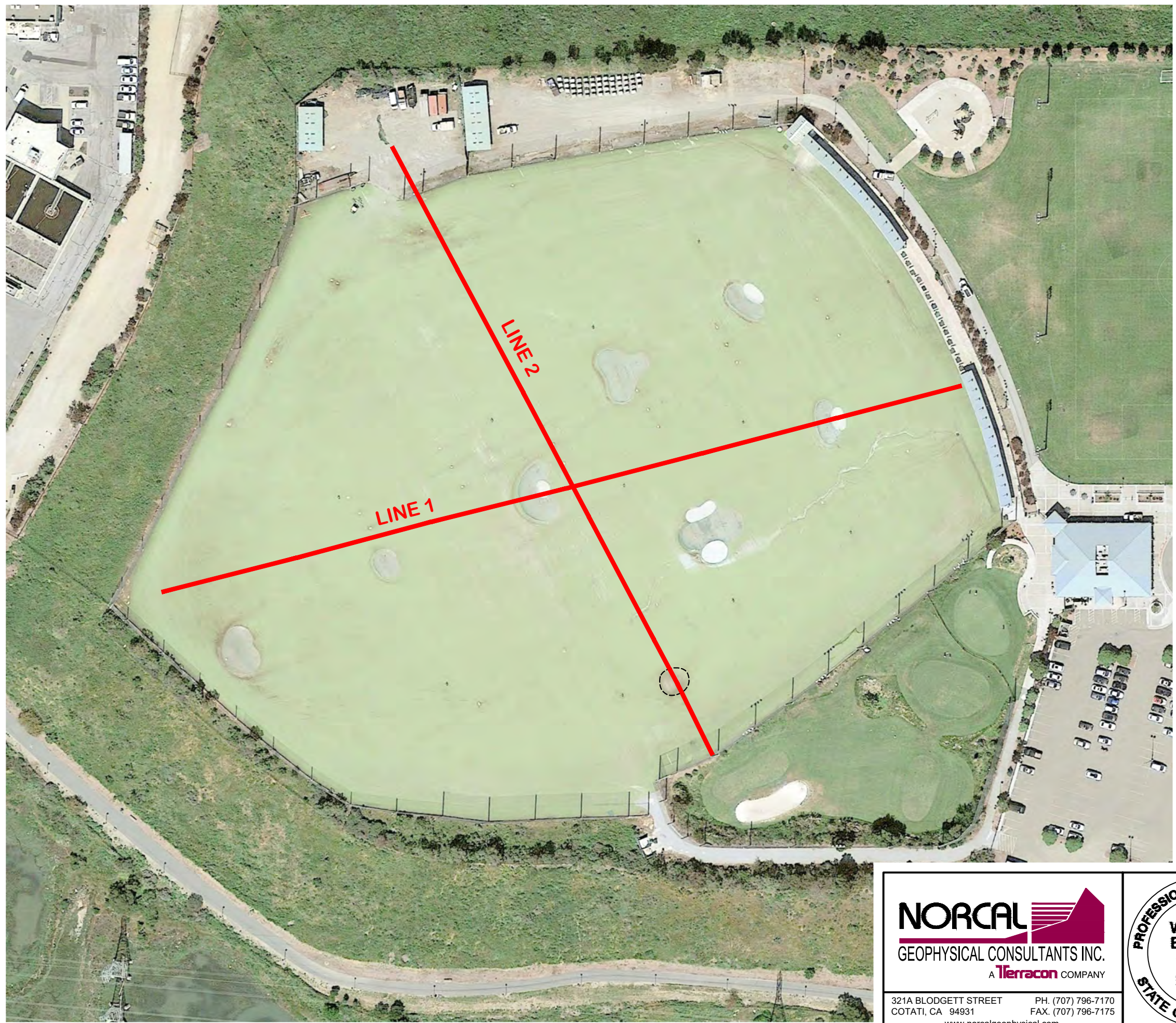
Sincerely,

NORCAL Geophysical Consultants, Inc.

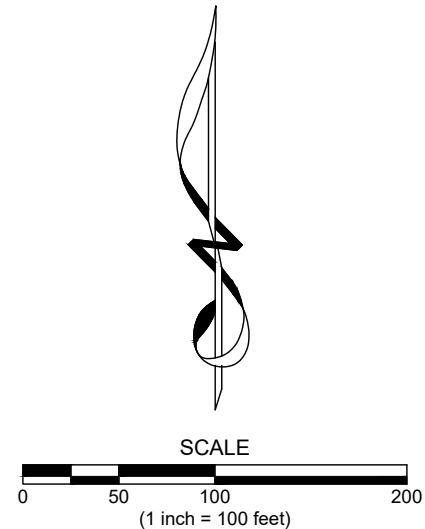
William E. Black
California Professional Geophysicist, PGp No. 843
WEB/tt



Enclosures: Plates 1 and 2
Appendix A – Electrical Resistivity Method



VICINITY MAP



LEGEND	
	ELECTRICAL RESISTIVITY LINE
	DEPRESSION

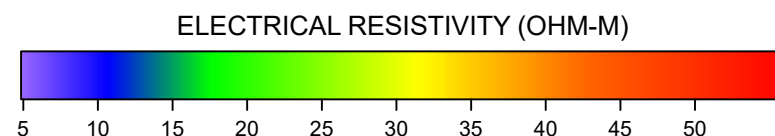
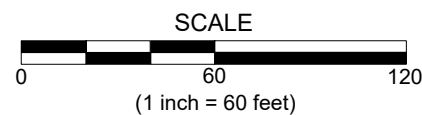
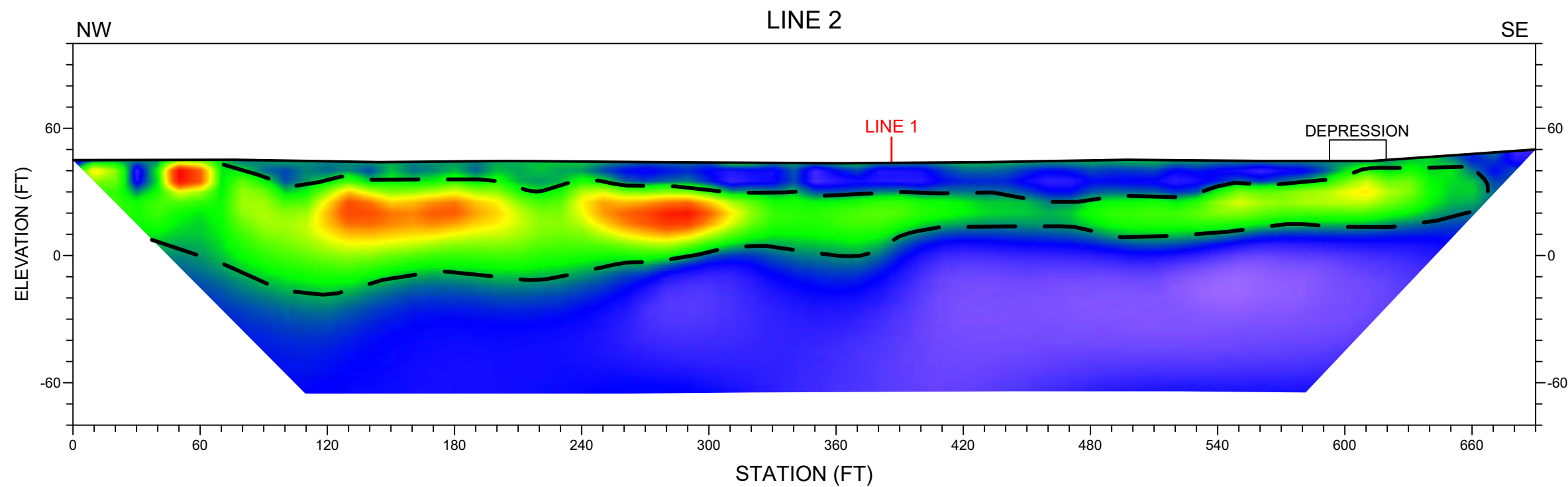
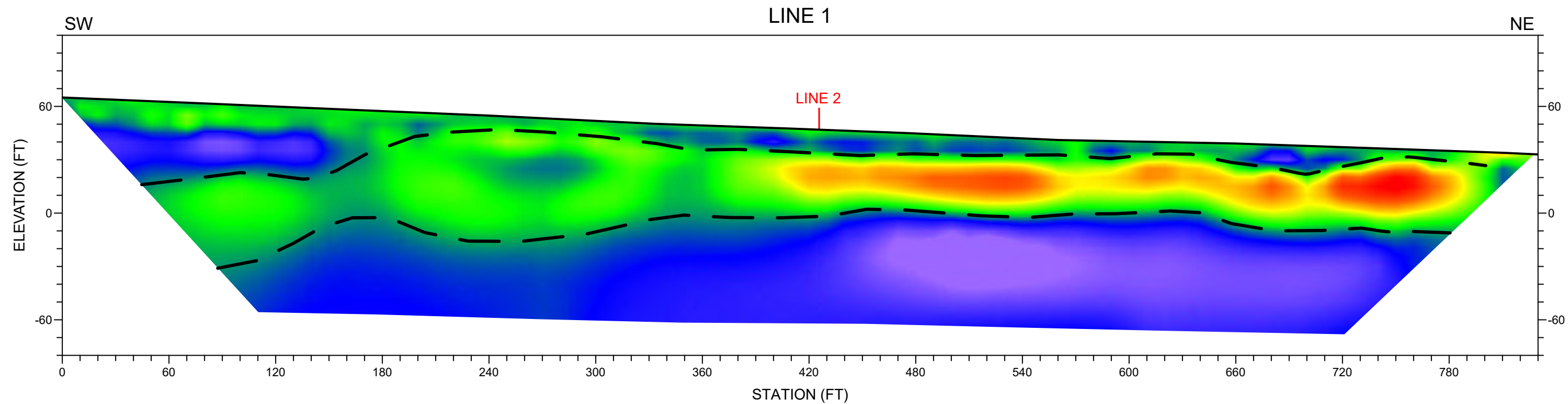
NORCAL
GEOPHYSICAL CONSULTANTS INC.
A Terracon COMPANY

321A BLODGETT STREET
COTATI, CA 94931
www.norcalgeophysical.com

PH. (707) 796-7170
FAX. (707) 796-7175

PROFESSIONAL GEOPHYSICIST
WILLIAM ERNEST BLACK
No. 843
STATE OF CALIFORNIA

SITE LOCATION MAP ELECTRICAL RESISTIVITY IMAGING SURVEY BURLINGAME LANDFILL		
LOCATION: BURLINGAME, CALIFORNIA		
CLIENT: RMC GEOSCIENCE		
JOB #. NS187008	DATE: APRIL 2018	PLATE 1
DRAWN BY: G.RANDALL	APPROVED BY: WEB	
<i>William E. Black</i> 4/26/2018		



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PROFESSIONAL GEOPHYSICIST
WILLIAM ERNEST BLACK
No. 843
STATE OF CALIFORNIA

ERI PROFILES
ELECTRICAL RESISTIVITY IMAGING SURVEY
BURLINGAME LANDFILL

LOCATION: BURLINGAME, CALIFORNIA

CLIENT: RMC GEOSCIENCE

JOB #: NS187008	DATE: APRIL 2018	PLATE 2
DRAWN BY: G.RANDALL	APPROVED BY: WEB	

William Ernest Black 4/26/2018



Appendix A

ELECTRICAL RESISTIVITY METHOD

APPENDIX A

ELECTRICAL RESISTIVITY (ER) SURVEY

1.0 METHODOLOGY

Electrical resistivity (ER) is the resistance of a volume of material to the flow of electrical current. The ER method is often used to measure the variation in ER with depth beneath a fixed point or along a line. This information can be valuable in determining stratigraphic and lithologic variations and other subsurface conditions that may relate to the depth and thickness of groundwater aquifers and permeable layers, the thickness of landfills, the delineation of fault traces and in some cases, the depth to bedrock.

There are a number of electrode configurations (arrays) that can be used to measure ER beneath a line. For this survey, we used one of the most commonly used configurations, the dipole-dipole array. In its simplest form, this consists of four electrodes distributed at even intervals in a collinear fashion. For each reading, electrical current (I) is input to the ground through one pair of electrodes (transmitter dipole) and the resulting potential drop (V) is measured across a second pair of electrodes (receiver dipole). The separation between electrodes (a) is the same for both dipoles and the separation between dipoles is always a multiple (n) of that distance. A simplified diagram of the dipole-dipole array is shown in Figure 1.

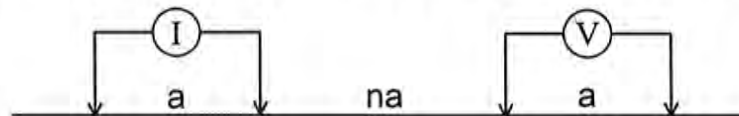


Figure 1: Dipole-Dipole Diagram

The values measured using this configuration are termed "apparent" resistivity (ρ_a) because they represent the resistance to the flow of electricity of a volume of material rather than a discrete layer. With the dipole-dipole array, apparent resistivity is calculated according to the following equation:

$$\rho_a = \frac{V}{I} \pi a n(n+1)(n+2)$$

Moving the array along a line and measuring ρ_a at even intervals (multiples of a) results in a data set that can be used to construct a cross-section (profile) depicting variations in ER versus depth and distance. The depth of investigation of the profile can be increased by increasing both a and n by even multiples of a .

Modern geophysical instrumentation makes it possible to collect dipole-dipole data using a large number of closely spaced electrodes and a wide range of a and n values. An example of how dipole-dipole data are obtained is illustrated by the three dipole-dipole diagrams shown in Figure 2. The rectangles at the top of each diagram represent electrode locations (42 in this case). The red and blue rectangles represent the transmitter dipole used for a particular measurement and the green rectangles represent the electrodes used as receiver dipoles for that measurement. The dark blue circles represent the data points obtained when the dipole length (l) is equal to the electrode separation (a), the red circles represent data points obtained when l is equal to $2a$ and the light blue circles represent the data points obtained when l is equal to $3a$. In each diagram, the farthest right (diagonal) column of circles represents data points obtained from the active (colored) dipoles shown at the top of the diagram. Note how the matrix of data points is being filled-in from left to right and top to bottom with each successive diagram. Note also that as the dipole length and spacing increases the depth of investigation also increases but with a corresponding decrease in resolution.

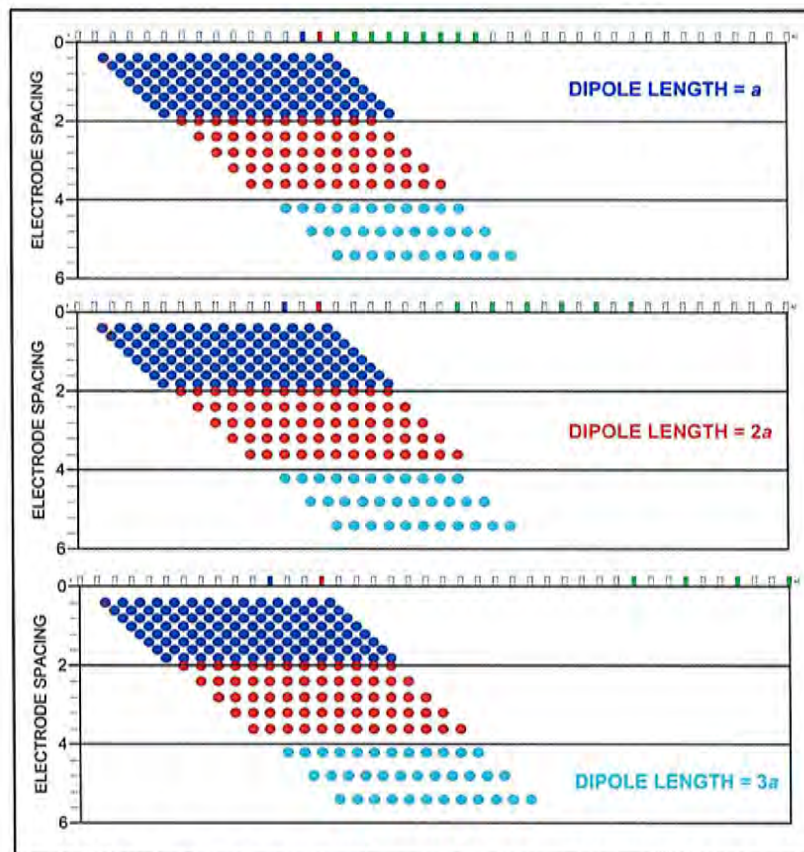


Figure 2: Dipole-dipole diagrams for dipole lengths of 1, 2, and 3 times the electrode separation (a).

2.0 DATA ACQUISITION

We collected ER data using the dipole-dipole array described above. A total of 70- to 84-stainless steel stakes (electrodes) were distributed along each traverse at 10-ft intervals resulting in total array lengths of 690- to 830-ft. At each electrode station, the 10-inch long electrode was driven into the ground and attached to the appropriate connector (take-out) on a multi-conductor cable that was, in turn, connected to the ER instrumentation (Section 3.0). Since the instrumentation has the capacity for only 56-electrodes at a time, it was necessary to move the first 14-electrodes to the end of the line once the readings with the first 56 were completed. Additional readings were then taken with the relocated electrodes to extend the coverage of the line. This is referred to as a "roll". Two rolls were required to complete Line 1 and one to complete Line 2.

3.0 INSTRUMENTATION

We collected the ER data using a **SuperSting R8** resistivity meter (see photo below). This system was configured with a 56-electrode switch box, four cables with 14 connectors (take-outs) per cable, and 56 stainless-steel electrodes. All of the instrumentation and cables comprising this system were manufactured by Advanced Geosciences Incorporated (AGI).





The **SuperSting R8** is a micro-processor controlled instrument that transmits current at outputs ranging from 1 to 1250 milliamps (mA). The instrument measures the potential drop (voltage) caused by the current influx and converts the data to values of apparent resistivity. A command file programmed into the instrument directs the switch box to activate certain electrodes for each reading according to electrode configuration and a number of other parameters that are selected by the operator. The resulting data are stored in the instrument internal memory and can be downloaded to a computer for subsequent processing and archival.

4.0 DATA PROCESSING

Once data acquisition was complete, the ER data were downloaded from the **SuperSting R8** to a computer using the computer program **AGISSADMIN** by AGI. The data were archived and then inverted using the computer program **Earthmager 2D**, also by AGI. We used this program to produce a 2D cross-section (profile) depicting the variation in ER versus elevation and distance beneath the line. The surface elevations were determined by correlating the GPS data we obtained along the line (Section 2.0) with elevations displayed on a topographic map provided by C2 Earth, Inc.

The resistivity data inversion proceeded as follows:

- 1) A starting resistivity model was constructed based on the apparent resistivity (ρ_a) distribution.
- 2) A virtual survey (forward modeling) was carried out for a predicted data set over the starting model and the initial root mean squared (RMS) error at the zero-th iteration was calculated.
- 3) A linearized inverse problem was solved based on the current model and data misfit for a model update ($\Delta \mathbf{m}$).
- 4) The resistivity model was updated using the formula: $\mathbf{m}_{i+1} = \mathbf{m}_i + \Delta \mathbf{m}$, where $\mathbf{m}$ consists of electrical conductivity of all model blocks in the finite element mesh and i is the iteration number.
- 5) A forward model (virtual survey) was run based on the updated model for an updated predicted data set.
- 6) A new RMS was calculated for the error between the predicted data and the measured data.
- 7) Steps (3) to (6) were repeated until the programmed stop criteria were satisfied, at which point the inversion was stopped.



Following each run of the inversion routine we reviewed the inversion diagrams produced by the software (not shown) to determine the degree of fit. If the RMS was considered to be too high, we would use routines included in **EarthImager** to filter the data by removing noisy data points. Typically, we removed no more than 10% at a time. We would then rerun the inversion process. This procedure was continued until an inverted model with acceptably low RMS was produced.

5.0 ELECTRICAL RESISTIVITY PROFILES

We used the computer program **Surfer 13.0** by Golden Software to create color contoured cross-sections (profiles) illustrating the results produced by **EarthImager** (Section 4.0) for Line 1 and Line 2. Both profiles were plotted at a scale of 1'=60-ft, vertical and horizontal. The horizontal axis on each profile represents distance (Station) in feet from the beginning of the line. The vertical axis represents elevation above mean sea level (msl) in feet, as determined by our GPS survey. Variations in electrical resistivity are represented by color shading according to the color bar shown beneath the two profiles. The dark line at the top of the color contoured section represents the ground surface. The locations of pertinent features, such as line intersections and certain surface features are annotated above the surface.

6.0 LIMITATIONS

A common feature of all electrical methods is that the models derived from the electric imaging are not unique. That is, depending on the subsurface geo-electric structure, there may be many models that will produce essentially the same apparent resistivities. This is known as the *principal of equivalence*. To overcome this limitation, computer software programs include routines for evaluating the equivalence of a given model relative to the observed resistivity values, resulting in a model that provides the closest fit to the observed data. Additionally, if the ground surface is too resistive, the system may have problems transmitting current into the subsurface (this situation can be remedied through the application of salt water at the base of each electrode). Conversely, if the ground surface is highly conductive, the potentials measured become negligible, resulting in a very low signal-to-noise ratio and therefore unreliable data.

Appendix F
BORING **AND** SCPT LOGS

APPENDIX A

FIELD PROCEDURE FOR SOIL SAMPLE COLLECTION

Bulk Samples: Bulk samples of subsurface earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

Standard Penetration Test (SPT) Samples: Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test (SPT) sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of $1\frac{3}{8}$ inches. The sampler was driven into the ground up to 18 inches with a 140 pound hammer falling freely from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed, and transported to the laboratory for testing.

Modified California Split Barrel Drive Samples: The sampler, with an external diameter of 3 inches, was lined with 1 inch-long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a hammer or the kelly bar of the drill rig in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer or bar, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

Geo-Logic Associates

Boring Log

BORING NO.: TG-01

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/20/18
 DATE FINISHED: 4/20/18
 ELEVATION: 37.0
 NORTHING: 2042914.7
 EASTING: 6024667.3

GW DEPTH: ~47 feet
 TOTAL DEPTH: 68.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	37.0	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-8') - cleared by hand auger and air knife.
							5	32.0	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
							10	27.0			REFUSE: Black (10YR 2/1) CLAY with very little waste. Concrete and wood.	Moist.
							15	22.0				
							20	17.0				
							25	12.0				
							30	7.0				
							35	2.0				
											...(21') - increase in refuse.	
							40	-3.0	CH		YOUNG BAY MUD: Dark greenish gray (5GY 4/1), fossiliferous, fat CLAY.	
						BULK			CL		OLD BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) SANDY CLAY with GRAVEL and iron-oxide staining.	Bulk sample collected.
84.4	15.6		15.7			BULK	45	-8.0	CL/SC		Dark yellowish brown (10YR 4/4) SANDY CLAY to CLAYEY SAND with GRAVEL.	Bulk sample collected.
					26	BULK MC			SC		Dark yellowish brown (10YR 4/4), fine SAND with minor CLAY.	Bulk sample collected.
									CL/SC		Dark yellowish brown (10YR 4/4), very stiff, fine SANDY CLAY to medium dense, fine CLAYEY SAND with iron-oxide staining.	No sample collected. Material in drive sample does not appear representative.
							50	-13.0	CL		Dark yellowish brown (10YR 4/4) SANDY CLAY with fine subrounded GRAVEL and iron-oxide staining.	Lots of water in boring. Wet.

CONTINUED ON NEXT PAGE

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-01

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/20/18
 DATE FINISHED: 4/20/18
 ELEVATION: 37.0
 NORTHING: 2042914.7
 EASTING: 6024667.3

GW DEPTH: ~47 feet
 TOTAL DEPTH: 68.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	-13.0		CL	Dark yellowish brown (10YR 4/4) SANDY CLAY with fine subrounded GRAVEL and iron-oxide staining.	
							55	-18.0		CL	Dark yellowish brown (10YR 4/4), fine to medium SANDY CLAY.	
			25.3	100.4	29	MC				CL	Olive (5Y 4/3), very stiff CLAY with iron- and manganese-oxide staining. ...(59') - no manganese-oxide staining.	
							60	-23.0				
							65	-28.0				
			22.4	106.5	44	MC				CL	Olive (5Y 4/3) hard CLAY with iron-oxide staining.	
							70	-33.0			Notes:	
											1. Total depth of boring 68.5 feet below ground surface (bgs). 2. Groundwater encountered at ~47 feet bgs. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							75	-38.0				
							80	-43.0				
							85	-48.0				
							90	-53.0				
							95	-58.0				
							100	-63.0				

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-02

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 39.5
 NORTHING: 2042942.0
 EASTING: 6024488.3

GW DEPTH: ~69 feet
 TOTAL DEPTH: 89.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	39.5	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-5') - cleared by hand auger and air knife.
							5	34.5	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
							10	29.5			REFUSE: Black (10YR 2/1) CLAY with refuse. Rubber, wood, plastic.	Wet (boring left open overnight).
					16	MC	15	24.5			...(11') - plus carpet.	Moist.
							20	19.5			...(13') - plus wood and metal.	Dry.
							25	14.5			...(17') - very stiff.	Sample discarded (loose material and carpet).
							30	9.5			...(19') - plus carpet and wood.	Moist.
							35	4.5			...(21') - metal wire.	
					50/3"	MC	40	-0.5			...(25') - ash.	
							45	-5.5			...(27') - mostly ash.	
							50	-10.5			...(29') - mostly wood waste.	
									CH		YOUNG BAY MUD: Dark greenish gray (5GY 4/1), fat CLAY with minor fossils (shells).	
			37.2	85.4		Shelby Tube			CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) SANDY CLAY with fine, subrounded GRAVEL and minor iron-oxide staining.	
					20	MC					...(49') - very stiff.	No sample recovery.
											...(51') - significantly more GRAVEL.	

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Geo-Logic Associates

Boring Log

BORING NO.: TG-02

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 39.5
 NORTHING: 2042942.0
 EASTING: 6024488.3

GW DEPTH: ~69 feet
 TOTAL DEPTH: 89.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	-10.5		CL	...same as above. ...(51') - significantly more GRAVEL.	
							55	-15.5				
					50/3'	MC	60	-20.5	CL		... (59') - hard. Olive (5Y 4/3) CLAY with minor SAND and subrounded GRAVEL. ...(63') - iron-oxide staining.	
							65	-25.5				
					50/6"	MC	70	-30.5	CL		... (69') - hard. Dark yellowish brown (10YR 4/4) SANDY CLAY with GRAVEL and minor iron-oxide staining.	Drive sample is very wet.
							75	-35.5	CL		Dark yellowish brown (10YR 4/4), plastic CLAY with minor SAND and iron-oxide staining.	
					50/2"	MC	80	-40.5			... (79') - hard.	
							85	-45.5	CL		Dark yellowish brown (10YR 4/4) SANDY/GRAVELLY CLAY. GRAVEL is subrounded.	
					50/4"	MC	90	-50.5	CL		Olive (5Y 4/3) CLAY with minor SAND. Dark yellowish brown (10YR 4/4) to dark gray, very dense, fine SAND with rounded GRAVEL and iron- and manganese-oxide staining.	
							95	-55.5			Notes: 1. Total depth of boring 89.5 feet below ground surface (bgs). 2. Groundwater encountered at ~69 feet bgs. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							100	-60.5				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-03

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 46.5
 NORTHING: 2042636.8
 EASTING: 6024439.4

GW DEPTH: ~18 feet
 TOTAL DEPTH: 78.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	46.5	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-7') - cleared by hand auger and air knife.
							5	41.5	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
							10	36.5			REFUSE: Black (10YR 2/1) CLAY with wood waste.	Moist.
							15	31.5				
							20	26.5				Wet. Moist to wet.
							25	21.5				
					16	MC	30	16.5			...(27') - hard.	Moist. Wet.
							35	11.5				
					52	MC	40	6.5			...(37') - hard.	Moist. Wet.
							45	1.5	CH		YOUNG BAY MUD: Dark greenish gray (5GY 4/1), fossiliferous, fat CLAY.	Shelby Tube 800 psi.
			60.0	64.1		Shelby Tube	50	-3.5	CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) CLAY with fine SAND and minor iron- and manganese-oxide staining.	

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Geo-Logic Associates

Boring Log

BORING NO.: TG-03

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 46.5
 NORTHING: 2042636.8
 EASTING: 6024439.4

GW DEPTH: ~18 feet
 TOTAL DEPTH: 78.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
					45	MC	50	-3.5	CL	CL	OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) CLAY with fine SAND and minor iron- and manganese-oxide staining. ...(53') - significant iron-oxide staining and minor manganese-oxide staining.	
							55	-8.5			...(57') - hard; staining absent.	Sample may not be representative.
							60	-13.5			...(59') - minor iron-oxide staining.	
			22.4	105.6	48	MC	65	-18.5	CL	CL	Dark yellowish brown (10YR 4/4) SANDY CLAY with subrounded GRAVEL and minor iron-oxide staining.	
							70	-23.5	CL	CL	Dark yellowish brown (10YR 4/4), hard, well-graded SANDY CLAY.	
							75	-28.5	CL/SC	CL/SC	Dark yellowish brown (10YR 4/4), well-graded SANDY CLAY to CLAYEY SAND with GRAVEL.	
							77	-28.5	CL/SC	CL/SC	Olive (5Y 4/3), fine SANDY CLAY.	
			11.0	127.6	70	MC	80	-33.5			...(75') - minor iron-oxide staining.	
							85	-38.5			...(77') - hard.	
							90	-43.5			Notes:	
							95	-48.5			1. Total depth of boring 78.5 feet below ground surface (bgs).	
							100	-53.5			2. Groundwater encountered at ~18 feet bgs.	
											3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	

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Geo-Logic Associates

Boring Log

BORING NO.: TG-04

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 48.2
 NORTHING: 2042939.8
 EASTING: 6024266.0

GW DEPTH: NA
 TOTAL DEPTH: 70.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	48.2	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND. Aggregate base rock.	...(0'-7') - cleared by hand auger and air knife.
							5	43.2	GP		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	
							10	38.2			REFUSE: Greenish black (2.5Y/10Y), firm CLAY with abundant debris/trash.	Moist.
							15	33.2				
							20	28.2				
							25	23.2				
					43	MC	30	18.2				...(30.5'-47') - no recovery.
							35	13.2				
							40	8.2				
							45	3.2				
							50	-1.8			...(47') - color change to black (GLEY1 2.5/N). ...(51') - color change to dark yellowish brown (10YR 4/4).	Moist. Moist.

CONTINUED ON NEXT PAGE

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Geo-Logic Associates

Boring Log

BORING NO.: TG-04

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 48.2
 NORTHING: 2042939.8
 EASTING: 6024266.0

GW DEPTH: NA
 TOTAL DEPTH: 70.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		4.0					50	-1.8			...same as above.	Moist.
							55	-6.8			... (51') - color change to dark yellowish brown (10YR 4/4).	
		1.75									... (54') - very stiff.	... (54') - moist. 4.0 tsf (pocket pen).
		2.75			22	MC	60	-11.8	CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/6), very stiff SANDY CLAY.	... (57') - moist. 1.75 tsf (pocket pen).
		1.5				BULK			CL		Strong brown (7.5YR 4/6), very stiff CLAY with SAND.	... (60') - 2.75 tsf (pocket pen). No sample recovered (slough).
									SC		Strong brown (7.5YR 4/6), very stiff CLAYEY SAND.	... (61') - moist. Bulk sample collected.
						BULK	65	-16.8	CL		Strong brown (7.5YR 4/6), very stiff CLAY with SAND.	... (62') - moist. 1.5 tsf (pocket pen).
									CL		Strong brown (7.5YR 4/6), very stiff SANDY CLAY.	... (65') - moist. Bulk sample collected.
		>4.5			43	MC	70	-21.8	CL		Strong brown (7.5YR 4/6), very stiff CLAY with SAND.	... (68') - moist. 4.5+ tsf (pocket pen).
											Notes:	
							75	-26.8			1. Total depth of boring 70.5 feet below ground surface (bgs). 2. No groundwater encountered. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							80	-31.8				
							85	-36.8				
							90	-41.8				
							95	-46.8				
							100	-51.8				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-06

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/18/18
 DATE FINISHED: 4/18/18
 ELEVATION: 58.4
 NORTHING: 2042720.6
 EASTING: 6024028.6

GW DEPTH: ~75 feet
 TOTAL DEPTH: 88.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	58.4	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-6') - cleared by hand auger and air knife.
							5	53.4	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
					24	MC	10	48.4			REFUSE: Black (10YR 2/1) CLAY with waste. Wood and concrete. ...(8') - mostly wood waste.	
							15	43.4			...(17') - very stiff.	No sample collected.
							20	38.4			...(20') - brick. ...(21') - mostly wood.	
							25	33.4			...(26') - concrete. ...(27') - mostly wood.	
							30	28.4			...(30') - decrease in refuse.	
							35	23.4			...(35') - mostly wood; minor brick.	
							40	18.4				
							45	13.4			...(47') - mix of wood and brick; minor plastic.	
							50	8.4			...(51'-53') - more CLAY than refuse.	

CONTINUED ON NEXT PAGE

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-06

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/18/18
 DATE FINISHED: 4/18/18
 ELEVATION: 58.4
 NORTHING: 2042720.6
 EASTING: 6024028.6

GW DEPTH: ~75 feet
 TOTAL DEPTH: 88.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	8.4			...same as above. ...(51'-53') - more CLAY than refuse.	
							55	3.4			...	
							60	-1.6			...	
			16.3			BULK					...	Moist.
							65	-6.6			...	
75.4	24.6		31.1	96.0	31 46	MC MC					...	
							70	-11.6			...	No sample return on 1st attempt. Add sand catcher and collect sample on 2nd attempt.
			19.6			BULK					...	
							75	-16.6			...	Bulk sample collected.
87.2	12.8		15.0		50/4"	MC					...	...
							80	-21.6			...	...
							85	-26.6			...	...
			18.0	115.2	35	MC					...	...
							90	-31.6			Notes:	
							95	-36.6			1. Total depth of boring 88.5 feet below ground surface (bgs). 2. Groundwater encountered at ~75 feet bgs. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							100	-41.6				

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-07

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE/G. REESE

DATE STARTED: 4/18/18
 DATE FINISHED: 4/18/18
 ELEVATION: 58.8
 NORTHING: 2042671.0
 EASTING: 6024057.6

GW DEPTH: ~71 feet
 TOTAL DEPTH: 91 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		3.25					0	58.8	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND. Aggregate base rock.	Moist.
							5	53.8	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	...
					18	MC	10	48.8			REFUSE: Greenish black, stiff CLAYEY matrix, with some trash (mostly wood debris with some concrete/asphalt) and minor SAND and fine GRAVEL.	Moist.
							15	43.8				
							20	38.8				
							25	33.8				
							30	28.8				
							35	23.8				
							40	18.8				
		1.0					45	13.8			...(41.5') - variable amounts of construction debris (wood and concrete rubble); interbedded SAND and GRAVEL up to 1" in size.	...(41.5') - moist. ...(43') - 1.0 tsf (pocket pen).
		2.5					50	8.8				...(48.5') - 2.5 tsf (pocket pen).

CONTINUED ON NEXT PAGE

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Geo-Logic Associates

Boring Log

BORING NO.: TG-07

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE/G. REESE

DATE STARTED: 4/18/18
 DATE FINISHED: 4/18/18
 ELEVATION: 58.8
 NORTHING: 2042671.0
 EASTING: 6024057.6

GW DEPTH: ~71 feet
 TOTAL DEPTH: 91 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	8.8			...same as above.	
							55	3.8				
		0.75					60	-1.2	CH		YOUNG BAY MUD: Black (2.5/N), soft, fat CLAY with minor seashells.	...(59') - moist. 0.75 tsf (pocket pen).
		1.5							CL		Greenish black, firm CLAY. ...(62') - abundant shells.	...(60.5') - 1.5 tsf (pocket pen).
						BULK			CL		OLDER BAY ALLUVIUM: Bluish black SANDY CLAY with GRAVEL.	Bulk sample collected.
							65	-6.2	SC		Dark yellowish brown (10YR 4/4), dense CLAYEY SAND with abundant fine to coarse GRAVEL up to 1" in size. 30-50% CLAY; oxidized.	Moist.
		2.5							CL		Dark yellowish brown (10YR 4/5), very stiff to hard CLAY with SAND. ~15% fine to medium SAND with minor fine GRAVEL.	...(67') - moist. 2.5 tsf (pocket pen).
			25.9	10.3.5	35	MC	70	-11.2				Moist.
									CL		Dark yellowish brown (10YR 4/4), stiff SANDY CLAY with GRAVEL. 5-10% fine to coarse GRAVEL.	Wet.
							75	-16.2	SC		Dark yellowish brown (10YR 3/4), dense CLAYEY SAND with abundant fine to coarse GRAVEL up to 1" in size. 30-50% CLAY.	Wet.
									SC		Dark yellowish brown (10YR 3/3), very dense CLAYEY SAND with abundant fine to coarse GRAVEL up to 1.5" in size. 15-25% CLAY.	Wet.
88.9	11.1		13.2	123.9	78	MC	80	-21.2	SC		Dark yellowish brown (10YR 3/6), very dense CLAYEY SAND. 50% CLAY.	Wet.
									SC		Dark yellowish brown (10YR 3/6), dense CLAYEY SAND. 30-50% CLAY.	Wet. Bulk sample collected.
							85	-26.2	CL		Dark greenish gray (GLE1 4/10GY), very stiff, lean CLAY.	Wet.
90.1	9.9		18.7		21	MC	90	-31.2	SW		Olive brown (2.5Y 4/4), medium dense, fine to medium SAND.	Moist. Bulk sample collected.
					BULK						Notes: 1. Total depth of boring 91 feet below ground surface (bgs). 2. Groundwater encountered at ~71 feet bgs. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							95	-36.2				
							100	-41.2				

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-08

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 59.5
 NORTHING: 2042582.5
 EASTING: 6024105.8

GW DEPTH: NA
 TOTAL DEPTH: 88.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	59.5	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-6') - cleared by hand auger and air knife.
							5	54.5	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
											REFUSE: Black (10YR 2/1) CLAY with waste (wood).	...(7'-16') - no sample return.
							10	49.5				
							15	44.5				
							20	39.5				
							25	34.5				
							30	29.5				
							35	24.5				
					44	MC	40	19.5			...(37') - hard.	...(37'-45') - no sample return.
							45	14.5			...(45') - mostly wood.	
							50	9.5				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-08

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 59.5
 NORTHING: 2042582.5
 EASTING: 6024105.8

GW DEPTH: NA
 TOTAL DEPTH: 88.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	9.5			...same as above.	
							55	4.5				
							60	-0.5	CH		YOUNG BAY MUD: Dark greenish gray (5Y 4/1), fossiliferous, fat CLAY.	
									CL		Dark greenish gray (5Y 4/1), fine SANDY CLAY.	
							65	-5.5	CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) CLAY with minor fine SAND. ...(65') - minor subangular, fine GRAVEL and very minor iron-oxide staining.	
			17.0		38	MC			CL		Dark yellowish brown (10YR 4/4), hard, coarse SANDY CLAY with GRAVEL.	
							70	-10.5				
85.7	14.3					BULK			CL/SC		Dark yellowish brown (10YR 4/4), coarse SANDY CLAY to CLAYEY SAND with subrounded GRAVEL.	Bulk sample collected.
							75	-15.5				
			14.0		50/5"	MC			SC		Dark yellowish brown (10YR 4/4,) coarse CLAYEY SAND with GRAVEL. ...(78') - very dense.	
							80	-20.5	CL		Dark yellowish brown (10YR 4/4) CLAY with minor SAND and iron-oxide staining.	
							85	-25.5			...(84') - minor fine GRAVEL. ...(85') - increase in iron- and manganese-oxide staining. ...(87') - hard.	
			17.9	112.9	50	MC						
							90	-30.5			Notes:	
											1. Total depth of boring 88.5 feet below ground surface (bgs). 2. No groundwater encountered. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							95	-35.5				
							100	-40.5				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-09

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 55.3
 NORTHING: 2042504.9
 EASTING: 6024252.0

GW DEPTH: ~70 feet
 TOTAL DEPTH: 90.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	55.3	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	...(0'-6') - cleared by hand auger and air knife.
									GP		Aggregate base rock.	
		1.75					5	50.3	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	
											REFUSE: Greenish black (2.5Y/10Y), firm CLAY matrix with construction debris/trash (wood, concrete, plastic, bricks).	Moist. ...(6.5') - 1.75 tsf (pocket pen).
		1.25					10	45.3				...(10.5') - 1.25 tsf (pocket pen).
							15	40.3				...(16.5') - 1.75 tsf (pocket pen). Wet.
		1.75					20	35.3				Wet. ...(22') - 1.25 tsf (pocket pen).
		1.25					25	30.3				...(24') - 1.25 tsf (pocket pen).
		1.25										...(26') - 1.25 tsf (pocket pen).
					76	MC	30	25.3			...(29.5') - some newspaper.	
							35	20.3				
							40	15.3				
							45	10.3				
							50	5.3				
									CH		YOUNG BAY MUD: Dark greenish gray (3/10Y), stiff, fat CLAY with minor GRAVEL and seashells.	Moist.

CONTINUED ON NEXT PAGE

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-09

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TRECCE

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 55.3
 NORTHING: 2042504.9
 EASTING: 6024252.0

GW DEPTH: ~70 feet
 TOTAL DEPTH: 90.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	5.3			...same as above.	
		2.0							CH		YOUNG BAY MUD: Dark greenish gray (3/10Y), stiff, fat CLAY with minor GRAVEL and seashells.	Moist. ...(52.5') - 2.0 tsf (pocket pen).
		2.0					55	0.3			...(55') - no GRAVEL.	...(55') - moist. 2.0 tsf (pocket pen).
49.3	50.7	2.0	12.3			BULK			CL		Dark greenish gray (4/5GY), stiff, fine to coarse SANDY CLAY with GRAVEL up to 1" in size.	...(57") - moist. 2.0 tsf (pocket pen). Bulk sample collected.
		16.2			26	MC	60	-4.7	CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4), medium dense, fine to coarse CLAYEY SAND with GRAVEL up to 1.5" in size.	Moist. ...(61') - moist. 3.0 tsf (pocket pen).
		3.0							CL		Brown (10YR 4/3), stiff CLAY with fine to medium SAND.	...(63') - moist. 1.5 tsf (pocket pen).
		1.5					65	-9.7	CL		...(61') - some fine GRAVEL.	...(65') - moist. 4.5+ tsf (pocket pen).
45.7	54.3	>4.5				BULK			CL		Brown (10YR 4/3), stiff CLAY with minor coarse SAND and fine GRAVEL up to 3/8" in size.	...(67') - moist. 2.5 tsf (pocket pen). Bulk sample collected.
		2.5	21.7								...(67") - color change to dark yellowish brown (10YR 4/4); minor fine SAND.	...(69') - moist. 1.5 tsf (pocket pen).
		1.5	22.1	103.9	41	MC	70	-14.7	SW		Dark yellowish brown (10YR 4/4), dense, fine to medium SAND.	Wet.
		2.0	19.1	113.1		BULK			CL		Dark yellowish brown (10YR 4/4), dense, fine to medium SANDY CLAY.	Wet.
		1.25					75	-19.7	SW		Dark yellowish brown (10YR 4/4), dense, fine to medium SAND.	...(71.5') - 2.0 tsf (pocket pen)
		2.0				BULK			SC		Dark yellowish brown (10YR 4/4), dense, fine to medium CLAYEY SAND.	...(72") - wet. Bulk sample collected.
		3.5							CL		Dark yellowish brown (10YR 4/4), dense CLAY with fine to medium SAND.	Wet.
77.3	22.7		19.8	119.8	49	MC	80	-24.7	SC		Dark blueish gray (GLEY2 4/1), dense, fine to medium CLAYEY SAND.	...(74.5') - wet. 1.25 tsf (pocket pen).
		3.0							CL		Dark blueish gray (GLEY2 4/1), dense, fine to medium SANDY CLAY.	...(75') - bulk sample.
		2.0							CL		Olive (5Y 4/3), very stiff CLAY; oxidation banding.	...(76.5') - wet. 2.0 tsf (pocket pen).
		>4.5					85	-29.7	CL		Dark greenish gray (4/5GY), dense, fine to medium SAND with CLAY.	...(77') - moist. Bulk sample collected.
									CL		Mottled with olive and bluish gray CLAY with SAND. Stiff to hard. Abundant fine SAND to fine GRAVEL.	...(77.5') - 3.5 tsf (pocket pen)
		>4.5				BULK			CL		Olive gray (5Y 4/2), hard CLAY with abundant fine SAND to coarse GRAVEL up to 3" in size.	...(78") - bulk sample.
			14.8	123.0	67	MC	90	-34.7	SC		...(88.5') - abundant medium SAND to fine GRAVEL; oxidation banding.	...(79.5') - wet.
											Dark yellowish brown, dense CLAYEY SAND.	...(81') - 3.0 tsf (pocket pen).
												...(82') - moist.
												...(83') - 2.0 tsf (pocket pen)
												...(84') - moist.
												...(85') - 4.5+ tsf (pocket pen)
												...(88') - 4.5+ tsf (pocket pen)
												Bulk sample collected.
												...(88.5') - moist.
												...(90') - wet.
							95	-39.7			Notes:	
							100	-44.7			1. Total depth of boring 90.5 feet below ground surface (bgs).	
											2. Groundwater encountered at ~70 feet bgs.	
											3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	

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Geo-Logic Associates

Boring Log

BORING NO.: TG-10

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/20/18
 DATE FINISHED: 4/20/18
 ELEVATION: 54.5
 NORTHING: 2042708.1
 EASTING: 6024158.8

GW DEPTH: ~69 feet
 TOTAL DEPTH: 80.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		1.25					0	54.5	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	...(0'-6') - cleared by hand auger and air knife.
							5	49.5	GP		Aggregate base rock.	
									CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	...(5') - 1.25 tsf (pocket pen).
							10	44.5			REFUSE: Greenish black (5GY 2.5/1) CLAY with variable amounts of trash/debris (wood, concrete, rubble, plastic, etc).	
							15	39.5				
							20	34.5				
							25	29.5			...(25') - minor trash/debris.	
		1.75					30	24.5				...(27') - 1.75 tsf (pocket pen).
							35	19.5				...(29'-36') - no sample return.
							40	14.5				
							45	9.5				
							50	4.5	CH		YOUNG BAY MUD: Dark greenish gray (5GY 3/1), medium dense SANDY CLAY. Abundant fine to coarse SAND with minor shells.	Moist to wet.
		1.75							CL		Dark greenish gray (5GY 3/1), firm, lean CLAY; abundant shells.	Moist. ...(52') - 1.75 tsf (pocket pen).

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Geo-Logic Associates

Boring Log

BORING NO.: TG-10

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/20/18
 DATE FINISHED: 4/20/18
 ELEVATION: 54.5
 NORTHING: 2042708.1
 EASTING: 6024158.8

GW DEPTH: ~69 feet
 TOTAL DEPTH: 80.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		1.75				BULK	50	4.5	CH		...same as above.	Moist to wet.
											YOUNG BAY MUD: Dark greenish gray (5GY 3/1), medium dense SANDY CLAY. Abundant fine to coarse SAND with minor shells.	Moist.
		>4.5					55	-0.5	CL		Dark greenish gray (5GY 3/1), firm, lean CLAY; abundant shells.	...(52') - 1.75 tsf (pocket pen).
		>4.5									...(54') - few shells.	Bulk sample collected.
									SC		Dark greenish gray (5GY 3/1), medium dense CLAYEY SAND with GRAVEL.	Wet.
					33	MC	60	-5.5	CL		OLDER BAY ALLUVIUM: Dark greenish gray (5GY 4/1), hard SANDY CLAY. Abundant fine SAND. CLAYEY SAND with GRAVEL at base.	Moist.
		2.5							CL		Dark yellowish brown, hard SANDY CLAY with GRAVEL up to 1" in size. Abundant fine to coarse SAND.	...(57') - 4.5+ tsf (pocket pen).
		3.0							CL		Dark yellowish brown, hard SANDY CLAY with GRAVEL up to 1" in size. Abundant fine to coarse SAND.	...(57.5') - moist.
		3.0				BULK	65	-10.5	SC		Dark yellowish brown (10YR 4/4), dense, fine to medium CLAYEY SAND.	...(58') - 4.5+ tsf (pocket pen).
		1.75							SW		Dark yellowish brown (10YR 4/4), dense, fine to medium SAND.	Wet. No liners in split spoon.
		1.5				BULK			CL		Dark yellowish brown (10YR 4/6), stiff CLAY with fine to coarse SAND and minor fine GRAVEL.	Wet.
					43	MC	70	-15.5	CL		Dark yellowish brown (10YR 4/6), very stiff CLAY with abundant fine SAND.	...(62') - moist. 2.5 tsf (pocket pen).
									SW		...(67') - siff; abundant fine SAND.	...(64') - moist. 3.0 tsf (pocket pen).
		2.75							CL		Interbedded SAND/CLAY.	...(65') - bulk sample.
									SC		Dark yellowish brown, dense CLAYEY SAND.	...(65.5') - 3.0 tsf (pocket pen).
		3.25				BULK	75	-20.5	CL		Dark yellowish brown, stiff CLAY with SAND.	...(67') - moist. 1.75 tsf (pocket pen).
									CL		Light olive brown (2.5Y 5/3), very stiff CLAY with minor fine to medium SAND.	...(68') - 1.5 tsf (pocket pen).
									CL		Light olive brown (2.5Y 5/3), very stiff SANDY CLAY with minor fine to medium SAND.	Bulk sample collected.
					11	MC	80	-25.5				...(69') - wet.
												...(72') - moist. 2.75 tsf (pocket pen).
												...(74') - moist. 3.25 tsf (pocket pen).
												Bulk sample.
												...(79') - slough, no sample recovered.
Notes:												
							85	-30.5			1. Total depth of boring 80.5 feet below ground surface (bgs).	
											2. Groundwater encountered at ~69 feet bgs.	
							90	-35.5			3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							95	-40.5				
							100	-45.5				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-14

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 45.8
 NORTHING: 2042810.5
 EASTING: 6024341.5

GW DEPTH: ~67 feet
 TOTAL DEPTH: 90.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	45.8	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	
									GP		Aggregate base rock.	Moist.
							5	40.8	CL		Low Permeability Barrier Layer: Very dark gray (2.5Y 3/1), stiff CLAY.	
							10	35.8	CL		Foundation Layer: Very dark grayish brown (2.5Y 3/2), stiff SANDY CLAY. Abundant fine to medium SAND and GRAVEL.	Moist.
							15	30.8	CL		Foundation Layer: Very dark greenish gray (2.5/5G), firm SANDY CLAY.	Moist.
					50/4"	MC	20	25.8			REFUSE: Wood, concrete, and plastic debris in a dark greenish gray to black CLAYEY matrix. ...(18') - mostly peat-like; woody debris. ...(21.5') - mostly greenish black, fat CLAY matrix around minor amounts of woody debris. Minor SAND and GRAVEL.	
							25	20.8				
							30	15.8				...(29') - no sample recovered.
							35	10.8				
					78/9"	MC	40	5.8			...(39.5') - woody debris in SANDY CLAY matrix. Minor SAND and GRAVEL.	
							45	0.8	CH		YOUNG BAY MUD: Greenish black (2.5/10GY), soft, fat CLAY.	...(46.5') - moist. 0.75 tsf (pocket pen).
		0.75									...(47'-47.5') - SAND lens.	
		2.5							CL		Dark greenish gray (4/5GY), stiff, lean CLAY with minor fine SAND.	...(48") - moist. 2.5 tsf (pocket pen).
		2.5	35.7	84.6	14	MC	50	-4.2	CL		OLDER BAY ALLUVIUM: Yellowish brown (10YR 5/4), stiff, lean CLAY; oxidized.	...(50') - moist. ...(50.5') - 2.5 tsf (pocket pen).

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Geo-Logic Associates

Boring Log

BORING NO.: TG-14

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 45.8
 NORTHING: 2042810.5
 EASTING: 6024341.5

GW DEPTH: ~67 feet
 TOTAL DEPTH: 90.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		2.5					50	-4.2		CL	OLDER BAY ALLUVIUM: Yellowish brown (10YR 5/4), stiff, lean CLAY; oxidized.	...(50') - moist.
		2.0									...	...(50.5') - 2.5 tsf (pocket pen).
		4.0									...	...(52.5') - moist.
							55	-9.2		CL	Yellowish brown (10YR 5/4), stiff, lean CLAY; oxidized.	...(53') - 2.0 tsf (pocket pen).
											...	...(55') - 4.0 tsf (pocket pen).
										CL	Yellowish brown (10YR 5/6), hard CLAY with fine to medium SAND.	Moist.
					50	MC				CL	Yellowish brown (10YR 5/6), hard, lean CLAY; oxidized.	Moist to wet.
							60	-14.2			...	...(59') - no sample recovered.
										CL	Yellowish brown (10YR 5/6), hard SANDY CLAY with GRAVEL.	Moist.
							65	-19.2			...	Wet.
					20	MC					...(67') - more GRAVEL than above; stiff; fine to coarse SAND and GRAVEL up to 1" in size.	
							70	-24.2		SW/CL	Brown (10YR 4/3), medium dense, well-graded, fine to coarse SAND with CLAY.	Moist to wet.
		2.5									...	Moist to wet.
										CL	Olive (2.5Y 5/4), stiff LEAN CLAY; minor oxidation.	...(72.5') - moist to wet. 2.5 tsf (pocket pen).
		2.5					75	-29.2			...	...(75.5') - 2.5 tsf (pocket pen).
			25.0	109.3	44	MC	80	-34.2				Wet.
Notes:												
							85	-39.2			1. Total depth of boring 80.5 feet below ground surface (bgs).	
											2. Groundwater encountered at ~67 feet bgs.	
											3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							90	-44.2				
							95	-49.2				
							100	-54.2				

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-16

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 39.9
 NORTHING: 2042825.8
 EASTING: 6024567.4

GW DEPTH: ~52 feet
 TOTAL DEPTH: 78.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	39.9	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	
									GP		Aggregate base rock.	
							5	34.9	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Dark olive brown, very stiff CLAY.	Moist.
							10	29.9			REFUSE: Greenish black (2.5/5GY), stiff CLAY with wood debris, carpet, concrete.	Moist.
					41	MC	15	24.9			...(17.5') - greenish black (2.5/5GY), stiff SANDY CLAY with wood debris, carpet, concrete.	Moist.
							20	19.9			...(19') - greenish black (2.5/5GY), stiff, fat CLAY with wood debris, carpet, concrete.	Moist.
											...(20.5') - same as above with abundant concrete/bricks.	Moist.
			27.7	76.4	45	MC	25	14.9				
							30	9.9			...(28') - same as above with wood chunks.	...(28') - free water in sample.
							35	4.9				Moist.
		1.0	59.6	54.5	45	MC	40	-0.1	CH		...(38') - more CLAY than above.	Moist.
											YOUNG BAY MUD: Greenish black (2.5/5GY), firm CLAY with abundant seashells and minor fine SAND.	...(39') - 1.0 tsf (pocket pen).
		2.75					45	-5.1	CL		OLDER BAY ALLUVIUM: Dark greenish gray (4/5GY), stiff, fat CLAY with abundant fine to coarse SAND.	...(43') - moist. 2.75 tsf (pocket pen).
		2.25							CL		Brown (10YR 5/3), very stiff CLAY with minor subrounded to subangular, fine to coarse SAND up to 1/8" in size; oxidized.	...(44') - moist. 2.25 tsf (pocket pen).
		3.5	19.5	110.6	40	MC					...(48') - 3.5 tsf (pocket pen)	
							50	-10.1	CL		Brown (10YR 5/3), firm CLAY; oxidized; little to no SAND.	...(49.5') - moist.
		2.0							CL		Brown (10YR 5/3), firm to stiff CLAY with minor fine to coarse SAND; oxidized.	...(50') - 1.25 tsf (pocket pen).
											...(52') - moist to wet.	
											2.0 tsf (pocket pen).	

CONTINUED ON NEXT PAGE

The data presented on this log is a simplification of actual conditions encountered and applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change with the passage of time.

Geo-Logic Associates

Boring Log

BORING NO.: TG-16

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: B. TREECE

DATE STARTED: 4/17/18
 DATE FINISHED: 4/17/18
 ELEVATION: 39.9
 NORTHING: 2042825.8
 EASTING: 6024567.4

GW DEPTH: ~52 feet
 TOTAL DEPTH: 78.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
		1.0					50	-10.1	CL	CL	...same as above.	...(50') - 1.25 tsf (pocket pen).
									CL	CL	Brown (10YR 5/3), firm to stiff CLAY with minor fine to coarse SAND; oxidized.	...(52') - moist to wet. 2.0 tsf (pocket pen).
							55	-15.1	SC	SC	Brown (10YR 5/3), dense, fine to medium CLAYEY SAND with minor fine GRAVEL.	Moist to wet.
									CL	CL	Brown (10YR 5/3), dense SANDY CLAY. Fine to medium SAND and minor fine GRAVEL.	Moist to wet.
50.5	49.5	>4.5	15.6	119.3	67	MC			CL	CL	Dark yellowish brown (10YR 4/6), hard CLAY with abundant fine to coarse SAND and minor fine GRAVEL.	Moist. ... (58') - 4.5+ tsf (pocket pen).
		>4.5					60	-20.1				...(59.5') - 4.5+ tsf (pocket pen).
									CL	CL	Olive (5Y 5/3), hard CLAY; rare medium SAND.	Moist.
							65	-25.1				
		2.5	38.3	82.5	33	MC			CL	CL	Dark yellowish brown (10YR 3/4), hard CLAY with minor fine to coarse SAND.	Moist.
		2.0							CL	CL	Olive (5Y 5/3), stiff CLAY.	...(67.5') - moist. 2.5 tsf (pocket pen).
		3.25					70	-30.1				...(68.5') - 2.0 tsf (pocket pen).
									CL	CL	Olive (5Y 5/3), very stiff CLAY; oxidized.	...(70') - moist.
									CL	CL	Yellowish brown (10YR 3/4), very stiff, fine to coarse SANDY CLAY with GRAVEL up to 3/4" in size; oxidized.	...(70.5') - 3.25 tsf (pocket pen).
		4.0										...(71') - moist.
												...(73.5') - 4.0 tsf (pocket pen).
		2.0					75	-35.1				...(74') - moist.
		1.5							CL	CL	Yellowish brown (10YR 3/4), hard CLAY. Oxidation banding.	...(75.5') - 2.0 tsf (pocket pen).
		1.5	27.7	96.8	69	MC					...(76.5') - color change to olive brown.	...(76.5') - moist. 1.5 tsf (pocket pen).
		3.0									...(77.5') - color change to yellowish brown (10YR 3/4).	...(77.5') - moist. 1.5 tsf (pocket pen).
							80	-40.1				...(78') - 3.0 tsf (pocket pen).
											Notes:	
											1. Total depth of boring 78.5 feet below ground surface (bgs).	
							85	-45.1			2. Groundwater encountered at ~52 feet bgs.	
											3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							90	-50.1				
							95	-55.1				
							100	-60.1				

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Geo-Logic Associates

Boring Log

BORING NO.: TG-17

PAGE: 1 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 34.9
 NORTHING: 2043069.7
 EASTING: 6024505.3

GW DEPTH: ~17 feet
 TOTAL DEPTH: 68.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							0	34.9	SM		FINAL COVER: Synthetic turf on top of gray, poorly graded, fine SILTY SAND.	Dry.
									GP		Aggregate base rock.	...(0'-7') - cleared by hand auger and air knife.
							5	29.9	CL		Low Permeability Barrier Layer and Foundation Layer (Undifferentiated): Black (10YR 2/1) CLAY.	Dry to moist.
							10	24.9			REFUSE: Black (10YR 2/1) CLAY with very little refuse.	Wet (boring left open overnight).
							15	19.9			...(11') - increase in refuse. Mostly wood, lesser tile and concrete.	Moist.
											...(17') - minimal refuse.	Wet.
							20	14.9			...(19') - mostly wood.	Moist.
							25	9.9				
					13	MC	30	4.9			...(27') - stiff.	Wet.
							35	-0.1				Moist.
									CH		YOUNG BAY MUD: Dark greenish gray (5GY 4/1), fossiliferous, fat CLAY.	Wet.
							40	-5.1	CL		OLDER BAY ALLUVIUM: Dark yellowish brown (10YR 4/4) SANDY CLAY with abundant GRAVEL and iron-oxide staining.	
									SC		Dark yellowish brown (10YR 4/4) CLAYEY SAND with GRAVEL.	
							45	-10.1	CL/SC		Dark yellowish brown (10YR 4/4) CLAYEY SAND to SANDY CLAY.	
			20.9	109.5	46	MC			CL		Dark yellowish brown (10YR 4/4) CLAY with SAND and iron-oxide staining.	
											...(47') - hard; minor GRAVEL.	
							50	-15.1	CL		Dark yellowish brown (10YR 4/4) SANDY CLAY with subrounded GRAVEL.	
											...(51') - iron-oxide staining.	

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Geo-Logic Associates

Boring Log

BORING NO.: TG-17

PAGE: 2 OF 2

JOB NO.: RM18.1038
 SITE LOCATION: TOPGOLF BURLINGAME
 DRILLING METHOD: 6" Ø SONIC (LS 600)
 CONTRACTOR: CASCADE DRILLING
 LOGGED BY: K. WELCHANS

DATE STARTED: 4/19/18
 DATE FINISHED: 4/19/18
 ELEVATION: 34.9
 NORTHING: 2043069.7
 EASTING: 6024505.3

GW DEPTH: ~17 feet
 TOTAL DEPTH: 68.5 feet

SAND & GRAVEL	SILT & CLAY	POCKET PEN (TSF)	MOISTURE (%)	DRY DENSITY (LBS/CU. FT.)	BLOWS (COUNT/FT.)	SAMPLE TYPE	DEPTH IN FEET	ELEVATION IN FEET	MATERIAL SYMBOL	USCS SYMBOL	DESCRIPTION	COMMENTS
							50	-15.1		CL	...same as above. ...(51') - iron-oxide staining. ...(53') - increase in GRAVEL content.	
					16	MC	55	-20.1			...(57') - very stiff.	No sample return. Sand catcher used.
							60	-25.1		CL	Olive (5Y 4/3) CLAY. ...(63') - iron-oxide staining.	
			37.6	82.2	22	MC	65	-30.1			...(67') - very stiff.	
							70	-35.1			Notes: 1. Total depth of boring 68.5 feet below ground surface (bgs). 2. Groundwater encountered at ~17 feet bgs. 3. Boring backfilled with bentonite grout to the top of trash. Bentonite chips placed on top of the slurry to one foot below ground surface. Top one foot backfilled with SANDY CLAY.	
							75	-40.1				
							80	-45.1				
							85	-50.1				
							90	-55.1				
							95	-60.1				
							100	-65.1				

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GREGG DRILLING, LLC.
WWW.GREGGDRILLING.COM

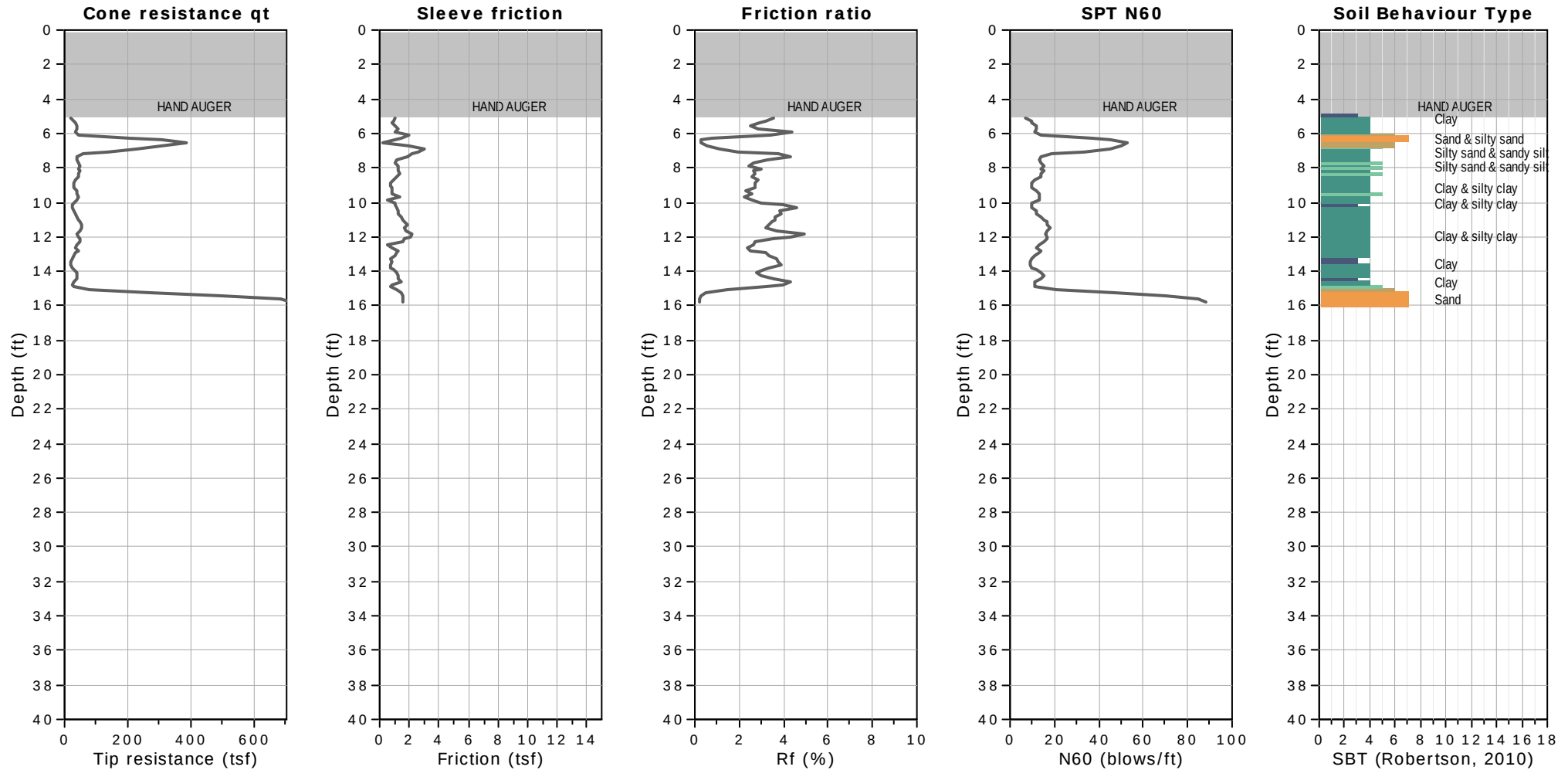
CPT: 2CPT-001

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 15.75 ft, Date: 1/14/2019



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |



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WWW.GREGGDRILLING.COM

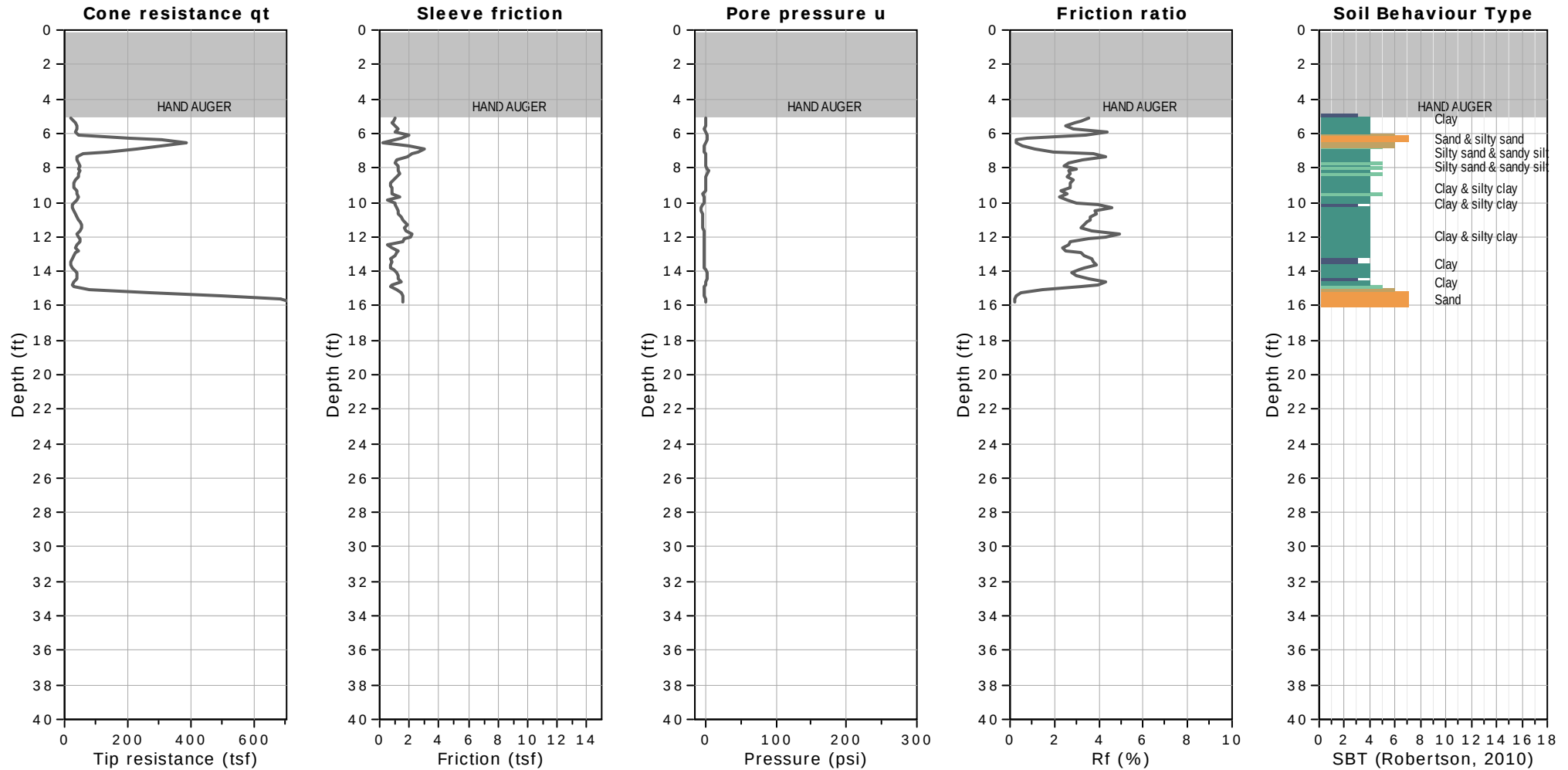
CPT: 2CPT-001

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 15.75 ft, Date: 1/14/2019



WATER TABLE FOR ESTIMATING PURPOSES ONLY



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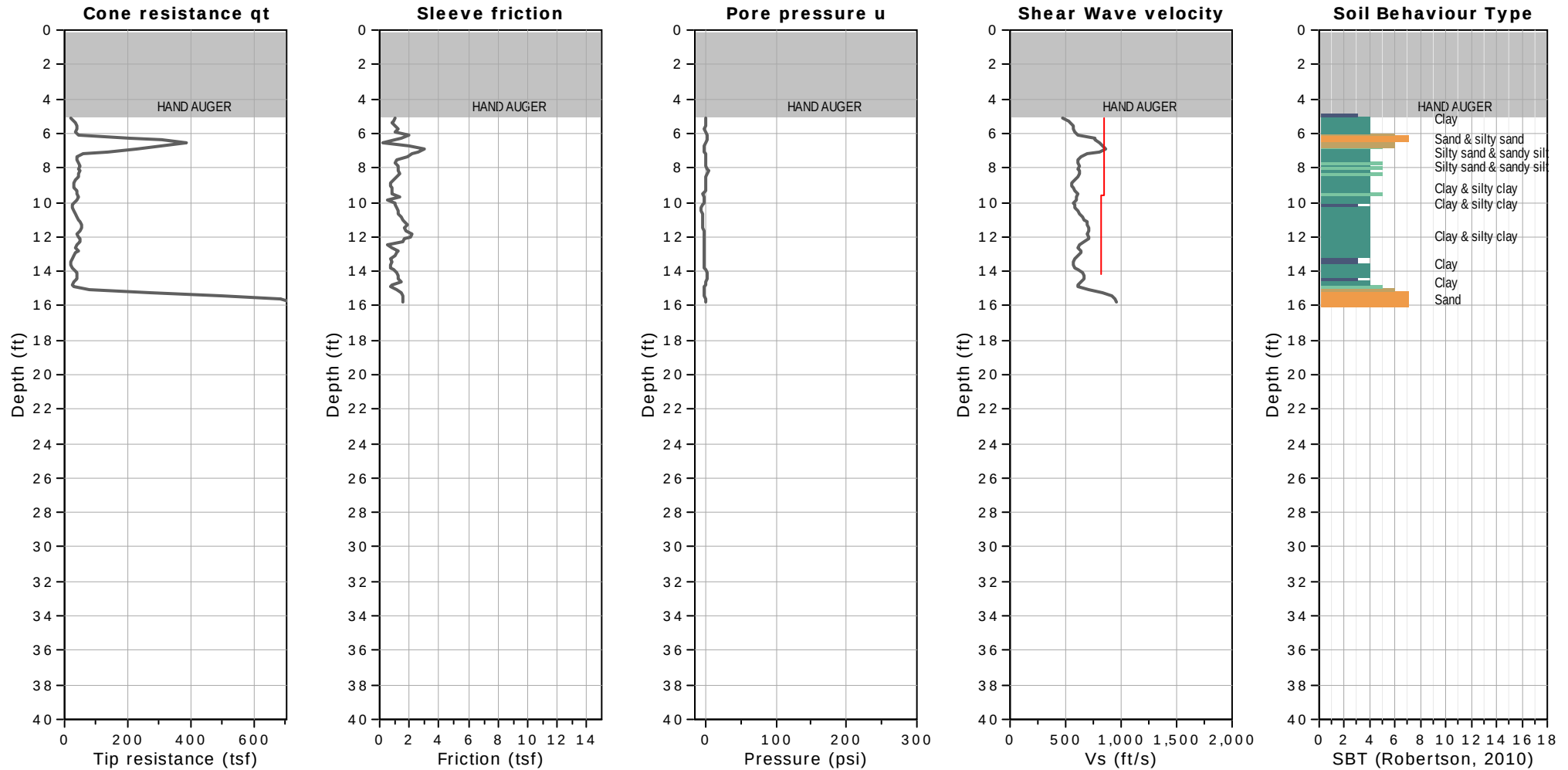
CPT: 2CPT-001

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 15.75 ft, Date: 1/14/2019



SBTn legend

- | | | |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand |
| 2. Organic material | 5. Silty sand to sandy silt | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay | 6. Clean sand to silty sand | 9. Very stiff fine grained |

WATER TABLE FOR ESTIMATING PURPOSES ONLY



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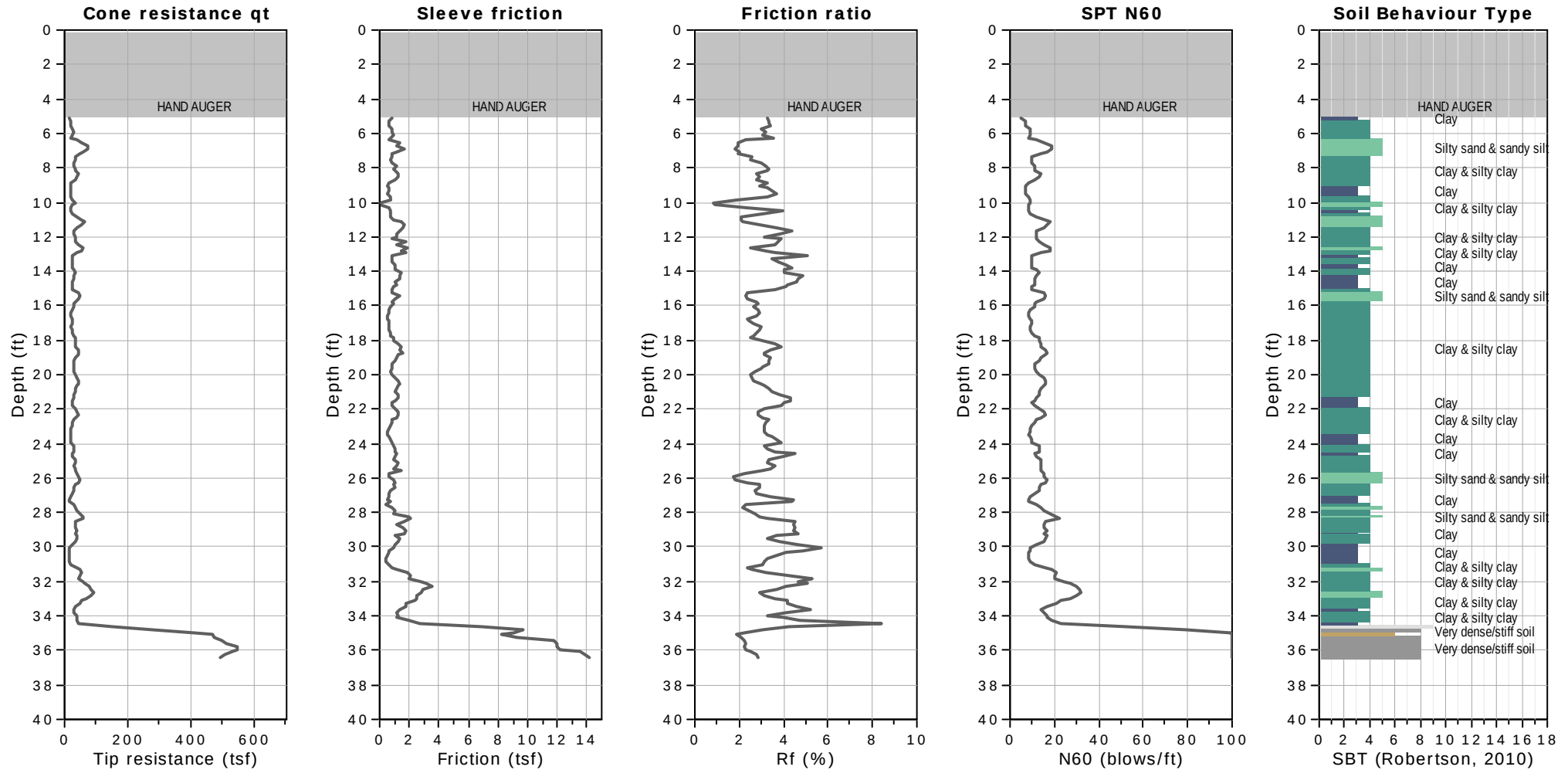
CPT: SCPT-01A

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 36.42 ft, Date: 1/14/2019





GREGG DRILLING, LLC.
WWW.GREGGDRILLING.COM

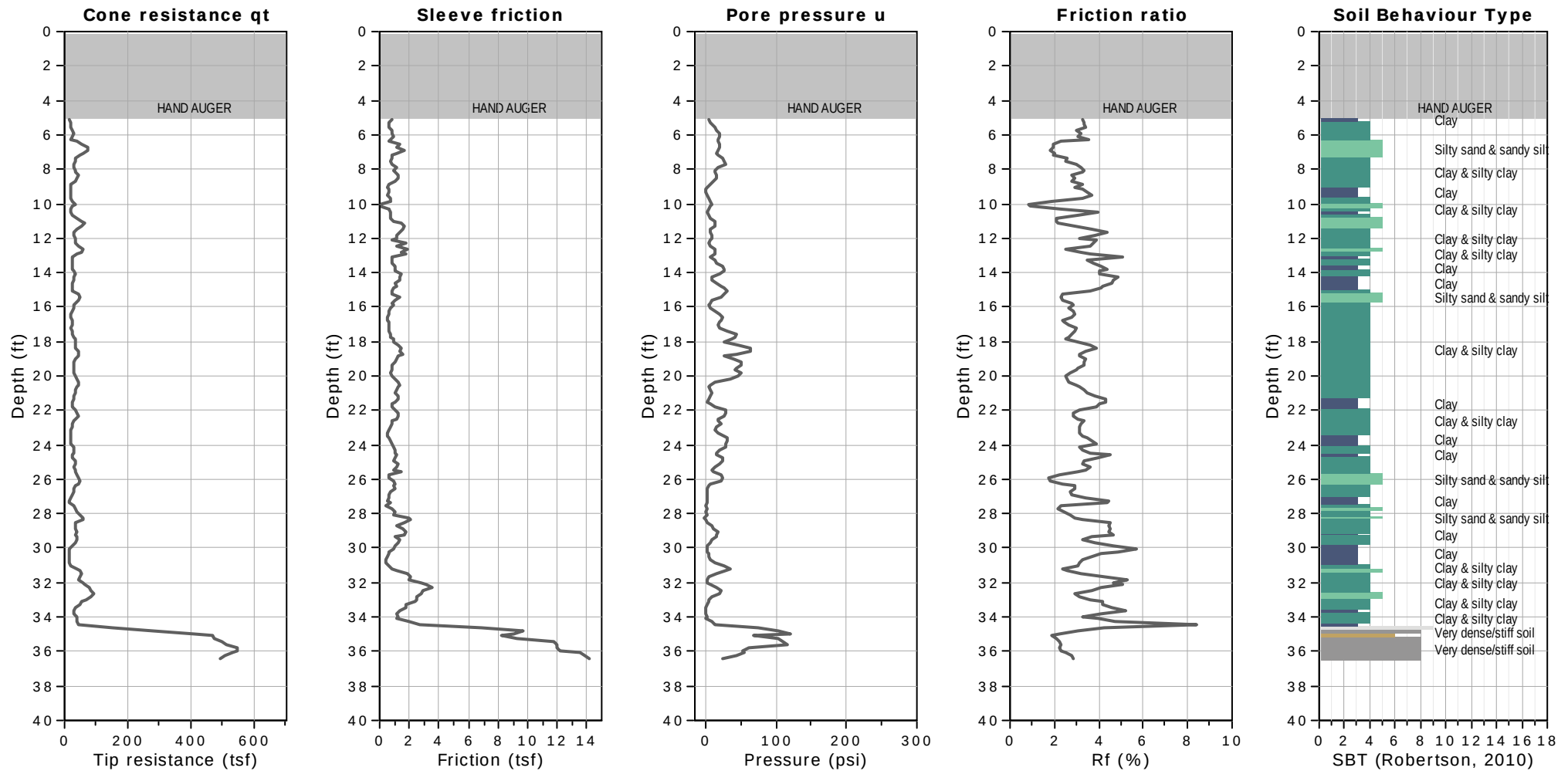
CPT: SCPT-01A

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 36.42 ft, Date: 1/14/2019



WATER TABLE FOR ESTIMATING PURPOSES ONLY



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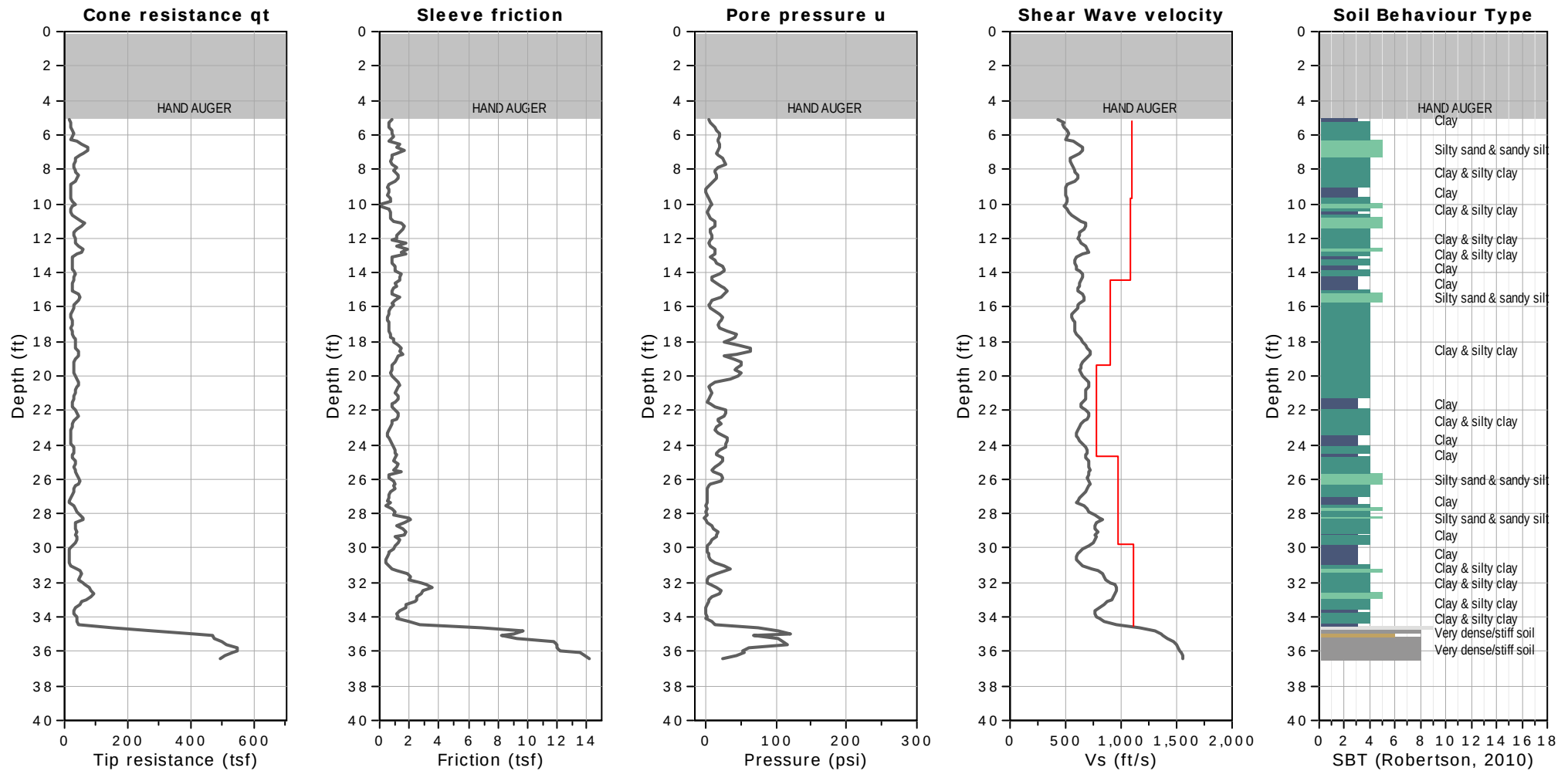
CPT: SCPT-01A

CLIENT: RMC

Field Rep: RICK M.

SITE: BURLINGAME GOLF CENTER - 1001 AIRPORT BLVD, BURLINGAME, CA

Total depth: 36.42 ft, Date: 1/14/2019



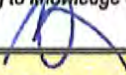
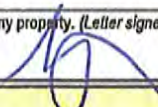
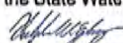
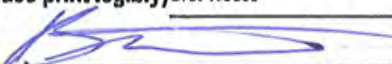
WATER TABLE FOR ESTIMATING PURPOSES ONLY

DRILLING NOTIFICATION FORM FOR ANNUAL GEOTECHNICAL DRILLING PERMIT

SAN MATEO COUNTY ENVIRONMENTAL HEALTH SERVICES DIVISION
2000 ALAMEDA DE LAS PULGAS, SUITE 100, SAN MATEO, CA. 94403
VOICE (650) 372-6200 FAX (650) 627-8244 WWW.SMCHEALTH.ORG

An accurate & correct map of proposed boring locations must be included with notification.

Notification is hereby given under Annual Geotechnical Drilling Permit No. AGDP-17-0737 with expiration date April 21, 2018 that Geo-Logic Associates will be drilling for soil boring geotechnical investigation only, not permanent structures or for environmental investigations, as described below.

ALL DRILLING MUST BE SCHEDULED WITH COUNTY STAFF (drilling@smcgov.org) AT LEAST TWO (2) WORKING DAYS (48 HOURS) IN ADVANCE	
DRILLING WILL BEGIN ON: <u>4/16/2018</u>	AT: <u>0900AM</u> (AM/PM) NO. OF BORINGS <u>19</u>
BORING DESIGNATIONS# <u>TG-01 Through TG-19</u>	
DRILLING INFORMATION (MUST BE FILLED OUT COMPLETELY)	
SITE NAME <u>Burlingame Golf Center</u>	ASSESSOR'S PARCEL # (REQUIRED) <u>02629038</u> (one per permit)
DRILLING LOCATION ADDRESS <u>250 Anza Blvd</u>	CITY <u>Burlingame</u> ZIP <u>94010</u>
Borings To Be Constructed In: ☐ Public Property ☒ Private Property ☒ Refuse ☐ Other _____	
Maximum Proposed Depth Wells/Borings <u>80</u>	(feet) Drilling Method <u>Sonic</u>
Boring Diameter <u>8"</u>	Grout Material: <u>use 6 gallons water max per 94 lb cement, can add up to 5% bentonite</u>
BORING OWNER (BORING OWNER NAME OR CONTACT NAME SHOULD MATCH SIGNATURE)	
NAME <u>City of Burlingame</u>	CONTACT PERSON <u>Margaret Glomstad</u>
ADDRESS <u>850 Burlingame Ave</u>	CITY, STATE, ZIP <u>Burlingame, CA, 94010</u>
TELEPHONE <u>6505587307</u>	EMAIL <u>mglomstad@burlingame.org</u>
<i>(Letter signed by boring owner attesting to knowledge of all permit requirements and conditions, may be substituted for signature on permit application.)</i>	
Boring Owner's Signature 	Date <u>4/11/18</u>
PROPERTY OWNER (NAME AS APPEARS ON ASSESSOR'S ROLES SHOULD MATCH SIGNATURE)	
NAME <u>City of Burlingame</u>	CONTACT PERSON <u>Margaret Glomstad</u>
ADDRESS <u>850 Burlingame Ave</u>	CITY, STATE, ZIP <u>Burlingame, CA, 94010</u>
TELEPHONE <u>6505587307</u>	EMAIL <u>mglomstad@burlingame.org</u>
<i>I understand that a boring(s) is being installed on my property. (Letter signed by property owner, containing previous language, or encroachment permit may be substituted for signature on permit application.)</i>	
Property Owner's Signature 	Date <u>4/11/18</u>
DRILLING COMPANY	
DRILLING COMPANY <u>Cascade Drilling</u>	CONTACT PERSON <u>Ken Phillips</u>
ADDRESS <u>3000 Duluth Street</u>	CITY, STATE, ZIP <u>West Sacramento, CA 95691</u>
TELEPHONE <u>916-638-1169</u>	C 57 LICENSE # <u>938110</u> E-MAIL <u>kphillips@cascade-env.com</u>
I certify that borings under this notification will be constructed/destroyed in compliance with the conditions of the Annual Geotechnical Drilling Permit listed above, the San Mateo County Ordinance, and the State Water Well Standards, and that the license listed above is considered current and active by the Contractor's State License Board.	
Driller's Signature 	Date <u>4/12/2018</u>
CONSULTANT COMPANY	
CONSULTANT COMPANY <u>Geo-Logic Associates</u>	PROJECT MANAGER <u>Bret Treece</u>
ADDRESS <u>16055 Caputo Drive Spc D</u>	TELEPHONE # <u>4087782818</u>
CITY, STATE, ZIP <u>Morgan Hill, CA, 95037</u>	E-MAIL <u>btreece@geo-logic.com</u>
I certify that this notification is correct to the best of my knowledge. I certify that the geotechnical borings under this notification will be constructed/destroyed in compliance with the conditions of the Annual Geotechnical Drilling Permit listed above, the San Mateo County Ordinance, and the State Water Well Standards. I certify if I indicated the purpose of drilling is geotechnical, then no one will use the boring to collect any samples for environmental analyses. (Responsible Professional must be a California Professional Geologist or Civil Engineer.)	
Responsible Professional's Name (Please print legibly) <u>Bret Treece</u>	
Responsible Professional's Signature 	Date <u>4/12/2018</u>
California Professional Geologist (PG) No. <u>9265</u>	or Civil Engineer (PE) No. _____

ORDINANCE: 04023

ENVIRONMENTAL HEALTH
SAN MATEO COUNTY



Protecting Our Health and Environment

PERMIT 19-0067

P/E: 2014 GEOTECHNICAL - 1X SOIL BORING PERMIT-PARCEL

FACILITY:

1001 AIRPORT BLVD, BURLINGAME

OWNER:

CITY OF BURLINGAME
850 BURLINGAME AVE
BURLINGAME

WP0012169 FA0065426
026290380
AMOUNT PAID: 0.00

CONTRACTOR:

GREGG DRILLING

TERMS & CONDITIONS:

CONSTRUCT SOIL BORINGS (2)
CONSULTANT: GEO-LOGIC ASSOCIATES
PROJECT MANAGER: R. MITCHELL

KIAN ATKINSON

ENVIRONMENTAL HEALTH SPECIALIST

DATE ISSUED: 1/14/2018

EXPIRATION DATE: 5/14/2019

THIS PERMIT IS NONTRANSFERABLE AND MUST BE POSTED ON-SITE IN A CONSPICUOUS PLACE



SAN MATEO COUNTY HEALTH
**ENVIRONMENTAL
HEALTH SERVICES**

SAN MATEO COUNTY
ENVIRONMENTAL HEALTH

JAN 09 2019

RECEIVED

Environmental Health Services
Groundwater Protection Program
2000 Alameda de las Pulgas, Suite #100
San Mateo, CA 94403
Phone: (650) 372-6200 | Fax: (650) 627-8244
smchealth.org/gpp

SUBSURFACE DRILLING PERMIT APPLICATION

Allow three (3) full working days for processing a complete permit application which includes payment (one permit per parcel). Drilling start date & time must be scheduled with County staff at (650) 464-0047 or drilling@smcgov.org at least 2 full working days (i.e. 48 hours) in advance. Visit smchealth.org/ehfees for Groundwater Protection Program Fees

PURPOSE OF APPLICATION ☐ Groundwater Monitoring/Vapor Well Installation ☒ Construct Soil Borings (variance request if to be left open >24 hrs)
☐ Groundwater Monitoring/Vapor Well Destruction Extension of Permit # (related to annual permit # 17-0737, attached)
No. of Wells 0 No. of Borings 2 Well/Boring Names CPT-01, CPT-02

PURPOSE OF DRILLING ☐ Environmental LEAD ☐ County GPP (permit approval is not to be considered work plan approval)
☒ Geotechnical AGENCY ☒ RWQCB/DTSC/USEPA (Provide approval letter) ☐ None (i.e. voluntary)

SITE / DRILLING INFORMATION

Agency Case # _____ Assessor's Parcel # (required) 026290380 (one per permit)

Drilling Location Address: 1001 Airport Boulevard City: Burlingame Zip: 94010

To Be Constructed In: ☐ Public Property ☐ Private Property ☐ Refuse

Maximum Proposed Depth (wells/borings) 150 (feet) Drilling Method: Cone Penetration Test (CPT)

Boring Diameter: Not Applicable Casing Diameter: Not Applicable Filter Pack Interval: Not Applicable Screen Interval: Not Applicable

Destruction Method: ☐ Pressure Grouting (provide well construction logs and grout calcs)
(6 gallons water max/94 lb cement, up to 5% bentonite) ☐ Overdrilling (guide rods for total depth prior to starting required)

WELL/BORING OWNER (Well/boring owner name or contact person should match signature)

Name: City of Burlingame Contact Person: Art Morimoto

Address: 850 Burlingame Avenue City, State, Zip: Burlingame, CA 94010

Telephone: 650-558-7246 Email: amorimoto@burlingame.org

It is my responsibility to notify the County of any known changes in the purpose of this well/boring from that which is indicated on this application, to submit indication of annual usage of wells to the County, and to maintain the well in good condition. (Letter signed by well/boring owner/contact person, containing above language and attesting to knowledge of all permit requirements and conditions, may be substituted for signature.)

Well/Boring Owner's/Contact Person's Signature: _____ Date: See Attachment

PROPERTY OWNER (Name as appears on assessor's roles should match signature)

Name: Same as Well/Boring Owner Contact Person: Same as Well/Boring Owner

Address: Same as Well/Boring Owner City, State, Zip: Same as Well/Boring Owner

Telephone: Same as Well/Boring Owner Email: Same as Well/Boring Owner

I understand that a well/boring is being installed on my property. I agree to notify the County and Well Owner of any known damage or future access issues to the well (Letter signed by property owner, containing above language, or encroachment permit may be substituted for signature)

Property Owner's Signature: _____ Date: Same as Well/Boring Owner

DRILLING COMPANY

Drilling Company: Gregg Drilling Contact Person: Mary Walden

Address: 950 Howe Road City, State, Zip: Martinez, CA 94553

Telephone: 925-313-5800 Email: mwalden@greggdrilling.com C57 Drillers License # 1044456 exp. 9/2020

I certify that the well/boring will be constructed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards, and that the license listed above is considered current and active by the Contractors State License Board.

Driller's Signature: _____ Date: See Attachment

CONSULTANT COMPANY

Consultant Company: Geo-Logic Associates Project Manager: R. Mitchell

Address: 405 East D Street, Suite N City, State, Zip: Petaluma, CA 94952

Telephone: 415-699-8073 Email: rmitchell@rmcgeoscience.com

Field Contact & Cell # (if known): Alan Witthoeft (214-729-1267)

I certify that this application is correct to the best of my knowledge and the well/boring will be constructed/destroyed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards. I understand that I am responsible for General Conditions E, F, K, and L of this permit and if I indicated the purpose of drilling is geotechnical, then no one will use the boring to collect any samples for environmental analyses. If there is a change in Responsible Professional, I will notify San Mateo County GPP staff.

Responsible Professional's Name (Please print legibly): Richard Mitchell

Responsible Professional's Signature: _____ Date: See Attachment

California Professional Geologist (PG) No. 4380 or Civil Engineer (PE) No. Not Applicable

SUBSURFACE DRILLING PERMIT APPLICATION

REQUIREMENTS:

An accurate and correct map must be submitted with the application and include the following: north arrow, existing and historic site features, existing and proposed well/boring locations with ID's to scale, property lines and any other pertinent information. A work plan describing the drilling and construction/destruction methodology may be requested by County staff. A complete application with appropriate fees must be submitted 3 working days in advance of drilling and notification of start date and time must be provided at least 2 working days prior to drilling. The permit is subject to both General and Special Conditions stated below. A copy of the approved Subsurface Drilling Permit must be available on site while work related to the permit is being performed. Drilling may begin at the notified date and time whether County staff is present or not.

GENERAL CONDITIONS:

- A. Field notification must be provided to GPP drilling inspection staff at least 2 full working days prior to the start of drilling. GPP Caseworker also must be notified if site is associated with a remedial action case.
- B. Well and boring construction and destruction under this permit are subject to the Standards for the Construction of Wells in San Mateo County, County Groundwater Protection Program (GPP) Guidelines, Policies & Procedures, the State Water Well Standards, and any instructions by a Health Department representative.
- C. Well/Boring Owner, Driller, and Responsible Professional assume responsibility for all activities and uses under the permit, including compliance with Workmen's Compensation Laws, and indemnify, defend and save the County of San Mateo, its officers, agents and employees, free and harmless from any and all expense, cost, or liability in connection with or resulting from work or stopped-work associated with the permit, including, but not limited to, property damage, personal injury, wrongful death, and loss of income.
- D. All borings must be properly destroyed (grouted/sealed) within 24 hours of drilling, unless special conditions are approved beforehand in writing as part of this permit, and must be continuously protected and stabilized.
- E. Analytical results of all soil, vapor, and groundwater samples collected during the execution of drilling under this permit must be submitted to County GPP staff by the Responsible Professional within 60 days of sample collection. If contamination is discovered during drilling, verbal notification to County GPP by the Responsible Professional is required within 72 hours of discovery. Proper storage, labeling & disposal of investigation-derived residual wastes are the responsibility of the consultant unless stated otherwise contractually.
- F. Boring logs, well construction details, and finalized as-built location map for all borings/ wells (except geotechnical borings) signed by a Responsible Professional, must be submitted to County GPP by the Responsible Professional within 60 days of drilling/construction/destruction. DWR Form 188 must be filed with the State per water code 13752.
- G. Permit is valid only for the purpose specified herein. No change in purpose or required procedures, as described on this permit application, in the associated workplan, or in the special conditions below, will be allowed except upon written permission from the County. Construction aspects can be changed based on conditions encountered in the field.
- H. Permit is valid for one mobilization associated with originally permitted boring/well locations only, including contingency locations, and is automatically canceled if not exercised, or if an extension is not applied for and granted within 120 days of the original permit issuance date. Failure to notify staff of cancellation or delay in start time will result in the Consultant being billed an Inspection Cancellation fee if GPP staff attempted to perform an inspection. Fees are listed at smchealth.org/ehfees
- I. Wells installed under this permit may not be used for domestic, municipal, agricultural, or irrigation water supply.
- J. All work performed must conform to Business and Profession Codes and State Water Well Standards.
- K. Top-of-casing elevation of all wells must be surveyed to the nearest 0.01-foot relative to Mean Sea Level or NAVD88 and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate. Geotechnical wells are exempt from this requirement if a written variance from GPP is obtained prior to drilling.
- L. Latitude and longitude of all wells must be surveyed with sub-meter accuracy relative to NAD83 and submitted to County GPP within 60 days of drilling, and to State GeoTracker as appropriate.
- M. Violation of any requirement or general or special permit condition may result in an order by GPP staff to cease work under this permit, correct the violation, potentially re-permit the work as a new mobilization, and potential actions may be taken against the Well Owner, Property Owner, or Responsible Professional by GPP.

SPECIAL CONDITIONS:

(agency use only)

For Agency Use Only:

County Approval: _____

ICWA

FA # _____

Date: _____

1/11/19



SAN MATEO COUNTY HEALTH
**ENVIRONMENTAL
HEALTH SERVICES**

Environmental Health Services
Groundwater Protection Program
2000 Alameda de las Pulgas, Suite #100
San Mateo, CA 94403
Phone: (650) 372-6200 | Fax: (650) 627-8244
smchealth.org/gpp

SUBSURFACE DRILLING PERMIT APPLICATION

Allow three (3) full working days for processing a complete permit application which includes payment (one permit per parcel). Drilling start date & time must be scheduled with County staff at (650) 464-0047 or drilling@smcgov.org at least 2 full working days (i.e. 48 hours) in advance. Visit smchealth.org/ehfees for Groundwater Protection Program Fees

PURPOSE OF APPLICATION ☐ Groundwater Monitoring/Vapor Well Installation ☐ Construct Soil Borings (variance request if to be left open >24 hrs)
☐ Groundwater Monitoring/Vapor Well Destruction ☐ Extension of Permit # _____
No. of Wells _____ No. of Borings 2 _____ Well/Boring Names CPT-01, CPT-02

PURPOSE OF DRILLING ☐ Environmental LEAD ☐ County GPP (permit approval is not to be considered work plan approval)
☐ Geotechnical AGENCY ☐ RWQCB/DTSC/USEPA (Provide approval letter) ☐ None (i.e. voluntary)

SITE / DRILLING INFORMATION

Agency Case # _____ Assessor's Parcel # (required) _____ (one per permit)

Drilling Location Address: 1001 Airport Boulevard City: Burlingame Zip: 94010

To Be Constructed In: ☐ Public Property ☐ Private Property ☐ Refuse

Maximum Proposed Depth (wells/borings) 150 (feet) Drilling Method: CPT

Boring Diameter: NA Casing Diameter: NA Filter Pack Interval: NA Screen Interval: NA

Destruction Method: ☐ Pressure Grouting (provide well construction logs and grout calcs)
(6 gallons water max/94 lb cement, up to 5% bentonite) ☐ Overdrilling (guide rods for total depth prior to starting required)

WELL/BORING OWNER (Well/boring owner name or contact person should match signature)

Name: City of Burlingame

Contact Person: Art Morimoto

Address: 850 Burlingame Avenue

City, State, Zip: Burlingame, CA 94010

Telephone: 650-558-7246

Email: amorimoto@burlingame.org

It is my responsibility to notify the County of any known changes in the purpose of this well/boring from that which is indicated on this application, to submit indication of annual usage of wells to the County, and to maintain the well in good condition. (Letter signed by well/boring owner/contact person, containing above language and attesting to knowledge of all permit requirements and conditions, may be substituted for signature.)

Well/Boring Owner's/Contact Person's Signature: _____

Date: _____

PROPERTY OWNER

(Name as appears on assessor's roles should match signature)

Name: _____

Contact Person: _____

Address: _____

City, State, Zip: _____

Telephone: _____

Email: _____

I understand that a well/boring is being installed on my property. I agree to notify the County and Well Owner of any known damage or future access issues to the well (Letter signed by property owner, containing above language, or encroachment permit may be substituted for signature)

Property Owner's Signature: _____

Date: _____

DRILLING COMPANY

Drilling Company: Gregg Drilling

Contact Person: Mary Walden

Address: 950 Howe Road

City, State, Zip: Martinez, CA 94553

Telephone: 925-313-5800

Email: mwalden@greggdrilling.com

C57 Drillers License # 1044456 exp. 9/2020

I certify that the well/boring will be constructed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards, and that the license listed above is considered current and active by the Contractors State License Board.

Driller's Signature: Mary Walden

Digitally signed by Mary Walden
Date: 2019.01.08 11:46:47 -0800

Date: 1/8/2019

CONSULTANT COMPANY

Consultant Company: Geo-Logic Associates

Project Manager: R. Mitchell

Address: 405 East D Street, Suite N

City, State, Zip: Petaluma, CA 94952

Telephone: 415-699-8073

Email: rmitchell@rmcgeoscience.com

Field Contact & Cell # (if known): Alan Witthoef (214-729-1267)

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Responsible Professional's Name (Please print legibly): Richard Mitchell

Responsible Professional's Signature: Richard Mitchell

Digitally signed by Richard Mitchell
DN: cn=Richard Mitchell, o=Geo-Logic Associates, c=US
Date: 2019.01.08 11:52:16 -0800

Date: 1/8/2019

California Professional Geologist (PG) No. 4380

or Civil Engineer (PE) No. _____



SAN MATEO COUNTY HEALTH
**ENVIRONMENTAL
HEALTH SERVICES**

Environmental Health Services
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smchealth.org/gpp

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☐ Groundwater Monitoring/Vapor Well Destruction Extension of Permit # _____
No. of Wells _____ No. of Borings 2 Well/Boring Names CPT-01, CPT-02

PURPOSE OF DRILLING ☐ Environmental **LEAD AGENCY** ☐ County GPP (permit approval is not to be considered work plan approval)
☒ Geotechnical ☐ RWQCB/DTSC/USEPA (Provide approval letter) ☒ None (i.e. voluntary)

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(6 gallons water max/94 lb cement, up to 5% bentonite) ☐ Overdrilling (guide rods for total depth prior to starting required)

WELL/BORING OWNER (Well/boring owner name or contact person should match signature)

Name: City of Burlingame Contact Person: Art Morimoto
Address: 850 Burlingame Avenue City, State, Zip: Burlingame, CA 94010
Telephone: 650-558-7246 Email: amorimoto@burlingame.org

It is my responsibility to notify the County of any known changes in the purpose of this well/boring from that which is indicated on this application, to submit indication of annual usage of wells to the County, and to maintain the well in good condition. (Letter signed by well/boring owner/contact person, containing above language and attesting to knowledge of all permit requirements and conditions, may be substituted for signature.)

Well/Boring Owner's/Contact Person's Signature: Art Morimoto Date: 1/8/19

PROPERTY OWNER (Name as appears on assessor's roles should match signature)

Name: _____ Contact Person: _____
Address: _____ City, State, Zip: _____
Telephone: _____ Email: _____

I understand that a well/boring is being installed on my property. I agree to notify the County and Well Owner of any known damage or future access issues to the well (Letter signed by property owner, containing above language, or encroachment permit may be substituted for signature)

Property Owner's Signature: _____ Date: _____

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Consultant Company: Geo-Logic Associates Project Manager: R. Mitchell
Address: 405 East D Street, Suite N City, State, Zip: Petaluma, CA 94952
Telephone: 415-699-8073 Email: rmitchell@rmcgeoscience.com

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Responsible Professional's Name (Please print legibly): Richard Mitchell

Responsible Professional's Signature: Richard Mitchell

Digital signed by Richard Mitchell
DN: cn=Richard Mitchell, o=Geo-Logic Associates, email=rmitchell@rmcgeoscience.com, c=US
Date: 2018.01.08 11:22:59 -0800

Date: 1/8/2019

California Professional Geologist (PG) No. 4380

or Civil Engineer (PE) No. _____



SAN MATEO COUNTY HEALTH
**ENVIRONMENTAL
HEALTH SERVICES**

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I certify that this application is correct to the best of my knowledge and the well/boring will be constructed/destroyed in compliance with the conditions of this permit (see reverse), the San Mateo County Well Ordinance, and the State Water Well Standards. I understand that I am responsible for General Conditions E, F, K, and L of this permit and if I indicated the purpose of drilling is geotechnical, then no one will use the boring to collect any samples for environmental analyses. If there is a change in Responsible Professional, I will notify San Mateo County GPP staff.

Responsible Professional's Name (Please print legibly): Richard Mitchell

Responsible Professional's Signature: Richard Mitchell Date: 1/8/2019

California Professional Geologist (PG) No. 4380 or Civil Engineer (PE) No. _____



January 9, 2019

Ms. Lindsay Whalin
San Francisco Bay Regional Water Quality Control Board
1525 Clay Street, Suite 1400
Oakland, California 94612

Subject: D R A F T Geotechnical Investigation Work Plan – Addendum 1
Golf Center Redevelopment Project, Closed Burlingame Landfill
Burlingame, California

Dear Ms. Whalin:

INTRODUCTION

Geo-Logic Associates, Inc. (GLA) previously prepared and submitted a Geotechnical Investigation Work Plan (Work Plan) dated April 2018 for subsurface exploration associated with the Golf Center Redevelopment Project at the Closed Burlingame Landfill (Site). The Site is located at 1001 Airport Boulevard in Burlingame, California.

In general accordance with the scope of work described in the Work Plan, geotechnical borings were advanced at the Site in April 2018. Soil samples were recovered at various locations, and selected soil samples were retained for laboratory testing. Upon termination of drilling the borings were backfilled with cement-bentonite grout in general accordance with San Mateo County well permit requirements.

After completion of this initial phase of subsurface exploration, gaps in data needed for detailed design were identified. To address these data gaps, additional subsurface exploration is planned. The additional exploration will involve Cone Penetration Test (CPT) methods, which have the advantage of being less intrusive relative to conventional borings (i.e., smaller hole diameter and negligible amount of soil cuttings, if any).

PLANNED SCOPE OF WORK

The field work will include advancing the CPT probe at up to three locations at the Site. The target CPT penetration depth is up to approximately 150 feet below the ground surface. We estimate that up to three days of field work will be required for this work. A full-size (20 to 30-ton) CPT rig will be used, and shear wave velocity measurements will be obtained at depth intervals of about 5 to 10 feet depending on conditions encountered in the field. The CPT



sounding locations will be backfilled with cement-bentonite grout in general accordance with San Mateo County well permit requirements. Full-time supervision of the field exploration will be performed by GLA personnel, with oversight provided by City of Burlingame staff on an as-needed basis.

ESTIMATED SCHEDULE

Field work is currently scheduled to begin on Monday, January 14, 2019, and to continue until the end of the day on Wednesday, January 16, 2019, unless completed sooner. This schedule assumes there are no delays due to permitting, rig availability, inclement weather, or other unforeseen circumstances.

CERTIFICATION

This Work Plan Addendum was prepared by Geo-Logic Associates under the direction of the undersigned. I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sincerely,

Geo-Logic Associates, Inc.

D R A F T

Richard A. Mitchell, PG 4380, CEG 1371

Principal Engineering Geologist

Attachment: Locations of Proposed CPT Soundings



FIGURE 2

SOIL BORING LOCATIONS		
PROPOSED TOPGOLF PROJECT		
BURLINGAME		
SAN MATEO COUNTY, CALIFORNIA		
Geo-Logic ASSOCIATES		
DRAWN BY: RM	DATE: APRIL 2018	JOB NO. RM18.1038

ORDINANCE: 04023

ENVIRONMENTAL HEALTH
SAN MATEO COUNTY

PERMIT 17- 0737

Protecting Our Health and Environment

PE: 2013 GEOTECHNICAL - ANNUAL SOIL BORING PERMIT

FACILITY:

SAN MATEO COUNTY 48 HOUR NOTICE

OWNER:GEO-LOGIC ASSOCIATES
16055 CAPUTO DR D
MORGAN HILL

SR0020720

AMOUNT PAID:

\$857.00

CONTRACTOR:**CONSULTANT:**
TREECE, BRET**TERMS & CONDITIONS:**

ANNUAL GEOTECHNICAL PERMIT

DATE ISSUED: 4/21/2017

KIAN ATKINSON

ENVIRONMENTAL HEALTH SPECIALIST

EXPIRATION DATE: 4/21/2018

THIS PERMIT IS NONTRANSFERABLE AND MUST BE POSTED ON-SITE IN A CONSPICUOUS PLACE



2017 ANNUAL GEOTECHNICAL DRILLING PERMIT APPLICATION

SAN MATEO COUNTY ENVIRONMENTAL HEALTH SERVICES DIVISION
2000 ALAMEDA DE LAS PULGAS, SUITE 100, SAN MATEO, CA 94403
VOICE (650) 372-6200 FAX (650) 627-8244 SMCHEALTH.ORG

SAN MATEO COUNTY
ENVIRONMENTAL HEALTH

APR 19 2017

RECEIVED

2017
As of 8/1/16
Fee: \$857

ALLOW THREE (3) WORKING DAYS FOR PROCESSING PERMIT ALL DRILLING MUST BE SCHEDULED WITH COUNTY STAFF (drilling@smcgov.org) AT LEAST TWO (2) WORKING DAYS (48 HOURS) IN ADVANCE, ONE APPLICATION PER OFFICE LOCATION

Consultant Company: (one per office) Geo-Logic Associates

Primary Contact: Bret Treece Email: BTreece@geo-logic.com

Mailing Address 16055 Caputo Drive Spc. D

City, State, Zip Morgan Hill, CA 95037 Telephone: (408) 778 2818

GENERAL CONDITIONS:

1. Only **GEOTECHNICAL** investigations will be performed under this permit. Other investigations including, but not limited to, environmental investigations and grab soil or water sampling for activities other than geotechnical investigation, require a Subsurface Drilling Permit Application with the appropriate fee.
2. Any well installations, including wells for geotechnical investigations, require a separate Subsurface Drilling Permit Application with the appropriate fee.
3. Written notification to Groundwater Protection Program (GPP) staff, on GPP-supplied forms, must occur at least two (2) working days prior to each drilling event.
4. An accurate & correct map of proposed boring locations must be included with the written notification. The boring location map must be to scale and include north arrow, existing site features, approximate property lines and any other pertinent existing & historic features and information.
5. Boring construction and destruction under this permit is subject to the Standards for the Construction of Wells in San Mateo County, County Groundwater Protection Program (GPP) Guidelines, Policies & Procedures, the State Water Well Standards, and any instructions by County GPP staff.
6. All borings must be properly destroyed (grouted/sealed), using neat cement grout with maximum of 5% bentonite or sand cement (as specified in California Well Standards), within 24 hours of drilling unless special conditions are approved in writing as part of this permit.
7. Drilling under this permit must be under the supervision of a California Professional Geologist or Civil Engineer.
8. If contamination is discovered during drilling, verbal notification to County GPP by the Responsible Professional is required within 72 hours of discovery. A written report is required within 30 days.
9. The consultant company named above assumes responsibility for all activities and uses under the permit, including compliance with Workmen's Compensation Laws, and indemnifies, defends and saves the County of San Mateo, its' officers, agents and employees, free and harmless from any and all expense, cost, or liability in connection with or resulting from work or stopped-work associated with the permit, including, but not limited to, property damage, personal injury, wrongful death, and loss of income.
10. Permit is valid for one calendar year only from the permit issue date.
11. Violation of any requirement or general or special permit condition as listed on this permit application or on the ANNUAL GEOTECHNICAL PERMIT DRILLING NOTIFICATION may result in an order by GPP staff to cease work under this permit and correct the violation. An office hearing may be held to determine if Consulting Company will be allowed to continue to have and apply for future Annual Geotechnical Drilling Permits.
12. If there is a change in Responsible Professional, I will notify San Mateo County GPP staff.

Responsible Professional's Signature

Responsible Professional's Name Bret Treece

California Professional Geologist (PG) No. 9265

or Civil Engineer (PE) No. _____

County Approval: [Signature]

Date: 4/19/17

Appendix G
CUTTINGS DISPOSAL

**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949



Date of Report: 06/15/2018

Rick Mitchell

Geologic - Morgan Hill

16055-D Caputo Drive

Morgan Hill, CA 95037

Client Project: RM18.1038

BCL Project: Top Golf

BCL Work Order: 1813132

Invoice ID: B303578, B305187, B306851

Enclosed are the results of analyses for samples received by the laboratory on 4/24/2018. If you have any questions concerning this report, please feel free to contact me.

Revised Report: This report supercedes Report ID 1000758021

Sincerely,

A handwritten signature in black ink, appearing to read "Natalie Serda".

Contact Person: Natalie Serda
Client Service Rep

A handwritten signature in black ink, appearing to read "Stuart Buttram".

Stuart Buttram
Technical Director

Certifications: CA ELAP #1186; NV #CA00014; OR ELAP #4032-001; AK UST101

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*All results listed in this report are for the exclusive use of the submitting party. BC Laboratories, Inc. assumes no responsibility for report alteration, separation, detachment or third party interpretation.



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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

Chain of Custody and Cooler Receipt Form for 1813132 Page 1 of 2

BC LABORATORIES, INC.		Chain of Custody Form	
Project #:		Page () of ()	
Client: GEA		Project Name: Top Golf	
Attn: Bret Treese		Sampler(s): BT	
Street Address: 16055 Caputo Dr #D		City, State, Zip: M. H. CA 93037	
Phone: 408.728.2818 Fax:		Email: BTreese@geo-logix.com	
Work Order #:		Analysis Requested	
Sample #	Description	Date Sampled	Time Sampled
1-2	Composite 1	4/20/18	1530
1-3	Composite 2		
1-4	Composite 3		
1-5	Composite 4		
Comments: 4 point composite		Result Request **Surcharge	
Sample Matrix		☒ STD ☐ 5 Day** ☐ 2 Day** ☐ 1 Day** (if two)	
Waste Water Ground Water Drinking Water Sledge Soil Other		Notes	
Please refer to the back of this form for information regarding the use of this form.		Global ID (needed for EDT) 1. Relinquished By: [Signature] Date: 4/23/18 Time: 1200 2. Relinquished By: [Signature] Date: [] Time: [] 3. Relinquished By: [Signature] Date: [] Time: []	
Billing: ☒ Same as above ☐ Different Client: [] Address: [] City: [] State: [] Zip: [] Attn: [] P.O. #: []		System # (needed for EDT) 1. Received By: [Signature] Date: 4/24/18 Time: 1045 2. Received By: [Signature] Date: [] Time: [] 3. Received By: [Signature] Date: [] Time: []	

BC Laboratories, Inc. - 4100 Atlas Ct. - Bakersfield, CA 93308 - 661.327.4911 - Fax: 661.327.1918 - www.bclabs.com

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Environmental Testing Laboratory Since 1949

Chain of Custody and Cooler Receipt Form for 1813132 Page 2 of 2

BC LABORATORIES INC.		COOLER RECEIPT FORM		Page <u>2</u> Of <u>2</u>						
Submission #: <u>18-13132</u>										
SHIPPING INFORMATION Fed Ex ☒ UPS ☐ Ontrac ☐ Hand Delivery ☐ BC Lab Field Service ☐ Other ☐ (Specify) _____		SHIPPING CONTAINER Ice Chest ☒ None ☐ Box ☐ Other ☐ (Specify) _____		FREE LIQUID YES ☐ NO ☐ W / S _____						
Refrigerant: Ice ☐ Blue Ice ☐ None ☒ Other ☐ Comments: _____										
Custody Seals: None ☒ Comments: _____										
All samples received? Yes ☒ No ☐ All samples containers intact? Yes ☒ No ☐ Description(s) match COC? Yes ☐ No ☐										
COC Received ☒ YES ☐ NO		Emissivity: <u>0.98</u> Container: <u>Clear glass</u> Thermometer ID: <u>274</u> Temperature: (A) <u>20.3</u> °C / (C) <u>21.3</u> °F Date/Time: <u>4-24-18 1045</u> Analyst Init: <u>KJG</u>								
SAMPLE CONTAINERS	SAMPLE NUMBERS									
	1	2	3	4	5	6	7	8	9	10
QT PE UNPRES										
4oz / 8oz / 16oz PE UNPRES										
2oz Cr ⁶										
QT INORGANIC CHEMICAL METALS										
INORGANIC CHEMICAL METALS 4oz / 8oz / 16oz										
PT CYANIDE										
PT NITROGEN FORMS										
PT TOTAL SULFIDE										
2oz. NITRATE / NITRITE										
PT TOTAL ORGANIC CARBON										
PT CHEMICAL OXYGEN DEMAND										
PA PHENOLICS										
40ml VOA VIAL TRAVEL BLANK										
40ml VOA VIAL										
QT EPA 1664										
PT ODOR										
RADIOLOGICAL										
BACTERIOLOGICAL										
40 ml VOA VIAL- 504										
QT EPA 508/618/8230										
QT EPA 515.1/8150										
QT EPA 525										
QT EPA 525 TRAVEL BLANK										
40ml EPA 547										
40ml EPA 531.1										
8oz EPA 548										
QT EPA 549										
QT EPA 8015M										
QT EPA 8270										
8oz / 16oz / 32oz AMBER										
8oz / 16oz / 32oz JAR										
SOIL-SIEVE	A	A	A	A						
PCB VIAL										
PLASTIC BAG										
FEDLAR BAG										
FERROUS IRON										
ENCORE										
MART KIT										
UMMA CANISTER										
Comments:										
Sample Numbering Completed By: <u>CMY JR</u>	Date/Time: <u>4-24-18 1507</u>									
= Actual / C = Corrected	Rev 21 05/23/2016									

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Laboratory / Client Sample Cross Reference

Laboratory		Client Sample Information	
1813132-01	COC Number:	---	Receive Date: 04/24/2018 10:45
	Project Number:	---	Sampling Date: 04/20/2018 15:30
	Sampling Location:	---	Sample Depth: ---
	Sampling Point:	4 Point Composite 1-4	Lab Matrix: Solids
	Sampled By:	---	Sample Type: Soil
1813132-02	COC Number:	---	Receive Date: 04/24/2018 10:45
	Project Number:	---	Sampling Date: 04/20/2018 15:30
	Sampling Location:	---	Sample Depth: ---
	Sampling Point:	Composite 1	Lab Matrix: Solids
	Sampled By:	---	Sample Type: Soil
1813132-03	COC Number:	---	Receive Date: 04/24/2018 10:45
	Project Number:	---	Sampling Date: 04/20/2018 15:30
	Sampling Location:	---	Sample Depth: ---
	Sampling Point:	Composite 2	Lab Matrix: Solids
	Sampled By:	---	Sample Type: Soil
1813132-04	COC Number:	---	Receive Date: 04/24/2018 10:45
	Project Number:	---	Sampling Date: 04/20/2018 15:30
	Sampling Location:	---	Sample Depth: ---
	Sampling Point:	Composite 3	Lab Matrix: Solids
	Sampled By:	---	Sample Type: Soil
1813132-05	COC Number:	---	Receive Date: 04/24/2018 10:45
	Project Number:	---	Sampling Date: 04/20/2018 15:30
	Sampling Location:	---	Sample Depth: ---
	Sampling Point:	Composite 4	Lab Matrix: Solids
	Sampled By:	---	Sample Type: Soil

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Organochlorine Pesticides (EPA Method 8081A)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTL Limits	Lab Quals	Run #
Aldrin	ND	mg/kg	0.00050	0.000049	EPA-8081A	1.4		1
alpha-BHC	ND	mg/kg	0.00050	0.000064	EPA-8081A			1
beta-BHC	ND	mg/kg	0.00050	0.000048	EPA-8081A			1
delta-BHC	ND	mg/kg	0.00050	0.00013	EPA-8081A			1
gamma-BHC (Lindane)	ND	mg/kg	0.00050	0.000086	EPA-8081A	4.0		1
Chlordane (Technical)	ND	mg/kg	0.050	0.0014	EPA-8081A	2.5		1
4,4'-DDD	0.0021	mg/kg	0.00050	0.000083	EPA-8081A	1.0		1
4,4'-DDE	0.0022	mg/kg	0.00050	0.000038	EPA-8081A	1.0		1
4,4'-DDT	0.0020	mg/kg	0.00050	0.00014	EPA-8081A	1.0		1
Dieldrin	0.00087	mg/kg	0.00050	0.000042	EPA-8081A	8.0		1
Endosulfan I	ND	mg/kg	0.00050	0.000028	EPA-8081A			1
Endosulfan II	ND	mg/kg	0.00050	0.000073	EPA-8081A			1
Endosulfan sulfate	ND	mg/kg	0.00050	0.00024	EPA-8081A			1
Endrin	ND	mg/kg	0.00050	0.000073	EPA-8081A	0.2		1
Endrin aldehyde	ND	mg/kg	0.00050	0.000077	EPA-8081A			1
Heptachlor	ND	mg/kg	0.00050	0.000099	EPA-8081A	4.7		1
Heptachlor epoxide	ND	mg/kg	0.00050	0.000030	EPA-8081A			1
Methoxychlor	ND	mg/kg	0.00050	0.00012	EPA-8081A	100		1
Toxaphene	ND	mg/kg	0.050	0.0019	EPA-8081A	5		1
TCMX (Surrogate)	132	%	20 - 130 (LCL - UCL)		EPA-8081A		S09	1
Decachlorobiphenyl (Surrogate)	28.8	%	40 - 130 (LCL - UCL)		EPA-8081A		S09	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8081A	05/01/18 09:00	05/01/18 19:31	HKS	GC-17	0.997	B012546

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

PCB Analysis (EPA Method 8082)

BCL Sample ID:	1813132-01	Client Sample Name:	4 Point Composite 1-4, 4/20/2018 3:30:00PM					
Constituent	Result	Units	PQL	MDL	Method	TTLT Limits	Lab Quals	Run #
PCB-1016	ND	mg/kg	0.010	0.0026	EPA-8082	50		1
PCB-1221	ND	mg/kg	0.010	0.0024	EPA-8082	50		1
PCB-1232	ND	mg/kg	0.010	0.0044	EPA-8082	50		1
PCB-1242	ND	mg/kg	0.010	0.0059	EPA-8082	50		1
PCB-1248	ND	mg/kg	0.010	0.0037	EPA-8082	50		1
PCB-1254	0.0067	mg/kg	0.010	0.0030	EPA-8082	50	J	1
PCB-1260	ND	mg/kg	0.010	0.0056	EPA-8082	50		1
Total PCB's (Summation)	0.0067	mg/kg	0.010	0.0050	EPA-8082	50	J	1
Decachlorobiphenyl (Surrogate)	16.7	%	40 - 120 (LCL - UCL)		EPA-8082		S09	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8082	05/01/18 15:00	05/08/18 13:34	HKS	GC-15	1.007	B012686

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLC Limits	Lab Quals	Run #
Benzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Bromobenzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Bromochloromethane	ND	mg/kg	0.0050	0.00092	EPA-8260B			1
Bromodichloromethane	ND	mg/kg	0.0050	0.00084	EPA-8260B			1
Bromoform	ND	mg/kg	0.0050	0.0015	EPA-8260B			1
Bromomethane	ND	mg/kg	0.0050	0.0016	EPA-8260B			1
n-Butylbenzene	ND	mg/kg	0.0050	0.0015	EPA-8260B			1
sec-Butylbenzene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
tert-Butylbenzene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
Carbon tetrachloride	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
Chlorobenzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Chloroethane	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
Chloroform	ND	mg/kg	0.0050	0.00063	EPA-8260B			1
Chloromethane	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
2-Chlorotoluene	ND	mg/kg	0.0050	0.0018	EPA-8260B			1
4-Chlorotoluene	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
Dibromochloromethane	ND	mg/kg	0.0050	0.00099	EPA-8260B			1
1,2-Dibromo-3-chloropropane	ND	mg/kg	0.0050	0.0017	EPA-8260B			1
1,2-Dibromoethane	ND	mg/kg	0.0050	0.0010	EPA-8260B			1
Dibromomethane	ND	mg/kg	0.0050	0.0018	EPA-8260B			1
1,2-Dichlorobenzene	ND	mg/kg	0.0050	0.00081	EPA-8260B			1
1,3-Dichlorobenzene	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
1,4-Dichlorobenzene	ND	mg/kg	0.0050	0.0015	EPA-8260B			1
Dichlorodifluoromethane	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
1,1-Dichloroethane	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
1,2-Dichloroethane	ND	mg/kg	0.0050	0.00085	EPA-8260B			1
1,1-Dichloroethene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
cis-1,2-Dichloroethene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
trans-1,2-Dichloroethene	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
Total 1,2-Dichloroethene	ND	mg/kg	0.010	0.0026	EPA-8260B			1
1,2-Dichloropropane	ND	mg/kg	0.0050	0.00081	EPA-8260B			1
1,3-Dichloropropane	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
2,2-Dichloropropane	ND	mg/kg	0.0050	0.0013	EPA-8260B			1

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLC Limits	Lab Quals	Run #
1,1-Dichloropropene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
cis-1,3-Dichloropropene	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
trans-1,3-Dichloropropene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
Total 1,3-Dichloropropene	ND	mg/kg	0.010	0.0020	EPA-8260B			1
Ethylbenzene	ND	mg/kg	0.0050	0.0015	EPA-8260B			1
Hexachlorobutadiene	ND	mg/kg	0.0050	0.0017	EPA-8260B			1
Isopropylbenzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
p-Isopropyltoluene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Methylene chloride	ND	mg/kg	0.010	0.0024	EPA-8260B			1
Methyl t-butyl ether	ND	mg/kg	0.0050	0.00050	EPA-8260B			1
Naphthalene	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
n-Propylbenzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Styrene	ND	mg/kg	0.0050	0.0014	EPA-8260B			1
1,1,1,2-Tetrachloroethane	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
1,1,2,2-Tetrachloroethane	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
Tetrachloroethene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
Toluene	ND	mg/kg	0.0050	0.0012	EPA-8260B			1
1,2,3-Trichlorobenzene	ND	mg/kg	0.0050	0.0021	EPA-8260B			1
1,2,4-Trichlorobenzene	ND	mg/kg	0.0050	0.0020	EPA-8260B			1
1,1,1-Trichloroethane	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
1,1,2-Trichloroethane	ND	mg/kg	0.0050	0.00077	EPA-8260B			1
Trichloroethene	ND	mg/kg	0.0050	0.0011	EPA-8260B	2040		1
Trichlorofluoromethane	ND	mg/kg	0.0050	0.0011	EPA-8260B			1
1,2,3-Trichloropropane	ND	mg/kg	0.0050	0.0016	EPA-8260B			1
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
1,2,4-Trimethylbenzene	ND	mg/kg	0.0050	0.0013	EPA-8260B			1
1,3,5-Trimethylbenzene	ND	mg/kg	0.0050	0.0015	EPA-8260B			1
Vinyl chloride	ND	mg/kg	0.0050	0.0016	EPA-8260B			1
Total Xylenes	ND	mg/kg	0.010	0.0034	EPA-8260B			1
t-Amyl Methyl ether	ND	mg/kg	0.0050	0.00056	EPA-8260B			1
t-Butyl alcohol	ND	mg/kg	0.050	0.017	EPA-8260B			1
Diisopropyl ether	ND	mg/kg	0.0050	0.00080	EPA-8260B			1
Ethanol	ND	mg/kg	1.0	0.066	EPA-8260B			1

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

BCL Sample ID:	1813132-01	Client Sample Name:	4 Point Composite 1-4, 4/20/2018 3:30:00PM					
Constituent	Result	Units	PQL	MDL	Method	TTLCLimits	Lab Quals	Run #
Ethyl t-butyl ether	ND	mg/kg	0.0050	0.00022	EPA-8260B			1
Methyl ethyl ketone	ND	mg/kg	0.010	0.0038	EPA-8260B			1
1,2-Dichloroethane-d4 (Surrogate)	103	%	70 - 121 (LCL - UCL)		EPA-8260B			1
Toluene-d8 (Surrogate)	103	%	81 - 117 (LCL - UCL)		EPA-8260B			1
4-Bromofluorobenzene (Surrogate)	98.9	%	74 - 121 (LCL - UCL)		EPA-8260B			1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8260B	04/26/18 16:43	04/27/18 01:36	BEP	MS-V3	1	B012041

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLC Limits	Lab Quals	Run #
Acenaphthene	ND	mg/kg	1.0	0.092	EPA-8270C		A01	1
Acenaphthylene	ND	mg/kg	1.0	0.18	EPA-8270C		A01	1
Aldrin	ND	mg/kg	1.0	0.16	EPA-8270C	1.4	A01	1
Aniline	ND	mg/kg	2.0	0.16	EPA-8270C		A01	1
Anthracene	ND	mg/kg	1.0	0.50	EPA-8270C		A01	1
Benzidine	ND	mg/kg	30	0.58	EPA-8270C		A01	1
Benzo[a]anthracene	ND	mg/kg	1.0	0.41	EPA-8270C		A01	1
Benzo[b]fluoranthene	ND	mg/kg	1.0	0.094	EPA-8270C		A01	1
Benzo[k]fluoranthene	ND	mg/kg	1.0	0.17	EPA-8270C		A01	1
Benzo[a]pyrene	ND	mg/kg	1.0	0.26	EPA-8270C		A01	1
Benzo[g,h,i]perylene	ND	mg/kg	1.0	0.11	EPA-8270C		A01	1
Benzoic acid	ND	mg/kg	5.0	0.57	EPA-8270C		A01	1
Benzyl alcohol	ND	mg/kg	1.0	0.073	EPA-8270C		A01	1
Benzyl butyl phthalate	ND	mg/kg	1.0	0.33	EPA-8270C		A01	1
alpha-BHC	ND	mg/kg	1.0	0.35	EPA-8270C		A01	1
beta-BHC	ND	mg/kg	1.0	0.40	EPA-8270C		A01	1
delta-BHC	ND	mg/kg	1.0	0.18	EPA-8270C		A01	1
gamma-BHC (Lindane)	ND	mg/kg	1.0	0.25	EPA-8270C	4.0	A01	1
bis(2-Chloroethoxy)methane	ND	mg/kg	1.0	0.45	EPA-8270C		A01	1
bis(2-Chloroethyl) ether	ND	mg/kg	1.0	0.26	EPA-8270C		A01	1
bis(2-Chloroisopropyl)ether	ND	mg/kg	1.0	0.15	EPA-8270C		A01	1
bis(2-Ethylhexyl)phthalate	ND	mg/kg	2.0	0.32	EPA-8270C		A01	1
4-Bromophenyl phenyl ether	ND	mg/kg	1.0	0.26	EPA-8270C		A01	1
4-Chloroaniline	ND	mg/kg	1.0	0.15	EPA-8270C		A01	1
2-Chloronaphthalene	ND	mg/kg	1.0	0.12	EPA-8270C		A01	1
4-Chlorophenyl phenyl ether	ND	mg/kg	1.0	0.11	EPA-8270C		A01	1
Chrysene	ND	mg/kg	1.0	0.16	EPA-8270C		A01	1
4,4'-DDD	ND	mg/kg	1.0	0.32	EPA-8270C	1.0	A01	1
4,4'-DDE	ND	mg/kg	1.0	0.33	EPA-8270C	1.0	A01	1
4,4'-DDT	ND	mg/kg	1.0	0.52	EPA-8270C	1.0	A01	1
Dibenzo[a,h]anthracene	ND	mg/kg	1.0	0.19	EPA-8270C		A01	1
Dibenzofuran	ND	mg/kg	1.0	0.13	EPA-8270C		A01	1
1,2-Dichlorobenzene	ND	mg/kg	1.0	0.084	EPA-8270C		A01	1

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLT Limits	Lab Quals	Run #
1,3-Dichlorobenzene	ND	mg/kg	1.0	0.12	EPA-8270C		A01	1
1,4-Dichlorobenzene	ND	mg/kg	1.0	0.18	EPA-8270C		A01	1
3,3-Dichlorobenzidine	ND	mg/kg	2.0	0.24	EPA-8270C		A01	1
Dieldrin	ND	mg/kg	1.0	0.31	EPA-8270C	8.0	A01	1
Diethyl phthalate	ND	mg/kg	1.0	0.073	EPA-8270C		A01	1
Dimethyl phthalate	ND	mg/kg	1.0	0.091	EPA-8270C		A01	1
Di-n-butyl phthalate	ND	mg/kg	1.0	0.19	EPA-8270C		A01	1
2,4-Dinitrotoluene	ND	mg/kg	1.0	0.30	EPA-8270C		A01	1
2,6-Dinitrotoluene	ND	mg/kg	1.0	0.16	EPA-8270C		A01	1
Di-n-octyl phthalate	ND	mg/kg	1.0	0.13	EPA-8270C		A01	1
1,2-Diphenylhydrazine	ND	mg/kg	1.0	0.16	EPA-8270C		A01	1
Endosulfan I	ND	mg/kg	2.0	0.62	EPA-8270C		A01	1
Endosulfan II	ND	mg/kg	2.0	0.62	EPA-8270C		A01	1
Endosulfan sulfate	ND	mg/kg	1.0	0.56	EPA-8270C		A01	1
Endrin	ND	mg/kg	2.0	0.53	EPA-8270C	0.2	A01	1
Endrin aldehyde	ND	mg/kg	5.0	0.44	EPA-8270C		A01	1
Fluoranthene	ND	mg/kg	1.0	0.11	EPA-8270C		A01	1
Fluorene	ND	mg/kg	1.0	0.13	EPA-8270C		A01	1
Heptachlor	ND	mg/kg	1.0	0.24	EPA-8270C	4.7	A01	1
Heptachlor epoxide	ND	mg/kg	1.0	0.65	EPA-8270C		A01	1
Hexachlorobenzene	ND	mg/kg	1.0	0.12	EPA-8270C		A01	1
Hexachlorobutadiene	ND	mg/kg	1.0	0.20	EPA-8270C		A01	1
Hexachlorocyclopentadiene	ND	mg/kg	1.0	0.29	EPA-8270C		A01	1
Hexachloroethane	ND	mg/kg	1.0	0.32	EPA-8270C		A01	1
Indeno[1,2,3-cd]pyrene	ND	mg/kg	1.0	0.13	EPA-8270C		A01	1
Isophorone	ND	mg/kg	1.0	0.099	EPA-8270C		A01	1
2-Methylnaphthalene	ND	mg/kg	1.0	0.082	EPA-8270C		A01	1
Naphthalene	ND	mg/kg	1.0	0.085	EPA-8270C		A01	1
2-Naphthylamine	ND	mg/kg	30	0.39	EPA-8270C		A01	1
2-Nitroaniline	ND	mg/kg	1.0	0.27	EPA-8270C		A01	1
3-Nitroaniline	ND	mg/kg	2.0	0.37	EPA-8270C		A01	1
4-Nitroaniline	ND	mg/kg	2.0	0.37	EPA-8270C		A01	1
Nitrobenzene	ND	mg/kg	1.0	0.098	EPA-8270C		A01	1

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLT Limits	Lab Quals	Run #
N-Nitrosodimethylamine	ND	mg/kg	1.0	0.77	EPA-8270C		A01	1
N-Nitrosodi-N-propylamine	ND	mg/kg	1.0	0.13	EPA-8270C		A01	1
N-Nitrosodiphenylamine	ND	mg/kg	1.0	0.18	EPA-8270C		A01	1
Phenanthrene	ND	mg/kg	1.0	0.34	EPA-8270C		A01	1
Pyrene	ND	mg/kg	1.0	0.27	EPA-8270C		A01	1
1,2,4-Trichlorobenzene	ND	mg/kg	1.0	0.16	EPA-8270C		A01	1
4-Chloro-3-methylphenol	ND	mg/kg	2.0	0.17	EPA-8270C		A01	1
2-Chlorophenol	ND	mg/kg	1.0	0.15	EPA-8270C		A01	1
2,4-Dichlorophenol	ND	mg/kg	1.0	0.21	EPA-8270C		A01	1
2,4-Dimethylphenol	ND	mg/kg	1.0	0.19	EPA-8270C		A01	1
4,6-Dinitro-2-methylphenol	ND	mg/kg	5.0	0.30	EPA-8270C		A01	1
2,4-Dinitrophenol	ND	mg/kg	5.0	1.8	EPA-8270C		A01	1
2-Methylphenol	ND	mg/kg	1.0	0.086	EPA-8270C		A01	1
3- & 4-Methylphenol	ND	mg/kg	2.0	0.34	EPA-8270C		A01	1
Total Methylphenol	ND	mg/kg	2.0	0.43	EPA-8270C		A01	1
2-Nitrophenol	ND	mg/kg	1.0	0.25	EPA-8270C		A01	1
4-Nitrophenol	ND	mg/kg	2.0	0.34	EPA-8270C		A01	1
Pentachlorophenol	ND	mg/kg	2.0	0.31	EPA-8270C	17	A01	1
Phenol	ND	mg/kg	1.0	0.15	EPA-8270C		A01	1
2,4,5-Trichlorophenol	ND	mg/kg	2.0	0.17	EPA-8270C		A01	1
2,4,6-Trichlorophenol	ND	mg/kg	2.0	0.28	EPA-8270C		A01	1
Pyridine	ND	mg/kg	5.0	0.36	EPA-8270C		A01	1
2-Fluorophenol (Surrogate)	60.6	%	20 - 130 (LCL - UCL)		EPA-8270C		A01	1
Phenol-d5 (Surrogate)	53.9	%	30 - 130 (LCL - UCL)		EPA-8270C		A01	1
Nitrobenzene-d5 (Surrogate)	44.2	%	30 - 130 (LCL - UCL)		EPA-8270C		A01	1
2-Fluorobiphenyl (Surrogate)	36.3	%	30 - 140 (LCL - UCL)		EPA-8270C		A01	1
2,4,6-Tribromophenol (Surrogate)	33.0	%	20 - 150 (LCL - UCL)		EPA-8270C		A01	1
p-Terphenyl-d14 (Surrogate)	50.4	%	30 - 150 (LCL - UCL)		EPA-8270C		A01	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8270C	05/03/18 14:20	05/08/18 12:29	MK1	MS-B2	9.564	B013245

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Total Petroleum Hydrocarbons

BCL Sample ID:	1813132-01	Client Sample Name:	4 Point Composite 1-4, 4/20/2018 3:30:00PM					
Constituent	Result	Units	PQL	MDL	Method	MB Bias	Lab Quals	Run #
TPH - Gasoline	ND	mg/kg	20	5.0	EPA-8015B/FFP	ND		1
TPH - Diesel (FFP)	9.1	mg/kg	10	1.2	EPA-8015B/FFP	ND	J,A52	1
TPH - Motor Oil	43	mg/kg	20	6.5	EPA-8015B/FFP	ND		1
Tetracosane (Surrogate)	85.8	%	20 - 145 (LCL - UCL)		EPA-8015B/FFP			1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-8015B/FFP	04/30/18 17:00	05/01/18 19:58	RCC	GC-2	0.984	B012359

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

WET Test (STLC)

BCL Sample ID:	1813132-01	Client Sample Name:	4 Point Composite 1-4, 4/20/2018 3:30:00PM					
Constituent	Result	Units	PQL	MDL	Method	STLC Limits	Lab Quals	Run #
Chromium	1.1	mg/L	0.10	0.0092	EPA-6010B	5.0		1
Lead	1.3	mg/L	0.50	0.16	EPA-6010B	5.0		1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-6010B	05/24/18 16:00	05/25/18 13:12	KDF	PE-OP3	1	B014758

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Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

TCLP Toxicity

BCL Sample ID:	1813132-01	Client Sample Name:	4 Point Composite 1-4, 4/20/2018 3:30:00PM					
Constituent	Result	Units	PQL	MDL	Method	TCLP Limits	Lab Quals	Run #
Chromium	0.013	mg/L	0.10	0.0075	EPA-6010B	5.0	J	1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-6010B	05/24/18 14:30	05/25/18 14:12	JRG	PE-OP2	1	B014703

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

Total Concentrations (TTLC)

BCL Sample ID: 1813132-01		Client Sample Name: 4 Point Composite 1-4, 4/20/2018 3:30:00PM						
Constituent	Result	Units	PQL	MDL	Method	TTLC Limits	Lab Quals	Run #
Antimony	ND	mg/kg	5.0	0.33	EPA-6010B	500		1
Arsenic	9.2	mg/kg	1.0	0.40	EPA-6010B	500		2
Barium	170	mg/kg	0.50	0.18	EPA-6010B	10000		1
Beryllium	0.37	mg/kg	0.50	0.047	EPA-6010B	75	J	1
Cadmium	2.1	mg/kg	0.50	0.052	EPA-6010B	100		2
Chromium	120	mg/kg	0.50	0.050	EPA-6010B	2500		2
Cobalt	14	mg/kg	2.5	0.098	EPA-6010B	8000		1
Copper	86	mg/kg	1.0	0.050	EPA-6010B	2500		1
Lead	55	mg/kg	2.5	0.28	EPA-6010B	1000		1
Mercury	0.12	mg/kg	0.16	0.019	EPA-7471A	20	J	3
Molybdenum	0.32	mg/kg	2.5	0.050	EPA-6010B	3500	J	1
Nickel	110	mg/kg	0.50	0.15	EPA-6010B	2000		1
Selenium	ND	mg/kg	1.0	0.98	EPA-6010B	100		2
Silver	3.3	mg/kg	0.50	0.067	EPA-6010B	500		2
Thallium	ND	mg/kg	5.0	0.64	EPA-6010B	700		1
Vanadium	49	mg/kg	0.50	0.11	EPA-6010B	2400		1
Zinc	81	mg/kg	2.5	0.087	EPA-6010B	5000		1

Run #	Method	Prep Date	Run Date/Time	Analyst	Instrument	Dilution	QC Batch ID
1	EPA-6010B	05/02/18 18:20	05/03/18 22:26	KDF	PE-OP3	0.980	B012605
2	EPA-6010B	05/02/18 18:20	05/04/18 19:59	KDF	PE-OP3	0.980	B012605
3	EPA-7471A	05/03/18 14:30	05/04/18 13:06	JP1	CETAC2	1.008	B012684

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Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Organochlorine Pesticides (EPA Method 8081A)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012546						
Aldrin	B012546-BLK1	ND	mg/kg	0.00050	0.000049	
alpha-BHC	B012546-BLK1	ND	mg/kg	0.00050	0.000064	
beta-BHC	B012546-BLK1	ND	mg/kg	0.00050	0.000048	
delta-BHC	B012546-BLK1	ND	mg/kg	0.00050	0.00013	
gamma-BHC (Lindane)	B012546-BLK1	ND	mg/kg	0.00050	0.000086	
Chlordane (Technical)	B012546-BLK1	ND	mg/kg	0.050	0.0014	
4,4'-DDD	B012546-BLK1	ND	mg/kg	0.00050	0.000083	
4,4'-DDE	B012546-BLK1	ND	mg/kg	0.00050	0.000038	
4,4'-DDT	B012546-BLK1	ND	mg/kg	0.00050	0.00014	
Dieldrin	B012546-BLK1	ND	mg/kg	0.00050	0.000042	
Endosulfan I	B012546-BLK1	ND	mg/kg	0.00050	0.000028	
Endosulfan II	B012546-BLK1	ND	mg/kg	0.00050	0.000073	
Endosulfan sulfate	B012546-BLK1	ND	mg/kg	0.00050	0.00024	
Endrin	B012546-BLK1	ND	mg/kg	0.00050	0.000073	
Endrin aldehyde	B012546-BLK1	ND	mg/kg	0.00050	0.000077	
Heptachlor	B012546-BLK1	ND	mg/kg	0.00050	0.000099	
Heptachlor epoxide	B012546-BLK1	ND	mg/kg	0.00050	0.000030	
Methoxychlor	B012546-BLK1	ND	mg/kg	0.00050	0.00012	
Toxaphene	B012546-BLK1	ND	mg/kg	0.050	0.0019	
TCMX (Surrogate)	B012546-BLK1	103	%	20 - 130 (LCL - UCL)		
Decachlorobiphenyl (Surrogate)	B012546-BLK1	101	%	40 - 130 (LCL - UCL)		

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Organochlorine Pesticides (EPA Method 8081A)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B012546										
Aldrin	B012546-BS1	LCS	0.0046660	0.0049505	mg/kg	94.3		70 - 130		
gamma-BHC (Lindane)	B012546-BS1	LCS	0.0049251	0.0049505	mg/kg	99.5		60 - 140		
4,4'-DDT	B012546-BS1	LCS	0.0038277	0.0049505	mg/kg	77.3		60 - 140		
Dieldrin	B012546-BS1	LCS	0.0047257	0.0049505	mg/kg	95.5		70 - 130		
Endrin	B012546-BS1	LCS	0.0043017	0.0049505	mg/kg	86.9		60 - 140		
Heptachlor	B012546-BS1	LCS	0.0044931	0.0049505	mg/kg	90.8		60 - 140		
TCMX (Surrogate)	B012546-BS1	LCS	0.0094211	0.0099010	mg/kg	95.2		20 - 130		
Decachlorobiphenyl (Surrogate)	B012546-BS1	LCS	0.018774	0.019802	mg/kg	94.8		40 - 130		

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 16055-D Caputo Drive
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 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Organochlorine Pesticides (EPA Method 8081A)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B012546		Used client sample: N									
Aldrin	MS	1807882-20	ND	0.0047165	0.0050505	mg/kg		93.4		50 - 140	
	MSD	1807882-20	ND	0.0047191	0.0049342	mg/kg	0.1	95.6	30	50 - 140	
gamma-BHC (Lindane)	MS	1807882-20	ND	0.0049943	0.0050505	mg/kg		98.9		50 - 140	
	MSD	1807882-20	ND	0.0049638	0.0049342	mg/kg	0.6	101	30	50 - 140	
4,4'-DDT	MS	1807882-20	ND	0.0035266	0.0050505	mg/kg		69.8		50 - 140	
	MSD	1807882-20	ND	0.0036128	0.0049342	mg/kg	2.4	73.2	30	50 - 140	
Dieldrin	MS	1807882-20	ND	0.0047791	0.0050505	mg/kg		94.6		40 - 140	
	MSD	1807882-20	ND	0.0047599	0.0049342	mg/kg	0.4	96.5	30	40 - 140	
Endrin	MS	1807882-20	ND	0.0041357	0.0050505	mg/kg		81.9		50 - 150	
	MSD	1807882-20	ND	0.0042020	0.0049342	mg/kg	1.6	85.2	30	50 - 150	
Heptachlor	MS	1807882-20	ND	0.0044532	0.0050505	mg/kg		88.2		60 - 140	
	MSD	1807882-20	ND	0.0044181	0.0049342	mg/kg	0.8	89.5	30	60 - 140	
TCMX (Surrogate)	MS	1807882-20	ND	0.0092970	0.010101	mg/kg		92.0		20 - 130	
	MSD	1807882-20	ND	0.0091730	0.0098684	mg/kg	1.3	93.0		20 - 130	
Decachlorobiphenyl (Surrogate)	MS	1807882-20	ND	0.018188	0.020202	mg/kg		90.0		40 - 130	
	MSD	1807882-20	ND	0.018345	0.019737	mg/kg	0.9	92.9		40 - 130	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

PCB Analysis (EPA Method 8082)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012686						
PCB-1016	B012686-BLK1	ND	mg/kg	0.010	0.0026	
PCB-1221	B012686-BLK1	ND	mg/kg	0.010	0.0024	
PCB-1232	B012686-BLK1	ND	mg/kg	0.010	0.0044	
PCB-1242	B012686-BLK1	ND	mg/kg	0.010	0.0059	
PCB-1248	B012686-BLK1	ND	mg/kg	0.010	0.0037	
PCB-1254	B012686-BLK1	ND	mg/kg	0.010	0.0030	
PCB-1260	B012686-BLK1	ND	mg/kg	0.010	0.0056	
Total PCB's (Summation)	B012686-BLK1	ND	mg/kg	0.010	0.0050	
Decachlorobiphenyl (Surrogate)	B012686-BLK1	107	%	65 - 120 (LCL - UCL)		

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

PCB Analysis (EPA Method 8082)

Quality Control Report - Laboratory Control Sample

								Control Limits		
Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Percent Recovery	RPD	Lab
										Quals
QC Batch ID: B012686										
PCB-1016	B012686-BS1	LCS	0.085714	0.083056	mg/kg	103		60 - 120		
PCB-1260	B012686-BS1	LCS	0.087375	0.083056	mg/kg	105		60 - 120		
Decachlorobiphenyl (Surrogate)	B012686-BS1	LCS	0.018937	0.019934	mg/kg	95.0		65 - 120		

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Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

PCB Analysis (EPA Method 8082)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B012686		Used client sample: N									
PCB-1016	MS	1810833-27	ND	0.081208	0.083893	mg/kg		96.8		60 - 120	
	MSD	1810833-27	ND	0.083775	0.082781	mg/kg	3.1	101	30	60 - 120	
PCB-1260	MS	1810833-27	ND	0.087584	0.083893	mg/kg		104		60 - 120	
	MSD	1810833-27	ND	0.091391	0.082781	mg/kg	4.3	110	30	60 - 120	
Decachlorobiphenyl (Surrogate)	MS	1810833-27	ND	0.020805	0.020134	mg/kg		103		65 - 120	
	MSD	1810833-27	ND	0.021192	0.019868	mg/kg	1.8	107		65 - 120	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012041						
Benzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Bromobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Bromochloromethane	B012041-BLK1	ND	mg/kg	0.0050	0.00092	
Bromodichloromethane	B012041-BLK1	ND	mg/kg	0.0050	0.00084	
Bromoform	B012041-BLK1	ND	mg/kg	0.0050	0.0015	
Bromomethane	B012041-BLK1	ND	mg/kg	0.0050	0.0016	
n-Butylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0015	
sec-Butylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	
tert-Butylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	
Carbon tetrachloride	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
Chlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Chloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
Chloroform	B012041-BLK1	ND	mg/kg	0.0050	0.00063	
Chloromethane	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
2-Chlorotoluene	B012041-BLK1	ND	mg/kg	0.0050	0.0018	
4-Chlorotoluene	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
Dibromochloromethane	B012041-BLK1	ND	mg/kg	0.0050	0.00099	
1,2-Dibromo-3-chloropropane	B012041-BLK1	ND	mg/kg	0.0050	0.0017	
1,2-Dibromoethane	B012041-BLK1	ND	mg/kg	0.0050	0.0010	
Dibromomethane	B012041-BLK1	ND	mg/kg	0.0050	0.0018	
1,2-Dichlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.00081	
1,3-Dichlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
1,4-Dichlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0015	
Dichlorodifluoromethane	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
1,1-Dichloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
1,2-Dichloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.00085	
1,1-Dichloroethene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	
cis-1,2-Dichloroethene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
trans-1,2-Dichloroethene	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
Total 1,2-Dichloroethene	B012041-BLK1	ND	mg/kg	0.010	0.0026	
1,2-Dichloropropane	B012041-BLK1	ND	mg/kg	0.0050	0.00081	
1,3-Dichloropropane	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
2,2-Dichloropropane	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
1,1-Dichloropropene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012041						
cis-1,3-Dichloropropene	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
trans-1,3-Dichloropropene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	
Total 1,3-Dichloropropene	B012041-BLK1	ND	mg/kg	0.010	0.0020	
Ethylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0015	
Hexachlorobutadiene	B012041-BLK1	ND	mg/kg	0.0050	0.0017	
Isopropylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
p-Isopropyltoluene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Methylene chloride	B012041-BLK1	ND	mg/kg	0.010	0.0024	
Methyl t-butyl ether	B012041-BLK1	ND	mg/kg	0.0050	0.00050	
Naphthalene	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
n-Propylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Styrene	B012041-BLK1	ND	mg/kg	0.0050	0.0014	
1,1,1,2-Tetrachloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
1,1,2,2-Tetrachloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
Tetrachloroethene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
Toluene	B012041-BLK1	ND	mg/kg	0.0050	0.0012	
1,2,3-Trichlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0021	
1,2,4-Trichlorobenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0020	
1,1,1-Trichloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
1,1,2-Trichloroethane	B012041-BLK1	ND	mg/kg	0.0050	0.00077	
Trichloroethene	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
Trichlorofluoromethane	B012041-BLK1	ND	mg/kg	0.0050	0.0011	
1,2,3-Trichloropropane	B012041-BLK1	ND	mg/kg	0.0050	0.0016	
1,1,2-Trichloro-1,2,2-trifluoroethane	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
1,2,4-Trimethylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0013	
1,3,5-Trimethylbenzene	B012041-BLK1	ND	mg/kg	0.0050	0.0015	
Vinyl chloride	B012041-BLK1	ND	mg/kg	0.0050	0.0016	
Total Xylenes	B012041-BLK1	ND	mg/kg	0.010	0.0034	
t-Amyl Methyl ether	B012041-BLK1	ND	mg/kg	0.0050	0.00056	
t-Butyl alcohol	B012041-BLK1	ND	mg/kg	0.050	0.017	
Diisopropyl ether	B012041-BLK1	ND	mg/kg	0.0050	0.00080	
Ethanol	B012041-BLK1	ND	mg/kg	1.0	0.066	
Ethyl t-butyl ether	B012041-BLK1	ND	mg/kg	0.0050	0.00022	
Methyl ethyl ketone	B012041-BLK1	ND	mg/kg	0.010	0.0038	

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012041						
1,2-Dichloroethane-d4 (Surrogate)	B012041-BLK1	98.7	%	70 - 121 (LCL - UCL)		
Toluene-d8 (Surrogate)	B012041-BLK1	99.5	%	81 - 117 (LCL - UCL)		
4-Bromofluorobenzene (Surrogate)	B012041-BLK1	99.6	%	74 - 121 (LCL - UCL)		

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B012041										
Benzene	B012041-BS1	LCS	0.12331	0.12500	mg/kg	98.6		70 - 130		
Bromodichloromethane	B012041-BS1	LCS	0.11003	0.12500	mg/kg	88.0		70 - 130		
Chlorobenzene	B012041-BS1	LCS	0.11251	0.12500	mg/kg	90.0		70 - 130		
Chloroethane	B012041-BS1	LCS	0.11904	0.12500	mg/kg	95.2		70 - 130		
1,4-Dichlorobenzene	B012041-BS1	LCS	0.10364	0.12500	mg/kg	82.9		70 - 130		
1,1-Dichloroethane	B012041-BS1	LCS	0.11718	0.12500	mg/kg	93.7		70 - 130		
1,1-Dichloroethene	B012041-BS1	LCS	0.11744	0.12500	mg/kg	94.0		70 - 130		
Toluene	B012041-BS1	LCS	0.11312	0.12500	mg/kg	90.5		70 - 130		
Trichloroethene	B012041-BS1	LCS	0.10650	0.12500	mg/kg	85.2		70 - 130		
1,2-Dichloroethane-d4 (Surrogate)	B012041-BS1	LCS	0.050570	0.050000	mg/kg	101		70 - 121		
Toluene-d8 (Surrogate)	B012041-BS1	LCS	0.049750	0.050000	mg/kg	99.5		81 - 117		
4-Bromofluorobenzene (Surrogate)	B012041-BS1	LCS	0.048020	0.050000	mg/kg	96.0		74 - 121		

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 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Volatile Organic Analysis (EPA Method 8260B)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B012041		Used client sample: N									
Benzene	MS	1810833-91	ND	0.12323	0.12500	mg/kg		98.6		70 - 130	
	MSD	1810833-91	ND	0.12138	0.12500	mg/kg	1.5	97.1	20	70 - 130	
Bromodichloromethane	MS	1810833-91	ND	0.11919	0.12500	mg/kg		95.4		70 - 130	
	MSD	1810833-91	ND	0.11851	0.12500	mg/kg	0.6	94.8	20	70 - 130	
Chlorobenzene	MS	1810833-91	ND	0.11500	0.12500	mg/kg		92.0		70 - 130	
	MSD	1810833-91	ND	0.11753	0.12500	mg/kg	2.2	94.0	20	70 - 130	
Chloroethane	MS	1810833-91	ND	0.12034	0.12500	mg/kg		96.3		70 - 130	
	MSD	1810833-91	ND	0.12353	0.12500	mg/kg	2.6	98.8	20	70 - 130	
1,4-Dichlorobenzene	MS	1810833-91	ND	0.11566	0.12500	mg/kg		92.5		70 - 130	
	MSD	1810833-91	ND	0.11346	0.12500	mg/kg	1.9	90.8	20	70 - 130	
1,1-Dichloroethane	MS	1810833-91	ND	0.11908	0.12500	mg/kg		95.3		70 - 130	
	MSD	1810833-91	ND	0.11647	0.12500	mg/kg	2.2	93.2	20	70 - 130	
1,1-Dichloroethene	MS	1810833-91	ND	0.12002	0.12500	mg/kg		96.0		70 - 130	
	MSD	1810833-91	ND	0.11962	0.12500	mg/kg	0.3	95.7	20	70 - 130	
Toluene	MS	1810833-91	ND	0.11768	0.12500	mg/kg		94.1		70 - 130	
	MSD	1810833-91	ND	0.11964	0.12500	mg/kg	1.7	95.7	20	70 - 130	
Trichloroethene	MS	1810833-91	ND	0.11162	0.12500	mg/kg		89.3		70 - 130	
	MSD	1810833-91	ND	0.11311	0.12500	mg/kg	1.3	90.5	20	70 - 130	
1,2-Dichloroethane-d4 (Surrogate)	MS	1810833-91	ND	0.048860	0.050000	mg/kg		97.7		70 - 121	
	MSD	1810833-91	ND	0.045360	0.050000	mg/kg	7.4	90.7		70 - 121	
Toluene-d8 (Surrogate)	MS	1810833-91	ND	0.048820	0.050000	mg/kg		97.6		81 - 117	
	MSD	1810833-91	ND	0.051220	0.050000	mg/kg	4.8	102		81 - 117	
4-Bromofluorobenzene (Surrogate)	MS	1810833-91	ND	0.050580	0.050000	mg/kg		101		74 - 121	
	MSD	1810833-91	ND	0.048860	0.050000	mg/kg	3.5	97.7		74 - 121	

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 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B013245						
Acenaphthene	B013245-BLK1	ND	mg/kg	0.10	0.0092	
Acenaphthylene	B013245-BLK1	ND	mg/kg	0.10	0.018	
Aldrin	B013245-BLK1	ND	mg/kg	0.10	0.016	
Aniline	B013245-BLK1	ND	mg/kg	0.20	0.016	
Anthracene	B013245-BLK1	ND	mg/kg	0.10	0.050	
Benzidine	B013245-BLK1	ND	mg/kg	3.0	0.058	
Benzo[a]anthracene	B013245-BLK1	ND	mg/kg	0.10	0.041	
Benzo[b]fluoranthene	B013245-BLK1	ND	mg/kg	0.10	0.0094	
Benzo[k]fluoranthene	B013245-BLK1	ND	mg/kg	0.10	0.017	
Benzo[a]pyrene	B013245-BLK1	ND	mg/kg	0.10	0.026	
Benzo[g,h,i]perylene	B013245-BLK1	ND	mg/kg	0.10	0.011	
Benzoic acid	B013245-BLK1	ND	mg/kg	0.50	0.057	
Benzyl alcohol	B013245-BLK1	ND	mg/kg	0.10	0.0073	
Benzyl butyl phthalate	B013245-BLK1	ND	mg/kg	0.10	0.033	
alpha-BHC	B013245-BLK1	ND	mg/kg	0.10	0.035	
beta-BHC	B013245-BLK1	ND	mg/kg	0.10	0.040	
delta-BHC	B013245-BLK1	ND	mg/kg	0.10	0.018	
gamma-BHC (Lindane)	B013245-BLK1	ND	mg/kg	0.10	0.025	
bis(2-Chloroethoxy)methane	B013245-BLK1	ND	mg/kg	0.10	0.045	
bis(2-Chloroethyl) ether	B013245-BLK1	ND	mg/kg	0.10	0.026	
bis(2-Chloroisopropyl)ether	B013245-BLK1	ND	mg/kg	0.10	0.015	
bis(2-Ethylhexyl)phthalate	B013245-BLK1	ND	mg/kg	0.20	0.032	
4-Bromophenyl phenyl ether	B013245-BLK1	ND	mg/kg	0.10	0.026	
4-Chloroaniline	B013245-BLK1	ND	mg/kg	0.10	0.015	
2-Chloronaphthalene	B013245-BLK1	ND	mg/kg	0.10	0.012	
4-Chlorophenyl phenyl ether	B013245-BLK1	ND	mg/kg	0.10	0.011	
Chrysene	B013245-BLK1	ND	mg/kg	0.10	0.016	
4,4'-DDD	B013245-BLK1	ND	mg/kg	0.10	0.032	
4,4'-DDE	B013245-BLK1	ND	mg/kg	0.10	0.033	
4,4'-DDT	B013245-BLK1	ND	mg/kg	0.10	0.052	
Dibenzo[a,h]anthracene	B013245-BLK1	ND	mg/kg	0.10	0.019	
Dibenzofuran	B013245-BLK1	ND	mg/kg	0.10	0.013	
1,2-Dichlorobenzene	B013245-BLK1	ND	mg/kg	0.10	0.0084	
1,3-Dichlorobenzene	B013245-BLK1	ND	mg/kg	0.10	0.012	

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Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B013245						
1,4-Dichlorobenzene	B013245-BLK1	ND	mg/kg	0.10	0.018	
3,3-Dichlorobenzidine	B013245-BLK1	ND	mg/kg	0.20	0.024	
Dieldrin	B013245-BLK1	ND	mg/kg	0.10	0.031	
Diethyl phthalate	B013245-BLK1	ND	mg/kg	0.10	0.0073	
Dimethyl phthalate	B013245-BLK1	ND	mg/kg	0.10	0.0091	
Di-n-butyl phthalate	B013245-BLK1	ND	mg/kg	0.10	0.019	
2,4-Dinitrotoluene	B013245-BLK1	ND	mg/kg	0.10	0.030	
2,6-Dinitrotoluene	B013245-BLK1	ND	mg/kg	0.10	0.016	
Di-n-octyl phthalate	B013245-BLK1	ND	mg/kg	0.10	0.013	
1,2-Diphenylhydrazine	B013245-BLK1	ND	mg/kg	0.10	0.016	
Endosulfan I	B013245-BLK1	ND	mg/kg	0.20	0.062	
Endosulfan II	B013245-BLK1	ND	mg/kg	0.20	0.062	
Endosulfan sulfate	B013245-BLK1	ND	mg/kg	0.10	0.056	
Endrin	B013245-BLK1	ND	mg/kg	0.20	0.053	
Endrin aldehyde	B013245-BLK1	ND	mg/kg	0.50	0.044	
Fluoranthene	B013245-BLK1	ND	mg/kg	0.10	0.011	
Fluorene	B013245-BLK1	ND	mg/kg	0.10	0.013	
Heptachlor	B013245-BLK1	ND	mg/kg	0.10	0.024	
Heptachlor epoxide	B013245-BLK1	ND	mg/kg	0.10	0.065	
Hexachlorobenzene	B013245-BLK1	ND	mg/kg	0.10	0.012	
Hexachlorobutadiene	B013245-BLK1	ND	mg/kg	0.10	0.020	
Hexachlorocyclopentadiene	B013245-BLK1	ND	mg/kg	0.10	0.029	
Hexachloroethane	B013245-BLK1	ND	mg/kg	0.10	0.032	
Indeno[1,2,3-cd]pyrene	B013245-BLK1	ND	mg/kg	0.10	0.013	
Isophorone	B013245-BLK1	ND	mg/kg	0.10	0.0099	
2-Methylnaphthalene	B013245-BLK1	ND	mg/kg	0.10	0.0082	
Naphthalene	B013245-BLK1	ND	mg/kg	0.10	0.0085	
2-Naphthylamine	B013245-BLK1	ND	mg/kg	3.0	0.039	
2-Nitroaniline	B013245-BLK1	ND	mg/kg	0.10	0.027	
3-Nitroaniline	B013245-BLK1	ND	mg/kg	0.20	0.037	
4-Nitroaniline	B013245-BLK1	ND	mg/kg	0.20	0.037	
Nitrobenzene	B013245-BLK1	ND	mg/kg	0.10	0.0098	
N-Nitrosodimethylamine	B013245-BLK1	ND	mg/kg	0.10	0.077	
N-Nitrosodi-N-propylamine	B013245-BLK1	ND	mg/kg	0.10	0.013	

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Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B013245						
N-Nitrosodiphenylamine	B013245-BLK1	ND	mg/kg	0.10	0.018	
Phenanthrene	B013245-BLK1	ND	mg/kg	0.10	0.034	
Pyrene	B013245-BLK1	ND	mg/kg	0.10	0.027	
1,2,4-Trichlorobenzene	B013245-BLK1	ND	mg/kg	0.10	0.016	
4-Chloro-3-methylphenol	B013245-BLK1	ND	mg/kg	0.20	0.017	
2-Chlorophenol	B013245-BLK1	ND	mg/kg	0.10	0.015	
2,4-Dichlorophenol	B013245-BLK1	ND	mg/kg	0.10	0.021	
2,4-Dimethylphenol	B013245-BLK1	ND	mg/kg	0.10	0.019	
4,6-Dinitro-2-methylphenol	B013245-BLK1	ND	mg/kg	0.50	0.030	
2,4-Dinitrophenol	B013245-BLK1	ND	mg/kg	0.50	0.18	
2-Methylphenol	B013245-BLK1	ND	mg/kg	0.10	0.0086	
3- & 4-Methylphenol	B013245-BLK1	ND	mg/kg	0.20	0.034	
Total Methylphenol	B013245-BLK1	ND	mg/kg	0.20	0.043	
2-Nitrophenol	B013245-BLK1	ND	mg/kg	0.10	0.025	
4-Nitrophenol	B013245-BLK1	ND	mg/kg	0.20	0.034	
Pentachlorophenol	B013245-BLK1	ND	mg/kg	0.20	0.031	
Phenol	B013245-BLK1	ND	mg/kg	0.10	0.015	
2,4,5-Trichlorophenol	B013245-BLK1	ND	mg/kg	0.20	0.017	
2,4,6-Trichlorophenol	B013245-BLK1	ND	mg/kg	0.20	0.028	
Pyridine	B013245-BLK1	ND	mg/kg	0.50	0.036	
2-Fluorophenol (Surrogate)	B013245-BLK1	63.9	%	20 - 130 (LCL - UCL)		
Phenol-d5 (Surrogate)	B013245-BLK1	58.9	%	30 - 130 (LCL - UCL)		
Nitrobenzene-d5 (Surrogate)	B013245-BLK1	56.7	%	30 - 130 (LCL - UCL)		
2-Fluorobiphenyl (Surrogate)	B013245-BLK1	53.8	%	30 - 140 (LCL - UCL)		
2,4,6-Tribromophenol (Surrogate)	B013245-BLK1	34.0	%	20 - 150 (LCL - UCL)		
p-Terphenyl-d14 (Surrogate)	B013245-BLK1	53.2	%	30 - 150 (LCL - UCL)		

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Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	Quals
QC Batch ID: B013245										
Acenaphthene	B013245-BS1	LCS	1.1241	1.6722	mg/kg	67.2		50 - 130		
1,4-Dichlorobenzene	B013245-BS1	LCS	1.0793	1.6722	mg/kg	64.5		50 - 130		
2,4-Dinitrotoluene	B013245-BS1	LCS	0.91304	1.6722	mg/kg	54.6		50 - 130		
Hexachlorobenzene	B013245-BS1	LCS	0.81739	1.3378	mg/kg	61.1		40 - 130		
Hexachlorobutadiene	B013245-BS1	LCS	0.88562	1.6722	mg/kg	53.0		50 - 130		
Hexachloroethane	B013245-BS1	LCS	1.1967	1.6722	mg/kg	71.6		50 - 130		
Nitrobenzene	B013245-BS1	LCS	1.0893	1.6722	mg/kg	65.1		50 - 130		
N-Nitrosodi-N-propylamine	B013245-BS1	LCS	1.1625	1.6722	mg/kg	69.5		40 - 120		
Pyrene	B013245-BS1	LCS	1.3756	1.6722	mg/kg	82.3		40 - 150		
1,2,4-Trichlorobenzene	B013245-BS1	LCS	0.94582	1.6722	mg/kg	56.6		50 - 120		
4-Chloro-3-methylphenol	B013245-BS1	LCS	0.86120	1.6722	mg/kg	51.5		50 - 130		
2-Chlorophenol	B013245-BS1	LCS	1.0120	1.6722	mg/kg	60.5		50 - 130		
2-Methylphenol	B013245-BS1	LCS	0.95786	1.6722	mg/kg	57.3		50 - 130		
3- & 4-Methylphenol	B013245-BS1	LCS	1.9712	3.3445	mg/kg	58.9		50 - 130		
4-Nitrophenol	B013245-BS1	LCS	0.57224	1.6722	mg/kg	34.2		30 - 130		
Pentachlorophenol	B013245-BS1	LCS	0.55318	1.3378	mg/kg	41.4		20 - 130		
Phenol	B013245-BS1	LCS	1.1933	1.6722	mg/kg	71.4		40 - 120		
2,4,6-Trichlorophenol	B013245-BS1	LCS	0.78629	1.6722	mg/kg	47.0		50 - 130		L21
Pyridine	B013245-BS1	LCS	0.38629	1.6722	mg/kg	23.1		10 - 110		J
2-Fluorophenol (Surrogate)	B013245-BS1	LCS	1.1288	1.3378	mg/kg	84.4		20 - 130		
Phenol-d5 (Surrogate)	B013245-BS1	LCS	1.0465	1.3378	mg/kg	78.2		30 - 130		
Nitrobenzene-d5 (Surrogate)	B013245-BS1	LCS	0.98227	1.3378	mg/kg	73.4		30 - 130		
2-Fluorobiphenyl (Surrogate)	B013245-BS1	LCS	0.81605	1.3378	mg/kg	61.0		30 - 140		
2,4,6-Tribromophenol (Surrogate)	B013245-BS1	LCS	0.69097	1.3378	mg/kg	51.6		20 - 150		
p-Terphenyl-d14 (Surrogate)	B013245-BS1	LCS	0.42074	0.66890	mg/kg	62.9		30 - 150		

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Precision & Accuracy

									Control Limits		
		Source	Source		Spike			Percent		Percent	Lab
Constituent	Type	Sample ID	Result	Result	Added	Units	RPD	Recovery	RPD	Recovery	Quals
QC Batch ID: B013245		Used client sample: N									
Acenaphthene	MS	1804625-25	ND	1.1225	1.6949	mg/kg		66.2		30 - 140	
	MSD	1804625-25	ND	1.1709	1.6556	mg/kg	4.2	70.7	30	30 - 140	
1,4-Dichlorobenzene	MS	1804625-25	ND	1.0836	1.6949	mg/kg		63.9		50 - 130	
	MSD	1804625-25	ND	1.1136	1.6556	mg/kg	2.7	67.3	30	50 - 130	
2,4-Dinitrotoluene	MS	1804625-25	ND	0.93847	1.6949	mg/kg		55.4		50 - 130	
	MSD	1804625-25	ND	0.96258	1.6556	mg/kg	2.5	58.1	30	50 - 130	
Hexachlorobenzene	MS	1804625-25	ND	0.84612	1.3559	mg/kg		62.4		50 - 130	
	MSD	1804625-25	ND	0.89305	1.3245	mg/kg	5.4	67.4	30	50 - 130	
Hexachlorobutadiene	MS	1804625-25	ND	0.89562	1.6949	mg/kg		52.8		50 - 130	
	MSD	1804625-25	ND	0.92781	1.6556	mg/kg	3.5	56.0	30	50 - 130	
Hexachloroethane	MS	1804625-25	ND	1.1909	1.6949	mg/kg		70.3		50 - 130	
	MSD	1804625-25	ND	1.2536	1.6556	mg/kg	5.1	75.7	30	50 - 130	
Nitrobenzene	MS	1804625-25	ND	1.1302	1.6949	mg/kg		66.7		30 - 120	
	MSD	1804625-25	ND	1.1530	1.6556	mg/kg	2.0	69.6	30	30 - 120	
N-Nitrosodi-N-propylamine	MS	1804625-25	ND	1.1212	1.6949	mg/kg		66.2		20 - 130	
	MSD	1804625-25	ND	1.2152	1.6556	mg/kg	8.1	73.4	30	20 - 130	
Pyrene	MS	1804625-25	ND	1.3630	1.6949	mg/kg		80.4		40 - 140	
	MSD	1804625-25	ND	1.3556	1.6556	mg/kg	0.5	81.9	30	40 - 140	
1,2,4-Trichlorobenzene	MS	1804625-25	ND	0.97734	1.6949	mg/kg		57.7		50 - 130	
	MSD	1804625-25	ND	0.98411	1.6556	mg/kg	0.7	59.4	30	50 - 130	
4-Chloro-3-methylphenol	MS	1804625-25	ND	0.90426	1.6949	mg/kg		53.4		50 - 130	
	MSD	1804625-25	ND	0.92351	1.6556	mg/kg	2.1	55.8	30	50 - 130	
2-Chlorophenol	MS	1804625-25	ND	1.0199	1.6949	mg/kg		60.2		50 - 130	
	MSD	1804625-25	ND	1.0639	1.6556	mg/kg	4.2	64.3	30	50 - 130	
2-Methylphenol	MS	1804625-25	ND	0.93449	1.6949	mg/kg		55.1		50 - 130	
	MSD	1804625-25	ND	0.98245	1.6556	mg/kg	5.0	59.3	30	50 - 130	
3- & 4-Methylphenol	MS	1804625-25	ND	1.8461	3.3898	mg/kg		54.5		50 - 130	
	MSD	1804625-25	ND	2.0623	3.3113	mg/kg	11.1	62.3	30	50 - 130	
4-Nitrophenol	MS	1804625-25	ND	0.44947	1.6949	mg/kg		26.5		30 - 140	Q03
	MSD	1804625-25	ND	0.47748	1.6556	mg/kg	6.0	28.8	30	30 - 140	Q03
Pentachlorophenol	MS	1804625-25	ND	0.60328	1.3559	mg/kg		44.5		30 - 130	
	MSD	1804625-25	ND	0.56457	1.3245	mg/kg	6.6	42.6	30	30 - 130	
Phenol	MS	1804625-25	ND	1.1677	1.6949	mg/kg		68.9		40 - 150	
	MSD	1804625-25	ND	1.2281	1.6556	mg/kg	5.0	74.2	30	40 - 150	
2,4,6-Trichlorophenol	MS	1804625-25	ND	0.84679	1.6949	mg/kg		50.0		50 - 130	
	MSD	1804625-25	ND	0.81093	1.6556	mg/kg	4.3	49.0	30	50 - 130	Q03

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Base Neutral and Acid Extractables Organic Analysis (EPA Method 8270C)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B013245		Used client sample: N									
Pyridine	MS	1804625-25	ND	0.52721	1.6949	mg/kg		31.1		10 - 110	
	MSD	1804625-25	ND	0.39073	1.6556	mg/kg	29.7	23.6	30	10 - 110	J
2-Fluorophenol (Surrogate)	MS	1804625-25	ND	1.1451	1.3559	mg/kg		84.5		20 - 130	
	MSD	1804625-25	ND	1.1844	1.3245	mg/kg	3.4	89.4		20 - 130	
Phenol-d5 (Surrogate)	MS	1804625-25	ND	1.0235	1.3559	mg/kg		75.5		30 - 130	
	MSD	1804625-25	ND	1.0689	1.3245	mg/kg	4.3	80.7		30 - 130	
Nitrobenzene-d5 (Surrogate)	MS	1804625-25	ND	1.0052	1.3559	mg/kg		74.1		30 - 130	
	MSD	1804625-25	ND	1.0364	1.3245	mg/kg	3.1	78.2		30 - 130	
2-Fluorobiphenyl (Surrogate)	MS	1804625-25	ND	0.84878	1.3559	mg/kg		62.6		30 - 140	
	MSD	1804625-25	ND	0.84073	1.3245	mg/kg	1.0	63.5		30 - 140	
2,4,6-Tribromophenol (Surrogate)	MS	1804625-25	ND	0.73849	1.3559	mg/kg		54.5		20 - 150	
	MSD	1804625-25	ND	0.69272	1.3245	mg/kg	6.4	52.3		20 - 150	
p-Terphenyl-d14 (Surrogate)	MS	1804625-25	ND	0.43519	0.67797	mg/kg		64.2		30 - 150	
	MSD	1804625-25	ND	0.44238	0.66225	mg/kg	1.6	66.8		30 - 150	

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Total Petroleum Hydrocarbons

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012359						
TPH - Gasoline	B012359-BLK1	ND	mg/kg	20	5.0	
TPH - Diesel (FFP)	B012359-BLK1	ND	mg/kg	10	1.2	
TPH - Motor Oil	B012359-BLK1	ND	mg/kg	20	6.5	
Tetracosane (Surrogate)	B012359-BLK1	118	%	20 - 145 (LCL - UCL)		

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Environmental Testing Laboratory Since 1949

Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Total Petroleum Hydrocarbons

Quality Control Report - Laboratory Control Sample

								Control Limits		
Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Percent	Lab	
								Recovery	RPD	Quals
QC Batch ID: B012359										
TPH - Diesel (FFP)	B012359-BS1	LCS	77.198	83.612	mg/kg	92.3		64 - 124		
Tetracosane (Surrogate)	B012359-BS1	LCS	3.6151	3.3445	mg/kg	108		20 - 145		

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Total Petroleum Hydrocarbons

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B012359		Used client sample: N									
TPH - Diesel (FFP)	MS	1807882-98	ND	80.083	82.508	mg/kg		97.1		52 - 131	
	MSD	1807882-98	ND	87.078	84.459	mg/kg	8.4	103	30	52 - 131	
Tetracosane (Surrogate)	MS	1807882-98	ND	3.7515	3.3003	mg/kg		114		20 - 145	
	MSD	1807882-98	ND	3.9515	3.3784	mg/kg	5.2	117		20 - 145	

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

WET Test (STLC)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B014758						
Chromium	B014758-BLK1	ND	mg/L	0.10	0.0092	
Lead	B014758-BLK1	ND	mg/L	0.50	0.16	

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Environmental Testing Laboratory Since 1949



Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

WET Test (STLC)

Quality Control Report - Laboratory Control Sample

								Control Limits		
Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Percent	Lab	
								Recovery	RPD	Quals
QC Batch ID: B014758										
Chromium	B014758-BS1	LCS	22.747	20.000	mg/L	114		85 - 115		
Lead	B014758-BS1	LCS	20.955	20.000	mg/L	105		85 - 115		

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 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

WET Test (STLC)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B014758		Used client sample: N									
Chromium	DUP	1814818-06	0.21728	0.22085		mg/L	1.6		20		
	MS	1814818-06	0.21728	23.034	20.408	mg/L		112		75 - 125	
	MSD	1814818-06	0.21728	23.240	20.408	mg/L	0.9	113	20	75 - 125	
Lead	DUP	1814818-06	3.1115	3.1634		mg/L	1.7		20		
	MS	1814818-06	3.1115	24.099	20.408	mg/L		103		75 - 125	
	MSD	1814818-06	3.1115	24.082	20.408	mg/L	0.1	103	20	75 - 125	

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Environmental Testing Laboratory Since 1949



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Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

TCLP Toxicity

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B014703						
Chromium	B014703-BLK1	0.0085106	mg/L	0.10	0.0075	J

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Environmental Testing Laboratory Since 1949

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Morgan Hill, CA 95037

Reported: 06/15/2018 9:35

Project: Top Golf

Project Number: RM18.1038

Project Manager: Rick Mitchell

TCLP Toxicity

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B014703										
Chromium	B014703-BS1	LCS	19.280	20.000	mg/L	96.4		85 - 115		

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

TCLP Toxicity

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B014703		Used client sample: N									
Chromium	DUP	1815010-23	0.017355	0.024336		mg/L	33.5		20		J,A02
	MS	1815010-23	0.017355	20.135	20.000	mg/L		101		75 - 125	
	MSD	1815010-23	0.017355	19.942	20.000	mg/L	1.0	99.6	20	75 - 125	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Total Concentrations (TTL)

Quality Control Report - Method Blank Analysis

Constituent	QC Sample ID	MB Result	Units	PQL	MDL	Lab Quals
QC Batch ID: B012605						
Antimony	B012605-BLK1	ND	mg/kg	5.0	0.33	
Arsenic	B012605-BLK2	ND	mg/kg	1.0	0.40	
Barium	B012605-BLK1	ND	mg/kg	0.50	0.18	
Beryllium	B012605-BLK1	ND	mg/kg	0.50	0.047	
Cadmium	B012605-BLK2	ND	mg/kg	0.50	0.052	
Chromium	B012605-BLK2	0.053772	mg/kg	0.50	0.050	J
Cobalt	B012605-BLK1	ND	mg/kg	2.5	0.098	
Copper	B012605-BLK1	0.10878	mg/kg	1.0	0.050	J
Lead	B012605-BLK1	ND	mg/kg	2.5	0.28	
Molybdenum	B012605-BLK1	0.36586	mg/kg	2.5	0.050	J
Nickel	B012605-BLK1	ND	mg/kg	0.50	0.15	
Selenium	B012605-BLK2	ND	mg/kg	1.0	0.98	
Silver	B012605-BLK2	ND	mg/kg	0.50	0.067	
Thallium	B012605-BLK1	ND	mg/kg	5.0	0.64	
Vanadium	B012605-BLK1	ND	mg/kg	0.50	0.11	
Zinc	B012605-BLK1	0.20234	mg/kg	2.5	0.087	J
QC Batch ID: B012684						
Mercury	B012684-BLK1	ND	mg/kg	0.16	0.019	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Total Concentrations (TTLC)

Quality Control Report - Laboratory Control Sample

Constituent	QC Sample ID	Type	Result	Spike Level	Units	Percent Recovery	RPD	Control Limits		Lab
								Percent Recovery	RPD	
QC Batch ID: B012605										
Antimony	B012605-BS1	LCS	108.08	100.00	mg/kg	108		75 - 125		
Arsenic	B012605-BS2	LCS	9.3321	10.000	mg/kg	93.3		75 - 125		
Barium	B012605-BS1	LCS	109.58	100.00	mg/kg	110		75 - 125		
Beryllium	B012605-BS1	LCS	10.152	10.000	mg/kg	102		75 - 125		
Cadmium	B012605-BS2	LCS	10.071	10.000	mg/kg	101		75 - 125		
Chromium	B012605-BS2	LCS	106.05	100.00	mg/kg	106		75 - 125		
Cobalt	B012605-BS1	LCS	108.22	100.00	mg/kg	108		75 - 125		
Copper	B012605-BS1	LCS	102.31	100.00	mg/kg	102		75 - 125		
Lead	B012605-BS1	LCS	101.77	100.00	mg/kg	102		75 - 125		
Molybdenum	B012605-BS1	LCS	105.99	100.00	mg/kg	106		75 - 125		
Nickel	B012605-BS1	LCS	109.22	100.00	mg/kg	109		75 - 125		
Selenium	B012605-BS2	LCS	9.4384	10.000	mg/kg	94.4		75 - 125		
Silver	B012605-BS2	LCS	9.8684	10.000	mg/kg	98.7		75 - 125		
Thallium	B012605-BS1	LCS	119.27	100.00	mg/kg	119		75 - 125		
Vanadium	B012605-BS1	LCS	103.20	100.00	mg/kg	103		75 - 125		
Zinc	B012605-BS1	LCS	105.75	100.00	mg/kg	106		75 - 125		
QC Batch ID: B012684										
Mercury	B012684-BS1	LCS	0.86336	0.80000	mg/kg	108		80 - 120		

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949


 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Total Concentrations (TTLC)

Quality Control Report - Precision & Accuracy

									Control Limits		
		Source	Source		Spike			Percent		Percent	Lab
Constituent	Type	Sample ID	Result	Result	Added	Units	RPD	Recovery	RPD	Recovery	Quals
QC Batch ID: B012605		Used client sample: N									
Antimony	DUP	1813644-02	ND	ND		mg/kg			20		
	MS	1813644-02	ND	16.077	100.00	mg/kg		16.1		16 - 119	
	MSD	1813644-02	ND	17.795	100.00	mg/kg	10.1	17.8	20	16 - 119	
Arsenic	DUP	1813644-02	5.4014	5.7666		mg/kg	6.5		20		
	MS	1813644-02	5.4014	13.638	10.000	mg/kg		82.4		75 - 125	
	MSD	1813644-02	5.4014	13.888	10.000	mg/kg	1.8	84.9	20	75 - 125	
Barium	DUP	1813644-02	118.07	113.15		mg/kg	4.3		20		
	MS	1813644-02	118.07	193.91	100.00	mg/kg		75.8		75 - 125	
	MSD	1813644-02	118.07	193.69	100.00	mg/kg	0.1	75.6	20	75 - 125	
Beryllium	DUP	1813644-02	0.36786	0.36309		mg/kg	1.3		20		J
	MS	1813644-02	0.36786	8.1196	10.000	mg/kg		77.5		75 - 125	
	MSD	1813644-02	0.36786	8.1684	10.000	mg/kg	0.6	78.0	20	75 - 125	
Cadmium	DUP	1813644-02	0.11272	0.12524		mg/kg	10.5		20		J
	MS	1813644-02	0.11272	8.3251	10.000	mg/kg		82.1		75 - 125	
	MSD	1813644-02	0.11272	8.2054	10.000	mg/kg	1.4	80.9	20	75 - 125	
Chromium	DUP	1813644-02	17.653	17.407		mg/kg	1.4		20		
	MS	1813644-02	17.653	97.959	100.00	mg/kg		80.3		75 - 125	
	MSD	1813644-02	17.653	97.312	100.00	mg/kg	0.7	79.7	20	75 - 125	
Cobalt	DUP	1813644-02	7.5921	7.5945		mg/kg	0.0		20		
	MS	1813644-02	7.5921	88.168	100.00	mg/kg		80.6		75 - 125	
	MSD	1813644-02	7.5921	91.152	100.00	mg/kg	3.3	83.6	20	75 - 125	
Copper	DUP	1813644-02	33.112	37.271		mg/kg	11.8		20		
	MS	1813644-02	33.112	119.33	100.00	mg/kg		86.2		75 - 125	
	MSD	1813644-02	33.112	124.90	100.00	mg/kg	4.6	91.8	20	75 - 125	
Lead	DUP	1813644-02	17.953	18.782		mg/kg	4.5		20		
	MS	1813644-02	17.953	92.259	100.00	mg/kg		74.3		75 - 125	Q03
	MSD	1813644-02	17.953	96.678	100.00	mg/kg	4.7	78.7	20	75 - 125	
Molybdenum	DUP	1813644-02	0.46850	0.38628		mg/kg	19.2		20		J
	MS	1813644-02	0.46850	79.896	100.00	mg/kg		79.4		75 - 125	
	MSD	1813644-02	0.46850	83.070	100.00	mg/kg	3.9	82.6	20	75 - 125	
Nickel	DUP	1813644-02	11.798	11.649		mg/kg	1.3		20		
	MS	1813644-02	11.798	86.398	100.00	mg/kg		74.6		75 - 125	Q03
	MSD	1813644-02	11.798	89.802	100.00	mg/kg	3.9	78.0	20	75 - 125	
Selenium	DUP	1813644-02	ND	ND		mg/kg			20		
	MS	1813644-02	ND	6.6815	10.000	mg/kg		66.8		75 - 125	Q03
	MSD	1813644-02	ND	6.8044	10.000	mg/kg	1.8	68.0	20	75 - 125	Q03
Silver	DUP	1813644-02	ND	ND		mg/kg			20		
	MS	1813644-02	ND	7.8513	10.000	mg/kg		78.5		75 - 125	
	MSD	1813644-02	ND	7.9210	10.000	mg/kg	0.9	79.2	20	75 - 125	

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Laboratories, Inc.

Environmental Testing Laboratory Since 1949

 Geologic - Morgan Hill
 16055-D Caputo Drive
 Morgan Hill, CA 95037

 Reported: 06/15/2018 9:35
 Project: Top Golf
 Project Number: RM18.1038
 Project Manager: Rick Mitchell

Total Concentrations (TTLC)

Quality Control Report - Precision & Accuracy

									Control Limits		
Constituent	Type	Source Sample ID	Source Result	Result	Spike Added	Units	RPD	Percent Recovery	RPD	Percent Recovery	Lab Quals
QC Batch ID: B012605		Used client sample: N									
Thallium	DUP	1813644-02	1.2368	1.1569		mg/kg	6.7		20		J
	MS	1813644-02	1.2368	79.886	100.00	mg/kg		78.6		75 - 125	
	MSD	1813644-02	1.2368	82.067	100.00	mg/kg	2.7	80.8	20	75 - 125	
Vanadium	DUP	1813644-02	38.683	37.931		mg/kg	2.0		20		
	MS	1813644-02	38.683	122.42	100.00	mg/kg		83.7		75 - 125	
	MSD	1813644-02	38.683	125.30	100.00	mg/kg	2.3	86.6	20	75 - 125	
Zinc	DUP	1813644-02	59.687	59.218		mg/kg	0.8		20		
	MS	1813644-02	59.687	132.57	100.00	mg/kg		72.9		75 - 125	Q03
	MSD	1813644-02	59.687	135.62	100.00	mg/kg	2.3	75.9	20	75 - 125	
QC Batch ID: B012684		Used client sample: N									
Mercury	DUP	1814219-01	0.055714	0.071111		mg/kg	24.3		20		J,A02
	MS	1814219-01	0.055714	0.94810	0.79365	mg/kg		112		80 - 120	
	MSD	1814219-01	0.055714	0.95302	0.79365	mg/kg	0.5	113	20	80 - 120	

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**Laboratories, Inc.**

Environmental Testing Laboratory Since 1949

Geologic - Morgan Hill
16055-D Caputo Drive
Morgan Hill, CA 95037

Reported: 06/15/2018 9:35
Project: Top Golf
Project Number: RM18.1038
Project Manager: Rick Mitchell

Notes And Definitions

J	Estimated Value (CLP Flag)
MDL	Method Detection Limit
ND	Analyte Not Detected
PQL	Practical Quantitation Limit
A01	Detection and quantitation limits are raised due to sample dilution.
A02	The difference between duplicate readings is less than the quantitation limit.
A52	Chromatogram not typical of diesel.
L21	The Laboratory Control Sample Soil (LCSS) recovery is not within laboratory established control limits.
Q03	Matrix spike recovery(s) is(are) not within the control limits.
S09	The surrogate recovery on the sample for this compound was not within the control limits.

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SPECIAL WASTE PROFILE

Page 1 of 2

Requested Disposal Facility: 4227 Ox Mountain LF CA

Waste Profile #

Saveable fill-in form. Restricted printing until all required (yellow) fields are completed.

I. Generator Information

Sales Rep #:

Generator Name: City of Burlingame			
Generator Site Address: 1001 S Airport Road			
City: Burlingame	County: San Mateo	State: California	Zip: 94010
State ID/Reg No:	State Approval/Waste Code: (if applicable)		NAICS # :
Generator Mailing Address (if different): ☒ 501 Primrose Road			
City: Burlingame	County: San Mateo	State: California	Zip: 94010
Generator Contact Name: Art Morimoto		Email:	
Phone Number: (650) 558-7246	Ext:	Fax Number:	

II. Billing Information

Bill To: Bradley Tanks, Inc.		Contact Name: Kelly Graser	
Billing Address: 402 Hartz Ave., Bld C		Email: kgraser@btienvironmental.com	
City: Danville	State: CA	Zip: 94526	Phone: (925) 229-2900

III. Waste Stream Information

Name of Waste: non-hazardous soil cuttings	
Process Generating Waste: Installation of groundwater monitoring wells at former City of Burlingame Landfill site	
Type of Waste:	☐ INDUSTRIAL PROCESS WASTE ☒ POLLUTION CONTROL WASTE
Physical State:	☒ SOLID ☐ SEMI-SOLID ☐ POWDER ☐ LIQUID
Method of Shipment:	☒ BULK ☐ DRUM ☐ BAGGED ☐ OTHER:
Estimated Annual Volume:	50 Cubic Yards
Frequency:	☒ ONE TIME ☐ ONGOING
Disposal Consideration:	☒ LANDFILL ☐ SOLIDIFICATION ☐ BIOREMEDIATION

IV. Representative Sample Certification☐ NO SAMPLE TAKEN

Is the representative sample collected to prepare this profile and laboratory analysis, collected in accordance with U.S. EPA 40 CFR 261.20(c) guidelines or equivalent rules?	☒ YES or ☐ NO
Type of Sample: ☒ COMPOSITE SAMPLE ☐ GRAB SAMPLE	
Sample Date: 4/20/2018	
Sample ID Numbers: 4 Point Composite 1-4,	



Waste Profile #

V. Physical Characteristics of Waste

Characteristic Components					% by Weight (range)	
1. Soil					95-100	
2. Debris, Trash, Plastic, PPE					0-5	
3.						
4.						
5.						
Color	Odor (describe)	Does Waste Contain Free Liquids?	% Solids	pH:	Flash Point	
Brown	none	☐ YES or ☒ NO	100	N/A	N/A °F	

Attach Laboratory Analytical Report (and/or Material Safety Data Sheet) Including Chain of Custody and Required Parameters Provided for this Profile

Does this waste or generating process contain regulated concentrations of the following Pesticides and/or Herbicides: Chlordane, Endrin, Heptachlor (and its epoxides), Lindane, Methoxychlor, Toxaphene, 2,4-D, or 2,4,5-TP Silvex as defined in 40 CFR 261.33?	☐ Yes or ☒ No
Does this waste contain reactive sulfides (greater than 500 ppm) or reactive cyanide (greater than 250 ppm)[reference 40 CFR 261.23(a)(5)]?	☐ Yes or ☒ No
Does this waste contain regulated concentrations of Polychlorinated Biphenyls (PCBs) as defined in 40 CFR Part 761?	☐ Yes or ☒ No
Does this waste contain concentrations of listed hazardous wastes defined in 40 CFR 261.31, 261.32, 261.33, including RCRA F-Listed Solvents?	☐ Yes or ☒ No
Does this waste exhibit a Hazardous Characteristic as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Does this waste contain regulated concentrations of 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCDD), or any other dioxin as defined in 40 CFR 261.31?	☐ Yes or ☒ No
Is this a regulated Radioactive Waste as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Is this a regulated Medical or Infectious Waste as defined by Federal and/or State regulations?	☐ Yes or ☒ No
Is this waste a reactive or heat generating waste?	☐ Yes or ☒ No
Does the waste contain sulfur or sulfur by-products?	☐ Yes or ☒ No
Is this waste generated at a Federal Superfund Clean Up Site?	☐ Yes or ☒ No
Is this waste from a TSD facility, TSD like facility or consolidator?	☐ Yes or ☒ No

VI. Certification

I hereby certify that to the best of my knowledge and belief, the information contained herein is a true, complete and accurate description of the waste material being offered for disposal and all known or suspected hazards have been disclosed. All Analytical Results/Material Safety Data Sheets submitted are truthful and complete and are representative of the waste.

I further certify that by utilizing this profile, neither myself nor any other employee of the company will deliver for disposal or attempt to deliver for disposal any waste which is classified as toxic waste, hazardous waste or infectious waste, or any other waste material this facility is prohibited from accepting by law. I shall immediately give written notice of any change or condition pertaining to the waste not provided herein. Our company hereby agrees to fully indemnify this disposal facility against any damages resulting from this certification being inaccurate or untrue.

I further certify that the company has not altered the form or content of this profile sheet as provided by Republic Services Inc.

Art Morimoto, Project Manager	City of Burlingame
_____ Authorized Representative Name And Title (Type or Print)	_____ Company Name
	5/31/2018
_____ Authorized Representative Signature	_____ Date

Appendix H

LABORATORY TESTING

Geo-Logic Associates
143E Spring Hill Drive
Grass Valley, CA 95945
USA
T+1 530 272 2448
F+1 530 272 8533
www.geo-logic.com

DATE: May 30, 2018

TO: Richard Mitchell

JOB NO: RM18.1038.003

LAB LOG: 4365.0

e-mail: rmitchell@rmcgeoscience.com, btreece@geo-logic.com

RE: Lab Report: Top Golf Burlingame

Enclosed are results for: Samples Received - May 15, 2018

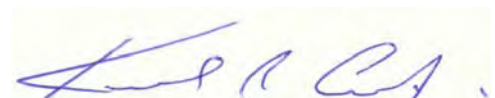
Code	Item	Quantity
2500	Moisture Content - ASTM D-2216	11
1850	Dry Density / Moisture Content - ASTM D-7263	17
1000	Atterberg Limits, wet or dry prep - ASTM D-4318	3
3000	Particle Size Analysis, w/ Gravel no Hydro - ASTM D-6913 (D-422)	5
3150	Percent Passing # 200 - ASTM C-117 or D-1140	10
4150	Triaxial Shear CU, 2-3" / pt - ASTM D-4767	6

Thank you for consulting Geo-Logic Associates for your material testing requirements. We look forward to working with you again. If you have any questions or require any additional information, please call us at 1-530-272-2448. This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job. This report shall not be reproduced except in full without written approval of Geo-Logic Associates.

Sincerely,



Prepared By: Kindra Hillman
Laboratory Manager



Reviewed By: Kenneth R. Criley
Technical Director

Client : RMC Geoscience, Inc.

Project No: RM18.1038.003

Lab Log: **4365**

Project Name: Top Golf Burlingame

Report Date: May 21, 2018

LSN	Sample ID	Soil Classification **	Water Content %	Dry Density pcf			
4365A	TG-01 @ 44'	Light Brown Clayey Gravel with Sand	16.2				
4365C	TG-01 @ 68-68.5'	Brown Lean Clay with Sand	22.4	106.5			
4365E	TG-03 @ 78-78.5'	Brown Gravel with Sand and Clay	11.0	127.6			
4365F	TG-06 @ 62'	Brown Clayey Sand with Gravel	16.3				
4365G	TG-06 @ 68-68.5'	Blueish Brown Clayey Sand	31.1	96.0			
4365H	TG-06 @ 72'	Light Brown Clayey Sand	19.6				
4365I	TG-06 @ 77.5-78'	Brown Clayey Gravel with Sand	15.0				
4365J	TG-06 @ 88-88.5'	Brown Clayey Sand	18.0	115.2			
4365K	TG-07 @ 70'	Light Brown Clay	25.9	103.5			
4365L	TG-07 @ 80'	Light Brown Gravel with Sand and Clay	13.2	123.9			

Notes: ** Classifications are based on ASTM D-2487 when appropriate test results are available and per ASTM D-2488 when visual

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client : RMC Geoscience, Inc.

Project No: RM18.1038.003

Lab Log: **4365**

Project Name: Top Golf Burlingame

Report Date: May 21, 2018

LSN	Sample ID	Soil Classification **	Water Content %	Dry Density pcf			
4365M	TG-07 @ 90-90.5'	Gray Sand with Silty Clay	18.7				
4365N	TG-08 @ 73'	Brown Clayey Sand	17.0				
4365O	TG-08 @ 78-78.5'	Brown Clayey Sand with Gravel	14.0				
4365P	TG-08 @ 88-88.5'	Light Brown Sandy Clay	17.9	112.9			
4365Q	TG-09 @ 57-58'	Brown Clayey Sand with Gravel	12.3				
4365R	TG-09 @ 59.5-60'	Brown Sandy Clay	16.2				
4365S	TG-09 @ 67'	Brown Clay	21.7				
4365T	TG-09 @ 69.5'	Brown Sandy Clay	22.3	103.9			
4365U	TG-09 @ 70'	Light Brown Sandy Clay	19.1	113.1			
4365V	TG-09 @ 80'	Blueish Brown Clayey Sand	19.8	119.8			

Notes: ** Classifications are based on ASTM D-2487 when appropriate test results are available and per ASTM D-2488 when visual

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client : RMC Geoscience, Inc.

Project No: RM18.1038.003

Lab Log: **4365**

Project Name: Top Golf Burlingame

Report Date: May 21, 2018

LSN	Sample ID	Soil Classification **	Water Content %	Dry Density pcf			
4365W	TG-09 @ 88'	Gray Brown Clay with Gravel	14.5				
4365X	TG-09 @ 90'	Brown Sand with Clay & Gravel	14.8	123.0			
4365Y	TG-14 @ 50'	Blue Gray Silty Clayey Sand	35.7	84.6			
4365Z	TG-14 @ 80'	Light Brown Clay with Sand	25.0	109.3			
4365AA	TG-16 @ 28.5'	Gray Sandy Clay w/ Gravel & Organics	27.7	76.4			
4365AB	TG-16 @ 38.5'	Very Dark Brown Gravelly Clay w/ Organics (Oily)	59.6	54.5			
4365AD	TG-16 @ 58'	Brown Clayey Sand	15.6	119.3			
4365AG	TG-17 @ 48-48.5'	Light Brown Lean Clay	20.9	109.5			

Notes: ** Classifications are based on ASTM D-2487 when appropriate test results are available and per ASTM D-2488 when visual

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client: RMC Geoscience, Inc.

Project No: RM18.1038.003

Lab Log: **4365**

Project Name: Top Golf Burlingame

Report Date: May 22, 2018

LSN	Sample ID	Soil Classification **	Water Content (%)	Percent Minus #200	Percent Sand & Gravel	
4365A	TG-01 @ 44'	Light Brown Clayey Gravel with Sand	15.7	15.6	84.4	
4365G	TG-06 @ 68-68.5'	Blueish Brown Clayey Sand	29.2	24.6	75.4	
4365I	TG-06 @ 77.5-78'	Brown Clayey Gravel with Sand	15.0	12.8	87.2	
4365L	TG-07 @ 80'	Light Brown Gravel with Sand and Clay	13.2	11.1	88.9	
4365M	TG-07 @ 90-90.5'	Gray Sand with Silty Clay	18.7	9.9	90.1	
4365N	TG-08 @ 73'	Brown Clayey Sand	17.0	14.3	85.7	
4365R	TG-09 @ 59.5-60'	Brown Sandy Clay	16.2	50.7	49.3	
4365T	TG-09 @ 69.5'	Brown Sandy Clay	22.1	54.3	45.7	
4365V	TG-09 @ 80'	Blueish Brown Clayey Sand	19.5	22.7	77.3	
4365AD	TG-16 @ 58'	Brown Clayey Sand	15.6	49.5	50.5	

Notes: ** Classifications are based on ASTM D-2487 when appropriate test results are available and per ASTM D-2488 when visual Samples are soaked for 4 hours unless otherwise noted.

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client :
 RMC Geoscience, Inc.

 Project No:
 RM18.1038.003

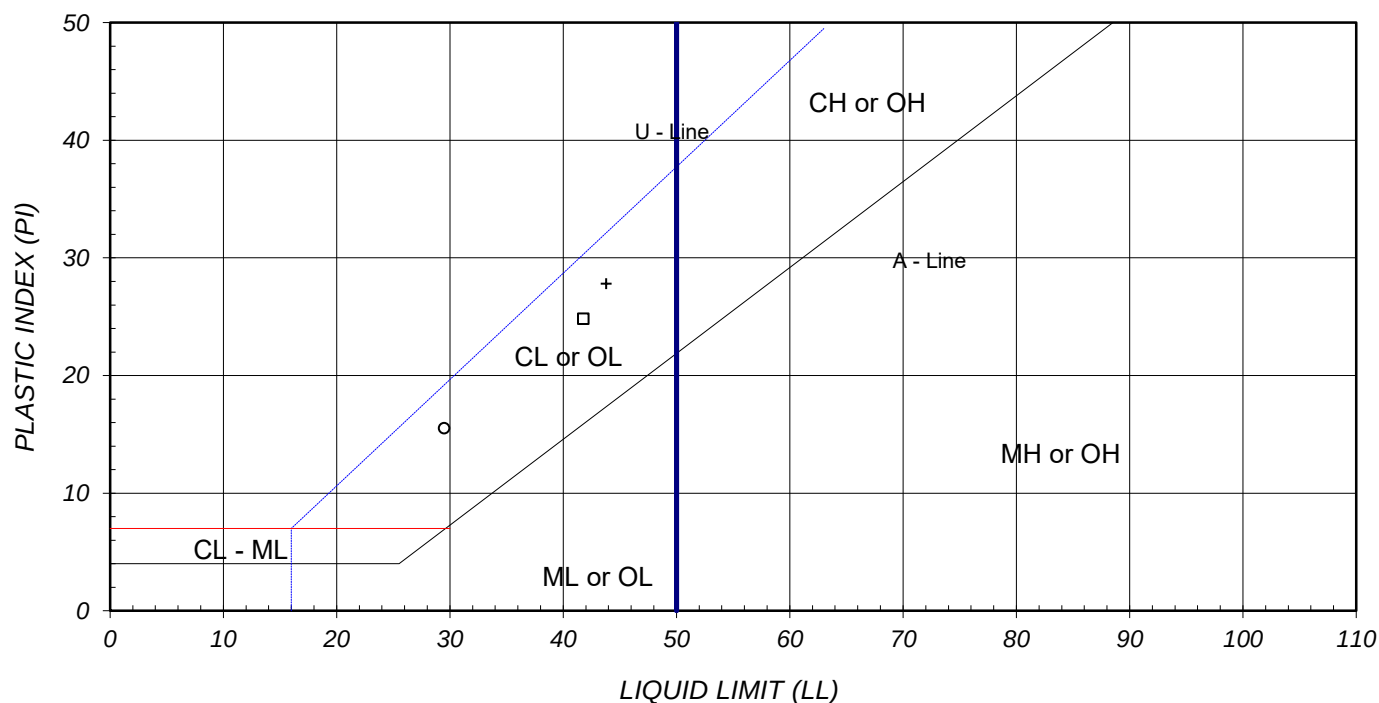
 Lab Log No.:
4365

 Project Name:
 Top Golf Burlingame

 Report Date:
 May 30, 2018

LSN	SYMBOL	SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX
4365C	□	TG-01 @ 68-68.5'	Light Brown Lean Clay with Sand	42	17	25
4365AC	○	TG-16 @ 48'	Brown Lean Clay	30	14	16
4365AG	+	TG-17 @ 48-48.5'	Light Brown Lean Clay	44	16	28

* Visual Classification based on ASTM D-2488

PLASTICITY CHART


This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

L : Labexcel \ Projects \ Client \ RMC Geoscience, \ RM18.1038.003

Entered By:

Reviewed By:

LLN:

Client :

RMC GEOSCIENCE, INC.

Project No:

RM18.1038.003

Lab Sample No:

4365F

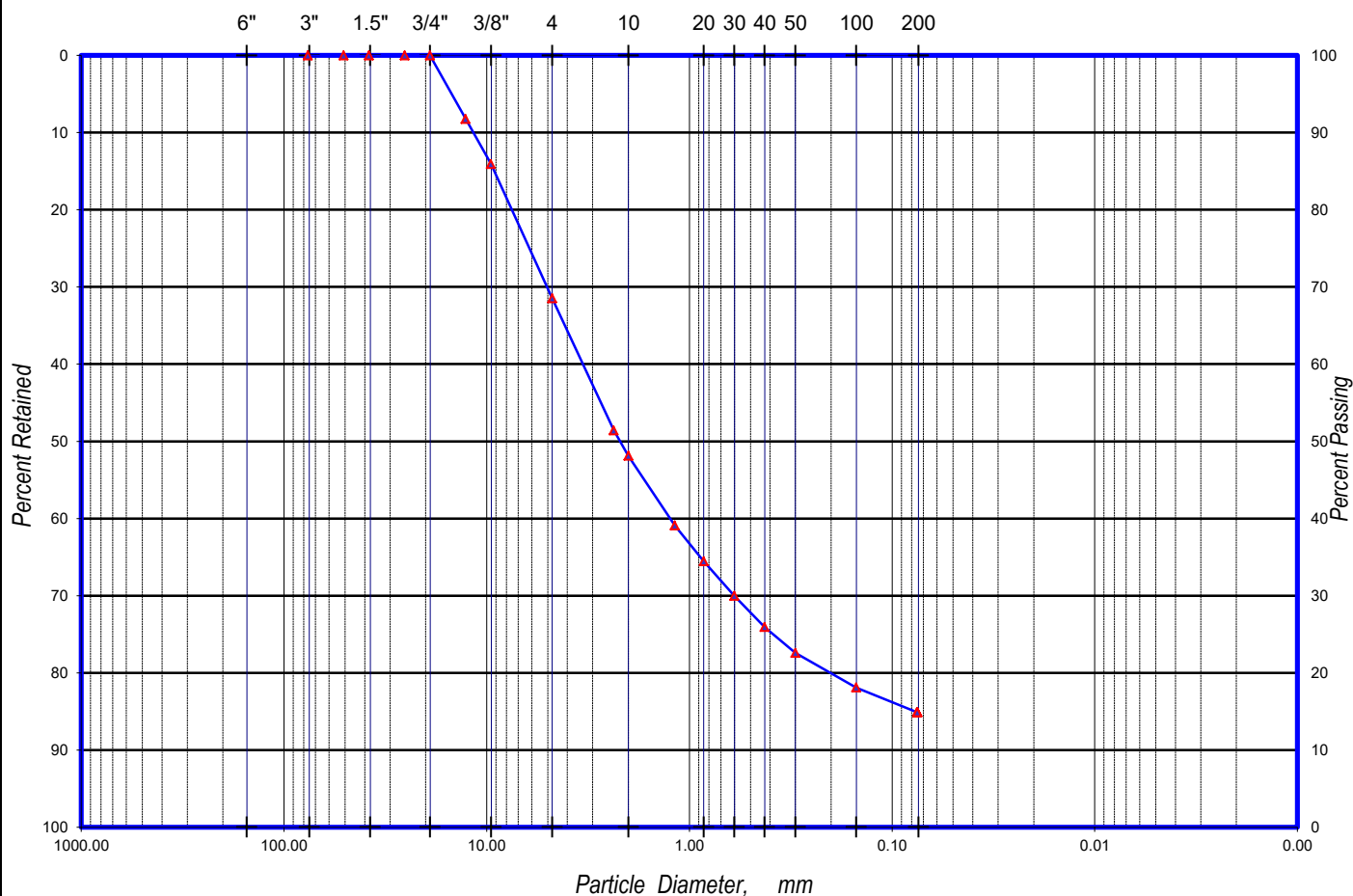
Project Name:

TOP GOLF BURLINGAME

Report Date:

May 24, 2018

	BOULDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE	
	US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	* Description	% Gravel	% Sand	% Silt - Clay
▲	TG-06 @ 62'	Brown Clayey Sand with Gravel	31.5	53.6	14.9

Size Passing, mm D_{60} = 3.56 D_{30} = 0.60 D_{10} = N/A
Coefficient of Curvature, C_c : N/A Coefficient of Uniformity, C_u : N/A Fineness Modulus = 3.84

* Visual Classification based on ASTM D-2488

Note: * Percentages are +/- 0.1% based on computer rounding as allowed by ASTM D-6026-01 Section 5.2.3.

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

PARTICLE SIZE ANALYSIS

Test Report

ASTM D-6913 / D-7928, (replacing D-422)

Method A: (+/-1%)

Client :

RMC GEOSCIENCE, INC.

Project No:

RM18.1038.003

Lab Sample No:

4365H

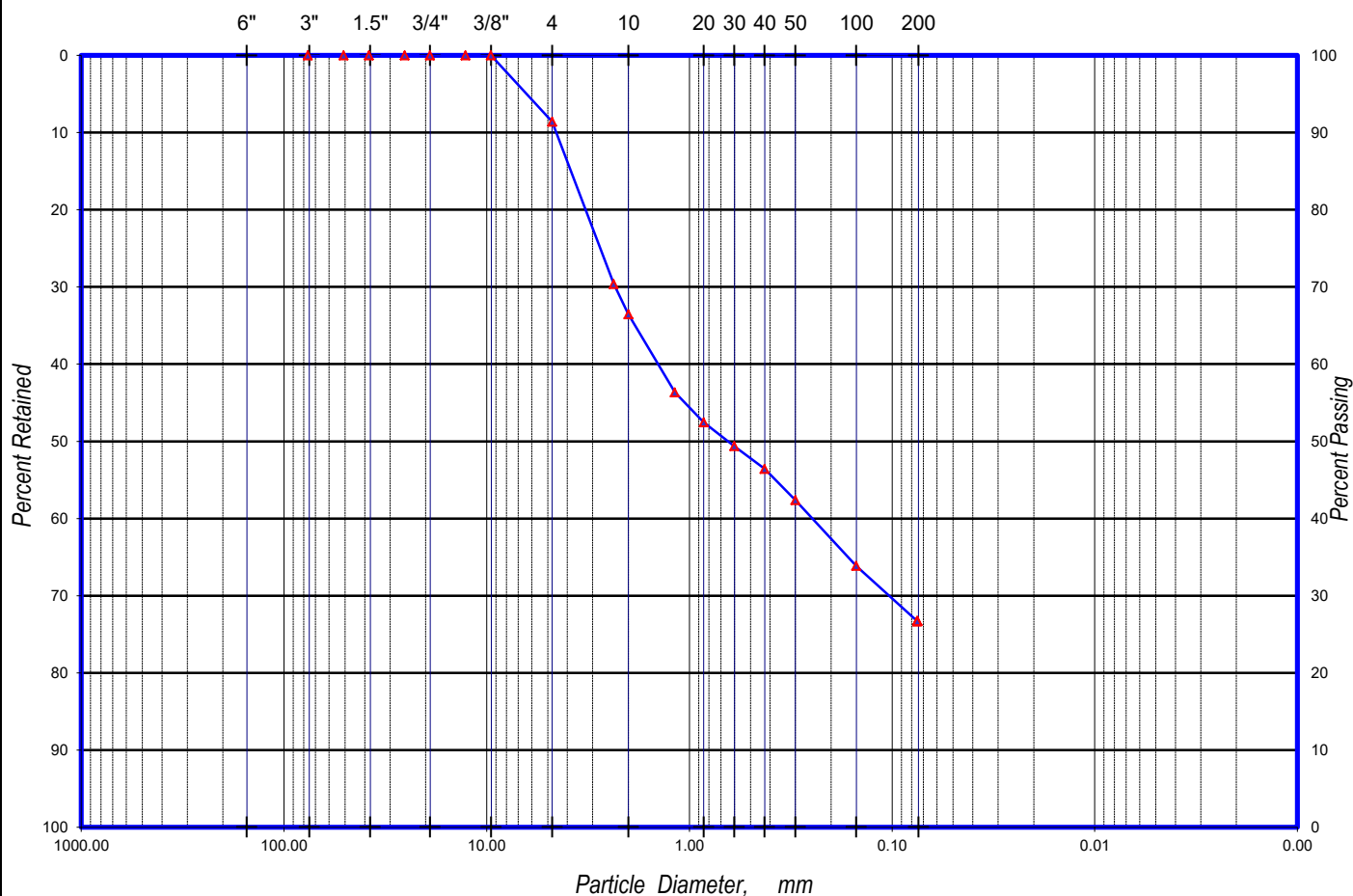
Project Name:

TOP GOLF BURLINGAME

Report Date:

May 24, 2018

	BOULDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE	
	US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	* Description	% Gravel	% Sand	% Silt - Clay
▲	TG-06 @ 72'	Light Brown Clayey Sand	8.6	64.7	26.7

Size Passing, mm $D_{60} = 1.48$ $D_{30} = 0.11$ $D_{10} = \text{N/A}$ Coefficient of Curvature, C_c : N/A Coefficient of Uniformity, C_u : N/A Fineness Modulus = 2.56

* Visual Classification based on ASTM D-2488

Note: * Percentages are +/- 0.1% based on computer rounding as allowed by ASTM D-6026-01 Section 5.2.3.

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

L : Labexcel \ Projects \ Client \ Client Name \ 4365 \ 4365H-ma

Print Date:

Entered By:

Reviewed By:

LSN:

DCN: MA-1p (rev. 6/27/12)

05/24/18

KH

JL

4365H

Client :

RMC GEOSCIENCE, INC.

Project No:

RM18.1038.003

Lab Sample No:

4365J

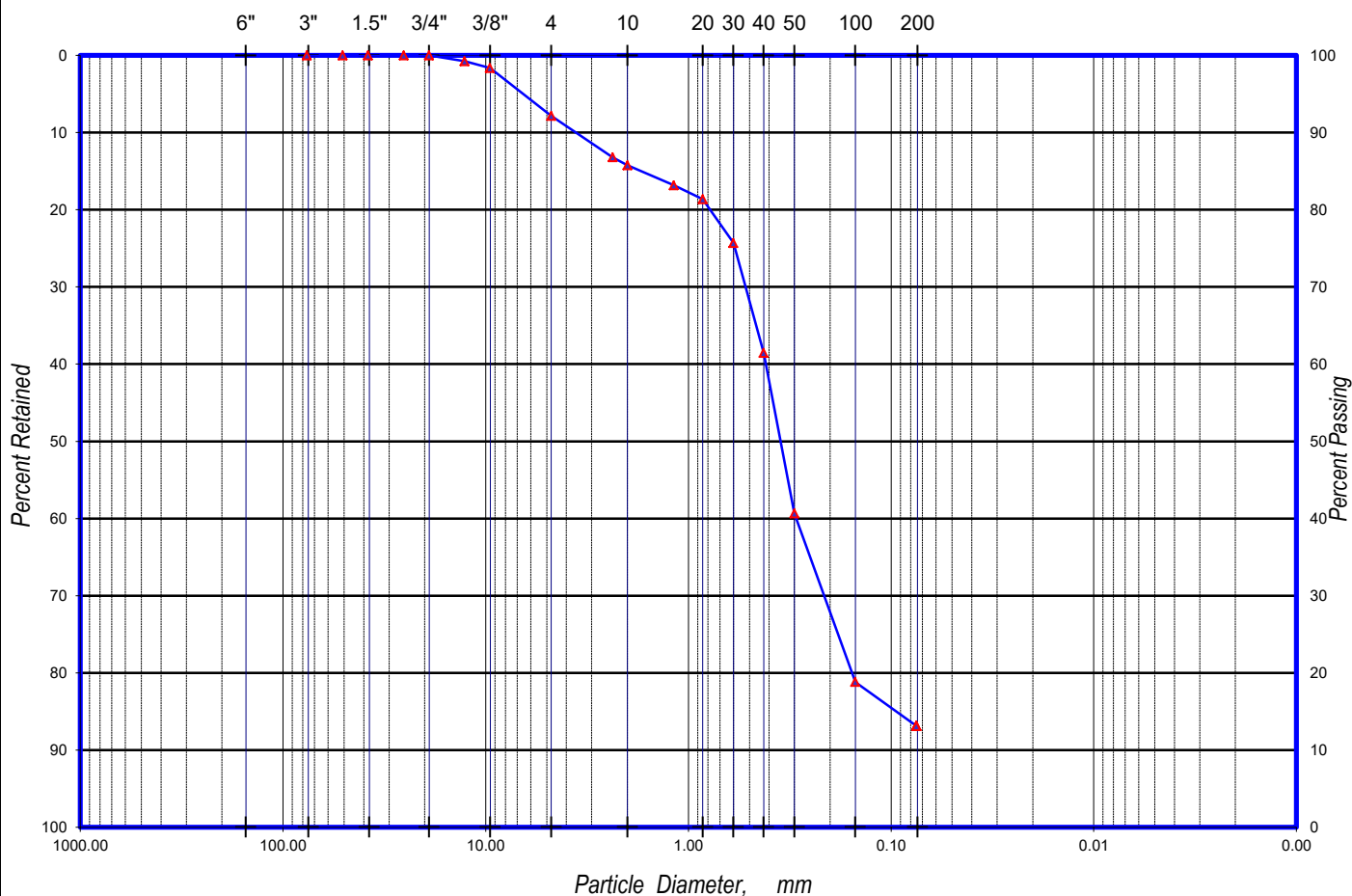
Project Name:

TOP GOLF BURLINGAME

Report Date:

May 24, 2018

	BOULDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE	
	US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	* Description	% Gravel	% Sand	% Silt - Clay
▲	TG-06 @ 88-88.5'	Brown Clayey Sand	7.8	79.1	13.1

Size Passing, mm D_{60} = 0.42 D_{30} = 0.23 D_{10} = N/A

Coefficient of Curvature, C_c : N/A Coefficient of Uniformity, C_u : N/A Fineness Modulus = 2.04

* Visual Classification based on ASTM D-2488

Note: * Percentages are +/- 0.1% based on computer rounding as allowed by ASTM D-6026-01 Section 5.2.3.

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client :

RMC GEOSCIENCE, INC.

Project No:

RM18.1038.003

Lab Sample No:

43650

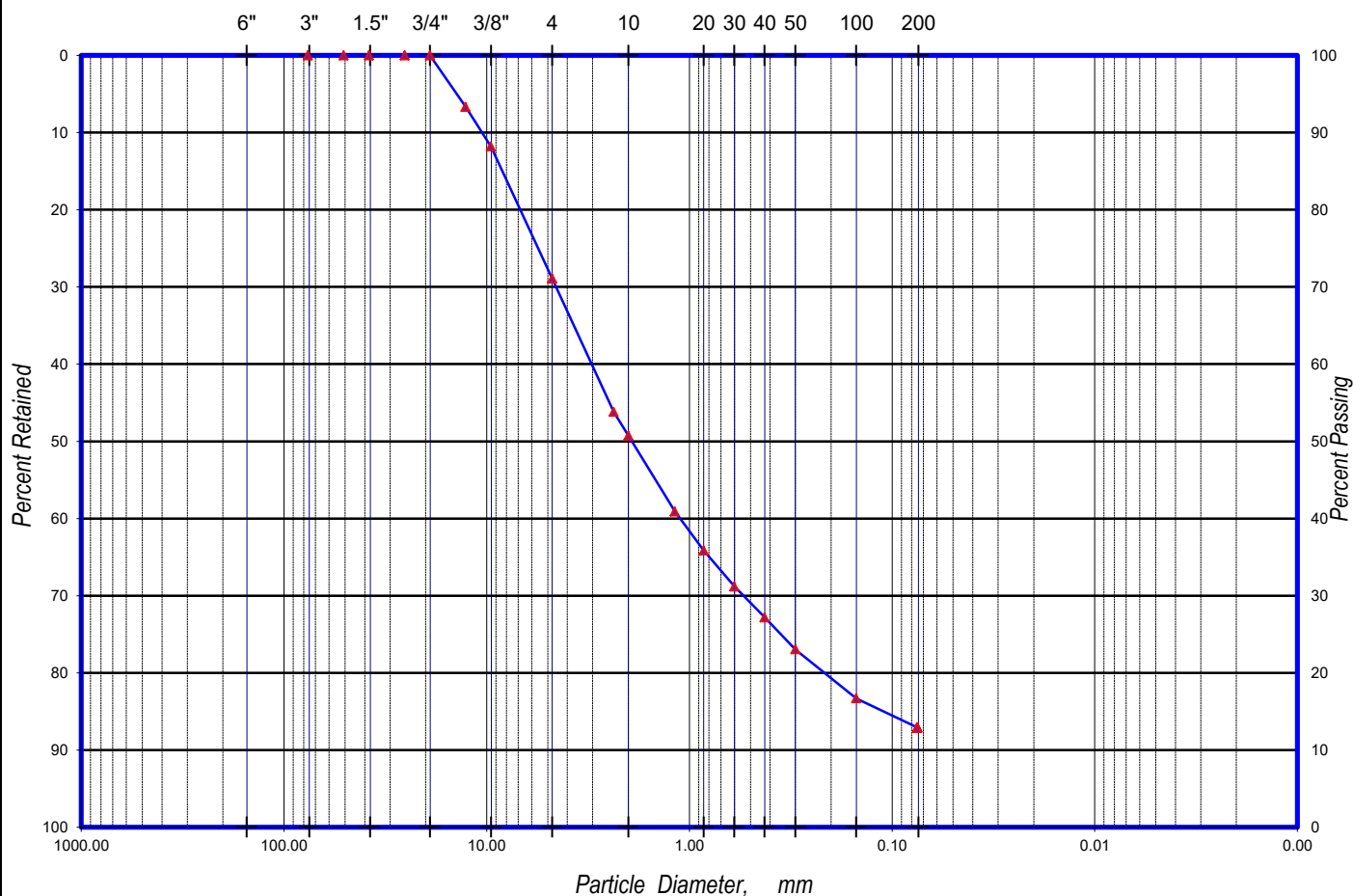
Project Name:

TOP GOLF BURLINGAME

Report Date:

May 24, 2018

	BOULDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE	
	US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	



Symbol	Sample ID	* Description	% Gravel	% Sand	% Silt - Clay
▲	TG-08 @ 78-78.5'	Brown Clayey Sand with Gravel	28.9	58.2	12.9

Size Passing, mm D_{60} = 3.22 D_{30} = 0.55 D_{10} = N/A
Coefficient of Curvature, C_c : N/A Coefficient of Uniformity, C_u : N/A Fineness Modulus = 3.75

* Visual Classification based on ASTM D-2488

Note: * Percentages are +/- 0.1% based on computer rounding as allowed by ASTM D-6026-01 Section 5.2.3.

This testing is based upon accepted industry practice as well as the test method listed. These results apply only to the samples supplied and tested for the above referenced job.

Client :

RMC GEOSCIENCE, INC.

Project No:

RM18.1038.003

Lab Sample No:

4365Q

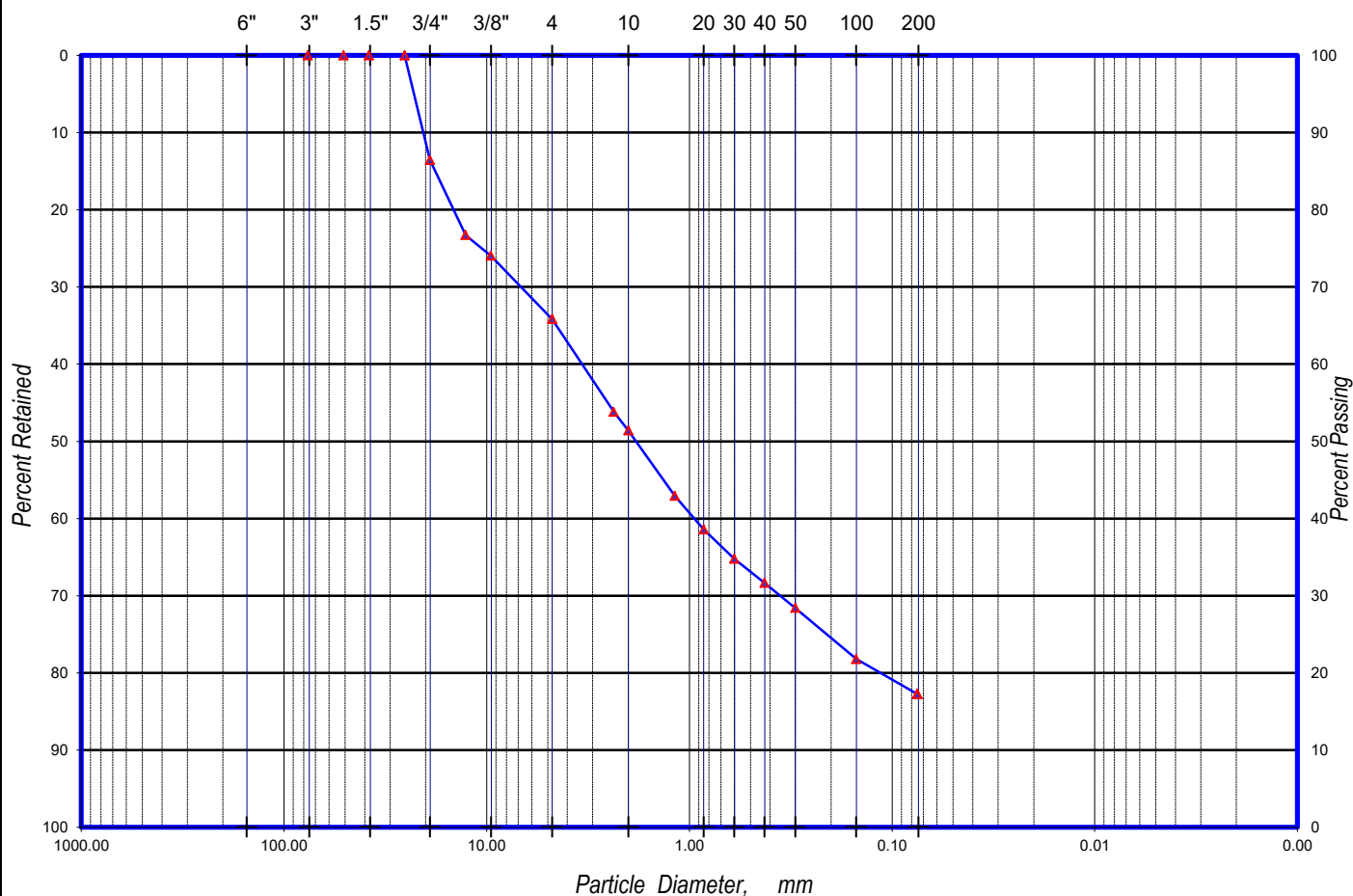
Project Name:

TOP GOLF BURLINGAME

Report Date:

May 24, 2018

	BOULDERS	COBBLES	GRAVEL		SAND			SILT AND CLAY
			COARSE	FINE	COARSE	MEDIUM	FINE	
	US SIEVE SIZE, INCHES			US STANDARD SIEVE SIZE No.			HYDROMETER	





TRIAXIAL SHEAR TEST

Consolidated-Undrained
ASTM D-4767

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AI

Sample ID:

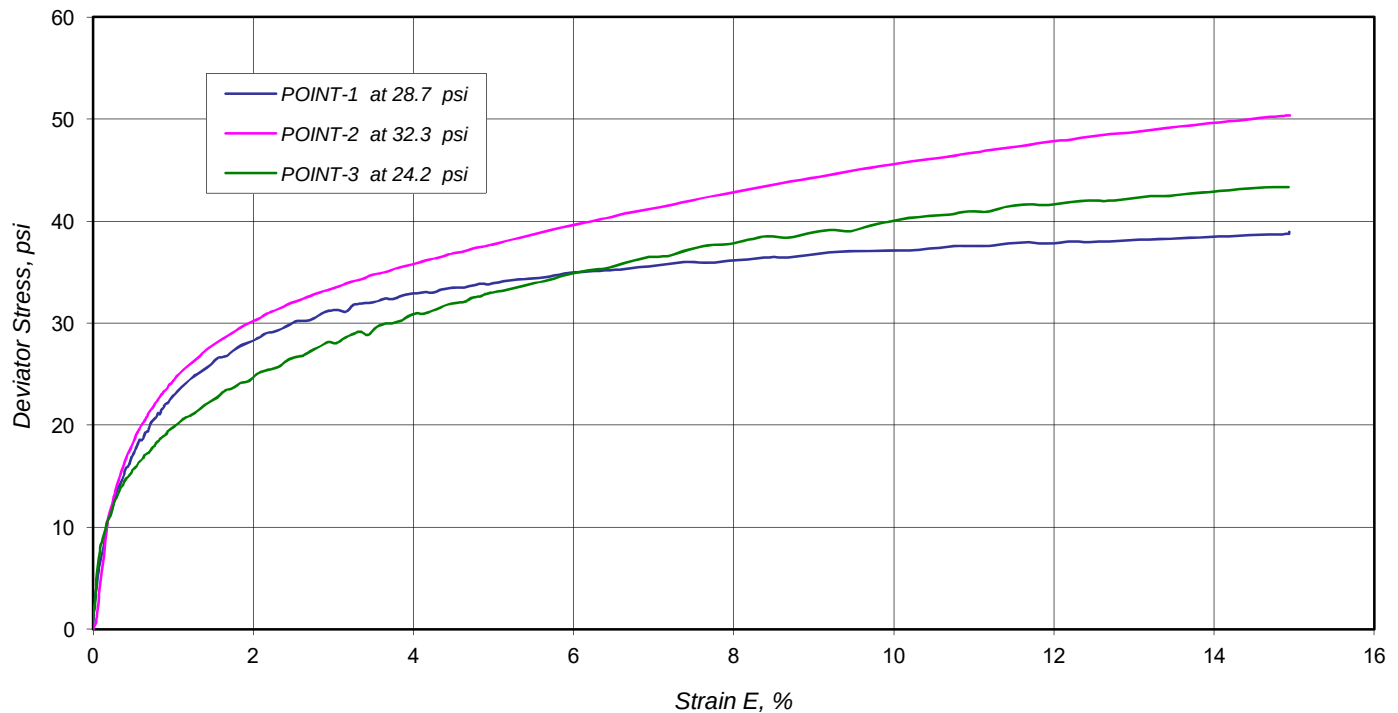
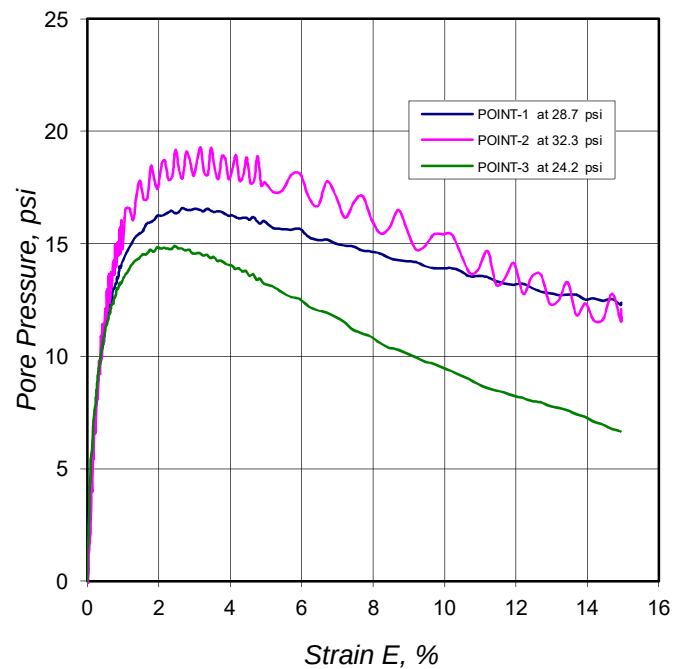
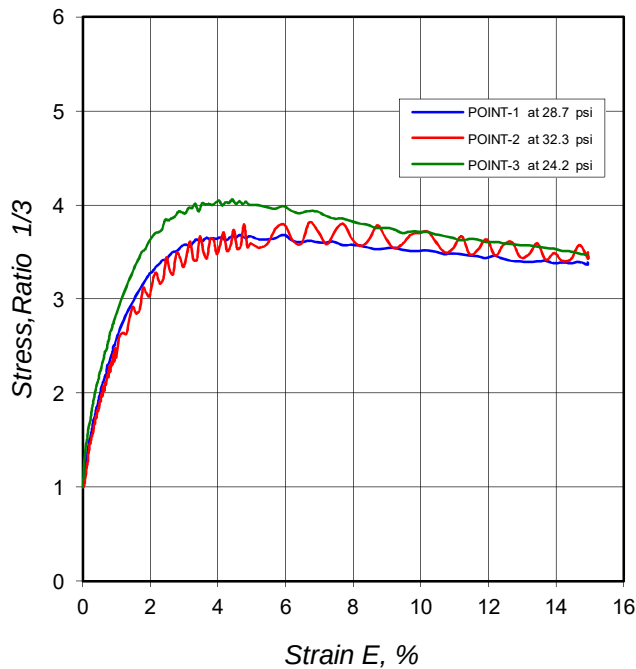
Description:

Report Date:

TXCU Composite 1

Brown Clay

May 30, 2018



Effective Consolidation Stresses, psi: Point 1: 29 Point 2: 32 Point 3: 24

L : Labexcel \ Projects \ Client \ Client Name \ 4365AI-TXCU

Print Date: 5/30/2018

Entered By:

Reviewed By:

LSN:



TRIAXIAL SHEAR TEST

Consolidated-Undrained
ASTM D-4767

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AI

Sample ID:

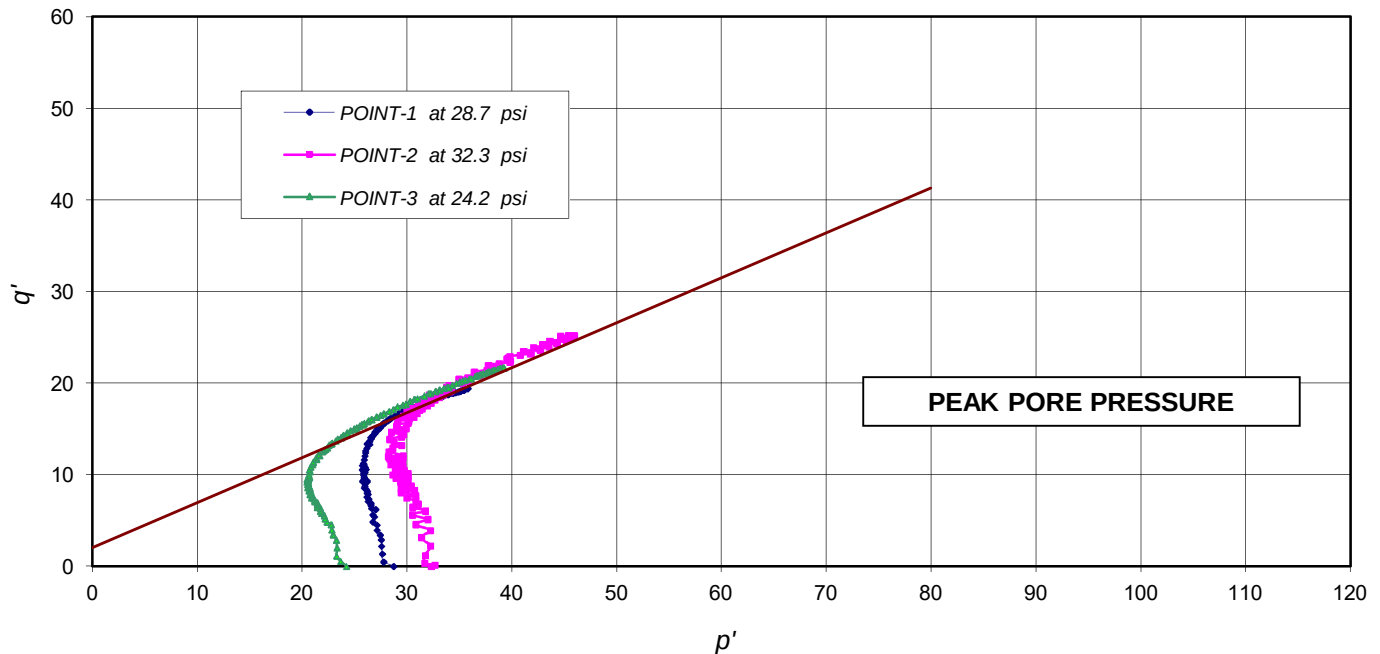
Description:

Report Date:

TXCU Composite 1

Brown Clay

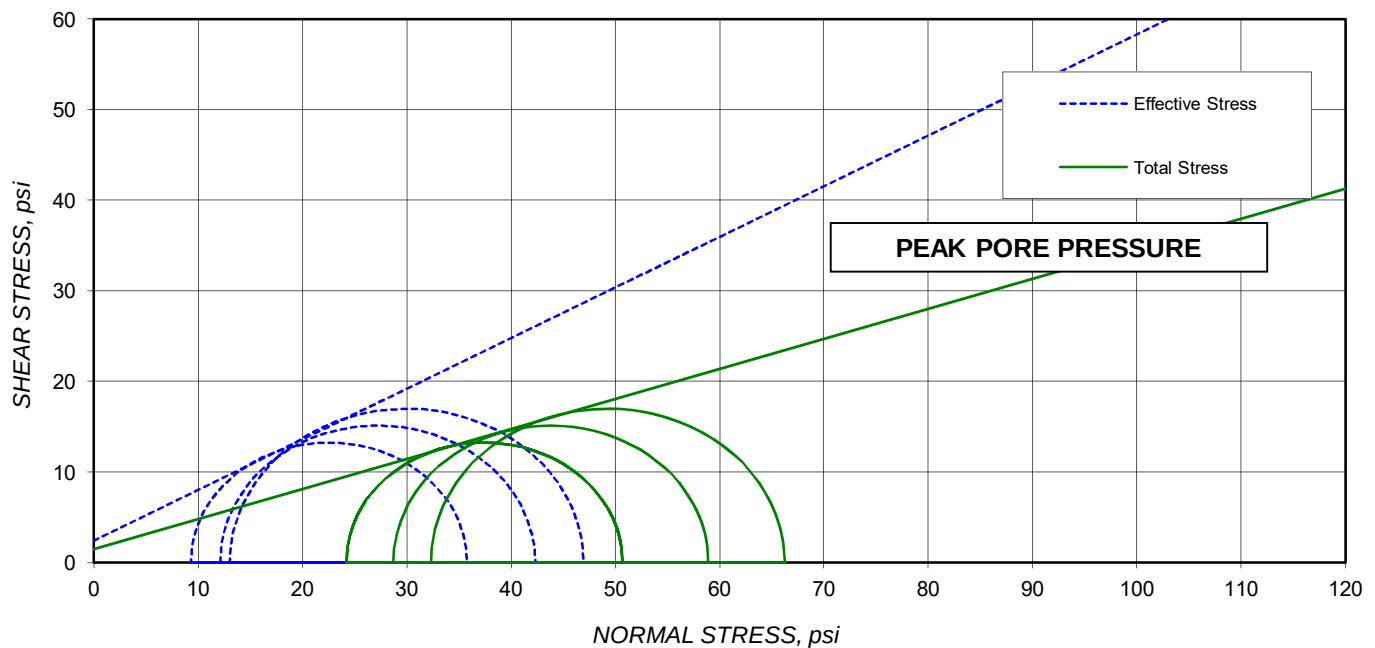
May 30, 2018



a (deg) = **26.1**

ϕ = **29.4**

c = **2**



EFFECTIVE STRESS : ϕ = **29.2** ° C (psi) = **3**

TOTAL STRESS: ϕ = **18.3** ° C (psi) = **2**

L : Labexcel \ Projects \ Client \ Client Name \ 4365AI-TXCU

Print Date: 5/30/2018

Entered By:

Reviewed By:

LSN:

DCN: Triaxial Shear-RP (rev. 06/27/12)

GRAPH-2

KH

krc

4365AI



TRIAXIAL SHEAR TEST

Consolidated-Undrained
ASTM D-4767

Client / Project Name:

Project No:

Lab Sample Number:

RMC Geoscience, Inc. / Top Golf Burlingame

RM18.1038.003

4365AI

Sample ID:

Description:

Report Date:

TXCU Composite 1

Brown Clay

May 30, 2018

Point No	Lab ID	Sample ID	Depth	Initial Water Content %	Initial Dry Density pcf
1	4365B	TG-01	58-58.5	25.3	100.4
2	4365D	TG-03	68-68.5	22.4	105.6
3	4365AC	TG-16	48	19.5	110.6

Final water contents are: 1) 23.7 % 2) 21.6 % 3) 18.7 %

SHEAR VALUES AT APPROXIMATELY : PEAK PORE PRESSURE SEE NOTES BELOW							
Total Confining Stress psi	Strain %	Deviator Stress psi	Pore Pressure psi	Effective Axial Stress psi	Effective Lateral Stress psi	p psi	q psi
1 28.7	2.7	30.2	16.6	42.3	12.1	27.2	15.1
2 32.3	3.2	33.9	19.3	46.9	13.0	30.0	17.0
3 24.2	2.4	26.5	14.9	35.8	9.3	22.5	13.2

GENERAL TEST NOTES:

- 1) This test was performed using a single 2.4" diameter by 5" tall specimen for each point.
- 2) The strain rates were 0.0003, 0.0002, and 0.0007 inches/minute, for points 1-3 respectively.
- 3) Skempton "B" Parameters were measured at 0.99, 0.98, and 0.97 prior to Consolidation and shear.
- 4) No visible shear plane was noted at end of test.
- 5) Friction and cohesion values plotted are based on certain criteria selected by the laboratory.
- 6) Friction and cohesion values must be evaluated by a qualified geotechnical engineer familiar with the specific site conditions and project requirements.

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AI

Sample ID:

TXCU Composite 1

Description:

Brown Clay

Report Date:

May 30, 2018





TRIAXIAL SHEAR TEST

Consolidated-Undrained
ASTM D-4767

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AJ

Sample ID:

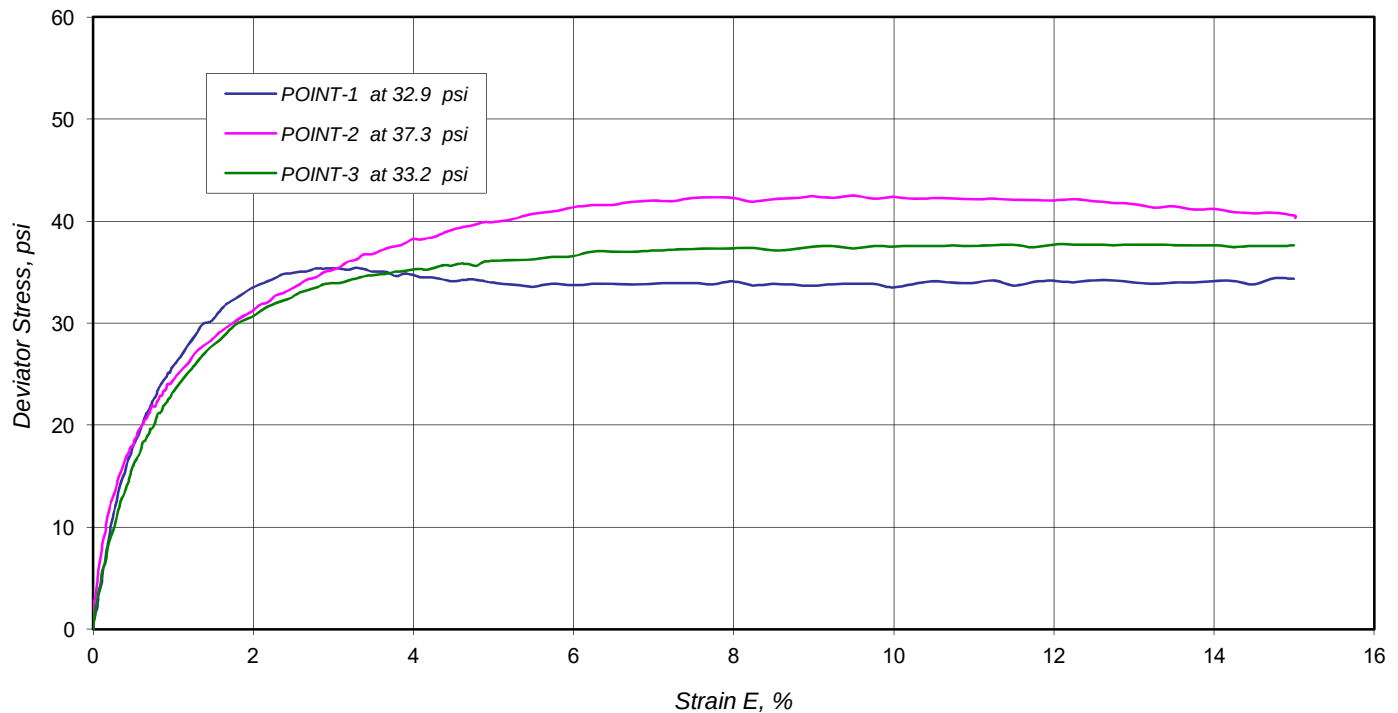
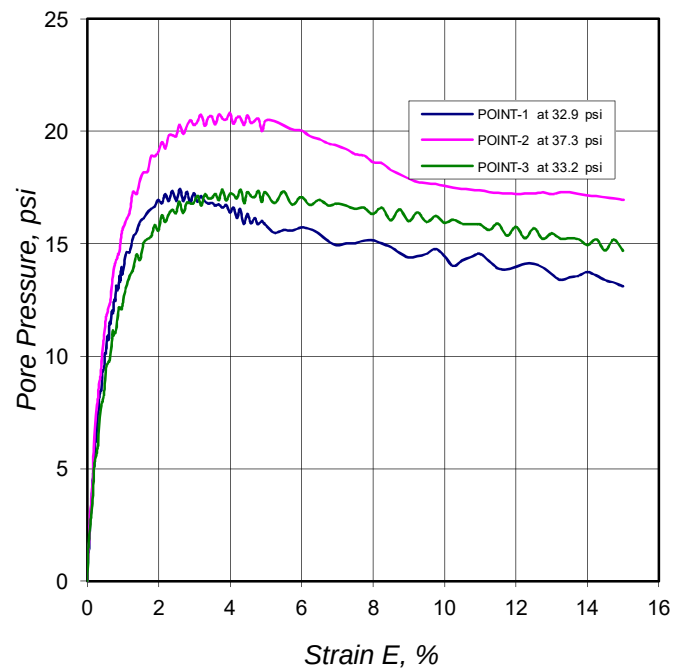
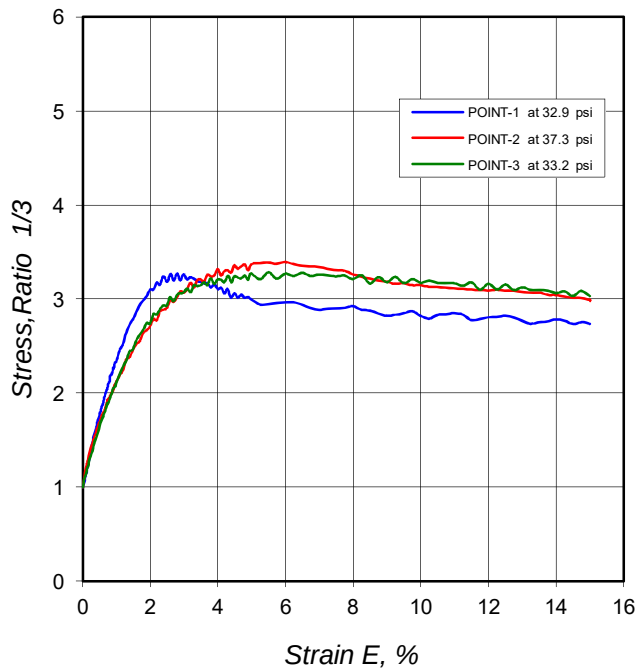
Description:

Report Date:

TXCU Composite 2

Gray Brown Clay

May 30, 2018



Effective Consolidation Stresses, psi: Point 1: 33 Point 2: 37 Point 3: 33

L : Labexcel \ Projects \ Client \ Client Name \ 4365AJ-TXCU

Print Date: 5/30/2018

Entered By:

Reviewed By:

LSN:



TRIAXIAL SHEAR TEST

Consolidated-Undrained
ASTM D-4767

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AJ

Sample ID:

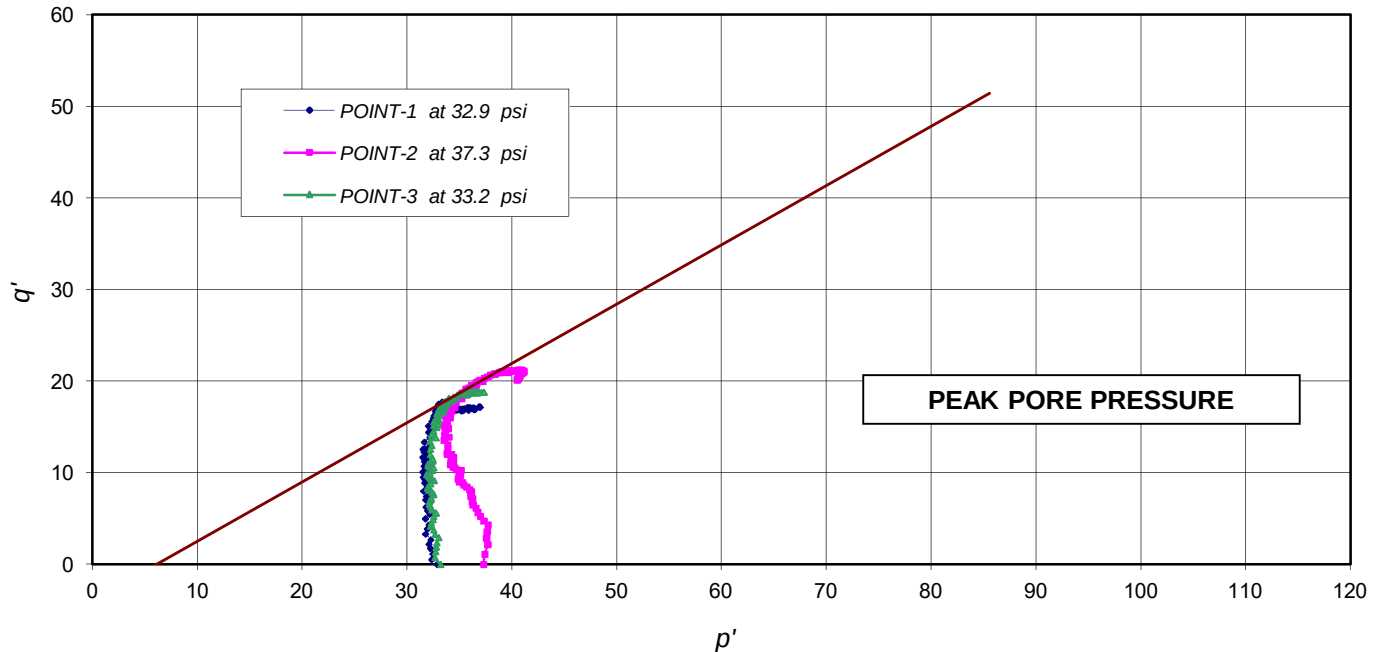
Description:

Report Date:

TXCU Composite 2

Gray Brown Clay

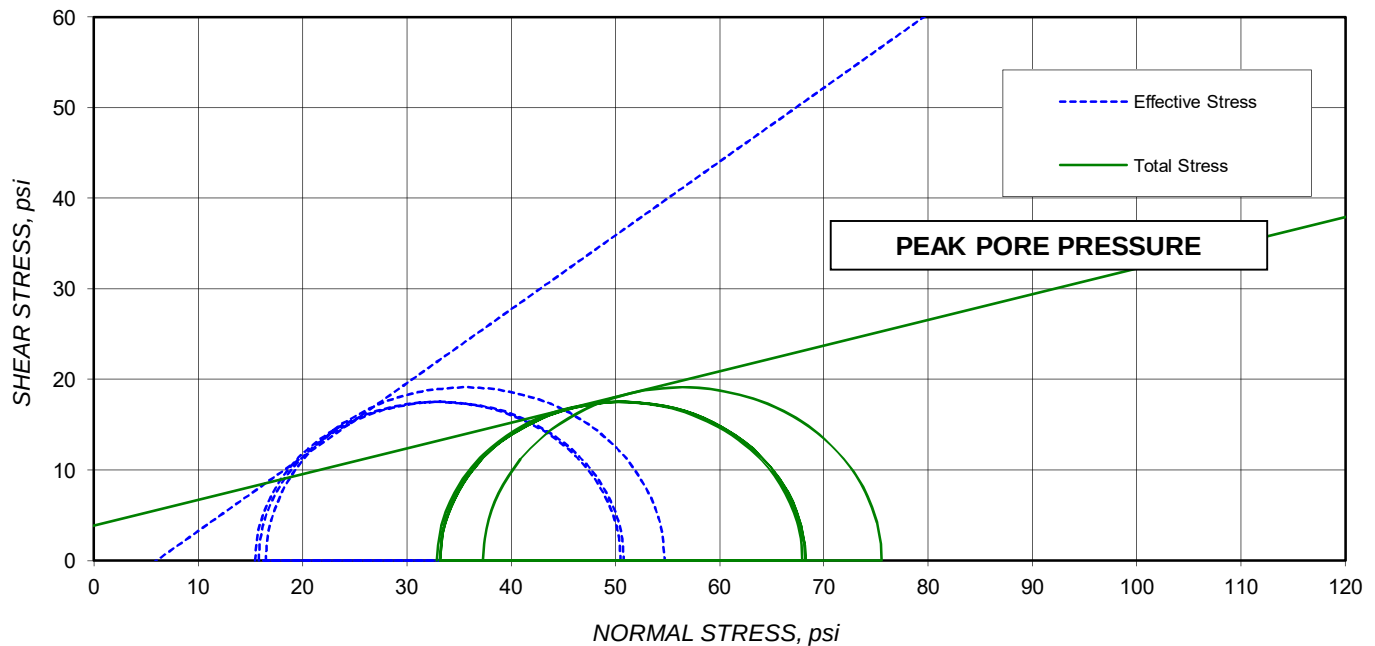
May 30, 2018



a (deg) = **32.9**

phi = **40.3**

c = **-5**



EFFECTIVE STRESS : phi = **39.2** ° C (psi) = **-5**

TOTAL STRESS: phi = **15.8** ° C (psi) = **4**

L : Labexcel \ Projects \ Client \ Client Name \ 4365AJ-TXCU

Print Date: 5/30/2018

Entered By:

Reviewed By:

LSN:

DCN: Triaxial Shear-RP (rev. 06/27/12)

GRAPH-2

KH

krc

4365AJ



TRIAXIAL SHEAR TEST

Consolidated-Undrained

ASTM D-4767

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AJ

Sample ID:

Description:

Report Date:

TXCU Composite 2

Gray Brown Clay

May 30, 2018

Point No	Lab ID	Sample ID	Depth	Initial Water Content %	Initial Dry Density pcf
1	4365AE	TG-16	68	38.3	82.5
2	4365AF	TG-16	78	27.7	96.8
3	4365AH	TG-17	68-68.5	37.6	82.2

Final water contents are: 1) 37.8 % 2) 26.5 % 3) 35.8 %

SHEAR VALUES AT APPROXIMATELY : PEAK PORE PRESSURE SEE NOTES BELOW							
Total Confining Stress psi	Strain %	Deviator Stress psi	Pore Pressure psi	Effective Axial Stress psi	Effective Lateral Stress psi	p psi	q psi
1 32.9	2.6	35.0	17.4	50.5	15.5	33.0	17.5
2 37.3	4.0	38.2	20.8	54.7	16.5	35.6	19.1
3 33.2	3.8	35.0	17.4	50.8	15.8	33.3	17.5

GENERAL TEST NOTES:

- 1) This test was performed using a single 2.4" diameter by 5" tall specimen for each point.
- 2) The strain rates were 0.0003, 0.001, and 0.0007 inches/minute, for points 1-3 respectively.
- 3) Skempton "B" Parameters were measured at 1.0, 0.98, and 0.98 prior to Consolidation and shear.
- 4) The shear angles were approximately 55°, 60°, and 55° for points 1-3, respectively.
- 5) Friction and cohesion values plotted are based on certain criteria selected by the laboratory.
- 6) Friction and cohesion values must be evaluated by a qualified geotechnical engineer familiar with the specific site conditions and project requirements.

Client / Project Name:

RMC Geoscience, Inc. / Top Golf Burlingame

Project No:

RM18.1038.003

Lab Sample Number:

4365AJ

Sample ID:

TXCU Composite 2

Description:

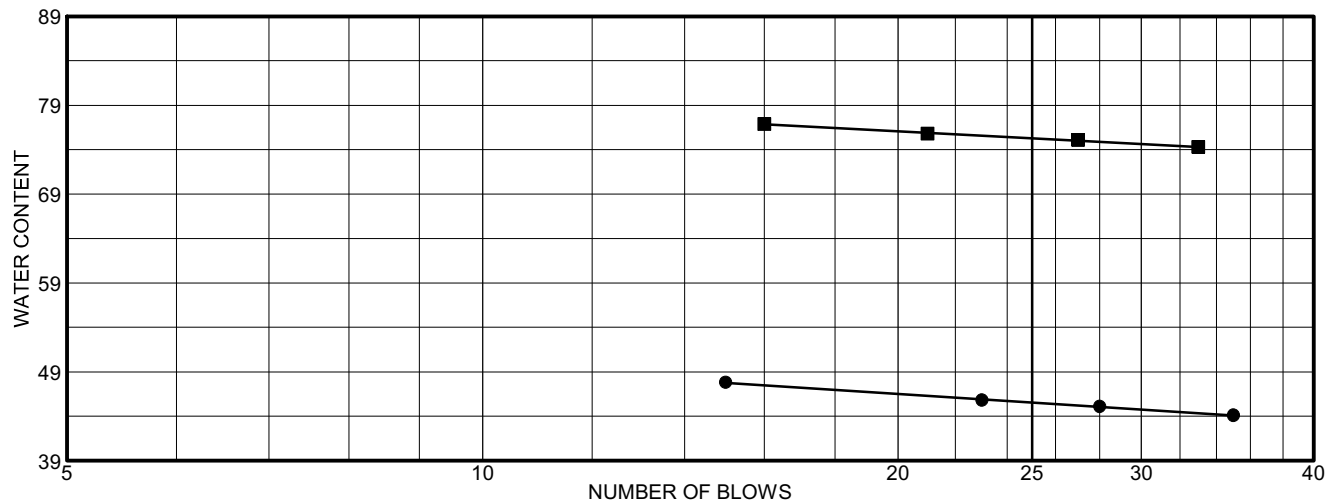
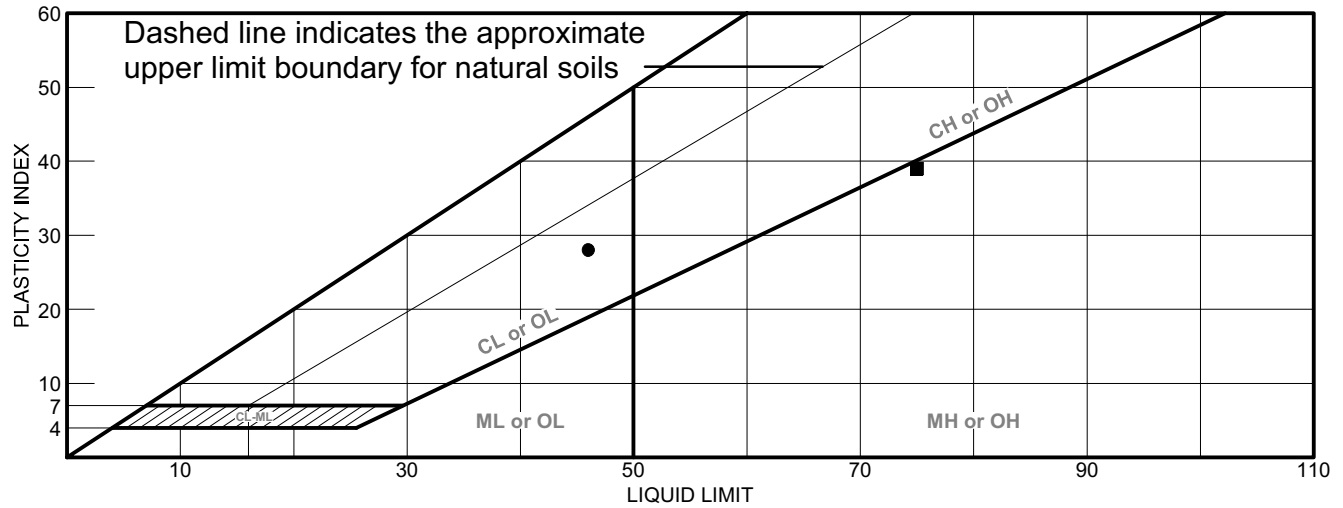
Gray Brown Clay

Report Date:

May 30, 2018



LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish Gray Sandy Lean CLAY	46	18	28			
■	Greenish Gray Elastic SILT w/ shell fragments (Bay Mud)	75	36	39			

Project No. 516-037 Client: GeoLogic Associates

Project: Top Golf Burlingame - RM18.1038

● Source: TG-02

■ Source: TG-03

Elev./Depth: 39'

Elev./Depth: 47'

Remarks:

●
■

LIQUID AND PLASTIC LIMITS TEST REPORT

COOPER TESTING LABORATORY

Figure

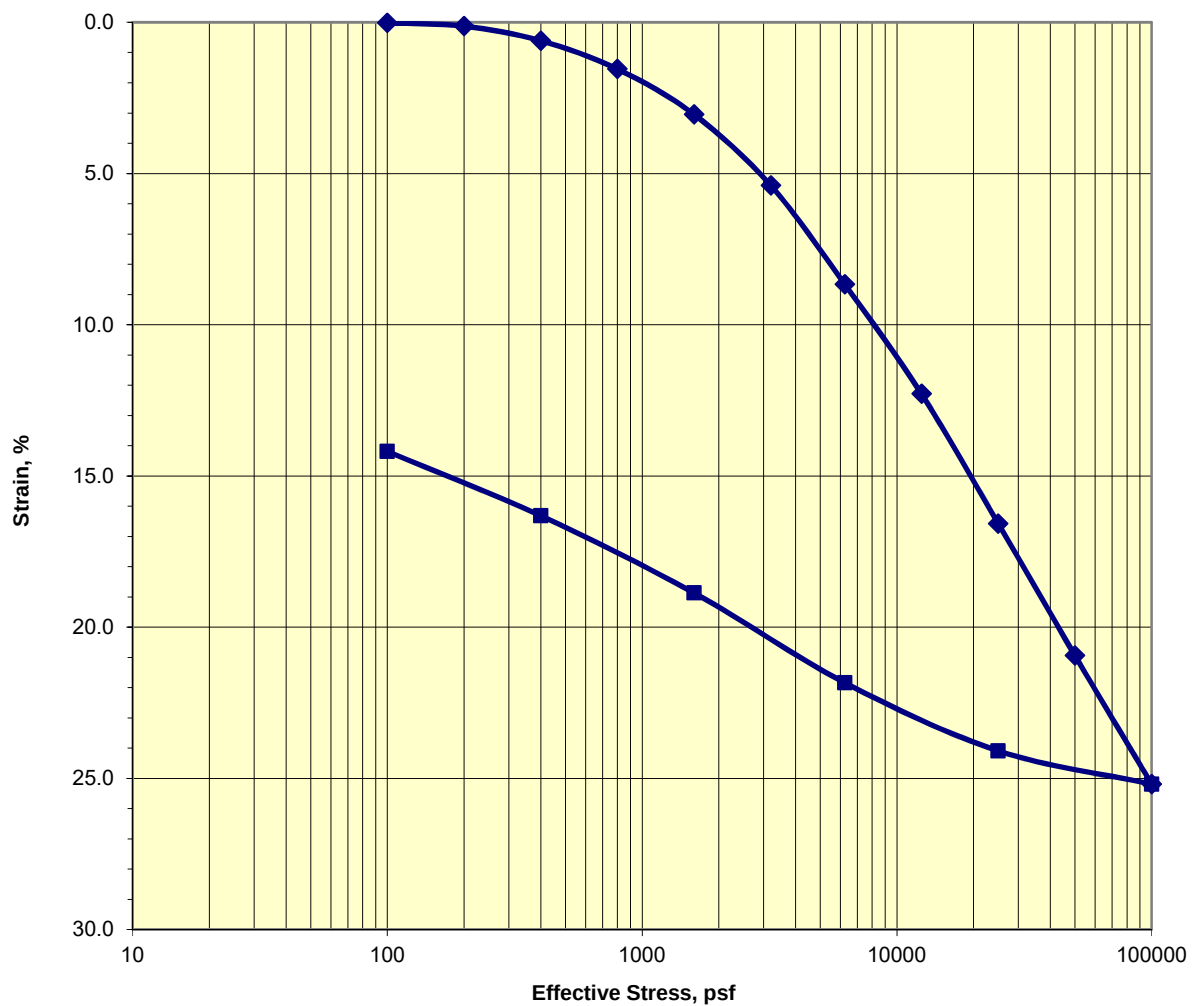


Consolidation Test

ASTM D2435

Job No.: 516-037	Boring: TG-02	Run By: MD
Client: Geo-Logic Associates	Sample:	Reduced: PJ
Project: RM18-1038	Depth, ft.: 39(Tip-3")	Checked: PJ/DC
Soil Type: Greenish Gray Sandy Lean CLAY		Date: 5/29/2018

Strain-Log-P Curve



Assumed Gs	2.8	Initial	Final
Moisture %:		30.2	23.3
Dry Density, pcf:		91.4	105.8
Void Ratio:		0.913	0.652
% Saturation:		92.5	100.0

Remarks:

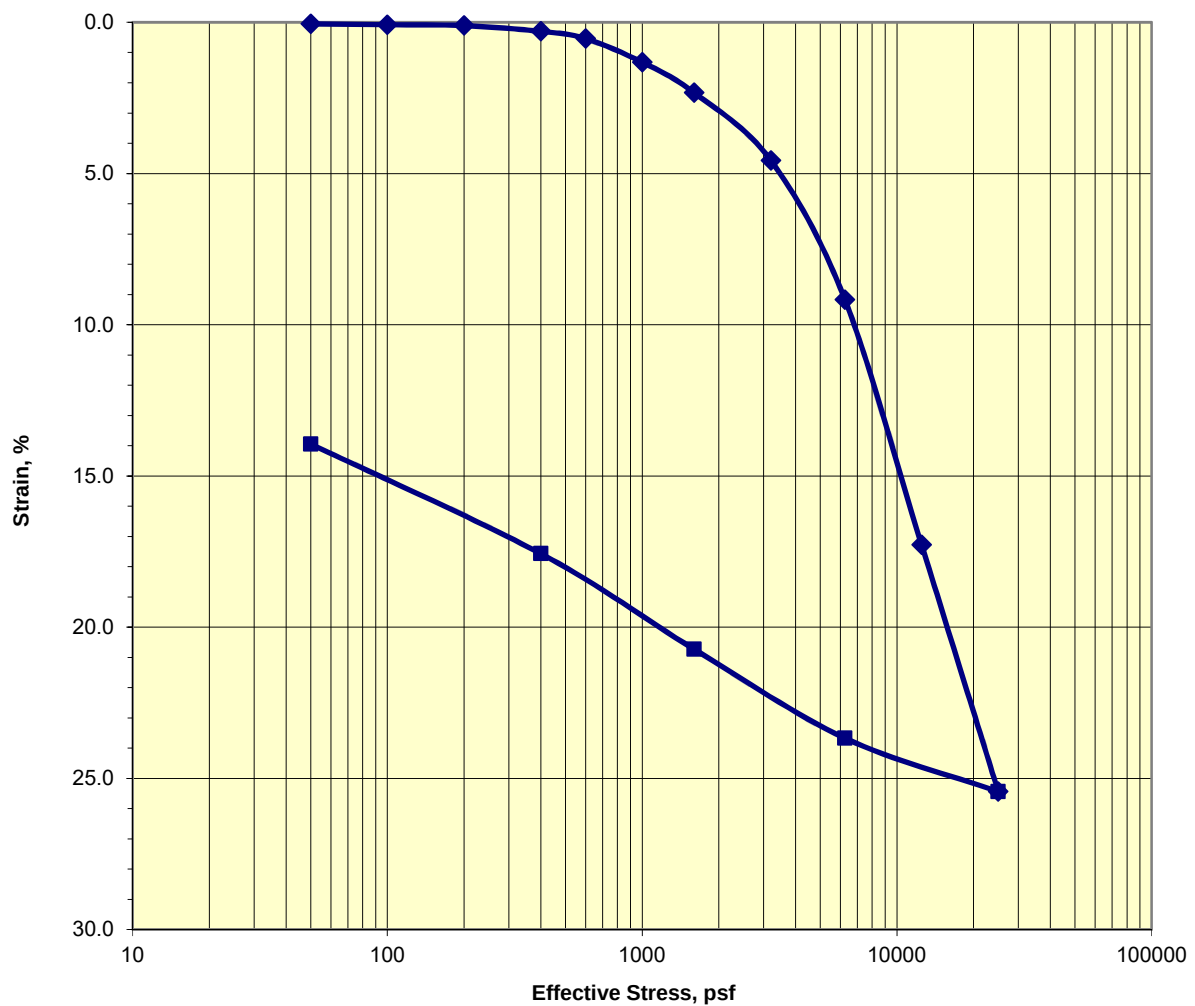


Consolidation Test

ASTM D2435

Job No.: 516-037	Boring: TG-03	Run By: MD
Client: Geo-Logic Associates	Sample:	Reduced: PJ
Project: RM18.1038	Depth, ft.: 47(Tip-6")	Checked: PJ/DC
Soil Type: Greenish Gray Elastic SILT w/ shell fragments (Bay Mud)		Date: 6/1/2018

Strain-Log-P Curve

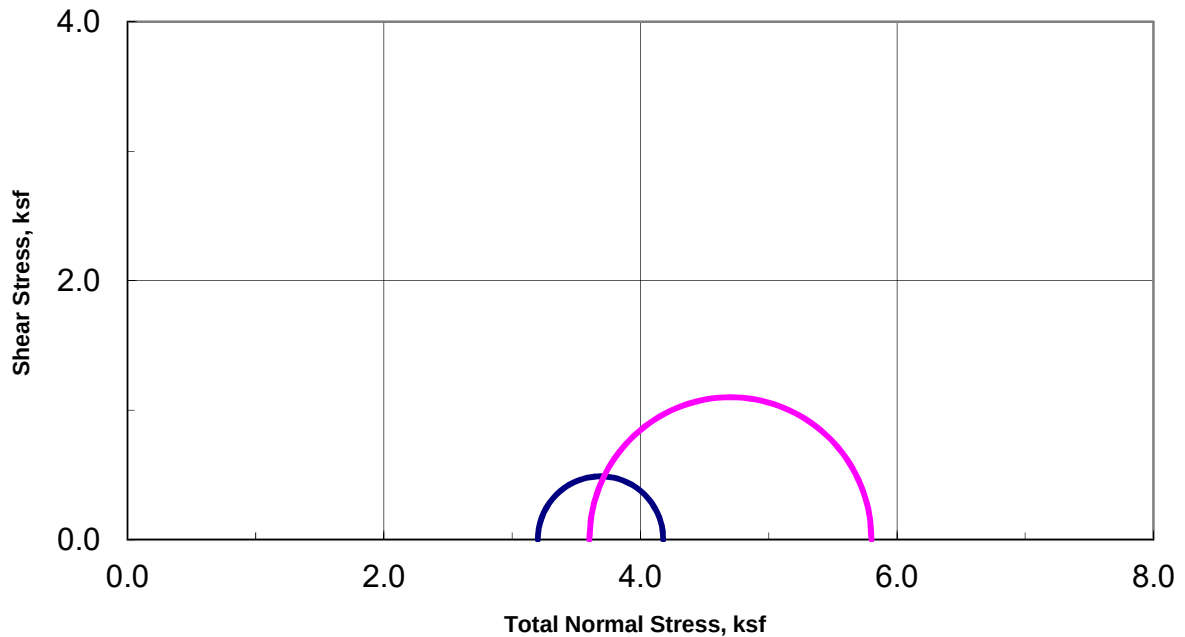


Assumed Gs	2.8	Initial	Final
Moisture %:		63.5	51.7
Dry Density, pcf:		61.7	71.4
Void Ratio:		1.835	1.447
% Saturation:		96.9	100.0

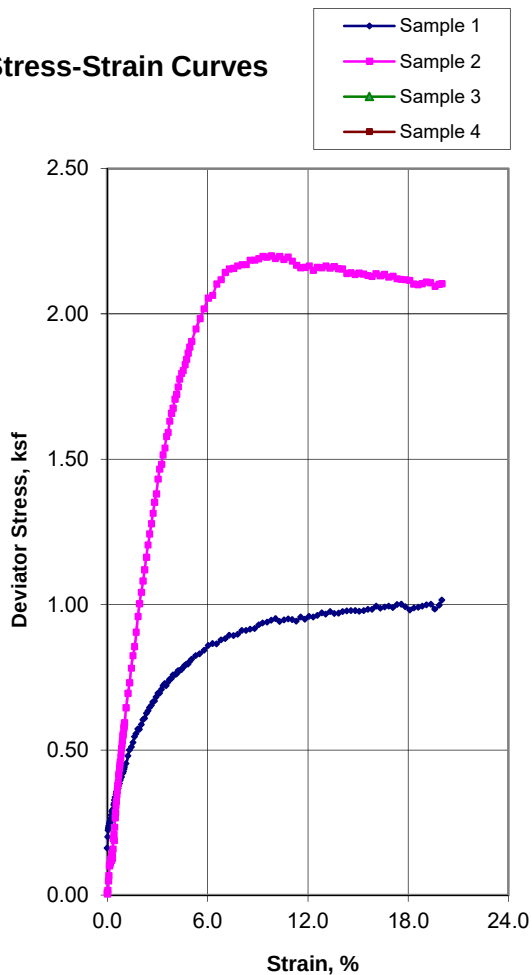
Remarks:



Unconsolidated-Undrained Triaxial Test ASTM D2850



Stress-Strain Curves



Sample Data

	1	2	3	4
Moisture %	37.2	60.0		
Dry Den,pcf	85.4	64.1		
Void Ratio	1.047	1.726		
Saturation %	99.6	97.4		
Height in	5.97	6.00		
Diameter in	2.85	2.85		
Cell psi	22.2	25.0		
Strain %	15.00	9.81		
Deviator, ksf	0.978	2.200		
Rate %/min	1.00	1.00		
in/min	0.059	0.060		
Job No.:	516-037			
Client:	Geo-Logic Associates			
Project:	RM18.1038			
Boring:	TG-02	TG-03		
Sample:				
Depth ft:	39(Tip-5")	47(Tip-8")		

Visual Soil Description

Sample #	
1	Greenish Gray Sandy Lean CLAY
2	Greenish Gray Elastic SILT w/ shell fragments (Bay Mud)
3	
4	

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

Appendix I
SITE RESPONSE ANALYSIS



Appendix I
SEISMIC SITE RESPONSE ANALYSIS
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

GENERAL

Geo-Logic Associates, Inc. (GLA) prepared the following site-specific seismic site response analysis (SRA) for the proposed Topgolf Burlingame Golf Center Redevelopment Project, which is located at 1001 Airport Boulevard in Burlingame, California (site). The analysis has been performed in accordance with the 2016 Edition of the California Building Code (CBC), and its reference codes, including IBC 2015 and ASCE 7-10 (codes). In particular, GLA followed the ASCE 7-10 Chapter 21 "Site-Specific Ground Motion Procedures for Seismic Design."

The design bedrock ground motions conform to the deterministic (84th percentile) spectrum with ordinates lower than its probabilistic (50th percentile) counterpart. Per code requirement, the deterministic spectrum was adjusted to conform to the maximum horizontal component. The SRA has been performed in the frequency domain using the equivalent-linear soil model. The seismic site characterization is based upon the results of site-specific shear wave velocity measurements. The results of SRA suggest that this site amplifies input bedrock motions along the frequency range of interest.

BACKGROUND

The proposed Topgolf USA Burlingame Golf Center Redevelopment Project is planned to be constructed on the closed Burlingame Landfill located at 1001 Airport Boulevard in Burlingame, California. Based on the concept drawings made available for GLA's review, this proposed golf driving range development will cover an area of approximately 15 acres and will incorporate a two-story structure in the southwesterly portion of the site, circular targets distributed downrange (i.e., northeast) of the building area of the site, net poles and netting around the range, new parking areas, and a new access road connection to Airport Boulevard. The approximate location of the site is shown on Figure 1. The approximate coordinates of the geometric center of the site are: 37.5903 degrees North Latitude and -122.3548 degrees East (i.e., +122.3548 degrees West) Longitude.

The layout of borings advanced by GLA (during a previous phase of work on this project) and by others, as well as Seismic Cone Penetration Test (SCPT) soundings advanced by GLA during the current phase of this project, is shown in Figure 2. GLA performed in-hole measurement of shear

wave velocity (V_s) at the SCPT locations designated as SCPT-01 and SCPT-01a in the figure. Field measurements of V_s for these two SCPT locations are shown in Figure 3.

The 2016 edition of the CBC requires special evaluations (i.e., site response analysis) for soil profiles containing “peats and/or highly organic clays ($H > 10$ feet of peat and/or highly organic clay where H = thickness of soil).” Soil profile at this site contains a deposit of Municipal Solid Waste (MSW) of considerable thickness (i.e., thickness in excess of 50 ft). Putrescible materials that are a significant portion of MSW profile, have mechanical properties similar to MSW. Therefore, deposits containing MSW are commonly treated as their counterparts containing “peats and/or highly organic clays” for which a site response analysis is required.

SEISMIC HAZARD EVALUATION

Seismic Source Model

The 2014 United States Geological Survey (USGS) national seismic hazard model for the Western United States WEUS-14), as implemented by Risk (2017) into EZ-FRISK (V 8.0), was used to identify the seismic sources for the ground-response analysis described herein. Faults located within 200 km of the Site were included in the analysis. The latest update of the Uniform California Earthquake Rupture Forecast UCERF-3 (Field et al., 2013) is also included in the version of EZ-FRISK used by GLA. The 2008 USGS model was used for the subduction events.

Site Conditions

To provide a seismic hazard input for site response analysis, the seismic hazard parameters, and further design ground motions (accelerograms) are evaluated for bedrock. At this site, based upon the results of regional geologic studies (e.g., Pampeyan, 1994), bedrock is established as a material with shear wave velocity (V_s) equal to 760 m/s (2,500 ft/s) that corresponds to, so called “B/C” boundary, i.e., boundary between NEHRP site classes B and C. This boundary is commonly referred to as “weak rock.” Accordingly, the seismic hazard evaluations were performed for a hypothetical “weak rock” outcrop at the geometric center of the site.

Ground Motion Prediction Equations Employed

Five NGA West-2 Ground Motion Prediction Equations (GMPEs), as implemented in EZ-FRISK, were used for both probabilistic and deterministic evaluations. In particular, the Abrahamson, Silva, and Kamai (2014); Boore, Stewart, Seyhan, and Atkinson (2014); Campbell and Bozorgnia (2014); Chiou and Youngs (2014); and Idriss (2014) GMPEs were used for evaluations involving shallow crustal events. Based on USGS practice for California, a weight of 12% was assigned to Idriss (2104). The four remaining GMPEs were assigned weights of 22%. A standard USGS set of GMPEs for subduction events was also used.

Seismic Hazard Analysis Results – Mean Component of Bedrock Ground Motion

Per 2016 edition of the CBC, GLA performed both Probabilistic and Deterministic Seismic Hazard Analyses (PSHA and DSHA) and evaluated the results. The results of PSHA, i.e., the 2% in 50 years (2,475-year return period) uniform hazard acceleration response spectra (UHS)¹, is compared to its deterministically evaluated counterpart (84th percentile deterministic spectrum)² in Figure 4. The calculations of both spectra were based upon a set of site-specific parameters and GMPEs selected. Both spectra shown in Figure 4 are the geometric mean spectra (i.e., no adjustment for the maximum rotated component) and were evaluated for free-field site conditions (i.e., no structure; level ground), 5% spectral damping. Both spectra shown in Figure 4 refer to a horizontal component of ground motion. Evaluation of the results indicated that the DSHA spectral ordinates (84th percentile) are lower than their PSHA (50th percentile) counterparts.

Seismic Hazard Analysis Results – Maximum Rotated Component

The 2016 edition of the CBC requires the use of the maximum rotated horizontal component (as opposed to the geometric mean of the horizontal component), but only when the NGA West-2 GMPEs are used at hospital sites. However, ASCE 7-10 (Chapter 21) requires the use of the maximum rotated component for all seismic hazard analyses. Therefore, the DSHA geometric mean ground motions (i.e., acceleration response spectrum corresponding to a geometric mean motion) was modified to correspond to the maximum rotated ground motion (i.e., acceleration response spectrum). The modification was performed using the Huang et al. (2008) method. The mean and maximum rotated acceleration response spectra are compared in Figure 5.

Seismic Hazard Analysis Results – Deaggregation

Deaggregation of the seismic sources employed in the probabilistic seismic hazard analysis was performed to evaluate design earthquake magnitude. The results of this deaggregation indicate that the largest (mode) contributor to the seismic hazard for the peak horizontal ground acceleration (PGA) at the site is a moment magnitude (M) 8.05 event on the San Andreas (Northern Segment, Peninsula Section) fault at an approximate site-to-source distance of $R = 4.07$ km. These deaggregated parameters refer to both mean and maximum rotated components of design ground motion. Additional details regarding this analysis are provided in Attachment A, (Echo of Input Data), Attachment B (UHS Acceleration Response Spectrum), and Attachment C (DSHA Acceleration Response Spectrum).

¹ Calculated by EZ-FRISK.

² Calculated by EZ-FRISK.

DEVELOPMENT OF DESIGN GROUND MOTIONS

Target Acceleration Response Spectrum (Bedrock)

The results of seismic hazard analysis indicate that the spectral ordinates of the 84th percentile deterministic spectrum are lower than their 50th percentile UHS counterparts. Therefore, in accordance with the code requirements, lower of the two bedrock spectra is selected for further evaluations. This 84th percentile deterministic spectrum maximum modified to correspond to the maximum rotated ground motion is reproduced from Figure 5 in Figure 6 for reference. This spectrum is further referred to herein as the *target spectrum* (i.e., spectrum that serves as a target for development of design bedrock ground motions).

The zero-period motion, i.e., the Peak Horizontal Ground Acceleration (PHGA) in bedrock at the geometric center of the site is 0.92 g. The design Moment Magnitude (M) is M 8.05.

Suite of Design Ground Motions (Bedrock)

A suite of design ground motions (accelerograms) was developed in an iterative process. This process involves comparing acceleration response spectra of candidate ground motions, retrieved from an online database of motions representative of bedrock site conditions and shallow crustal events, to the *target spectrum*. Five “best fit” motions (i.e., of the candidate motions evaluated, the five with spectra most closely approximating the target spectrum) were selected for further use as input (bedrock) motions in site response analysis.

The design ground motion selection process is documented in Figure 6, where acceleration response spectra of selected motions are compared to the *target spectrum*. An internal “quality control”-type check of this process is presented in Figure 7, where an average of design ground motions (i.e., average acceleration response spectrum) is compared to the *target spectrum*. Figure 7 shows that the average spectrum of selected ground motions generally matches and/or exceeds the target acceleration response spectrum in the period range of 0.2 to 1.0 seconds, the period range of interest for seismic considerations at the site.

SEISMIC SITE RESPONSE ANALYSIS

Method of Analysis

The seismic response analysis for the site was carried out following the methodology outlined below:

- (i) develop a soil column for site response analysis based upon site geologic, borehole, CPT sounding, and geophysical survey information;

- (ii) assign material properties to the representative soil column based upon interpretation of available information and on past experience;
- (iii) perform one-dimensional equivalent-linear seismic site response analyses of the soil column and express the results in terms of free-field acceleration response spectra;
- (iv) develop a “smoothed” acceleration spectrum; and
- (v) perform adjustments per CBC 2016 / ASCE 7-10 to obtain Design Spectrum (2/3 reduction).

Representative One-Dimensional Column with Material Properties

Based on subsurface exploration by GLA and by others, and on the geologic map for the site developed by Pampeyan (1994), the site is generally underlain by:

- Municipal Solid Waste (MSW) possibly mixed with inert fill, underlain by
- San Francisco Bay Mud (SFBM), underlain by
- Alluvial and/or marine deposits, underlain by
- Bedrock of the Franciscan Formation.

Franciscan Formation bedrock was not encountered in GLA’s subsurface exploration locations, but we understand that it may be present at an elevation of approximately -175 feet above mean sea level (AMSL), corresponding to a depth on the order of 235 feet below the ground surface (BGS).

GLA developed a one-dimensional (1D) column for site response analysis. Input parameters for the 1D column were developed based on GLA’s measured values where available (i.e., within the upper approximately 35 feet of the MSW stratum). Where data were not available from GLA measurements (i.e., in the layers underlying the MSW stratum), input values were developed based on results of geophysical measurements, in situ testing, and laboratory testing of SFBM, alluvial and marine deposits, and Franciscan Formation bedrock as reported by Fugro (2001) for the San Francisco-Oakland Bay Bridge East Span Seismic Safety Project.

A (1D) column for site response analysis is characterized by its stiffness profile (i.e., shear modulus profile), unit weight profile, layering, and equivalent linear material properties (modulus reduction and damping) assigned to each layer in the profile. The stiffness profile is derived from simplified shear wave velocity profile (see “black” line in Figure 8) and unit weight profile.

The modulus reduction and damping curves used for alluvial soils and MSW at this site are based on Vucetic and Dobry (1991) ($PI = 50$)³ and Matasovic and Kavazanjian (1998), respectively. These curves are shown in Figure 9 (soils) and Figure 10 (MSW). The equivalent linear material

³ This $PI = 50$ curve is very similar to curve developed for the SFBM by Stokoe and Lodde (1978).

properties of “weak rock” are represented by the Shibuya et al. (1990) curve. More detailed information about layering, soil classification within the profile, and how this information was used to assign modulus reduction and damping curves to individual layers is provided in Attachment D.

Seismic Site Response Analysis

One-dimensional equivalent-linear SRA of the 243-ft thick column was conducted using SHAKE2000 (www.GeoMotions.com). The design ground motions (accelerograms) shown in terms of corresponding acceleration response spectra in Figure 6 were scaled to the design bedrock PHGA of 0.92 g and applied as “outcrop” motions at the base of one-dimensional (1D) model of the site.

The results of SRA are presented in Figure 11 in the form of free-field (i.e., ground surface / no structure) acceleration response spectra. For reference the maximum rotated component of the bedrock deterministic spectrum is also shown in Figure 11. Figure 11 shows that a 243-ft thick alluvial soil/waste profile attenuates design (i.e., bedrock) ground motions within low period range (up to approximately 0.4 seconds) and amplifies them beyond 0.4 seconds. This type of response is typical for deep, relatively soft soil deposits and was expected.

The suite of calculated free-field acceleration response spectra shown in Figure 11 is not convenient for seismic design in accordance with the building code. Therefore, a process referred to as “smoothing” is typically used. This process is based upon engineering judgment. The “smoothed” acceleration response spectrum is also shown in Figure 11 (thick red line). This acceleration response spectrum served as a basis for development of design acceleration response spectrum.

Figure 12 presents comparison of smoothed acceleration response spectrum to average of spectral ordinates of surface motions, and to 80% of NEHRP Site Class E acceleration response spectrum, as evaluated by the USGS UHS calculator. Both comparisons are required by the Chapter 21 of ASCE 7-10. As shown in Figure 12, both the average spectrum and the 80% of NEHRP Site Class E acceleration response spectrum are lower than the smoothed spectrum.

The design acceleration response spectrum is shown in Figure 13. This design acceleration response spectrum was developed by multiplying the “smoothed” spectrum from Figures 11 and 12 by two-thirds. Tabulated discrete values of spectral ordinates, along with other information, are presented in Figure 13 as well. Note that the design spectrum is representative of the maximum rotated horizontal component of ground motion and is applicable for Risk Categories I, II, or III (risk-adjustment factors for these three categories are assumed herein to equal to unity). This Design Spectrum (Figure 13) is recommended for structural design for the proposed Topgolf Burlingame Golf Center.

SUMMARY AND RECOMMENDATIONS

This report documents results of site-specific SRA. The analysis has been performed in accordance with the California Building Code (CBC), 2016 Edition, and its reference codes, the International Building Code (IBC), 2015 Edition and the American Society of Civil Engineers (ASCE) 7, 2010 Edition (ASCE 7-10) requirements. The evaluations are based upon seismic hazard input parameters developed for bedrock ($V_s = 760$ m/s).

The results of site-specific evaluations documented herein are expressed in the form of the Design Acceleration Response Spectrum (Design Spectrum) shown in Figure 12. This Design Spectrum may be used for structural evaluations and design of the proposed Topgolf Burlingame Golf Center.

LIMITATIONS

In preparing the findings and professional opinions presented in this letter report, Geo-Logic Associates (GLA) has endeavoured to follow generally accepted principles and practices of the engineering geologic and geotechnical engineering professions in the area and at the time our services were performed. This letter report was internally peer reviewed in accordance with GLA's peer review policy. No warranty, express or implied, is provided.

The conclusions and recommendations contained in this letter report are based, in part, on information that has been provided to us. In the event that the general development concept or general location and type of structures are modified, our conclusions and recommendations shall not be considered valid unless we are retained to review such changes and to make any necessary additions or changes to our recommendations.

Subsurface exploration is necessarily confined to selected locations and conditions may, and often do, vary between these locations. Should conditions different from those described in this letter report be encountered during project development, GLA should be consulted to review the conditions and determine whether our recommendations are still valid. Additional exploration, testing, and analysis may be required for such evaluation.

Should persons concerned with this project observe geotechnical features or conditions at the site or surrounding areas which are different from those described in this letter report, those observations should be reported immediately to GLA for evaluation.

It is important that the information in this letter report be made known to the design professionals involved with the project, that our recommendations be incorporated into project drawings and documents, and that the recommendations be carried out during construction by the contractor and subcontractors. It is not the responsibility of GLA to notify the design professionals and the project contractors and subcontractors.



The findings, conclusions and recommendations presented in this letter report are applicable only to the specific project development on this specific site. These data should not be used for other projects, sites or purposes unless they are reviewed by GLA or a qualified geotechnical professional.

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FIGURES 1 THROUGH 12



Note:
Directions, dimensions, and locations are approximate.

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SITE LOCATION
SUPPLEMENTAL EXPLORATION & SITE RESPONSE ANALYSIS
PROPOSED TOPGOLF LOCATION, BURLINGAME, CALIFORNIA

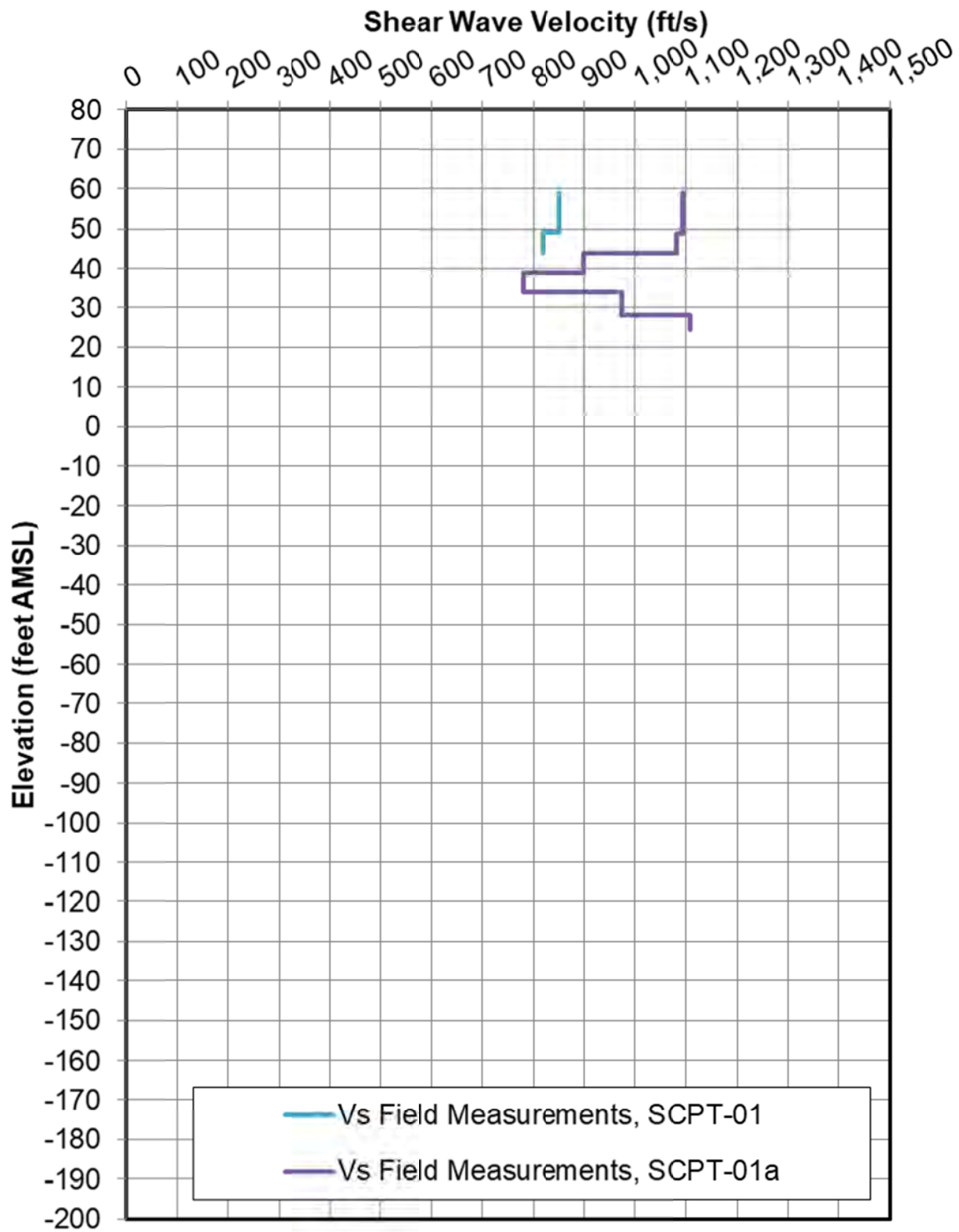
DATE:	February 2019	FIGURE NO.	1
PROJECT NO.	RM18.1038.00		



Geo-Logic
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BORING & SUPPLEMENTAL CPT SOUNDING LOCATIONS
SUPPLEMENTAL EXPLORATION & SITE RESPONSE ANALYSIS
PROPOSED TOPGOLF LOCATION, BURLINGAME, CALIFORNIA

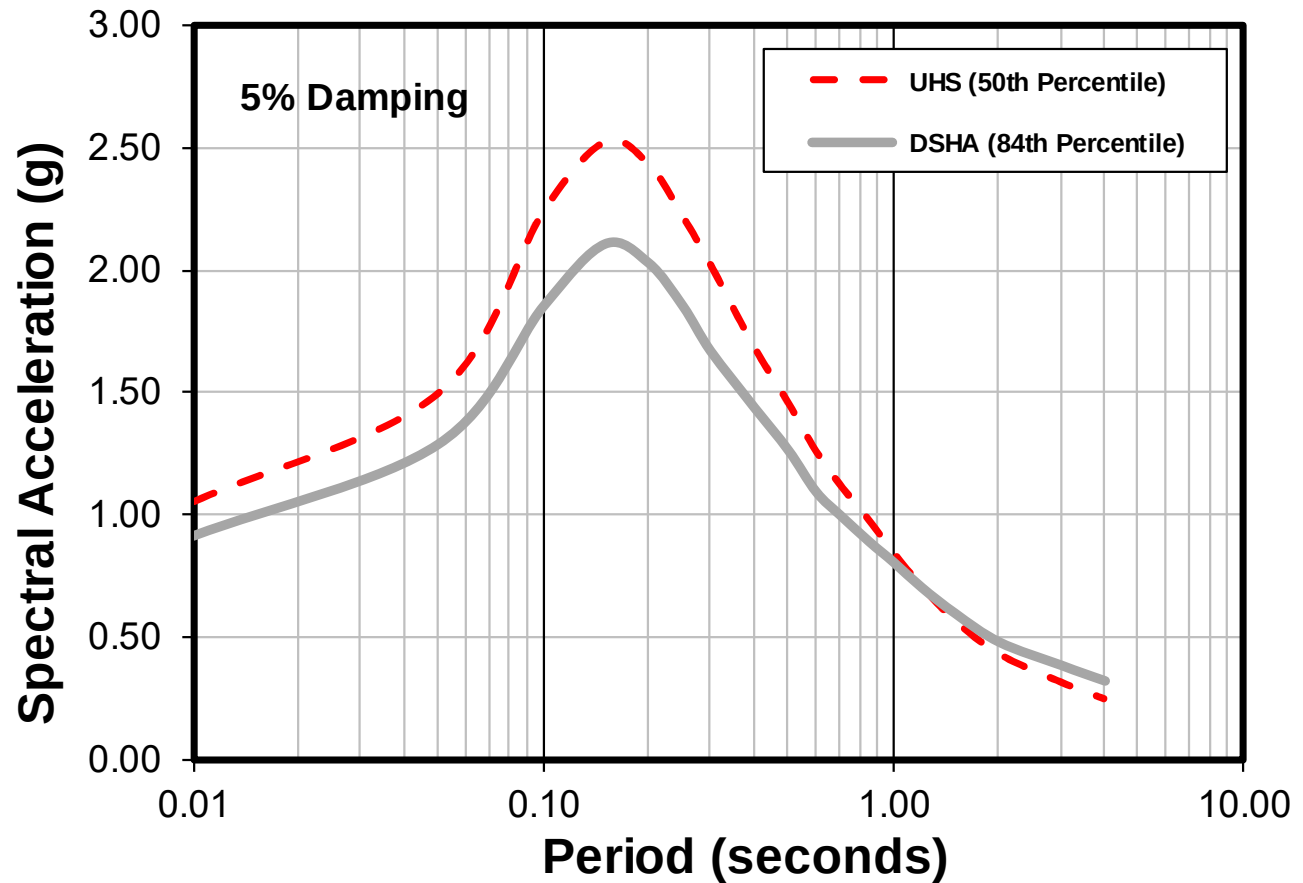
DATE:	February 2019	FIGURE NO.:	6
PROJECT NO.:	RM18.1038.00		



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SHEAR WAVE VELOCITY FIELD MEASUREMENTS
SUPPLEMENTAL EXPLORATION & SITE RESPONSE ANALYSIS
PROPOSED TOPGOLF LOCATION, BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	3
PROJECT NO.	RM18.1038.00		

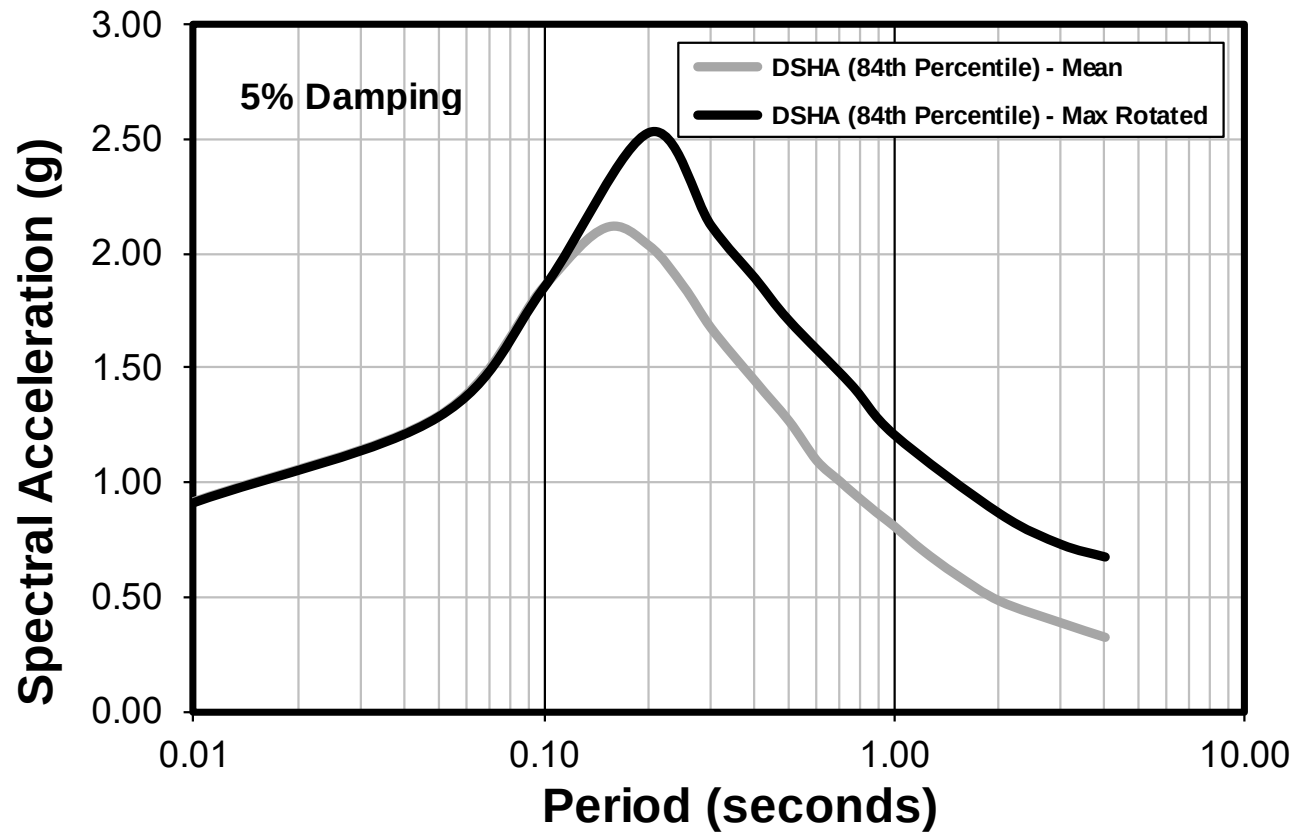


- The Uniform Hazard Spectrum (UHS) corresponds to an event with 2% Probability of Exceedance (PE) in 50 years (2,475-year return period).
- Both UHS and Deterministic spectra are representative of geometric mean ground motion
- Both the UHS and Deterministic Spectra were developed for:
 - o Free-field site conditions (no structure; level ground);
 - o 5% spectral damping;
 - o Shear wave velocity, $V_s = 760$ m/s (2,500 ft/s); and
 - o Horizontal component of ground motion.

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COMPARISON OF RESULTS OF DSHA AND PSHA SPECTRA
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	4
PROJECT NO.	RM18.1038		

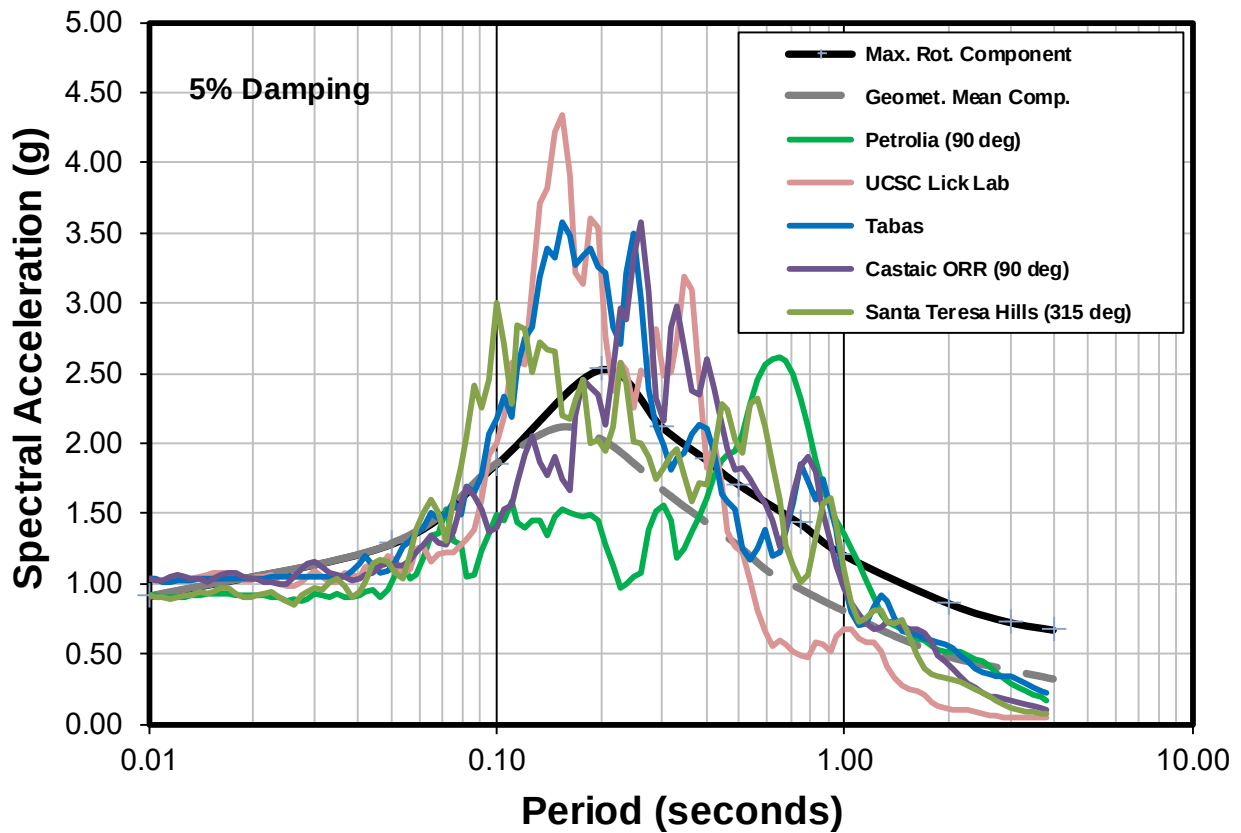


- Both spectra are Deterministic Spectra (84th Percentile).
- Both spectra were developed for:
 - o Free-field site conditions (no structure; level ground);
 - o 5% spectral damping;
 - o Shear wave velocity, $V_s = 760$ m/s (2,500 ft/s); and
 - o Horizontal components (i.e., geometric mean and max. rotated) of ground motion.

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MEAN AND MAX ROTATED ACCELERATION RESPONSE SPECTRA
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	5
PROJECT NO.	RM18.1038		



Design Accelerograms:

- The 360-degree component of the Castaic – Old Ridge Route Accelerogram from the **M 6.7 Northridge** earthquake;
- The 315-degree component of the Santa Teresa Hills accelerogram from the **M 6.9 Loma Prieta** earthquake;
- The 360-degree component of the University of California, Santa Cruz (UCSC), Lick Laboratory accelerogram from the **M 6.9 Loma Prieta** earthquake;
- The 90-degree component of the Petrolia accelerogram, recorded during the **M 7.0 Cape Mendocino** earthquake; and
- The North-South (N-S) component of the **Tabas** accelerogram from the 1978 **M 7.4 Tabas-e-Golshan, Iran** earthquake.

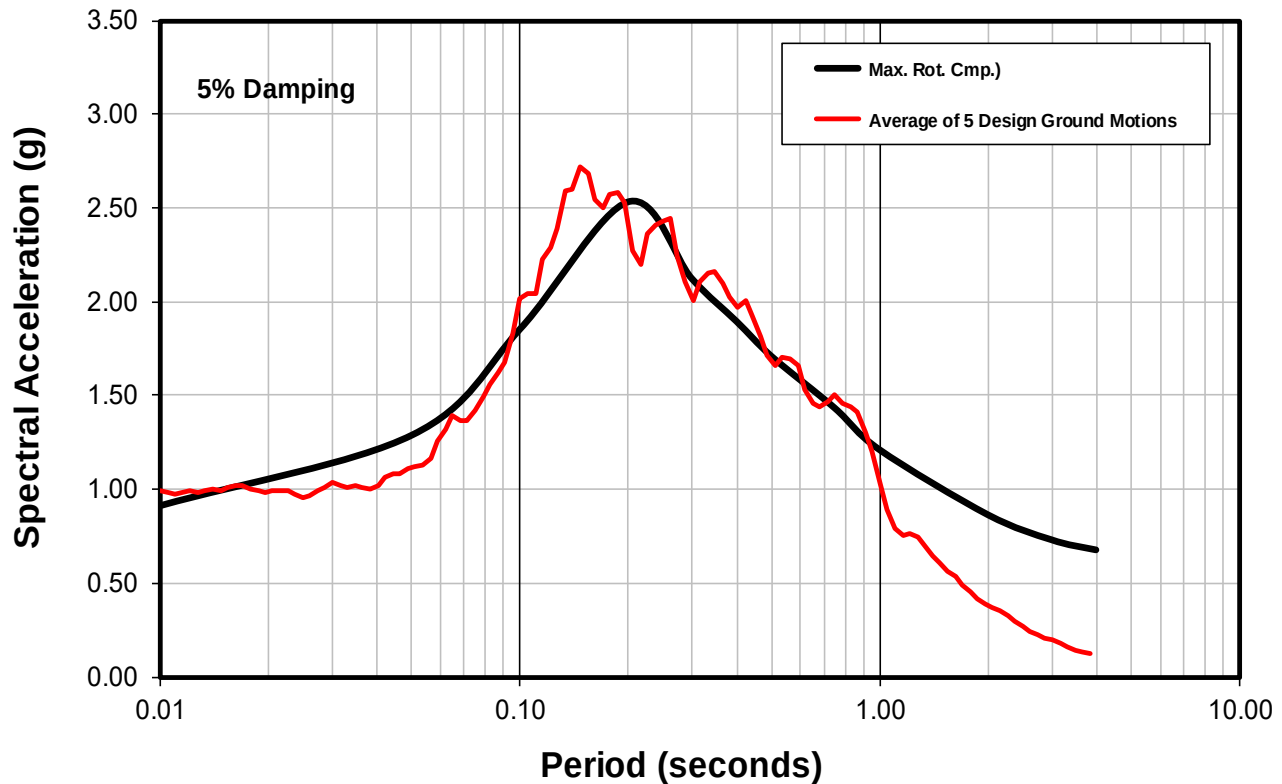
Site Conditions:

- o Free-field site conditions (no structure; level ground);
- o 5% spectral damping;
- o Shear wave velocity, $V_s = 760$ m/s (2,500 ft/s); and
- o Horizontal components (geometric mean and max. rotated) of motion.

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DESIGN ACCELEROGRAMS
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	6
PROJECT NO.	RM18.1038		

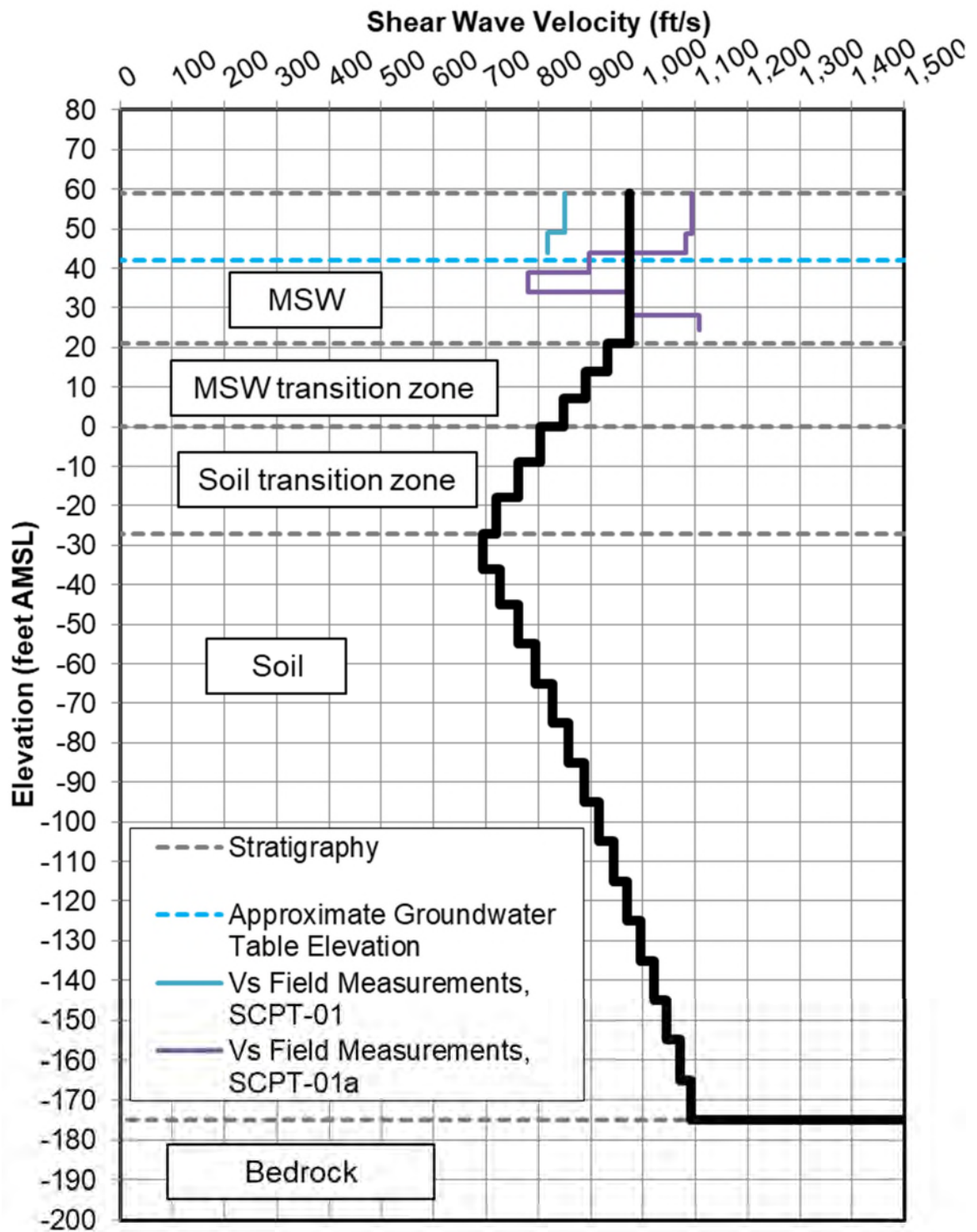


- Red line is an average of acceleration response spectra of 5 design ground motions. The comparison of this average acceleration response spectrum to the *Target Spectrum* is for quality control purposes, only.
- The Target Spectrum is an 84th percentile deterministic spectrum (max. rotated component).
- All spectra were developed for:
 - o Free-field site conditions (no structure; level ground);
 - o 5% spectral damping;
 - o Shear wave velocity, $V_s = 760$ m/s (2,500 ft/s); and
 - o Horizontal component.

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AVERAGE SPECTRUM OF DESIGN MOTIONS COMPARED TO TARGET
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	7
PROJECT NO.	RM18.1038		



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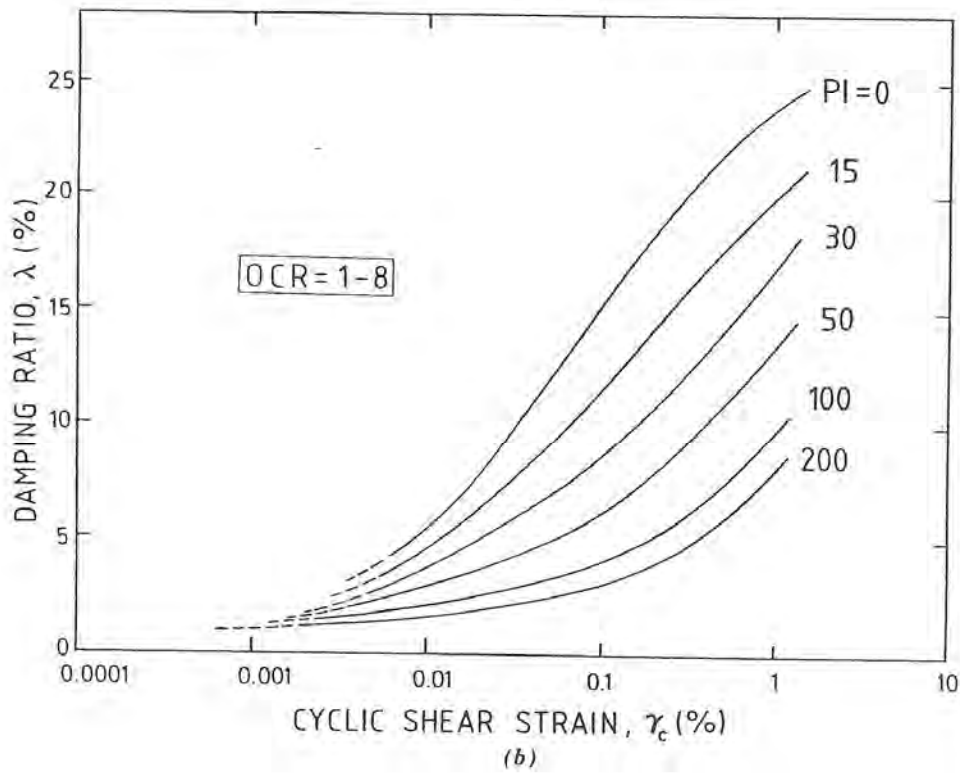
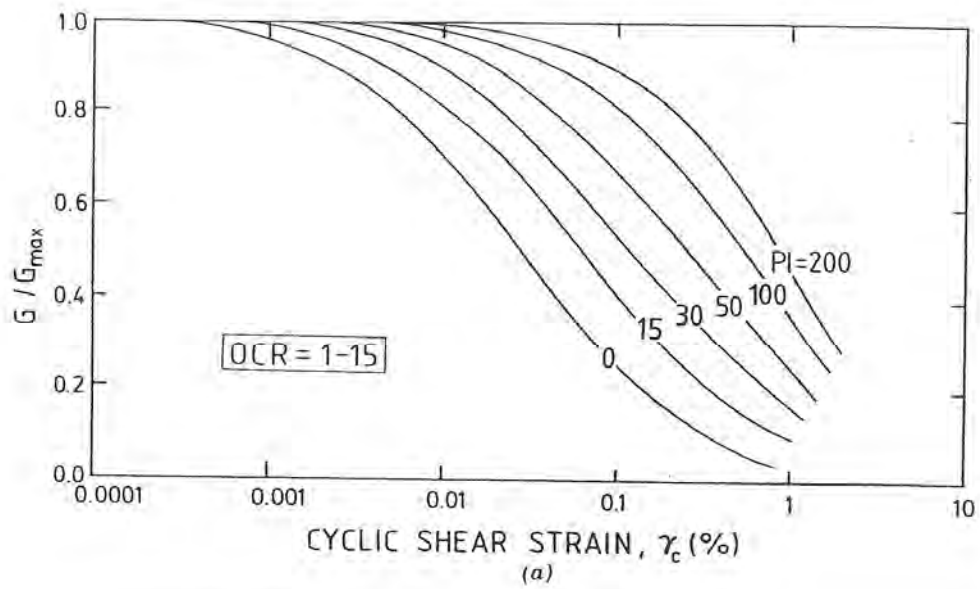
REPRESENTATIVE SHEAR WAVE VELOCITY MODEL FOR SRA
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE: February 2019

PROJECT NO. RM18.1038.00

FIGURE NO.

8

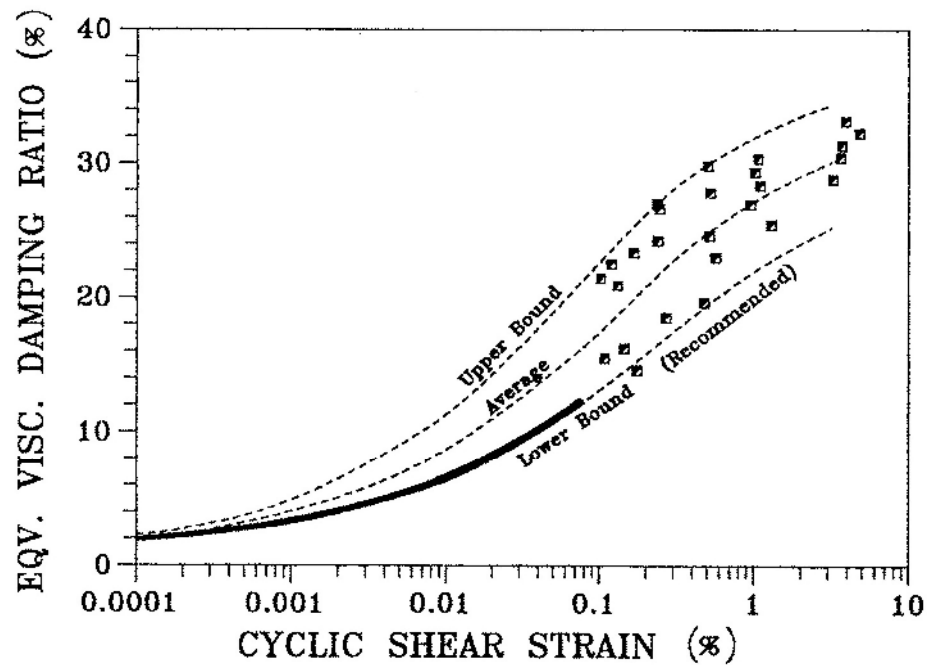
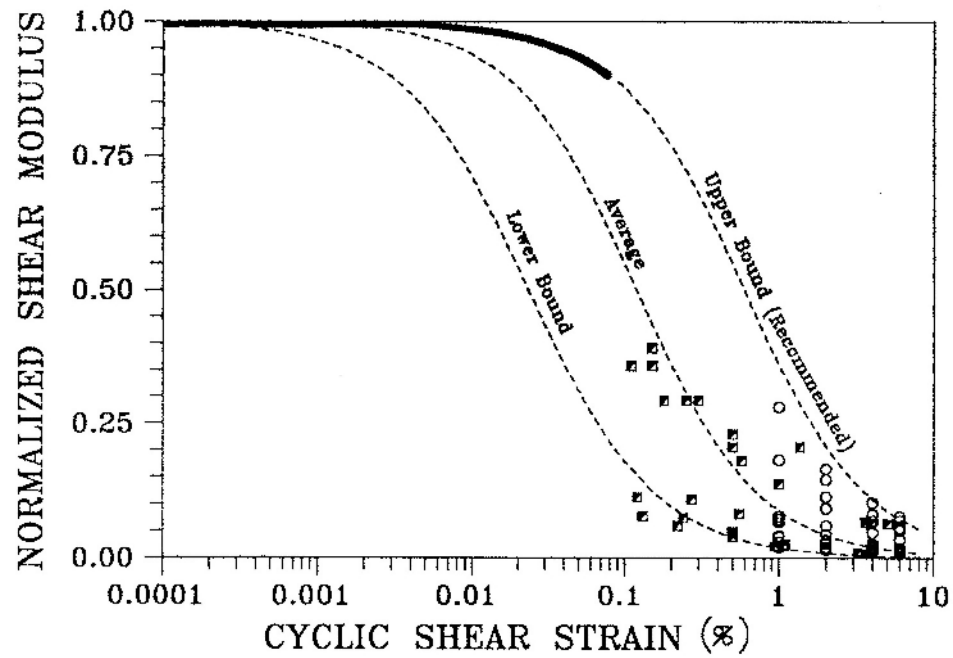


Vucetic and Dobry (1991)

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MODULUS REDUCTION AND DAMPING CURVES - SOIL
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	9
PROJECT NO.	RM18.1038		



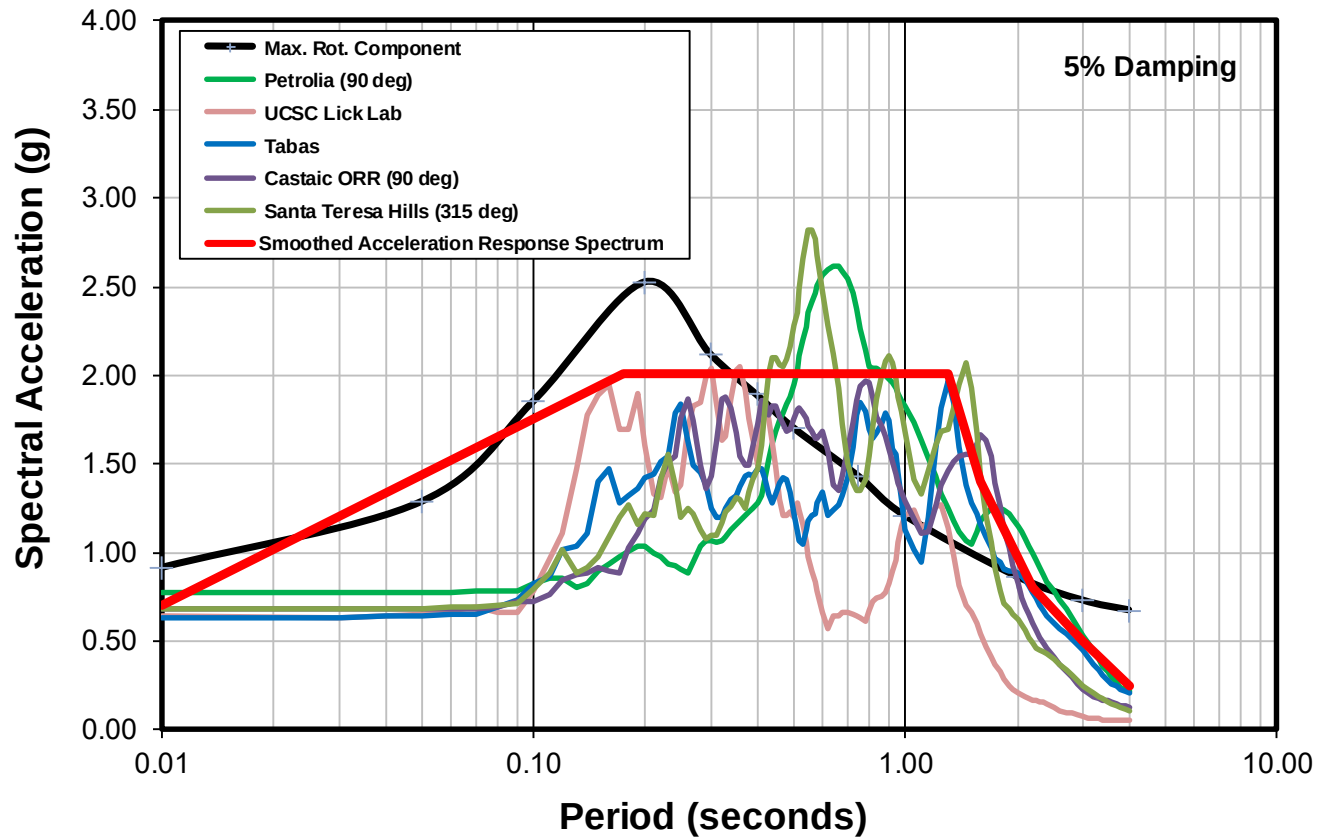
- Back Calculated
 ○ Evaluated from Monotonic DSS Testing of Oil Solid Waste
 ■ Evaluated from Cyclic DSS Testing of Oil Solid Waste

Matasovic and Kavazanjian (1998)

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MODULUS REDUCTION AND DAMPING CURVES - MSW
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	10
PROJECT NO.	RM18.1038		



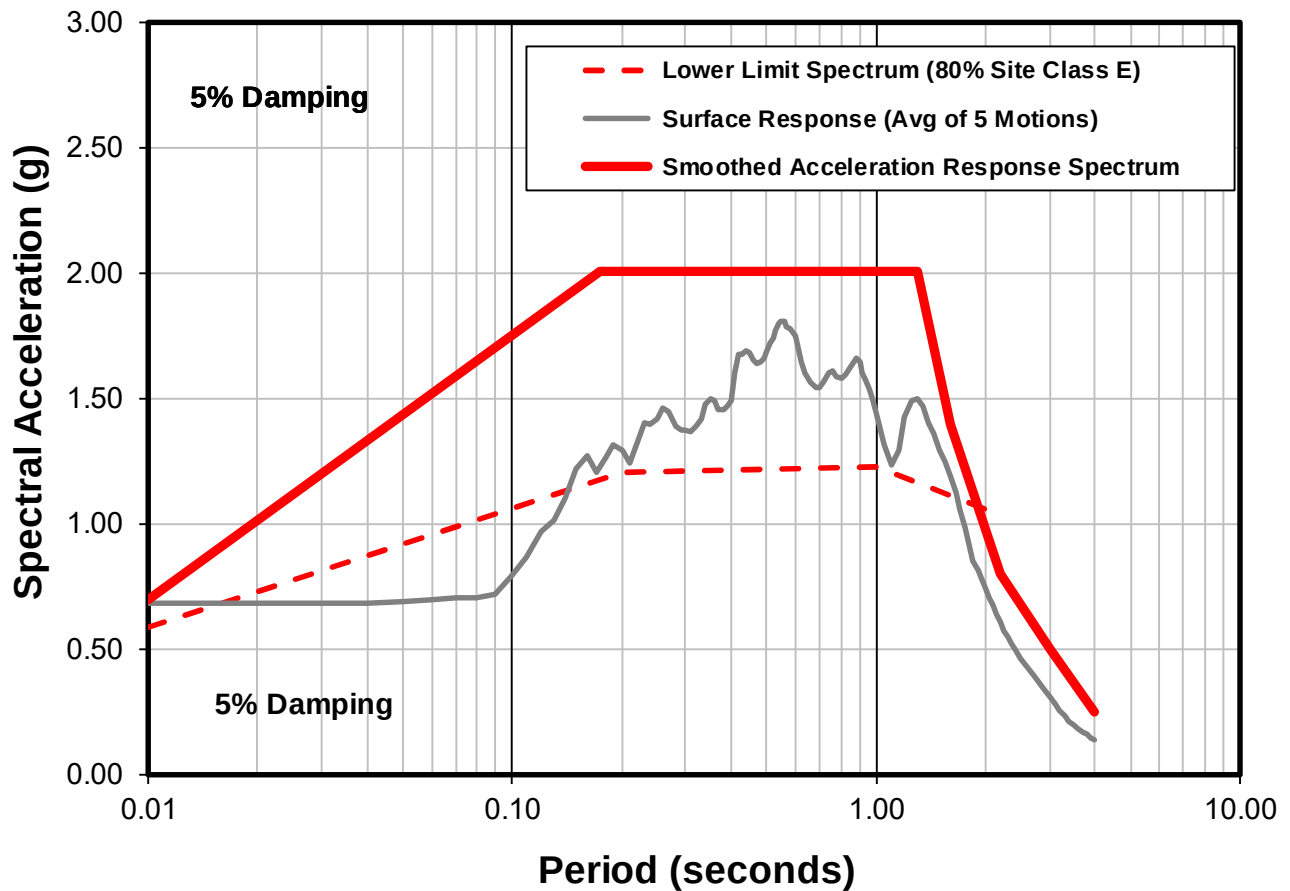
Site Conditions (Soil):

- o Free-field site conditions (no structure; level ground);
- o 5% spectral damping; and
- o The deterministic ("weak rock" spectrum (Max. Rotated Comp) is shown for comparison, only.

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RESULTS OF SITE RESPONSE ANALYSIS & SMOOTHED SPECTRUM
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	11
PROJECT NO.	RM18.1038		



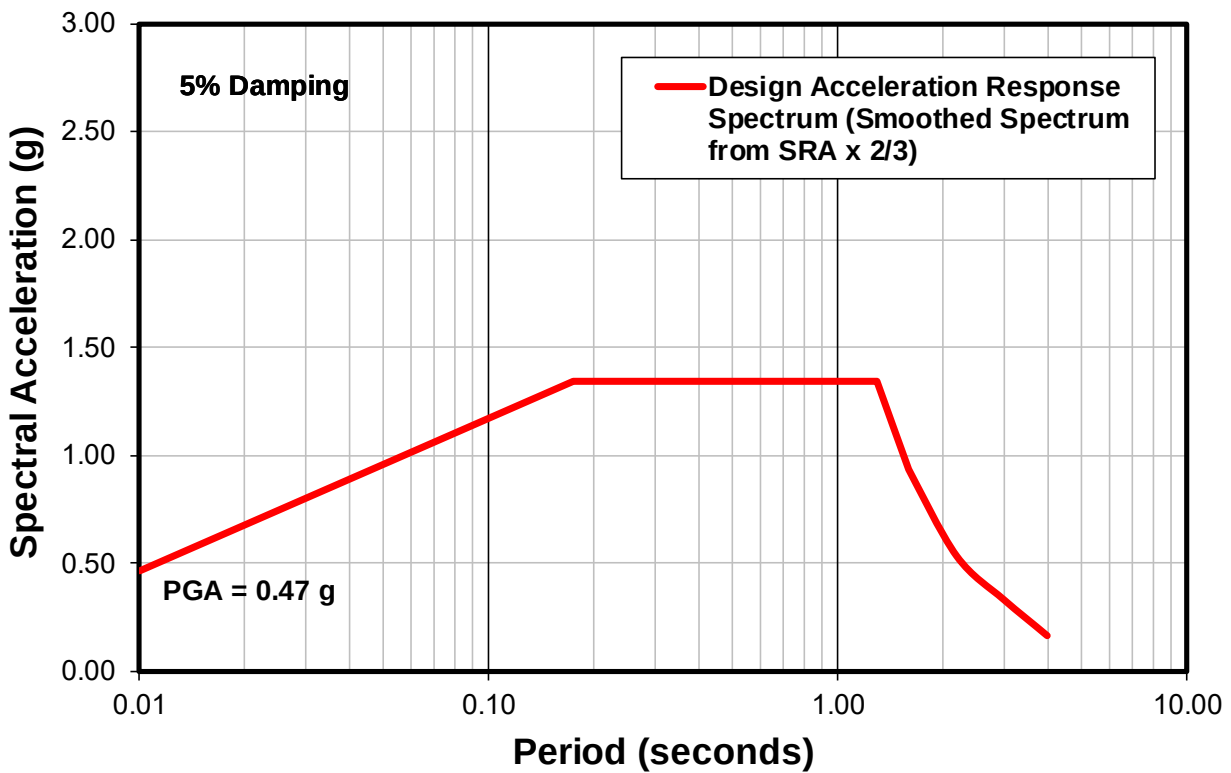
Comparison of Acceleration Response Spectra

- Maximum rotated component;
- Risk Categories I, II, or III (No Adjustment);
- Free-field site conditions (no structure; level ground);
- 5% spectral damping;
- Horizontal components of ground motion;

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COMPARISON OF ACCELERATION RESPONSE SPECTRA
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE:	February 2019	FIGURE NO.	12
PROJECT NO.	RM18.1038		



Design Acceleration Spectrum

Period (s)	Sa (g)
0.01	0.47
0.175	1.34
1.3	1.34
1.4	0.93
1.6	0.53
1.8	0.33
2.0	0.17

Design Acceleration Spectrum = Smoothed Spectrum x 2/3

- CBC 2016 / ASCE 7-10 (Chapter 21 Analysis)
- Maximum rotated component;
- Risk Categories I, II, or III (No Adjustment Made);
- Free-field site conditions (no structure; level ground);
- 5% spectral damping;
- Horizontal components of ground motion;

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DESIGN ACCELERATION RESPONSE SPECTRUM
TOPGOLF BURLINGAME GOLF CENTER REDEVELOPMENT PROJECT
BURLINGAME, CALIFORNIA

DATE: February 2019

PROJECT NO. RM18.1038

FIGURE NO.

13



ATTACHMENT A

EZ-FRISK - Echo File (1st 5 Pages)

```
1          *****
2          *****      EZ-FRISK      *****
3          ***** SEISMIC HAZARD ANALYSIS DEFINITION *****
4          *****      FUGRO CONSULTANTS, INC.      *****
5          *****      WALNUT CREEK, CA  USA      *****
6          *****
7
8 PROGRAM VERSION
9   EZ-FRISK 8.00 beta Build 000
10
11 ANALYSIS TITLE:
12   Topgolf Burlingame Golf Center Redevelopment Project
13
14 ANALYSIS TYPE:
15   Single Site Analysis
16
17 SITE COORDINATES
18   Latitude 37.5903
19   Longitude -122.355
20
21 INTENSITY TYPE: Spectral Response @ 5% Damping
22
23 HAZARD DEAGGREGATION
24   Status: ON
25   Bin Configuration
26     Magnitude
27     Scale:      Moment Magnitude
28     Lowest Value: 5 Mw
29     Highest Value: 9 Mw
30     Bin Size:   0.1
31   Distance
32     Lowest Value: 0 km
33     Highest Value: 102.5 km
34     Bin Size:    2.5 km
35   Epsilon
36     Lowest Value: -2.2
37     Highest Value: 4.2
38     Bin Size:    0.2
39
40 SOIL AMPLIFICATION
41   Method: Do not use soil amplification
42
43 ATTENUATION EQUATION SITE PARAMETERS
44   Depth[Vs=1000m/s] (m): -1
45   Estimate Z1 from Vs30 for CY NGA: 1
46   Regional Code: Default
47   Vs30 (m/s): 760
```

48 Vs30 Is Measured: 0
49 Z25 (km): 3
50
51 AMPLITUDES - Acceleration (g)
52 0.0001
53 0.0005
54 0.001
55 0.005
56 0.008
57 0.01
58 0.02
59 0.05
60 0.07
61 0.1
62 0.2
63 0.3
64 0.4
65 0.5
66 0.7
67 1
68 2
69 3
70 5
71 7
72
73 PERIODS (s)
74 PGA
75 0.05
76 0.1
77 0.15
78 0.2
79 0.25
80 0.3
81 0.4
82 0.5
83 0.6
84 0.7
85 0.85
86 1
87 1.2
88 1.5
89 2
90 3
91 4
92
93 DETERMINISTIC FRACTILES
94 0.5

```
95 0.8413
96 0.9772
97 Mean
98
99 PLOTTING PARAMETERS
100 Period at which to plot PGA: 0.01
101
102 CALCULATIONAL PARAMETERS
103 Fault Seismic Sources -
104 Maximum inclusion distance : 300 km
105 Down dip integration increment : 1 km
106 Horizontal integration increment : 1 km
107 Number rupture length per earthquake : 1
108 Subduction Interface Seismic Sources -
109 Maximum inclusion distance : 1000 km
110 Down dip integration increment : 5 km
111 Horizontal integration increment : 20 km
112 Number rupture length per earthquake : 1
113 Subduction Slab Seismic Sources -
114 Maximum inclusion distance : 300 km
115 Down dip integration increment : 5 km
116 Horizontal integration increment : 20 km
117 Number rupture length per earthquake : 1
118 Area Seismic Sources -
119 Maximum inclusion distance : 200 km
120 Vertical integration increment : 3 km
121 Number of rupture azimuths : 3
122 Minimum epicentral distance step : 0.5 km
123 Maximum epicentral distance step : 10 km
124 Gridded Seismic Sources -
125 Maximum inclusion distance : 300 km
126 Default number of rupture azimuths : 20
127 Maximum distance for default azimuths : 40 km
128 Minimum distance for one azimuth : 150
129 Use binned calculations if possible : true
130 Bins per decade in distance (km) : 20
131 All Seismic Sources -
132 Magnitude integration step : 0.1 M
133 Apply magnitude scaling : NO
134 Include near-source directivity : YES
135 Method : Somerville et al. (1997) + Abrahamson(2000)
136 Component : Average Factor
137 Hypocenter integration increment : 5 km
138
139 ATTENUATION EQUATIONS
140
141 Name: Abrahamson-et al (2014) NGA West 2 USGS 2014
```

142 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
143 Base: Abrahamson-et al 2014 NGA West 2
144 Truncation Type: USGS 2008 NSHM Truncation
145 Truncation Value: 3
146 Magnitude Scale: Moment Magnitude
147 Distance Type: Distance To Rupture
148
149 Name: Atkinson-Boore (2003) Cascadia Subduction USGS 2008
150 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
151 Base: Atkinson-Boore 2003-3
152 Truncation Type: USGS 2008 NSHM Truncation
153 Truncation Value: 3
154 Magnitude Scale: Moment Magnitude
155 Distance Type: Distance To Rupture
156
157 Name: Atkinson-Boore (2003) Worldwide Subduction USGS 2008
158 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
159 Base: Atkinson-Boore 2003-3
160 Truncation Type: USGS 2008 NSHM Truncation
161 Truncation Value: 3
162 Magnitude Scale: Moment Magnitude
163 Distance Type: Distance To Rupture
164
165 Name: Atkinson-Macias (2009) USGS 2014
166 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
167 Base: Atkinson-Macias 2009
168 Truncation Type: USGS 2008 NSHM Truncation
169 Truncation Value: 3
170 Magnitude Scale: Moment Magnitude
171 Distance Type: Distance To Rupture
172
173 Name: BCHydro (2012) USGS 2014
174 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
175 Base: BCHydro 2012
176 Truncation Type: USGS 2008 NSHM Truncation
177 Truncation Value: 3
178 Magnitude Scale: Moment Magnitude
179 Distance Type: Distance To Rupture
180
181 Name: Boore-et al (2014) NGA West 2 USGS 2014
182 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
183 Base: Boore-et al 2014 NGA West 2
184 Truncation Type: USGS 2008 NSHM Truncation
185 Truncation Value: 3
186 Magnitude Scale: Moment Magnitude
187 Distance Type: Horizontal Distance To Rupture
188

189 Name: Campbell-Bozorgnia (2014) NGA West 2 USGS 2014
 190 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
 191 Base: Campbell-Bozorgnia 2014 NGA West 2
 192 Truncation Type: USGS 2008 NSHM Truncation
 193 Truncation Value: 3
 194 Magnitude Scale: Moment Magnitude
 195 Distance Type: Distance To Rupture
 196
 197 Name: Chiou-Youngs (2014) NGA West 2 USGS 2014
 198 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
 199 Base: Chiou-Youngs 2014 NGA West 2
 200 Truncation Type: USGS 2008 NSHM Truncation
 201 Truncation Value: 3
 202 Magnitude Scale: Moment Magnitude
 203 Distance Type: Distance To Rupture
 204
 205 Name: Idriss (2014) NGA West 2 USGS 2014
 206 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
 207 Base: Idriss 2014 NGA West 2
 208 Truncation Type: USGS 2008 NSHM Truncation
 209 Truncation Value: 3
 210 Magnitude Scale: Moment Magnitude
 211 Distance Type: Distance To Rupture
 212
 213 Name: Zhao et al (2006) USGS 2008
 214 Database: C:\Program Files (x86)\EZ-FRISK 8.00\Files\standard.bin-attendb
 215 Base: Zhao et al 2006 Japan
 216 Truncation Type: Trunc Sigma*Value
 217 Truncation Value: 3
 218 Magnitude Scale: Moment Magnitude
 219 Distance Type: Distance To Rupture
 220

221 SEISMIC SOURCE SUMMARY TABLE

Source	Region	Closest Deterministic Fault			Dip Dips	
		Distance	Magnitude	Mechanism	Angle To	
224 Bartlett Springs	USGS 2008 California - 2014 Rates Excluded	149.88	7.3000	Strike Slip	90.0000	--
226 Blackwater	USGS 2008 California - 2014 Rates Excluded	501.32	7.1000	Strike Slip	90.0000	--
227 Brawley Gridded, Strike Slip	USGS 2008 California - 2014 Rates Excluded	732.39	6.5000	Strike Slip	90.0000	--
228 Burnt Mtn	USGS 2008 California - 2014 Rates Excluded	654.55	6.8000	Strike Slip	67.0000	W
229 Calaveras	USGS 2008 California - 2014 Rates Excluded	38.82	7.0250	Strike Slip	90.0000	--
230 Calico-Hidalgo	USGS 2008 California - 2014 Rates Excluded	565.92	7.4000	Strike Slip	90.0000	--
231 Chino	USGS 2008 California - 2014 Rates Excluded	570.94	6.8000	Strike Slip	50-65	SW
232 Cleghorn	USGS 2008 California - 2014 Rates Excluded	571.14	6.8000	Strike Slip	90.0000	--
233 Collayomi	USGS 2008 California - 2014 Rates Excluded	135.14	6.7000	Strike Slip	90.0000	--
234 Coronado Bank	USGS 2008 California - 2014 Rates Excluded	625.10	7.4000	Strike Slip	90.0000	--
235 Death Valley	USGS 2008 California - 2014 Rates Excluded	365.22	7.9000	Strike Slip	60-90	SW,W



ATTACHMENT **B**
EZ-FRISK - PSHA (1st 5 Pages)

1 Probabilistic Spectra results for EZ-FRISK 8.00 beta Build 000
 2
 3 ANNUAL FREQUENCY OF EXCEEDANCE: 4.041e-004
 4 RETURN PERIOD: 2474.9
 5 PROBABILITY OF EXCEEDENCE: 2.0% IN 50.0 YEARS
 6 Column 1: Spectral Period
 7 Column 2: Acceleration (g) for: Mean
 8 Column 3: Acceleration (g) for: Abrahamson-et al (2014) NGA West 2 USGS 2014
 9 Column 4: Acceleration (g) for: Boore-et al (2014) NGA West 2 USGS 2014
 10 Column 5: Acceleration (g) for: Campbell-Bozorgnia (2014) NGA West 2 USGS 2014
 11 Column 6: Acceleration (g) for: Chiou-Youngs (2014) NGA West 2 USGS 2014
 12 Column 7: Acceleration (g) for: Idriss (2014) NGA West 2 USGS 2014
 13 Column 8: Acceleration (g) for: Atkinson-Boore (2003) Cascadia Subduction USGS 2008
 14 Column 9: Acceleration (g) for: Atkinson-Boore (2003) Worldwide Subduction USGS 2008
 15 Column 10: Acceleration (g) for: Zhao et al (2006) USGS 2008
 16 Column 11: Acceleration (g) for: BCHydro (2012) USGS 2014
 17 Column 12: Acceleration (g) for: Atkinson-Macias (2009) USGS 2014
 18

19	1	2	3	4	5	6	7	8	9	10
20	PGA	1.057e+000	1.097e+000	9.646e-001	9.872e-001	1.005e+000	1.326e+000	2.933e-003	6.715e-002	4.361e-002
21	0.05	1.500e+000	1.315e+000	1.416e+000	1.724e+000	1.481e+000	1.568e+000	3.808e-003	6.924e-002	4.554e-002
22	0.1	2.244e+000	2.143e+000	2.158e+000	2.242e+000	2.329e+000	2.420e+000	4.707e-003	8.318e-002	6.550e-002
23	0.15	2.526e+000	2.780e+000	2.330e+000	2.285e+000	2.602e+000	2.677e+000	6.236e-003	9.853e-002	7.806e-002
24	0.2	2.431e+000	2.712e+000	2.211e+000	2.112e+000	2.604e+000	2.524e+000	7.650e-003	1.081e-001	7.902e-002
25	0.25	2.220e+000	2.350e+000	2.057e+000	1.909e+000	2.481e+000	2.278e+000	7.246e-003	1.222e-001	8.015e-002
26	0.3	2.023e+000	2.005e+000	1.899e+000	1.755e+000	2.333e+000	1.974e+000	6.941e-003	1.365e-001	8.250e-002
27	0.4	1.687e+000	1.461e+000	1.650e+000	1.568e+000	2.069e+000	1.592e+000	6.497e-003	1.663e-001	8.509e-002
28	0.5	1.460e+000	1.192e+000	1.472e+000	1.370e+000	1.799e+000	1.410e+000	5.488e-003	1.616e-001	9.091e-002
29	0.6	1.264e+000	1.027e+000	1.308e+000	1.227e+000	1.525e+000	1.131e+000	4.766e-003	1.580e-001	8.785e-002
30	0.7	1.130e+000	8.850e-001	1.190e+000	1.123e+000	1.341e+000	9.444e-001	4.155e-003	1.551e-001	8.501e-002
31	0.85	9.819e-001	7.409e-001	1.048e+000	1.016e+000	1.124e+000	7.724e-001	3.505e-003	1.517e-001	8.302e-002
32	1	8.482e-001	6.379e-001	9.235e-001	9.209e-001	9.631e-001	6.723e-001	3.048e-003	1.491e-001	7.904e-002
33	1.2	7.133e-001	5.252e-001	7.761e-001	7.958e-001	7.722e-001	5.577e-001	2.563e-003	1.362e-001	7.131e-002
34	1.5	5.712e-001	4.148e-001	6.317e-001	6.743e-001	5.937e-001	4.485e-001	2.093e-003	1.230e-001	5.891e-002
35	2	4.354e-001	3.166e-001	4.769e-001	5.305e-001	4.276e-001	3.536e-001	1.641e-003	1.090e-001	4.729e-002
36	3	3.205e-001	2.130e-001	3.546e-001	4.017e-001	2.618e-001	3.562e-001	8.925e-004	5.301e-002	3.018e-002
37	4	2.517e-001	1.705e-001	2.977e-001	3.077e-001	1.812e-001	2.999e-001	6.590e-004	3.755e-002	1.922e-002
38										
39										
40										



ATTACHMENT C
EZ-FRISK - DSHA (1st 5 Pages)

1 Deterministic Spectra Results using EZ-FRISK 8.00 beta Build 000

2
3 Largest Amplitudes of Ground Motions Considering All Sources Calculated using Weighted Mean of Attenuation Equations
4 Amplitude Units: Acceleration (g)

5
6 Fractile: 0.5

7	Period	Amplitude	Magnitude	Closest	Region	Controlling Source
8				Distance(km)		
9	PGA	5.020e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
10	0.05	6.907e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
11	0.1	9.688e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
12	0.15	1.098e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
13	0.2	1.061e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
14	0.25	9.711e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
15	0.3	8.710e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
16	0.4	7.448e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
17	0.5	6.468e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
18	0.6	5.533e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
19	0.7	5.041e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
20	0.85	4.471e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
21	1	4.042e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
22	1.2	3.537e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
23	1.5	3.011e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
24	2	2.447e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
25	3	1.980e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
26	4	1.685e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

27
28 Fractile: 0.8413

29	Period	Amplitude	Magnitude	Closest	Region	Controlling Source
30				Distance(km)		
31	PGA	9.148e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
32	0.05	1.289e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
33	0.1	1.854e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
34	0.15	2.109e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
35	0.2	2.029e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
36	0.25	1.854e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
37	0.3	1.671e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
38	0.4	1.440e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
39	0.5	1.266e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
40	0.6	1.095e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
41	0.7	1.002e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
42	0.85	8.918e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
43	1	8.068e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
44	1.2	7.043e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
45	1.5	5.969e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
46	2	4.810e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
47	3	3.859e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

48	4	3.225e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
49	Fractile: 0.9772					
50	Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
51	PGA	1.668e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
52	0.05	2.407e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
53	0.1	3.553e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
54	0.15	4.049e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
55	0.2	3.884e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
56	0.25	3.540e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
57	0.3	3.207e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
58	0.4	2.786e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
59	0.5	2.480e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
60	0.6	2.168e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
61	0.7	1.994e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
62	0.85	1.779e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
63	1	1.611e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
64	1.2	1.403e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
65	1.5	1.184e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
66	2	9.459e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
67	3	7.525e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
68	4	6.178e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
69	Fractile: Mean					
70	Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
71	PGA	6.013e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
72	0.05	8.394e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
73	0.1	1.197e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
74	0.15	1.359e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
75	0.2	1.309e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
76	0.25	1.197e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
77	0.3	1.077e+000	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
78	0.4	9.259e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
79	0.5	8.107e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
80	0.6	6.986e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
81	0.7	6.385e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
82	0.85	5.675e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
83	1	5.133e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
84	1.2	4.485e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
85	1.5	3.806e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
86	2	3.075e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
87	3	2.474e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
88	4	2.081e-001	8.05 Mw	4.07	USGS 2008 California - 2014 Rates Excluded	Northern San Andreas
89						
90						
91						
92						
93						
94						

95 Largest Amplitudes of Ground Motions Considering Sources Calculated with Abrahamson-et al (2014) NGA West 2 USGS 2014

96 Amplitude Units: Acceleration (g)

97

98 Fractile: 0.5

99	Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
100						
101	PGA	5.179e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
102	0.05	6.343e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
103	0.1	9.842e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
104	0.15	1.242e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
105	0.2	1.195e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
106	0.25	1.013e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
107	0.3	8.304e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
108	0.4	6.220e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
109	0.5	5.014e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
110	0.6	4.225e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
111	0.7	3.796e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
112	0.85	3.305e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
113	1	2.938e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
114	1.2	2.499e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
115	1.5	2.049e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
116	2	1.635e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
117	3	1.207e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
118	4	1.045e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

119

120 Fractile: 0.8413

121	Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
122						
123	PGA	9.746e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
124	0.05	1.179e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
125	0.1	1.848e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
126	0.15	2.417e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
127	0.2	2.335e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
128	0.25	1.988e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
129	0.3	1.643e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
130	0.4	1.241e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
131	0.5	1.009e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
132	0.6	8.553e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
133	0.7	7.687e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
134	0.85	6.706e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
135	1	5.973e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
136	1.2	5.074e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
137	1.5	4.151e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
138	2	3.311e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
139	3	2.393e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
140	4	2.036e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

141

142 Fractile: 0.9772

143	Period	Amplitude	Magnitude	Closest	Region	Controlling Source
144				Distance(km)		
145	PGA	1.834e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
146	0.05	2.191e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
147	0.1	3.471e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
148	0.15	4.702e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
149	0.2	4.562e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
150	0.25	3.901e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
151	0.3	3.251e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
152	0.4	2.477e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
153	0.5	2.031e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
154	0.6	1.732e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
155	0.7	1.557e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
156	0.85	1.361e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
157	1	1.214e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
158	1.2	1.030e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
159	1.5	8.405e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
160	2	6.704e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
161	3	4.742e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
162	4	3.965e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

163

164 Fractile: Mean

165	Period	Amplitude	Magnitude	Closest	Region	Controlling Source
166				Distance(km)		
167	PGA	6.325e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
168	0.05	7.687e-001	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
169	0.1	1.201e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
170	0.15	1.550e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
171	0.2	1.496e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
172	0.25	1.272e+000	7.00 Mw	5.00	USGS 2008 California - 2014	Rates Excluded California Gridded
173	0.3	1.048e+000	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
174	0.4	7.899e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
175	0.5	6.405e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
176	0.6	5.418e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
177	0.7	4.869e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
178	0.85	4.245e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
179	1	3.779e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
180	1.2	3.212e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
181	1.5	2.629e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
182	2	2.097e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
183	3	1.526e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas
184	4	1.306e-001	8.05 Mw	4.07	USGS 2008 California - 2014	Rates Excluded Northern San Andreas

185

186

187 Largest Amplitudes of Ground Motions Considering Sources Calculated with Boore-et al (2014) NGA West 2 USGS 2014

188 Amplitude Units: Acceleration (g)

189												
190	Fractile: 0.5											
191	Period	Amplitude	Magnitude	Closest	Region				Controlling Source			
192				Distance(km)								
193	PGA	4.599e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
194	0.05	6.480e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
195	0.1	9.461e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
196	0.15	1.105e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
197	0.2	1.097e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
198	0.25	1.019e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
199	0.3	9.525e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
200	0.4	8.091e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
201	0.5	7.097e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
202	0.6	6.230e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
203	0.7	5.795e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
204	0.85	5.213e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
205	1	4.739e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
206	1.2	4.234e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
207	1.5	3.689e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
208	2	2.986e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
209	3	2.459e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
210	4	2.205e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
211												
212	Fractile: 0.8413											
213	Period	Amplitude	Magnitude	Closest	Region				Controlling Source			
214				Distance(km)								
215	PGA	8.421e-001	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
216	0.05	1.281e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
217	0.1	1.922e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
218	0.15	2.142e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
219	0.2	2.041e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
220	0.25	1.871e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
221	0.3	1.746e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
222	0.4	1.499e+000	7.00 Mw	5.00	USGS	2008	California	-	2014	Rates	Excluded	California Gridded
223	0.5	1.345e+000	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
224	0.6	1.201e+000	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
225	0.7	1.127e+000	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
226	0.85	1.022e+000	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
227	1	9.322e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
228	1.2	8.294e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
229	1.5	7.179e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
230	2	5.792e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
231	3	4.748e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
232	4	4.219e-001	8.05 Mw	4.07	USGS	2008	California	-	2014	Rates	Excluded	Northern San Andreas
233												
234	Fractile: 0.9772											
235	Period	Amplitude	Magnitude	Closest	Region				Controlling Source			



ATTACHMENT **D**
SHAKE - Site Response Model

TOPGOLF BURLINGAME | REDEVELOPMENT PROJ. | SHAKE 2014 Model

Geo-Logic
ASSOCIATES

Input is in blue, calculated values show in red, and descriptive labels are in green.

Layer (-)	Description (-)	Thickness (ft)	Depth (ft)	V_s [ft/s]	V_s (m/s)	γ (lb/ft ³)	γ (kN/m ³)	Curves (-)	Initial Damping (-)	Displacement Curve
1	Cover	8.0	-4.0	975.0	297.2	120.0	18.8	PI = 50	0.05	
2	MSW	9.0	-12.5	975.0	297.2	95.0	14.9	M & K (1998)	0.05	
3	MSW	7.0	-20.5	975.0	297.2	95.0	14.9	M & K (1998)	0.05	
4	MSW	7.0	-27.5	975.0	297.2	95.0	14.9	M & K (1998)	0.05	
5	MSW	7.0	-34.5	975.0	297.2	95.0	14.9	M & K (1998)	0.05	
6	MSW	7.0	-41.5	932.5	284.2	95.0	14.9	M & K (1998)	0.05	
7	MSW	7.0	-48.5	890.0	271.3	95.0	14.9	M & K (1998)	0.05	
8	MSW	7.0	-55.5	847.5	258.3	95.0	14.9	M & K (1998)	0.05	
9	BM, All, MS	9.0	-63.5	805.0	245.4	100.6	15.8	PI = 50	0.05	
10	BM, All, MS	9.0	-72.5	762.5	232.4	100.6	15.8	PI = 50	0.05	
11	BM, All, MS	9.0	-81.5	720.0	219.5	100.6	15.8	PI = 50	0.05	
12	BM, All, MS	9.0	-90.5	711.2	216.8	113.3	17.8	PI = 50	0.05	
13	BM, All, MS	9.0	-99.5	720.0	219.5	113.3	17.8	PI = 50	0.05	
14	BM, All, MS	10.0	-109.0	744.0	226.8	113.3	17.8	PI = 50	0.05	
15	BM, All, MS	10.0	-119.0	778.0	237.1	113.3	17.8	PI = 50	0.05	
16	BM, All, MS	10.0	-129.0	811.8	247.4	113.3	17.8	PI = 50	0.05	
17	BM, All, MS	10.0	-139.0	843.3	257.0	113.3	17.8	PI = 50	0.05	
18	BM, All, MS	10.0	-149.0	873.5	266.2	113.3	17.8	PI = 50	0.05	
19	BM, All, MS	10.0	-159.0	902.5	275.1	113.3	17.8	PI = 50	0.05	
20	BM, All, MS	10.0	-169.0	930.5	283.6	113.3	17.8	PI = 50	0.05	
21	BM, All, MS	10.0	-179.0	957.6	291.9	113.3	17.8	PI = 50	0.05	
22	BM, All, MS	10.0	-189.0	983.8	299.9	113.3	17.8	PI = 50	0.05	
23	BM, All, MS	10.0	-199.0	1009.2	307.6	113.3	17.8	PI = 50	0.05	
24	BM, All, MS	10.0	-209.0	1033.9	315.1	113.3	17.8	PI = 50	0.05	
25	BM, All, MS	10.0	-219.0	1058.0	322.5	113.3	17.8	PI = 50	0.05	
26	BM, All, MS	10.0	-229.0	1081.0	329.5	113.3	17.8	PI = 50	0.05	
27	BM, All, MS	9.0	-238.5	1104.0	336.5	113.3	17.8	PI = 50	0.05	
28	Bedrock			2500.0	762.0	135.0	21.2	Shibuya (1990)	0.1	

H (ft) = 243.0 $(V_s)_{avg}$ (ft/s) = 902.77 T (s) = 1.077 M_{max} = 8.05 n (-) = 0.705 c (%) = 0.05

