Aspen 1-New Brighton

Project# P09-038/M09-032

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Draft Environmental Impact Report

Volume III

Appendices K-O

PREPARED FOR THE
CITY OF SACRAMENTO

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APPENDIX K

NICHOLS CONSULTING ENGINEERS, Chtd.
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February 2, 2011

NCE Job #A419.03.35

Mr. Michael G. Isle
Stonebridge Properties, LLC
3600 American River Drive, Suite 160
Sacramento, California 95864-5805

Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Dear Mr. Isle:

Nichols Consulting Engineers, Chtd. (NCE) is pleased to submit the attached *Environmental Data Evaluation Report* for the above referenced site. If you have any questions, please do not hesitate to call.

Yours very truly,

NICHOLS CONSULTING ENGINEERS, Chtd.

Michael J. Leacox, C.E.G.
Principal

Enclosure

cc: Katharine Wagner, Downey Brand

NICHOLS CONSULTING ENGINEERS, Chtd.
Engineering and Environmental Services

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Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Prepared for

Stonebridge Properties, LLC
3600 American River Drive, Suite 160
Sacramento, California 95864-5805

NCE Project No. A419.03.35

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February 2, 2011

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EXECUTIVE SUMMARY

Nichols Consulting Engineers, Chtd. (NCE) conducted a review of existing and recently collected environmental data for the Aspen 1 Property (herein referred to as the Site) located in the City of Sacramento, Sacramento County, California (Plates 1 and 2). The Site was historically used for aggregate mining. In addition, a portion of the Site was the location of a former nursery (herein referred to as the Matsuda property). The purpose of this evaluation was to assess the potential for on-site and off-site constituents in the different media (i.e., soil, groundwater, and soil vapor) located on-site, and on the properties adjacent to it (i.e., the F-P and L and D Landfills), to impact conditions at the Site in light of Stonebridge's re-use plans for the Site. Stonebridge's near future plans include residential, mixed use, commercial, recreational and urban farm re-use. The evaluation included reviews of environmental regulatory agency records and available environmental reports related to the Site and adjacent properties, and interviews with knowledgeable personnel familiar with the historical activities conducted at the Site.

Based on a review of the historical activities conducted at the Site with Teichert Aggregates (Teichert) personnel familiar with these activities, the following on-site areas were targeted for additional data collection activities:

- Agricultural chemical storage building on the Matsuda property. A portion of the property was used to store and handle agricultural chemicals and it appeared prudent to assess the potential for impacts in the vicinity of the storage building.

- Area of the Site that is currently farmed. These soils are intended to be stripped and re-used for top soil possibly at the Urban Farm and a park. This area was identified to evaluate the possible presence of agricultural chemicals from the historical and current farming practice.

- Silt drying beds. This area was identified to evaluate the potential for enrichment of heavy metals in the dried silts.

- On-site ponds. This area was identified to evaluate the possible accumulation of agricultural chemicals and metals in sediments in the on-site ponds. These ponds have received drainage from the Matsuda property and other areas of the Site.

- Background arsenic evaluation. Additional arsenic data was needed to conduct a background assessment of the arsenic previously detected[1] in soil samples collected during a previous investigation at the Matsuda property.

A follow-on field investigation to collect the additional data was conducted by NCE between March and July 2010. Based on the results of that investigation, and the previous investigation conducted at the Matsuda property in June 2003, the identified Site-related constituents do not appear to represent a significant threat to re-use of the Site. Arsenic is the only Site-related constituent present in on-site soil that exceeds regulatory screening levels. This phenomenon commonly occurs in California. However, the arsenic present at the Site appears to be from naturally occurring sources instead of anthropogenic contributions or a Site-specific release based on the following:

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[1] Detected means that the analyte concentration exceeded the laboratory reporting limit.

- Background concentrations of arsenic in California soils typically exceed risk-based screening levels.
- Detected and non-detected concentrations of chlorinated herbicides and pesticides did not correlate with the detected concentrations of arsenic.
- The occurrence and concentrations of arsenic in the soil at the Site are similar, randomly distributed, and within the range of published sources of information on background concentrations found in California soils from mostly agricultural fields distant from known sources of contamination throughout the state, including cropland soils in seven vegetable producing regions, and background concentrations for arsenic in soil at two nearby properties that have the same lithology as that found on-site.

The adjoining property to the west, the F-P Landfill, does not appear to represent a significant threat to re-use of the Site. Low levels of trichloroflouromethane (TCFM), also known as Freon 11, are present in groundwater beneath the F-P Landfill and the Site. However, the TCFM appears to be localized at the F-P Landfill in the vicinity of monitoring wells MW-D and MW-F, and at the Site in the vicinity of monitoring well MW-2, located immediately adjacent to and east of the F-P Landfill. The reported concentrations do not exceed the applicable United States Environmental Protection Agency (EPA) Region 9 Regional Screening Levels (RSLs). During the most recent sampling events conducted at the F-P Landfill in May and November 2009, TCFM was detected in groundwater samples from well MW-D (located in the center of the F-P Landfill) at concentrations of 3.9 and 4.42 micrograms per liter (µg/L), respectively. TCFM was detected in samples from well MW-F (located in the southeast corner of the F-P Landfill) during those same events at concentrations of 4.7 and 9.92 µg/L, respectively. Between December 2004 and May 2010, the most recent sampling events conducted at the Site, TCFM was detected in samples collected from well MW-2 (located on the Site), at concentrations ranging from 0.57 to 2.7 µg/L. Each of these concentrations is more than three orders of magnitude less than the RSL for tap water of 1,300 µg/L. According to the California Department of Toxic Substances Control (DTSC) Office of Human and Ecological Risk (HERO), the tap water RSLs are based on assumed residential exposure to water via ingestion from drinking and inhalation of volatile chemicals generated during household use (e.g. showering, dish washing) (DTSC, 2009).

Based on the presence of a volatile compound in groundwater beneath the Site, the potential for the compound to pose a vapor intrusion risk was evaluated. Based on the evaluation, volatilization of the TCFM detected in groundwater at the F-P Landfill and the Site does not appear to be a concern. This conclusion is based on a comparison of the most recent groundwater and soil vapor data collected at the Site and the F-P Landfill, respectively, to screening levels generated using the Johnson-Ettinger vapor intrusion screening level model. This is a conservative computer spreadsheet model found on the EPA online database. The model output provided screening values for concentrations of TCFM in groundwater and soil gas, respectively. Comparison of those estimated screening values resulted in the following:

- TCFM was detected in a groundwater sample collected from on-site monitoring well MW-2 during the most recent monitoring event at the Site (conducted in May 2010) at a concentration of 1.2 µg/L. This sample concentration is two orders of magnitude less than the “more protective” groundwater TCFM screening level identified by the Johnson Ettinger vapor intrusion screening level model for potential vapor intrusion concerns of 692.5 µg/L.

- TCFM was detected in a soil vapor sample collected in November 2009 from soil vapor monitoring well GP-2D (located in the southeast portion of the F-P Landfill) at a concentration of 9,900 micrograms per meter cubed (µg/m^3), less than the “more protective” TCFM screening soil gas screening level identified by the Johnson Ettinger vapor intrusion screening level model of 1,388,000 µg/m^3.

The adjoining property to the south, the L and D Landfill, also does not appear to represent a significant threat to re-use of the Site. Historically, volatile organic compounds (VOCs) have been detected in groundwater and landfill gas (LFG) in the southern portion, or LF-1 section of the landfill. During the most recent groundwater and LFG monitoring events (conducted in 2009), VOCs were not detected in groundwater and LFG monitoring points located adjacent to the Site, suggesting a low potential for impacts to the Site itself. Another potential source of VOCs could be from migration of LFG in the vadose zone (unsaturated zone located above the water table) from the landfill to the Site. However, L and D Landfill's environmental consultant (i.e., SCS Engineers) concluded in its recent technical report (i.e., *Second Semi-Annual 2009 Monitoring Report, LFG Migration Control System, L and D Landfill, Sacramento, California*) that the LFG extraction system is controlling LFG migration. Based on this conclusion, it appears unlikely that VOCs present in landfill gas at the L and D Landfill will impact the Site.

In addition to reviewing the existing and recently collected environmental data for the Site, NCE also conducted an assessment of several potential on- and/or off-site environmental concerns (i.e., natural and manmade hazardous materials), including (1) potential asbestos-containing material (ACM), (2) naturally occurring asbestos (NOA) in Site soils, (3) the presence of current or former oil and gas fields, and (4) potential for exposure to electric and magnetic fields (EMF) from on-site and nearby overhead electric distribution and transmission lines. The findings of the assessment indicated the following:

- On January 27, 2011, NCE looked at the existing onsite building located on the Matsuda property for potential asbestos containing materials (ACM). The building was observed to be made out of steel and aluminum only. No other building materials were visible.
- Review of published geologic documents did not identify the presence of NOA within the Site vicinity.
- No current or former oil and gas fields (i.e., oil and gas, dry gas production, water source production, gas storage [production and injection], liquefied gas [production and injection], or geothermal wells were identified within an approximate one-mile radius of the Site during a review of the the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) Online Mapping System (http://maps.conservation.ca.gov/doms/doms-app.html).

- According to Ms. Del Rio with the SMUD Real Estate Department during a phone conversation with NCE on January 26, 2011, the Sacramento Municipal Utility District (SMUD) and the Western Area Power Administration (WAPA), an agency of the United States Department of Energy (DOE), maintain right-of-ways for their transmission lines to ensure adequate building setback requirements with the intent to avoid concerns related to possible health and safety aspects relating to overhead transmission lines. Maintaining setback requirements and the current easements/corridors should be adhered to as part of any planned re-use of the Site.

- In addition, to the building setback restrictions related to the utility easements, the California Code of Regulations, Title 5, Section 14010(c) and the California Department of Education Minimum Site Criteria document provided by the Elk Grove Unified School District (Attachment K), the California Department of Education established in consultation with the California Department of Health Services (DHS) the following limits for locating any part of a school site property line near the edge of utility easements/corridors for high voltage power transmission lines:

- 100 feet from the edge of an easement for an existing or planned 50 to 133 kV line;
- 150-feet from the edge of an easement for an existing or planned 220 to 230 kV line; and
- 350-feet from the edge of an easement for an existing or planned 500 to 550 kV line.

1.0 INTRODUCTION

This report presents a review of existing and recently collected environmental data for the Aspen 1 Property (herein referred to as the Site) located in the City of Sacramento, Sacramento County, California (Plates 1 and 2). The Site was historically used for aggregate mining and the location of a former nursery. The purpose of this evaluation was to assess the potential for on-site and off-site constituents in the different media (i.e., soil, groundwater, and soil vapor) located on the Site, and on the properties adjacent to it (i.e., the F-P and L and D Landfills), to impact conditions at the Site in light of Stonebridge's re-use plans for the Site. Stonebridge's near future plans include residential, mixed use, commercial, recreational, and urban farm re-use. The evaluation included reviews of environmental regulatory agency records and available environmental reports related to the Site and adjoining properties, and interviews with knowledgeable personnel familiar with the historical activities conducted at the Site.

Section 2 of this report includes a general description of the Site, the area geology and hydrogeology, and a summary of previous environmental investigations and activities performed to date at the Site. Section 3 presents a description of the field activities and the results of the follow-on field investigation conducted by NCE. Section 4 presents a data evaluation and comparison of Site-related constituents in soil to applicable regulatory screening levels and describes their potential to impact conditions at the Site. Section 5 describes the environmental conditions on the adjacent properties to the Site, based on previous environmental investigations and activities performed to date at those sites, and the potential for non-Site related constituents related to those properties to impact conditions beneath the Site. Section 6 discusses other potential on- and/or off-site environmental concerns (i.e., natural and manmade hazardous materials) including (1) potential asbestos-containing material (ACM), (2) naturally occurring asbestos (NOA) in Site soils, (3) the presence of current or former oil and gas fields, and (4) exposure to electric and magnetic fields (EMF) from on-site and nearby overhead electric distribution and transmission lines. Section 7 presents the conclusions regarding the subsurface conditions based on the findings of this environmental data evaluation.

2.0 SITE DESCRIPTION AND BACKGROUND

This section provides a description of the Site and surrounding land use, an overview of the area geology and hydrogeology, and relevant historical information regarding the Site and results of prior environmental investigations conducted by others at the Site.

2.1 Site Description and Surrounding Land Use

The Site is located south of Jackson Road (also known and herein referred to as State Route 16 [SR 16]) and west of South Watt Avenue, within the City of Sacramento, Sacramento County, California (Plates 1 and 2). It is comprised of all or portions of 17 parcels totaling approximately 232-acres in areal extent. The Site is located in a suburban area characterized by extensive commercial and residential development. A brief description of the current land use on nearby parcels is provided below.

- The Site's northern boundary is defined by SR 16. Across SR 16 are previously mined (aggregate) vacant land and an active aggregate mining operation (Perkins Plant) to the north and a large residential development to the northeast.

- The Site's eastern boundary is defined by South Watt Avenue. Across this north-south arterial road is previously mined (aggregate) vacant land.

- Immediately south is the L and D Landfill (Class III Solid Waste Facility).

- Situated to the west, from north to south, respectively, are the former Florin-Perkins Landfill (herein referred to as F-P Landfill) (Class III Solid Waste Facility), which is now operating as a material recovery/large volume transfer station, and an industrial park.

Due to changes during mining and subsequent backfill operations, the topography at the Site varies from information obtained from previously published maps (e.g., 1992 United States Geological Society [USGS] topographic map). According to Wallace Kuhl & Associates, Inc. in its report entitled, *Preliminary Geotechnical Engineering Report, ASPEN 1 PROJECT*, dated September 2, 2009, the ground surface at the Site ranges from about 12-feet above mean sea level (msl) to 50-feet above msl.

The majority of the Site was historically utilized for aggregate mining. In addition, a former nursery (Matsuda Nursery) operated from as early as 1981 until 2007 on land owned by Teichert Aggregates (Teichert). This land was located in the northeast corner of the Site.

The Site currently supports silt drying beds that are used to collect fine grained material washed from Teichert's gravel mining and aggregate operations. These beds are also used to dry and compact the fine materials for use as in-place fill material. Current Site uses also include agriculture farming operations that are occurring on the northwest portion of the Site.

2.2 Geology and Hydrogeology

Geology

The Site lies within the Sacramento Valley, a large, relatively flat, elongated, north-northwest-trending, asymmetric trough, bounded to the east by the Sierra Nevada mountain range and the west by the Northern Coast Ranges. Predominant physiographic features of the valley include the river channels and floodplains of the southward-flowing Sacramento River and the westward-flowing American River.

Exposed in the areas of the Site that have not been disturbed by mining operations are Pleistocene-age unconsolidated alluvial deposits of the Riverbank Formation. These consist of a wide range of silty to sandy fine- and coarse-grained gravels, gravelly sand and silt, and minor fine-grained sediments. Within the Sacramento area, the Riverbank Formation is a heterogeneous assemblage of buried stream-channel and flood deposits comprised of interbedded clays, silts, sands, and gravels. Sediments within this sequence may contain both localized and extensive hard pan horizons (California Department of Water Resources [DWR], 1978).

Underlying the Riverbank Formation is reportedly the Laguna Formation, an older sequence of Pliocene-age sediments similar in composition to the overlying Riverbank Formation. Sediment of the Laguna Formation is comprised of consolidated silts and arkosic sands, which grade into coarser-grained sands and gravels at depth (DWR, 1978). To the west, the Laguna Formation grades laterally into the Tehama Formation along the axis of the valley. The maximum thickness of the Laguna Formation is approximately 400-feet; this formation is reportedly underlain by the Mehrten Formation of lower Pliocene to upper Miocene age.

Based on explorations by NCE and subsurface data obtained from previous investigations (i.e., LFR Levine Fricke [LFR, 2003] and Wallace Kuhl & Associates, Inc., 2006), the Site vicinity is underlain by fill to depths ranging from 28-feet to 35-feet below ground surface (bgs) in some areas of the Site that were reclaimed following mining activities. These soils typically consist of sandy clays and clayey sands with thin discontinuous layers of silty sands encountered at various depths. Underlying the fill is native undisturbed soil that generally consists of silty sands to 40-feet bgs, the total depth explored. Perched groundwater was not encountered to 40-feet bgs during the investigations.

Hydrogeology

The Site is located within the Sacramento River Hydrologic Basin as defined by the DWR (1978). Groundwater of usable quality occurs in the Pliocene- to Pleistocene-age unconsolidated sediments of the Riverbank, and coarse-grained sections of the Laguna and Mehrten Formations. Some production wells do withdraw water from the floodplain deposits; however, these wells typically produce from the deeper coarser-grained units below. Aquifer units comprising the shallow coarser grained sediments of Pleistocene to Recent age are generally unconfined or locally confined. At depth, in older Pleistocene to Pliocene material, aquifer units are typically confined beneath impermeable clays and volcanic mudflows. The underlying Eocene marine sediments are impermeable or contain saline or brackish water and are not used for groundwater production (DWR, 1978).

Groundwater in the Site vicinity is reported to occur at approximately 75-feet bgs, according to published regional groundwater maps (County of Sacramento, 2003). However, based on historical groundwater table measurements of three on-site groundwater monitoring wells, MW-1 through MW-3, owned by Teichert, located along the southwest Site boundary (Plate 3), unconfined groundwater is encountered in the immediate vicinity of the Site at an average depth of about 50- to 60-feet bgs. Groundwater elevations measured in wells MW-1 through MW-3 have ranged from -17.73-feet below msl (in well MW-1 in June 2006) to -25.47-feet below msl (in well MW-3 in October 2005) (Table 1). The groundwater flow direction in the Site vicinity is generally to the south-southwest.

Surface Waters

The closest major surface water body is the American River located about two miles northwest of the Site. It flows in a southwesterly direction in the vicinity of the Site and eventually discharges into the Sacramento River.

Surface water and storm water drainage for the Site is all internal. Shallow, man-made ponds created by historical mining activity are located in the northwest and northeast portions of the Site and receive significant portions of the internal drainage, including surface water and storm water runoff from the Matsuda property and other portions of the Site.

According to the Environmental Data Resources, Inc. (EDR), Radius Map Report (EDR, 2007), the Site is located within the 500-year flood zone, but not in the 100-year flood zone. A 100-year flood zone is located about one-eighth of a mile north of the Site along the American River.

2.3 Site History and Previous Investigations

Based on a review of historical photographs, prior to 1952, at the earliest, the Site was utilized for cultivation of row crops. From as early as 1961 to the mid to late 1970s aggregate mining appeared to have occurred at the Site. During and following mining activities, the Site was reclaimed with fill materials to current grade. The Northeast corner of the Site became a plant nursery (i.e., Matsuda Nursery) as early as 1981 and operated until 2007.

In 1992, a 4,000-gallon diesel underground storage tank (UST) was removed from the Matsuda property under oversight by the Sacramento County Environmental Management Department (SCEMD) (Plate 3). In 1993, the SCEMD issued a “No further action letter” for the UST, based on the laboratory analytical results of soil samples collected during UST removal.

As part of a general environmental stewardship conducted by Teichert, in June 2002, LFR (2003) conducted a visual survey of the Matsuda property for potential environmental concerns. LFR identified the potential for the internal draining of surface-water discharge of nursery related constituents (fertilizers and agricultural compounds) to be discharged into the existing ponds located in the northwest portion of the Site.

In December 2002, based on the findings of the June 2002 visual survey, LFR collected storm water samples at the Site to evaluate the storm water run-off quality. Laboratory analyses of those samples revealed heptachlor and nitrate at concentrations of 0.26 and 32 micrograms per liter (µg/L), respectively. Based on these findings, Teichert requested that the Matsuda Nursery implement changes to their operation methods and institute and modify their best management practices to minimize the presence of these constituents in their stormwater and surface water run-off to the ponds.

As part of the environmental stewardship, further assessment of the Matsuda property was conducted in June 2003. The additional investigation included:

- Installation of six borings across the Site (B-1 through B-6) (Plate 3) to evaluate potential impacts to the subsurface soils from pesticide and fertilizer use on the Site. Three soil samples for laboratory analysis were collected from each boring. One sample was collected at ground surface and the other two samples were collected at depths of 3- and 6-feet bgs. Only the samples collected from the ground surface were analyzed. The additional deeper samples were retained for possible analyses depending upon the findings from the ground surface samples; no analyses were ultimately conducted on these samples.

- Installation of one boring (B-7) (Plate 3) in the vicinity of the former location of the diesel UST and associated fuel dispenser to further assess potential impacts associated with the former UST system. This boring was advanced to 20-feet bgs and sampled at 5-foot intervals. Only the soil sample collected at 15-feet bgs was analyzed. The additional samples were retained for possible analyses depending upon the findings from the 15-foot sample.

- Collection of one groundwater sample from the agricultural water supply well located in the central portion of the Matsuda property to evaluate groundwater quality.

The shallow 0.5-foot soil samples from borings B-1 through B-6 were analyzed for metals, chlorinated herbicides, organochlorine pesticides (OCPs), and organophosphorous pesticides (OPPs); the 15-foot sample from boring B-7 was analyzed for diesel-range petroleum hydrocarbons (DRPH) and volatile organic compounds (VOCs); and the groundwater sample was analyzed for general minerals (alkalinity, total dissolved solids [TDS], pH, conductivity, nitrate, and chloride), VOCs, and metals.

The laboratory analyses conducted for the LFR investigation indicated the following (Table 2):

- Chlorinated pesticides and herbicides were not detected[2] in the surface soil samples collected from borings B-1 through B-6.

- Nitrate-nitrogen was detected in the surface soil samples collected from borings B-1, B-5, and B-6, but at concentrations within the normal range of nitrate in agricultural land (LFR, 2003).

- Total metal concentrations in surface soils did not exceed their corresponding United States Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals (PRGs).

- DRPH and VOCs were not detected in the 15-foot soil sample collected from boring B-7.

- Constituents were either not detected or did not exceed their primary or secondary maximum contaminant levels (MCLs), or PRGs for tap water in the groundwater sample collected from the water supply well. Although arsenic and thallium were not detected, the laboratory reporting limits for arsenic and thallium were greater than the corresponding PRGs for tap water. LFR suggested that the water in the supply well may be suitable as a source for drinking water.

Table 2 lists the constituents detected in soil samples collected at the Site during the LFR investigation, along with the analytical methods and laboratory at which the analyses were conducted. LFR's 2003 report entitled *Subsurface Sampling Results, Matsuda Nursery Property, 8888 Jackson Road, Sacramento, California,* is included in Appendix A.

As part of the intended re-use of the Aspen 1 Project area, NCE reviewed historical activities that occurred at the Site with Teichert personnel familiar with these activities. The purpose of the

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[2] Detected means that the analyte concentration exceeded the laboratory reporting limit.

review was to identify historical Site uses that had a potential to result in impacts to the re-use of the Site. Based on that review, the following on-site areas were targeted for additional data collection activities:

- Agricultural chemical storage building on the Matsuda property. A portion of the property was used to store and handle agricultural chemicals and it appeared prudent to assess the potential for impacts in the vicinity of the storage building.
- Area of the Site that is currently farmed. These soils are intended to be stripped and re-used for top soil possibly at the Urban Farm and a park. This area was identified to evaluate the possible presence of agricultural chemicals from the historical and current farming practice.
- Silt drying beds. This area was identified to evaluate the potential for enrichment of heavy metals in the dried silts.
- On-site ponds. This area was identified to evaluate the possible accumulation of agricultural chemicals and metals within the sediments in the on-site ponds that have received drainage from Matsuda and other areas of the Site.
- Presence of arsenic reported in the soil samples at the Matsuda property, as identified in the LFR investigation. While the concentrations were below the PRGs, they exceeded the screening levels for residential and commercial land uses listed in the California Environmental Protection Agency's (Cal/EPA) California Human Health Screening Levels (CHHSLs). The CHHSL Guidance document (Cal/EPA, 2005) acknowledges that arsenic is a naturally occurring metal and that naturally occurring concentrations commonly exceed their screening levels. It further acknowledges that if reported concentrations represent background conditions, then they do not require any additional regulatory consideration.

Furthermore, the proposed development project includes substantial changes in the current grades of the Site. The proposed grade changes include the continued accumulation of silt in the silt drying beds from the aggregate operations, the relocation and movement of existing on-site soils to bring current grades to lower elevations, and the import of soil from a nearby source that has yet to be identified. The result is that some existing grades will be buried and some soils currently buried will be exposed. At the proposed Urban Farm area, the plan is to strip the existing top soil prior to re-grading of this area (currently anticipated to have 10- to 15-feet of cut), stockpile the top soil, and place it back onto the area slated for the Urban Farm. It is anticipated that the replaced top soil will be approximately four-feet thick. These current surface soils were selected to be tested as they represent soils that will be at the surface at the completion of the project.

Accordingly, a follow-on field investigation was developed that included sampling and testing of soils in the vicinity of the storage building on the Matsuda property, soil within the current agricultural areas, silts within the silt drying beds for metals, and sediments within the existing ponds. The sampling locations were in part selected to support the conceptual re-use plan as shown on Wood Rodgers land use map entitled *SPD-PUD Schematic Plan, Aspen 1 – New Brighton* (Appendix B), which includes multi-family residential, residential mixed use, commercial, school, urban farm, open space, and recreational land uses (i.e., park).

3.0 FOLLOW-ON FIELD INVESTIGATION

The follow-on field investigation was conducted between March and July 2010 and is described in the following sections.

3.1 Field Activities

Field activities by NCE were completed on April 23 and May 5, 2010. A total of 12 shallow borings were installed and soil samples were collected from the borings for laboratory analysis to characterize soil conditions at select locations at the Site. In addition, three sediment samples were collected from within the existing ponds for laboratory analysis to characterize the sediments within the ponds. The locations of both the soil and sediment samples are shown on Plate 3:

- Shallow samples were collected from borings NCE-1, NCE-2, NCE-3, and NCE-4 (Plate 3) completed in the vicinity of the storage and mixing area of the Matsuda Nursery (located in the northeast portion of the Site) to evaluate the potential impacts from the storage and handling of the agricultural chemicals placed in that area.

- Shallow samples were collected from borings NCE-5, NCE-6, NCE-7, NCE-8, NCE-9, NCE-10, NCE-11, and NCE-12 completed in the vicinity of the Urban Farm Areas (located in the southwest portion of the Site) to evaluate the potential for agricultural chemicals and elevated metals to be present in the soils that will be stripped and used within the Urban Farm.

- Shallow sediment samples were collected at locations NCE-13, NCE-14, and NCE-15, which are within the existing ponds (located in the northwest portion of the Site), to assess the potential presence of agricultural chemicals and elevated metals in the pond sediments that may have been transported by storm water from the Matsuda Property and other portions of the Site.

Discrete soil samples from borings NCE-1 through NCE-12 were obtained from soil cores, collected at five-foot intervals, in a disposable acetate liner using direct-push sampling methods and geoprobe drilling provided by WDC Exploration & Wells of Woodland, California. Discrete sediment samples were collected from locations NCE-13 through NCE-15 using a sediment sampler.

The soil samples from borings NCE-1 through NCE-4 were collected at depths of about 0.5, 2.0, and 5.0 feet bgs, respectively. Samples from borings NCE-5 through NCE-12 were collected at depths of about 0.5 and 1.0 feet bgs, respectively. Sediment samples at locations NCE-13 through NCE-15 were collected at about 0.5 feet below the sediment.

Soils encountered during sampling activities were classified by a NCE geologist in accordance with the Unified Soil Classification System (USCS) (American Society for Testing and Materials [ASTM] D2488). Appendix C contains the boring logs for borings NCE-1 through NCE-4.

The soil samples were submitted to Southern Petroleum Laboratories, Inc. (SPL) located in Houston, Texas, for analysis under standard sample preservation and chain-of-custody procedures. The shallow 0.5-foot soil samples were analyzed for the following:

- California Assessment Method (CAM) 17 Metals by EPA Method 6020A (Method SW7471A for mercury);

- Chlorinated herbicides by EPA Method 8151A;
- OCPs by EPA Method 8081A; and
- OPPs by EPA Method 8141A.

The additional deeper samples were retained for possible analyses depending upon the findings from the 0.5-foot samples.

All equipment that came in contact with soil was cleaned with phosphate free detergent and rinsed with deionized water between sample collection and borings. After the soil sample collection was complete, the borings were abandoned by backfilling with a cement/bentonite grout in accordance with the California Well Standards, Bulletin 74-90 (DWR, June 1991).

In addition to NCE's field activities described above, Teichert collected silt samples from the silt drying beds on March 5 and July 16, 2010 (Plate 3). The two samples collected in March were identified as Perkins Rock Pond – Silt (Aspen 2 – Bed 2) and Prewash Pond – Silt (Aspen 4 – Bed 2). The two samples collected in July were identified as Rock Plt. Pond Aspen 1-F and Prewash Pond Aspen 4-A. All of the samples were submitted to California Laboratory Services located in Rancho Cordova, California, for analysis of CAM 17 Metals under standard sample preservation and chain-of-custody procedures.

3.2 Results

This section presents the findings of the follow-on field investigation activities. Results include a description of the soil conditions and a summary of analytical results for soil samples collected at the Site on March 5, April 23, and May 5, and July 16, 2010. Analytical results were compared to the following screening levels for both unrestricted/residential and commercial/industrial land uses:

- California EPA California Human Health Screening Levels (CHHSLs);
- EPA Region 9 Regional Screening Levels (RSLs); and
- California Regional Water Quality Control Board (CRWQCB), San Francisco Bay Area Environmental Screening Levels (ESLs).

The results of the soil analyses of the detected constituents are tabulated in Table 2. Analytical reports and chain-of-custody documents are provided in Appendix D.

Soils Encountered

Soil observed in borings NCE-1 through NCE-4 consisted of moist, low plasticity, reddish-brown silt from ground surface to the total depth explored of five-feet bgs. Appendix C contains the boring logs for borings NCE-1 through NCE-4.

Analytical Results

Matsuda Nursery

A total of four soil samples (NCE-1 through NCE-4) were analyzed by the laboratory. The results are summarized as follows:

- Antimony, cadmium, mercury, selenium, silver, and thallium were not detected in any of the samples analyzed.
- Barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc were detected at all four sample locations. Beryllium and molybdenum were detected at two or more sample locations. However, all of the detected concentrations were detected at similar concentrations and were significantly less than their associated regulatory screening levels.
- Arsenic was detected at all of the sample locations at concentrations ranging from 3.55 milligrams per kilogram (mg/kg) (NCE-3) to 4.49 mg/kg (NCE-4). These detected concentrations exceeded the corresponding CHHSL, RSL, and ESL for both the unrestricted/residential and commercial/industrial land uses.
- Chlorinated herbicides were mostly non-detected except low concentrations of 2-methyl-r-chlorophenoxyacetic acid (MCPA) at sample location NCE-1 and 2-(2-methyl-r-chlorophenoxy) propionic acid (MCPP) at sample location NCE-2. The detected MCPA concentration was 1.8 mg/kg. The detected MCPP concentration was 1.6 mg/kg. Both detected concentrations were less than their corresponding RSLs for unrestricted/residential land uses of 31 and 61 mg/kg, respectively.
- OCPs and OPPs were not detected in any of the samples analyzed.

Urban Farm Areas

A total of eight samples (NCE-5 through NCE-12) were analyzed by the laboratory. The results are summarized as follows:

- Antimony, beryllium, cadmium, mercury, selenium, silver, and thallium were not detected in any of the samples analyzed.
- Barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc were detected at all of the sample locations and molybedenum was detected in 7 of 8 sample locations. However, the detections for each of the metals were at similar concentrations and at concentrations that were significantly less than their associated regulatory screening levels.
- Arsenic was detected at all of the sample locations at concentrations ranging from 3.21 mg/kg (NCE-8) to 4.75 mg/kg (NCE-9). These detected concentrations exceeded the corresponding CHHSL, RSL, and ESL for unrestricted/residential land use.
- Chlorinated herbicides were non-detected except low concentrations of MCPA detected in samples from sample locations NCE-7, NCE-9, NCE-10, and NCE-12. The detected MCPA concentrations ranged from 3 mg/kg (NCE-7) to 7.4 mg/kg (NCE-10). These detected concentrations are significantly less than the RSL for unrestricted/residential land use of 31 mg/kg.

- OCPs and OPPs were not detected in any of the samples analyzed.

Existing Ponds

A total of three samples (NCE-13 through NCE-15) were analyzed by the laboratory. The results are summarized as follows:

- Antimony, beryllium, cadmium, mercury, molybdenum, selenium, silver, and thallium were not detected in any of the samples analyzed.

- Barium, chromium, cobalt, copper, lead, nickel, vanadium, and zinc were detected at all of the sample locations. The detections for each of the metals were at similar concentrations and at concentrations that were significantly less than their associated regulatory screening levels.

- Arsenic was detected at all of the sample locations at concentrations ranging from 1 mg/kg (NCE-13) to 3.19 mg/kg (NCE-15). These detected concentrations exceeded the corresponding CHHSL, RSL, and ESL for unrestricted/residential land use.

- Chlorinated herbicides were non-detected except for low levels of 4-(2, 4-dichlorophenoxy)butyric acid (2, 4-DB). Low concentrations of 2, 4-DB were detected at sample locations NCE-13 and NCE-15 at 0.11 and 0.052 mg/kg, respectively. These detected concentrations are significantly less than both the RSL for unrestricted/residential land use of 490 mg/kg.

- OCPs and OPPs were not detected in any of the samples analyzed.

Silt Drying Beds

A total of four samples were analyzed. Samples Perkins Rock Pond – Silt (Aspen 2 – Bed 2) and Prewash Pond – Silt (Aspen 4 – Bed 2) were collected in March 2010. Samples Rock Plt. Pond Aspen 1-F and Prewash Pond Aspen 4-A were collected in July 2010. The results are summarized as follows:

- Selenium, thallium, antimony, beryllium, and mercury were not detected in any of the samples analyzed.

- Barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium, and zinc were detected at all of the sample locations. Cadmium was only detected at one sample location, Prewash Pond Aspen 4-A. Silver was detected at sample locations Rock Plt. Pond Aspen 1-F and Prewash Pond Aspen 4-A. The detections for each of the metals were at similar concentrations and at concentrations that were significantly less than their corresponding regulatory screening levels.

- Arsenic was detected at all of the sample locations at concentrations ranging from 3.2 mg/kg in sample Perkins Rock Pond-Silt (collected in March 2010) to 6.2 mg/kg in sample Prewash Pond Aspen 4-A (collected in July 2010). These detected concentrations exceeded the corresponding CHHSL, RSL, and ESL for both the unrestricted/residential and commercial/industrial land uses.

4.0 EVALUATION OF ON-SITE DATA

This section compares the existing data collected during LFR's 2003 investigation and NCE's follow-on investigation with applicable regulatory screening levels (i.e., CHHSLs, RSLs, and ESLs) and describes their potential to impact conditions at the Site. Table 2 lists the constituents detected in soil at the Site.

LFR's visual survey and NCE's Phase I Environmental Site Assessment (ESA) identified the Matsuda Nursery as a potential source of agricultural chemicals and associated heavy metals in soil at the Site. Based on the findings of the LFR and NCE investigations, none of the constituents of concern were detected in soil at concentrations greater than the applicable CHHSL, RSL, and ESL for either unrestricted/residential or commercial/industrial land use scenarios, except arsenic.

Arsenic was present in soil samples collected from sample locations B-1 through B-6 and NCE-1 through NCE-15 at concentrations ranging from 1 to 7.5 mg/kg (Table 2). These detected concentrations are greater than the applicable CHHSL, RSL, and ESL for unrestricted-residential land uses of 0.07, 0.39, and 0.38 mg/kg, respectively. They are also greater than the applicable CHHSL, RSL, and ESL for commercial/industrial land uses of 0.24, 1.6, and 1.5 mg/kg, respectively (Table 2).

Review of the data suggests the arsenic in soil at the Site is comprised of naturally occurring metals instead of regional anthropogenic contributions or a Site-related release based on the following reasons:

- No potential source areas of the arsenic were indentified for the surface or subsurface soil at the Site because the data showed that arsenic concentrations are similar, widespread and randomly distributed across the Site. Arsenic was detected in soil ranging from 3.55 to 7.5 mg/kg in the vicinity of the Matsuda Nursery, 3.21 to 4.75 mg/kg in the vicinity of the Urban Farm Areas, 1 to 3.19 mg/kg in the vicinity of the existing ponds, and 3.2 to 6.2 in the silt drying beds.

- The arsenic concentrations are similar and within the range of background concentrations for arsenic detected in California agricultural soils based on two studies described below:

    - According to the Kearney Foundation of Soil Science, Division of Agriculture and Natural Resources, University of California Special Report (Herein referred to as the Kearney Report) (Kearney, 2006) entitled *Background Concentrations of Trace and Major Elements in California Soils*, a study was conducted in 1967 to develop a database on background concentrations of trace and major elements in California soils. The study consisted of collecting soil samples from the ground surface (excluding the organic debris at the surface) to a depth of 50 centimeters (approximately 1.6-feet) at 50 sites (representing 50 different morphologically typical soils of California) located throughout California and analyzing the samples for various metals, including arsenic. According to the Kearney Report, these sites were mostly agricultural fields (e.g., wild lands, rangelands, pastures, and low-input and low-intensity agricultural lands) located in areas that were relatively uninhabited and distant from known sources of contamination. The overall range of arsenic detected in the samples collected from those 50 sites was 0.6 to 11.0 mg/kg, with a mean of 3.5 mg/kg. Of the nine sample locations closest to the Sacramento area, concentrations in soil ranged from 0.8 to 9.6 mg/kg, with a mean of 3.7 mg/kg. As a comparison, concentrations in Site soils ranged from 1 to 7.5 mg/kg, with a mean of

4.5 mg/kg and a median of 4.2 mg/kg. Based on this information, the arsenic concentrations detected in soil at the Site (1 to 7.5 mg/kg) are within the concentration ranges defined by the 1967 study for California Soils.

  - According to Chen et al. (2007) in their document entitled *Arsenic, Cadmium, and Lead in California Cropland Soils: Role of Phosphate and Micronutrient Fertilizers*, 49 of the 50 original sites described in Kearney's Report were resampled in 2001 in conjunction with sampling activities of cropland soils in seven vegetable production regions in California to evaluate in part, (1) the concentrations of various metals including arsenic in benchmark soils, and (2) the concentrations of various metals including arsenic in cropland soils in seven vegetable production regions. The soil samples were collected from the ground surface to a depth of 150 cm (approximately 4.9-feet). Arsenic was detected in the benchmark soil samples at concentrations ranging form 1.8 to 16.6 mg/kg, with a mean of 7.6 mg/kg. Arsenic was detected in samples collected from cropland soils at concentrations ranging from 1.2 to 18.4 mg/kg, with a mean of 7.6 mg/kg. As a comparison, concentrations in Site soils ranged from 1 to 7.5 mg/kg, with a mean of 4.5 mg/kg and a median of 4.2 mg/kg. Based on this information, the arsenic concentrations detected in soil at the Site (1 to 7.5 mg/kg) are within the concentration ranges defined by the 2001 study for both benchmark and croplands soils in California soils.

- Results showed that the arsenic concentrations are similar and within the range of background concentrations for arsenic detected in soil at two nearby properties that have similar lithologies as that found on-site. In its October 31, 2005 document entitled, *Designated Waste Determination Investigation, Teichert Aggregates, Perkins Plant, Sacramento County, California*, Tetra Tech EM Inc. (Tetra Tech) evaluated background metals concentrations in soil in the vicinity of the nearby Perkins Plant and Aspen 4 properties. Tetra Tech determined that the background concentrations for arsenic in the Site vicinity ranged from 1.5 to 13.4 mg/kg, based on analytical results of soil samples collected from areas in the southeast corner of the Perkins Plant and the northeast corner of the Aspen 4 properties, respectively.

- Detected and non-detected concentrations of chlorinated herbicides and pesticides did not correlate with the detected concentrations of arsenic (arsenic is a naturally occurring metalloid used in combination with chlorinated pesticides and herbicides). For instance, both the median and mean arsenic concentrations (3.85 and 3.87 mg/kg, respectively) detected in soil in the vicinity of the Urban Farm Area where the chlorinated herbicide, MCPA, was detected in 4 of 8 sample locations (at concentrations ranging from 3 to 7.4 mg/kg) are slightly lower than the median and mean arsenic concentrations (4.4 and 4.9 mg/kg, respectively) at the Matsuda Nursery where MCPA was only detected in one sample location (NCE-1 at 1.8 mg/kg). Furthermore, although MCPP was also detected in the sample collected at sample location NCE-2 (1.6 mg/kg), arsenic was detected at only 3.57 mg/kg, which is less than both the median and mean arsenic concentrations in that area of 4.4 and 4.9 and mg/kg, respectively.

To further evaluate background levels for arsenic at the Site, NCE performed both a graphical evaluation and a statistical analysis utilizing the California Department of Toxic Substances Control (DTSC) protocol. The procedures for conducting the statistical analyses are described in DTSC's document entitled, *Arsenic Strategies, Determination of Arsenic Remediation, Development of Arsenic Cleanup Goals for Proposed and Existing School Sites,* dated March 21, 2007.

To evaluate the background levels using the graphical evaluation, two cumulative probability plots were constructed using data from the Matsuda property and the Urban Farm Area, respectively (Appendix E):

- The first plot was created using data collected from only the Matsuda property. As can be seen from that plot, the data appears to be normally distributed and linear in two ranges: from about 3.5 to 4.5 and 5.7 to 7.5 mg/kg. An inflection point separating the two ranges occurs at an approximate arsenic concentration of 4.5 mg/kg. Therefore, the lower range may be representative of background concentrations and the higher range from 5.7 to 7.5 mg/kg may be representative of anthropogenic contributions or a Site-specific release. However, although two data ranges can be seen on the plot, the differences in concentrations between the two ranges appear to be insignificant because they are within the same order of magnitude and significantly less than the maximum background concentration for arsenic of 13.4 mg/kg noted above.

- The second plot was created using data collected from only the Urban Farm Area. As can be seen from that plot, all of the data appears to be normally distributed and linear in the range from 3 to about 4.75 mg/kg. Thus, the findings suggest that arsenic in soil also consists of naturally occurring metals. In addition, no outliers were noted.

5.0 EVALUATION OF OFF-SITE DATA

Available environmental reports prepared by others were reviewed to assess whether non-Site related constituents related to the current and historical land uses at two nearby properties, the F-P and L and D Landfills, had the potential to impact conditions beneath the Site. The F-P Landfill adjoins the Site to the west. The L and D Landfill adjoins the Site to the South. The environmental conditions, based on previous environmental investigations and activities performed to date by others at the F-P and L and D Landfills, are described in Section 5.1. The potential for the non-Site related constituents related to the F-P and L and D Landfills to impact conditions beneath the Site is described in Section 5.2.

5.1 Adjacent Properties Site History and Previous Investigations

This section describes the environmental conditions at the F-P and the L and D landfills, respectively. Applicable regulatory screening levels (i.e., CHHSLs, RSLs, and the ESLs) were compared to the groundwater monitoring data collected at the Site and the F-P and L and D Landfills. Tables 2 through 5 present selected groundwater monitoring and sampling results from the most recent events conducted at the Site, F-P Landfill, and the L and D Landfill.

F-P Landfill

The F-P Landfill is located south of SR 16 and east of Florin Perkins Road (Plate 3). It also adjoins the Site to the west, as noted in Section 2.1. It is approximately 160-acres in extent and includes a former landfill, a transfer station, a materials recovery facility, and associated access roads and structures. It also includes chip and grind and soil blend operations in the central portion of the landfill that have not yet been filled.

Florin-Perkins Landfill, Inc. operated the F-P Landfill from February 1994 to February 2005. Since January 2005, no wastes for disposal have been accepted at the F-P Landfill. Prior to January 2005, the F-P Landfill was permitted to accept only non-hazardous solid waste and inert waste.

Review of documents by others (CRWQCB, 1991; and Earthtec, Inc. [Earthtec], 2010) indicates the following:

- F-P Landfill is underlain by a 10- to 20-foot thick cobble and gravel layer, and then by a sand layer extending well into the saturated zone.

- Maximum depth of waste is estimated to be about 38-feet bgs (11-feet above msl).

- Depth to the shallow groundwater table is about 30-feet below the base of the F-P Landfill (69-feet bgs, - 9-feet MSL).

- Groundwater flow direction is generally to the south-southwest.

The groundwater monitoring well network at the F-P Landfill currently consists of six groundwater monitoring wells: two upgradient wells (MW-A and MW-E), one crossgradient well (MW-B), and three downgradient wells (MW-C, MW-D and MW-F). Well MW-D is in the central part of the landfill and wells MW-C and MW-F are compliance wells along the southern perimeter.

Since 2002, groundwater samples were collected semi-annually from monitoring wells MW-A through MW-F and analyzed for VOCs, total metals, dissolved iron, specific conductance, turbidity, pH, TDS, chloride, nitrate as nitrogen, sulfate, sulfide, total alkalinity, and bicarbonate as $CaCO^3$. Review of the groundwater monitoring data collected between June 2002 and October 2009 indicates the following:

- Elevated concentrations of two VOCs, methylene chloride and TCFM, were detected in groundwater beneath the Site.

- Methylene chloride was detected in samples from only one event (May 2004). During that event, it was also detected in the associated method blank sample. The method blank is an analyte-free matrix that is prepared by the laboratory and analyzed with each batch of samples to determine if laboratory handling and analysis may have resulted in sample contamination. Because methylene chloride was detected in the method blank during that event and was never detected in samples collected at this site during any of the other events, the methylene chloride concentrations detected in the samples during that event appear to be representative of laboratory contamination instead of actual groundwater conditions at the F-P Landfill. Based on these results, methylene chloride it not considered further in this report because it does not appear to be a concern

- TCFM is considered to be the primary concern at the F-P Landfill. Because TCFM has never been detected in samples from upgradient wells MW-A and MW-E, the source of the TCFM appears to be the F-P Landfill.

- Low concentrations of TCFM were detected in samples from wells MW-B, MW-C, MW-D, MW-E, and MW-F. TCFM was detected in samples collected from well MW-F during 16 consecutive sampling events from June 2002 through November 2009.

- Elevated TDS and bicarbonate have also been historically detected in wells MW-B, MW-C, MW-D and MW-E.

Between May and November 2009, Earthtec (2009) conducted semi-annual groundwater monitoring and sampling to monitor the lateral and vertical extent of impacted groundwater; and collected soil vapor samples in select soil gas monitoring wells to monitor the migration of landfill gas (LFG). In addition, the property owner conducted weekly observations of standing water at the Site and liquid entering or leaving the landfill. Earthtec's document entitled *2009 Annual Groundwater Monitoring Report, Florin-Perkins Landfill, Florin-Perkins Road, Sacramento, California,* is included in Appendix F.

Review of the most recent groundwater monitoring report indicates the following (Table 3):

- TCFM was detected only in samples from wells MW-D and MW-F. TCFM was detected in samples from well MW-D (located in the center of the F-P Landfill and adjacent to the material recovery facility) during the May and November 2009 monitoring events at concentrations of 3.9 and 4.4 2 µg/L, respectively. TCFM was detected in samples from well MW-F (located in the southeast corner of the F-P Landfill) during the May and November 2009 monitoring events at concentrations of 4.7 and 9.92 µg/L. These concentrations are two orders of magnitude less than the corresponding RSL for tapwater of 1,300 µg/L.

- Elevated concentrations of nitrate as NO_3, specific conductance, TDS, aluminum, chromium, and manganese were detected in samples from one or more wells.

Depth to groundwater table measurements were also collected from the wells during the sampling events. These data in conjunction with the groundwater measurements collected from three monitoring wells (MW-1 through MW-3) at the adjacent Jackson Road Landfill Site were used to evaluate the direction of the first encountered water bearing zone. Groundwater flow direction was generally to the southeast at a hydraulic gradient of approximately 0.001 feet/foot (ft/ft).

In November 2009, Earthtec collected a soil vapor sample from soil vapor monitoring well GP-2D (located adjacent to groundwater monitoring well MW-F) and submitted the sample for laboratory analysis of VOCs. Three VOCs were detected: acetone, dichlorodifluoromethane (also known as Freon 12), and TCFM. Acetone was detected at 70 micrograms per cubic meter (μg/m^3). Dichlorodifluoromethane was detected at 160 μg/m^3. TCFM was detected at 9,900 μg/m^3.

In December 2009, Earthtec collected soil gas samples at depths of approximately 10-, 25-, and 40-feet bgs from soil vapor monitoring wells GP1, GP2, and GP3 (located along the southeast property boundary and adjacent to the southwest corner of the Site) to monitor the migration of LFG. The purpose of the sampling event was to monitor the southward migration of LFG along the southeast boundary of the F-P Landfill. The vapor samples were analyzed for methane, carbon dioxide, and oxygen. Methane was only detected in one sample location, GP2, at a depth of 40-feet bgs. The detected concentration was 0.5 percent.

Between August and December 2009, the property owner of the F-P Landfill conducted weekly observations of the F-P Landfill. During these observations, no standing water was observed at the Site and no liquid was observed entering or leaving the F-P Landfill.

In 2000, Teichert initiated the installation of three groundwater monitoring wells (MW-1 through MW-3). The purpose of the wells was to provide groundwater information that allowed Teichert to be proactive in managing and protecting its interests as an adjacent landowner. The wells were installed by IT Corporation along the southwest boundary of the Site (Plate 3).

Information gleaned from the most recent monitoring report, by HDR Engineering Inc. (HDR) entitled *First Half 2010 Groundwater Monitoring Report, May 2010, Teichert Aspen I Property, Sacramento, California*, dated June 15, 2010, indicated the following:

- Groundwater samples are routinely collected from the wells and tested for VOCs, specific conductance or electrical conductivity (EC), TDS, chloride, nitrate as nitrogen, sulfate, total alkalinity, bicarbonate as CaCO^3, carbonate as CaCO^3, and hydroxide as CaCO^3.

- Laboratory analyses indicate slightly elevated inorganic compounds such as total alkalinity, bicarbonate as CaCO^3, chloride, nitrate, sulfate and TDS.

- With the exception of TCFM, laboratory analyses of subsequent groundwater samples collected from wells MW-1 through MW-3 between 2001 and 2010 indicated VOCs were not present. Low concentrations of TCFM (ranging from 0.57 to 2.7 μg/L) have been detected in groundwater samples from well MW-2 beginning in December 2004. Prior to December 2004, TCFM was never detected in samples from well MW-2 (7 separate events). However, since 2004, TCFM has been detected in 8 out of 10 events. These data indicate TCFM has migrated in groundwater from the F-P Landfill to the Site.

HDR's report also indicated that groundwater samples were collected from wells MW-1, MW-2 and MW-3 in May 2010 and analyzed for the following:

- VOCs by EPA Method 8260B;
- Total alkalinity, bicarbonate as $CaCO^3$, carbonate as $CaCO^3$, and hydroxide as $CaCO^3$ by SM2540C;
- TDS by SM2540C;
- Conductivity by EPA Method 120.1; and
- Nitrate as nitrogen, chloride, and sulfate by EPA Method 300.0.

Review of the May 2010 results shows that the data is consistent with historical monitoring results dating back to December 2004 (Table 1). The results are summarized as follows:

- VOCs were not present in wells MW-1 through MW-3, with the exception of TCFM in well MW-2. The detected concentration was 1.2 µg/L.
- Elevated concentrations of TDS were detected in all three wells. The detected concentrations ranged from 320 mg/L (MW-3) to 600 mg/L (MW-1). Water with less than 500 mg/L is recommended by the EPA in their National Secondary Drinking Water Standards.
- Bicarbonate as $CaCO^3$ was detected in all three wells. The detected concentrations ranged from 260 mg/L (MW-2) to 500 mg/L (MW-1).

Depth to groundwater table measurements were also collected from the wells during the sampling event. The groundwater elevations in May 2010 ranged from -18.19-feet below msl in well MW-1 to -20.89-feet below msl in well MW-3. These data in conjunction with the groundwater measurements collected at the L and D Landfill on the same day were used to determine the direction of shallow groundwater flow. During this sampling event, the groundwater flow was generally to the south with a gradient of 0.011 ft/ft.

Table 1 provides depth to groundwater, groundwater elevations, and groundwater analytical results from groundwater sampling events conducted at the Site between March 2001 and May 2010. HDR's document entitled *First Half 2010 Groundwater Monitoring Report, May 2010, Teichert Aspen I Property, Sacramento, California, HDR | e^2M Project No.: 141770 (June 15, 2010)* is included in Appendix G.

L and D Landfill

The L and D Landfill is located near the corner of South Watt Avenue and Fruitridge Road. It adjoins the Site to the south, as noted in Section 2.1.

The L and D Landfill is divided into three major waste management units (WMUs): East Pit WMUs, West Pit WMUs, and LF-2. The East and West Pit WMUs jointly are known as LF-1 and are located in the southern portion of the L and D Landfill. The LF-1 is the original unlined portion of the landfill. The LF-2 is located in the northern portion of the L and D Landfill, adjacent to the southern Site boundary. The LF-2 is lined, which means it is designed to capture part or all of the generated leachate. In 2009, all waste deposition was concentrated in the LF-2.

There are two aquifer zones that are monitored at the L and D Landfill. The uppermost aquifer is encountered under unconfined conditions between approximately -30- and -60-feet below msl (approximately 50- to 80-feet bgs). It is comprised of sand and fine gravel in which the sediments generally grade from relatively coarse materials at depth to fine materials at its upper limits.

Historically, the groundwater flow direction in the uppermost aquifer has generally been towards the south—from the northeast corner of the L and D Landfill (where an infiltration pond contributes to groundwater recharge) to the extraction wells system along the southern boundary of the landfill).

Groundwater monitoring at the L and D Landfill has mostly focused on the uppermost aquifer because it has a greater risk of being impacted by the L and D Landfill than the lowermost aquifer. The groundwater monitoring well network used to monitor the uppermost aquifer consists of the following:

- Five background wells (MW-12, MW-13, MW-29, MW-30, and MW-31) located in the LF-2 in the northern portion of the L and D Landfill (upgradient).

- Three point-of-compliance wells (MW-2A, MW-4, and MW-5) located in the LF-1 in the southern portion of the L and D Landfill (downgradient);

- Seven groundwater extraction wells (MW-18 through MW-24) located in the LF-1 along the southern portion of the L and D Landfill (downgradient); and

- Four monitoring points (MW-15, MW-16, MW-17, and MW-32) located off-site to the south of the LF-1 of the L and D Landfill (downgradient).

Monitoring wells MW-8, MW-9, MW-11, and MW-17 are used to monitor the lower aquifer. They are located along the southern boundary of the L and D Landfill.

Reportedly, releases of constituents of concern into the uppermost aquifer from the LF-1 were confirmed as early as 1987 (SCS Engineers [SCS], 2010a). The primary constituents of concern in groundwater at the L and D Landfill are VOCs (Table 4).

The primary VOC detected is cis-1,2-dichloroethene (1,2-DCE). Other VOCs detected include chloromethane, 1, 2-dichlorobenzene, 1, 1-dichloroethane (1, 1-DCA), methyl tertiary butyl ether (MTBE), tetrachloroethane (PCE), trichloroethane (TCE), TCFM, 1, 1-dichloro-1-fluoromethane, 1-chloro-1-fluoroethene, chlorodifluoromethane, and diethyl ether. Nine tentatively identified organic compounds (TIOCs) and one unknown compound were also detected based on the 2009 monitoring results. Also, groundwater monitoring data for the L and D Landfill shows historically elevated concentrations of general minerals, including TDS and bicarbonate.

In July 2000, a groundwater remediation system was installed to remove the dissolved VOCs from groundwater. It consists of an air stripping unit and extraction wells. According to SCS (2010a), based on the historic monitoring data, the VOC plume appears to be stable and/or decreasing since startup of this system.

In May and November 2009, SCS (2010a) conducted semi-annual groundwater monitoring and sampling at the L and D Landfill. Review of the most recent groundwater monitoring report indicates the following (Table 5):

- Groundwater analytical data collected in May and November 2009 indicated that the vast majority of contaminant detections were in samples from monitoring wells MW-2A (cis-1,2-dichloroethane), MW-4 (MTBE), MW-5 (PCE), MW-8 (chloromethane), MW-9 (chloromethane), MW-11 (chloromethane), MW-17 (1,1-dichloroethane, cis-1,2-dichloroethane, PCE, and TCE), MW-31 (MTBE) and MW-32 (chloromethane, 1,1-dichlorethane, cis-1,2-dichloroethane, PCE, TCE, TCFM, and trichloroflouromethane). All of these wells are located in the LF-1, located more than 2,000 feet downgradient of the Site.

- Samples from off-site well MW-32 consistently showed the most detections and highest concentrations among all the samples. Well MW-32 is located south (downgradient) of the L and D Landfill on the east side of 88th Street.

Table 4 provides a summary of the groundwater elevations collected quarterly in 2009. Table 5 provides groundwater analytical results from groundwater sampling events conducted in May and November 2009. SCS's document entitled, *Second Semi-Annual and Annual 2009, Monitoring Report, L and D Landfill, Sacramento, California,* is included in Appendix H.

Between July and December 2009, SCS conducted monthly monitoring of LFG migration to assess whether LFG migration is occurring along the perimeters of the L and D Landfill. During each monitoring event, select extraction and monitoring wells and leachate collection and removal system risers were analyzed for methane, carbon dioxide, oxygen, and balance gas (i.e., nitrogen). Review of the most recent LFG monitoring report indicates the following:

- Extraction wells EW-1 through EW-29 (located along the perimeter of LF-1) are operating and methane concentrations in these wells were less than one percent, except extraction well EW-1. Methane was detected at 1.75 percent in extraction well EW-1.

- Extraction wells NW-1 through NW-11 (located in the central portion of the LF-1) are operating and all of these wells are extracting LFG, except extraction wells NW-1S, NW-4S, and NW-8D. Wells NW-1S and NW-4S are located in the southwest portion of the L and D Landfill. Well NW-4S is located in the south central portion of the L and D Landfill. According to SCS, a vacuum will continue to be applied to these wells and extraction will continue until the monitoring data indicates that LFG is not present in the proximity of these wells.

- Monitoring wells NW-14, MW-15, NW-16, NW-17D, NW-17S, NW-18, NW-19D, NW-19S, NW-20, NW-21S, NW-21D, NW-22, NW-23D, NW-23S, NW-24, NW-25D, NW-25S, and NW-26) (located along the perimeter of the LF-1) are extracting LFG, except wells NW-14, NW-15, NW-16, and NW-17D. According to SCS, a vacuum will continue to be applied to these wells to control migration of VOCs in groundwater along the western perimeter of the L and D Landfill.

- Leachate collection and removal system risers LCRS-1, LCRS-3, LCRS-5, and LCRS-7 (located along the northwest corner of the LF-2 and adjacent to the southwest portion of the Site) are extracting moderate quality of LFG. Three of the four leachate risers contained average methane concentrations above 20 percent.

Based on the information described above, LFG is being generated and is present adjacent to the Site boundary. However, SCS concluded in their report that since upgrade of the LFG extraction system (Phase II), the LFG facility is removing significant quantities of LFG, thereby preventing

LFG migration. SCS's document entitled *Second Semi-Annual 2009 Monitoring Report, LFG Migration Control System, L and D Landfill, Sacramento, California,* is included in Appendix I.

Storm water runoff from the L and D Landfill is captured into two drainage ditches, identified as the West Perimeter Channel and East Perimeter Channel, respectively. Both drainage ditches discharge into the infiltration pond at the northeast portion of the Site. In January and October 2009, SCS collected stormwater samples from each channel. Chloroform was detected in the sample collected from the Western Perimeter Channel in January 2009. Acetone was detected in both the Western and Eastern Perimeter Channels in October 2009.

5.2 Data Evaluation and Comparison of Non Site-related Constituents in Groundwater and Landfill Gas to Regulatory Screening Levels

This section compares the existing data collected at the F-P and L and D Landfills, respectively, with applicable regulatory screening levels (i.e., CHHSLs, RSLs, and the ESLs), and describes their potential for the non site-related constituents related to the F-P and L and D Landfills to impact conditions at the Site. Tables 2, 3, and 5 lists the constituents detected in groundwater at the Site, and the L and D and F-P landfills, respectively.

Non Site-Related Constituents in Groundwater at the Site

Groundwater beneath the F-P Landfill appears to have been impacted with elevated inorganic compounds (TDS and bicarbonate) and the VOC TCFM. There is limited potential for the inorganic compounds to impact the Site or intended re-uses because of the limited exposure pathways.

Based on the monitoring data, the TCFM appears to be localized to the F-P Landfill with the exception of the detections in Teichert well MW-2, located immediately adjacent to and east of the F-P Landfill. TCFM has been detected in well MW-2 at concentrations ranging from 0.57 to 2.7 µg/L. The highest concentration detected to date in the samples collected from MW-2 (detected at 2.7 µg/L in May 2009) is more than three orders of magnitude less than the RSL for tap water of 1,300 µg/L. According to the DTSC Office of Human and Ecological Risk (HERO), the tap water RSLs are based on assumed residential exposure to water via ingestion from drinking and inhalation of volatile chemicals generated during household use (e.g., showering, dish washing) (DTSC, 2009). There is no listed ESL for TCFM.

TCFM is an organic compound that is only slightly soluble in water and is denser (1.494 gram per cubic meter (g/cm^3) than water (1.0 g/cm^3). The contaminant migration mechanism that may be active at the Site is volatilization of TCFM. Volatilization occurs when contaminants in groundwater and/or contaminants adsorbed to soil particles in the unsaturated zone transfer into the vapor phase in unsaturated soil. Since the Site is not a source of TCFM, volatilization from soil was not considered significant. Volatilization from groundwater only occurs at the water table, and the rates depend on the relative volatility of the contaminants. Diffusion is driven by chemical concentration gradients and is the primary mechanism for vapor transport in unsaturated soil. Based on the above, the potential exposure pathway and receptor scenario for TCFM in groundwater at the Site is exposure through inhalation of vapors originating from TCFM impacted-groundwater that migrates up to the ground surface.

RSLs and ESLs for TCFM in groundwater that are intended to address the intrusion of vapors into buildings and subsequent impact on indoor-air quality have not been established. To assess the potential for intrusion of vapors into buildings and subsequent impact on indoor-air quality at the Site, NCE generated a screening level for TCFM using a computer spreadsheet model found on the EPA online database (http: //www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.html).

This spreadsheet is based on the Johnson and Ettinger (Johnson and Ettinger, 1991) simplified model to evaluate the vapor intrusion pathway into buildings. Assuming the lithology beneath the Site is sand (a conservative assumption) and the depth from the ground surface to the top of contaminated groundwater is 50-feet, the results suggest the groundwater screening level for potential vapor intrusion concerns for TCFM is 692.5 µg/L. Using these assumptions, the resulting screening level is more than two orders of magnitude greater than the highest concentration detected in well MW-2 (2.7 µg/L) to date. The printout of the model results and inputs are provided in Appendix J.

Non Site-Related Constituents in LFG from the F-P Landfill

During the most recent monitoring event conducted at the F-P Landfill in December 2009, little LFG was present in LFG probes adjacent to the Site. These data suggest LFG from the F-P Landfill is not a significant threat at this time.

Non Site-Related Constituents in Groundwater from the L and D Landfill

During the most recent groundwater monitoring events (conducted in 2009), VOCs were not detected in monitoring wells located adjacent to the Site. Accordingly, there appears to be no transport mechanism in place for these VOCs to reach the Site and the Site is hydraulically upgradient of the landfill.

Non Site-Related Constituents in LFG from the L and D Landfill

During the most recent monitoring events conducted at the L and D Landfill between July and December 2009, significant quantities of LFG were being extracted by the LFG extraction system. According to SCS (Appendix I), LFG is being generated, but the migration of LFG is controlled by the current system.

6.0 EVALUATION OF OTHER POTENTIAL ENVIRONMENTAL CONCERNS

This section discusses other potential on- and/or off-site environmental concerns (i.e., natural and manmade hazardous materials), including (1) potential asbestos-containing material (ACM), (2) naturally occurring asbestos (NOA) in Site soils, (3) the presence of current or former oil and gas fields, and (4) exposure to electric and magnetic fields (EMF) from on-site and nearby overhead electric distribution and transmission lines.

6.1 Asbestos-Containing Material (ACM)

On January 27, 2011, NCE looked at the existing onsite building located on the Matsuda property for potential asbestos containing materials (ACM). The building was observed to be made out of steel and aluminum only. No other building materials were visible.

6.2 Naturally Occurring Asbestos (NOA) in Site Soils

Natural occurring asbestos (NOA), if present, is generally encountered in, and immediately adjacent to, areas of ultramafic rocks. Ultramafic rocks are igneous rocks with very low silica content and are composed of usually greater than 90 percent mafic minerals (dark colored, high magnesium, and iron content). Ultramafic rocks may be partially or completely altered to a type of metamorphic rock called serpentinite. Sometimes the metamorphic conditions are right for the formation of chrysotile asbestos or amphibole asbestos in bodies of ultramafic rock, or along their boundaries.

Review of published geologic documents did not identify the presence of NOA within the Site vicinity. Provided below is NCE’s review of these documents.

- The Department of Conservation, California Geological Survey’s (CGS, 2006) document entitled Relative Likelihood for the Presence of Naturally Occurring Asbestos in Eastern Sacramento County, California, shows that the Site is not located in an area that is likely to contain NOA. The report indicates that the predominate rock types in eastern Sacramento County are granitic rocks, volcanic rocks, sedimentary rocks, unconsolidated alluvium, and tailings from gold dredging, which have a lower likelihood for the presence of NOA due to their chemical and/or physical characteristics (CGS, 2006). These rock types are similar to what occurs in the immediate vicinity of the Site. The closest area to the Site that is classified by the CGS as “moderately likely to contain NOA” is located approximately 15-miles east of the Site along a northerly trending region that extends from Folsom Lake to the north to the Cosumnes River to the south.

- According to the Department of Conservation, Division of Mines and Geology’s document entitled *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos*, NAO is unlikely to be encountered in the Site vicinity. The purpose of this document and associated map is to inform government agencies, private industry, and the public of the areas in California where NOA may be an issue.

6.3 Oil and Gas Fields

NCE reviewed the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) Online Mapping System (http://maps.conservation.ca.gov/doms/doms-app.html) to identify the potential presence of current or former oil fields, oil and gas wells, oil production areas, natural gas production areas, and oil or natural gas reserves within an approximate one-half mile radius of the Site. No oil and gas fields (i.e., oil and gas, dry gas production, water source production, gas storage [production and injection], liquefied gas [production and injection], and geothermal wells were identified within an approximate one-mile radius of the Site during the review.

6.4 Exposure to Electric and Magnetic Fields (EMF)

Sources of Electric and Magnetic Fields (EMF)

Electric and magnetic fields (EMF) are invisible lines of force associated with the production, transmission, and use of electric power such as those associated with power lines, electric appliances, and the wiring in buildings of homes, schools, and work structures. The sources of potential EMF at the Site are overhead electric distribution lines located on easements along the northern and eastern Site boundaries and in the southern portion of the Site, and two overhead electric transmission lines located on a transmission line corridor that transects the southwest portion of the Site.

According to Ms. Rachel Del Rio with the Sacramento Municipal Utility District (SMUD) Real Estate Department during a phone conversation with NCE on January 26, 2011, SMUD owns all of the distribution lines and the westernmost transmission line, and the Western Area Power Administration (WAPA), an agency of the United States Department of Energy (DOE), owns the easternmost transmission line. In addition, the distribution lines operate at voltages ranging from 12,000 to 69,000 kilovolts (kV) and the transmission lines operate at voltages ranging from 115 to 230 kV.

According to SMUD's website (www.smud.org/en/education-safety/customer-safety/outdoor-safety-tips/Pages/EMF.aspx), the maximum magnetic fields under power distribution lines in California range from approximately 1 to 80 milligauss, and the maximum magnetic fields from the edge of the right-of-way of power transmission lines range from approximately 1 to 300 milligauss. As a comparison, according to the website, the magnetic fields of a microwave oven and a television at 1.2-inches away range from 750 to 2,000 and 25 to 500 milligauss, respectively.

Potential EMF Impacts to the Proposed Residential Land Use at the Site

Numerous studies have been completed by the medical and scientific communities concerning the potential adverse health effects. Provided below is a summary of NCE's review of this information:

- According to SMUD's brochure entitled *Understanding EMF* (dated October 18, 2007) (SMUD, 2007), homeowners in neighborhoods adjacent to overhead power lines frequently express concerns regarding the potential health effects from exposure to EMF. However, based on the results from many research studies by international (e.g., World Health Organization [WHO], national (e.g., National Institute of Environmental Health Sciences [NIEHS], and California EMF research programs (e.g., California Public Utility Commission [CPUC]) to find out if EMF poses any health risk, the medical and scientific communities have been unable to determine whether residential exposures to EMF cause adverse health effects.

- Similarly, a review of the USEPA (http://www.epa.gov/radtown/power-lines.html) and

NIEHS (www.niehs.nih.gov/health/topics/agents/emf/) websites indicate that the hazards of exposure to EMF from common sources such as power lines, electrical wiring, medical equipment, cellular phones, and computers are not known. NIEHS scientists have concluded that there might be a weak association between increasing exposure to EMFs and an increased risk of childhood leukemia. However, there has not been any supporting laboratory evidence or scientific explanation linking EMF exposures with Leukemia. The websites also state that the few studies that have been conducted on adult exposures to EMF show no evidence of a link between residential EMF exposure and adult cancers.

- According to NIEHS' June 2002 document entitled *Electric and Magnetic Fields Associated with the Use of Electric Power* (NIEH, 2002), recent reviews of the most recent research studies related to the possible health effects of EMF to date have substantially reduced the level of concern of EMF. The present scientific uncertainty means that public health officials cannot establish any standard or level of exposure that is known to be either safe or harmful.

- According to the California Department of Education (herein referred to as the Department) website (www.cde.ca.gov/ls/fa/sf/schoolsiteguide.asp#highvoltage), although electric power transmission lines may or may not be hazardous to human health, school districts should be cautious about the health and safety aspects relating to overhead transmission lines.

Building Setbacks Restrictions

According to Ms. Del Rio with the SMUD Real Estate Department during a phone conversation with NCE on January 26, 2011, SMUD and WAPA maintain right-of-ways for their transmission lines to ensure adequate building setback requirements with the intent to avoid concerns related to possible health and safety aspects relating to overhead transmission lines. Maintaining setback requirements and the current easements/corridors should be adhered to as part of any planned re-use of the Site.

In addition to the utility easements, the California Code of Regulations, Title 5, Section 14010(c) and the California Department of Education Minimum Site Criteria document provided by the Elk Grove Unified School District (Attachment K), the Department established in consultation with the California Department of Health Services (DHS) the following limits for locating any part of a school site property line near the edge of utility easements/corridors for high voltage power transmission lines:

- 100 feet from the edge of an easement for an existing or planned 50 to 133 kV line;
- 150-feet from the edge of an easement for an existing or planned 220 to 230 kV line; and
- 350-feet from the edge of an easement for an existing or planned 500 to 550 kV line.

7.0 CONCLUSIONS

Site-related constituents at the Site do not appear to represent a significant threat to re-use of the Site. With the exception of arsenic, concentrations of detected Site-related constituents were less than the applicable residential and industrial CHHSLs, RSLs, and ESLs for soil, based on the results of LFR's 2003 investigation and NCE's 2010 follow-on field investigation. Arsenic was detected in soil samples collected from the Site at concentrations exceeding the regulatory screening levels for unrestricted/residential land uses. It was also detected in all of the soil samples except one at concentrations greater than the less conservative regulatory screening levels (i.e., commercial/industrial land uses). However, the arsenic present at the Site appears to be from naturally occurring sources instead of anthropogenic contributions or a Site-specific release based on the following:

- Background concentrations of arsenic in California soils typically exceed risk-based screening levels.
- Detected and non-detected concentrations of chlorinated herbicides and pesticides did not correlate with the detected concentrations of arsenic.
- The occurrence and concentrations of arsenic in the soil at the Site are similar, randomly distributed, and within the range of published sources of information on background concentrations found in California soils from mostly agricultural fields distant from known sources of contamination throughout the state, including cropland soils in seven vegetable producing regions, and background concentrations for arsenic in soil at two nearby properties that have the same lithology as that found on-site.

The adjoining property to the west, the F-P Landfill, does not appear to represent a significant threat to re-use of the Site. TCFM is present in groundwater beneath the F-P Landfill and the Site. However, the TCFM appears to be localized at the F-P Landfill in the vicinity of monitoring wells MW-D and MW-F, and at the Site in the vicinity of monitoring well MW-2, located immediately adjacent to and east of the F-P Landfill. The reported concentrations do not exceed the applicable EPA Region 9 RSLs. During the most recent sampling events conducted at the F-P Landfill in May and November 2009, TCFM was detected in groundwater samples from well MW-D (located in the center of the F-P Landfill) at concentrations of 3.9 and 4.42 µg/L, respectively. TCFM was detected in samples from well MW-F (located in the southeast corner of the F-P Landfill) during those same events at concentrations of 4.7 and 9.92 µg/L, respectively. Between December 2004 and May 2010, the most recent sampling events conducted at the Site, TCFM was detected in samples collected from well MW-2 (located on the Site), at concentrations ranging from 0.57 to 2.7 µg/L. Each of these concentrations is more than three orders of magnitude less than the RSL for tap water of 1,300 µg/L.

Based on the presence of a volatile compound in groundwater beneath the Site, the potential for the compound to pose a vapor intrusion risk was evaluated. Based on the evaluation, volatilization of the TCFM detected in groundwater at the F-P Landfill and the Site does not appear to be a concern. This conclusion is based on a comparison of the most recent groundwater and soil vapor data collected at the Site and at the F-P, respectively, to screening levels generated using the Johnson-Ettinger Vapor intrusion screening level model found on the EPA online database. The model output provided screening values for concentrations that included screening values for TCFM in groundwater and soil gas. Comparison of those estimated screening values resulted in the following:

- TCFM was detected in a groundwater sample collected from on-site monitoring well MW-2 during the most recent monitoring event (conducted in May 2010) at the Site at a concentration of 1.2 µg/L. This sample concentration is two orders of magnitude less than the "more protective" groundwater TCFM screening level for potential vapor intrusion concerns of 692.5 µg/L.

- TCFM was detected in a soil vapor sample collected in November 2009 from soil vapor monitoring well GP-2D (located in the southeast portion of the F-P Landfill) at a concentration of 9,900 µg/m^3, less than the "more protective" screening soil gas screening level of 1,388,000 µg/m^3, identified in the Johnson Ettinger Screening Level Model.

The adjoining property to the south, the L and D Landfill, also does not appear to represent a significant threat to re-use of the Site. Historically, VOCs have been detected in groundwater and LFG in the southern portion, or LF-1 section of the landfill. During the most recent groundwater and LFG monitoring events (conducted in 2009), VOCs were not detected in groundwater and LFG monitoring points located adjacent to the Site suggesting a low potential for impacts to the Site itself. Another potential source of VOCs could be from migration of LFG in the vadose zone (unsaturated zone located above the water table) from the landfill to the Site. However, L and D Landfill's environmental consultant (i.e., SCS Engineers) concluded in its recent technical report (i.e., *Second Semi-Annual 2009 Monitoring Report, LFG Migration Control System, L and D Landfill, Sacramento, California*) that the LFG extraction system is controlling LFG migration. Based on this conclusion, it appears unlikely that VOCs present in landfill gas at the L&D Landfill will impact the Site.

In addition to reviewing the existing and recently collected environmental data for the Site, NCE also conducted an assessment of several potential on- and/or off-site environmental concerns (i.e., natural and manmade hazardous conditions), including (1) potential asbestos-containing material (ACM), (2) naturally occurring asbestos (NOA) in Site soils, (3) the presence of current or former oil and gas fields, and (4) potential for exposure to electric and magnetic fields (EMF) from on-site and nearby overhead electric distribution and transmission lines. The findings of the assessment indicated the following:

- On January 27, 2011, NCE looked at the existing onsite building located on the Matsuda property for potential asbestos containing materials (ACM). The building was observed to be made out of steel and aluminum only. No other building materials were visible.
- Review of published geologic documents did not identify the presence of NOA within the Site vicinity.
- No current or former oil and gas fields (i.e., oil and gas, dry gas production, water source production, gas storage [production and injection], liquefied gas [production and injection], or geothermal wells were identified within an approximate one-mile radius of the Site during a review of the the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR) Online Mapping System (http://maps.conservation.ca.gov/doms/doms-app.html).

- According to Ms. Del Rio with the SMUD Real Estate Department during a phone conversation with NCE on January 26, 2011, the Sacramento Municipal Utility District (SMUD) and the Western Area Power Administration (WAPA), an agency of the United States Department of Energy (DOE), maintain right-of-ways for their transmission lines to ensure adequate building setback requirements with the intent to avoid concerns related to possible health and safety aspects relating to overhead transmission lines. Maintaining setback requirements and the current easements/corridors should be adhered to as part of any planned re-use of the Site.

- In addition, to the building setback restrictions related to the utility easements, the California Code of Regulations, Title 5, Section 14010(c) and the California Department of Education Minimum Site Criteria document provided by the Elk Grove Unified School District (Attachment K), the California Department of Education established in consultation with the California Department of Health Services (DHS) the following limits for locating any part of a school site property line near the edge of utility easements/corridors for high voltage power transmission lines:
    - 100 feet from the edge of an easement for an existing or planned 50 to 133 kV line;
    - 150-feet from the edge of an easement for an existing or planned 220 to 230 kV line; and
    - 350-feet from the edge of an easement for an existing or planned 500 to 550 kV line.

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TABLES

Table 1
Summary of Soil Analytical Data - Aspen 1 Property
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Sample Location Identification	Date Sampled	Sample Depth (Feet bgs)	Total Metals[1] (mg/kg)													Chlorinated Herbicides[2] (mg/kg)		
			Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybedenum	Nickel	Silver	Vanadium	Zinc	2,4-DB	MCPA	MCPP
B-1-Surface	6/23/03	--	4.2	130	<1.0	<1.0	65	11	27	7.8	<1.0	56	<1.0	61	64	<1.0	<100	<100
B-2-Surface	6/23/03	--	4.4	120	<1.0	<1.0	69	11	24	7.3	<1.0	49	<1.0	61	61	<1.0	<100	<100
B-3-Surface	6/23/03	--	4.2	140	<1.0	<1.0	61	12	31	14	<1.0	47	<1.0	52	64	<1.0	<100	<100
B-4-Surface	6/23/03	--	6.9	140	<1.0	<1.0	74	13	33	11	<1.0	53	<1.0	80	78	<1.0	<100	<100
B-5-Surface	6/23/03	--	5.7	160	<1.0	<1.0	81	19	36	9.8	<1.0	78	<1.0	87	86	<1.0	<100	<100
B-6-Surface	6/23/03	--	7.5	190	<1.0	<1.0	110	22	47	20	1.5	94	<1.0	110	100	<1.0	<100	<100
B-1-Surface	6/23/03	--	4.2	130	<1.0	<1.0	65	11	27	7.8	<1.0	56	<1.0	61	64	<1.0	<100	<100
B-2-Surface	6/23/03	--	4.4	120	<1.0	<1.0	69	11	24	7.3	<1.0	49	<1.0	61	61	<1.0	<100	<100
B-3-Surface	6/23/03	--	4.2	140	<1.0	<1.0	61	12	31	14	<1.0	47	<1.0	52	64	<1.0	<100	<100
B-4-Surface	6/23/03	--	6.9	140	<1.0	<1.0	74	13	33	11	<1.0	53	<1.0	80	78	<1.0	<100	<100
B-5-Surface	6/23/03	--	5.7	160	<1.0	<1.0	81	19	36	9.8	<1.0	78	<1.0	87	86	<1.0	<100	<100
B-6-Surface	6/23/03	--	7.5	190	<1.0	<1.0	110	22	47	20	1.5	94	<1.0	110	100	<1.0	<100	<100
Perkins Rock Pond - Silt	03/05/10	--	**3.2**	63	<0.50	<0.50	27	7.4	23	2.9	1.3	21	<0.50	37	27	--	--	--
Rock Plt. Pond Aspen 1-F	07/16/10	--	**4.8**	120	<0.50	<0.50	51	13	36	4.6	1.1	37	0.66	63	47	--	--	--
Prewash Pond - Silt	03/05/10	--	**5.0**	170	<0.50	<0.50	41	19	39	9.0	2.3	46	<0.50	68	61	--	--	--
Prewash Pond Aspen 4-A	07/16/10	--	**6.2**	200	<0.50	0.65	55	22	50	7.5	1.4	60	0.80	82	59	--	--	--
NCE-1-0.5	4/23/10	0.5	**4.47**	109	0.438	<0.5	49.6	10.6	23.3	8.25	0.663	40	<0.5	62.7	37.3	<0.033	1.8	<1
NCE-2-0.5	4/23/10	0.5	**3.57**	114	<0.4	<0.5	43.8	10	20.8	6.09	1	44.3	<0.5	54.6	36.4	<0.033	<1	1.6
NCE-3-0.5	4/23/10	0.5	**3.55**	122	<0.4	<0.5	39.4	9.37	21.7	5.5	<0.5	42.4	<0.5	49.9	38.1	<0.033	<1	<1
NCE-4-0.5	4/23/10	0.5	**4.49**	107	0.459	<0.5	50.4	9.99	24.2	7.18	0.595	45.3	<0.5	61.1	38.8	<0.033	<1	<1
NCE-5-0.5	4/23/10	0.5	**3.86**	98.1	<0.4	<0.5	42.9	9.85	22.4	6.2	0.523	47.9	<0.5	54.2	38.6	<0.033	<1	<1
NCE-6-0.5	4/23/10	0.5	**3.84**	93.6	<0.4	<0.5	40.8	10.4	21.9	6.6	0.624	47.5	<0.5	50.3	40.7	<0.033	<1	<1
NCE-7-0.5	4/23/10	0.5	**3.53**	121	<0.4	<0.5	39.4	9.24	21.2	6.3	0.501	45.4	<0.5	46.4	35.8	<0.033	3	<1
NCE-8-0.5	4/23/10	0.5	**3.21**	109	<0.4	<0.5	41.7	9.26	19.8	5.96	<0.5	43.1	<0.5	46.6	33.1	<0.033	<1	<1
NCE-9-0.5	4/23/10	0.5	**4.75**	120	<0.4	<0.5	46.6	16.3	25.5	7.29	1.77	56.3	<0.5	58.2	45	<0.033	6	<1
NCE-10-0.5	4/23/10	0.5	**4.02**	119	<0.4	<0.5	46.6	10.5	23.9	7.17	1.48	52.7	<0.5	54.2	43.6	<0.033	7.4	<1
NCE-11-0.5	4/23/10	0.5	**4.43**	132	<0.4	<0.5	47.5	10.8	24.4	8.01	0.541	52.2	<0.5	57.4	45.2	<0.033	<1	<1
NCE-12-0.5	4/23/10	0.5	**3.34**	103	<0.4	<0.5	33.7	7.94	18.2	5.38	0.57	36.9	<0.5	42.8	37.4	<0.033	6.2	<1
NCE-13	5/5/10	0.5	**1**	61.8	<0.4	<0.5	31.9	5.63	21.2	5.01	<0.5	29.9	<0.5	32.4	30.1	0.11	<1	<1
NCE-14	5/5/10	0.5	**2.64**	85.9	<0.4	<0.5	41	11.3	26.2	6.29	<0.5	45.8	<0.5	38.2	37	<0.033	<1	<1
NCE-15	5/5/10	0.5	**3.19**	110	<0.4	<0.5	41.3	10.9	24.8	6.96	<0.5	38.1	<0.5	43.7	38.2	0.052	<1	<1
CHHSLs for Residential Land Uses			0.07	5,200	150	1.7	100,000	660	3,000	80	380	1,600	380	530	23,000	NL	NL	NL
CHHSLs for Industrial Land Uses			0.24	63,000	1,700	7.5	100,000	3,200	38,000	3,500	4,800	16,000	4,800	6,700	100,000	NL	NL	NL
RSLs for Residential Land Uses			0.39	15,000	160	70	120,000	23	3,100	400	390	1,600	390	390	23,000	490	31	61
RSLs for Industrial Land Uses			1.6	190,000	2,000	800	1,500,000	300	41,000	800	5,100	20,000	5,100	5,200	31,000	4,900	310	620
ESLs for Unrestricted/Residential Land Uses			0.38	750	4	1.7	750	40	230	200	40	150	20	15	600	NL	NL	NL
ESLs for Commercial/Industrial Land Uses			1.5	1,500	8	7.4	750	80	230	750	40	150	40	190	600	NL	NL	NL

[1] Total metals by either EPA Method SW6020, 6020A, or 7471A. Only total metals that were detected are listed in this table. For a full list of total metals, see the attached analytical report.

[2] Chlorinated herbicides by EPA Method 8151A. Only chlorinated herbicides that were detected are listed in this table. For a full list of chlorinated herbicides, see the attached analytical report.

2,4-DB = 4-(2,4-dichlorophenoxy)butyric acid.
MCPA = 2-methyl-4-chlorophenoxyacetic acid.
MCPP = 2-(2-methyl-4-chlorophenoxy) propionic acid.
< ( ) = Below laboratory reporting limit.
mg/kg = Milligrams per kilogram.
bgs = Below ground surface.
-- = Not applicable or not analyzed.
CHHSLs = California Human Health Screening Levels developed by the California Environmental Protection Agency (CalEPA) Office of Environmental Health Hazard Assessment.
RSLs = Regional Screening Levels developed by Region 9 of the United States Environmental Protection Agency (EPA).
ESLs = Environmental Screening Levels for shallow soils less than or equal to 3-meters (approximately 10-feet) bgs and groundwater is current or potential source of drinking water.
ESLs developed by the California Regional Water Quality Control Board, San francisco Bay Area Region (CRWQCBSF).
NL = Not listed.
Bolded and shaded values indicate a concentration exceeded the CHHSL, RSL, and ESL for residential land use.
Chemical analyses for samples collected in June 2003 were performed by Alpha Analytical, Inc. located in Sparks, Nevada.
Chemical analyses for samples collected in March 2010 were performed by California Laboratory Services located in Rancho Cordova, California.
Chemical analyses for samples collected in April and May 2010 were performed by South Petroleum Laboratories, Inc. (SPL) located in Houston, Texas.

Table 2
Summary of Groundwater Analytical Data - F-P Landfill
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Sample Location Identification	Date Sampled	Chloroform (ug/L)	TCE (ug/L)	Methylene Chloride (ug/L)	TCFM (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	Nitrates as NO_3 (mg/L)	Specific Conductance (ug/cm)	TDS (mg/L)	Aluminum (mg/L)	Chromium (mg/L)	Manganese (mg/L)
MW-A	05/25/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	NA	NA	NA	0.061	0.055	<0.020
	11/16/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	30	378	280	<0.050	0.050	<0.020
MW-B	05/25/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	NA	NA	NA	0.44	<0.010	0.037
	11/16/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	42	707	480	0.72	<0.010	0.041
MW-C	05/25/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	NA	NA	NA	<0.050	0.084	<0.020
	11/16/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	39	1,590	920	0.12	0.052	<0.020
MW-D	05/25/09	<0.50	<0.50	<0.50	3.9	<0.50	<0.50	<1.0	NA	NA	NA	1.1	0.022	0.083
	11/16/09	<0.50	<0.50	<0.50	4.4	<0.50	<0.50	<1.0	38	654	490	1.4	<0.010	0.069
MW-E	05/25/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	NA	NA	NA	0.200	<0.010	<0.020
	11/16/09	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<1.0	56	822	500	0.270	<0.010	<0.020
MW-F	05/25/09	<0.50	<0.50	<0.50	4.4	<0.50	<0.50	<1.0	NA	NA	NA	1.1	<0.010	0.051
	11/16/09	<0.50	<0.50	<0.50	9.9	<0.50	<0.50	<1.0	40	780	590	1.3	<0.010	0.045

TCE = Trichloroethene.
TCFM = Trichlorofluoromethane.
TDS = Total dissolved solids.
µg/L = Micrograms per liter.
µg/cm = Micrograms per centimeter.
mg/L = Milligrams per liter.
NA = Not available.
Chemical analyses for samples were performed by California Laboratory Services located in Rancho Cordova, California.

Table 3
Summary of Groundwater Analytical Data - Aspen 1 Property
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Well Number	Date Sampled	Top of casing Elevation (Feet msl) ^{1}	Depth to Groundwater (Feet bgs)	Groundwater Elevation (Feet bgs)	VOCs (ug/L)	Total Alkalinity (mg/L)	Bicarbonate (CaCO3) (mg/L)	Carbonate (CaCO3) (mg/L)	Hydroxide (CaCO3) (mg/L)	Sulfate (mg/L)	Nitrate (N) (mg/L)	Chloride (mg/L)	TDS (mg/L)	EC (uS/cm)
MW-1	03/13/01	34.08	54.52	-20.44	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	09/12/01	34.08	55.07	-20.99	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/4/02	34.08	57.91	-23.83	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/15/02	34.08	55.70	-21.62	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	05/30/03	34.08	53.08	-19.00	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/31/03	34.08	55.42	-21.34	ND	**310**	**310**	<5.0	<5.0	**41**	NA	NA	**500**	NA
	07/01/04	34.08	53.03	-19.85	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/04	34.08	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	02/02/05	34.08	54.97	-20.89	ND	**260**	**260**	<1.0	<1.0	**61**	**6.3**	**30**	**430**	**650**
	10/28/05	32.75	55.44	-22.69	ND	**310**	**310**	<1.0	<1.0	**42**	**4.9**	**19**	**450**	NA
	06/30/06	32.75	50.48	-17.73	ND	**440**	**440**	<1.0	<1.0	**45**	**8**	**10**	**585**	NA
	11/20/07	32.75	52.60	-19.85	ND	**380**	**380**	NA	NA	**47**	**8**	**18**	**580**	**940**
	06/09/08	32.75	50.76	-18.01	ND	**400**	**400**	<5.0	<5.0	**45**	**8.5**	**15**	**560**	**920**
	11/03/08	32.75	53.21	-20.46	ND	**420**	**420**	<5.0	<5.0	**52**	**8.3**	**21**	**600**	**920**
	05/11/09	32.75	51.73	-18.98	ND	**410**	**410**	<5.0	<5.0	**43**	**7.1**	**23**	**600**	**930**
	11/12/09	32.75	52.85	-20.10	ND	**440**	**440**	<5.0	<5.0	**50**	**5.6**	**24**	**590**	**980**
	05/05/10	32.75	50.94	-18.19	ND	**500**	**500**	<10	<10	**44**	**7.6**	**33**	**600**	**970**
MW-2	03/13/01	35.46	57.26	-21.8	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	09/12/01	35.46	57.91	-22.45	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/4/02	35.46	56.55	-21.09	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/15/02	35.46	58.40	-22.94	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	05/30/03	35.46	56.28	-20.82	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/31/03	35.46	58.24	-22.78	ND	**200**	**200**	<5.0	<5.0	**10**	NA	NA	NA	NA
	07/01/04	35.46	57.06	-21.6	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/04	35.46	NA	NA	**1.3 ***	NA	NA	NA	NA	NA	NA	NA	NA	NA
	02/02/05	35.46	58.10	-22.64	ND	**170**	**170**	<1.0	<1.0	**13**	**7.7**	**9.5**	**430**	**660**
	10/28/05	34.24	58.11	-23.87	ND	**180**	**170**	<1.0	<1.0	**13**	**7.5**	**72**	**410**	NA
	06/30/06	34.24	53.65	-19.41	**0.57 ***	**180**	**180**	<1.0	<1.0	**23**	**8.8**	**88**	**547**	NA
	11/20/07	34.24	55.20	-20.96	**1.3 ***	**230**	**230**	NA	NA	**42**	**9.8**	**80**	**520**	**840**
	06/09/08	34.24	53.52	-19.28	**1.8 ***	**240**	**240**	<5.0	<5.0	**51**	**9.8**	**76**	**520**	**880**
	11/03/08	34.24	55.48	-21.24	**2.4 ***	**210**	**210**	<5.0	<5.0	**60**	**10**	**73**	**520**	**830**
	05/11/09	34.24	54.28	-20.04	**2.7 ***	**250**	**250**	<5.0	<5.0	**55**	**11**	**74**	**570**	**870**
	11/12/09	34.24	55.32	-21.08	**1.2 ***	**250**	**250**	<5.0	<5.0	**57**	**12**	**85**	**530**	**910**
	05/05/10	34.24	53.58	-19.34	**1.2 ***	**260**	**260**	<10	<10	**53**	**13**	**89**	**520**	**920**
MW-3	03/13/01	35.37	58.62	-23.25	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	09/12/01	35.37	59.19	-23.82	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	03/4/02	35.37	53.52	-18.15	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/15/02	35.37	59.60	-24.23	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	05/30/03	35.37	57.93	-22.56	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/31/03	35.37	59.51	-24.14	ND	**180**	**180**	<5.0	<5.0	**53**	NA	NA	**420**	NA
	07/01/04	35.37	58.73	-23.36	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	12/10/04	35.37	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
	02/02/05	35.37	59.54	-24.17	ND	**230**	**230**	<1.0	<1.0	**34**	**18**	**24**	**500**	**750**
	10/28/05	33.38	59.35	-25.47	ND	**210**	**210**	<1.0	<1.0	**42**	**8.9**	**14**	**380**	**NA**
	06/30/06	33.38	55.43	-21.55	ND	**320**	**320**	<1.0	<1.0	**37**	**8.2**	**15**	**467**	**NA**
	11/20/07	33.38	57.70	-23.82	ND	**420**	**420**	NA	NA	**38**	**10**	**17**	**560**	**880**
	06/09/08	33.38	54.80	-20.92	ND	**380**	**380**	<5.0	<5.0	**39**	**14**	**18**	**570**	**940**
	11/03/08	33.38	56.15	-22.27	ND	**370**	**370**	<5.0	<5.0	**37**	**14**	**19**	**560**	**860**
	05/11/09	33.38	55.21	-21.33	ND	**400**	**400**	<5.0	<5.0	**34**	**14**	**16**	**580**	**910**
	11/12/09	33.38	56.26	-22.38	ND	**400**	**400**	<5.0	<5.0	**36**	**13**	**16**	**550**	**900**
	05/05/10	33.38	54.77	-20.89	ND	**410**	**410**	<10	<10	**38**	**17**	**17**	**320**	**940**

(1) Top of casing was re-surveyed prior to the 10/05/05 monitoring event.
* = Trichlorofluoromethane (TCFM).
VOCs = Volatile organic compounds.
EC = Electric conductivity.
TDS = Total dissolved solids.
msl = Mean sea level.

bgs = Below ground surface.
NA = Information not available.
ND = Analyte not detected.
mg/L = Milligrams per liter.
uS/cm = Microsiemens per centimeter.
Detected analytes are **bold.**

Table 4
Summary of 2009 Groundwater Table Elevations - L and D Landfill
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Well Sample	MP Elevation (feet) #	MP Elevation (feet) ##	1Q2009 DTW (feet bmp)	Water Elevation (feet msl)	2Q2009 DTW (feet bmp)	Water Elevation (feet msl)	3Q2009 DTW (feet bmp)	Water Elevation (feet msl)	4Q2009 (11/4/09) DTW (feet bmp)	Water Elevation (feet msl)	4Q2009 (11/24/09) [1] DTW (feet bmp)	Water Elevation (feet msl)
MW-2A	48.34	47.99	72.88	-24.54	70.46	-22.12	73.16	-25.17	72.30	-24.31	72.21	-24.22
MW-3	32.70	32.62	56.12	-23.42	53.54	-20.84	58.39	-25.77	NC	----	54.55	-21.93
MW-4	45.78	45.23	69.96	-24.18	68.14	-22.36	70.06	-24.83	69.35	-24.12	69.26	-24.03
MW-5	43.48		67.21	-23.73	65.51	-22.03	68.41	-24.93	66.22	-22.74	66.16	-22.68
MW-6	51.16	50.69	76.10	-24.94	74.19	-23.03	76.49	-25.8	75.28	-24.59	75.23	-24.54
MW-7	50.77	50.45	75.98	-25.21	74.40	-23.63	76.29	-25.84	74.91	-24.46	74.82	-24.37
MW-8	47.50	47.30	72.08	-24.58	70.39	-22.89	72.53	-25.23	71.43	-24.13	71.34	-24.04
MW-9	46.21	46.11	71.81	-25.60	68.44	-22.23	72.18	-26.07	70.0	-23.89	69.89	-23.78
MW-9D**												
MW-10	48.46	46.69	72.39	-23.93	70.29	-21.83	72.41	-25.72	NC	----	70.33	-23.64
MW-11	48.46	46.67	70.65	-22.19	70.05	-21.59	71.49	-24.82	70.20	-23.53	70.11	-23.44
MW-12	33.63		56.32	-22.69	54.22	-20.59	56.71	-23.08	Erroneous data collected [2]		55.31	-21.68
MW-13	29.49		52.57	-23.08	50.16	-20.67	52.91	-23.42	51.90	-22.41	51.90	-22.41
MW-14	28.69		53.55	-24.86	50.60	-21.91	54.01	-25.32	52.34	-23.65	52.22	-23.53
MW-14D***												
MW-15	42.53		67.77	-25.24	66.10	-23.57	68.14	-25.61	66.96	-24.43	66.86	-24.33
MW-16	41.39		67.10	-25.71	64.75	-23.36	67.26	-25.87	66.35	-24.96	65.57	-24.18
MW-17	41.15		67.81	-26.66	65.31	-24.16	68.18	-27.03	65.62	-24.47	66.22	-25.07
MW-18	47.47		72.91	-25.44	71.46	-23.99	73.03	-25.56	71.70	-24.23	71.70	-24.23
MW-19	48.69		74.06	-25.37	72.84	-24.15	74.22	-25.53	72.85	-24.16	72.7	-24.01
MW-20	50.37		75.89	-25.52	75.89	-25.52	76.14	-25.77	74.85	-24.48	74.95	-24.58
MW-21	48.98		74.19	-25.21	73.65	-24.67	74.37	-25.39	73.30	-24.32	73.35	-24.37
MW-22	48.15		73.06	-24.91	72.87	-24.72	73.81	-25.66	72.35	-24.2	72.3	-24.15
MW-23	46.63		72.14	-25.51	72.04	-25.41	72.51	-25.88	70.90	-24.27	70.8	-24.17
MW-24	46.14		72.66	-26.52	71.55	-25.41	73.16	-27.02	69.8	-23.66	69.8	-23.66
MW-25	28.48	28.01	49.00	-20.52	47.64	-19.16	49.22	-21.21	49.23	-21.22	49.21	-21.20
MW-26	34.79	34.47	57.71	-22.92	56.81	-22.02	58.19	-23.72	56.07	-21.6	56.06	-21.59
MW-28	28.77	28.27	50.16	-21.39	48.96	-20.19	50.63	-22.36	49.77	-21.5	49.82	-21.55
MW-29	32.03	31.68	53.56	-21.53	52.52	-20.49	53.79	-22.11	53.87	-22.19	53.78	-22.10
MW-30	70.71		95.20	-24.49	92.89	-22.18	93.14	-22.43	93.94	-23.23	93.90	-23.19
MW-31 **	58.96	58.34	69.96	-11.00	80.22	-21.26	80.82	-22.48	Erroneous data collected [2]		81.26	-22.92
MW-32 ***	44.38		67.21	-22.83	67.16	-22.78	70.31	-25.93	68.79	-24.41	68.67	-24.29
MW-32****												

*Measuring points were resurveyed on July 6, 2009 and again on 9/10/09. Previous survey data was used to calculate the 1Q2009 elevations.
7/10/09 survey data was used to calculate the 2Q2009 elevations. 9/10/09 survey data was used to calculate the 3Q2009 and 4Q2009 elevations.
**Casing was extended following the 1Q09 depth to water measurement. Previous survey elevation of 47.45 ft msl used to calculate groundwater elevation for 1Q09.
***Depth to water was recorded as 76.16 on field sheets for 2Q2009 event, but is believed to be 67.16

[1] Depth to water readings were collected twice during the fourth quarter because not all wells were accessible and data for wells 12 and 31 appeared erroneous during during the 11/04/09 data collection event.

[2] Depth to water measurements were recorded at well 12 (70.35 feet) and well 31 (51.40 feet). These are not believed to represent accurate readings for these locations, and it is possible the data was switched between wells on field data sheets. Depth to water readings were collected again on 11/24/2009

ft msl = feet above mean sea level.
MP = measuring point
bmp = below measuring
NC = Not collected
# = Survey 7/6/09
= Survey 9/10/09

Table 5
Summary of Groundwater Analytical Data - L and D Landfill
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

Sample Location Identification	Date Sampled	General Wet Chemistry		Ions				Total Metals				Volatile Organic Compounds															TICs (Volatile Organic Compounds)									
		mg/L										µg/L															µg/L									
		Total Alkalinity	Total Dissolved Solids	Chloride	Nitrate as N	Bicarbonate	Sulfate as $S0^4$	Calcium	Magnesium	Sodium	Potassium	Chlorobenzene	Chloroform	Chloromethane	1,2-dichlorobenzene	1,4-dichloroethane	1,1-dichlroethane	1,2-dichlroethane	cis-1,2-dichlroethene	Methylene chloride	Methyl t-butyl ether	Tetrachloroethene	Toluene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	1,1-Dichloro-1-fluoroethane	1-Chloro-1-fluoroethane	Chlorodifluoromethane	Chlorofluoromethane	Dichlorofluoromethane	Diethyl ether	Dimethyl sulfide	Isopropyl alcohol	Tetrahydrofuran	Unknown compound
MW-2A	5/13/09	350	480	24		430	26	71	44	16	3.2						0.13J		2.7										0.98							
	11/12/09	350	490	22		430	23	73	46	15	3.3		0.080JB				0.15J		2.4									0.76	0.85			1.5J				
MW-4	5/13/09	110	210	10	1.9	130	5.3	25	9.3	13	2.0																									
	11/11/09	580	840	70		710	52	140	81	29	4.4										0.59								3.9			2.1			13J	0.69
MW-5	5/15/09	240	430	14	2.3	290	50	62	32	12	2.9	0.48J										0.46J		0.17J					1.1							
	11/9/09	260	440	18	1.5	320	68	72	39	13	3.0						0.11J		0.27J			0.65		0.27J	0.19J											
MW-8	5/13/09	87	170	7.9	1.5	110	3.0	19	7.3	12	1.8																									
	11/11/09	92	180	7.6	1.6	110	3.0	20	8.5	12	1.8			0.74B																						
MW-9	5/13/09	110	200	10	1.9	130	5.5	25	9.3	14	2.1																							87J		
	11/11/09	130	240	10	1.9	150	7.4	31	12	13	2.2			0.58B																						
MW-9D**	11/11/09	130	230	10	1.9	150	7.5	31	12	13	2.2																									
MW-11	5/13/09	470	660	36	2.8	570	43	100	55	29	3.4																									
	11/11/09	410	580	45	0.58	500	22	110	41	27	3.9			0.75B			0.19J												1.7			1.8J				
MW-12	5/13/09	580	750	18	9.6	710	36	140	62	28	3.8																									
	11/9/09	600	720	13	9.8	730	31	140	67	29	4.1																									
MW-13	5/13/09	290	450	18	6.3	360	24	80	24	24	3.6																									
	11/9/09	250	420	23	1.4	300	36	68	27	18	2.7																									
MW-14	5/14/09	300	460	19	5.2	360	30	91	19	25	4.2																									
	11/9/09	290	470	17	4.9	360	29	89	19	23	4.4																									
MW-14D***	5/14/09	300	410	18	5.0	360	30	88	19	25	4.3																									
MW-15	5/15/09	110	250	7.6	2.0	140	22	23	15	17	2.7																									
	11/10/09	110	250	7.6	2.2	140	22	24	16	15	2.1																									
MW-16	5/15/09	79	170	4.6	1.3	96	4.3	16	6.2	11	2.1																									
	11/10/09	73	160	4.2	1.2	89	1.9	16	5.3	9.6	2.0																									
MW-17	5/15/09	73	150	4.1	1.2	89	1.8	15	4.9	11	1.9																									
	11/10/09	480	440	39	2.1	580	24	110	59	23	4.0						0.56		1.7			1.4		0.66												
MW-18	5/12/09	300	440	24	3.3	370	22	63	35	19	2.6						0.40J		1.0									0.77	0.34							
	11/4/09	290	470	22	3.7	350	18	64	37	18	2.7						0.37J		0.76			0.24J		0.25J	0.12J			0.67	0.99							
MW-19	5/12/09	300	430	24	2.2	360	14	60	32	19	2.7						0.50		2.0			0.36J		0.21J	0.41J		2.4	0.84	2.0		0.93					
	11/4/09	310	480	22	2.0	380	12	66	38	17	2.8						0.49J		1.9			0.37J			0.35J		1.6	1.4	1.5		1.7					
MW-20	5/12/09	420	430	21	1.2	510	26	91	40	23	4.2					0.43J	2.1		1.5			0.37J		0.28J	0.39J				6.7	2.8	4.7					
	11/4/09	450	630	20	1.1	550	25	110	50	23	4.3					0.47J	2.1	0.18J	1.8			0.52		0.43J	0.30J				7.8	3.2	4.5	2.2				
MW-21	5/12/09	360	460	23	1.6	440	34	76	38	21	3.6						0.70		2.2			0.32J							4.3	0.68	0.95					
	11/4/09	360	530	21	1.4	440	31	80	43	20	3.7					0.10J	0.59		2.2			0.28J		0.26J	0.16J				3.8		0.60	0.89J				
MW-22	5/12/09	320	480	23	0.70	390	32	67	37	18	2.8	0.14J			1.1	0.25J	0.13J		3.0									0.29	1.2							
	11/4/09	330	500	22	0.63	400	29	73	43	18	3.0	0.13J			0.87	0.19J	0.14J		2.2					0.24J		015J		1.2	1.3			0.96J				
MW-23	5/12/09	410	590	37	1.0	510	27	85	47	22	3.1	0.21J							1.0										2.9							
	11/4/09	440	640	37	0.77	530	27	95	55	24	3.3	0.5J					0.16J		0.94		0.15J	0.17J							3.0							
MW-24	5/13/09	450	630	40	1.2	550	45	99	54	29	3.2																		1.0							
	11/4/09	440	680	36	1.3	540	44	97	56	28	3.2		0.080JB																1.1			1.4J				
MW-29	5/14/09	290	430	17	7.2	350	18	74	27	22	3.0																									
	11/11/09	290	420	13	7.7	350	16	74	29	22	3.1		0.080JB																							
MW-30	5/14/09	230	280	12	0.073J	280	0.72J	49	23	14	2.4												0.14J										12			
MW-31	5/14/09	350	510	22	5.4	430	28	85	33	24	3.6																									
MW-32	5/12/09	330	480	42	2.5	400	28	72	39	22	2.9						5.1		0.54	0.32J		0.52		0.57	0.96				8.6	1.0	6.7					
	11/10/09	340	370	29	2.6	420	21	80	43	22	3.4			0.99B			6.4		0.82			1.1		1.1	4.0						0.78					
MW-32****	11/10/09	340	360	29	2.6	420	21	80	42	23	3.4						5.7		0.66			0.96		1.0	3.6						0.78					

Blank Cell = Analyte was not detected.
TICs = Tentatively identified organic compounds.
**=Called out as MW-100 in lab report.
*** = Called out as MW-101 in lab report.

**** = Called out as MW-101 in lab report.
µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
J = Detected below the reporting limit but above the method detection limit.

D = Duplicate Sample
B = Compound detected in trip, field, and/or equipment blank.

PLATES

4191935012.ppt

Nichols Consulting Engineers, Chtd.
8795 Folsom Blvd., Suite 250
Sacramento, CA 95826
(916) 388-5655

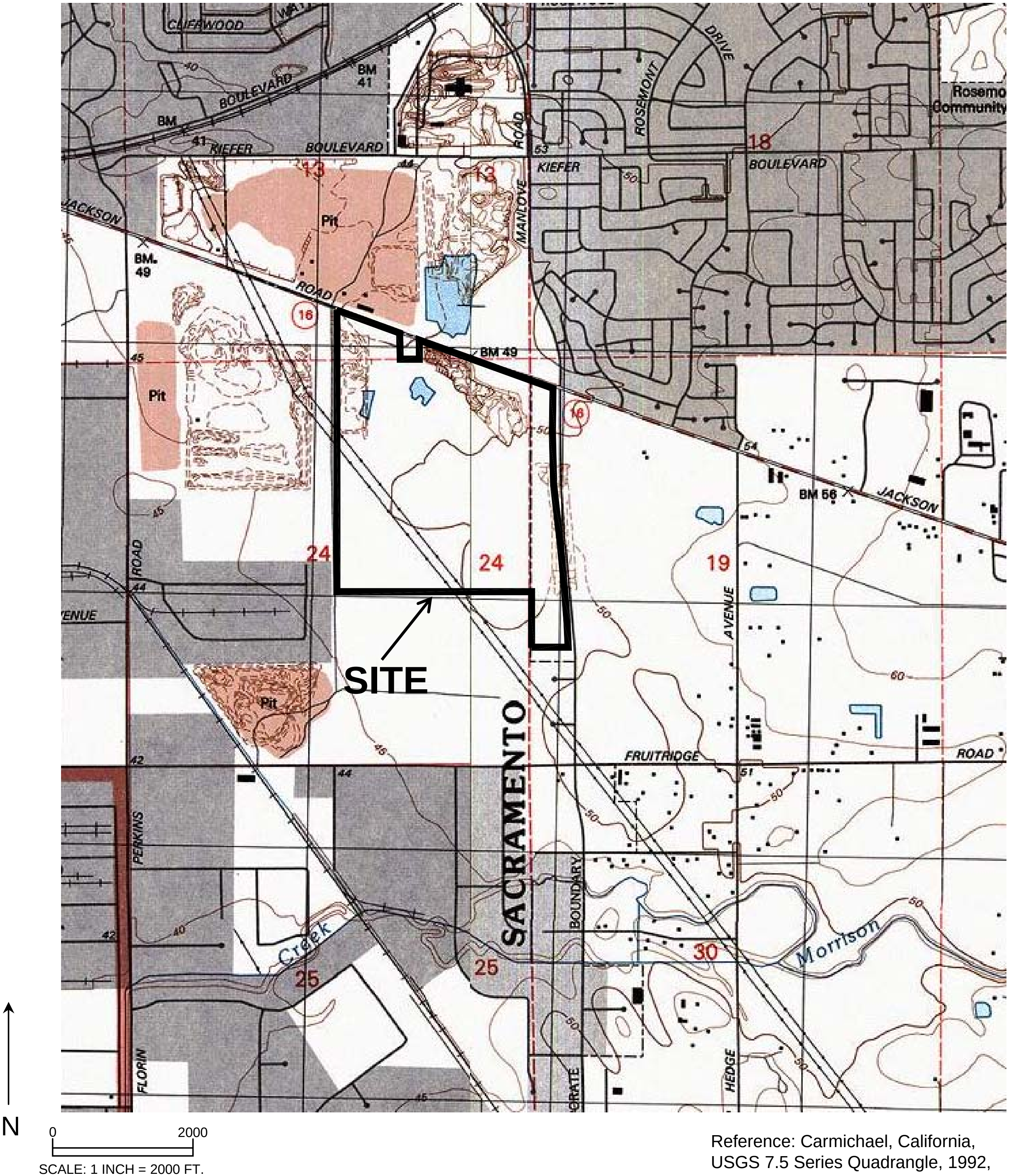
Site Location Map

Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

PLATE

1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
YVG	A419.19.35		11/10	



Reference: Carmichael, California,
USGS 7.5 Series Quadrangle, 1992,
revised, 1997.

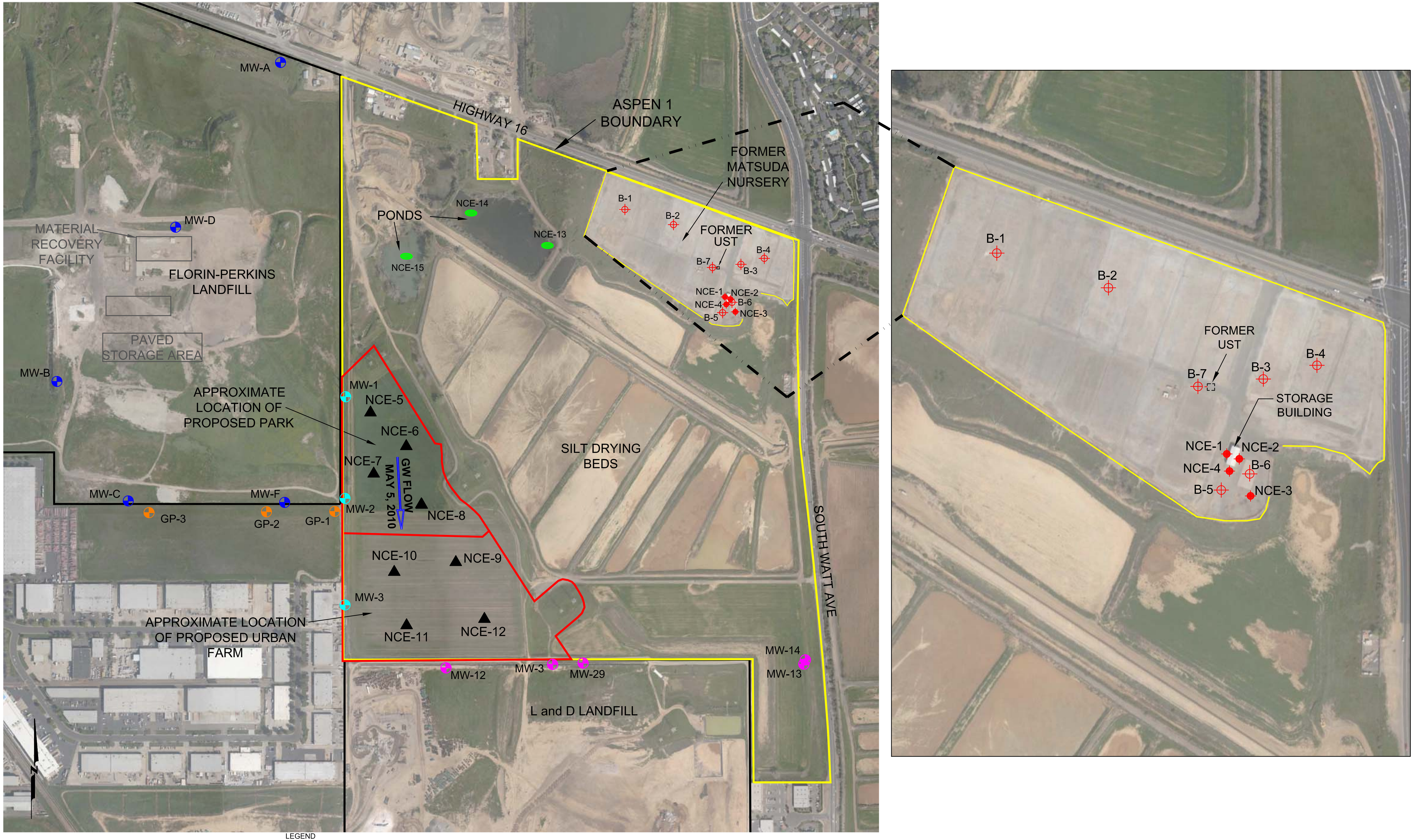
4191935013.ppt

Nichols Consulting
Engineers, Chtd.
8795 Folsom Blvd., Suite 250
Sacramento, CA 95826
(916) 388-5655

Site Vicinity Map
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

PLATE
2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
YVG	A419.19.35		11/10	



0 600

SCALE: 1 INCH = 600 FEET

Reference:
Aerial Photograph, Google Earth Pro, 2009

LEGEND

B-7 ⌖ APPROXIMATE LOCATION OF BORING PREVIOUSLY DRILLED BY LFR

NCE-3 ◆ BORING LOCATION

▲ SURFACE (TOP SOIL) SAMPLES

🟢 SEDIMENT SAMPLES

● ASPEN 1 MONITORING WELLS

● FLORIN-PERKINS GAS PROBE LOCATIONS

● FLORIN-PERKINS MONITORING WELLS

● L and D MONITORING WELLS

Nichols Consulting Engineers, Chtd.
8795 Folsom Blvd., Suite 250
Sacramento, CA 95826
(916) 388 5655

Site Plan
Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

PLATE
3

DRAWN	FILE NAME	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
YG	4191935003.dwg	A419.19.35		11/10	

APPENDIX A

LFR'S REPORT ENTITLED
SUBSURFACE SAMPLING RESULTS, MATSUDA NURSERY PROPERTY, 8888 JACKSON ROAD, SACRAMENTO, CALIFORNIA

Subsurface Sampling Results
Matsuda Nursery Property
8888 Jackson Road, Sacramento, California

December 8, 2003
003-09036-01

LFR
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Subsurface Sampling Results
Matsuda Nursery Property
8888 Jackson Road, Sacramento, California

December 8, 2003
003-09036-01

Prepared for:
Teichert Land Company
c/o: Downey Brand LLP
555 Capitol Mall, 10th Floor
Sacramento, California 95814-4686

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December 8, 2003

003-09036-01

Ms. Katharine Wagner
Downey Brand LLP
555 Capitol Mall, 10th Floor
Sacramento, California 95814-4686

Subject: Subsurface Sampling Results, Matsuda Nursery Property
8888 Jackson Road, Sacramento, California

Dear Katharine:

This letter presents the results of subsurface sampling efforts at the Matsuda Nursery property, located at 8888 Jackson Road, Sacramento, California ("the Site"). The work was performed by LFR Levine·Fricke (LFR) on behalf of Teichert Land Company ("Teichert"), and under the direction of Downey Brand LLP (Downey Brand). The scope of work summarized in this letter followed LFR's proposal to Downey Brand dated May 27, 2003.

In June 2002, LFR conducted a visual survey of the Site for potential environmental liabilities related to the use, handling, storage, and potential discharge of hazardous substances. During the review, facility personnel indicated to LFR personnel that a diesel fuel underground storage tank (UST) had been abandoned and removed in 1992. Facility personnel also indicated that a diesel fuel release had occurred to the surface prior to UST abandonment. During LFR's site reconnaissance, the LFR representative observed pesticides being handled and mixed in a manner that could potentially result in surface-water discharge of contaminants to the neighboring Aspen 1 property to the south, owned by Teichert.

On February 21, 2003, LFR issued a report summarizing a review of regulatory records concerning the Site and the results of storm-water sampling conducted at the Site in December 2002. Storm-water sampling results identified heptachlor at a concentration of 0.26 micrograms per liter (μg/l) and nitrate at concentrations up to 32 μg/l. The detected presence of heptachlor in storm-water runoff from the Site presented a concern about whether heptachlor or other pesticides and/or herbicide are present in site soils and are being discharged to the Teichert property from the Matsuda site.

SCOPE OF WORK

The scope of work for this assessment included the collection and analysis of soil samples at selected areas of the Site to evaluate impacts to the subsurface from previous and ongoing chemical use at the Site. The scope of work also included collection of soil samples adjacent to the former UST fuel dispenser to assess potential impacts associated with the former UST. A water sample was also collected from an on-site agricultural well for laboratory analysis.

On June 23, 2003, LFR coordinated the drilling and sampling of seven push-rod soil borings across the Site (B1 through B7; Figure 1). Soil borings B1 through B4 were advanced and sampled at selected locations within the nursery area to evaluate shallow soil conditions related to on-site pesticide application, while B5 and B6 were sampled within the fertilizer mixing area. Three soil samples were collected from each boring location at ground surface and from depths of approximately 3 and 6 feet below ground surface (bgs) for potential laboratory analysis. The surface samples were collected using a stainless steel hand trowel and transferred into clean glass jars provided by the analytical laboratory.

One additional soil boring (B7) was completed adjacent to the greenhouse, in the vicinity of the previous UST and fuel dispenser location (Figure 1). Boring B7 was advanced and sampled at 5-foot intervals to a depth of 20 feet bgs for the purpose of evaluating soil conditions beneath the previous UST excavation.

The soil borings were advanced using limited access drilling equipment provided by TEG of Rancho Cordova, California. Soil samples were collected in laboratory-supplied containers for soil description, field screening using a photoionization detector (PID) to identify the general presence of volatile organic compounds (VOCs) in soil vapor, and potential laboratory analysis. After completion of sampling activities, each borehole was backfilled with bentonite chips, hydrated, and capped with a concrete seal at the surface. No soil cuttings requiring off-site disposal were generated during the sampling process.

LFR also collected a water sample from the existing agricultural water supply well at the Site for the purpose of evaluating general groundwater quality. The water sample was collected from the existing pump and piping header used for irrigation at the Site. Although the actual construction details of the well are unknown and the depth to water in the supply well was not measured, LFR was informed by on-site personnel that the pump in the well draws water from below 100 feet bgs. During this assessment and previous site visits, on-site personnel informed LFR that the well routinely pumps in excess of 200 gallons per day (gpd).

ASSESSMENT FINDINGS

Observations of the lithologic conditions from the soil borings indicated that shallow soil conditions beneath the Site consist of reddish/brown clay to at least 20 feet bgs. PID screening results did not detect the presence of elevated VOCs in the soil vapor from the seven soil borings. Selected soil and groundwater samples were submitted to Alpha Analytical of Sparks, Nevada, which is certified by the California Environmental Protection Agency (Cal-EPA) for the applied test methods. A summary of the analytical methods used for each boring location is provided in Table 1. Copies of the laboratory data sheets for soil analytical results from this assessment are included in Attachment A. A summary of the analytical findings is provided below.

- Surface soil samples collected from B1 through B6 did not have detectable concentrations of organophosphate and chlorinated pesticides/herbicides above the corresponding analytical reporting limits.

- Nitrate-nitrogen was detected in three of six surface soil samples at concentrations of 18 milligrams per kilogram (mg/kg) in B1, 15 mg/kg in B5, and 130 mg/kg in B6. These detected nitrate-nitrogen concentrations are considered within the normal range for nitrates in agricultural land (Harter et al. 1997[1]). Based on the initial results for the surface soil samples, samples collected at 3 feet bgs and 6 feet bgs were not analyzed.
- Total metals concentrations in the six surface soil samples analyzed were compared to the EPA Region 9 Residential Preliminary Remedial Goals (PRGs), which are conservative screening levels used to evaluate whether chemical concentrations in soil pose a potential human health risk in a residential setting. Detected metals concentrations in the six soil samples did not exceed their corresponding Residential PRGs.
- The detected arsenic concentrations in the six surface soil samples were also compared to the corresponding EPA Site Screening Level (SSL) for arsenic, which represents leaching potential to groundwater. Detected arsenic concentrations in the six surface soil samples did not exceed the corresponding SSL for arsenic of 29 mg/kg.
- VOCs and total petroleum hydrocarbons as diesel (TPHd) were not detected above the laboratory detection limit of 10 mg/kg in the 15-foot-depth soil sample collected from B7. Because TPHd and VOC were not detected in the 15-foot-depth sample, the 20-foot-depth soil sample was not analyzed.

Soil analytical results are summarized in Tables 1 and 2.

The water sample collected from the on-site agricultural well was analyzed for general minerals analysis (alkalinity, total dissolved solids [TDS], pH, conductivity, nitrates, and chloride), VOCs, and regulated metal concentrations. The general water-quality parameters were reported within normal range and not above primary or secondary MCLs for each parameter. Of the 17 target metals analyzed in the water sample, the laboratory reporting limits for thallium and arsenic were higher than the corresponding PRGs for tap water. Given the lack of detections of thallium in shallow soil samples, and the fact that arsenic concentrations in the shallow soil samples were well below residential PRGs and the EPA's SSL, the laboratory reporting limits for these compounds in the water sample are not considered a significant concern.

Groundwater analytical results and corresponding Maximum Contaminant Levels (MCLs) are summarized in Tables 3 and 4.

---

[1] Harter et al. 1997. *Long-Term Nitrate Leaching Below the Root Zone in California Tree Fruit Orchards*, California Department of Food & Agriculture, Fertilizer Research and Education Program, FREP Contract # 97-0365 M97-04.

SUMMARY

The results of this subsurface assessment did not identify the presence of elevated pesticide or herbicide concentrations in four shallow soils collected across the nursery or from two soil samples collected in the fertilizer mixing area. Therefore, surface soil sampled during the assessment does not appear to be acting as a significant contributor of these compounds to storm-water runoff, and a specific source of the heptachlor previously detected in storm-water runoff was not identified. LFR recommends that Teichert continue to work with Matsuda to make sure that the nursery's chemical handling practices do not contribute contaminants to storm water.

The detected nitrate concentrations in three of the six shallow soil samples are within the range of background concentrations for both unfertilized and fertilized soil, and do not appear to warrant further action at this time.

Detected metals concentrations in the four shallow soils collected across the nursery and from two soil samples collected in the fertilizer mixing area were not above corresponding regulatory guidance levels for the protection of soil, groundwater, or human exposure in a residential setting (the most conservative exposure scenario; Harter et al. 1997). These concentrations do not appear to warrant further action at this time.

Analysis of the soil sample collected at a depth of 15 feet bgs from boring B7, adjacent to the former diesel UST fuel dispenser, did not identify detected concentrations of VOCs or TPHd. Because of the overexcavation and removal of soil during the UST removal, residual concentrations in soil, if present, have likely attenuated over time. Based on the expected depth to groundwater in excess of 100 feet bgs and the lack of detected VOC or TPHd concentrations in the 15-foot-depth sample from B7, this assessment appears adequate in resolving whether a significant release had occurred from the previous UST into underlying soil. No further assessment of this area is recommended at this time.

Analytical results for the water sample collected from the agricultural well did not exceed primary or secondary MCLs, or PRGs for tap water. The well's yield (capable of periodic pumping in excess of 200 gpd), the TDS level (200 milligrams per liter), and the absence of other chemicals above regulatory levels may make it suitable for use as a source of drinking water. However, given the absence of details concerning well construction and the on-site storage and use of agricultural chemicals, Teichert may wish to limit the well to non-potable uses.

Based on the overall results of this assessment, LFR recommends continued monitoring of on-site chemical storage, use, handling, and disposal practices to minimize accidental releases to the environment. Soil or groundwater analytical data to date do not warrant further subsurface assessment activities at this time.

If you have any questions about the contents of this letter, please call me at (916) 786-0320, or John Blasco at (510) 652-4500.

Sincerely,

Scott A. Armstrong, R.G., C.HG., REA
Senior Hydrogeologist

Attachments

cc: Bob Hamel, Teichert Land Company

Confidential: Attorney-Client Privileged/Attorney Work Product

Table 1
Soil Analysis Results (Organic Compounds)
LFR 003-09036-01/003

			Organic Analyses					
Sample Location	Sample Depth(feet bgs)	Date Sampled	Organochlorine pesticides/herbicides by EPA Method SW8081A (µg/Kg)	Organophosphorus pesticides by EPA Method 8141A (µg/g)	Chlorinated Herbicides by EPA Method 8151A (µg/g)	Anions by IC EPA Method 300.0 (mg/Kg)	TPHd by EPA Method SW8015B (mg/Kg)	VOCs by EPA Method 8260B
B-1	**Surface**	6/23/2003	All ND	All ND	All ND	**Nitrate-Nitrogen: 18**	---	---
B-2	**Surface**	6/23/2003	All ND	All ND	All ND	ND	---	---
B-3	**Surface**	6/23/2003	All ND	All ND	All ND	ND	---	---
B-4	**Surface**	6/23/2003	All ND	All ND	All ND	ND	---	---
B-5	**Surface**	6/23/2003	All ND	All ND	All ND	**15**	---	---
B-6	**Surface**	6/23/2003	All ND	All ND	All ND	**130**	---	---
B-7	**15**	6/23/2003	---	---	---	---	All ND	All ND

NOTES:	Only detected compounds in soil listed; see analytical report for all analytes tested.
ND	Analyte not detected above laboratory reporting limit.
All ND	Listed compounds not detected above laboratory reporting limits. See analytical report.
µg/g	Milligram per gram (as parts per billion)
µg/Kg	Milligram per kilogram (as parts per billion)
---	Not collected or submitted for analysis

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Table 2:
Soil Sampling Results: Metals by ICPMS (EPA Method SW6020)
LFR 003-09036-01/003

Total metal results reported in milligrams per kilogram (mg/kg) as parts per million (ppm)

Sample Number	**Sample Date**	***Target Metals***																
		Be	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**As**	**Se**	**Mo**	**Ag**	**Cd**	**Sb**	**Ba**	**Hg**	**Tl**	**Pb**
B-1-Surface	6/23/2003	<1.0	**61**	**65**	**11**	**56**	**27**	**64**	**4.2**	<1.0	<1.0	<1.0	<1.0	<1.0	**130**	<0.20	<1.0	**7.8**
B-2-Surface	6/23/2003	<1.0	**61**	**69**	**11**	**49**	**24**	**61**	**4.4**	<1.0	<1.0	<1.0	<1.0	<1.0	**120**	<0.20	<1.0	**7.3**
B-3-Surface	6/23/2003	<1.0	**52**	**61**	**12**	**47**	**31**	**64**	**4.2**	<1.0	<1.0	<1.0	<1.0	<1.0	**140**	<0.20	<1.0	**14**
B-4-Surface	6/23/2003	<1.0	**80**	**74**	**13**	**53**	**33**	**78**	**6.9**	<1.0	<1.0	<1.0	<1.0	<1.0	**140**	<0.20	<1.0	**11**
B-5-Surface	6/23/2003	<1.0	**87**	**81**	**19**	**78**	**36**	**86**	**5.7**	<1.0	<1.0	<1.0	<1.0	<1.0	**160**	<0.20	<1.0	**9.8**
B-6-Surface	6/23/2003	<1.0	**110**	**110**	**22**	**94**	**47**	**100**	**7.5**	<1.0	**1.5**	<1.0	<1.0	<1.0	**190**	<0.20	<1.0	**20**
Residential Preliminary Remedial Goals (RPRGs)		150	550	210	900	1600	3100	23000	22	390	390	390	37.0	31	5400	23	5.2	150

Notes:

<	Not detected above laboratory test method reporting limits
Bold	Detected concentration above laboratory detection

Be	Beryllium
Na	Sodium
Mg	Magnesium
K	Potassium
Ca	Calcium
V	Vanadium
Cr	Chromium
Co	Cobalt
Ni	Nickel
Cu	Copper
Zn	Zinc
As	Arsenic
Se	Selenium
Mo	Molybdenum
Ag	Silver
Cd	Cadmium
Sb	Antimony
Ba	Barium
Hg	Mercury
Tl	Thallium
Pb	Lead

Table 3
Agricultural Well Sampling Results (excluding ICPMS metals)
LFR 003-09036-01/003

	General Parameters							
Chemical Parameter	Total Alkalinity	Total Alkalinity	Specific Conductance	pH	Total Dissolved Solids (TDS)	Nitrate	Chloride	VOCs
EPA Method	310.1	SM2340B	120.1	150.1	160.1	300.0	300.00	SW 8260B
Units	mg/L	mg/L	µs/cm	unitless	mg/L	mg/L	mg/L	ug/L
Well Sample	**95**	**97**	**250**	**7.78**	**200**	**2.0**	**7.60**	All ND
CA MCL	---	---	900(1)	6.5 - 8.5(1)	500(1)	10	250(1)	---

NOTES:

(1)	California Department of Health Services Secondary MCL
mg/L	Milligrams per liter
µs/cm	Microsiemens per centimeter
All ND	Listed compounds not detected above laboratory reporting limits. See analytical report.
VOCs	Volatile Organic Compounds by EPA 8260B. See analytical report.

Table 4:
Agricultural Well Sampling Results: Metals by ICPMS (EPA Method SW6020)
LFR 003-09036-01/003

Total metal results reported in milligrams per liter (mg/L) as parts per million (ppm)

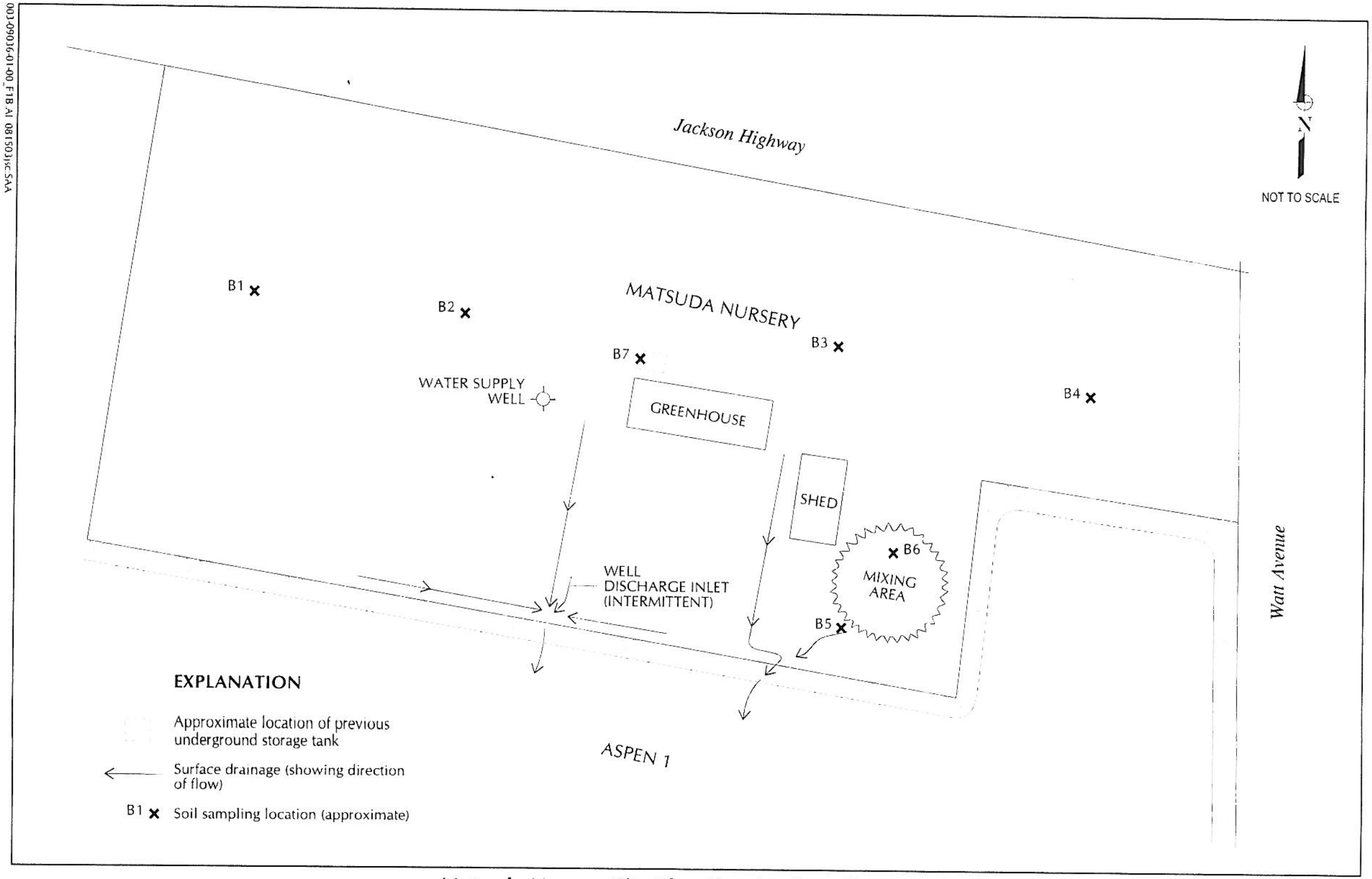
Sample Reference	Sample Date	***Target Metals***																				
		Be	**Na**	**Mg**	**K**	**Ca**	**V**	**Cr**	**Co**	**Ni**	**Cu**	**Zn**	**As**	**Se**	**Mo**	**Ag**	**Cd**	**Sb**	**Ba**	**Hg**	**Tl**	**Pb**
Well Sample	6/23/2003	<0.0050	**11**	**6.4**	**3.4**	**28**	**0.015**	**0.0064**	<0.0050	<0.0050	<0.0050	**0.24**	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	**0.071**	<0.0010	<0.0050	<0.0050
PRGs for Tap Water		0.073	---	---	---	---	0.26	---	2.2	0.73	1.5	11	0.000045	0.18	0.18	0.18	0.018	0.015	2.6	---	0.0024	---
CA MCLs		0.004	---	---	---	---	---	0.05	50(1)	0.1	1.3	5.0	0.05	0.05	---	100(2)	0.005	0.006	1.0	0.002	0.002	0.015

Notes:

(1)	Agricultural water Quality Goal
(2)	California Department of Health Services Secondary MCL
<	Not detected above laboratory test method reporting limits
Bold	Detected concentration above laboratory detection
---	Not listed under PRGs

Be	Beryllium
Na	Sodium
Mg	Magnesium
K	Potassium
Ca	Calcium
V	Vanadium
Cr	Chromium
Co	Cobalt
Ni	Nickel
Cu	Copper
Zn	Zinc
As	Arsenic
Se	Selenium
Mo	Molybdenum
Ag	Silver
Cd	Cadmium
Sb	Antimony
Ba	Barium
Hg	Mercury
Tl	Thallium
Pb	Lead

003-09036-01-00_F1B.AI 081503jsc.SAA



Matsuda Nursery Site Plan Showing Sampling Locations

Teichert

LFR LEVINE•FRICKE

Figure 1

Attachment A

Laboratory Data Sheets

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-01A
Client I.D. Number: Matsuda

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method 608/SM6630C/SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	0.050 µg/L
2	gamma-BHC (Lindane)	ND	0.050 µg/L
3	Heptachlor	ND	0.050 µg/L
4	Aldrin	ND	0.050 µg/L
5	beta-BHC	ND	0.050 µg/L
6	delta-BHC	ND	0.050 µg/L
7	Heptachlor epoxide	ND	0.050 µg/L
8	Endosulfan I	ND	0.050 µg/L
9	Chlordane (Technical)	ND	1.0 µg/L
10	4,4´-DDE	ND	0.10 µg/L
11	Dieldrin	ND	0.10 µg/L
12	Endrin	ND	0.10 µg/L
13	4,4´-DDD	ND	0.10 µg/L
14	Endosulfan II	ND	0.10 µg/L
15	4,4´-DDT	ND	0.10 µg/L
16	Endrin aldehyde	ND	0.20 µg/L
17	Methoxychlor	ND	0.50 µg/L
18	Endosulfan sulfate	ND	0.10 µg/L
19	Endrin ketone	ND	0.20 µg/L
20	Toxaphene	ND	5.0 µg/L

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 281-4848 / Wichita, KS • (316) 722-5890 / info@alpha-analytical.com

7/9/03
Report Date

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-02A
Client I.D. Number: B-1-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-05A
Client I.D. Number: B-2-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-08A
Client I.D. Number: B-3-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-11A
Client I.D. Number: B-4-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

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7/9/03
Report Date

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-14A
Client I.D. Number: B-5-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/02/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366
Date Received 06/24/03

Job#: Teichert/Matsuda

Total Petroleum Hydrocarbons - Extractable (TPH-E) EPA Method SW8015B/DHS LUFT Manual

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	**B-7-15ft.**	TPH-E (Diesel)	ND	1.0 mg/Kg	06/23/03	06/30/03
Lab ID :	LVF03062441-23A					

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

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6/30/03
Report Date

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-17A
Client I.D. Number: B-6-Surface

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 07/03/03

Organochlorine Pesticides
EPA Method SW8081A

	Compound	Concentration	Reporting Limit
1	alpha-BHC	ND	1.7 µg/Kg
2	gamma-BHC (Lindane)	ND	1.7 µg/Kg
3	Heptachlor	ND	1.7 µg/Kg
4	Aldrin	ND	1.7 µg/Kg
5	beta-BHC	ND	1.7 µg/Kg
6	delta-BHC	ND	1.7 µg/Kg
7	Heptachlor epoxide	ND	1.7 µg/Kg
8	Endosulfan I	ND	1.7 µg/Kg
9	Chlordane (Technical)	ND	33 µg/Kg
10	4,4´-DDE	ND	3.3 µg/Kg
11	Dieldrin	ND	3.3 µg/Kg
12	Endrin	ND	3.3 µg/Kg
13	4,4´-DDD	ND	3.3 µg/Kg
14	Endosulfan II	ND	3.3 µg/Kg
15	4,4´-DDT	ND	3.3 µg/Kg
16	Endrin aldehyde	ND	6.6 µg/Kg
17	Methoxychlor	ND	17 µg/Kg
18	Endosulfan sulfate	ND	3.3 µg/Kg
19	Endrin ketone	ND	6.6 µg/Kg
20	Toxaphene	ND	170 µg/Kg

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

7/9/03
Report Date

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-01A
Client I.D. Number: Matsuda

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 06/25/03

Volatile Organics by GC/MS
EPA Method SW8260B

	Compound	Concentration	Reporting Limit
1	Chloromethane	ND	2.0 µg/L
2	Vinyl chloride	ND	1.0 µg/L
3	Chloroethane	ND	1.0 µg/L
4	Bromomethane	ND	1.0 µg/L
5	Trichlorofluoromethane	ND	1.0 µg/L
6	1,1-Dichloroethene	ND	1.0 µg/L
7	Dichloromethane	ND	2.0 µg/L
8	trans-1,2-Dichloroethene	ND	1.0 µg/L
9	1,1-Dichloroethane	ND	1.0 µg/L
10	cis-1,2-Dichloroethene	ND	1.0 µg/L
11	Chloroform	ND	1.0 µg/L
12	1,2-Dichloroethane	ND	1.0 µg/L
13	1,1,1-Trichloroethane	ND	1.0 µg/L
14	Carbon tetrachloride	ND	1.0 µg/L
15	Benzene	ND	0.50 µg/L
16	1,2-Dichloropropane	ND	1.0 µg/L
7	Trichloroethene	ND	1.0 µg/L
8	Bromodichloromethane	ND	1.0 µg/L
19	cis-1,3-Dichloropropene	ND	1.0 µg/L
20	trans-1,3-Dichloropropene	ND	1.0 µg/L
21	1,1,2-Trichloroethane	ND	1.0 µg/L
22	Toluene	ND	0.50 µg/L
23	Dibromochloromethane	ND	1.0 µg/L
24	Tetrachloroethene	ND	1.0 µg/L
25	Chlorobenzene	ND	1.0 µg/L

	Compound	Concentration	Reporting Limit
26	Ethylbenzene	ND	0.50 µg/L
27	m,p-Xylene	ND	0.50 µg/L
28	Bromoform	ND	1.0 µg/L
29	o-Xylene	ND	0.50 µg/L
30	1,1,2,2-Tetrachloroethane	ND	1.0 µg/L
31	1,3-Dichlorobenzene	ND	1.0 µg/L
32	1,4-Dichlorobenzene	ND	1.0 µg/L
33	1,2-Dichlorobenzene	ND	1.0 µg/L

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

6/30/03
Report Date

Alpha Analytical, Inc.

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746
Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366

Alpha Analytical Number: LVF03062441-23A
Client I.D. Number: B-7-15ft.

Sampled: 06/23/03
Received: 06/24/03
Analyzed: 06/27/03

Volatile Organics by GC/MS
EPA Method SW8260B

	Compound	Concentration	Reporting Limit
1	Chloromethane	ND	40 µg/Kg
2	Vinyl chloride	ND	20 µg/Kg
3	Chloroethane	ND	20 µg/Kg
4	Bromomethane	ND	20 µg/Kg
5	Trichlorofluoromethane	ND	20 µg/Kg
6	1,1-Dichloroethene	ND	20 µg/Kg
7	Dichloromethane	ND	40 µg/Kg
8	trans-1,2-Dichloroethene	ND	20 µg/Kg
9	1,1-Dichloroethane	ND	20 µg/Kg
10	cis-1,2-Dichloroethene	ND	20 µg/Kg
11	Chloroform	ND	20 µg/Kg
12	1,2-Dichloroethane	ND	20 µg/Kg
13	1,1,1-Trichloroethane	ND	20 µg/Kg
14	Carbon tetrachloride	ND	20 µg/Kg
15	Benzene	ND	5.0 µg/Kg
16	1,2-Dichloropropane	ND	20 µg/Kg
17	Trichloroethene	ND	20 µg/Kg
18	Bromodichloromethane	ND	20 µg/Kg
19	cis-1,3-Dichloropropene	ND	20 µg/Kg
20	trans-1,3-Dichloropropene	ND	20 µg/Kg
21	1,1,2-Trichloroethane	ND	20 µg/Kg
22	Toluene	ND	5.0 µg/Kg
23	Dibromochloromethane	ND	20 µg/Kg
24	Tetrachloroethene	ND	20 µg/Kg
25	Chlorobenzene	ND	20 µg/Kg
26	Ethylbenzene	ND	5.0 µg/Kg
27	m,p-Xylene	ND	5.0 µg/Kg
28	Bromoform	ND	20 µg/Kg
29	o-Xylene	ND	5.0 µg/Kg
30	1,1,2,2-Tetrachloroethane	ND	20 µg/Kg
31	1,3-Dichlorobenzene	ND	20 µg/Kg
32	1,4-Dichlorobenzene	ND	20 µg/Kg
33	1,2-Dichlorobenzene	ND	20 µg/Kg

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

6/30/03
Report Date

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

VOC pH Report

Work Order: LVF03062441

Project: Teichert/Matsuda

Alpha's Sample ID	Client's Sample ID	Matrix	pH
03062441-01A	Matsuda	Aqueous	2

6/30/03
Report Date

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366
Date Received 06/24/03

Job#: Teichert/Matsuda

Anions by IC
EPA Method 300.0 / 9056

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	**Matsuda**					
Lab ID :	LVF03062441-01A	Chloride	7.6	1.3 mg/L	06/23/03	06/24/03
		Nitrate (NO3) - N	2.0	0.25 mg/L	06/23/03	06/24/03
		Sulfate (SO4)	6.5	1.3 mg/L	06/23/03	06/24/03
Client ID :	**B-1-Surface**					
Lab ID :	LVF03062441-02A	Nitrate (NO3) - N	18	2.5 mg/Kg	06/23/03	06/24/03
Client ID :	**B-2-Surface**					
Lab ID :	LVF03062441-05A	Nitrate (NO3) - N	ND	2.5 mg/Kg	06/23/03	06/24/03
Client ID :	**B-3-Surface**					
Lab ID :	LVF03062441-08A	Nitrate (NO3) - N	ND	2.5 mg/Kg	06/23/03	06/24/03
Client ID :	**B-4-Surface**					
Lab ID :	LVF03062441-11A	Nitrate (NO3) - N	ND	2.5 mg/Kg	06/23/03	06/24/03
Client ID :	**B-5-Surface**					
Lab ID :	LVF03062441-14A	Nitrate (NO3) - N	15	2.5 mg/Kg	06/23/03	06/24/03
Client ID :	**B-6-Surface**					
Lab ID :	LVF03062441-17A	Nitrate (NO3) - N	130	5.0 mg/Kg	06/23/03	06/24/03

ND = Not Detected

R Scholl   Randy Gardner   Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

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7/7/03
Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

CLIENT: LFR Levine Fricke
Work Order: LVF03062441
Project: Teichert/Matsuda
Lab ID: LVF03062441-01A

Client Sample ID: Matsuda
Date Sampled: 6/23/2003 11:50:00 AM
Date Received: 6/24/2003
Matrix: AQUEOUS

Analyte	Result	Reporting Limit	Qual	Units	Date Analyzed	Analytical Method
Specific Conductance (at 25°C)	250	10		µS/cm	06/24/2003	EPA Method 120.1 / SM2510B /SW9050A
pH	7.78	0.010		pH Units	06/24/2003	EPA Method 150.1 / SW9040B
pH - Temperature	26.7	0.10		°C	06/24/2003	EPA Method 150.1 / SW9040B
Solids, Total Dissolved (TDS)	200	10		mg/L	06/25/2003	EPA Method 160.1 / SM 2540 C
Alkalinity, Bicarbonate (As CaCO3)	95	1.0		mg/L	06/30/2003	EPA Method 310.1
Alkalinity, Carbonate (As CaCO3)	ND	1.0		mg/L	06/30/2003	EPA Method 310.1
Alkalinity, Hydroxide (As CaCO3)	ND	1.0		mg/L	06/30/2003	EPA Method 310.1
Alkalinity, Total (As CaCO3 at pH 4.5)	95	1.0		mg/L	06/30/2003	EPA Method 310.1
Phenolphthalein (As CaCO3 at pH 8.3)	ND	1.0		mg/L	06/30/2003	EPA Method 310.1

ND = Not Detected

R Scholl Randy Gardner Walter Hinchman

7/7/03
Report Date

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366
Date Received 06/24/03

Job#: Teichert/Matsuda

Metals by ICPMS
SM2340B

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	Matsuda					
Lab ID :	LVF03062441-01A	Hardness, Total (calc as CaCO3)	97	0.025 mg/L	06/23/03	06/30/03

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ANALYTICAL REPORT

LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100
Granite Bay, CA 95746

Job#: Teichert/Matsuda

Attn: Scott Armstrong
Phone: (916) 786-0320
Fax: (916) 786-0366
Date Received 06/24/03

Metals by ICPMS
EPA Method SW6020

		Parameter	Concentration	Reporting Limit	Date Sampled	Date Analyzed
Client ID :	**Matsuda**					
Lab ID :	LVF03062441-01A	Beryllium	ND	0.0050 mg/L	06/23/03	06/30/03
		Sodium	11	0.50 mg/L	06/23/03	06/30/03
		Magnesium	6.4	0.50 mg/L	06/23/03	06/30/03
		Potassium	3.4	0.50 mg/L	06/23/03	06/30/03
		Calcium	28	0.50 mg/L	06/23/03	06/30/03
		Vanadium	0.015	0.0050 mg/L	06/23/03	06/30/03
		Chromium	0.0064	0.0050 mg/L	06/23/03	06/30/03
		Cobalt	ND	0.0050 mg/L	06/23/03	06/30/03
		Nickel	ND	0.0050 mg/L	06/23/03	06/30/03
		Copper	ND	0.0050 mg/L	06/23/03	06/30/03
		Zinc	0.24	0.010 mg/L	06/23/03	06/30/03
		Arsenic	ND	0.0050 mg/L	06/23/03	06/30/03
		Selenium	ND	0.0050 mg/L	06/23/03	06/30/03
		Molybdenum	ND	0.0050 mg/L	06/23/03	06/30/03
		Silver	ND	0.0050 mg/L	06/23/03	06/30/03
		Cadmium	ND	0.0050 mg/L	06/23/03	06/30/03
		Antimony	ND	0.0050 mg/L	06/23/03	06/30/03
		Barium	0.071	0.0050 mg/L	06/23/03	06/30/03
		Mercury	ND	0.0010 mg/L	06/23/03	06/30/03
		Thallium	ND	0.0050 mg/L	06/23/03	06/30/03
		Lead	ND	0.0050 mg/L	06/23/03	06/30/03
Client ID :	**B-1-Surface**					
Lab ID :	LVF03062441-02A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	61	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	65	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	11	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	56	1.0 mg/Kg	06/23/03	06/26/03
		Copper	27	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	64	10 mg/Kg	06/23/03	06/26/03
		Arsenic	4.2	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	ND	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	130	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	7.8	1.0 mg/Kg	06/23/03	06/26/03

Client ID :	**B-2-Surface**					
Lab ID :	LVF03062441-05A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	61	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	69	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	11	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	49	1.0 mg/Kg	06/23/03	06/26/03
		Copper	24	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	61	10 mg/Kg	06/23/03	06/26/03
		Arsenic	4.4	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	ND	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	120	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	7.3	1.0 mg/Kg	06/23/03	06/26/03
Client ID :	**B-3-Surface**					
Lab ID :	LVF03062441-08A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	52	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	61	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	12	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	47	1.0 mg/Kg	06/23/03	06/26/03
		Copper	31	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	64	10 mg/Kg	06/23/03	06/26/03
		Arsenic	4.2	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	ND	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	140	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	14	1.0 mg/Kg	06/23/03	06/26/03
Client ID :	**B-4-Surface**					
Lab ID :	LVF03062441-11A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	80	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	74	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	13	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	53	1.0 mg/Kg	06/23/03	06/26/03
		Copper	33	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	78	10 mg/Kg	06/23/03	06/26/03
		Arsenic	6.9	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	ND	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	140	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	11	1.0 mg/Kg	06/23/03	06/26/03

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method SW8015**
File ID:
Batch ID: **8118** Analysis Date: **06/30/2003 18:50**
Sample ID: **MBLK_8118** Units : **mg/Kg** Run ID: **GC/FID_1_030629A** Prep Date: **06/30/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
TPH-E (Diesel)	ND	1								
Surr: Nonane	116		100		116	56	138			

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW8015**
File ID:
Batch ID: **8118** Analysis Date: **06/30/2003 18:18**
Sample ID: **LCS_8118** Units : **mg/Kg** Run ID: **GC/FID_1_030629A** Prep Date: **06/30/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
TPH-E (Diesel)	93.6	10	100		94	44	148			
Surr: Nonane	117		100		117	56	138			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW8015**
File ID:
Batch ID: **8118** Analysis Date: **06/30/2003 15:39**
Sample ID: **03062709-01AMS** Units : **mg/Kg** Run ID: **GC/FID_1_030629A** Prep Date: **06/29/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
TPH-E (Diesel)	132	10	100	0	132	44	148			
Surr: Nonane	120		100		120	56	138			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW8015**
File ID:
Batch ID: **8118** Analysis Date: **06/30/2003 16:11**
Sample ID: **03062709-01AMSD** Units : **mg/Kg** Run ID: **GC/FID_1_030629A** Prep Date: **06/29/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
TPH-E (Diesel)	132	10	100	0	132	44	148	132.4	0.0139	
Surr: Nonane	112		100		112	56	138			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Client ID :	**B-5-Surface**					
Lab ID :	LVF03062441-14A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	87	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	81	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	19	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	78	1.0 mg/Kg	06/23/03	06/26/03
		Copper	36	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	86	10 mg/Kg	06/23/03	06/26/03
		Arsenic	5.7	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	ND	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	160	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	9.8	1.0 mg/Kg	06/23/03	06/26/03
Client ID :	**B-6-Surface**					
Lab ID :	LVF03062441-17A	Beryllium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Vanadium	110	1.0 mg/Kg	06/23/03	06/26/03
		Chromium	110	1.0 mg/Kg	06/23/03	06/26/03
		Cobalt	22	1.0 mg/Kg	06/23/03	06/26/03
		Nickel	94	1.0 mg/Kg	06/23/03	06/26/03
		Copper	47	1.0 mg/Kg	06/23/03	06/26/03
		Zinc	100	10 mg/Kg	06/23/03	06/26/03
		Arsenic	7.5	1.0 mg/Kg	06/23/03	06/26/03
		Selenium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Molybdenum	1.5	1.0 mg/Kg	06/23/03	06/26/03
		Silver	ND	1.0 mg/Kg	06/23/03	06/26/03
		Cadmium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Antimony	ND	1.0 mg/Kg	06/23/03	06/26/03
		Barium	190	1.0 mg/Kg	06/23/03	06/26/03
		Mercury	ND	0.20 mg/Kg	06/23/03	06/26/03
		Thallium	ND	1.0 mg/Kg	06/23/03	06/26/03
		Lead	20	1.0 mg/Kg	06/23/03	06/26/03

ND = Not Detected

R Scholl   Randy Gardner   Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer

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7/7/03

Report Date

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method SW8260B**
File ID: **D:\MSDCHEM\MS12\DATA\030627\03062705.D** Batch ID: **MS12S0627A** Analysis Date: **06/27/2003 09:34**
Sample ID: **MBLK MS12S0627A** Units : **µg/Kg** Run ID: **GC/MSD_12_030627A** Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloromethane	ND	40								
Vinyl chloride	ND	20								
Chloroethane	ND	20								
Bromomethane	ND	20								
Trichlorofluoromethane	ND	20								
1,1-Dichloroethene	ND	20								
Dichloromethane	ND	40								
trans-1,2-Dichloroethene	ND	20								
1,1-Dichloroethane	ND	20								
cis-1,2-Dichloroethene	ND	20								
Chloroform	ND	20								
1,2-Dichloroethane	ND	20								
1,1,1-Trichloroethane	ND	20								
Carbon tetrachloride	ND	20								
Benzene	ND	5								
1,2-Dichloropropane	ND	20								
Trichloroethene	ND	20								
Bromodichloromethane	ND	20								
cis-1,3-Dichloropropene	ND	20								
trans-1,3-Dichloropropene	ND	20								
1,1,2-Trichloroethane	ND	20								
Toluene	ND	5								
Dibromochloromethane	ND	20								
Tetrachloroethene	ND	20								
Chlorobenzene	ND	20								
Ethylbenzene	ND	5								
m,p-Xylene	ND	5								
Bromoform	ND	20								
o-Xylene	ND	5								
,1,2,2-Tetrachloroethane	ND	20								
1,3-Dichlorobenzene	ND	20								
1,4-Dichlorobenzene	ND	20								
1,2-Dichlorobenzene	ND	20								
Surr: 1,2-Dichloroethane-d4	200		200		99.9	70	120			
Surr: Toluene-d8	198		200		99	79	124			
Surr: 4-Bromofluorobenzene	214		200		107	75	122			

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW8260B**
File ID: **D:\MSDCHEM\MS12\DATA\030627\03062706.D** Batch ID: **MS12S0627A** Analysis Date: **06/27/2003 09:55**
Sample ID: **LCS MS12S0627A** Units : **µg/Kg** Run ID: **GC/MSD_12_030627A** Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	214	20	200		107	0	147			
Benzene	227	5	200		114	60	142			
Trichloroethene	230	20	200		115	60	142			
Toluene	214	5	200		107	58	143			
Chlorobenzene	212	20	200		106	57	144			
Ethylbenzene	210	5	200		105	58	147			
m,p-Xylene	413	5	400		103	57	147			
o-Xylene	204	5	200		102	58	149			
urr: 1,2-Dichloroethane-d4	207		200		104	70	120			
urr: Toluene-d8	200		200		100	79	124			
Surr: 4-Bromofluorobenzene	204		200		102	75	122			

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW8260B**
File ID: **D:\MSDCHEM\MS12\DATA\030627\03062707.D** Batch ID: **MS12S0627A** Analysis Date: **06/27/2003 10:16**
Sample ID: **03062444-02AMS** Units : **µg/Kg** Run ID: **GC/MSD_12_030627A** Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	167	20	200	0	83	0	147			
Benzene	181	5	200	0	91	60	142			
Trichloroethene	195	20	200	0	97	60	142			
Toluene	182	5	200	0	91	58	143			
Chlorobenzene	180	20	200	0	90	57	144			
Ethylbenzene	181	5	200	0	90	58	147			
m,p-Xylene	350	5	400	0	88	57	147			
o-Xylene	173	5	200	0	86	58	149			
Surr: 1,2-Dichloroethane-d4	193		200		97	70	120			
Surr: Toluene-d8	202		200		101	79	124			
Surr: 4-Bromofluorobenzene	208		200		104	75	122			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW8260B**
File ID: **D:\MSDCHEM\MS12\DATA\030627\03062708.D** Batch ID: **MS12S0627A** Analysis Date: **06/27/2003 10:36**
Sample ID: **03062444-02AMSD** Units : **µg/Kg** Run ID: **GC/MSD_12_030627A** Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	159	20	200	0	79	0	147	166.7	4.77	
Benzene	179	5	200	0	89	60	142	181.4	1.44	
Trichloroethene	189	20	200	0	94	60	142	194.5	2.94	
Toluene	173	5	200	0	87	58	143	182	5.03	
Chlorobenzene	176	20	200	0	88	57	144	180.4	2.59	
Ethylbenzene	174	5	200	0	87	58	147	180.5	3.94	
m,p-Xylene	339	5	400	0	85	57	147	350.4	3.23	
o-Xylene	166	5	200	0	83	58	149	172.7	3.85	
Surr: 1,2-Dichloroethane-d4	204		200		102	70	120			
Surr: Toluene-d8	199		200		99.6	79	124			
Surr: 4-Bromofluorobenzene	209		200		104	75	122			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Alpha Analytical, Inc.
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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method SW8260B**
File ID: **D:\HPCHEM\MS09\DATA\030625\03062506.D** Batch ID: **MS9W0625A** Analysis Date: **06/25/2003 11:14**
Sample ID: **MBLK MS9W0625A** Units : **µg/L** Run ID: **GC/MSD_9_030625A** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloromethane	ND	2								
Vinyl chloride	ND	1								
Chloroethane	ND	1								
Bromomethane	ND	1								
Trichlorofluoromethane	ND	1								
1,1-Dichloroethene	ND	1								
Dichloromethane	ND	2								
trans-1,2-Dichloroethene	ND	1								
1,1-Dichloroethane	ND	1								
cis-1,2-Dichloroethene	ND	1								
Chloroform	ND	1								
1,2-Dichloroethane	ND	1								
1,1,1-Trichloroethane	ND	1								
Carbon tetrachloride	ND	1								
Benzene	ND	0.5								
1,2-Dichloropropane	ND	1								
Trichloroethene	ND	1								
Bromodichloromethane	ND	1								
cis-1,3-Dichloropropene	ND	1								
trans-1,3-Dichloropropene	ND	1								
1,1,2-Trichloroethane	ND	1								
Toluene	ND	0.5								
Dibromochloromethane	ND	1								
Tetrachloroethene	ND	1								
Chlorobenzene	ND	1								
Ethylbenzene	ND	0.5								
m,p-Xylene	ND	0.5								
Bromoform	ND	1								
o-Xylene	ND	0.5								
1,1,2,2-Tetrachloroethane	ND	1								
1,3-Dichlorobenzene	ND	1								
1,4-Dichlorobenzene	ND	1								
1,2-Dichlorobenzene	ND	1								
Surr: 1,2-Dichloroethane-d4	8.25		10		83	72	126			
Surr: Toluene-d8	10.4		10		104	71	128			
Surr: 4-Bromofluorobenzene	9.22		10		92	76	121			

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW8260B**
File ID: **D:\HPCHEM\MS09\DATA\030625\03062504.D** Batch ID: **MS9W0625A** Analysis Date: **06/25/2003 10:28**
Sample ID: **LCS MS9W0625A** Units : **µg/L** Run ID: **GC/MSD_9_030625A** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	10.5	1	10		105	80	120			
Benzene	10.5	0.5	10		105	83	119			
Trichloroethene	10.8	1	10		108	76	127			
Toluene	10.6	0.5	10		106	80	120			
Chlorobenzene	10.4	1	10		104	76	124			
Ethylbenzene	10.5	0.5	10		105	80	120			
m,p-Xylene	18.6	0.5	20		93	77	124			
o-Xylene	9.72	0.5	10		97	77	125			
Surr: 1,2-Dichloroethane-d4	8.33		10		83	72	126			
Surr: Toluene-d8	10.5		10		105	71	128			
Surr: 4-Bromofluorobenzene	9.26		10		93	76	121			

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW8260B**
File ID: **D:\HPCHEM\MS09\DATA\030625\03062510.D** Batch ID: **MS9W0625A** Analysis Date: **06/25/2003 12:48**
Sample ID: **03062443-01AMS** Units : **µg/L** Run ID: **GC/MSD_9_030625A** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	45.9	2.5	50	0	92	80	120			
Benzene	48.9	1.3	50	0	98	83	119			
Trichloroethene	48.1	2.5	50	0	96	76	127			
Toluene	49.3	1.3	50	0	99	80	120			
Chlorobenzene	49.2	2.5	50	0	98	76	124			
Ethylbenzene	48.6	1.3	50	0	97	80	120			
m,p-Xylene	86.5	1.3	100	0	87	77	124			
o-Xylene	45.8	1.3	50	0	92	77	125			
Surr: 1,2-Dichloroethane-d4	42.3		50		85	72	126			
Surr: Toluene-d8	53.3		50		107	71	128			
Surr: 4-Bromofluorobenzene	45.4		50		91	76	121			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW8260B**
File ID: **D:\HPCHEM\MS09\DATA\030625\03062511.D** Batch ID: **MS9W0625A** Analysis Date: **06/25/2003 13:22**
Sample ID: **03062443-01AMSD** Units : **µg/L** Run ID: **GC/MSD_9_030625A** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
1,1-Dichloroethene	45.9	2.5	50	0	92	80	120	45.91	0.0653	
Benzene	49.5	1.3	50	0	99	83	119	48.89	1.26	
Trichloroethene	48.9	2.5	50	0	98	76	127	48.05	1.79	
Toluene	49.6	1.3	50	0	99	80	120	49.28	0.627	
Chlorobenzene	49.5	2.5	50	0	99	76	124	49.19	0.628	
Ethylbenzene	49.1	1.3	50	0	98	80	120	48.62	1	
m,p-Xylene	88.2	1.3	100	0	88	77	124	86.51	1.91	
o-Xylene	45.9	1.3	50	0	92	77	125	45.84	0.153	
Surr: 1,2-Dichloroethane-d4	41.7		50		83	72	126			
Surr: Toluene-d8	52.5		50		105	71	128			
Surr: 4-Bromofluorobenzene	46.4		50		93	76	121			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

EPA Method SW8082
QC Summary

Batch: 8097
Date: 07/02/03

Initials :
Instrument ID : GC/ECD#5L
QC Reviewer Initial :

Analyte	LRB		LCS LCS-8097 PCB						Precision	Accuracy	Comments
	Conc. µg/L	R.L. µg/L	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. % ✓	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	RPD %	Range of Acceptability*	
1221	ND	1.0	5.0	4.0	80	5.0				30-131	
1254	ND	1.0	5.0	4.6	92 ✓	5.0				43-128	

Analyte	LRB		MS LVF03062441-01AMS PCB						Precision	Accuracy	Comments
	Conc. µg/L	R.L. µg/L	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. % ✓	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	RPD %	Range of Acceptability*	
1221	ND	1.0	5.0	4.5	90	5.0				30-131	
1254	ND	1.0	5.0	5.1	101 ✓	5.0				43-128	

* DQO's are laboratory derived.

EPA Method 608/SW8081A
QC Summary

Batch: 8097
Date: 07/02/03

Initials: JS
Instrument ID: GC/ECD#5L
QC Reviewer Initial:

Analyte	LRB		LCS LCS-8097 PEST			0			Precision	Accuracy	Comments
	Conc µg/L	R.L. µg/L	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	RPD %	Range of Acceptability*	
Hexachlorobenzene	ND	0.05	1.0	0.85	85	1.0				35-122	
alpha-BHC	ND	0.05	1.0	0.98	98	1.0				34-129	
gamma-BHC	ND	0.05	1.0	0.98	98	1.0				38-128	
Heptachlor	ND	0.05	1.0	0.91	91	1.0				38-139	
Aldrin	ND	0.05	1.0	0.85	85	1.0				31-140	
beta-BHC	ND	0.05	1.0	0.99	99	1.0				41-129	
delta-BHC	ND	0.05	1.0	0.97	97	1.0				44-139	
Heptachlor epoxide	ND	0.05	1.0	0.92	92	1.0				43-126	
Endosulfan I	ND	0.10	1.0	0.53	53	1.0				19-113	
gamma-Chlordane	ND	0.10	1.0	0.93	93	1.0				38-126	
alpha-Chlordane	ND	0.10	1.0	0.89	89	1.0				42-125	
4,4'-DDE	ND	0.10	1.0	0.89	89	1.0				43-130	
Dieldrin	ND	0.10	1.0	0.91	91	1.0				45-129	
Endrin	ND	0.10	1.0	0.96	96	1.0				28-173	
4,4'-DDD	ND	0.10	1.0	0.89	89	1.0				29-140	
Endosulfan II	ND	0.10	1.0	0.82	82	1.0				30-110	
4,4'-DDT	ND	0.10	1.0	0.89	89	1.0				18-188	
Endrin aldehyde	ND	0.20	1.0	0.82	82	1.0				31-126	
Methoxychlor	ND	0.10	1.0	0.91	91	1.0				27-183	
Endosulfan sulfate	ND	0.50	1.0	0.88	88	1.0				24-166	
Endrin ketone	ND	0.20	1.0	0.82	82	1.0				39-132	
trans-Permethrin	ND	1.00	10.0	7.97	80	10.0				33-133	
cis-Permethrin	ND	1.00	10.0	8.56	86	10.0				35-140	

Analyte	LRB		MS LVF03062441-01AMS PEST			0			Precision	Accuracy	Comments
	Conc. µg/L	R.L. µg/L	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	Spike Amt. µg/L	Rec. Amt. µg/L	Rec. %	RPD %	Range of Acceptability*	
Hexachlorobenzene	ND	0.05	1.0	0.9	86	1.0				35-122	
alpha-BHC	ND	0.05	1.0	1.1	108	1.0				34-129	
gamma-BHC	ND	0.05	1.0	1.1	109	1.0				38-128	
Heptachlor	ND	0.05	1.0	0.9	90	1.0				38-139	
Aldrin	ND	0.05	1.0	0.8	83	1.0				31-140	
beta-BHC	ND	0.05	1.0	1.1	111	1.0				41-129	
delta-BHC	ND	0.05	1.0	1.1	110	1.0				44-139	
Heptachlor epoxide	ND	0.05	1.0	1.0	101	1.0				43-126	
Endosulfan I	ND	0.10	1.0	0.6	61	1.0				19-113	
gamma-Chlordane	ND	0.10	1.0	1.0	100	1.0				38-126	
alpha-Chlordane	ND	0.10	1.0	1.0	98	1.0				42-125	
4,4'-DDE	ND	0.10	1.0	1.0	97	1.0				43-130	
Dieldrin	ND	0.10	1.0	1.0	100	1.0				45-129	
Endrin	ND	0.10	1.0	1.1	107	1.0				28-173	
4,4'-DDD	ND	0.10	1.0	1.0	99	1.0				29-140	
Endosulfan II	ND	0.10	1.0	0.9	94	1.0				30-110	
4,4'-DDT	ND	0.10	1.0	1.0	99	1.0				18-188	
Endrin aldehyde	ND	0.20	1.0	0.9	92	1.0				31-126	
Methoxychlor	ND	0.10	1.0	1.0	99	1.0				27-183	
Endosulfan sulfate	ND	0.50	1.0	1.0	100	1.0				24-166	
Endrin ketone	ND	0.20	1.0	0.9	92	1.0				39-132	
trans-Permethrin	ND	1.00	10.0	10.2	102	10.0				33-133	
cis-Permethrin	ND	1.00	10.0	10.5	105	10.0				35-140	

* DQO's are laboratory derived

Endrin Breakdown: 13%
DDT Breakdown: 3%

Alpha Analytical, Inc.

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Date:
21-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **SM2340B**
File ID: **063003.B\058A_ICB.D**
Batch ID: **8114**
Analysis Date: **06/30/2003 17:28**
Sample ID: **MB-8114**
Units : **mg/L**
Run ID: **ICP/MS_030630B**
Prep Date: **06/30/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Hardness, Total (calc as CaCO3)	ND	2.5								

Laboratory Control Spike

Type **LCS** Test Code: **SM2340B**
File ID: **063003.B\059A_LCS.D**
Batch ID: **8114**
Analysis Date: **06/30/2003 17:32**
Sample ID: **LCS-8114**
Units : **mg/L**
Run ID: **ICP/MS_030630B**
Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Hardness, Total (calc as CaCO3)	166	2.5	165.4		101	85	115			

Sample Matrix Spike

Type **MS** Test Code: **SM2340B**
File ID: **063003.B\062ASMPL.D**
Batch ID: **8114**
Analysis Date: **06/30/2003 17:45**
Sample ID: **03062441-01AMS**
Units : **mg/L**
Run ID: **ICP/MS_030630B**
Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Hardness, Total (calc as CaCO3)	249	2.5	165.4	97.23	92	70	130			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **SM2340B**
File ID: **063003.B\070SMPL.D**
Batch ID: **8114**
Analysis Date: **06/30/2003 18:19**
Sample ID: **03062441-01AMSD**
Units : **mg/L**
Run ID: **ICP/MS_030630B**
Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Hardness, Total (calc as CaCO3)	240	2.5	165.4	97.23	87	85	115	248.9	5.77	

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8090A** Analysis Date: **06/24/2003 14:34**
Sample ID: **MBLK_8090A** Units : **mg/Kg** Run ID: **IC_1_030624A** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	ND	2.5								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8090A** Analysis Date: **06/24/2003 14:51**
Sample ID: **LCS_8090A** Units : **mg/Kg** Run ID: **IC_1_030624A** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	2.05	2.5	2		103	90	110			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8090A** Analysis Date: **06/24/2003 16:37**
Sample ID: **03062441-11AMS** Units : **mg/Kg** Run ID: **IC_1_030624A** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	1.96	2.5	2	0	98	80	120			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8090A** Analysis Date: **06/24/2003 16:54**
Sample ID: **03062441-11AMSD** Units : **mg/Kg** Run ID: **IC_1_030624A** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	2	2.5	2	0	100	80	120	1.962	1.97	

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083A** Analysis Date: **06/24/2003 09:43**
Sample ID: **MBLK_8083A** Units : **mg/L** Run ID: **IC_1_030624B** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	ND	0.25								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083A** Analysis Date: **06/24/2003 11:21**
Sample ID: **LCS_8083A** Units : **mg/L** Run ID: **IC_1_030624B** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	2.13	0.25	2		107	90	110			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083A** Analysis Date: **06/24/2003 11:04**
Sample ID: **03062327-01AMS** Units : **mg/L** Run ID: **IC_1_030624B** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	4910	0.25	4000	670	106	80	120			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083A** Analysis Date: **06/24/2003 12:14**
Sample ID: **03062325-01AMS** Units : **mg/L** Run ID: **IC_1_030624B** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Nitrate (NO3) - N	4.64	0.25	4	0.39	106	80	120			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083B**
Analysis Date: **06/24/2003 09:43**
Sample ID: **MBLK_8083B**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Sulfate (SO4)	ND	0.25								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083B**
Analysis Date: **06/24/2003 11:21**
Sample ID: **LCS_8083B**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Sulfate (SO4)	4.1	0.25	4		102	90	110			

Laboratory Control Spike Duplicate

Type **LCSD** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083B**
Analysis Date: **06/24/2003 11:39**
Sample ID: **LCSD_8083B**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Sulfate (SO4)	4.05	0.25	4		101	90	110	4.095	1.06	

Sample Matrix Spike

Type **MS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083B**
Analysis Date: **06/24/2003 11:04**
Sample ID: **03062327-01AMS**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Sulfate (SO4)	9730	0.25	8000	1800	99	80	120			

Comments:
ND - Not Detected at the Reporting Limit.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
S - Spike Recovery outside accepted recovery limits.
M - Spike Recovery outside accepted recovery limits due to matrix.
B - Analyte detected in the associated Method Blank.

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Date: *11-Jul-03*

QC Summary Report

Work Order: 03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083C**
Analysis Date: **06/24/2003 09:43**
Sample ID: **MBLK_8083C**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloride	ND	0.25								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083C**
Analysis Date: **06/24/2003 11:21**
Sample ID: **LCS_8083C**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloride	4.25	0.25	4		106	90	110			

Laboratory Control Spike Duplicate

Type **LCSD** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083C**
Analysis Date: **06/24/2003 11:39**
Sample ID: **LCSD_8083C**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloride	4.22	0.25	4		105	90	110	4.254	0.826	

Sample Matrix Spike

Type **MS** Test Code: **EPA Method 300.0 / 9056**
File ID:
Batch ID: **8083C**
Analysis Date: **06/24/2003 11:04**
Sample ID: **03062327-01AMS**
Units : **mg/L**
Run ID: **IC_1_030624B**
Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Chloride	9330	0.25	8000	890	106	80	120			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method SW6020**
File ID: **063003.B\058A_ICB.D** Batch ID: **8114** Analysis Date: **06/30/2003 17:28**
Sample ID: **MB-8114** Units : **mg/L** Run ID: **ICP/MS_030630B** Prep Date: **06/30/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	ND	0.005								
Sodium	ND	0.5								
Magnesium	ND	0.5								
Potassium	ND	0.5								
Calcium	ND	0.5								
Vanadium	ND	0.005								
Chromium	ND	0.005								
Cobalt	ND	0.005								
Nickel	ND	0.005								
Copper	ND	0.005								
Zinc	ND	0.01								
Arsenic	ND	0.005								
Selenium	ND	0.005								
Molybdenum	ND	0.005								
Silver	ND	0.005								
Cadmium	ND	0.005								
Antimony	ND	0.005								
Barium	ND	0.005								
Mercury	ND	0.001								
Thallium	ND	0.005								
Lead	ND	0.005								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW6020**
File ID: **063003.B\059A_LCS.D** Batch ID: **8114** Analysis Date: **06/30/2003 17:32**
Sample ID: **LCS-8114** Units : **mg/L** Run ID: **ICP/MS_030630B** Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	0.241	0.005	0.25		96	85	115			
Sodium	25.2	0.5	25		101	85	115			
Magnesium	25.4	0.5	25		102	85	115			
Potassium	24.4	0.5	25		98	85	115			
Calcium	24.8	0.5	25		99	85	115			
Vanadium	0.25	0.005	0.25		99.8	85	115			
Chromium	0.241	0.005	0.25		96	85	115			
Cobalt	0.257	0.005	0.25		103	85	115			
Nickel	0.253	0.005	0.25		101	85	115			
Copper	0.243	0.005	0.25		97	85	115			
Zinc	0.246	0.01	0.25		98	85	115			
Arsenic	0.245	0.005	0.25		98	85	115			
Selenium	0.245	0.005	0.25		98	85	115			
Molybdenum	0.255	0.005	0.25		102	85	115			
Silver	0.254	0.005	0.25		99.8	85	115			
Cadmium	0.248	0.005	0.25		99	85	115			
Antimony	0.255	0.005	0.25		102	85	115			
Barium	0.253	0.005	0.25		101	85	115			
Mercury	0.00468	0.001	0.005		94	85	115			
Thallium	0.249	0.005	0.25		99	85	115			
Lead	0.241	0.005	0.25		96	85	115			

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW6020**

File ID: **063003.B\062ASMPL.D**

Batch ID: **8114** Analysis Date: **06/30/2003 17:45**

Sample ID: **03062441-01AMS** Units : **mg/L** Run ID: **ICP/MS_030630B** Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	0.227	0.001	0.25	0	91	70	130			
Sodium	34	0.2	25	11.06	92	70	130			
Magnesium	29.3	0.2	25	6.426	92	70	130			
Potassium	26.1	0.2	25	3.435	90	70	130			
Calcium	51.3	0.2	25	28.34	92	70	130			
Vanadium	0.264	0.001	0.25	0.01479	99.7	70	130			
Chromium	0.247	0.001	0.25	0.006414	96	70	130			
Cobalt	0.237	0.001	0.25	0	95	70	130			
Nickel	0.238	0.001	0.25	0	95	70	130			
Copper	0.242	0.001	0.25	0	97	70	130			
Zinc	0.462	0.01	0.25	0.2409	88	70	130			
Arsenic	0.242	0.001	0.25	0	97	70	130			
Selenium	0.239	0.001	0.25	0	95	70	130			
Molybdenum	0.255	0.001	0.25	0	102	70	130			
Silver	0.247	0.001	0.25	0	99	70	130			
Cadmium	0.242	0.001	0.25	0	97	70	130			
Antimony	0.244	0.001	0.25	0	98	70	130			
Barium	0.316	0.001	0.25	0.07088	98	70	130			
Mercury	0.00483	0.001	0.005	0	97	70	130			
Thallium	0.248	0.001	0.25	0	99	70	130			
Lead	0.245	0.001	0.25	0	98	70	130			

Sample Matrix Spike Duplicate

Type **MSD** Test Code: **EPA Method SW6020**

File ID: **063003.B\070SMPL.D**

Batch ID: **8114** Analysis Date: **06/30/2003 18:19**

Sample ID: **03062441-01AMSD** Units : **mg/L** Run ID: **ICP/MS_030630B** Prep Date: **06/27/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	0.215	0.001	0.25	0	86	85	115	0.2265	5.07	
Sodium	33.1	0.2	25	11.06	88	85	115	33.98	4.05	
Magnesium	28.6	0.2	25	6.426	89	85	115	29.33	3.06	
Potassium	24.7	0.2	25	3.435	85	85	115	26.05	5.97	
Calcium	49	0.2	25	28.34	83	85	115	51.3	10.4	M
Vanadium	0.256	0.001	0.25	0.01479	96	85	115	0.264	3.35	
Chromium	0.239	0.001	0.25	0.006414	93	85	115	0.2474	3.72	
Cobalt	0.234	0.001	0.25	0	94	85	115	0.2368	1.23	
Nickel	0.23	0.001	0.25	0	92	85	115	0.2382	3.33	
Copper	0.234	0.001	0.25	0	94	85	115	0.2415	2.98	
Zinc	0.45	0.01	0.25	0.2409	84	85	115	0.4618	5.63	M
Arsenic	0.238	0.001	0.25	0	95	85	115	0.2421	1.71	
Selenium	0.24	0.001	0.25	0	96	85	115	0.2387	0.501	
Molybdenum	0.248	0.001	0.25	0	99	85	115	0.2546	2.71	
Silver	0.244	0.001	0.25	0	98	85	115	0.2471	1.14	
Cadmium	0.237	0.001	0.25	0	95	85	115	0.2417	1.8	
Antimony	0.243	0.001	0.25	0	97	85	115	0.2443	0.74	
Barium	0.302	0.001	0.25	0.07088	93	85	115	0.3162	5.83	
Mercury	0.0047	0.001	0.005	0	94	85	115	0.004827	2.58	
Thallium	0.229	0.001	0.25	0	92	85	115	0.2484	8.13	
Lead	0.233	0.001	0.25	0	93	85	115	0.2449	5.19	

Comments:

ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method SW6020**
File ID: **062603.B\056_ICB.D** Batch ID: **8109** Analysis Date: **06/26/2003 16:03**
Sample ID: **MB-8109** Units : **mg/Kg** Run ID: **ICP/MS_030626A** Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	ND	1								
Vanadium	ND	1								
Chromium	ND	1								
Cobalt	ND	1								
Nickel	ND	1								
Copper	ND	1								
Zinc	ND	10								
Arsenic	ND	1								
Selenium	ND	1								
Molybdenum	ND	1								
Silver	ND	1								
Cadmium	ND	1								
Antimony	ND	1								
Barium	ND	1								
Mercury	ND	0.2								
Thallium	ND	1								
Lead	ND	1								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method SW6020**
File ID: **062603.B\057_LCS.D** Batch ID: **8109** Analysis Date: **06/26/2003 16:08**
Sample ID: **LCS-8109** Units : **mg/Kg** Run ID: **ICP/MS_030626A** Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	22.5	1	25		90	85	115			
Vanadium	23.9	1	25		96	85	115			
Chromium	22.7	1	25		91	85	115			
Cobalt	23.6	1	25		94	85	115			
Nickel	23.7	1	25		95	85	115			
Copper	24.7	1	25		99	85	115			
Zinc	24.2	10	25		97	85	115			
Arsenic	23.1	1	25		93	85	115			
Selenium	24.2	1	25		97	85	115			
Molybdenum	23.1	1	25		92	85	115			
Silver	23.9	1	25		96	85	115			
Cadmium	23.9	1	25		96	85	115			
Antimony	23.3	1	25		93	85	115			
Barium	22.7	1	25		91	85	115			
Mercury	0.489	0.2	0.5		98	85	115			
Thallium	24.4	1	25		97	85	115			
Lead	24.1	1	25		96	85	115			

Sample Matrix Spike

Type **MS** Test Code: **EPA Method SW6020**
File ID: **062603.B\060SMPL.D** Batch ID: **8109** Analysis Date: **06/26/2003 16:21**
Sample ID: **03062441-02AMS** Units : **mg/Kg** Run ID: **ICP/MS_030626A** Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	27.8	1	25	0	111	70	130			
Vanadium	94.5	1	25	60.77	135	70	130			M
Chromium	94.5	1	25	65.03	118	70	130			
Cobalt	36.6	1	25	11.06	102	70	130			
Nickel	91.4	1	25	56.35	140	70	130			M
Copper	57.5	1	25	27.37	121	70	130			
Zinc	96	10	25	63.59	130	70	130			
Arsenic	27.9	1	25	4.215	95	70	130			
Selenium	22.9	1	25	0	92	70	130			
Molybdenum	28.8	1	25	0	115	70	130			
Silver	29.1	1	25	0	116	70	130			
Cadmium	28.5	1	25	0	114	70	130			
Antimony	25.8	1	25	0	103	70	130			
Barium	183	1	25	129.5	215	70	130			D
Mercury	0.637	0.2	0.5	0	127	70	130			
Thallium	31	1	25	0	124	70	130			
Lead	39.8	1	25	7.803	128	70	130			

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Sample Matrix Spike Duplicate

Type **MSD**

Test Code: **EPA Method SW6020**

File ID: **062603.B\061SMPL.D**

Batch ID: **8109**

Analysis Date: **06/26/2003 16:25**

Sample ID: **03062441-02AMSD**

Units : **mg/Kg**

Run ID: **ICP/MS_030626A**

Prep Date: **06/26/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Beryllium	24.1	1	25	0	96	70	130	27.84	14.6	
Vanadium	84.4	1	25	60.77	94	70	130	94.51	35.3	
Chromium	83.3	1	25	65.03	73	70	130	94.48	46.9	
Cobalt	33.2	1	25	11.06	88	70	130	36.55	14.3	
Nickel	78.6	1	25	56.35	89	70	130	91.41	44.8	
Copper	49.5	1	25	27.37	89	70	130	57.5	30.5	
Zinc	85.9	10	25	63.59	89	70	130	96.01	37.1	
Arsenic	24.2	1	25	4.215	80	70	130	27.92	17.3	
Selenium	20.3	1	25	0	81	70	130	22.91	12	
Molybdenum	24.8	1	25	0	99	70	130	28.82	14.8	
Silver	24.7	1	25	0	99	70	130	29.1	16.2	
Cadmium	24.9	1	25	0	99	70	130	28.53	13.8	
Antimony	24.1	1	25	0	96	70	130	25.8	6.77	
Barium	158	1	25	129.5	113	70	130	183.3	62.1	D
Mercury	0.516	0.2	0.5	0	103	70	130	0.6366	21	
Thallium	27	1	25	0	108	70	130	31.03	13.8	
Lead	34.6	1	25	7.803	107	70	130	39.77	17.6	

Comments: ND - Not Detected at the Reporting Limit.

S - Spike Recovery outside accepted recovery limits.

B - Analyte detected in the associated Method Blank.

D - If the spiked value is <25% of the reference value, recovery should not be calculated.

M - Spike Recovery outside accepted recovery limits due to matrix.

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Laboratory Control Spike

Type **LCS**

Test Code: **EPA Method 150.1 / SW9040B**

File ID:

Batch ID: **W030624PH**

Analysis Date: **06/24/2003 00:00**

Sample ID: **LCS_W030624PH**

Units : **pH Units**

Run ID: **WETLAB_030624A**

Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
pH	5.16	0.01	5		103	90	110			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

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Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 160.1 / SM 2540 C**

File ID:

Batch ID: **W030625TDS** Analysis Date: **06/25/2003 00:00**

Sample ID: **MBLK_W030625TDS** Units : **mg/L** Run ID: **WETLAB_030625B** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Solids, Total Dissolved (TDS)	ND	10								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 160.1 / SM 2540 C**

File ID:

Batch ID: **W030625TDS** Analysis Date: **06/25/2003 00:00**

Sample ID: **LCS_W030625TDS** Units : **mg/L** Run ID: **WETLAB_030625B** Prep Date: **06/25/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Solids, Total Dissolved (TDS)	212	10	200		106	80	120			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Date:
11-Jul-03

QC Summary Report

Work Order:
03062441

Method Blank

Type **MBLK** Test Code: **EPA Method 120.1 / SM2510B /SW9050A**
File ID:
Batch ID: **W030624CON** Analysis Date: **06/24/2003 00:00**
Sample ID: **MBLK_W030624CON** Units : **µS/cm** Run ID: **WETLAB_030624B** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Specific Conductance (at 25°C)	ND	10								

Laboratory Control Spike

Type **LCS** Test Code: **EPA Method 120.1 / SM2510B /SW9050A**
File ID:
Batch ID: **W030624CON** Analysis Date: **06/24/2003 00:00**
Sample ID: **LCS_W030624CON** Units : **µS/cm** Run ID: **WETLAB_030624B** Prep Date: **06/24/2003**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	Qual
Specific Conductance (at 25°C)	1430	10	1410		102	98	102			

Comments:
ND - Not Detected at the Reporting Limit.
S - Spike Recovery outside accepted recovery limits.
B - Analyte detected in the associated Method Blank.
D - If the spiked value is <25% of the reference value, recovery should not be calculated.
M - Spike Recovery outside accepted recovery limits due to matrix.

Billing Information:

Name L R Levine Fricke
Address 4080 Cavitt Stallman SUITE 100
City, State, Zip Granite Bay CA 95746
Phone Number 916 7860320 Fax 916 786-0366

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Page # 1 of 2

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Client Name, SAME AS ABOVE
Address
City, State, Zip

P.O. # 003-09036-01-003
PWS #
Phone #

Job # Teichert
DWR # Matsuda
Fax #

Sampled by K ZANGMEISTER
Report Attention SCOTT ARMSTRONG

Analyses Required

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers ** See below	8260B	608/614/615	300.0	general minerals 200 series	CAM17 metals	8051	~~TPHd 8015 mod.~~	HOLD	REMARKS
1150	6-2303	W		Matsuda	4L,3V	X	X	X	X	X				
1043	↓	S		B-1-surface	P		X	X		X	X			
1045		S		B-1-3ft	P								X	
1050		S		B-1-6ft	P								X	
1022		S		B-2-surface	P		X	X		X	X			
1025		S		B-2-3ft	P								X	
1030		S		B-2-6ft	P								X	
1005		S		B-3-surface	P		X	X		X	X			
1008		S		B-3-3ft	P								X	
1010		S		B-3-6ft	P								X	
0825		S		B-4-surface	B		X	X		X	X			
0835		S		B-4-3ft	B								X	
0850		S		B-4-6ft	B								X	

ADDITIONAL INSTRUCTIONS:

	Signature	Print Name	Company	Date	Time
Relinquished by		K ZANGMEISTER	LFR	6-23-03	1305
Received by		Mike Gil-Blanco	Alpha	6-23-03	1305
Relinquished by					
Received by					
Relinquished by					
Received by					

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other

**: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this coc. The liability of the laboratory is limited to the amount paid for the report.

Billing Information:
Name LFR Levine - Fricke
Address 4080 Cavitt Stallman #100
City, State, Zip Granite Bay, CA 95746
Phone Number (916) 786-0320 Fax 916 786 0366

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Sparks, Nevada 89431-5778
Phone (775) 355-1044
Fax (775) 355-0406

Page # 2 of 2

2776

Client Name SAME AS Above
Address
City, State, Zip

P.O. # 003-09036-01-003
PWS #
Phone #

Job # Teichert -
DWR # MatsuDA
Fax #

Sampled by K ZANGMEISTER
Report Attention SCOTT Armstrong

Analyses Required

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers ** See below	608/614/615	8051	300.0	CAM 17	8260 B	8015 MOD.(TPHd)		HOLD	REMARKS
0910	6-23-03	S		B-5- surface	P	X	X	X	X					
0915				B-5-3ft									X	
0920				B-5-6ft									X	
0945				B-6- surface		X	X	X	X					
0948				B-6-3ft									X	
0950				B-6-6ft									X	
1110				B-7-surface		~~X~~	~~X~~ EDZ	~~X~~	~~X~~				X	
1115				B-7- 5ft									X	
1120				B-7 -10ft	↓								X	
1210				B-7-15ft	B					X	X			
1225	↓	↓		B-7-20ft	B								X	
END														

ADDITIONAL INSTRUCTIONS:

	Signature	Print Name	Company	Date	Time
Relinquished by	K Zangmeister	K Zangmeister	LFR	6-23-03	1320
Received by		Mike	Alpha	6-23-03	1320
Relinquished by					
Received by					
Relinquished by					
Received by					

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other

**: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

Page: 1 of 3

Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

Job : Teichert/Matsuda
PO : 003-09036-01-003

Report Attention : Scott Armstrong
CC Report :

Client's COC # : 2819/2776

EDD Required : Yes
Sampled by : K. Zangmeister
Cooler Temp : 4 °C
24-Jun-03

Cancelled Not requested Per Scott

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	No. of Bottles SUB	TAT	PWS #	Requested Tests 8081_S	8081_W	8082_S	8082_W	8141_S	8141_W	8151_S	8151_W	Sample Remarks
LVF03062441-01A	Matsuda	AQ	06/23/03 11:50	8	2	9			PEST		PCB		8141		8151	Inorgancis-8141 & 8151-NOC
LVF03062441-02A	B-1-Surface	SO	06/23/03 10:43	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-03A	B-1-3ft.	SO	06/23/03 10:45	1	0	9										
LVF03062441-04A	B-1-6ft.	SO	06/23/03 10:50	1	0	9										
LVF03062441-05A	B-2-Surface	SO	06/23/03 10:22	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-06A	B-2-3ft.	SO	06/23/03 10:25	1	0	9										
LVF03062441-07A	B-2-6ft.	SO	06/23/03 10:30	1	0	9										
LVF03062441-08A	B-3-Surface	SO	06/23/03 10:05	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-09A	B-3-3ft.	SO	06/23/03 10:08	1	0	9										
LVF03062441-10A	B-3-6ft.	SO	06/23/03 10:10	1	0	9										

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DSBalcom	DSBalcom	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

Page: 2
2 of 3

Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366
Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

EDD Required : Yes

Sampled by : K. Zangmeister

Cooler Temp : 4 °C

24-Jun-03

Report Attention : Scott Armstrong

CC Report :

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	Requested Tests ALKALINITY	ANIONS(A)_S	ANIONS(A)_W	ANIONS(B)_W	ANIONS(C)_W	CONDUCTIVITY	HARDNESS	HOLD	Sample Remarks
LVF03062441-01A	Matsuda	AQ	06/23/03 11:50	8	2	9		x		x	x	x	x	x		Inorgancis-8141 & 8151-NOC
LVF03062441-02A	B-1-Surface	SO	06/23/03 10:43	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-03A	B-1-3ft.	SO	06/23/03 10:45	1	0	9									Hold	
LVF03062441-04A	B-1-6ft.	SO	06/23/03 10:50	1	0	9									Hold	
LVF03062441-05A	B-2-Surface	SO	06/23/03 10:22	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-06A	B-2-3ft.	SO	06/23/03 10:25	1	0	9									Hold	
LVF03062441-07A	B-2-6ft.	SO	06/23/03 10:30	1	0	9									Hold	
LVF03062441-08A	B-3-Surface	SO	06/23/03 10:05	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-09A	B-3-3ft.	SO	06/23/03 10:08	1	0	9									Hold	
LVF03062441-10A	B-3-6ft.	SO	06/23/03 10:10	1	0	9									Hold	

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DSBaker	DSBaker	Alpha Analytical, Inc.	6/24/03 1230

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

Page: 3
1 of 3

Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

EDD Required : Yes

Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

Sampled by : K. Zangmeister

Cooler Temp : 4 °C

24-Jun-03

Report Attention : Scott Armstrong
CC Report :

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	Requested Tests METALS_AQ	METALS_SO	PH_W	TDS	TPH/E_S	VOC_S	VOC_W	Sample Remarks
LVF03062441-01A	Matsuda	AQ	06/23/03 11:50	8	2	9		X		X	X			8260_Cs	Inorgancis-8141 & 8151-NOC
LVF03062441-02A	B-1-Surface	SO	06/23/03 10:43	1	1	9			CAM_17_TT LC						Inorganics-8141 & 8151-NOC
LVF03062441-03A	B-1-3ft.	SO	06/23/03 10:45	1	0	9									
LVF03062441-04A	B-1-6ft.	SO	06/23/03 10:50	1	0	9									
LVF03062441-05A	B-2-Surface	SO	06/23/03 10:22	1	1	9			CAM_17_TT LC						Inorganics-8141 & 8151-NOC
LVF03062441-06A	B-2-3ft.	SO	06/23/03 10:25	1	0	9									
LVF03062441-07A	B-2-6ft.	SO	06/23/03 10:30	1	0	9									
LVF03062441-08A	B-3-Surface	SO	06/23/03 10:05	1	1	9			CAM_17_TT LC						Inorganics-8141 & 8151-NOC
LVF03062441-09A	B-3-3ft.	SO	06/23/03 10:08	1	0	9									
LVF03062441-10A	B-3-6ft.	SO	06/23/03 10:10	1	0	9									

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DsBaker	DsBaker	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

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Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

EDD Required : Yes

Sampled by : K. Zangmeister

Report Attention : Scott Armstrong
CC Report :

Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

Cooler Temp : 4 °C

24-Jun-03

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	8081_S	8081_W	8082_S	8082_W	8141_S	8141_W	8151_S	8151_W	Sample Remarks
LVF03062441-11A	B-4-Surface	SO	06/23/03 08:25	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-12A	B-4-3ft.	SO	06/23/03 08:35	1	0	9										
LVF03062441-13A	B-4-6ft.	SO	06/23/03 08:50	1	0	9										
LVF03062441-14A	B-5-Surface	SO	06/23/03 09:10	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-15A	B-5-3ft.	SO	06/23/03 09:15	1	0	9										
LVF03062441-16A	B-5-6ft.	SO	06/23/03 09:20	1	0	9										
LVF03062441-17A	B-6-Surface	SO	06/23/03 09:45	1	1	9		PEST		PCB		8141		8151		Inorganics-8141 & 8151-NOC
LVF03062441-18A	B-6-3ft.	SO	06/23/03 09:48	1	0	9										
LVF03062441-19A	B-6-6ft.	SO	06/23/03 09:50	1	0	9										
LVF03062441-20A	B-7-Surface	SO	06/23/03 11:10	1	0	9										

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DSBaker	DSBaker	Alpha Analytical, Inc.	6/24/03 1930

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other)

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

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Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

EDD Required : Yes

Sampled by : K. Zangmeister

Report Attention : Scott Armstrong
CC Report :

Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

Cooler Temp : 4 °C

24-Jun-03

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	Requested Tests ALKALINITY	ANIONS(A) _S	ANIONS(A) _W	ANIONS(B) _W	ANIONS(C) _W	CONDUCTIVITY	HARDNESS	HOLD	Sample Remarks
LVF03062441-11A	B-4-Surface	SO	06/23/03 08:25	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-12A	B-4-3ft.	SO	06/23/03 08:35	1	0	9									Hold	
LVF03062441-13A	B-4-6ft.	SO	06/23/03 08:50	1	0	9									Hold	
LVF03062441-14A	B-5-Surface	SO	06/23/03 09:10	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-15A	B-5-3ft.	SO	06/23/03 09:15	1	0	9									Hold	
LVF03062441-16A	B-5-6ft.	SO	06/23/03 09:20	1	0	9									Hold	
LVF03062441-17A	B-6-Surface	SO	06/23/03 09:45	1	1	9			NO3							Inorganics-8141 & 8151-NOC
LVF03062441-18A	B-6-3ft.	SO	06/23/03 09:48	1	0	9									Hold	
LVF03062441-19A	B-6-6ft.	SO	06/23/03 09:50	1	0	9									Hold	
LVF03062441-20A	B-7-Surface	SO	06/23/03 11:10	1	0	9									Hold	

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DSBaker	DSBaker	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

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Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

EDD Required : Yes

Sampled by : K. Zangmeister

Report Attention : Scott Armstrong
CC Report :

Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

Cooler Temp : 4 °C

24-Jun-03

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	Requested Tests METALS_AQ	METALS_SO	PH_W	TDS	TPH/E_S	VOC_S	VOC_W	Sample Remarks
LVF03062441-11A	B-4-Surface	SO	06/23/03 08:25	1	1	9			CAM_17_TTLC						Inorganics-8141 & 8151-NOC
LVF03062441-12A	B-4-3ft.	SO	06/23/03 08:35	1	0	9									
LVF03062441-13A	B-4-6ft.	SO	06/23/03 08:50	1	0	9									
LVF03062441-14A	B-5-Surface	SO	06/23/03 09:10	1	1	9			CAM_17_TTLC						Inorganics-8141 & 8151-NOC
LVF03062441-15A	B-5-3ft.	SO	06/23/03 09:15	1	0	9									
LVF03062441-16A	B-5-6ft.	SO	06/23/03 09:20	1	0	9									
LVF03062441-17A	B-6-Surface	SO	06/23/03 09:45	1	1	9			CAM_17_TTLC						Inorganics-8141 & 8151-NOC
LVF03062441-18A	B-6-3ft.	SO	06/23/03 09:48	1	0	9									
LVF03062441-19A	B-6-6ft.	SO	06/23/03 09:50	1	0	9									
LVF03062441-20A	B-7-Surface	SO	06/23/03 11:10	1	0	9									

Comments: Custody seal, Frozen ice, CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DS Baker	DS Baker	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other)

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

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Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366
Job : Teichert/Matsuda
PO : 003-09036-01-003

Client's COC # : 2819/2776

EDD Required : Yes
Sampled by : K. Zangmeister
Cooler Temp : 4 °C
24-Jun-03

Report Attention : Scott Armstrong
CC Report :

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	Requested Tests ALKALINITY	ANIONS(A)_S	ANIONS(A)_W	ANIONS(B)_W	ANIONS(C)_W	CONDUCTIVITY	HARDNESS	HOLD	Sample Remarks
LVF03062441-21A	B-7-5ft.	SO	06/23/03 11:15	1	0	9									Hold	
LVF03062441-22A	B-7-10ft.	SO	06/23/03 11:20	1	0	9									Hold	
LVF03062441-23A	B-7-15ft.	SO	06/23/03 12:10	1	0	9										
LVF03062441-24A	B-7-20ft.	SO	06/23/03 12:25	1	0	9									Hold	

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	D. Baker	D Baker	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.

Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other)

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information :

CHAIN-OF-CUSTODY RECORD

CA

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Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

WorkOrder : LVF03062441

Report Due By : 5:00 PM On : 08-Jul-03

Client:
LFR Levine Fricke
4080 Cavitt Stallman Rd., Ste. 100

Granite Bay, CA 95746

Scott Armstrong
TEL : (916) 786-0320
FAX : (916) 786-0366

EDD Required : Yes

Sampled by : K. Zangmeister

Report Attention : Scott Armstrong

CC Report :

Job : Teichert/Matsuda

PO : 003-09036-01-003

Client's COC # : 2819/2776

Cooler Temp : 4 °C

24-Jun-03

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

Alpha Sample ID	Client Sample ID	Matrix	Collection Date	No. of Bottles ORG	SUB	TAT	PWS #	METALS_AQ	METALS_SO	PH_W	TDS	TPH/E_S	VOC_S	VOC_W	Sample Remarks
LVF03062441-21A	B-7-5ft.	SO	06/23/03 11:15	1	0	9									
LVF03062441-22A	B-7-10ft.	SO	06/23/03 11:20	1	0	9									
LVF03062441-23A	B-7-15ft.	SO	06/23/03 12:10	1	0	9						TPH/E_C	8260_Cs		
LVF03062441-24A	B-7-20ft.	SO	06/23/03 12:25	1	0	9									

Comments: Custody seal. Frozen ice. CA samples. TAT: 4 day TAT for all TPHs and VOCs ONLY IF THEY ARE NOT KINDERMORGAN!!!!!. 9 day TAT for tests that Walter runs in the wet lab, per Edana :

	Signature	Print Name	Company	Date/Time
Received by:	DSBaker	DSBaker	Alpha Analytical, Inc.	6/24/03 1030

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

Billing Information:

Name [illegible]
Address 4080 Cavitt Stallman SUITE 100
City, State, Zip Granite Bay CA 95746
Phone Number 916 786 0320 Fax 916 786-0366

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431-5778
Phone (775) 355-1044
Fax (775) 355-0406

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Client Name SAME AS ABOVE
Address
City, State, Zip
P.O. # 003-09030-01-003
PWS #
Phone #
Job # Teichert-
DWR # Matsuda
Fax #
Office Use Only
Sampled by KZANGMEISTER
Report Attention SCOTT ARMSTRONG

Analyses Required

Time Sampled	Date Sampled	Matrix* See Key Below	Lab ID Number	Sample Description	Total and type of containers ** See below	8260B - VOCs	608/614/615 **	300.0 *	general minerals [illegible]	CAM17 metals	8151 - herbicides	~~TPHd~~ 8015 mod	HOLD	REMARKS
1150	6-23-03	W	UIF03062441-01	Matsuda	4L, 3V	X	X	X	X	X				
1043	↓	S	-02	B-1-surface	P		X	X		X	X			* Nitrates using
1045		S	-03	B-1-3ft	P								X	EPA method 300.0
1050		S	-04	B-1-6ft	P								X	** organophosphate/
1022		S	-05	B-2-surface	P		X	X		X	X			chlorinated pesticides
1025		S	-06	B-2-3ft	P								X	
1030		S	-07	B-2-6ft	P								X	
1005		S	-08	B-3-surface	P		X	X		X	X			
1008		S	-09	B-3-3ft	P								X	
1010		S	-10	B-3-6ft	P								X	
0825		S	-11	B-4-surface	B		X	X		X	X			
0835		S	-12	B-4-3ft	B								X	
0850	↓	S	-13	B-4-6ft	B								X	

ADDITIONAL INSTRUCTIONS:

	Signature	Print Name	Company	Date	Time
Relinquished by	K Bangmeister	KZANGMEISTER	LFR	6.23.03	1305
Received by		Mike Gil-Blanco	Alpha	6-23-03	1305
Relinquished by					
Received by	D Baker	D Baker	Alpha	6/24/03	1030
Relinquished by					
Received by					

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other **: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this coc. The liability of the laboratory is limited to the amount paid for the report.

Billing Information:
Name LFR Levine - Fricke
Address 4080 Cavitt Stallman #100
City, State, Zip Granite Bay, CA 95746
Phone Number (916) 786-0320 Fax 916 786-0366

Alpha Analytical, Inc.
255 Glendale Avenue, Suite 21
Sparks, Nevada 89431-5778
Phone (775) 355-1044
Fax (775) 355-0406

Page # 2 of 2

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Client Name SAME AS ABOVE
Address
City, State, Zip
P.O. # 003-09036-01-003
PWS #
Phone #
Job # Teichert -
DWR # MatsuDA
Fax #

Sampled by K ZANGMEISTER
Report Attention SCOTT Armstrong

Analyses Required

Time Sampled	Date Sampled	Matrix* See Key Below	Office Use Only Lab ID Number	Sample Description	Total and type of containers ** See below	608/614/615**	8051-herbicides	300.0*	CAM17	8260B	8015 MOD (TPHd)		HOLD	REMARKS
0910	6-23-03	S	LVF03062441-14	B-5-surface	P	X	X	X	X					
0915			-15	B-5-3ft									X	* nitrates
0920			-16	B-5-6ft									X	
0945			-17	B-6-surface		X	X	X	X					** orgainophosphat/
0948			-18	B-6-3ft									X	chlorinated pesticides/
0950			-19	B-6-6ft									X	herbicides
1110			-20	B-7-surface		~~X~~	~~X~~ EDZ	~~X~~	~~X~~				X	
1115			-21	B-7-5ft									X	
1120			-22	B-7-10ft	↓								X	
1210			-23	B-7-15ft	B					X	X			
1225	↓	↓	-24	B-7-20ft	B								X	
END														

ADDITIONAL INSTRUCTIONS:

	Signature	Print Name	Company	Date	Time
Relinquished by	Zangmeister	K Zangmeister	LFR	6-23-03	1320
Received by		Mike [illegible]	Alpha	6-23-03	1320
Relinquished by					
Received by	DS Baker	DS Baker	Alpha	6/24/03	1030
Relinquished by					
Received by					

*Key: AQ - Aqueous SO - Soil WA - Waste OT - Other **: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this coc. The liability of the laboratory is limited to the amount paid for the report.

NORTH COAST
LABORATORIES LTD.

July 03, 2003

Alpha Analytical
255 Glendale Ave., Suite 21
Sparks, NV 89431-5778

Attn: Randy Gardner

RE: LVF03062441

Order No.: 0306605
Invoice No.: 34994
PO No.: LVF03062441
ELAP No. 1247-Expires July 2004

SAMPLE IDENTIFICATION

Fraction	Client Sample Description
01A	LVF03062441-01A
01B	LVF03062441-01A
02A	LVF03062441-02A
03A	LVF03062441-05A
04A	LVF03062441-08A
05A	LVF03062441-11A
06A	LVF03062441-14A
07A	LVF03062441-17A

ND = Not Detected at the Reporting Limit

Limit = Reporting Limit

All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY

Laboratory Supervisor(s)

Edmundo
QA Unit

Jesse G. Chaney, Jr.
Laboratory Director

CLIENT: Alpha Analytical
Project: LVF03062441
Lab Order: 0306605

CASE NARRATIVE

EPA 8151A - Soil:
The reporting limit for dinoseb was raised due to low recoveries in the quality control samples.

EPA 8151A - Water:
The laboratory control sample (LCS) recoveries were below the lower acceptance limits for several analytes. The response of the reporting limit standard was such that the analytes would have been detected even with the low recoveries; therefore, the data were accepted.

Date: 03-Jul-03
WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-01A **Received:** 6/25/03 **Collected:** 6/23/03 11:50
Lab ID: 0306605-01A

Test Name: Organophosphorous Pesticides **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Mevinphos	ND	1.0	µg/L	1.0	6/27/03	7/3/03
Ethoprophos	ND	1.0	µg/L	1.0	6/27/03	7/3/03
Phorate	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Demeton-S	ND	2.0	µg/L	1.0	6/27/03	7/3/03
Diazinon	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Disulfoton	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Dimethoate	ND	2.0	µg/L	1.0	6/27/03	7/3/03
Ronnel	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Methyl Parathion	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Chlorpyrifos	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Malathion	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Parathion	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Fenthion	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Tetrachlorvinphos	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Ethion	ND	0.50	µg/L	1.0	6/27/03	7/3/03
Fensulfothion	ND	1.0	µg/L	1.0	6/27/03	7/3/03
Azinphos	ND	2.5	µg/L	1.0	6/27/03	7/3/03
Coumaphos	ND	2.5	µg/L	1.0	6/27/03	7/3/03
Surrogate: Triphenylphosphate	99.3	47.9-119	% Rec	1.0	6/27/03	7/3/03

Client Sample ID: LVF03062441-01A **Received:** 6/25/03 **Collected:** 6/23/03 11:50
Lab ID: 0306605-01B

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	2.0	µg/L	1.0	6/26/03	7/2/03
Dicamba	ND	0.50	µg/L	1.0	6/26/03	7/2/03
MCPP	ND	250	µg/L	1.0	6/26/03	7/2/03
MCPA	ND	250	µg/L	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/L	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/L	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.50	µg/L	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.50	µg/L	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/L	1.0	6/26/03	7/2/03
Dinoseb	ND	0.50	µg/L	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	72.9	46.6-111	% Rec	1.0	6/26/03	7/2/03

Date: 03-Jul-03
WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-02A **Received:** 6/25/03 **Collected:** 6/23/03 10:43
Lab ID: 0306605-02A

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	73.4	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	98.3	29.9-137	% Rec	1.0	6/25/03	6/27/03

Date: 03-Jul-03
WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-05A   **Received:** 6/25/03   **Collected:** 6/23/03 10:22
Lab ID: 0306605-03A

Test Name: Chlorinated Herbicides   **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	79.2	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides   **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	96.2	29.9-137	% Rec	1.0	6/25/03	6/27/03

Date: 03-Jul-03

WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-08A **Received:** 6/25/03 **Collected:** 6/23/03 10:05

Lab ID: 0306605-04A

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	59.9	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	104	29.9-137	% Rec	1.0	6/25/03	6/27/03

Date: 03-Jul-03
WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-11A **Received:** 6/25/03 **Collected:** 6/23/03 8:25
Lab ID: 0306605-05A

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	67.5	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	105	29.9-137	% Rec	1.0	6/25/03	6/27/03

Date: 03-Jul-03
WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-14A **Received:** 6/25/03 **Collected:** 6/23/03 9:10
Lab ID: 0306605-06A

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	71.6	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	102	29.9-137	% Rec	1.0	6/25/03	6/27/03

Date: 03-Jul-03

WorkOrder: 0306605

ANALYTICAL REPORT

Client Sample ID: LVF03062441-17A **Received:** 6/25/03 **Collected:** 6/23/03 9:45

Lab ID: 0306605-07A

Test Name: Chlorinated Herbicides **Reference:** EPA 8151A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dalapon	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dicamba	ND	0.20	µg/g	1.0	6/26/03	7/2/03
MCPP	ND	100	µg/g	1.0	6/26/03	7/2/03
MCPA	ND	100	µg/g	1.0	6/26/03	7/2/03
Dichlorprop	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4-D	ND	1.0	µg/g	1.0	6/26/03	7/2/03
2,4,5-TP	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4,5-T	ND	0.10	µg/g	1.0	6/26/03	7/2/03
2,4-DB	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Dinoseb	ND	1.0	µg/g	1.0	6/26/03	7/2/03
Surrogate: 2,3-D	68.0	44.2-99.9	% Rec	1.0	6/26/03	7/2/03

Test Name: Organophosphorous Pesticides · **Reference:** EPA 8141A

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Dichlorvos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Mevinphos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Ethoprophos	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Phorate	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Demeton-S	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Diazinon	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Disulfoton	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Dimethoate	ND	2.0	µg/g	1.0	6/25/03	6/27/03
Ronnel	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Methyl Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Chlorpyrifos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Malathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Parathion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fenthion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Tetrachlorvinphos	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Ethion	ND	0.50	µg/g	1.0	6/25/03	6/27/03
Fensulfothion	ND	1.0	µg/g	1.0	6/25/03	6/27/03
Azinphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Coumaphos	ND	2.5	µg/g	1.0	6/25/03	6/27/03
Surrogate: Triphenylphosphate	103	29.9-137	% Rec	1.0	6/25/03	6/27/03

North Coast Laboratories, Ltd.

Date: 03-Jul-03

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Method Blank

Sample ID **MB-9316** Batch ID: **9316** Test Code: **8140S** Units: **µg/g** Analysis Date **6/27/03 1:24:03 AM** Prep Date **6/25/03**

Client ID: Run ID: **ORGC10_030626A** SeqNo: **348000**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dichlorvos	ND	0.50									
Mevinphos	0.3828	1.0									J
Ethoprophos	ND	1.0									
Phorate	ND	1.0									
Demeton-S	ND	2.0									
Diazinon	ND	0.50									
Disulfoton	ND	0.50									
Dimethoate	ND	2.0									
Ronnel	ND	0.50									
Methyl Parathion	ND	0.50									
Chlorpyrifos	ND	0.50									
Malathion	ND	0.50									
Parathion	ND	0.50									
Fenthion	ND	0.50									
Tetrachlorvinphos	ND	0.50									
Ethion	ND	0.50									
Fensulfothion	ND	1.0									
Azinphos	ND	2.5									
Coumaphos	ND	2.5									
Triphenylphosphate	4.92	0.10	5.00	0	98.3%	30	137	0			

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Method Blank

Sample ID **MB-9339** Batch ID: **9339** Test Code: **8140W** Units: **µg/L** Analysis Date **7/3/03 12:39:00 AM** Prep Date **6/27/03**
Client ID: Run ID: **ORGC10_030702A** SeqNo: **349345**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dichlorvos	ND	0.50									
Mevinphos	ND	1.0									
Ethoprophos	ND	1.0									
Phorate	ND	0.50									
Demeton-S	ND	2.0									
Diazinon	0.3032	0.50									J
Disulfoton	ND	0.50									
Dimethoate	ND	2.0									
Ronnel	ND	0.50									
Methyl Parathion	ND	0.50									
Chlorpyrifos	ND	0.50									
Malathion	ND	0.50									
Parathion	ND	0.50									
Fenthion	ND	0.50									
Tetrachlorvinphos	ND	0.50									
Ethion	ND	0.50									
Fensulfothion	ND	1.0									
Azinphos	ND	2.5									
Coumaphos	ND	2.5									
Triphenylphosphate	4.14	0.10	5.00	0	82.7%	48	119	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Method Blank

Sample ID **MB-9317** Batch ID: **9317** Test Code: **8150S** Units: **µg/g** Analysis Date **7/2/03 2:43:58 AM** Prep Date **6/26/03**
Client ID: Run ID: **ORGC4_030701A** SeqNo: **349223**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	ND	1.0									
Dicamba	ND	0.20									
MCPP	ND	100									
MCPA	ND	100									
Dichlorprop	ND	1.0									
2,4-D	ND	1.0									
2,4,5-TP	ND	0.10									
2,4,5-T	ND	0.10									
2,4-DB	ND	1.0									
Dinoseb	ND	1.0									
2,3-D	3.60	0.10	5.00	0	72.1%	44	100	0			

Sample ID **MB-9320** Batch ID: **9320** Test Code: **8150W** Units: **µg/L** Analysis Date **7/2/03 10:08:54 PM** Prep Date **6/26/03**
Client ID: Run ID: **ORGC4_030702A** SeqNo: **349412**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	ND	2.0									
Dicamba	ND	0.50									
MCPP	ND	250									
MCPA	ND	250									
Dichlorprop	ND	1.0									
2,4-D	ND	1.0									
2,4,5-TP	ND	0.50									
2,4,5-T	ND	0.50									
2,4-DB	ND	1.0									
Dinoseb	ND	0.50									
2,3-D	3.23	0.10	5.00	0	64.6%	47	111	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 03-Jul-03

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-9316** Batch ID: **9316** Test Code: **8140S** Units: **µg/g** Analysis Date **6/27/03 2:04:33 AM** Prep Date **6/25/03**

Client ID: Run ID: **ORGC10_030626A** SeqNo: **348001**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dichlorvos	2.679	0.50	2.50	0	107%	46	145	0			
Mevinphos	4.007	1.0	5.00	0	80.1%	32	131	0			
Ethoprophos	4.537	1.0	5.00	0	90.7%	38	135	0			
Phorate	1.658	1.0	2.50	0	66.3%	39	146	0			
Demeton-S	9.006	2.0	10.0	0	90.1%	30	137	0			
Diazinon	1.967	0.50	2.50	0	78.7%	42	132	0			
Disulfoton	2.358	0.50	2.50	0	94.3%	37	139	0			
Dimethoate	7.572	2.0	10.0	0	75.7%	17	134	0			
Ronnel	2.366	0.50	2.50	0	94.6%	32	172	0			
Methyl Parathion	2.225	0.50	2.50	0	89.0%	27	141	0			
Chlorpyrifos	2.403	0.50	2.50	0	96.1%	37	150	0			
Malathion	1.829	0.50	2.50	0	73.2%	48	139	0			
Parathion	2.276	0.50	2.50	0	91.0%	28	152	0			
Fenthion	2.398	0.50	2.50	0	95.9%	37	137	0			
Tetrachlorvinphos	2.227	0.50	2.50	0	89.1%	44	135	0			
Ethion	2.284	0.50	2.50	0	91.4%	51	128	0			
Fensulfothion	3.609	1.0	5.00	0	72.2%	20	138	0			
Azinphos	11.70	2.5	12.5	0	93.6%	38	146	0			
Coumaphos	11.70	2.5	12.5	0	93.6%	39	143	0			
Triphenylphosphate	4.74	0.10	5.00	0	94.8%	30	137	0			

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Laboratory Control Spike Duplicate

Sample ID **LCSD-9316** Batch ID: **9316** Test Code: **8140S** Units: **µg/g** Analysis Date **6/27/03 2:45:04 AM** Prep Date **6/25/03**
Client ID: Run ID: **ORGC10_030626A** SeqNo: **348002**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dichlorvos	3.141	0.50	2.50	0	126%	46	145	2.68	15.9%	43	
Mevinphos	4.222	1.0	5.00	0	84.4%	32	131	4.01	5.21%	35	
Ethoprophos	4.719	1.0	5.00	0	94.4%	38	135	4.54	3.93%	25	
Phorate	1.734	1.0	2.50	0	69.4%	39	146	1.66	4.47%	34	
Demeton-S	9.283	2.0	10.0	0	92.8%	30	137	9.01	3.03%	33	
Diazinon	2.022	0.50	2.50	0	80.9%	42	132	1.97	2.77%	58	
Disulfoton	2.472	0.50	2.50	0	98.9%	37	139	2.36	4.71%	33	
Dimethoate	7.776	2.0	10.0	0	77.8%	17	134	7.57	2.67%	56	
Ronnel	2.460	0.50	2.50	0	98.4%	32	172	2.37	3.88%	30	
Methyl Parathion	2.266	0.50	2.50	0	90.7%	27	141	2.22	1.85%	37	
Chlorpyrifos	2.468	0.50	2.50	0	98.7%	37	150	2.40	2.70%	34	
Malathion	1.791	0.50	2.50	0	71.6%	48	139	1.83	2.13%	36	
Parathion	2.123	0.50	2.50	0	84.9%	28	152	2.28	6.95%	28	
Fenthion	2.266	0.50	2.50	0	90.6%	37	137	2.40	5.66%	32	
Tetrachlorvinphos	2.500	0.50	2.50	0	100%	44	135	2.23	11.5%	28	
Ethion	2.377	0.50	2.50	0	95.1%	51	128	2.28	3.97%	35	
Fensulfothion	3.551	1.0	5.00	0	71.0%	20	138	3.61	1.62%	52	
Azinphos	11.72	2.5	12.5	0	93.7%	38	146	11.7	0.112%	32	
Coumaphos	11.72	2.5	12.5	0	93.7%	39	143	11.7	0.112%	32	
Triphenylphosphate	5.00	0.10	5.00	0	100%	30	137	4.74	5.42%	31	

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-9339** Batch ID: **9339** Test Code: **8140W** Units: **µg/L** Analysis Date **7/3/03 1:19:18 AM** Prep Date **6/27/03**
Client ID: Run ID: **ORGC10_030702A** SeqNo: **349346**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dichlorvos	2.147	0.50	2.50	0	85.9%	13	113	0			
Mevinphos	3.282	1.0	5.00	0	65.6%	10	93	0			
Ethoprophos	3.548	1.0	5.00	0	71.0%	26	104	0			
Phorate	1.572	0.50	2.50	0	62.9%	14	112	0			
Demeton-S	6.467	2.0	10.0	0	64.7%	17	99	0			
Diazinon	1.479	0.50	2.50	0	59.2%	15	119	0			
Disulfoton	1.729	0.50	2.50	0	69.2%	20	111	0			
Dimethoate	6.640	2.0	10.0	0	66.4%	12	80	0			
Ronnel	1.752	0.50	2.50	0	70.1%	22	117	0			
Methyl Parathion	1.678	0.50	2.50	0	67.1%	15	128	0			
Chlorpyrifos	1.778	0.50	2.50	0	71.1%	21	123	0			
Malathion	0.9598	0.50	2.50	0	38.4%	18	96	0			
Parathion	1.406	0.50	2.50	0	56.2%	34	101	0			
Fenthion	1.682	0.50	2.50	0	67.3%	24	109	0			
Tetrachlorvinphos	1.666	0.50	2.50	0	66.6%	15	136	0			
Ethion	1.713	0.50	2.50	0	68.5%	41	101	0			
Fensulfothion	2.959	1.0	5.00	0	59.2%	9	101	0			
Azinphos	7.473	2.5	12.5	0	59.8%	37	104	0			
Coumaphos	7.915	2.5	12.5	0	63.3%	37	106	0			
Triphenylphosphate	4.28	0.10	5.00	0	85.6%	48	119	0			

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-9317** Batch ID: **9317** Test Code: **8150S** Units: **µg/g** Analysis Date **7/2/03 3:30:52 AM** Prep Date **6/26/03**
Client ID: Run ID: **ORGC4_030701A** SeqNo: **349224**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	2.872	1.0	5.00	0	57.4%	35	99	0			
Dicamba	0.5888	0.20	1.00	0	58.9%	36	102	0			
MCPP	257.9	100	500	0	51.6%	32	69	0			
MCPA	274.1	100	500	0	54.8%	25	82	0			
Dichlorprop	3.132	1.0	5.00	0	62.6%	41	98	0			
2,4-D	3.073	1.0	5.00	0	61.5%	38	104	0			
2,4,5-TP	0.2853	0.10	0.500	0	57.1%	38	101	0			
2,4,5-T	0.3000	0.10	0.500	0	60.0%	36	106	0			
2,4-DB	3.056	1.0	5.00	0	61.1%	40	101	0			
Dinoseb	ND	1.0	1.00	0	0%	4	73	0			S
2,3-D	3.52	0.10	5.00	0	70.5%	44	100	0			

Sample ID **LCSD-9317** Batch ID: **9317** Test Code: **8150S** Units: **µg/g** Analysis Date **7/2/03 4:17:47 AM** Prep Date **6/26/03**
Client ID: Run ID: **ORGC4_030701A** SeqNo: **349225**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	2.778	1.0	5.00	0	55.6%	35	99	2.87	3.32%	15	
Dicamba	0.6050	0.20	1.00	0	60.5%	36	102	0.589	2.71%	15	
MCPP	236.0	100	500	0	47.2%	32	69	258	8.88%	15	
MCPA	271.7	100	500	0	54.3%	25	82	274	0.885%	15	
Dichlorprop	3.195	1.0	5.00	0	63.9%	41	98	3.13	2.01%	15	
2,4-D	3.145	1.0	5.00	0	62.9%	38	104	3.07	2.33%	15	
2,4,5-TP	0.3003	0.10	0.500	0	60.1%	38	101	0.285	5.13%	15	
2,4,5-T	0.3077	0.10	0.500	0	61.5%	36	106	0.300	2.54%	15	
2,4-DB	3.142	1.0	5.00	0	62.8%	40	101	3.06	2.77%	15	
Dinoseb	ND	1.0	1.00	0	0%	4	73	0	0%	15	S
2,3-D	3.57	0.10	5.00	0	71.4%	44	100	3.52	1.33%	15	

Qualifiers:

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Alpha Analytical
Work Order: 0306605
Project: LVF03062441

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID **LCS-9320** Batch ID: **9320** Test Code: **8150W** Units: **µg/L** Analysis Date **7/2/03 10:55:50 PM** Prep Date **6/26/03**

Client ID: Run ID: **ORGC4_030702A** SeqNo: **349413**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dalapon	5.125	2.0	10.0	0	51.2%	53	107	0			S
Dicamba	1.310	0.50	2.50	0	52.4%	53	106	0			S
MCPP	546.5	250	1,250	0	43.7%	34	109	0			
MCPA	654.3	250	1,250	0	52.3%	41	119	0			
Dichlorprop	2.477	1.0	5.00	0	49.5%	50	110	0			S
2,4-D	3.002	1.0	5.00	0	60.0%	61	106	0			S
2,4,5-TP	1.318	0.50	2.50	0	52.7%	58	105	0			S
2,4,5-T	1.319	0.50	2.50	0	52.8%	55	112	0			S
2,4-DB	4.006	1.0	5.00	0	80.1%	72	115	0			
Dinoseb	1.321	0.50	2.50	0	52.8%	34	120	0			
2,3-D	3.04	0.10	5.00	0	60.9%	47	111	0			

Qualifiers:

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

B - Analyte detected in the associated Method Blank

0306605

Alpha Analytical, Inc.
255 Glendale Avenue
Suite 21
Sparks, Nevada 89431-5778
Phone: (775) 355-1044
Fax: (775) 355-0406

SUB CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Work Order : LVF03062441

*Please reference the Work Order number on all reports and invoices.
*Also please include the dates of analysis and detection limits.

Report Due By : 5:00 PM
On : 08-Jul-03

Subcontractor:

North Coast Laboratories Ltd.
5680 West End Road

Arcata, CA 95521

TEL: (707) 822-4649
FAX: (707) 822-6831
Acct #:

EDD Required: Yes

Required QC:
Final Rpt, MBLK, LCS, MS/MSD With Surrogates

24-Jun-03

Alpha's Sample ID	Client's Sample ID	Matrix	Collection Date	Type (#) of Bottles Sulfuric	Nitric	Other	Requested Tests SW8141A	SW8141A	SW8151	SW8151	Sample Comments
LVF03062441-01A ✓✓	Matsuda	Aqueous	06/23/03 11:50			OTHER (2)		Organophosphorus Pesticides (8141_W)		Chlorinated Herbicides (8151_W)	See Attached Sheet Of Sample Comments
LVF03062441-02A ✓	B-1-Surface	Soil	06/23/03 10:43			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments
LVF03062441-05A ✓	B-2-Surface	Soil	06/23/03 10:22			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments
LVF03062441-08A ✓	B-3-Surface	Soil	06/23/03 10:05			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments
LVF03062441-11A ✓	B-4-Surface	Soil	06/23/03 08:25			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments
LVF03062441-14A ✓	B-5-Surface	Soil	06/23/03 09:10			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments
LVF03062441-17A ✓	B-6-Surface	Soil	06/23/03 09:45			BAGGIE (1)	Organophosphorus Pesticides (8141_S)		Chlorinated Herbicides (8151_S)		See Attached Sheet Of Sample Comments

Comments:

Cooler Temp. = On Ice
Fed-Ex

		Date/Time			Date/Time
Relinquished by:	DSBaker	6/24/03 1400	Received by:	Amanda Bort	6/25/03 12:0
Relinquished by:			Received by:		

LFR
LEVINE • FRICKE

APPENDIX B

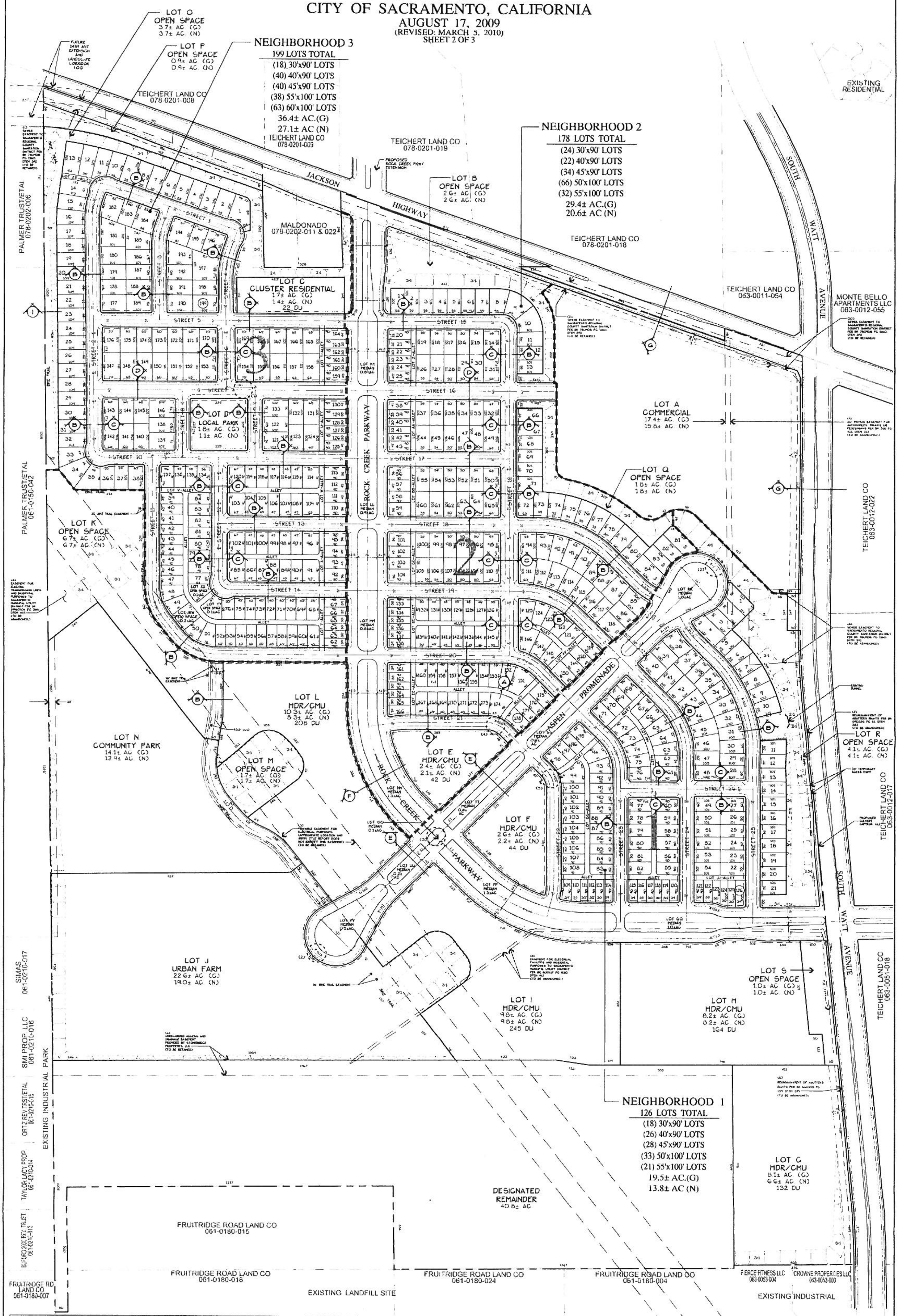
WOOD ROGER'S LAND USE MAP ENTITLED
SPD-PUD SCHEMATIC PLAN, ASPEN 1-NEW BRIGHTON

TENTATIVE SUBDIVISION MAP

ASPEN 1

CITY OF SACRAMENTO, CALIFORNIA

AUGUST 17, 2009
(REVISED: MARCH 5, 2010)
SHEET 2 OF 3



PROJECT NOTES

APPLICANT/OWNER
TEICHERT LAND COMPANY/STONEBRIDGE PROPERTIES LLC
3500 AMERICAN RIVER DRIVE, SUITE 160
SACRAMENTO, CALIFORNIA 95864
CONTACT: MIKE ISLE
PHONE: (916) 484-3237

PLANNER/ENGINEER
WOOD RODGERS INC
3301 C STREET BLDG. 100B
SACRAMENTO, CA 95816
CONTACT: TIMOTHY DENHAM AICP LEED AP
PHONE: 916 341-7760

ASSESSOR'S PARCEL NO.
078-0202-007, 008, 009, 010 + 013
061-0150-003, 004, 015, 016, 027 + 028
061-0180-003, 017, 025
063-0014-002 + 006
063-0053-001

AREA
232.3± ACRES GROSS

NUMBER OF LOTS
498 SINGLE FAMILY RESIDENTIAL LOTS
1 CLUSTER RESIDENTIAL LOT
6 HDR/CMU LOTS
1 COMMERCIAL LOT
10 ALLEY LOTS
2 PARK LOTS
11 OPEN SPACE LOTS
12 MEDIAN LOTS

EXISTING USE
AGGREGATE MINING

PROPOSED USE
MASTER PLANNED COMMUNITY

EXISTING ZONING
M-2S + M-2S-R

PROPOSED ZONING
PUD

PARK DISTRICT
CITY OF SACRAMENTO

FIRE PROTECTION
CITY OF SACRAMENTO

SCHOOL DISTRICT
ELK GROVE UNIFIED SCHOOL DISTRICT

SEWER
SACRAMENTO REGIONAL SANITATION DISTRICT

STORM DRAIN
CITY OF SACRAMENTO

WATER
CITY OF SACRAMENTO

ELECTRICITY
SMUD

GAS
PG&E

NOTES

1. SUBDIVIDER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS PURSUANT TO SECTION 66456.1(A) OF THE SUBDIVISION MAP ACT
2. THIS IS AN APPLICATION FOR A DEVELOPMENT PERMIT
3. A 12.5 FOOT PUBLIC UTILITY EASEMENT WILL BE LOCATED ADJACENT TO ALL RIGHTS OF WAY UNLESS OTHERWISE NOTED OR AS APPROVED BY THE CITY ENGINEER
4. VILLAGE (LARGE LOT) NUMBERING IS FOR IDENTIFICATION PURPOSES ONLY AND DOES NOT INDICATE PHASING ORDER OF DEVELOPMENT. ULTIMATE DEVELOPMENT PHASING SHALL BE ORDERLY AND WILL BE DETERMINED AT FINAL MAP AND/OR IMPROVEMENT PLAN STAGE
5. ALL EXISTING STRUCTURES TO BE REMOVED AND ALL EXISTING WELLS TO BE ABANDONED
6. PARK IN-LIEU FEES FOR LOTS D AND N SHALL BE PAID UPON APPROVAL OF FINAL DEVELOPMENT PLANS
7. THE AERIAL TOPOGRAPHY SHOWN HEREON WAS PROVIDED BY LIDAR
8. THIS EXHIBIT IS FOR TENTATIVE MAP PURPOSES ONLY. ALL SITE CHARACTERISTICS ARE TO BE VERIFIED PRIOR TO FINAL MAP
9. PURSUANT TO SECTION 66499.20 1/2 OF THE SUBDIVISION MAP ACT, THE LAND SHOWN HEREON AS ASPEN 1 IS HEREBY MERGED AND RESUBDIVIDED
10. PURSUANT TO SECTION 66434(G) OF THE SUBDIVISION MAP ACT, THE FOLLOWING EASEMENTS ARE HEREBY ABANDONED:

(2) EASEMENT FOR ELECTRIC TRANSMISSION LINES AND INCIDENTAL PURPOSES TO SACRAMENTO MUNICIPAL UTILITY DISTRICT PER BK 19960104 PG 386 (ITEM 45)

(5) EASEMENT FOR ELECTRICAL FACILITIES AND INCIDENTAL PURPOSES TO SACRAMENTO MUNICIPAL UTILITY DISTRICT PER BK 800117 PG 830 (ITEM 41)

(7) RELINQUISHMENT OF ABUTTERS RIGHTS PER BK 690326 PG 11 (ITEM 36)

(8) SEWER EASEMENT TO SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT PER BK 780908 PG 1160 (ITEM 34)

LAND USE SUMMARY

LOT NO./ VILLAGE NO.	GENERAL PLAN ZONING DESIGNATIONS	USE	GROSS ACRES	NET ACRES	NET DENSITY	DWELLING UNITS
1	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21/PUD	SINGLE FAMILY RESIDENTIAL (30X90', 40X90', 45X100', 50X100', 55X100' TYP.)	19.5	13.8	9.1	126
2	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21/PUD	SINGLE FAMILY RESIDENTIAL (30X90', 40X90', 45X100', 50X100', 55X100' TYP.)	29.4	20.6	8.6	177
3	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21/PUD	SINGLE FAMILY RESIDENTIAL (30X90', 45X100', 55X100', 60X100' TYP.)	36.4	27.1	7.3	199
SUBTOTAL			85.3	61.5	8.2	502
A	SUBURBAN CENTER DENSITY 15-36/FAR 0.25-2.0 / PUD	COMMERCIAL	17.4	15.8		
B	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	2.6	2.6		
C	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	CLUSTER RESIDENTIAL	1.7	1.4	16	22
D	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	PARK	1.8	1.1		
E	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	2.4	2.1	20	42
F	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	2.6	2.2	20	44
G	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	8.1	6.6	20	132
H	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	8.2	8.2	20	164
I	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	9.8	9.8	25	245
J	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	URBAN FARM	22.6	19.0		
K	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	6.7	6.7		
L	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	HDR/CMU	10.3	8.3	25	208
M	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	1.7	1.7		
N	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	COMMUNITY PARK	14.1	12.9		
O	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	3.7	3.7		
P	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	0.9	0.9		
Q	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	1.8	1.8		
R	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	4.1			
S	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	1.0	1.0		
T-JJ & ZZ	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	ALLEYS		3.5		
KK-VV	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	MEDIANS / RC PKWY & ASPEN PROMENADE	5.2			
WW	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	0.2	0.2		
XX	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	0.1	0.1		
YY	TRADITIONAL NEIGHBORHOOD MED DENSITY 8-21 / PUD	OPEN SPACE	0.1	0.1		
SUBTOTAL			131.1	109.7		857
	ROCK CREEK PKWY (EXCLUDES LANDSCAPE MEDIANS)		8.4			
	ASPEN PROMINADE (EXCLUDES LANDSCAPE MEDIANS)		4.2			
	JACKSON HWY/S. WATT AVE		3.3			
SUBTOTAL			15.9			
TOTAL			232.3 AC ***			1359 DU

* Net acreage excludes public streets, alleys, slope areas and landscape easements where applicable.
** Gross acreage includes alleys and adjacent roadways but excludes Jackson Highway, South Watt Avenue, Rock Creek Parkway, Aspen Promenade, open space, slope areas and parks.
*** Total acreage does not include Designated Remainder.

DENSITY SUMMARY
13.6 DU/AC RESIDENTIAL NET *
10.6 DU/AC RESIDENTIAL GROSS **
5.8 DU/AC OVERALL (TOTAL SITE ACREAGE) ***

ENGINEER'S REVIEW

No. 41978
Exp. 03-31-12

REVIEWED BY DATE
TIMOTHY R. CRUSH PE 41978 LEED AP

NORTH
0 100 200 400

SHEET 2 OF 3

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C St, Bldg. 100-B Tel 916.341.7760
Sacramento, CA 95816 Fax 916.341.7767

APPENDIX C
BORING LOGS

Project: Environmental Impact Report - Aspen 1 Property	**Log of Boring NCE-1**
Project Location: Sacramento, California	Sheet 1 of 1
Project Number: A419.19.35	

Date(s) Drilled	**4/23/2010**	Logged By	**Frank Drewes**	Checked By	**Mike Leacox**
Drilling Method	**Direct Push**	Drill Bit Size/Type	**N/A**	Total Depth of Borehole	**5 feet below ground surface (bgs)**
Drill Rig Type	**Geoprobe**	Drilling Contractor	**WDC Exploration & Wells**	Surface Elevation	**N/A**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s)	**Continuous Core**	Hammer Data	**N/A**
Borehole Backfill	**Cement/bentonite grout**	Location	**(See Site Plan)**		

Elevation, feet	Depth, feet			Sample	Blows / foot	PID (units)	Odor	USCS Symbol	Graphic Log	LITHOLOGIC DESCRIPTION
	0							ML		REDDISH-BROWN SILT (ML) moist, soft, low plasticity
				☒						Same as above
	5			☒						Same as above
										Terminated boring at 5 feet bgs and backfilled with a cement/bentonite grout.
	10									
	15									
	20									
	25									
	30									

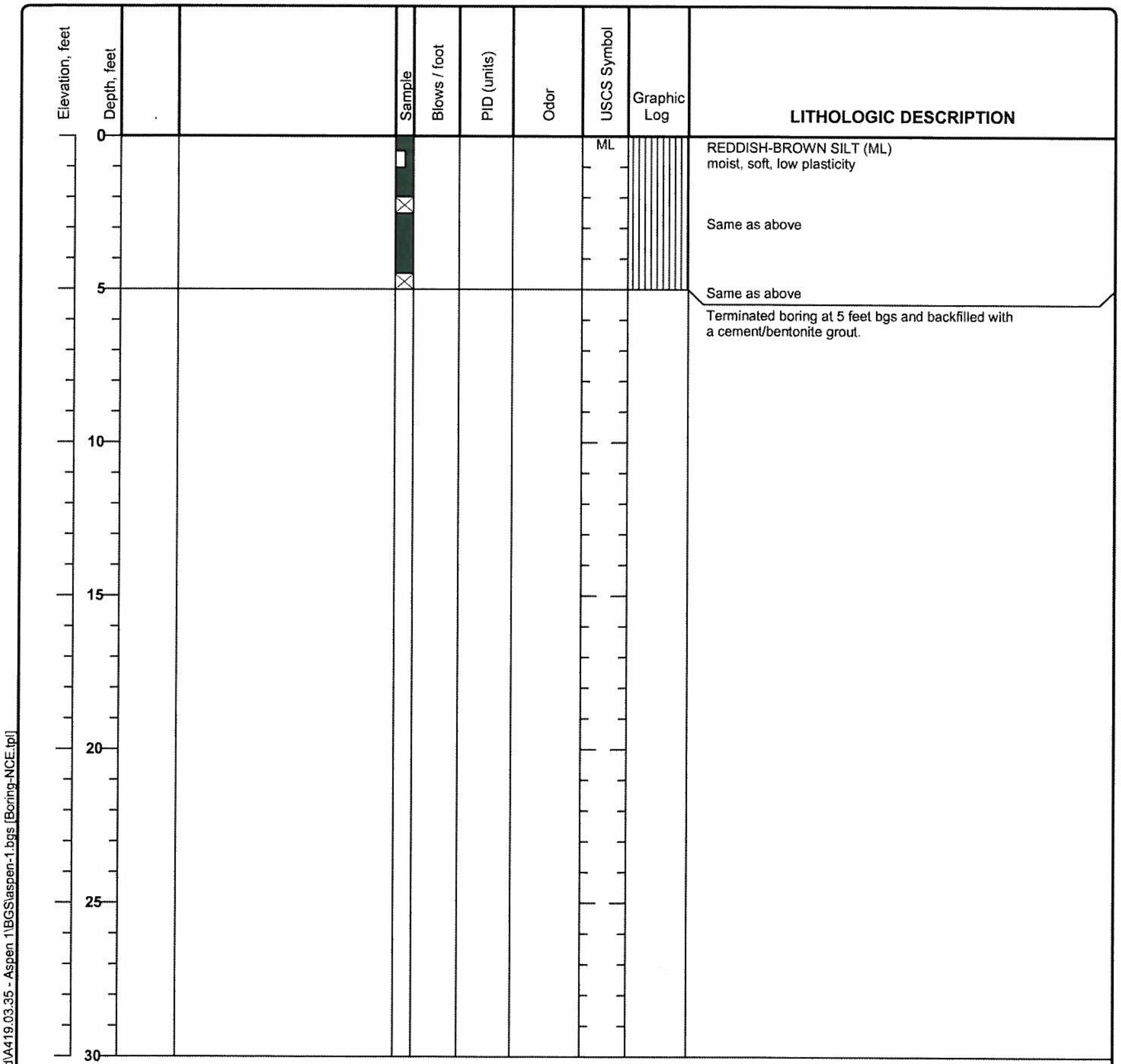
Nichols Consulting Engineers, Chtd.
Engineering & Environmental Services
8795 Folsom Blvd., Suite #250
Sacramento, CA 95826

Project: Environmental Impact Report - Aspen 1 Property
Project Location: Sacramento, California
Project Number: A419.19.35

Log of Boring NCE-2

Sheet 1 of 1

Date(s) Drilled **4/23/2010**	Logged By **Frank Drewes**	Checked By **Mike Leacox**
Drilling Method **Direct Push**	Drill Bit Size/Type **N/A**	Total Depth of Borehole **5 feet below ground surface (bgs)**
Drill Rig Type **Geoprobe**	Drilling Contractor **WDC Exploration & Wells**	Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Continuous Core**	Hammer Data **N/A**
Borehole Backfill **Cement/bentonite grout**	Location **(See Site Plan)**	



REDDISH-BROWN SILT (ML)
moist, soft, low plasticity

Same as above

Same as above

Terminated boring at 5 feet bgs and backfilled with a cement/bentonite grout.

P:\A419 - Downey Brand\A419.03.35 - Aspen 1\BGS\aspen-1.bgs [Boring-NCE.tpl]

Nichols Consulting Engineers, Chtd.
Engineering & Environmental Services
8795 Folsom Blvd., Suite #250
Sacramento, CA 95826

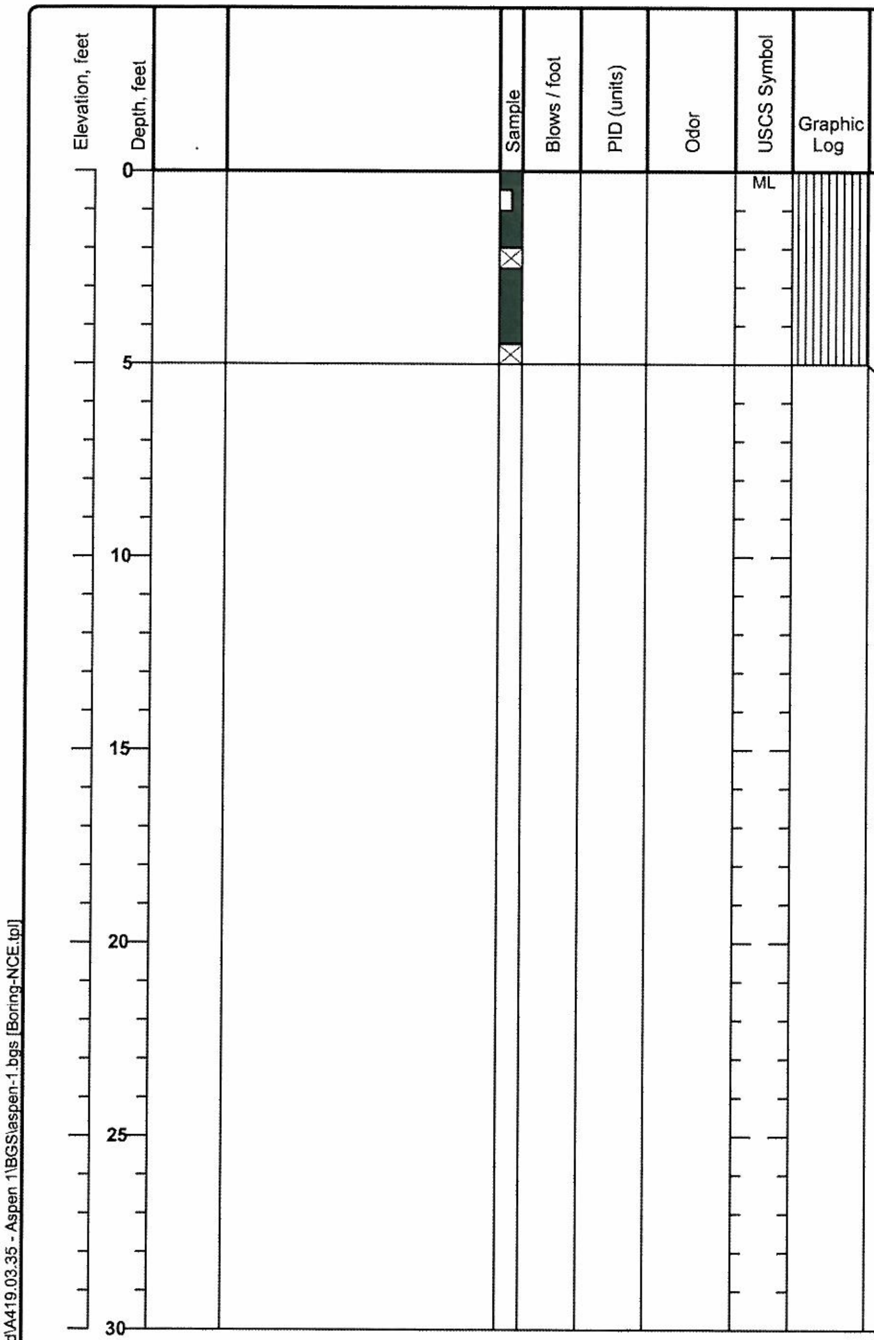
Plate B-3

Project: Environmental Impact Report - Aspen 1 Property
Project Location: Sacramento, California
Project Number: A419.19.35

Log of Boring NCE-3

Sheet 1 of 1

Date(s) Drilled **4/23/2010**	Logged By **Frank Drewes**	Checked By **Mike Leacox**
Drilling Method **Direct Push**	Drill Bit Size/Type **N/A**	Total Depth of Borehole **5 feet below ground surface (bgs)**
Drill Rig Type **Geoprobe**	Drilling Contractor **WDC Exploration & Wells**	Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Continuous Core**	Hammer Data **N/A**
Borehole Backfill **Cement/bentonite grout**	Location **(See Site Plan)**	



LITHOLOGIC DESCRIPTION

REDDISH-BROWN SILT (ML)
moist, soft, low plasticity

Same as above

Same as above

Terminated boring at 5 feet bgs and backfilled with a cement/bentonite grout.

Nichols Consulting Engineers, Chtd.
Engineering & Environmental Services
8795 Folsom Blvd., Suite #250
Sacramento, CA 95826

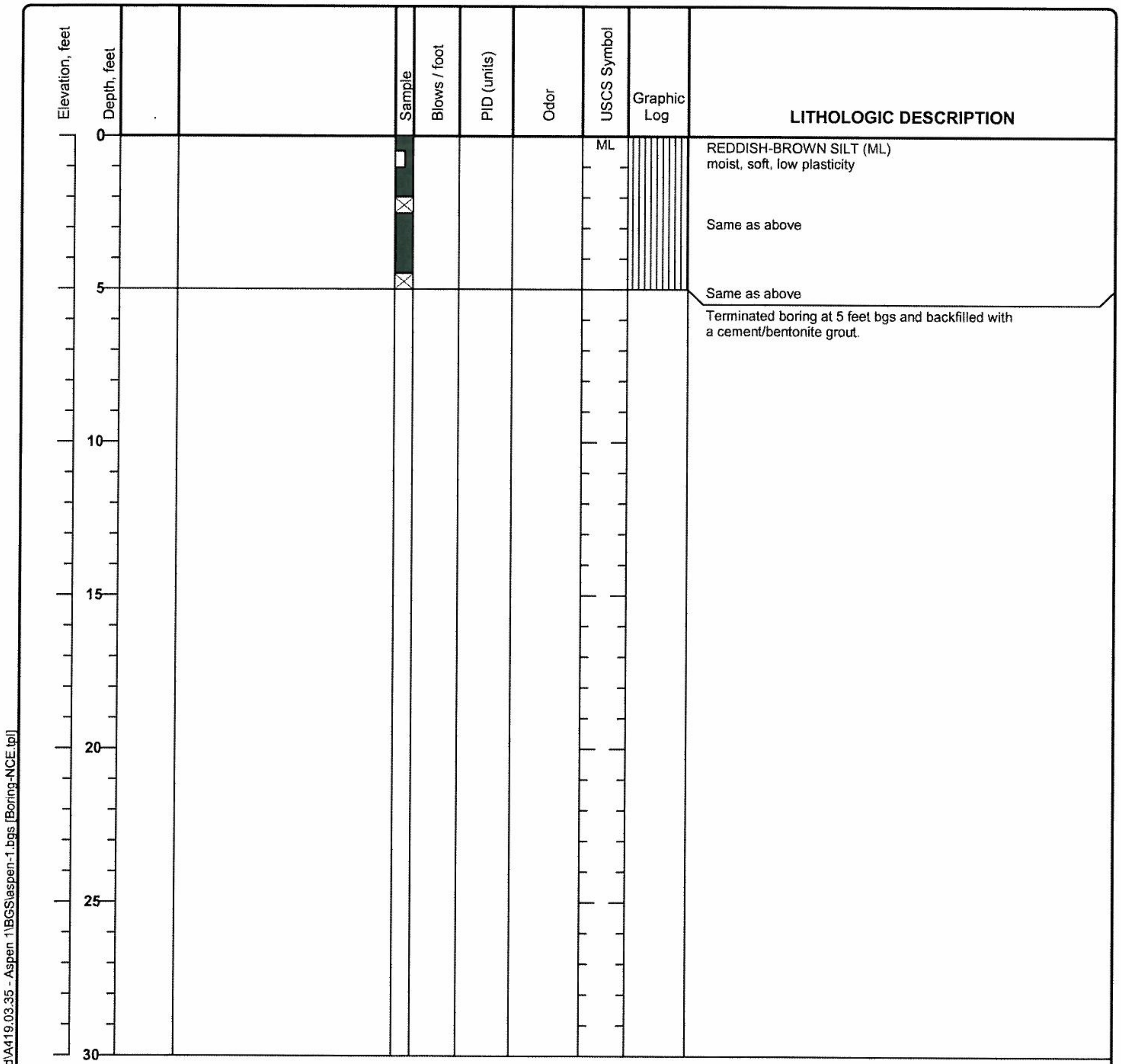
P:\A419 - Downey Brand\A419.03.35 - Aspen 1\BGS\aspen-1.bgs [Boring-NCE.tpl]

Project: Environmental Impact Report - Aspen 1 Property
Project Location: Sacramento, California
Project Number: A419.19.35

Log of Boring NCE-4

Sheet 1 of 1

Date(s) Drilled **4/23/2010**	Logged By **Frank Drewes**	Checked By **Mike Leacox**
Drilling Method **Direct Push**	Drill Bit Size/Type **N/A**	Total Depth of Borehole **5 feet below ground surface (bgs)**
Drill Rig Type **Geoprobe**	Drilling Contractor **WDC Exploration & Wells**	Surface Elevation **N/A**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Continuous Core**	Hammer Data **N/A**
Borehole Backfill **Cement/bentonite grout**	Location **(See Site Plan)**	



REDDISH-BROWN SILT (ML)
moist, soft, low plasticity

Same as above

Same as above

Terminated boring at 5 feet bgs and backfilled with a cement/bentonite grout.

Nichols Consulting Engineers, Chtd.
Engineering & Environmental Services
8795 Folsom Blvd., Suite #250
Sacramento, CA 95826

Plate B-5

P:\A419 - Downey Brand\A419.03.35 - Aspen 1\BGS\aspen-1.bgs [Boring-NCE.tpl]

APPENDIX D
LABORATORY ANALYTICAL REPORTS

CALIFORNIA LABORATORY SERVICES
3249 Fitzgerald Road Rancho Cordova, CA 95742

CLS Work Order #: CTC0265
COC #:

March 12, 2010

Robert Lucchesi
Teichert Aggregates

P.O. Box 15002, 3500 American River Dr.
Sacramento, CA 95851

Project Name: Perkins Silt Drying Beds

Enclosed are the results of analyses for samples received by the laboratory on 03/05/10 16:40. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that the results are in compliance both technically and for completeness.

Analytical results are attached to this letter. Please call if we can provide additional assistance.

Sincerely,

James Liang, Ph.D.
Laboratory Director

CA DOHS ELAP Accreditation/Registration number 1233

Teichert Aggregates P.O. Box 15002, 3500 American River Dr. Sacramento, CA 95851	Project: Perkins Silt Drying Beds Project Number: [none] Project Manager: Robert Lucchesi	CLS Work Order #: CTC0265 COC #:

CAM 17 Metals

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Perkins Rock Pond - Silt (Aspen 2 - Bed 2) (CTC0265-01) Soil		**Sampled: 03/05/10 12:19**			**Received: 03/05/10 16:40**				
Arsenic	3.2	1.0	mg/kg	10	CT01627	03/09/10	03/09/10	EPA 6020/7000	
Selenium	ND	2.5	"	"	"	"	"	"	
Thallium	ND	1.0	"	"	"	"	"	"	
Antimony	ND	2.5	"	1	CT01628	03/09/10	03/09/10	EPA 6010B	
Barium	63	1.0	"	"	"	"	"	"	
Beryllium	ND	0.50	"	"	"	"	"	"	
Cadmium	ND	0.50	"	"	"	"	"	"	
Cobalt	7.4	1.0	"	"	"	"	"	"	
Chromium	27	1.0	"	"	"	"	"	"	
Copper	23	1.0	"	"	"	"	"	"	
Lead	2.9	2.5	"	"	"	"	"	"	
Molybdenum	1.3	1.0	"	"	"	"	"	"	
Nickel	21	1.0	"	"	"	"	"	"	
Silver	ND	0.50	"	"	"	"	"	"	
Vanadium	37	1.0	"	"	"	"	"	"	
Zinc	27	1.0	"	"	"	"	"	"	
Mercury	ND	0.10	"	"	CT01651	03/10/10	03/10/10	EPA 7471A	
Prewash Pond - Silt (Aspen ~~2~~ 1 - Bed 2) (CTC0265-02) Soil		**Sampled: 03/05/10 12:46**			**Received: 03/05/10 16:40**				
Arsenic	5.0	1.0	mg/kg	10	CT01627	03/09/10	03/09/10	EPA 6020/7000	
Selenium	ND	2.5	"	"	"	"	"	"	
Thallium	ND	1.0	"	"	"	"	"	"	
Antimony	ND	2.5	"	1	CT01628	03/09/10	03/09/10	EPA 6010B	
Barium	170	1.0	"	"	"	"	"	"	
Beryllium	ND	0.50	"	"	"	"	"	"	
Cadmium	ND	0.50	"	"	"	"	"	"	
Cobalt	19	1.0	"	"	"	"	"	"	
Chromium	41	1.0	"	"	"	"	"	"	
Copper	39	1.0	"	"	"	"	"	"	
Lead	9.0	2.5	"	"	"	"	"	"	
Molybdenum	2.3	1.0	"	"	"	"	"	"	
Nickel	46	1.0	"	"	"	"	"	"	
Silver	ND	0.50	"	"	"	"	"	"	
Vanadium	68	1.0	"	"	"	"	"	"	
Zinc	61	1.0	"	"	"	"	"	"	

Teichert Aggregates
P.O. Box 15002, 3500 American River Dr.
Sacramento, CA 95851

Project: Perkins Silt Drying Beds
Project Number: [none]
Project Manager: Robert Lucchesi

CLS Work Order #: CTC0265
COC #:

CAM 17 Metals

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Prewash Pond - Silt (Aspen 2 - Bed 2) (CTC0265-02) Soil	**Sampled: 03/05/10 12:46**			**Received: 03/05/10 16:40**					
Mercury	ND	0.10	mg/kg	1	CT01651	03/10/10	03/10/10	EPA 7471A	

ALIFORNIA LABORATORY SERVICES CHAIN OF CUSTODY

CLS ID. NO. CTC0265 (1 of 1)

Report To:

ame and Address: Teichert Aggregates,
PO Box 15002, Sacramento, CA 95864

roject Manager: Robert Lucchesi

roject Name: Perkins Silt Drying Beds

ampled By: Robert Lucchesi

ob Description: **Silt Drying Beds for Perkins Pond and Prewash**

Site Location: Perkins Rock Plant Pond & Prewash Pond

Client Job Number:

Destination Laboratory:

☐ CLS (916) 638-7301
3249 Fitzgerald Road
Rancho Cordova, CA
95742
www.californialab.com

☐ OTHER

ANALYSIS REQUESTED

GEOTRACKER

EDF REPORT ☐ YES ☐ NO

GLOBAL ID.

FIELD CONDITIONS:

COMPOSITE:

DATE	TIME	SAMPLE IDENTIFICATION	FIELD ID.	MATRIX	CONTAINER NO.	CONTAINER TYPE	PRESERVATIVES	CAM – 17	TURNAROUND TIME IN DAYS 1	2	5	10	SPECIAL INSTRUCTIONS
3-5-10	12:19pm	Perkins Rock Pond – Silt	ASPEN2 BED2	H20 & Silt	1	CAM17		X				X	
3-5-10	12:46	Prewash Pond – Silt	ASPEN BED2 (Aspen 4	H20 & Silt	1	CAM17		X					

INVOICE TO:

PO#

QUOTE#

SUSPECTED CONSTITUENTS

SAMPLE RETENTION TIME

PRESERVATIVES (1) HCL (2) HNO_3 (3) = COLD (4)

RELINQUISHED BY (Signature)	PRINT NAME/COMPANY	DATE/TIME	RECEIVED BY (Signature)	PRINT NAME/COMPANY
	R. Lucchesi/Teichert Aggregates	3-5-10/ 4:40pm		

RECEIVED AT LAB BY: JonR

DATE/TIME: 3-5-10 16:40

CONDITIONS/COMMENTS: 2.8°C

SHIPPED BY: ☐ FED EX ☐ UPS ☐ OTHER

AIR BILL #

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

10040678

Report To:

Nichols Consulting Engineers, Chtd.
Mike Leacox
8795 Folsom Boulevard, Suite 103

Sacramento
CA
95826-
ph: (916) 388-5655 fax:

Project Name: Aspen 1
Site: Aspen 1
Site Address:

PO Number:
State: California
State Cert. No.: 01142CA
Date Reported: 5/28/2010

This Report Contains A Total Of 40 Pages

Excluding This Page, Chain Of Custody

And

Any Attachments

5/28/2010
Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Case Narrative for:

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

10040678

Report To:

Nichols Consulting Engineers, Chtd.
Mike Leacox
8795 Folsom Boulevard, Suite 103

Sacramento
CA
95826-
ph: (916) 388-5655 **fax:**

Project Name: **Aspen 1**
Site: **Aspen 1**
Site Address:

PO Number:
State: **California**
State Cert. No.: **01142CA**
Date Reported: **5/28/2010**

I. SAMPLE RECEIPT:

All samples were received intact. The internal ice chest temperatures were measured on receipt and are recorded on the attached Sample Receipt Checklist.

II: ANALYSIS AND EXCEPTIONS:

Subcontract Analysis:

Your samples were subcontracted to TestAmerica Savannah 5102 LaRoche Avenue, Savannah, GA 31404 for the 8141A Organophosphorous Pesticides analysis analysis. See the enclosed report for your results.

SW6020A - Total Metals analysis:

Sample ID "NCE-5-0.5" (SPL ID: 10040678-03) was randomly selected for use in SPL's quality control program for (Batch ID: 99442A-I). The MS and MSD recoveries were outside of the advisable quality control limits due to matrix interference for Thallium. A Post Digestion Spike (PDS) and Post Digestion Spike Duplicate (PDSD) was performed and all recoveries were outside quality control limits for Thallium. In addition, for sample ID "NCE-5-0.5" (SPL ID: 10040678-03) for Batch ID: 99442-I, the MS and MSD recoveries were outside of the advisable quality control limits due to matrix interference for Antimony. A Post Digestion Spike (PDS) and Post Digestion Spike Duplicate (PDSD) was performed and all recoveries were within quality control limits. A Laboratory Control Sample (LCS) was analyzed as a quality control check for the analytical batch and all recoveries were within acceptable limits.

III. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report (" mg\kg-dry " or " ug\kg-dry ").

Matrix spike (MS) and matrix spike duplicate (MSD) samples are chosen and tested at random from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. Since the MS and MSD are chosen at random from an analytical batch, the sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The Laboratory Control Sample (LCS) and the Method Blank (MB) are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

Some of the percent recoveries and RPD's on the QC report for the MS/MSD may be different than the calculated recoveries and RPD's using the sample result and the MS/MSD results that appear on the report because, the actual raw result is used to perform the calculations for percent recovery and RPD.

Any other exceptions associated with this report will be footnoted in the analytical result page(s) or the quality control summary page(s).

Please do not hesitate to contact us if you have any questions or comments pertaining to this data report. Please reference the above Certificate of Analysis Number.

Erica Cardenas

5/28/2010

Erica Cardenas
Project Manager

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Case Narrative for:

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

10040678

This report shall not be reproduced except in full, without the written approval of the laboratory. The reported results are only representative of the samples submitted for testing.

SPL, Inc. is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or by his designee, as verified by the following signature.

Erica Cardenas

5/28/2010

Erica Cardenas
Project Manager

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

10040678

Report To: Nichols Consulting Engineers, Chtd.
Mike Leacox
8795 Folsom Boulevard, Suite 103

Sacramento
CA
95826-
ph: (916) 388-5655 fax: (916) 388-5676

Fax To:

Project Name: Aspen 1
Site: Aspen 1
Site Address:

PO Number:
State: California
State Cert. No.: 01142CA
Date Reported: 5/28/2010

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
NCE-4-2	10040678-01	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-4-5	10040678-02	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-5-0.5	10040678-03	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-6-0.5	10040678-04	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-7-0.5	10040678-05	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-8-0.5	10040678-06	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-9-0.5	10040678-07	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-10-0.5	10040678-08	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-11-0.5	10040678-09	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-12-0.5	10040678-10	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-1-0.5	10040678-11	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-1-2	10040678-12	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-1-5	10040678-13	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-2-0.5	10040678-14	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-2-2	10040678-15	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-2-5	10040678-16	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-3-0.5	10040678-17	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐
NCE-3-2	10040678-18	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-3-5	10040678-19	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☑
NCE-4-0.5	10040678-20	Soil	04/23/2010 0:00	4/27/2010 9:15:00 AM		☐

5/28/2010

Erica Cardenas
Project Manager

Date

Kesavalu M. Bagawandoss Ph.D., J.D.
Laboratory Director

Ted Yen
Quality Assurance Officer

Client Sample ID: NCE-5-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-03

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 15:05	E_S1	5479319
2,4,5-TP (Silvex)	ND		33	1	05/05/10 15:05	E_S1	5479319
2,4-D	ND		33	1	05/05/10 15:05	E_S1	5479319
2,4-DB	ND		33	1	05/05/10 15:05	E_S1	5479319
Dicamba	ND		33	1	05/05/10 15:05	E_S1	5479319
Dichloroprop	ND		33	1	05/05/10 15:05	E_S1	5479319
Dinoseb	ND		33	1	05/05/10 15:05	E_S1	5479319
MCPA	ND		1000	1	05/05/10 15:05	E_S1	5479319
MCPP	ND		1000	1	05/05/10 15:05	E_S1	5479319
Surr: DCAA	83.8		% 12-139	1	05/05/10 15:05	E_S1	5479319

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 14:57	R_V	5475221

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 17:27	AL_H	5473352
Arsenic	3.86		0.5	1	04/30/10 17:27	AL_H	5473352
Barium	98.1		0.5	1	04/30/10 17:27	AL_H	5473352
Beryllium	ND		0.4	1	05/04/10 17:34	AL_H	5475454
Cadmium	ND		0.5	1	04/30/10 17:27	AL_H	5473352
Chromium	42.9		0.5	1	04/30/10 17:27	AL_H	5473352
Cobalt	9.85		0.5	1	04/30/10 17:27	AL_H	5473352
Copper	22.4		0.5	1	04/30/10 17:27	AL_H	5473352
Lead	6.2		0.5	1	04/30/10 17:27	AL_H	5473352
Molybdenum	0.523		0.5	1	04/30/10 17:27	AL_H	5473352
Nickel	47.9		0.5	1	04/30/10 17:27	AL_H	5473352
Selenium	ND		0.5	1	04/30/10 17:27	AL_H	5473352
Silver	ND		0.5	1	04/30/10 17:27	AL_H	5473352
Thallium	ND		0.5	1	05/04/10 17:34	AL_H	5475454
Vanadium	54.2		0.5	1	04/30/10 17:27	AL_H	5473352
Zinc	38.6		1	1	04/30/10 17:27	AL_H	5473352

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

- ND/U - Not Detected at the Reporting Limit
- B/V - Analyte detected in the associated Method Blank
- * - Surrogate Recovery Outside Advisable QC Limits
- J - Estimated Value between MDL and PQL
- E - Estimated Value exceeds calibration curve
- TNTC - Too numerous to count
- >MCL - Result Over Maximum Contamination Limit(MCL)
- D - Surrogate Recovery Unreportable due to Dilution
- MI - Matrix Interference

Client Sample ID: NCE-5-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-03

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A			**MCL**		**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 13:36	E_S1	5477142
4,4´-DDE	ND		1.7	1	05/05/10 13:36	E_S1	5477142
4,4´-DDT	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Aldrin	ND		1.7	1	05/05/10 13:36	E_S1	5477142
alpha-BHC	ND		1.7	1	05/05/10 13:36	E_S1	5477142
alpha-Chlordane	ND		1.7	1	05/05/10 13:36	E_S1	5477142
beta-BHC	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Chlordane	ND		17	1	05/05/10 13:36	E_S1	5477142
delta-BHC	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Dieldrin	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endosulfan I	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endosulfan II	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endosulfan sulfate	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endrin	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endrin aldehyde	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Endrin ketone	ND		1.7	1	05/05/10 13:36	E_S1	5477142
gamma-BHC	ND		1.7	1	05/05/10 13:36	E_S1	5477142
gamma-Chlordane	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Heptachlor	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Heptachlor epoxide	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Methoxychlor	ND		1.7	1	05/05/10 13:36	E_S1	5477142
Toxaphene	ND		33	1	05/05/10 13:36	E_S1	5477142
Surr: Decachlorobiphenyl	96.7	%	35-155	1	05/05/10 13:36	E_S1	5477142
Surr: Tetrachloro-m-xylene	94.5	%	33-121	1	05/05/10 13:36	E_S1	5477142

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID:NCE-6-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-04

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 16:03	E_S1	5479322
2,4,5-TP (Silvex)	ND		33	1	05/05/10 16:03	E_S1	5479322
2,4-D	ND		33	1	05/05/10 16:03	E_S1	5479322
2,4-DB	ND		33	1	05/05/10 16:03	E_S1	5479322
Dicamba	ND		33	1	05/05/10 16:03	E_S1	5479322
Dichloroprop	ND		33	1	05/05/10 16:03	E_S1	5479322
Dinoseb	ND		33	1	05/05/10 16:03	E_S1	5479322
MCPA	ND		1000	1	05/05/10 16:03	E_S1	5479322
MCPP	ND		1000	1	05/05/10 16:03	E_S1	5479322
Surr: DCAA	101		% 12-139	1	05/05/10 16:03	E_S1	5479322

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 15:14	R_V	5475228

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 17:57	AL_H	5473358
Arsenic	3.84		0.5	1	04/30/10 17:57	AL_H	5473358
Barium	93.6		0.5	1	04/30/10 17:57	AL_H	5473358
Beryllium	ND		0.4	1	05/04/10 18:09	AL_H	5475461
Beryllium	ND		0.4	1	05/05/10 16:14	AL_H	5476403
Cadmium	ND		0.5	1	04/30/10 17:57	AL_H	5473358
Chromium	40.8		0.5	1	04/30/10 17:57	AL_H	5473358
Cobalt	10.4		0.5	1	04/30/10 17:57	AL_H	5473358
Copper	21.9		0.5	1	04/30/10 17:57	AL_H	5473358
Lead	6.6		0.5	1	04/30/10 17:57	AL_H	5473358
Molybdenum	0.624		0.5	1	04/30/10 17:57	AL_H	5473358
Nickel	47.5		0.5	1	04/30/10 17:57	AL_H	5473358
Selenium	ND		0.5	1	04/30/10 17:57	AL_H	5473358
Silver	ND		0.5	1	04/30/10 17:57	AL_H	5473358
Thallium	ND		0.5	1	05/04/10 18:09	AL_H	5475461
Vanadium	50.3		0.5	1	04/30/10 17:57	AL_H	5473358
Zinc	40.7		1	1	04/30/10 17:57	AL_H	5473358

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID:NCE-6-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-04

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7		1	05/05/10 13:56	E_S1	5477143
4,4´-DDE	ND		1.7		1	05/05/10 13:56	E_S1	5477143
4,4´-DDT	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Aldrin	ND		1.7		1	05/05/10 13:56	E_S1	5477143
alpha-BHC	ND		1.7		1	05/05/10 13:56	E_S1	5477143
alpha-Chlordane	ND		1.7		1	05/05/10 13:56	E_S1	5477143
beta-BHC	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Chlordane	ND		17		1	05/05/10 13:56	E_S1	5477143
delta-BHC	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Dieldrin	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endosulfan I	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endosulfan II	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endosulfan sulfate	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endrin	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endrin aldehyde	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Endrin ketone	ND		1.7		1	05/05/10 13:56	E_S1	5477143
gamma-BHC	ND		1.7		1	05/05/10 13:56	E_S1	5477143
gamma-Chlordane	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Heptachlor	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Heptachlor epoxide	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Methoxychlor	ND		1.7		1	05/05/10 13:56	E_S1	5477143
Toxaphene	ND		33		1	05/05/10 13:56	E_S1	5477143
Surr: Decachlorobiphenyl	81.6	%	35-155		1	05/05/10 13:56	E_S1	5477143
Surr: Tetrachloro-m-xylene	82.7	%	33-121		1	05/05/10 13:56	E_S1	5477143

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B/V - Analyte detected in the associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated Value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

Client Sample ID: NCE-7-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-05

Site: **Aspen 1**

CHLORINATED HERBICIDES BY METHOD 8151A — MCL — SW8151A — Units: ug/kg

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
2,4,5-T	ND		33	1	05/05/10 16:22	E_S1	5479323
2,4,5-TP (Silvex)	ND		33	1	05/05/10 16:22	E_S1	5479323
2,4-D	ND		33	1	05/05/10 16:22	E_S1	5479323
2,4-DB	ND		33	1	05/05/10 16:22	E_S1	5479323
Dicamba	ND		33	1	05/05/10 16:22	E_S1	5479323
Dichloroprop	ND		33	1	05/05/10 16:22	E_S1	5479323
Dinoseb	ND		33	1	05/05/10 16:22	E_S1	5479323
MCPA	3000		1000	1	05/05/10 16:22	E_S1	5479323
MCPP	ND		1000	1	05/05/10 16:22	E_S1	5479323
Surr: DCAA	49.4		% 12-139	1	05/05/10 16:22	E_S1	5479323

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL — MCL — SW7471A — Units: mg/kg

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Mercury	ND		0.03	1	05/04/10 15:16	R_V	5475229

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL — MCL — SW6020A — Units: mg/kg

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Antimony	ND		0.5	1	04/30/10 18:12	AL_H	5473361
Arsenic	3.53		0.5	1	04/30/10 18:12	AL_H	5473361
Barium	121		0.5	1	04/30/10 18:12	AL_H	5473361
Beryllium	ND		0.4	1	05/05/10 16:19	AL_H	5476404
Cadmium	ND		0.5	1	04/30/10 18:12	AL_H	5473361
Chromium	39.4		0.5	1	04/30/10 18:12	AL_H	5473361
Cobalt	9.24		0.5	1	04/30/10 18:12	AL_H	5473361
Copper	21.2		0.5	1	04/30/10 18:12	AL_H	5473361
Lead	6.3		0.5	1	04/30/10 18:12	AL_H	5473361
Molybdenum	0.501		0.5	1	04/30/10 18:12	AL_H	5473361
Nickel	45.4		0.5	1	04/30/10 18:12	AL_H	5473361
Selenium	ND		0.5	1	04/30/10 18:12	AL_H	5473361
Silver	ND		0.5	1	04/30/10 18:12	AL_H	5473361
Thallium	ND		0.5	1	05/04/10 18:24	AL_H	5475464
Vanadium	46.4		0.5	1	04/30/10 18:12	AL_H	5473361
Zinc	35.8		1	1	04/30/10 18:12	AL_H	5473361

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-7-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-05

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	MCL	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7		1	05/05/10 14:16	E_S1	5477144
4,4´-DDE	ND		1.7		1	05/05/10 14:16	E_S1	5477144
4,4´-DDT	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Aldrin	ND		1.7		1	05/05/10 14:16	E_S1	5477144
alpha-BHC	ND		1.7		1	05/05/10 14:16	E_S1	5477144
alpha-Chlordane	ND		1.7		1	05/05/10 14:16	E_S1	5477144
beta-BHC	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Chlordane	ND		17		1	05/05/10 14:16	E_S1	5477144
delta-BHC	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Dieldrin	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endosulfan I	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endosulfan II	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endosulfan sulfate	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endrin	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endrin aldehyde	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Endrin ketone	ND		1.7		1	05/05/10 14:16	E_S1	5477144
gamma-BHC	ND		1.7		1	05/05/10 14:16	E_S1	5477144
gamma-Chlordane	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Heptachlor	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Heptachlor epoxide	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Methoxychlor	ND		1.7		1	05/05/10 14:16	E_S1	5477144
Toxaphene	ND		33		1	05/05/10 14:16	E_S1	5477144
Surr: Decachlorobiphenyl	88.2		% 35-155		1	05/05/10 14:16	E_S1	5477144
Surr: Tetrachloro-m-xylene	86.0		% 33-121		1	05/05/10 14:16	E_S1	5477144

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-8-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-06

Site: **Aspen 1**

CHLORINATED HERBICIDES BY METHOD 8151A **MCL** **SW8151A** **Units: ug/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
2,4,5-T	ND		33	1	05/05/10 16:41	E_S1	5479324
2,4,5-TP (Silvex)	ND		33	1	05/05/10 16:41	E_S1	5479324
2,4-D	ND		33	1	05/05/10 16:41	E_S1	5479324
2,4-DB	ND		33	1	05/05/10 16:41	E_S1	5479324
Dicamba	ND		33	1	05/05/10 16:41	E_S1	5479324
Dichloroprop	ND		33	1	05/05/10 16:41	E_S1	5479324
Dinoseb	ND		33	1	05/05/10 16:41	E_S1	5479324
MCPA	ND		1000	1	05/05/10 16:41	E_S1	5479324
MCPP	ND		1000	1	05/05/10 16:41	E_S1	5479324
Surr: DCAA	57.2		% 12-139	1	05/05/10 16:41	E_S1	5479324

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL **MCL** **SW7471A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Mercury	ND		0.03	1	05/04/10 15:18	R_V	5475230

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL **MCL** **SW6020A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Antimony	ND		0.5	1	04/30/10 18:17	AL_H	5473362
Arsenic	3.21		0.5	1	04/30/10 18:17	AL_H	5473362
Barium	109		0.5	1	04/30/10 18:17	AL_H	5473362
Beryllium	ND		0.4	1	05/05/10 16:24	AL_H	5476405
Cadmium	ND		0.5	1	04/30/10 18:17	AL_H	5473362
Chromium	41.7		0.5	1	04/30/10 18:17	AL_H	5473362
Cobalt	9.26		0.5	1	04/30/10 18:17	AL_H	5473362
Copper	19.8		0.5	1	04/30/10 18:17	AL_H	5473362
Lead	5.96		0.5	1	04/30/10 18:17	AL_H	5473362
Molybdenum	ND		0.5	1	04/30/10 18:17	AL_H	5473362
Nickel	43.1		0.5	1	04/30/10 18:17	AL_H	5473362
Selenium	ND		0.5	1	04/30/10 18:17	AL_H	5473362
Silver	ND		0.5	1	04/30/10 18:17	AL_H	5473362
Thallium	ND		0.5	1	05/04/10 18:29	AL_H	5475465
Vanadium	46.6		0.5	1	04/30/10 18:17	AL_H	5473362
Zinc	33.1		1	1	04/30/10 18:17	AL_H	5473362

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-8-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-06

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 14:36	E_S1	5477145
4,4´-DDE	ND		1.7	1	05/05/10 14:36	E_S1	5477145
4,4´-DDT	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Aldrin	ND		1.7	1	05/05/10 14:36	E_S1	5477145
alpha-BHC	ND		1.7	1	05/05/10 14:36	E_S1	5477145
alpha-Chlordane	ND		1.7	1	05/05/10 14:36	E_S1	5477145
beta-BHC	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Chlordane	ND		17	1	05/05/10 14:36	E_S1	5477145
delta-BHC	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Dieldrin	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endosulfan I	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endosulfan II	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endosulfan sulfate	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endrin	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endrin aldehyde	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Endrin ketone	ND		1.7	1	05/05/10 14:36	E_S1	5477145
gamma-BHC	ND		1.7	1	05/05/10 14:36	E_S1	5477145
gamma-Chlordane	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Heptachlor	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Heptachlor epoxide	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Methoxychlor	ND		1.7	1	05/05/10 14:36	E_S1	5477145
Toxaphene	ND		33	1	05/05/10 14:36	E_S1	5477145
Surr: Decachlorobiphenyl	80.8		% 35-155	1	05/05/10 14:36	E_S1	5477145
Surr: Tetrachloro-m-xylene	84.8		% 33-121	1	05/05/10 14:36	E_S1	5477145

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B/V - Analyte detected in the associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated Value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Client Sample ID: NCE-9-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-07

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 17:00	E_S1	5479325
2,4,5-TP (Silvex)	ND		33	1	05/05/10 17:00	E_S1	5479325
2,4-D	ND		33	1	05/05/10 17:00	E_S1	5479325
2,4-DB	ND		33	1	05/05/10 17:00	E_S1	5479325
Dicamba	ND		33	1	05/05/10 17:00	E_S1	5479325
Dichloroprop	ND		33	1	05/05/10 17:00	E_S1	5479325
Dinoseb	ND		33	1	05/05/10 17:00	E_S1	5479325
MCPA	6000		1000	1	05/05/10 17:00	E_S1	5479325
MCPP	ND		1000	1	05/05/10 17:00	E_S1	5479325
Surr: DCAA	275 MI	*	% 12-139	1	05/05/10 17:00	E_S1	5479325

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 15:21	R_V	5475231

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 18:22	AL_H	5473363
Arsenic	4.75		0.5	1	04/30/10 18:22	AL_H	5473363
Barium	120		0.5	1	04/30/10 18:22	AL_H	5473363
Beryllium	ND		0.4	1	05/05/10 16:29	AL_H	5476406
Cadmium	ND		0.5	1	04/30/10 18:22	AL_H	5473363
Chromium	46.6		0.5	1	04/30/10 18:22	AL_H	5473363
Cobalt	16.3		0.5	1	04/30/10 18:22	AL_H	5473363
Copper	25.5		0.5	1	04/30/10 18:22	AL_H	5473363
Lead	7.29		0.5	1	04/30/10 18:22	AL_H	5473363
Molybdenum	1.77		0.5	1	04/30/10 18:22	AL_H	5473363
Nickel	56.3		0.5	1	04/30/10 18:22	AL_H	5473363
Selenium	ND		0.5	1	04/30/10 18:22	AL_H	5473363
Silver	ND		0.5	1	04/30/10 18:22	AL_H	5473363
Thallium	ND		0.5	1	05/04/10 18:34	AL_H	5475466
Vanadium	58.2		0.5	1	04/30/10 18:22	AL_H	5473363
Zinc	45		1	1	04/30/10 18:22	AL_H	5473363

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-9-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-07

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 14:55	E_S1	5477146
4,4´-DDE	ND		1.7	1	05/05/10 14:55	E_S1	5477146
4,4´-DDT	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Aldrin	ND		1.7	1	05/05/10 14:55	E_S1	5477146
alpha-BHC	ND		1.7	1	05/05/10 14:55	E_S1	5477146
alpha-Chlordane	ND		1.7	1	05/05/10 14:55	E_S1	5477146
beta-BHC	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Chlordane	ND		17	1	05/05/10 14:55	E_S1	5477146
delta-BHC	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Dieldrin	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endosulfan I	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endosulfan II	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endosulfan sulfate	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endrin	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endrin aldehyde	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Endrin ketone	ND		1.7	1	05/05/10 14:55	E_S1	5477146
gamma-BHC	ND		1.7	1	05/05/10 14:55	E_S1	5477146
gamma-Chlordane	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Heptachlor	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Heptachlor epoxide	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Methoxychlor	ND		1.7	1	05/05/10 14:55	E_S1	5477146
Toxaphene	ND		33	1	05/05/10 14:55	E_S1	5477146
Surr: Decachlorobiphenyl	79.5		% 35-155	1	05/05/10 14:55	E_S1	5477146
Surr: Tetrachloro-m-xylene	85.1		% 33-121	1	05/05/10 14:55	E_S1	5477146

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-10-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-08

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 17:19	E_S1	5479326
2,4,5-TP (Silvex)	ND		33	1	05/05/10 17:19	E_S1	5479326
2,4-D	ND		33	1	05/05/10 17:19	E_S1	5479326
2,4-DB	ND		33	1	05/05/10 17:19	E_S1	5479326
Dicamba	ND		33	1	05/05/10 17:19	E_S1	5479326
Dichloroprop	ND		33	1	05/05/10 17:19	E_S1	5479326
Dinoseb	ND		33	1	05/05/10 17:19	E_S1	5479326
MCPA	7400		1000	1	05/05/10 17:19	E_S1	5479326
MCPP	ND		1000	1	05/05/10 17:19	E_S1	5479326
Surr: DCAA	181 MI	*	% 12-139	1	05/05/10 17:19	E_S1	5479326

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 15:23	R_V	5475232

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 18:27	AL_H	5473364
Arsenic	4.02		0.5	1	04/30/10 18:27	AL_H	5473364
Barium	119		0.5	1	04/30/10 18:27	AL_H	5473364
Beryllium	ND		0.4	1	05/05/10 16:34	AL_H	5476407
Cadmium	ND		0.5	1	04/30/10 18:27	AL_H	5473364
Chromium	46.6		0.5	1	04/30/10 18:27	AL_H	5473364
Cobalt	10.5		0.5	1	04/30/10 18:27	AL_H	5473364
Copper	23.9		0.5	1	04/30/10 18:27	AL_H	5473364
Lead	7.17		0.5	1	04/30/10 18:27	AL_H	5473364
Molybdenum	1.48		0.5	1	04/30/10 18:27	AL_H	5473364
Nickel	52.7		0.5	1	04/30/10 18:27	AL_H	5473364
Selenium	ND		0.5	1	04/30/10 18:27	AL_H	5473364
Silver	ND		0.5	1	04/30/10 18:27	AL_H	5473364
Thallium	ND		0.5	1	05/04/10 18:39	AL_H	5475467
Vanadium	54.2		0.5	1	04/30/10 18:27	AL_H	5473364
Zinc	43.6		1	1	04/30/10 18:27	AL_H	5473364

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-10-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-08

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 18:13	E_S1	5477153
4,4´-DDE	ND		1.7	1	05/05/10 18:13	E_S1	5477153
4,4´-DDT	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Aldrin	ND		1.7	1	05/05/10 18:13	E_S1	5477153
alpha-BHC	ND		1.7	1	05/05/10 18:13	E_S1	5477153
alpha-Chlordane	ND		1.7	1	05/05/10 18:13	E_S1	5477153
beta-BHC	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Chlordane	ND		17	1	05/05/10 18:13	E_S1	5477153
delta-BHC	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Dieldrin	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endosulfan I	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endosulfan II	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endosulfan sulfate	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endrin	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endrin aldehyde	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Endrin ketone	ND		1.7	1	05/05/10 18:13	E_S1	5477153
gamma-BHC	ND		1.7	1	05/05/10 18:13	E_S1	5477153
gamma-Chlordane	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Heptachlor	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Heptachlor epoxide	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Methoxychlor	ND		1.7	1	05/05/10 18:13	E_S1	5477153
Toxaphene	ND		33	1	05/05/10 18:13	E_S1	5477153
Surr: Decachlorobiphenyl	74.8		% 35-155	1	05/05/10 18:13	E_S1	5477153
Surr: Tetrachloro-m-xylene	75.4		% 33-121	1	05/05/10 18:13	E_S1	5477153

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:		
	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B/V - Analyte detected in the associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated Value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

Client Sample ID:NCE-11-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-09

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 18:35	E_S1	5479330
2,4,5-TP (Silvex)	ND		33	1	05/05/10 18:35	E_S1	5479330
2,4-D	ND		33	1	05/05/10 18:35	E_S1	5479330
2,4-DB	ND		33	1	05/05/10 18:35	E_S1	5479330
Dicamba	ND		33	1	05/05/10 18:35	E_S1	5479330
Dichloroprop	ND		33	1	05/05/10 18:35	E_S1	5479330
Dinoseb	ND		33	1	05/05/10 18:35	E_S1	5479330
MCPA	ND		1000	1	05/05/10 18:35	E_S1	5479330
MCPP	ND		1000	1	05/05/10 18:35	E_S1	5479330
Surr: DCAA	328 MI	*	% 12-139	1	05/05/10 18:35	E_S1	5479330

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 15:25	R_V	5475233

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 18:32	AL_H	5473365
Arsenic	4.43		0.5	1	04/30/10 18:32	AL_H	5473365
Barium	132		0.5	1	04/30/10 18:32	AL_H	5473365
Beryllium	ND		0.4	1	05/05/10 16:39	AL_H	5476408
Cadmium	ND		0.5	1	04/30/10 18:32	AL_H	5473365
Chromium	47.5		0.5	1	04/30/10 18:32	AL_H	5473365
Cobalt	10.8		0.5	1	04/30/10 18:32	AL_H	5473365
Copper	24.4		0.5	1	04/30/10 18:32	AL_H	5473365
Lead	8.01		0.5	1	04/30/10 18:32	AL_H	5473365
Molybdenum	0.541		0.5	1	04/30/10 18:32	AL_H	5473365
Nickel	52.2		0.5	1	04/30/10 18:32	AL_H	5473365
Selenium	ND		0.5	1	04/30/10 18:32	AL_H	5473365
Silver	ND		0.5	1	04/30/10 18:32	AL_H	5473365
Thallium	ND		0.5	1	05/04/10 18:44	AL_H	5475468
Vanadium	57.4		0.5	1	04/30/10 18:32	AL_H	5473365
Zinc	45.2		1	1	04/30/10 18:32	AL_H	5473365

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID:NCE-11-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-09

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 18:33	E_S1	5477154
4,4´-DDE	ND		1.7	1	05/05/10 18:33	E_S1	5477154
4,4´-DDT	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Aldrin	ND		1.7	1	05/05/10 18:33	E_S1	5477154
alpha-BHC	ND		1.7	1	05/05/10 18:33	E_S1	5477154
alpha-Chlordane	ND		1.7	1	05/05/10 18:33	E_S1	5477154
beta-BHC	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Chlordane	ND		17	1	05/05/10 18:33	E_S1	5477154
delta-BHC	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Dieldrin	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endosulfan I	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endosulfan II	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endosulfan sulfate	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endrin	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endrin aldehyde	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Endrin ketone	ND		1.7	1	05/05/10 18:33	E_S1	5477154
gamma-BHC	ND		1.7	1	05/05/10 18:33	E_S1	5477154
gamma-Chlordane	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Heptachlor	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Heptachlor epoxide	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Methoxychlor	ND		1.7	1	05/05/10 18:33	E_S1	5477154
Toxaphene	ND		33	1	05/05/10 18:33	E_S1	5477154
Surr: Decachlorobiphenyl	79.5		% 35-155	1	05/05/10 18:33	E_S1	5477154
Surr: Tetrachloro-m-xylene	79.7		% 33-121	1	05/05/10 18:33	E_S1	5477154

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Client Sample ID: NCE-12-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-10

Site: **Aspen 1**

CHLORINATED HERBICIDES BY METHOD 8151A **MCL** **SW8151A** **Units: ug/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
2,4,5-T	ND		33	1	05/05/10 18:54	E_S1	5479331
2,4,5-TP (Silvex)	ND		33	1	05/05/10 18:54	E_S1	5479331
2,4-D	ND		33	1	05/05/10 18:54	E_S1	5479331
2,4-DB	ND		33	1	05/05/10 18:54	E_S1	5479331
Dicamba	ND		33	1	05/05/10 18:54	E_S1	5479331
Dichloroprop	ND		33	1	05/05/10 18:54	E_S1	5479331
Dinoseb	ND		33	1	05/05/10 18:54	E_S1	5479331
MCPA	6200		1000	1	05/05/10 18:54	E_S1	5479331
MCPP	ND		1000	1	05/05/10 18:54	E_S1	5479331
Surr: DCAA	174 MI	*	% 12-139	1	05/05/10 18:54	E_S1	5479331

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL **MCL** **SW7471A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Mercury	ND		0.03	1	05/04/10 15:32	R_V	5475236

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL **MCL** **SW6020A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Antimony	ND		0.5	1	04/30/10 18:37	AL_H	5473366
Arsenic	3.34		0.5	1	04/30/10 18:37	AL_H	5473366
Barium	103		0.5	1	04/30/10 18:37	AL_H	5473366
Beryllium	ND		0.4	1	05/05/10 16:44	AL_H	5476409
Cadmium	ND		0.5	1	04/30/10 18:37	AL_H	5473366
Chromium	33.7		0.5	1	04/30/10 18:37	AL_H	5473366
Cobalt	7.94		0.5	1	04/30/10 18:37	AL_H	5473366
Copper	18.2		0.5	1	04/30/10 18:37	AL_H	5473366
Lead	5.38		0.5	1	04/30/10 18:37	AL_H	5473366
Molybdenum	0.57		0.5	1	04/30/10 18:37	AL_H	5473366
Nickel	36.9		0.5	1	04/30/10 18:37	AL_H	5473366
Selenium	ND		0.5	1	04/30/10 18:37	AL_H	5473366
Silver	ND		0.5	1	04/30/10 18:37	AL_H	5473366
Thallium	ND		0.5	1	05/04/10 18:49	AL_H	5475469
Vanadium	42.8		0.5	1	04/30/10 18:37	AL_H	5473366
Zinc	37.4		1	1	04/30/10 18:37	AL_H	5473366

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-12-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-10

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A			**MCL**		**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 18:52	E_S1	5477155
4,4´-DDE	ND		1.7	1	05/05/10 18:52	E_S1	5477155
4,4´-DDT	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Aldrin	ND		1.7	1	05/05/10 18:52	E_S1	5477155
alpha-BHC	ND		1.7	1	05/05/10 18:52	E_S1	5477155
alpha-Chlordane	ND		1.7	1	05/05/10 18:52	E_S1	5477155
beta-BHC	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Chlordane	ND		17	1	05/05/10 18:52	E_S1	5477155
delta-BHC	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Dieldrin	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endosulfan I	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endosulfan II	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endosulfan sulfate	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endrin	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endrin aldehyde	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Endrin ketone	ND		1.7	1	05/05/10 18:52	E_S1	5477155
gamma-BHC	ND		1.7	1	05/05/10 18:52	E_S1	5477155
gamma-Chlordane	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Heptachlor	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Heptachlor epoxide	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Methoxychlor	ND		1.7	1	05/05/10 18:52	E_S1	5477155
Toxaphene	ND		33	1	05/05/10 18:52	E_S1	5477155
Surr: Decachlorobiphenyl	82.8		% 35-155	1	05/05/10 18:52	E_S1	5477155
Surr: Tetrachloro-m-xylene	89.3		% 33-121	1	05/05/10 18:52	E_S1	5477155

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-1-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-11

Site: **Aspen 1**

CHLORINATED HERBICIDES BY METHOD 8151A **MCL** **SW8151A** **Units: ug/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
2,4,5-T	ND		33	1	05/05/10 19:13	E_S1	5479332
2,4,5-TP (Silvex)	ND		33	1	05/05/10 19:13	E_S1	5479332
2,4-D	ND		33	1	05/05/10 19:13	E_S1	5479332
2,4-DB	ND		33	1	05/05/10 19:13	E_S1	5479332
Dicamba	ND		33	1	05/05/10 19:13	E_S1	5479332
Dichloroprop	ND		33	1	05/05/10 19:13	E_S1	5479332
Dinoseb	ND		33	1	05/05/10 19:13	E_S1	5479332
MCPA	1800		1000	1	05/05/10 19:13	E_S1	5479332
MCPP	ND		1000	1	05/05/10 19:13	E_S1	5479332
Surr: DCAA	100		% 12-139	1	05/05/10 19:13	E_S1	5479332

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL **MCL** **SW7471A** **Units: mg/kg**

Mercury	ND		0.03	1	05/04/10 15:35	R_V	5475237

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL **MCL** **SW6020A** **Units: mg/kg**

Antimony	ND		0.5	1	04/30/10 18:42	AL_H	5473367
Arsenic	4.47		0.5	1	04/30/10 18:42	AL_H	5473367
Barium	109		0.5	1	04/30/10 18:42	AL_H	5473367
Beryllium	0.438		0.4	1	05/05/10 16:49	AL_H	5476410
Cadmium	ND		0.5	1	04/30/10 18:42	AL_H	5473367
Chromium	49.6		0.5	1	04/30/10 18:42	AL_H	5473367
Cobalt	10.6		0.5	1	04/30/10 18:42	AL_H	5473367
Copper	23.3		0.5	1	04/30/10 18:42	AL_H	5473367
Lead	8.25		0.5	1	04/30/10 18:42	AL_H	5473367
Molybdenum	0.663		0.5	1	04/30/10 18:42	AL_H	5473367
Nickel	40		0.5	1	04/30/10 18:42	AL_H	5473367
Selenium	ND		0.5	1	04/30/10 18:42	AL_H	5473367
Silver	ND		0.5	1	04/30/10 18:42	AL_H	5473367
Thallium	ND		0.5	1	05/04/10 18:54	AL_H	5475470
Vanadium	62.7		0.5	1	04/30/10 18:42	AL_H	5473367
Zinc	37.3		1	1	04/30/10 18:42	AL_H	5473367

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-1-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-11

Site: **Aspen 1**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 19:12	E_S1	5477156
4,4´-DDE	ND		1.7	1	05/05/10 19:12	E_S1	5477156
4,4´-DDT	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Aldrin	ND		1.7	1	05/05/10 19:12	E_S1	5477156
alpha-BHC	ND		1.7	1	05/05/10 19:12	E_S1	5477156
alpha-Chlordane	ND		1.7	1	05/05/10 19:12	E_S1	5477156
beta-BHC	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Chlordane	ND		17	1	05/05/10 19:12	E_S1	5477156
delta-BHC	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Dieldrin	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endosulfan I	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endosulfan II	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endosulfan sulfate	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endrin	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endrin aldehyde	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Endrin ketone	ND		1.7	1	05/05/10 19:12	E_S1	5477156
gamma-BHC	ND		1.7	1	05/05/10 19:12	E_S1	5477156
gamma-Chlordane	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Heptachlor	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Heptachlor epoxide	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Methoxychlor	ND		1.7	1	05/05/10 19:12	E_S1	5477156
Toxaphene	ND		33	1	05/05/10 19:12	E_S1	5477156
Surr: Decachlorobiphenyl	83.8	%	35-155	1	05/05/10 19:12	E_S1	5477156
Surr: Tetrachloro-m-xylene	89.9	%	33-121	1	05/05/10 19:12	E_S1	5477156

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-2-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-14

Site: **Aspen 1**

CHLORINATED HERBICIDES BY METHOD 8151A

MCL **SW8151A** **Units: ug/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
2,4,5-T	ND		33	1	05/05/10 19:32	E_S1	5479333
2,4,5-TP (Silvex)	ND		33	1	05/05/10 19:32	E_S1	5479333
2,4-D	ND		33	1	05/05/10 19:32	E_S1	5479333
2,4-DB	ND		33	1	05/05/10 19:32	E_S1	5479333
Dicamba	ND		33	1	05/05/10 19:32	E_S1	5479333
Dichloroprop	ND		33	1	05/05/10 19:32	E_S1	5479333
Dinoseb	ND		33	1	05/05/10 19:32	E_S1	5479333
MCPA	ND		1000	1	05/05/10 19:32	E_S1	5479333
MCPP	1600		1000	1	05/05/10 19:32	E_S1	5479333
Surr: DCAA	84.1		% 12-139	1	05/05/10 19:32	E_S1	5479333

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL

MCL **SW7471A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Mercury	ND		0.03	1	05/04/10 15:37	R_V	5475238

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL

MCL **SW6020A** **Units: mg/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
Antimony	ND		0.5	1	04/30/10 18:47	AL_H	5473368
Arsenic	3.57		0.5	1	04/30/10 18:47	AL_H	5473368
Barium	114		0.5	1	04/30/10 18:47	AL_H	5473368
Beryllium	ND		0.4	1	05/05/10 17:20	AL_H	5476413
Cadmium	ND		0.5	1	04/30/10 18:47	AL_H	5473368
Chromium	43.8		0.5	1	04/30/10 18:47	AL_H	5473368
Cobalt	10		0.5	1	04/30/10 18:47	AL_H	5473368
Copper	20.8		0.5	1	04/30/10 18:47	AL_H	5473368
Lead	6.09		0.5	1	04/30/10 18:47	AL_H	5473368
Molybdenum	1		0.5	1	04/30/10 18:47	AL_H	5473368
Nickel	44.3		0.5	1	04/30/10 18:47	AL_H	5473368
Selenium	ND		0.5	1	04/30/10 18:47	AL_H	5473368
Silver	ND		0.5	1	04/30/10 18:47	AL_H	5473368
Thallium	ND		0.5	1	05/04/10 18:59	AL_H	5475471
Vanadium	54.6		0.5	1	04/30/10 18:47	AL_H	5473368
Zinc	36.4		1	1	04/30/10 18:47	AL_H	5473368

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-2-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-14

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**	
4,4´-DDD	ND		1.7	1	05/05/10 15:15	E_S1	5477147
4,4´-DDE	ND		1.7	1	05/05/10 15:15	E_S1	5477147
4,4´-DDT	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Aldrin	ND		1.7	1	05/05/10 15:15	E_S1	5477147
alpha-BHC	ND		1.7	1	05/05/10 15:15	E_S1	5477147
alpha-Chlordane	ND		1.7	1	05/05/10 15:15	E_S1	5477147
beta-BHC	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Chlordane	ND		17	1	05/05/10 15:15	E_S1	5477147
delta-BHC	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Dieldrin	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endosulfan I	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endosulfan II	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endosulfan sulfate	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endrin	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endrin aldehyde	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Endrin ketone	ND		1.7	1	05/05/10 15:15	E_S1	5477147
gamma-BHC	ND		1.7	1	05/05/10 15:15	E_S1	5477147
gamma-Chlordane	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Heptachlor	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Heptachlor epoxide	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Methoxychlor	ND		1.7	1	05/05/10 15:15	E_S1	5477147
Toxaphene	ND		33	1	05/05/10 15:15	E_S1	5477147
Surr: Decachlorobiphenyl	83.2		% 35-155	1	05/05/10 15:15	E_S1	5477147
Surr: Tetrachloro-m-xylene	88.1		% 33-121	1	05/05/10 15:15	E_S1	5477147

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-3-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-17

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**		**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33		1	05/05/10 19:52	E_S1	5479334
2,4,5-TP (Silvex)	ND		33		1	05/05/10 19:52	E_S1	5479334
2,4-D	ND		33		1	05/05/10 19:52	E_S1	5479334
2,4-DB	ND		33		1	05/05/10 19:52	E_S1	5479334
Dicamba	ND		33		1	05/05/10 19:52	E_S1	5479334
Dichloroprop	ND		33		1	05/05/10 19:52	E_S1	5479334
Dinoseb	ND		33		1	05/05/10 19:52	E_S1	5479334
MCPA	ND		1000		1	05/05/10 19:52	E_S1	5479334
MCPP	ND		1000		1	05/05/10 19:52	E_S1	5479334
Surr: DCAA	53.5		% 12-139		1	05/05/10 19:52	E_S1	5479334

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL				**MCL**		**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03		1	05/04/10 15:39	R_V	5475239

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL				**MCL**		**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5		1	04/30/10 18:52	AL_H	5473369
Arsenic	3.55		0.5		1	04/30/10 18:52	AL_H	5473369
Barium	122		0.5		1	04/30/10 18:52	AL_H	5473369
Beryllium	ND		0.4		1	05/05/10 17:25	AL_H	5476414
Cadmium	ND		0.5		1	04/30/10 18:52	AL_H	5473369
Chromium	39.4		0.5		1	04/30/10 18:52	AL_H	5473369
Cobalt	9.37		0.5		1	04/30/10 18:52	AL_H	5473369
Copper	21.7		0.5		1	04/30/10 18:52	AL_H	5473369
Lead	5.5		0.5		1	04/30/10 18:52	AL_H	5473369
Molybdenum	ND		0.5		1	04/30/10 18:52	AL_H	5473369
Nickel	42.4		0.5		1	04/30/10 18:52	AL_H	5473369
Selenium	ND		0.5		1	04/30/10 18:52	AL_H	5473369
Silver	ND		0.5		1	04/30/10 18:52	AL_H	5473369
Thallium	ND		0.5		1	05/04/10 19:04	AL_H	5475472
Vanadium	49.9		0.5		1	04/30/10 18:52	AL_H	5473369
Zinc	38.1		1		1	04/30/10 18:52	AL_H	5473369

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-3-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-17

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A				**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7		1	05/05/10 19:32	E_S1	5477157
4,4´-DDE	ND		1.7		1	05/05/10 19:32	E_S1	5477157
4,4´-DDT	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Aldrin	ND		1.7		1	05/05/10 19:32	E_S1	5477157
alpha-BHC	ND		1.7		1	05/05/10 19:32	E_S1	5477157
alpha-Chlordane	ND		1.7		1	05/05/10 19:32	E_S1	5477157
beta-BHC	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Chlordane	ND		17		1	05/05/10 19:32	E_S1	5477157
delta-BHC	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Dieldrin	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endosulfan I	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endosulfan II	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endosulfan sulfate	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endrin	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endrin aldehyde	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Endrin ketone	ND		1.7		1	05/05/10 19:32	E_S1	5477157
gamma-BHC	ND		1.7		1	05/05/10 19:32	E_S1	5477157
gamma-Chlordane	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Heptachlor	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Heptachlor epoxide	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Methoxychlor	ND		1.7		1	05/05/10 19:32	E_S1	5477157
Toxaphene	ND		33		1	05/05/10 19:32	E_S1	5477157
Surr: Decachlorobiphenyl	84.3		% 35-155		1	05/05/10 19:32	E_S1	5477157
Surr: Tetrachloro-m-xylene	85.5		% 33-121		1	05/05/10 19:32	E_S1	5477157

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B/V - Analyte detected in the associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated Value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

Client Sample ID: NCE-4-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-20

Site: Aspen 1

Analyses/Method	**Result**	**QUAL**	**Rep.Limit**	**Dil. Factor**	**Date Analyzed**	**Analyst**	**Seq. #**
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/05/10 20:11	E_S1	5479335
2,4,5-TP (Silvex)	ND		33	1	05/05/10 20:11	E_S1	5479335
2,4-D	ND		33	1	05/05/10 20:11	E_S1	5479335
2,4-DB	ND		33	1	05/05/10 20:11	E_S1	5479335
Dicamba	ND		33	1	05/05/10 20:11	E_S1	5479335
Dichloroprop	ND		33	1	05/05/10 20:11	E_S1	5479335
Dinoseb	ND		33	1	05/05/10 20:11	E_S1	5479335
MCPA	ND		1000	1	05/05/10 20:11	E_S1	5479335
MCPP	ND		1000	1	05/05/10 20:11	E_S1	5479335
Surr: DCAA	45.4		% 12-139	1	05/05/10 20:11	E_S1	5479335

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/30/2010 11:42	QMT	1.00

MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/04/10 15:41	R_V	5475240

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/04/2010 11:10	F_S	1.00

METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	04/30/10 18:57	AL_H	5473373
Arsenic	4.49		0.5	1	04/30/10 18:57	AL_H	5473373
Barium	107		0.5	1	04/30/10 18:57	AL_H	5473373
Beryllium	0.459		0.4	1	05/05/10 17:30	AL_H	5476415
Cadmium	ND		0.5	1	04/30/10 18:57	AL_H	5473373
Chromium	50.4		0.5	1	04/30/10 18:57	AL_H	5473373
Cobalt	9.99		0.5	1	04/30/10 18:57	AL_H	5473373
Copper	24.2		0.5	1	04/30/10 18:57	AL_H	5473373
Lead	7.18		0.5	1	04/30/10 18:57	AL_H	5473373
Molybdenum	0.595		0.5	1	04/30/10 18:57	AL_H	5473373
Nickel	45.3		0.5	1	04/30/10 18:57	AL_H	5473373
Selenium	ND		0.5	1	04/30/10 18:57	AL_H	5473373
Silver	ND		0.5	1	04/30/10 18:57	AL_H	5473373
Thallium	ND		0.5	1	05/04/10 19:09	AL_H	5475473
Vanadium	61.1		0.5	1	04/30/10 18:57	AL_H	5473373
Zinc	38.8		1	1	04/30/10 18:57	AL_H	5473373

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	04/27/2010 17:30	M_W	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B/V - Analyte detected in the associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated Value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-4-0.5 **Collected:** 04/23/2010 0:00 **SPL Sample ID:** 10040678-20

Site: Aspen 1

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A			**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7	1	05/05/10 19:51	E_S1	5477158
4,4´-DDE	ND		1.7	1	05/05/10 19:51	E_S1	5477158
4,4´-DDT	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Aldrin	ND		1.7	1	05/05/10 19:51	E_S1	5477158
alpha-BHC	ND		1.7	1	05/05/10 19:51	E_S1	5477158
alpha-Chlordane	ND		1.7	1	05/05/10 19:51	E_S1	5477158
beta-BHC	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Chlordane	ND		17	1	05/05/10 19:51	E_S1	5477158
delta-BHC	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Dieldrin	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endosulfan I	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endosulfan II	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endosulfan sulfate	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endrin	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endrin aldehyde	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Endrin ketone	ND		1.7	1	05/05/10 19:51	E_S1	5477158
gamma-BHC	ND		1.7	1	05/05/10 19:51	E_S1	5477158
gamma-Chlordane	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Heptachlor	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Heptachlor epoxide	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Methoxychlor	ND		1.7	1	05/05/10 19:51	E_S1	5477158
Toxaphene	ND		33	1	05/05/10 19:51	E_S1	5477158
Surr: Decachlorobiphenyl	88.8		% 35-155	1	05/05/10 19:51	E_S1	5477158
Surr: Tetrachloro-m-xylene	91.2		% 33-121	1	05/05/10 19:51	E_S1	5477158

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	04/29/2010 11:13	QMT	1.00

Qualifiers:	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B/V - Analyte detected in the associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated Value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

Quality Control Documentation

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Organochlorine Pesticides by Method 8081A** **WorkOrder:** **10040678**
Method: **SW8081A** **Lab Batch ID:** **99476**

Laboratory Control Sample (LCS)

RunID: VARG_100505A-5477150 Units: ug/kg
Analysis Date: 05/05/2010 16:14 Analyst: E_S1
Preparation Date: 04/29/2010 11:13 Prep By: QMT Method: SW3550C

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
delta-BHC	33.3	26.4	79.4	15	138
Dieldrin	33.3	34.0	102	60	140
Endosulfan I	33.3	28.7	86.2	65	131
Endosulfan II	33.3	33.1	99.4	67	143
Endosulfan sulfate	33.3	32.8	98.5	62	135
Endrin	33.3	35.1	105	60	154
Endrin aldehyde	33.3	30.8	92.4	49	142
Endrin ketone	33.3	32.3	97.1	42	139
gamma-BHC	33.3	31.9	95.9	58	137
gamma-Chlordane	33.3	30.8	92.5	72	129
Heptachlor	33.3	33.2	99.6	68	147
Heptachlor epoxide	33.3	33.2	99.7	67	136
Methoxychlor	33.3	34.2	103	57	138
Surr: Decachlorobiphenyl	33.3	29.3	88.1	35	155
Surr: Tetrachloro-m-xylene	33.3	29.7	89.1	33	121

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10040678-14
RunID: VARG_100505A-5477148 Units: ug/kg
Analysis Date: 05/05/2010 15:35 Analyst: E_S1
Preparation Date: 04/29/2010 11:13 Prep By: QMT Method: SW3550C

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
4,4´-DDD	ND	33.3	33.5	101	33.3	33.6	101	0.439	23	8	134
4,4´-DDE	ND	33.3	35.3	106	33.3	35.3	106	0.227	33	13	128
4,4´-DDT	ND	33.3	34.4	103	33.3	34.6	104	0.614	35	4	144
Aldrin	ND	33.3	33.6	101	33.3	33.9	102	0.807	28	31	112
alpha-BHC	ND	33.3	32.2	96.6	33.3	31.6	94.8	1.88	31	21	124
alpha-Chlordane	ND	33.3	29.1	87.5	33.3	29.5	88.4	1.06	62	33	112
beta-BHC	ND	33.3	34.1	102	33.3	34.3	103	0.754	33	38	136

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Organochlorine Pesticides by Method 8081A**
Method: **SW8081A**
WorkOrder: **10040678**
Lab Batch ID: **99476**

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10040678-14
RunID: VARG_100505A-5477148 Units: ug/kg
Analysis Date: 05/05/2010 15:35 Analyst: E_S1
Preparation Date: 04/29/2010 11:13 Prep By: QMT Method: SW3550C

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
delta-BHC	ND	33.3	26.8	80.5	33.3	26.8	80.6	0.160	46	7	143
Dieldrin	ND	33.3	33.8	101	33.3	34.0	102	0.741	65	21	143
Endosulfan I	ND	33.3	28.8	86.3	33.3	29.0	87.1	0.846	51	22	120
Endosulfan II	ND	33.3	33.1	99.4	33.3	33.2	99.7	0.313	34	21	132
Endosulfan sulfate	ND	33.3	32.2	96.6	33.3	32.6	97.8	1.20	59	15	150
Endrin	ND	33.3	35.2	106	33.3	35.7	107	1.34	20	56	168
Endrin aldehyde	ND	33.3	30.1	90.4	33.3	30.5	91.5	1.21	22	22	130
Endrin ketone	ND	33.3	31.8	95.5	33.3	32.1	96.5	0.997	22	6	156
gamma-BHC	ND	33.3	32.6	97.8	33.3	32.3	97.1	0.739	28	24	167
gamma-Chlordane	ND	33.3	29.5	88.5	33.3	29.9	89.7	1.35	35	28	117
Heptachlor	ND	33.3	33.9	102	33.3	33.9	102	0.0368	33	28	165
Heptachlor epoxide	ND	33.3	33.3	100	33.3	33.0	99.0	1.10	25	30	117
Methoxychlor	ND	33.3	33.1	99.5	33.3	32.3	96.9	2.69	30	10	139
Surr: Decachlorobiphenyl	ND	33.3	28.5	85.6	33.3	29.1	87.5	2.19	30	35	155
Surr: Tetrachloro-m-xylene	ND	33.3	31.4	94.3	33.3	30.1	90.4	4.31	30	33	121

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Quality Control Report

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Chlorinated Herbicides by Method 8151A**
Method: **SW8151A**

WorkOrder: **10040678**
Lab Batch ID: **99501**

Method Blank

RunID: HP_9_100505A-5479328 Units: ug/kg
Analysis Date: 05/05/2010 17:57 Analyst: E_S1
Preparation Date: 04/30/2010 11:42 Prep By: QMT Method: SW3550C

Analyte	Result	Rep Limit
2,4,5-T	ND	33
2,4,5-TP (Silvex)	ND	33
2,4-D	ND	33
2,4-DB	ND	33
Dicamba	ND	33
Dichloroprop	ND	33
Dinoseb	ND	33
MCPA	ND	1000
MCPP	ND	1000
Surr: DCAA	65.7	12-139

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10040678-03A	NCE-5-0.5
10040678-04A	NCE-6-0.5
10040678-05A	NCE-7-0.5
10040678-06A	NCE-8-0.5
10040678-07A	NCE-9-0.5
10040678-08A	NCE-10-0.5
10040678-09A	NCE-11-0.5
10040678-10A	NCE-12-0.5
10040678-11A	NCE-1-0.5
10040678-14A	NCE-2-0.5
10040678-17A	NCE-3-0.5
10040678-20A	NCE-4-0.5

Laboratory Control Sample (LCS)

RunID: HP_9_100505A-5479327 Units: ug/kg
Analysis Date: 05/05/2010 17:38 Analyst: E_S1
Preparation Date: 04/30/2010 11:42 Prep By: QMT Method: SW3550C

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
2,4,5-T	33.3	20.1	60.4	15	144
2,4,5-TP (Silvex)	33.3	27.8	83.5	20	123
2,4-D	33.3	17.5	52.5	10	152
2,4-DB	33.3	23.0	69.1	22	133
Dicamba	33.3	24.1	72.3	10	143
Dichloroprop	33.3	25.9	77.8	22	157
Dinoseb	33.3	11.1	33.2	10	125
MCPA	3330	2370	71.0	21	139
MCPP	3330	3110	93.5	12	177
Surr: DCAA	33.3	22.9	68.6	12	139

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10040678-03
RunID: HP_9_100505A-5479320 Units: ug/kg
Analysis Date: 05/05/2010 15:24 Analyst: E_S1
Preparation Date: 04/30/2010 11:42 Prep By: QMT Method: SW3550C

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Chlorinated Herbicides by Method 8151A**
Method: **SW8151A**

WorkOrder: **10040678**
Lab Batch ID: **99501**

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
2,4,5-T	ND	33.3	23.9	71.8	33.3	16.5	49.5	36.8	44	10	160
2,4,5-TP (Silvex)	ND	33.3	21.3	63.8	33.3	17.5	52.5	19.5	42	10	150
2,4-D	ND	33.3	32.6	97.9	33.3	20.4	61.3	46.0	51	15	137
2,4-DB	ND	33.3	61.6	185	33.3	69.2	208	11.6	56	10	208
Dicamba	ND	33.3	25.5	58.5	33.3	18.0	36.1	34.3	50	9	150
Dichloroprop	ND	33.3	20.2	60.6	33.3	16.9	50.7	17.7	33	21	199
Dinoseb	ND	33.3	25.0	75.0	33.3	23.9	71.9	4.20	48	15	134
MCPA	ND	3330	1340	40.2	3330	1370	41.2	2.60	42	33	127
MCPP	ND	3330	2680	80.6	3330	2160	64.8	21.7	50	12	177
Surr: DCAA	ND	33.3	32.9	98.9	33.3	34.2	103	3.91	30	12	139

Qualifiers: ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis:	**Metals by Method 6020A, Total**		**WorkOrder:**	**10040678**
Method:	**SW6020A**		**Lab Batch ID:**	**99442A-I**

Method Blank

RunID: ICPMS_100504A-5475453 Units: mg/kg
Analysis Date: 05/04/2010 17:24 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Result	Rep Limit
Beryllium	ND	0.4
Thallium	ND	0.5

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10040678-03A	NCE-5-0.5
10040678-04A	NCE-6-0.5
10040678-05A	NCE-7-0.5
10040678-06A	NCE-8-0.5
10040678-07A	NCE-9-0.5
10040678-08A	NCE-10-0.5
10040678-09A	NCE-11-0.5
10040678-10A	NCE-12-0.5
10040678-11A	NCE-1-0.5
10040678-14A	NCE-2-0.5
10040678-17A	NCE-3-0.5
10040678-20A	NCE-4-0.5

Laboratory Control Sample (LCS)

RunID: ICPMS_100504A-5475455 Units: mg/kg
Analysis Date: 05/04/2010 17:39 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Beryllium	51.00	44.42	87.10	83	117
Thallium	184.0	216.2	117.5	77	122

Post Digestion Spike (PDS) / Post Digestion Spike Duplicate (PDSD)

Sample Spiked: 10040678-03
RunID: ICPMS_100504A-5475459 Units: mg/kg
Analysis Date: 05/04/2010 17:59 Analyst: AL_H

Analyte	Sample Result	PDS Spike Added	PDS Result	PDS % Recovery	PDSD Spike Added	PDSD Result	PDSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Thallium	ND	10	14.7	144.8 *	10	14.33	141.1 *	2.549	20	75	125

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Qualifiers:

- ND/U - Not Detected at the Reporting Limit
- B - Analyte Detected In The Associated Method Blank
- J - Estimated Value Between MDL And PQL
- E - Estimated Value exceeds calibration curve
- N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
- TNTC - Too numerous to count
- MI - Matrix Interference
- D - Recovery Unreportable due to Dilution
- * - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Metals by Method 6020A, Total**
Method: **SW6020A**
WorkOrder: **10040678**
Lab Batch ID: **99442A-I**

Sample Spiked: 10040678-03
RunID: ICPMS_100504A-5475456 Units: mg/kg
Analysis Date: 05/04/2010 17:44 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Beryllium	ND	10	8.971	86.42	10	8.872	85.43	1.110	20	75	125
Thallium	ND	10	13.53	133.1 *	10	13.69	134.7 *	1.176	20	75	125

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Quality Control Report

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis:	**Metals by Method 6020A, Total**	**WorkOrder:**	**10040678**
Method:	**SW6020A**	**Lab Batch ID:**	**99442-I**

Method Blank

RunID: ICPMS_100430A-5473350 Units: mg/kg
Analysis Date: 04/30/2010 17:17 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Result	Rep Limit
Antimony	ND	0.5
Arsenic	ND	0.5
Barium	ND	0.5
Cadmium	ND	0.5
Chromium	ND	0.5
Cobalt	ND	0.5
Copper	ND	0.5
Lead	ND	0.5
Molybdenum	ND	0.5
Nickel	ND	0.5
Selenium	ND	0.5
Silver	ND	0.5
Vanadium	ND	0.5
Zinc	ND	1

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10040678-03A	NCE-5-0.5
10040678-04A	NCE-6-0.5
10040678-05A	NCE-7-0.5
10040678-06A	NCE-8-0.5
10040678-07A	NCE-9-0.5
10040678-08A	NCE-10-0.5
10040678-09A	NCE-11-0.5
10040678-10A	NCE-12-0.5
10040678-11A	NCE-1-0.5
10040678-14A	NCE-2-0.5
10040678-17A	NCE-3-0.5
10040678-20A	NCE-4-0.5

Laboratory Control Sample (LCS)

RunID: ICPMS_100430A-5473351 Units: mg/kg
Analysis Date: 04/30/2010 17:22 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Antimony	127.0	99.74	78.54	30	210
Arsenic	280.0	276.5	98.75	81	119
Barium	520.0	444.2	85.42	83	117
Cadmium	182.0	175.7	96.54	82	118
Chromium	142.0	132.9	93.59	81	120
Cobalt	110.0	107.9	98.09	82	118
Copper	132.0	121.4	91.97	83	117
Lead	72.20	64.19	88.91	82	118
Molybdenum	80.90	91.90	113.6	80	120
Nickel	155.0	154.8	99.87	82	117
Selenium	165.0	173.9	105.4	77	133
Silver	126.0	120.9	95.95	66	134
Vanadium	186.0	164.6	88.49	77	123
Zinc	346.0	326.8	94.45	79	121

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
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* - Recovery Outside Advisable QC Limits

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Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Metals by Method 6020A, Total**
Method: **SW6020A**

WorkOrder: **10040678**
Lab Batch ID: **99442-I**

Post Digestion Spike (PDS) / Post Digestion Spike Duplicate (PDSD)

Sample Spiked: 10040678-03
RunID: ICPMS_100430A-5473356 Units: mg/kg
Analysis Date: 04/30/2010 17:47 Analyst: AL_H

Analyte	Sample Result	PDS Spike Added	PDS Result	PDS % Recovery	PDSD Spike Added	PDSD Result	PDSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Antimony	ND	10	9.274	91.56	10	9.26	91.42	0.1511	20	75	125

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10040678-03
RunID: ICPMS_100430A-5473353 Units: mg/kg
Analysis Date: 04/30/2010 17:32 Analyst: AL_H
Preparation Date: 04/27/2010 17:30 Prep By: M_ Method: SW3050B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Antimony	ND	10	3.830	37.12 *	10	3.852	37.34 *	0.5728	20	75	125
Arsenic	3.856	10	12.35	84.94	10	12.78	89.24	3.422	20	75	125
Barium	98.09	10	112.3	N/C	10	117.5	N/C	N/C	20	75	125
Cadmium	ND	10	8.666	86.66	10	8.963	89.63	3.369	20	75	125
Chromium	42.91	10	57.32	N/C	10	57.29	N/C	N/C	20	75	125
Cobalt	9.851	10	18.99	91.39	10	21.32	114.7	11.56	20	75	125
Copper	22.43	10	32.32	98.90	10	33.21	107.8	2.716	20	75	125
Lead	6.199	10	15.68	94.81	10	15.72	95.21	0.2548	20	75	125
Molybdenum	0.5233	10	9.901	93.78	10	9.991	94.68	0.9049	20	75	125
Nickel	47.91	10	61.49	N/C	10	65.03	N/C	N/C	20	75	125
Selenium	ND	10	7.924	79.24	10	7.667	76.67	3.297	20	75	125
Silver	ND	10	8.527	85.27	10	8.759	87.59	2.684	20	75	125
Vanadium	54.16	10	65.56	N/C	10	66.46	N/C	N/C	20	75	125
Zinc	38.62	10	48.95	103.3	10	48.21	95.90	1.523	20	75	125

Qualifiers:

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B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
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Quality Control Report

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: Mercury, Total
Method: SW7471A

WorkOrder: 10040678
Lab Batch ID: 99569

Method Blank

RunID: HGLD_100504B-5475219 Units: mg/kg
Analysis Date: 05/04/2010 14:52 Analyst: R_V
Preparation Date: 05/04/2010 11:10 Prep By: F_S Method: SW7471A

Analyte	Result	Rep Limit
Mercury	ND	0.03

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10040678-03A	NCE-5-0.5
10040678-04A	NCE-6-0.5
10040678-05A	NCE-7-0.5
10040678-06A	NCE-8-0.5
10040678-07A	NCE-9-0.5
10040678-08A	NCE-10-0.5
10040678-09A	NCE-11-0.5
10040678-10A	NCE-12-0.5
10040678-11A	NCE-1-0.5
10040678-14A	NCE-2-0.5
10040678-17A	NCE-3-0.5
10040678-20A	NCE-4-0.5

Laboratory Control Sample (LCS)

RunID: HGLD_100504B-5475220 Units: mg/kg
Analysis Date: 05/04/2010 14:54 Analyst: R_V
Preparation Date: 05/04/2010 11:10 Prep By: F_S Method: SW7471A

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Mercury	8.480	7.954	93.79	80	120

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10040678-03
RunID: HGLD_100504B-5475222 Units: mg/kg
Analysis Date: 05/04/2010 14:59 Analyst: R_V
Preparation Date: 05/04/2010 11:10 Prep By: F_S Method: SW7471A

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Mercury	ND	0.3	0.3133	101.3	0.3	0.3186	103.0	1.675	20	80	120

Qualifiers: ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
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Sample Receipt Checklist
And
Chain of Custody

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Sample Receipt Checklist

Workorder: **10040678**

Date and Time Received: **4/27/2010 9:15:00 AM**

Temperature: **1.8°C**

Received By: **AMV**

Carrier name: **Fedex-Priority**

Chilled by: **Water Ice**

1.	**Shipping container/cooler in good condition?**	Yes ☑	No ☐	Not Present ☐
2.	**Custody seals intact on shippping container/cooler?**	Yes ☐	No ☐	Not Present ☑
3.	**Custody seals intact on sample bottles?**	Yes ☐	No ☐	Not Present ☑
4.	**Chain of custody present?**	Yes ☑	No ☐	
5.	**Chain of custody signed when relinquished and received?**	Yes ☑	No ☐	
6.	**Chain of custody agrees with sample labels?**	Yes ☑	No ☐	
7.	**Samples in proper container/bottle?**	Yes ☑	No ☐	
8.	**Sample containers intact?**	Yes ☑	No ☐	
9.	**Sufficient sample volume for indicated test?**	Yes ☑	No ☐	
10.	**All samples received within holding time?**	Yes ☑	No ☐	
11.	**Container/Temp Blank temperature in compliance?**	Yes ☑	No ☐	
12.	**Water - VOA vials have zero headspace?**	Yes ☐	No ☐	VOA Vials Not Present ☑
13.	**Water - Preservation checked upon receipt (except VOA*)?**	Yes ☐	No ☐	Not Applicable ☑

***VOA Preservation Checked After Sample Analysis**

SPL Representative:

Contact Date & Time:

Client Name Contacted:

Non Conformance Issues:

Client Instructions:

Nichols Consulting Engineers, Chtd.

NCE Chain of Custody/Laboratory Analysis Request Form

10040678

Page ___ of ___

Bill to: Attn:______________________
Nichols Consulting Engineers
8795 Folsom Blvd, #~~103~~ 250
Sacramento CA, 958~~26~~

Lab Name: SPL

Address:______________________

Phone:______________________

NCE Project Number:______________________

NCE Project/Site: Aspen I

Contractor/Project Manager: McKallcox

Firm: NCE

Address: 8795 Folsom

Phone & Fax (916) 388-5655

Sampler's Signature:

SAMPLE ID	DATE	TIME	LAB ID	MATRIX		Unpreserved	H_2SO_4	HNO_3	HCL			EPA8260B	Organochlorine Pesticides	Chlorinated Herbicides	Organophosphate Pesticides		CAM 17 Metals			REMARKS:
NCE-4-2	4-23			Soil																Hold
NCE-4-5																				Hold
NCE-5-0.5													X	X	X		X			
NCE-6-0.5													X	X	X		X			
NCE-7-0.5													X	X	X		X			
NCE-8-0.5													X	X	X		X			
NCE-9-0.5													X	X	X		X			
NCE-10-0.5													X	X	X		X			
NCE-11-0.5													X	X	X		X			
NCE-12-0.5													X	X	X		X			

No. of Containers & Preservative

Requested Analysis

Relinquish by/date/time:______________ / / hrs
Received by/date:______________ / / hrs
Relinquish by/date:______________ / / hrs
Received by/date:______________ / / hrs
Relinquish by/date: ______________ 4/20 / hrs
Received by/date: Amanda Vickerman hrs 4/27/10 9:15

EDF Report? ____Yes ____No

EDF Deliverable to (Email Address)

____

NOTES TO LAB:

REPORT REQUIREMENTS: (circle) I. Routine Report II. Report III. Data Validation Report IV. CLP Deliverable Report

Requested Report Date:______________________

TURNAROUND TIME: ____24 hr. ____48 hr. ____5 day _X_Standard ____Provide Verbal Prelim Results ____Fax Prelim Results

Nichols Consulting Engineers, Chtd.

NCE Chain of Custody/Laboratory Analysis Request Form

100406078

Page ___of___

Bill to: Attn:____________________
Nichols Consulting Engineers
8795 Folsom Blvd, #~~103~~ 250
Sacramento CA, 95826

Lab Name: APL
Address:____________________
Phone:____________________

NCE Project Number:____________________

NCE Project/Site: Agam 1
Contractor/Project Manager: M Wilcox
Firm: ~~NCE~~
Address: 8795 Folsom Blvd
Phone & Fax (916) 388-5655
Sampler's Signature:

No. of Containers & Preservative

Requested Analysis

herbicides

SAMPLE ID	DATE	TIME	LAB ID	MATRIX			Unpreserved	H_2SO_4	HNO_3	HCL			EPA8260B	Organochlorine Pesticides	Chlorinated ~~Pesticides~~	Organophosphate Pesticides	~~[illegible]~~ Nitrate as N	CAM 17 Metals	~~[illegible]~~		REMARKS:
NCE-1-0.5	4-23			Soil										X	X	X	X				
NCE-1-2																					Hold
NCE-1-5																					Hold
NCE-2-0.5														X	X	X	X				
NCE-2-2																					Hold
NCE-2-5																					Hold
NCE-3-0.5														X	X	X	X				
NCE-3-2																					Hold
NCE-3-5																					Hold
NCE-4-0.5														X	X	X	X				

Relinquish by/date/time:__________ / / hrs
Received by/date:__________ / / hrs
Relinquish by/date:__________ / / hrs
Received by/date:__________ / / hrs
Relinquish by/date: / 4/26 / 1200 hrs
Received by/date: Amanda Kierpaig 4/26/10 915 hrs

EDF Report? ____Yes ____No

EDF Deliverable to (Email Address)
____

NOTES TO LAB:

REPORT REQUIREMENTS: (circle) I. Routine Report II. Report III. Data Validation Report IV. CLP Deliverable Report

Requested Report Date:____________________

TURNAROUND TIME: ____24 hr. ____48 hr. ____5 day ☒ Standard ____Provide Verbal Prelim Results ____Fax Prelim Results

Subcontract Analysis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 680-57331-1

Job Description: 10040678

For:
Southern Petroleum Laboratories
8880 Interchange Drive
Houston, TX 77054

Attention: Erica Cardenas

Approved for release.
Sheila Hoffman
Project Manager I
5/18/2010 10:01 AM

Sheila Hoffman
Project Manager I
sheila.hoffman@testamericainc.com
05/18/2010

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. This report may not be reproduced, except in full, without the written approval of the laboratory. Questions should be directed to the person who signed this report.

Savannah Certifications and ID #s: A2LA: 0399.01; AL: 41450; ARDEQ: 88-0692; ARDOH; CA: 03217CA; CO; CT: PH0161; DE; FL: E87052; GA: 803; Guam; HI; IL: 200022; IN; IA: 353; KS: E-10322; KY EPPC: 90084; KY UST; LA DEQ: 30690; LA DHH: LA080008; ME: 2008022; MD: 250; MA: M-GA006; MI: 9925; MS; NFESC: 249; NV: GA00006; NJ: GA769; NM; NY: 10842; NC DWQ: 269; NC DHHS: 13701; PA: 68-00474; PR: GA00006; RI: LAO00244; SC: 98001001; TN: TN0296; TX: T104704185; USEPA: GA00006; VT: VT-87052; VA: 00302; WA; WV DEP: 094; WV DHHR: 9950 C; WI DNR: 999819810; WY/EPAR8: 8TMS-Q

Job Narrative
680-57331-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC Semi VOA
Method(s) 8141A: The laboratory control sample (LCS) for batch 680-167762 exceeded control limits for the following analyte(s): Naled. Naled has been identified as a poor performing analyte when analyzed using this method; therefore, re-extraction/re-analysis was not performed. These results have been reported and qualified.

Method(s) 8141A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-167762 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 8141A: Surrogate recovery for the following sample(s) was outside control limits: 10040678-03B NCE-5-0.5 (680-57331-1),10040678-04B NCE-6-0.5 (680-57331-2, 10040678-05B NCE-7-0.5 (680-57331-3), 10040678-06B NCE-8-0.5 (680-57331-4), 10040678-08B NCE-10-0.5 (680-57331-6), 10040678-09B NCE-11-0.5 (680-57331-7), 10040678-20B NCE-4-0.5 (680-57331-12). Re-extraction and/or re-analysis was performed outside of holding time with acceptable results. Both sets of data have been reported.

Method(s) 8141A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 680-168093 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

SAMPLE SUMMARY

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
680-57331-1	10040678-03B NCE-5-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-2	10040678-04B NCE-6-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-3	10040678-05B NCE-7-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-4	10040678-06B NCE-8-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-5	10040678-07B NCE-9-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-6	10040678-08B NCE-10-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-7	10040678-09B NCE-11-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-8	10040678-10B NCE-12-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-9	10040678-11B NCE-1-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-10	10040678-14B NCE-2-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-11	10040678-17B NCE-3-0.5	Solid	04/23/2010 0000	05/05/2010 0939
680-57331-12	10040678-20B NCE-4-0.5	Solid	04/23/2010 0000	05/05/2010 0939

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-03B NCE-5-0.5**

Lab Sample ID: 680-57331-1

Client Matrix: Solid

% Moisture: 16.2

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762		Initial Weight/Volume:	15.20 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0003			Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712			Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<39		39
Bolstar		<39		39
Chlorpyrifos		<39		39
Coumaphos		<39		39
Demeton-O		<98		98
Demeton-S		<98		98
Diazinon		<39		39
Dichlorvos		<79		79
Dimethoate		<79		79
Disulfoton		<79		79
EPN		<39		39
Famphur		<79		79
Fensulfothion		<200		200
Fenthion		<39		39
Malathion		<39		39
Methyl parathion		<20		20
Merphos		<59		59
Mevinphos		<79		79
Monochrotophos		<390		390
Naled		<200	*	200
Parathion		<39		39
Phorate		<39		39
Ronnel		<39		39
Stirophos		<39		39
Sulfotepp		<20		20
Thionazin		<39		39
Tokuthion		<39		39
Trichloronate		<39		39
Ethoprop		<20		20

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	41	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-03B NCE-5-0.5**

Lab Sample ID:	680-57331-1			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	16.2	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168728		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-168093		Initial Weight/Volume:	15.12 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1425	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<39	H	39
Bolstar		<39	H	39
Chlorpyrifos		<39	H	39
Coumaphos		<39	H	39
Demeton-O		<98	H	98
Demeton-S		<98	H	98
Diazinon		<39	H	39
Dichlorvos		<79	H	79
Dimethoate		<79	H	79
Disulfoton		<79	H	79
EPN		<39	H	39
Famphur		<79	H	79
Fensulfothion		<200	H	200
Fenthion		<39	H	39
Malathion		<39	H	39
Methyl parathion		<20	H	20
Merphos		<59	H	59
Mevinphos		<79	H	79
Monochrotophos		<390	H	390
Naled		<200	H	200
Parathion		<39	H	39
Phorate		<39	H	39
Ronnel		<39	H	39
Stirophos		<39	H	39
Sulfotepp		<20	H	20
Thionazin		<39	H	39
Tokuthion		<39	H	39
Trichloronate		<39	H	39
Ethoprop		<20	H	20

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	49		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-04B NCE-6-0.5**

Lab Sample ID:	680-57331-2			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	27.7	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.50 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0027		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<44		44
Bolstar		<44		44
Chlorpyrifos		<44		44
Coumaphos		<44		44
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<44		44
Dichlorvos		<90		90
Dimethoate		<90		90
Disulfoton		<90		90
EPN		<44		44
Famphur		<90		90
Fensulfothion		<230		230
Fenthion		<44		44
Malathion		<44		44
Methyl parathion		<23		23
Merphos		<67		67
Mevinphos		<90		90
Monochrotophos		<440		440
Naled		<230	*	230
Parathion		<44		44
Phorate		<44		44
Ronnel		<44		44
Stirophos		<44		44
Sulfotepp		<23		23
Thionazin		<44		44
Tokuthion		<44		44
Trichloronate		<44		44
Ethoprop		<23		23

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	31	X	42 - 128

Client Sample ID: **10040678-04B NCE-6-0.5**

Lab Sample ID:	680-57331-2			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	27.7	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168728		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-168093		Initial Weight/Volume:	15.12 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1450	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<45	H	45
Bolstar		<45	H	45
Chlorpyrifos		<45	H	45
Coumaphos		<45	H	45
Demeton-O		<110	H	110
Demeton-S		<110	H	110
Diazinon		<45	H	45
Dichlorvos		<92	H	92
Dimethoate		<92	H	92
Disulfoton		<92	H	92
EPN		<45	H	45
Famphur		<92	H	92
Fensulfothion		<230	H	230
Fenthion		<45	H	45
Malathion		<45	H	45
Methyl parathion		<23	H	23
Merphos		<69	H	69
Mevinphos		<92	H	92
Monochrotophos		<450	H	450
Naled		<230	H	230
Parathion		<45	H	45
Phorate		<45	H	45
Ronnel		<45	H	45
Stirophos		<45	H	45
Sulfotepp		<23	H	23
Thionazin		<45	H	45
Tokuthion		<45	H	45
Trichloronate		<45	H	45
Ethoprop		<23	H	23

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	38	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-05B NCE-7-0.5**

Lab Sample ID:	680-57331-3			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	24.7	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID: SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume: 15.38 g
Dilution:	1.0		Final Weight/Volume: 5 mL
Date Analyzed:	05/11/2010 0052		Injection Volume: 2 uL
Date Prepared:	05/06/2010 1712		Result Type: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43		43
Bolstar		<43		43
Chlorpyrifos		<43		43
Coumaphos		<43		43
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<43		43
Dichlorvos		<87		87
Dimethoate		<87		87
Disulfoton		<87		87
EPN		<43		43
Famphur		<87		87
Fensulfothion		<220		220
Fenthion		<43		43
Malathion		<43		43
Methyl parathion		<22		22
Merphos		<65		65
Mevinphos		<87		87
Monochrotophos		<430		430
Naled		<220	*	220
Parathion		<43		43
Phorate		<43		43
Ronnel		<43		43
Stirophos		<43		43
Sulfotepp		<22		22
Thionazin		<43		43
Tokuthion		<43		43
Trichloronate		<43		43
Ethoprop		<22		22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	24	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-05B NCE-7-0.5**

Lab Sample ID:	680-57331-3			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	24.7	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch:	680-168728	Instrument ID:	SGO
Preparation:	3550B	Prep Batch:	680-168093	Initial Weight/Volume:	15.29 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1515	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43	H	43
Bolstar		<43	H	43
Chlorpyrifos		<43	H	43
Coumaphos		<43	H	43
Demeton-O		<110	H	110
Demeton-S		<110	H	110
Diazinon		<43	H	43
Dichlorvos		<87	H	87
Dimethoate		<87	H	87
Disulfoton		<87	H	87
EPN		<43	H	43
Famphur		<87	H	87
Fensulfothion		<220	H	220
Fenthion		<43	H	43
Malathion		<43	H	43
Methyl parathion		<22	H	22
Merphos		<65	H	65
Mevinphos		<87	H	87
Monochrotophos		<430	H	430
Naled		<220	H	220
Parathion		<43	H	43
Phorate		<43	H	43
Ronnel		<43	H	43
Stirophos		<43	H	43
Sulfotepp		<22	H	22
Thionazin		<43	H	43
Tokuthion		<43	H	43
Trichloronate		<43	H	43
Ethoprop		<22	H	22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	58		42 - 128

Analytical Data

Client:	Southern Petroleum Laboratories	Job Number:	680-57331-1

Client Sample ID:	**10040678-06B NCE-8-0.5**				
Lab Sample ID:	680-57331-4			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	23.1	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.08 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0117		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43		43
Bolstar		<43		43
Chlorpyrifos		<43		43
Coumaphos		<43		43
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<43		43
Dichlorvos		<87		87
Dimethoate		<87		87
Disulfoton		<87		87
EPN		<43		43
Famphur		<87		87
Fensulfothion		<220		220
Fenthion		<43		43
Malathion		<43		43
Methyl parathion		<22		22
Merphos		<65		65
Mevinphos		<87		87
Monochrotophos		<430		430
Naled		<220	*	220
Parathion		<43		43
Phorate		<43		43
Ronnel		<43		43
Stirophos		<43		43
Sulfotepp		<22		22
Thionazin		<43		43
Tokuthion		<43		43
Trichloronate		<43		43
Ethoprop		<22		22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	33	X	42 - 128

Client Sample ID: **10040678-06B NCE-8-0.5**

Lab Sample ID:	680-57331-4			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	23.1	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch:	680-168728	Instrument ID:	SGO
Preparation:	3550B	Prep Batch:	680-168093	Initial Weight/Volume:	15.45 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1539	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<42	H	42
Bolstar		<42	H	42
Chlorpyrifos		<42	H	42
Coumaphos		<42	H	42
Demeton-O		<100	H	100
Demeton-S		<100	H	100
Diazinon		<42	H	42
Dichlorvos		<85	H	85
Dimethoate		<85	H	85
Disulfoton		<85	H	85
EPN		<42	H	42
Famphur		<85	H	85
Fensulfothion		<210	H	210
Fenthion		<42	H	42
Malathion		<42	H	42
Methyl parathion		<21	H	21
Merphos		<63	H	63
Mevinphos		<85	H	85
Monochrotophos		<420	H	420
Naled		<210	H	210
Parathion		<42	H	42
Phorate		<42	H	42
Ronnel		<42	H	42
Stirophos		<42	H	42
Sulfotepp		<21	H	21
Thionazin		<42	H	42
Tokuthion		<42	H	42
Trichloronate		<42	H	42
Ethoprop		<21	H	21

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	42		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-07B NCE-9-0.5**

Lab Sample ID:	680-57331-5			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	19.2	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.09 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0141		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<41		41
Bolstar		<41		41
Chlorpyrifos		<41		41
Coumaphos		<41		41
Demeton-O		<100		100
Demeton-S		<100		100
Diazinon		<41		41
Dichlorvos		<82		82
Dimethoate		<82		82
Disulfoton		<82		82
EPN		<41		41
Famphur		<82		82
Fensulfothion		<210		210
Fenthion		<41		41
Malathion		<41		41
Methyl parathion		<21		21
Merphos		<61		61
Mevinphos		<82		82
Monochrotophos		<410		410
Naled		<210	*	210
Parathion		<41		41
Phorate		<41		41
Ronnel		<41		41
Stirophos		<41		41
Sulfotepp		<21		21
Thionazin		<41		41
Tokuthion		<41		41
Trichloronate		<41		41
Ethoprop		<21		21

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	55		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-08B NCE-10-0.5**

Lab Sample ID:	680-57331-6			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	12.8	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.12 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0206		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<38		38
Bolstar		<38		38
Chlorpyrifos		<38		38
Coumaphos		<38		38
Demeton-O		<94		94
Demeton-S		<94		94
Diazinon		<38		38
Dichlorvos		<76		76
Dimethoate		<76		76
Disulfoton		<76		76
EPN		<38		38
Famphur		<76		76
Fensulfothion		<190		190
Fenthion		<38		38
Malathion		<38		38
Methyl parathion		<19		19
Merphos		<57		57
Mevinphos		<76		76
Monochrotophos		<380		380
Naled		<190	*	190
Parathion		<38		38
Phorate		<38		38
Ronnel		<38		38
Stirophos		<38		38
Sulfotepp		<19		19
Thionazin		<38		38
Tokuthion		<38		38
Trichloronate		<38		38
Ethoprop		<19		19

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	34	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-08B NCE-10-0.5**

Lab Sample ID:	680-57331-6			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	12.8	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch:	680-168728	Instrument ID:	SGO
Preparation:	3550B	Prep Batch:	680-168093	Initial Weight/Volume:	15.14 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1604	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<37	H	37
Bolstar		<37	H	37
Chlorpyrifos		<37	H	37
Coumaphos		<37	H	37
Demeton-O		<94	H	94
Demeton-S		<94	H	94
Diazinon		<37	H	37
Dichlorvos		<76	H	76
Dimethoate		<76	H	76
Disulfoton		<76	H	76
EPN		<37	H	37
Famphur		<76	H	76
Fensulfothion		<190	H	190
Fenthion		<37	H	37
Malathion		<37	H	37
Methyl parathion		<19	H	19
Merphos		<57	H	57
Mevinphos		<76	H	76
Monochrotophos		<370	H	370
Naled		<190	H	190
Parathion		<37	H	37
Phorate		<37	H	37
Ronnel		<37	H	37
Stirophos		<37	H	37
Sulfotepp		<19	H	19
Thionazin		<37	H	37
Tokuthion		<37	H	37
Trichloronate		<37	H	37
Ethoprop		<19	H	19

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	60		42 - 128

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID:	**10040678-09B NCE-11-0.5**		
Lab Sample ID:	680-57331-7		Date Sampled: 04/23/2010 0000
Client Matrix:	Solid	% Moisture: 21.5	Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.25 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0231		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<41		41
Bolstar		<41		41
Chlorpyrifos		<41		41
Coumaphos		<41		41
Demeton-O		<100		100
Demeton-S		<100		100
Diazinon		<41		41
Dichlorvos		<84		84
Dimethoate		<84		84
Disulfoton		<84		84
EPN		<41		41
Famphur		<84		84
Fensulfothion		<210		210
Fenthion		<41		41
Malathion		<41		41
Methyl parathion		<21		21
Merphos		<63		63
Mevinphos		<84		84
Monochrotophos		<410		410
Naled		<210	*	210
Parathion		<41		41
Phorate		<41		41
Ronnel		<41		41
Stirophos		<41		41
Sulfotepp		<21		21
Thionazin		<41		41
Tokuthion		<41		41
Trichloronate		<41		41
Ethoprop		<21		21

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	41	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories	Job Number: 680-57331-1

Client Sample ID: **10040678-09B NCE-11-0.5**

Lab Sample ID:	680-57331-7			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	21.5	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168728		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-168093		Initial Weight/Volume:	15.01 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1629	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<42	H	42
Bolstar		<42	H	42
Chlorpyrifos		<42	H	42
Coumaphos		<42	H	42
Demeton-O		<110	H	110
Demeton-S		<110	H	110
Diazinon		<42	H	42
Dichlorvos		<85	H	85
Dimethoate		<85	H	85
Disulfoton		<85	H	85
EPN		<42	H	42
Famphur		<85	H	85
Fensulfothion		<220	H	220
Fenthion		<42	H	42
Malathion		<42	H	42
Methyl parathion		<22	H	22
Merphos		<64	H	64
Mevinphos		<85	H	85
Monochrotophos		<420	H	420
Naled		<220	H	220
Parathion		<42	H	42
Phorate		<42	H	42
Ronnel		<42	H	42
Stirophos		<42	H	42
Sulfotepp		<22	H	22
Thionazin		<42	H	42
Tokuthion		<42	H	42
Trichloronate		<42	H	42
Ethoprop		<22	H	22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	53		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-10B NCE-120.5**

Lab Sample ID: 680-57331-8

Client Matrix: Solid

% Moisture: 35.4

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762		Initial Weight/Volume:	15.36 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0255			Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712			Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<50		50
Bolstar		<50		50
Chlorpyrifos		<50		50
Coumaphos		<50		50
Demeton-O		<130		130
Demeton-S		<130		130
Diazinon		<50		50
Dichlorvos		<100		100
Dimethoate		<100		100
Disulfoton		<100		100
EPN		<50		50
Famphur		<100		100
Fensulfothion		<260		260
Fenthion		<50		50
Malathion		<50		50
Methyl parathion		<26		26
Merphos		<76		76
Mevinphos		<100		100
Monochrotophos		<500		500
Naled		<260	*	260
Parathion		<50		50
Phorate		<50		50
Ronnel		<50		50
Stirophos		<50		50
Sulfotepp		<26		26
Thionazin		<50		50
Tokuthion		<50		50
Trichloronate		<50		50
Ethoprop		<26		26

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	50		42 - 128

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-11B NCE-1-0.5**

Lab Sample ID: 680-57331-9

Client Matrix: Solid

% Moisture: 26.2

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762		Initial Weight/Volume:	15.31 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0320			Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712			Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<44		44
Bolstar		<44		44
Chlorpyrifos		<44		44
Coumaphos		<44		44
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<44		44
Dichlorvos		<89		89
Dimethoate		<89		89
Disulfoton		<89		89
EPN		<44		44
Famphur		<89		89
Fensulfothion		<230		230
Fenthion		<44		44
Malathion		<44		44
Methyl parathion		<23		23
Merphos		<66		66
Mevinphos		<89		89
Monochrotophos		<440		440
Naled		<230	*	230
Parathion		<44		44
Phorate		<44		44
Ronnel		<44		44
Stirophos		<44		44
Sulfotepp		<23		23
Thionazin		<44		44
Tokuthion		<44		44
Trichloronate		<44		44
Ethoprop		<23		23

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	44		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-14B NCE-2D.5**

Lab Sample ID: 680-57331-10

Client Matrix: Solid

% Moisture: 24.1

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.10 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0345		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43		43
Bolstar		<43		43
Chlorpyrifos		<43		43
Coumaphos		<43		43
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<43		43
Dichlorvos		<88		88
Dimethoate		<88		88
Disulfoton		<88		88
EPN		<43		43
Famphur		<88		88
Fensulfothion		<220		220
Fenthion		<43		43
Malathion		<43		43
Methyl parathion		<22		22
Merphos		<65		65
Mevinphos		<88		88
Monochrotophos		<430		430
Naled		<220	*	220
Parathion		<43		43
Phorate		<43		43
Ronnel		<43		43
Stirophos		<43		43
Sulfotepp		<22		22
Thionazin		<43		43
Tokuthion		<43		43
Trichloronate		<43		43
Ethoprop		<22		22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	51		42 - 128

Client Sample ID: **10040678-17B NCE-3-0.5**

Lab Sample ID:	680-57331-11			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	24.3	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.34 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0409		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43		43
Bolstar		<43		43
Chlorpyrifos		<43		43
Coumaphos		<43		43
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<43		43
Dichlorvos		<87		87
Dimethoate		<87		87
Disulfoton		<87		87
EPN		<43		43
Famphur		<87		87
Fensulfothion		<220		220
Fenthion		<43		43
Malathion		<43		43
Methyl parathion		<22		22
Merphos		<65		65
Mevinphos		<87		87
Monochrotophos		<430		430
Naled		<220	*	220
Parathion		<43		43
Phorate		<43		43
Ronnel		<43		43
Stirophos		<43		43
Sulfotepp		<22		22
Thionazin		<43		43
Tokuthion		<43		43
Trichloronate		<43		43
Ethoprop		<22		22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	48		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-0B NCE-4-0.5**

Lab Sample ID:	680-57331-12			Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	% Moisture:	24.2	Date Received:	05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168078	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-167762	Initial Weight/Volume:	15.45 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/11/2010 0434		Injection Volume:	2 uL
Date Prepared:	05/06/2010 1712		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<42		42
Bolstar		<42		42
Chlorpyrifos		<42		42
Coumaphos		<42		42
Demeton-O		<110		110
Demeton-S		<110		110
Diazinon		<42		42
Dichlorvos		<86		86
Dimethoate		<86		86
Disulfoton		<86		86
EPN		<42		42
Famphur		<86		86
Fensulfothion		<220		220
Fenthion		<42		42
Malathion		<42		42
Methyl parathion		<22		22
Merphos		<64		64
Mevinphos		<86		86
Monochrotophos		<420		420
Naled		<220		220
Parathion		<42		42
Phorate		<42		42
Ronnel		<42		42
Stirophos		<42		42
Sulfotepp		<22		22
Thionazin		<42		42
Tokuthion		<42		42
Trichloronate		<42		42
Ethoprop		<22		22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	40	X	42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Client Sample ID: **10040678-02B NCE-4-0.5**

Lab Sample ID: 680-57331-12

Client Matrix: Solid

% Moisture: 24.2

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-168728		Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-168093		Initial Weight/Volume:	15.01 g
Dilution:	1.0			Final Weight/Volume:	5 mL
Date Analyzed:	05/15/2010 1654	Run Type:	RE	Injection Volume:	2 uL
Date Prepared:	05/11/2010 1340			Result Type:	SECONDARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<43	H	43
Bolstar		<43	H	43
Chlorpyrifos		<43	H	43
Coumaphos		<43	H	43
Demeton-O		<110	H	110
Demeton-S		<110	H	110
Diazinon		<43	H	43
Dichlorvos		<88	H	88
Dimethoate		<88	H	88
Disulfoton		<88	H	88
EPN		<43	H	43
Famphur		<88	H	88
Fensulfothion		<220	H	220
Fenthion		<43	H	43
Malathion		<43	H	43
Methyl parathion		<22	H	22
Merphos		<66	H	66
Mevinphos		<88	H	88
Monochrotophos		<430	H	430
Naled		<220	H	220
Parathion		<43	H	43
Phorate		<43	H	43
Ronnel		<43	H	43
Stirophos		<43	H	43
Sulfotepp		<22	H	22
Thionazin		<43	H	43
Tokuthion		<43	H	43
Trichloronate		<43	H	43
Ethoprop		<22	H	22

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	44		42 - 128

General Chemistry

Client Sample ID: **10040678-03B NCE-5-0.5**

Lab Sample ID: 680-57331-1

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	16		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-04B NCE-6-0.5**

Lab Sample ID: 680-57331-2

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	28		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-05B NCE-7-0.5**

Lab Sample ID: 680-57331-3

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	25		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-07B NCE-9-0.5**

Lab Sample ID: 680-57331-5
Client Matrix: Solid

Date Sampled: 04/23/2010 0000
Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	19		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-08B NCE-10-0.5**

Lab Sample ID: 680-57331-6

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	13		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-09B NCE-11-0.5**

Lab Sample ID: 680-57331-7

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	22		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

General Chemistry

Client Sample ID: **10040678-10B NCE-120.5**

Lab Sample ID: 680-57331-8

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	35		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-11B NCE-1-0.5**

Lab Sample ID: 680-57331-9

Client Matrix: Solid

Date Sampled: 04/23/2010 0000

Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	26		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-14B NCE-20.5**

Lab Sample ID:	680-57331-10	Date Sampled:	04/23/2010 0000
Client Matrix:	Solid	Date Received:	05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	24		%	0.010	1.0	Moisture
	Analysis Batch: 680-167697	Date Analyzed: 05/06/2010 1008				DryWt Corrected: N

General Chemistry

Client Sample ID: **10040678-17B NCE-3-0.5**

Lab Sample ID: 680-57331-11
Client Matrix: Solid

Date Sampled: 04/23/2010 0000
Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	24		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

General Chemistry

Client Sample ID: **10040678-12B NCE-4-0.5**

Lab Sample ID: 680-57331-12
Client Matrix: Solid

Date Sampled: 04/23/2010 0000
Date Received: 05/05/2010 0939

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	24		%	0.010	1.0	Moisture

Analysis Batch: 680-167697 Date Analyzed: 05/06/2010 1008 DryWt Corrected: N

DATA REPORTING QUALIFIERS

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Lab Section	Qualifier	Description
GC Semi VOA		
	*	LCS or LCSD exceeds the control limits
	F	MS or MSD exceeds the control limits
	H	Sample was prepped or analyzed beyond the specified holding time
	X	Surrogate is outside control limits

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Method Blank - Batch: 680-167762

Method: 8141A
Preparation: 3550B

Lab Sample ID: MB 680-167762/13-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/10/2010 2249
Date Prepared: 05/06/2010 1712

Analysis Batch: 680-168078
Prep Batch: 680-167762
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe10021.d
Initial Weight/Volume: 15.04 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Result	Qual	RL
Azinphos-methyl	<33		33
Bolstar	<33		33
Chlorpyrifos	<33		33
Coumaphos	<33		33
Demeton-O	<83		83
Demeton-S	<83		83
Diazinon	<33		33
Dichlorvos	<67		67
Dimethoate	<67		67
Disulfoton	<67		67
EPN	<33		33
Famphur	<67		67
Fensulfothion	<170		170
Fenthion	<33		33
Malathion	<33		33
Methyl parathion	<17		17
Merphos	<50		50
Mevinphos	<67		67
Monochrotophos	<330		330
Naled	<170		170
Parathion	<33		33
Phorate	<33		33
Ronnel	<33		33
Stirophos	<33		33
Sulfotepp	<17		17
Thionazin	<33		33
Tokuthion	<33		33
Trichloronate	<33		33
Ethoprop	<17		17

Surrogate	% Rec	Acceptance Limits
Triphenylphosphate	69	42 - 128

Lab Control Sample - Batch: 680-167762

Method: 8141A
Preparation: 3550B

Lab Sample ID: LCS 680-167762/14-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/10/2010 2313
Date Prepared: 05/06/2010 1712

Analysis Batch: 680-168078
Prep Batch: 680-167762
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe10022.d
Initial Weight/Volume: 15.07 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Azinphos-methyl	133	74.8	56	30 - 130	
Bolstar	133	69.6	52	30 - 130	
Chlorpyrifos	133	74.8	56	30 - 130	
Coumaphos	133	72.4	55	30 - 130	
Diazinon	133	79.5	60	30 - 146	
Dichlorvos	133	75.8	57	30 - 130	
Disulfoton	133	<67	50	30 - 130	
Fensulfothion	133	<170	79	30 - 130	
Fenthion	133	72.1	54	30 - 130	
Methyl parathion	133	61.9	47	18 - 124	
Merphos	133	84.3	64	30 - 130	
Mevinphos	133	81.7	62	30 - 130	
Naled	133	<170	27	30 - 130	*
Phorate	133	72.7	55	30 - 130	
Ronnel	133	74.4	56	28 - 141	
Stirophos	133	79.5	60	30 - 130	
Tokuthion	133	68.6	52	30 - 130	
Trichloronate	133	72.1	54	30 - 130	
Ethoprop	133	84.5	64	30 - 130	

Surrogate	% Rec	Acceptance Limits
Triphenylphosphate	68	42 - 128

Lab Control Sample - Batch: 680-167762

Method: 8141A
Preparation: 3550B

Lab Sample ID: LCS 680-167762/17-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/10/2010 2338
Date Prepared: 05/06/2010 1712

Analysis Batch: 680-168078
Prep Batch: 680-167762
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe10023.d
Initial Weight/Volume: 15.12 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Demeton-O	132	<82	52	30 - 130	
Demeton-S	132	<82	55	30 - 130	
Dimethoate	132	<66	48	30 - 130	
EPN	132	68.5	52	30 - 130	
Famphur	132	<66	44	30 - 130	
Malathion	132	64.2	49	30 - 130	

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Lab Control Sample - Batch: 680-167762

Method: 8141A
Preparation: 3550B

Lab Sample ID:	LCS 680-167762/17-A	Analysis Batch:	680-168078	Instrument ID:	SGO
Client Matrix:	Solid	Prep Batch:	680-167762	Lab File ID:	oe10023.d
Dilution:	1.0	Units:	ug/Kg	Initial Weight/Volume:	15.12 g
Date Analyzed:	05/10/2010 2338			Final Weight/Volume:	5 mL
Date Prepared:	05/06/2010 1712			Injection Volume:	2 uL
				Column ID:	PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Monochrotophos	1320	745	56	30 - 130	
Parathion	132	66.1	50	35 - 134	
Sulfotepp	132	74.8	57	30 - 130	
Thionazin	132	72.8	55	31 - 118	

Surrogate	% Rec	Acceptance Limits
Triphenylphosphate	73	42 - 128

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 680-167762

Method: 8141A
Preparation: 3550B

MS Lab Sample ID: 680-57331-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/11/2010 0549
Date Prepared: 05/06/2010 1712

Analysis Batch: 680-168078
Prep Batch: 680-167762

Instrument ID: SGO
Lab File ID: oe10038.d
Initial Weight/Volume: 15.16 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

MSD Lab Sample ID: 680-57331-1
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/11/2010 0613
Date Prepared: 05/06/2010 1712

Analysis Batch: 680-168078
Prep Batch: 680-167762

Instrument ID: SGO
Lab File ID: oe10039.d
Initial Weight/Volume: 15.25 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Azinphos-methyl	48	49	30 - 130	3	50		
Bolstar	44	43	30 - 130	2	50		
Chlorpyrifos	42	42	30 - 130	1	50		
Coumaphos	46	48	30 - 130	3	50		
Demeton-O	0	0	30 - 130	NC	50	F	F
Demeton-S	0	0	30 - 130	NC	50	F	F
Diazinon	43	42	30 - 146	3	50		
Dichlorvos	48	41	30 - 130	17	50		
Disulfoton	35	30	30 - 130	16	50		
Fensulfothion	0	0	30 - 130	NC	50	F	F
Fenthion	41	41	30 - 130	0	50		
Methyl parathion	40	39	18 - 124	3	50		
Merphos	48	52	30 - 130	7	50		
Mevinphos	41	39	30 - 130	4	50		
Naled	0	0	30 - 130	NC	50	F	F
Phorate	41	32	30 - 130	25	50		
Ronnel	41	40	28 - 141	3	50		
Stirophos	46	49	30 - 130	6	50		
Tokuthion	41	42	30 - 130	2	50		
Trichloronate	41	41	30 - 130	0	50		
Ethoprop	45	43	30 - 130	6	50		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
Triphenylphosphate	50	51	42 - 128

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Method Blank - Batch: 680-16809

Method: 8141A
Preparation: 3550B

Lab Sample ID: MB 680-168093/12-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/15/2010 1311
Date Prepared: 05/11/2010 1340

Analysis Batch: 680-168728
Prep Batch: 680-168093
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe15013.d
Initial Weight/Volume: 15.31 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Result	Qual	RL
Azinphos-methyl	<32		32
Bolstar	<32		32
Chlorpyrifos	<32		32
Coumaphos	<32		32
Demeton-O	<81		81
Demeton-S	<81		81
Diazinon	<32		32
Dichlorvos	<66		66
Dimethoate	<66		66
Disulfoton	<66		66
EPN	<32		32
Famphur	<66		66
Fensulfothion	<170		170
Fenthion	<32		32
Malathion	<32		32
Methyl parathion	<17		17
Merphos	<49		49
Mevinphos	<66		66
Monochrotophos	<320		320
Naled	<170		170
Parathion	<32		32
Phorate	<32		32
Ronnel	<32		32
Stirophos	<32		32
Sulfotepp	<17		17
Thionazin	<32		32
Tokuthion	<32		32
Trichloronate	<32		32
Ethoprop	<17		17

Surrogate	% Rec	Acceptance Limits
Triphenylphosphate	50	42 - 128

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Lab Control Sample - Batch: 680-16809

Method: 8141A
Preparation: 3550B

Lab Sample ID: LCS 680-168093/16-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/15/2010 1400
Date Prepared: 05/11/2010 1340

Analysis Batch: 680-168728
Prep Batch: 680-168093
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe15015.d
Initial Weight/Volume: 15.28 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Monochrotophos	1310	1210	93	30 - 130	
Parathion	131	105	80	35 - 134	
Sulfotepp	131	97.6	75	30 - 130	
Thionazin	131	94.5	72	31 - 118	

Surrogate	% Rec	Acceptance Limits
Triphenylphosphate	76	42 - 128

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57331-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 680-16809

Method: 8141A
Preparation: 3550B

MS Lab Sample ID:	680-57331-7	Analysis Batch:	680-168728	Instrument ID:	SGO
Client Matrix:	Solid	Prep Batch:	680-168093	Lab File ID:	oe15025.d
Dilution:	1.0			Initial Weight/Volume:	15.12 g
Date Analyzed:	05/15/2010 1808			Final Weight/Volume:	5 mL
Date Prepared:	05/11/2010 1340			Injection Volume:	2 uL
				Column ID:	PRIMARY

MSD Lab Sample ID:	680-57331-7	Analysis Batch:	680-168728	Instrument ID:	SGO
Client Matrix:	Solid	Prep Batch:	680-168093	Lab File ID:	oe15026.d
Dilution:	1.0			Initial Weight/Volume:	15.18 g
Date Analyzed:	05/15/2010 1833			Final Weight/Volume:	5 mL
Date Prepared:	05/11/2010 1340			Injection Volume:	2 uL
				Column ID:	PRIMARY

Analyte	% Rec. MS	 MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Demeton-O	33	0	30 - 130	NC	50	H	H F
Demeton-S	38	0	30 - 130	NC	50	H	H F
Dimethoate	57	0	30 - 130	NC	50	H	H F
EPN	93	0	30 - 130	NC	50	H	H F
Famphur	77	0	30 - 130	NC	50	H	H F
Malathion	67	0	30 - 130	NC	50	H	H F
Monochrotophos	15	0	30 - 130	NC	50	H F	H F
Parathion	72	0	35 - 134	NC	50	H	H F
Sulfotepp	40	0	30 - 130	NC	50	H	H F
Thionazin	38	0	31 - 118	NC	50	H	H F

Surrogate	MS % Rec	MSD % Rec		Acceptance Limits
Triphenylphosphate	76	0	X	42 - 128

SPL, Inc.
8880 Interchange Drive

Houston, TX 77054-2512
(713) 660-0901

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Subcontractor: Sheila Hoffman
STL / Test America
5102 La Roche Avenue

Savanna, Georgia 31404

TEL: (912) 354-7858
FAX:

Acct #:

28-Apr-10

Sample ID	Client Sample	Matrix	Collection Date	Due Date	Requested Tests						
					MISC						
10040678-03B	NCE-5-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-04B	NCE-6-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-05B	NCE-7-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-06B	NCE-8-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-07B	NCE-9-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-08B	NCE-10-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-09B	NCE-11-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-10B	NCE-12-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-11B	NCE-1-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-14B	NCE-2-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-17B	NCE-3-0.5	Soil	04/23/10 0:00	05/09/10	1						
10040678-20B	NCE-4-0.5	Soil	04/23/10 0:00	05/09/10	1						

3.1 °C
680-57331

Comments: Please analyze for Organophosphate Pesticides by 8141. Send results to Erica Cardenas at ecardenas@spl-inc.com.

	Date/Time		Date/Time
Relinquished by:	5/4/10 1654	**Received by:**	5/5/10 0929
Relinquished by:		**Received by:**	

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:
10050150

Report To:		**Project Name:**	**Aspen 1**
	Nichols Consulting Engineers, Chtd. **Mike Leacox** **8795 Folsom Boulevard, Suite 103**	**Site:**	**Sacramento, CA**
		Site Address:	
	Sacramento **CA** **95826-**	**PO Number:**	
		State:	**California**
		State Cert. No.:	**01142CA**
	ph: (916) 388-5655 **fax:**	**Date Reported:**	**6/4/2010**

This Report Contains A Total Of 23 Pages

Excluding This Page, Chain Of Custody

And

Any Attachments

6/4/2010

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Case Narrative for:

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

<u>10050150</u>

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or by his designee, as verified by the following signature.

Erica Cardenas

6/4/2010

Erica Cardenas
Project Manager

Date

Test results meet all requirements of NELAC, unless specified in the narrative.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Certificate of Analysis Number:

10050150

Report To: Nichols Consulting Engineers, Chtd.
Mike Leacox
8795 Folsom Boulevard, Suite 103

Sacramento
CA
95826-
ph: (916) 388-5655 fax: (916) 388-5676

Fax To:

Project Name: Aspen 1
Site: Sacramento, CA
Site Address:

PO Number:
State: California
State Cert. No.: 01142CA
Date Reported: 6/4/2010

Client Sample ID	Lab Sample ID	Matrix	Date Collected	Date Received	COC ID	HOLD
NCE-13	10050150-01	Soil	05/05/2010 0:00	5/6/2010 9:15:00 AM		☐
NCE-14	10050150-02	Soil	05/05/2010 0:00	5/6/2010 9:15:00 AM		☐
NCE-15	10050150-03	Soil	05/05/2010 0:00	5/6/2010 9:15:00 AM		☐

Erica Cardenas

6/4/2010

Erica Cardenas
Project Manager

Date

Kesavalu M. Bagawandoss Ph.D., J.D.
Laboratory Director

Ted Yen
Quality Assurance Officer

Client Sample ID: NCE-13 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-01

Site: Sacramento, CA

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**		
2,4,5-T	ND		33		1	05/12/10 1:26	E_S1	5491041
2,4,5-TP (Silvex)	ND		33		1	05/12/10 1:26	E_S1	5491041
2,4-D	ND		33		1	05/12/10 1:26	E_S1	5491041
2,4-DB	110		99		3	05/19/10 17:03	E_S1	5491289
Dicamba	ND		33		1	05/12/10 1:26	E_S1	5491041
Dichloroprop	ND		33		1	05/12/10 1:26	E_S1	5491041
Dinoseb	ND		33		1	05/12/10 1:26	E_S1	5491041
MCPA	ND		1000		1	05/12/10 1:26	E_S1	5491041
MCPP	ND		1000		1	05/12/10 1:26	E_S1	5491041
Surr: DCAA	D	*	% 12-139		3	05/19/10 17:03	E_S1	5491289
Surr: DCAA	46.2		% 12-139		1	05/12/10 1:26	E_S1	5491041

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/10/2010 17:06	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**		
Mercury	0.036		0.03		1	05/14/10 11:17	R_V	5484269

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/14/2010 9:30	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit		Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**		
Antimony	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Arsenic	1		0.5		1	05/15/10 19:02	AL_H	5485461
Barium	61.8		0.5		1	05/15/10 19:02	AL_H	5485461
Beryllium	ND		0.4		1	05/15/10 18:28	AL_H	5486156
Cadmium	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Chromium	31.9		0.5		1	05/15/10 18:28	AL_H	5486156
Cobalt	5.63		0.5		1	05/15/10 18:28	AL_H	5486156
Copper	21.2		0.5		1	05/15/10 19:02	AL_H	5485461
Lead	5.01		0.5		1	05/15/10 18:28	AL_H	5486156
Molybdenum	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Nickel	29.9		0.5		1	05/15/10 18:28	AL_H	5486156
Selenium	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Silver	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Thallium	ND		0.5		1	05/15/10 19:02	AL_H	5485461
Vanadium	32.4		0.5		1	05/17/10 15:07	AL_H	5487028
Zinc	30.1		1		1	05/15/10 19:02	AL_H	5485461

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-13 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-01

Site: **Sacramento, CA**

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	05/11/2010 9:45	F_S	1.00
SW3050B	05/11/2010 9:45	F_S	1.00

ORGANOCHLORINE PESTICIDES BY METHOD 8081A **MCL** **SW8081A** **Units: ug/kg**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
4,4´-DDD	ND		1.9	1	05/19/10 14:20	E_S1	5489621
4,4´-DDE	ND		1.9	1	05/19/10 14:20	E_S1	5489621
4,4´-DDT	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Aldrin	ND		1.9	1	05/19/10 14:20	E_S1	5489621
alpha-BHC	ND		1.9	1	05/19/10 14:20	E_S1	5489621
alpha-Chlordane	ND		1.9	1	05/19/10 14:20	E_S1	5489621
beta-BHC	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Chlordane	ND		19	1	05/19/10 14:20	E_S1	5489621
delta-BHC	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Dieldrin	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endosulfan I	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endosulfan II	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endosulfan sulfate	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endrin	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endrin aldehyde	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Endrin ketone	ND		1.9	1	05/19/10 14:20	E_S1	5489621
gamma-BHC	ND		1.9	1	05/19/10 14:20	E_S1	5489621
gamma-Chlordane	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Heptachlor	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Heptachlor epoxide	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Methoxychlor	ND		1.9	1	05/19/10 14:20	E_S1	5489621
Toxaphene	ND		37	1	05/19/10 14:20	E_S1	5489621
Surr: Decachlorobiphenyl	86.2	%	35-155	1	05/19/10 14:20	E_S1	5489621
Surr: Tetrachloro-m-xylene	87.6	%	33-121	1	05/19/10 14:20	E_S1	5489621

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/11/2010 12:05	QMT	1.11

Qualifiers:		
	ND/U - Not Detected at the Reporting Limit	>MCL - Result Over Maximum Contamination Limit(MCL)
	B - Analyte Detected In The Associated Method Blank	D - Surrogate Recovery Unreportable due to Dilution
	* - Surrogate Recovery Outside Advisable QC Limits	MI - Matrix Interference
	J - Estimated value between MDL and PQL	
	E - Estimated Value exceeds calibration curve	
	TNTC - Too numerous to count	

Client Sample ID: NCE-14 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-02

Site: **Sacramento, CA**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A				**MCL**	**SW8151A**	**Units: ug/kg**	
2,4,5-T	ND		33	1	05/12/10 1:45	E_S1	5491042
2,4,5-TP (Silvex)	ND		33	1	05/12/10 1:45	E_S1	5491042
2,4-D	ND		33	1	05/12/10 1:45	E_S1	5491042
2,4-DB	ND		33	1	05/12/10 1:45	E_S1	5491042
Dicamba	ND		33	1	05/12/10 1:45	E_S1	5491042
Dichloroprop	ND		33	1	05/12/10 1:45	E_S1	5491042
Dinoseb	ND		33	1	05/12/10 1:45	E_S1	5491042
MCPA	ND		1000	1	05/12/10 1:45	E_S1	5491042
MCPP	ND		1000	1	05/12/10 1:45	E_S1	5491042
Surr: DCAA	8 MI	*	% 12-139	1	05/12/10 1:45	E_S1	5491042

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/10/2010 17:06	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL				**MCL**	**SW7471A**	**Units: mg/kg**	
Mercury	ND		0.03	1	05/14/10 11:19	R_V	5484270

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/14/2010 9:30	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL				**MCL**	**SW6020A**	**Units: mg/kg**	
Antimony	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Arsenic	2.64		0.5	1	05/15/10 19:07	AL_H	5485462
Barium	85.9		0.5	1	05/15/10 19:07	AL_H	5485462
Beryllium	ND		0.4	1	05/15/10 18:34	AL_H	5486157
Cadmium	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Chromium	41		0.5	1	05/15/10 18:34	AL_H	5486157
Cobalt	11.3		0.5	1	05/15/10 18:34	AL_H	5486157
Copper	26.2		0.5	1	05/15/10 19:07	AL_H	5485462
Lead	6.29		0.5	1	05/15/10 18:34	AL_H	5486157
Molybdenum	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Nickel	45.8		0.5	1	05/15/10 18:34	AL_H	5486157
Selenium	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Silver	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Thallium	ND		0.5	1	05/15/10 19:07	AL_H	5485462
Vanadium	38.2		0.5	1	05/17/10 15:13	AL_H	5487029
Zinc	37		1	1	05/15/10 19:07	AL_H	5485462

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	05/11/2010 9:45	F_S	1.00
SW3050B	05/11/2010 9:45	F_S	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count
>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-14 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-02

Site: Sacramento, CA

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A			**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7	1	05/19/10 14:40	E_S1	5489622
4,4´-DDE	ND		1.7	1	05/19/10 14:40	E_S1	5489622
4,4´-DDT	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Aldrin	ND		1.7	1	05/19/10 14:40	E_S1	5489622
alpha-BHC	ND		1.7	1	05/19/10 14:40	E_S1	5489622
alpha-Chlordane	ND		1.7	1	05/19/10 14:40	E_S1	5489622
beta-BHC	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Chlordane	ND		17	1	05/19/10 14:40	E_S1	5489622
delta-BHC	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Dieldrin	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endosulfan I	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endosulfan II	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endosulfan sulfate	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endrin	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endrin aldehyde	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Endrin ketone	ND		1.7	1	05/19/10 14:40	E_S1	5489622
gamma-BHC	ND		1.7	1	05/19/10 14:40	E_S1	5489622
gamma-Chlordane	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Heptachlor	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Heptachlor epoxide	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Methoxychlor	ND		1.7	1	05/19/10 14:40	E_S1	5489622
Toxaphene	ND		33	1	05/19/10 14:40	E_S1	5489622
Surr: Decachlorobiphenyl	82.7		% 35-155	1	05/19/10 14:40	E_S1	5489622
Surr: Tetrachloro-m-xylene	85.2		% 33-121	1	05/19/10 14:40	E_S1	5489622

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/11/2010 12:05	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-15 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-03

Site: **Sacramento, CA**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
CHLORINATED HERBICIDES BY METHOD 8151A			**MCL**	**SW8151A**	**Units: ug/kg**		
2,4,5-T	ND		33	1	05/12/10 2:04	E_S1	5491043
2,4,5-TP (Silvex)	ND		33	1	05/12/10 2:04	E_S1	5491043
2,4-D	ND		33	1	05/12/10 2:04	E_S1	5491043
2,4-DB	52		33	1	05/12/10 2:04	E_S1	5491043
Dicamba	ND		33	1	05/12/10 2:04	E_S1	5491043
Dichloroprop	ND		33	1	05/12/10 2:04	E_S1	5491043
Dinoseb	ND		33	1	05/12/10 2:04	E_S1	5491043
MCPA	ND		1000	1	05/12/10 2:04	E_S1	5491043
MCPP	ND		1000	1	05/12/10 2:04	E_S1	5491043
Surr: DCAA	57.3		% 12-139	1	05/12/10 2:04	E_S1	5491043

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/10/2010 17:06	QMT	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
MERCURY, TOTAL			**MCL**	**SW7471A**	**Units: mg/kg**		
Mercury	ND		0.03	1	05/14/10 11:22	R_V	5484271

Prep Method	Prep Date	Prep Initials	Prep Factor
SW7471A	05/14/2010 9:30	F_S	1.00

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
METALS BY METHOD 6020A, TOTAL			**MCL**	**SW6020A**	**Units: mg/kg**		
Antimony	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Arsenic	3.19		0.5	1	05/15/10 19:12	AL_H	5485463
Barium	110		0.5	1	05/15/10 19:12	AL_H	5485463
Beryllium	ND		0.4	1	05/15/10 18:40	AL_H	5486158
Cadmium	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Chromium	41.3		0.5	1	05/15/10 18:40	AL_H	5486158
Cobalt	10.9		0.5	1	05/15/10 18:40	AL_H	5486158
Copper	24.8		0.5	1	05/15/10 19:12	AL_H	5485463
Lead	6.96		0.5	1	05/15/10 18:40	AL_H	5486158
Molybdenum	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Nickel	38.1		0.5	1	05/15/10 18:40	AL_H	5486158
Selenium	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Silver	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Thallium	ND		0.5	1	05/15/10 19:12	AL_H	5485463
Vanadium	43.7		0.5	1	05/17/10 15:19	AL_H	5487030
Zinc	38.2		1	1	05/15/10 19:12	AL_H	5485463

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3050B	05/11/2010 9:45	F_S	1.00
SW3050B	05/11/2010 9:45	F_S	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Client Sample ID: NCE-15 **Collected:** 05/05/2010 0:00 **SPL Sample ID:** 10050150-03

Site: **Sacramento, CA**

Analyses/Method	Result	QUAL	Rep.Limit	Dil. Factor	Date Analyzed	Analyst	Seq. #
ORGANOCHLORINE PESTICIDES BY METHOD 8081A			**MCL**	**SW8081A**	**Units: ug/kg**		
4,4´-DDD	ND		1.7	1	05/19/10 15:00	E_S1	5489623
4,4´-DDE	ND		1.7	1	05/19/10 15:00	E_S1	5489623
4,4´-DDT	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Aldrin	ND		1.7	1	05/19/10 15:00	E_S1	5489623
alpha-BHC	ND		1.7	1	05/19/10 15:00	E_S1	5489623
alpha-Chlordane	ND		1.7	1	05/19/10 15:00	E_S1	5489623
beta-BHC	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Chlordane	ND		17	1	05/19/10 15:00	E_S1	5489623
delta-BHC	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Dieldrin	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endosulfan I	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endosulfan II	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endosulfan sulfate	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endrin	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endrin aldehyde	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Endrin ketone	ND		1.7	1	05/19/10 15:00	E_S1	5489623
gamma-BHC	ND		1.7	1	05/19/10 15:00	E_S1	5489623
gamma-Chlordane	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Heptachlor	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Heptachlor epoxide	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Methoxychlor	ND		1.7	1	05/19/10 15:00	E_S1	5489623
Toxaphene	ND		33	1	05/19/10 15:00	E_S1	5489623
Surr: Decachlorobiphenyl	82.7		% 35-155	1	05/19/10 15:00	E_S1	5489623
Surr: Tetrachloro-m-xylene	85.7		% 33-121	1	05/19/10 15:00	E_S1	5489623

Prep Method	Prep Date	Prep Initials	Prep Factor
SW3550C	05/11/2010 12:05	QMT	1.00

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
* - Surrogate Recovery Outside Advisable QC Limits
J - Estimated value between MDL and PQL
E - Estimated Value exceeds calibration curve
TNTC - Too numerous to count

>MCL - Result Over Maximum Contamination Limit(MCL)
D - Surrogate Recovery Unreportable due to Dilution
MI - Matrix Interference

Quality Control Documentation

Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Chlorinated Herbicides by Method 8151A**
Method: **SW8151A**

WorkOrder: **10050150**
Lab Batch ID: **99693**

Method Blank

RunID: HP_9_100520A-5491036 Units: ug/kg
Analysis Date: 05/11/2010 20:01 Analyst: E_S1
Preparation Date: 05/10/2010 17:06 Prep By: QMT Method: SW3550C

Analyte	Result	Rep Limit
2,4,5-T	ND	33
2,4,5-TP (Silvex)	ND	33
2,4-D	ND	33
2,4-DB	ND	33
Dicamba	ND	33
Dichloroprop	ND	33
Dinoseb	ND	33
MCPA	ND	1000
MCPP	ND	1000
Surr: DCAA	70.1	12-139

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10050150-01A	NCE-13
10050150-02A	NCE-14
10050150-03A	NCE-15

Laboratory Control Sample (LCS)

RunID: HP_9_100520A-5491035 Units: ug/kg
Analysis Date: 05/11/2010 19:42 Analyst: E_S1
Preparation Date: 05/10/2010 17:06 Prep By: QMT Method: SW3550C

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
2,4,5-T	33.3	29.8	89.6	15	144
2,4,5-TP (Silvex)	33.3	32.0	96.0	20	123
2,4-D	33.3	29.0	87.0	10	152
2,4-DB	33.3	22.0	66.1	22	133
Dicamba	33.3	29.4	88.2	10	143
Dichloroprop	33.3	32.0	96.1	22	157
Dinoseb	33.3	17.0	50.9	10	125
MCPA	3330	3310	99.3	21	139
MCPP	3330	4630	139	12	177
Surr: DCAA	33.3	24.7	74.2	12	139

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: H1005015200
RunID: HP_9_100520A-5502852 Units: ug/kg
Analysis Date: 05/11/2010 19:04 Analyst: E_S1
Preparation Date: 05/10/2010 17:06 Prep By: QMT Method: SW3550C

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Chlorinated Herbicides by Method 8151A**
Method: **SW8151A**
WorkOrder: **10050150**
Lab Batch ID: **99693**

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
2,4,5-T	ND	33.3	0	0 *	33.3	0	0 *	0	44	10	160
2,4,5-TP (Silvex)	ND	33.3	7.26	21.8	33.3	7.21	21.6	0.669	42	10	150
2,4-D	ND	33.3	9.53	-16.0 *	33.3	0	-44.6 *	200 *	51	15	137
2,4-DB	ND	33.3	0	0 *	33.3	0	0 *	0	56	10	208
Dicamba	ND	33.3	34.3	89.1	33.3	4.89	0.671 *	150 *	50	9	150
Dichloroprop	ND	33.3	22.1	16.3 *	33.3	20.3	11.1 *	8.15	33	21	199
Dinoseb	ND	33.3	0	0 *	33.3	0	0 *	0	48	15	134
MCPA	5210	3330	3730	-44.4 *	3330	3570	-49.0 *	4.23	42	33	127
MCPP	ND	3330	63400	1900 *	3330	63000	1890 *	0.703	50	12	177
Surr: DCAA	ND	33.3	2.69	8.09 *	33.3	6.06	18.2	76.8 *	30	12	139

Qualifiers: ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Organochlorine Pesticides by Method 8081A** **WorkOrder:** **10050150**
Method: **SW8081A** **Lab Batch ID:** **99709**

Method Blank

RunID: VARG_100519A-5489626 Units: ug/kg
Analysis Date: 05/19/2010 15:59 Analyst: E_S1
Preparation Date: 05/11/2010 12:05 Prep By: QMT Method: SW3550C

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10050150-01A	NCE-13
10050150-02A	NCE-14
10050150-03A	NCE-15

Analyte	Result	Rep Limit
4,4´-DDD	ND	1.7
4,4´-DDE	ND	1.7
4,4´-DDT	ND	1.7
Aldrin	ND	1.7
alpha-BHC	ND	1.7
alpha-Chlordane	ND	1.7
beta-BHC	ND	1.7
Chlordane	ND	17
delta-BHC	ND	1.7
Dieldrin	ND	1.7
Endosulfan I	ND	1.7
Endosulfan II	ND	1.7
Endosulfan sulfate	ND	1.7
Endrin	ND	1.7
Endrin aldehyde	ND	1.7
Endrin ketone	ND	1.7
gamma-BHC	ND	1.7
gamma-Chlordane	ND	1.7
Heptachlor	ND	1.7
Heptachlor epoxide	ND	1.7
Methoxychlor	ND	1.7
Toxaphene	ND	33
Surr: Decachlorobiphenyl	89.0	35-155
Surr: Tetrachloro-m-xylene	89.7	33-121

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

RunID: VARG_100519A-5489866 Units: ug/kg
Analysis Date: 05/20/2010 12:20 Analyst: E_S1
Preparation Date: 05/11/2010 12:05 Prep By: QMT Method: SW3550C

Analyte	LCS Spike Added	LCS Result	LCS Percent Recovery	LCSD Spike Added	LCSD Result	LCSD Percent Recovery	RPD	RPD Limit	Lower Limit	Upper Limit
4,4´-DDD	33.3	33.8	102	33.3	34.0	102	0.6	23	59	136
4,4´-DDE	33.3	35.3	106	33.3	35.6	107	0.9	33	65	133
4,4´-DDT	33.3	34.0	102	33.3	34.3	103	0.8	35	58	137
Aldrin	33.3	33.5	101	33.3	33.4	100	0.2	28	68	126
alpha-BHC	33.3	32.8	98.4	33.3	32.8	98.6	0.1	31	67	136
alpha-Chlordane	33.3	31.8	95.6	33.3	32.2	96.6	1.1	62	69	132

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis:	**Organochlorine Pesticides by Method 8081A**	**WorkOrder:**	**10050150**
Method:	**SW8081A**	**Lab Batch ID:**	**99709**

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

RunID:	VARG_100519A-5489866	Units:	ug/kg
Analysis Date:	05/20/2010 12:20	Analyst:	E_S1
Preparation Date:	05/11/2010 12:05	Prep By:	QMT Method: SW3550C

Analyte	LCS Spike Added	LCS Result	LCS Percent Recovery	LCSD Spike Added	LCSD Result	LCSD Percent Recovery	RPD	RPD Limit	Lower Limit	Upper Limit
beta-BHC	33.3	33.3	100	33.3	33.4	100	0.4	30	61	146
delta-BHC	33.3	30.6	91.8	33.3	30.6	91.8	0.1	46	15	138
Dieldrin	33.3	33.7	101	33.3	33.9	102	0.7	65	60	140
Endosulfan I	33.3	31.9	95.8	33.3	32.0	96.1	0.3	51	65	131
Endosulfan II	33.3	38.8	116	33.3	40.1	120	3.4	34	67	143
Endosulfan sulfate	33.3	32.5	97.6	33.3	32.7	98.1	0.6	59	62	135
Endrin	33.3	30.9	92.9	33.3	30.9	92.8	0.1	20	60	154
Endrin aldehyde	33.3	31.1	93.3	33.3	31.1	93.4	0.1	22	49	142
Endrin ketone	33.3	33.5	101	33.3	33.2	99.8	0.8	22	42	139
gamma-BHC	33.3	32.7	98.3	33.3	32.7	98.1	0.1	28	58	137
gamma-Chlordane	33.3	31.3	93.9	33.3	31.6	95.0	1.1	35	72	129
Heptachlor	33.3	31.0	93.2	33.3	30.9	92.9	0.3	33	68	147
Heptachlor epoxide	33.3	33.1	99.4	33.3	33.1	99.4	0.0	25	67	136
Methoxychlor	33.3	33.4	100	33.3	32.9	98.9	1.3	30	57	138
Surr: Decachlorobiphenyl	33.3	31.0	93.2	33.3	31.3	93.9	0.8	30	35	155
Surr: Tetrachloro-m-xylene	33.3	30.4	91.3	33.3	30.2	90.8	0.6	30	33	121

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Quality Control Report

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis:	**Metals by Method 6020A, Total**	**WorkOrder:**	**10050150**
Method:	**SW6020A**	**Lab Batch ID:**	**99705A-I**

Method Blank

RunID: ICPMS2_100515A-5486146 Units: mg/kg
Analysis Date: 05/15/2010 17:28 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10050150-01A	NCE-13
10050150-02A	NCE-14
10050150-03A	NCE-15

Analyte	Result	Rep Limit
Beryllium	ND	0.4
Chromium	ND	0.5
Cobalt	ND	0.5
Lead	ND	0.5
Nickel	ND	0.5

Laboratory Control Sample (LCS)

RunID: ICPMS2_100515A-5486147 Units: mg/kg
Analysis Date: 05/15/2010 17:34 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Beryllium	51.00	46.37	90.92	83	117
Chromium	142.0	123.7	87.11	81	120
Cobalt	110.0	105.0	95.45	82	118
Lead	72.20	65.65	90.93	82	118
Nickel	155.0	146.6	94.58	82	117

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10050227-03
RunID: ICPMS2_100515A-5486149 Units: mg/kg-dry
Analysis Date: 05/15/2010 17:46 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Beryllium	ND	11.14	9.935	86.37	11.14	9.756	84.76	1.821	20	75	125
Chromium	5.163	11.14	16.50	101.8	11.14	15.85	95.94	4.062	20	75	125
Cobalt	3.596	11.14	13.72	90.91	11.14	12.98	84.31	5.505	20	75	125
Lead	5.958	11.14	16.17	91.70	11.14	15.30	83.90	5.520	20	75	125

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Metals by Method 6020A, Total** **WorkOrder:** **10050150**
Method: **SW6020A** **Lab Batch ID:** **99705A-I**

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10050227-03
RunID: ICPMS2_100515A-5486149 Units: mg/kg-dry
Analysis Date: 05/15/2010 17:46 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Nickel	5.521	11.14	16.57	99.22	11.14	15.56	90.12	6.308	20	75	125

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Quality Control Report

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Metals by Method 6020A, Total**
Method: **SW6020A**

WorkOrder: **10050150**
Lab Batch ID: **99705-I**

Method Blank

RunID: ICPMS2_100517A-5487020 Units: mg/kg
Analysis Date: 05/17/2010 14:19 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10050150-01A	NCE-13
10050150-02A	NCE-14
10050150-03A	NCE-15

Analyte	Result	Rep Limit
Vanadium	ND	0.5

Laboratory Control Sample (LCS)

RunID: ICPMS2_100517A-5487021 Units: mg/kg
Analysis Date: 05/17/2010 14:25 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Vanadium	186.0	173.0	93.01	77	123

Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

Sample Spiked: 10050227-03
RunID: ICPMS2_100517A-5487023 Units: mg/kg-dry
Analysis Date: 05/17/2010 14:37 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Sample Result	MS Spike Added	MS Result	MS % Recovery	MSD Spike Added	MSD Result	MSD % Recovery	RPD	RPD Limit	Low Limit	High Limit
Antimony	ND	11.14	6.972	60.99 *	11.14	6.802	59.46 *	2.474	20	75	125
Arsenic	2.220	11.14	12.94	96.26	11.14	12.66	93.76	2.175	20	75	125
Barium	125.3	11.14	189.2	N/C	11.14	345.1	N/C	N/C	20	75	125
Cadmium	ND	11.14	11.83	104.8	11.14	11.51	102.0	2.672	20	75	125
Copper	4.049	11.14	15.38	101.7	11.14	15.07	98.94	2.048	20	75	125
Molybdenum	ND	11.14	8.318	69.80 *	11.14	8.124	68.05 *	2.370	20	75	125
Selenium	0.6196	11.14	12.00	102.2	11.14	11.65	99.04	3.013	20	75	125
Silver	ND	11.14	11.61	104.3	11.14	11.54	103.6	0.6734	20	75	125
Thallium	ND	11.14	10.66	92.90	11.14	10.14	88.20	5.033	20	75	125
Vanadium	11.36	11.14	23.82	111.9	11.14	22.55	100.5	5.476	20	75	125
Zinc	16.35	11.14	31.26	133.9 *	11.14	29.39	117.1	6.170	20	75	125

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Analysis:	**Metals by Method 6020A, Total**	**WorkOrder:**	**10050150**
Method:	**SW6020A**	**Lab Batch ID:**	**99705-I**

Qualifiers:

ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count

MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

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Nichols Consulting Engineers, Chtd.

Aspen 1

Analysis: **Metals by Method 6020A, Total** **WorkOrder:** **10050150**
Method: **SW6020A** **Lab Batch ID:** **99705-I**

Method Blank

RunID: ICPMS_100515A-5485451 Units: mg/kg
Analysis Date: 05/15/2010 18:11 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Samples in Analytical Batch:

Lab Sample ID	Client Sample ID
10050150-01A	NCE-13
10050150-02A	NCE-14
10050150-03A	NCE-15

Analyte	Result	Rep Limit
Antimony	ND	0.5
Arsenic	ND	0.5
Barium	ND	0.5
Cadmium	ND	0.5
Copper	ND	0.5
Molybdenum	ND	0.5
Selenium	ND	0.5
Silver	ND	0.5
Thallium	ND	0.5
Zinc	ND	1

Laboratory Control Sample (LCS)

RunID: ICPMS_100515A-5485452 Units: mg/kg
Analysis Date: 05/15/2010 18:16 Analyst: AL_H
Preparation Date: 05/11/2010 9:45 Prep By: F_S Method: SW3050B

Analyte	Spike Added	Result	Percent Recovery	Lower Limit	Upper Limit
Antimony	127.0	111.6	87.87	30	210
Arsenic	280.0	279.5	99.82	81	119
Barium	520.0	505.5	97.21	83	117
Cadmium	182.0	185.3	101.8	82	118
Copper	132.0	131.0	99.24	83	117
Molybdenum	80.90	80.82	99.90	80	120
Selenium	165.0	177.3	107.5	77	133
Silver	126.0	132.9	105.5	66	134
Thallium	184.0	198.3	107.8	77	122
Zinc	346.0	333.9	96.50	79	121

Post Digestion Spike (PDS) / Post Digestion Spike Duplicate (PDSD)

Sample Spiked: 10050227-03
RunID: ICPMS_100515A-5485457 Units: mg/kg-dry
Analysis Date: 05/15/2010 18:41 Analyst: AL_H

Qualifiers:
ND/U - Not Detected at the Reporting Limit
B - Analyte Detected In The Associated Method Blank
J - Estimated Value Between MDL And PQL
E - Estimated Value exceeds calibration curve
N/C - Not Calculated - Sample concentration is greater than 4 times the amount of spike added. Control limits do not apply.
TNTC - Too numerous to count
MI - Matrix Interference
D - Recovery Unreportable due to Dilution
* - Recovery Outside Advisable QC Limits

QC results presented on the QC Summary Report have been rounded. RPD and percent recovery values calculated by the SPL LIMS system are derived from QC data prior to the application of rounding rules.

Sample Receipt Checklist
And
Chain of Custody

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TX 77054
(713) 660-0901

Sample Receipt Checklist

Workorder:	**10050150**	Received By:	**AMV**
Date and Time Received:	**5/6/2010 9:15:00 AM**	Carrier name:	**Fedex-Priority**
Temperature:	**4.0°C**	Chilled by:	**Water Ice**

1.	**Shipping container/cooler in good condition?**	Yes ☑	No ☐	Not Present ☐
2.	**Custody seals intact on shippping container/cooler?**	Yes ☐	No ☐	Not Present ☑
3.	**Custody seals intact on sample bottles?**	Yes ☐	No ☐	Not Present ☑
4.	**Chain of custody present?**	Yes ☑	No ☐	
5.	**Chain of custody signed when relinquished and received?**	Yes ☑	No ☐	
6.	**Chain of custody agrees with sample labels?**	Yes ☑	No ☐	
7.	**Samples in proper container/bottle?**	Yes ☑	No ☐	
8.	**Sample containers intact?**	Yes ☑	No ☐	
9.	**Sufficient sample volume for indicated test?**	Yes ☑	No ☐	
10.	**All samples received within holding time?**	Yes ☑	No ☐	
11.	**Container/Temp Blank temperature in compliance?**	Yes ☑	No ☐	
12.	**Water - VOA vials have zero headspace?**	Yes ☐	No ☐	VOA Vials Not Present ☑
13.	**Water - Preservation checked upon receipt (except VOA*)?**	Yes ☐	No ☐	Not Applicable ☑

***VOA Preservation Checked After Sample Analysis**

SPL Representative: ☐ **Contact Date & Time:** ☐

Client Name Contacted: ☐

Non Conformance Issues: ☐

Client Instructions: ☐

Nichols Consulting Engineers, Chtd.

NCE Chain of Custody/Laboratory Analysis Request Form L0050150 Page of

Bill to: Attn:
Nichols Consulting Engineers
8795 Folsom Blvd, #103
Sacramento CA, 95826

Lab Name: SPL
Address:
Phone:

NCE Project Number:

NCE Project/Site: Aspen 1
Contractor/Project Manager: M. Lacroix
Firm: NCE
Address: 8795 Folsom Blvd Sacramento
Phone & Fax: (916) 388-5655
Sampler's Signature:

Requested Analysis

SAMPLE ID	DATE	TIME	LAB ID	MATRIX		No. of Containers & Preservative: Unpreserved	H$_2$SO$_4$	HNO$_3$	HCL			EPA8260B	CAM 17 metals	Volatile halocarbons	organochlorine pes	and pesticides	Organophosphate pesticides			REMARKS:
NCE13	5/5			Soil		1	1		X	-			X	X	X		X			
NCE-14	"			"		1							X	X	X		X			
NCE-15	"			"		1	1		X	X	+		X	X	X		X			

Relinquish by/date/time: / / hrs
Received by/date: / / hrs
Relinquish by/date: / / hrs
Received by/date: / / hrs
Relinquish by/date: F. 5/5 1700 hrs
Received by/date: Amanda Heckman hrs 5/6/10 9:15

EDF Report? ____Yes ____No
EDF Deliverable to (Email Address)

NOTES TO LAB:

REPORT REQUIREMENTS: (circle) I. Routine Report II. Report III. Data Validation Report IV. CLP Deliverable Report

Requested Report Date:

TURNAROUND TIME: ____24 hr. ____48 hr. ____5 day [✓ Standard] [✓ Provide Verbal Prelim Results] ____Fax Prelim Results

Subcontract Analysis

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

Job Number: 680-57749-1

Job Description: 10050150

For:
Southern Petroleum Laboratories
8880 Interchange Drive
Houston, TX 77054

Attention: Erica Cardenas

Approved for release.
Sheila Hoffman
Project Manager I
5/27/2010 10:00 AM

Sheila Hoffman
Project Manager I
sheila.hoffman@testamericainc.com
05/27/2010

The test results in this report meet NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted. Results pertain only to samples listed in this report. This report may not be reproduced, except in full, without the written approval of the laboratory. Questions should be directed to the person who signed this report.

Savannah Certifications and ID #s: A2LA: 0399.01; AL: 41450; ARDEQ: 88-0692; ARDOH; CA: 03217CA; CO; CT: PH0161; DE; FL: E87052; GA: 803; Guam; HI; IL: 200022; IN; IA: 353; KS: E-10322; KY EPPC: 90084; KY UST; LA DEQ: 30690; LA DHH: LA080008; ME: 2008022; MD: 250; MA: M-GA006; MI: 9925; MS; NFESC: 249; NV: GA00006; NJ: GA769; NM; NY: 10842; NC DWQ: 269; NC DHHS: 13701; PA: 68-00474; PR: GA00006; RI: LAO00244; SC: 98001001; TN: TN0296; TX: T104704185; USEPA: GA00006; VT: VT-87052; VA: 00302; WA; WV DEP: 094; WV DHHR: 9950 C; WI DNR: 999819810; WY/EPAR8: 8TMS-Q

TestAmerica Laboratories, Inc.
TestAmerica Savannah 5102 LaRoche Avenue, Savannah, GA 31404
Tel (912) 354-7858 Fax (912) 352-0165 www.testamericainc.com

ACCREDITED IN ACCORDANCE WITH

Job Narrative
680-57749-1

Comments
No additional comments.

Receipt
All samples were received in good condition within temperature requirements.

GC Semi VOA
Method(s) 8141A: The laboratory control sample (LCS) for batch 680-169080 recovered outside acceptance limits for dimethoate and monochrotophos. There was insufficient sample to perform a re-extraction or re-analysis; therefore,the data have been reported.

No other analytical or quality issues were noted.

General Chemistry
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

METHOD / ANALYST SUMMARY

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

Method	Analyst	Analyst ID
SW846 8141A	Kellar, Joshua	JK
EA Moisture	Morgan, Harriet	HM

SAMPLE SUMMARY

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
680-57749-1	10050250-01B NCE-13	Solid	05/05/2010 0000	05/19/2010 0923
680-57749-2	10050250-02B NCE-14	Solid	05/05/2010 0000	05/19/2010 0923
680-57749-3	10050250-03B NCE-15	Solid	05/05/2010 0000	05/19/2010 0923

Analytical Data

Client: Southern Petroleum Laboratories　　Job Number: 680-57749-1

Client Sample ID: **10050250-01B NCE-13**

Lab Sample ID:	680-57749-1			Date Sampled: 05/05/2010 0000
Client Matrix:	Solid	% Moisture:	45.8	Date Received: 05/19/2010 0923

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-169462	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-169080	Initial Weight/Volume:	15.19 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/21/2010 1609		Injection Volume:	2 uL
Date Prepared:	05/19/2010 2200		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<60		60
Bolstar		<60		60
Chlorpyrifos		<60		60
Coumaphos		<60		60
Demeton-O		<150		150
Demeton-S		<150		150
Diazinon		<60		60
Dichlorvos		<120		120
Dimethoate		<120	*	120
Disulfoton		<120		120
EPN		<60		60
Famphur		<120		120
Fensulfothion		<310		310
Fenthion		<60		60
Malathion		<60		60
Merphos		<91		91
Methyl parathion		<31		31
Mevinphos		<120		120
Ethoprop		<31		31
Monochrotophos		<600	*	600
Naled		<310		310
Ethyl Parathion		<60		60
Phorate		<60		60
Ronnel		<60		60
Stirophos		<60		60
Sulfotepp		<31		31
Thionazin		<60		60
Tokuthion		<60		60
Trichloronate		<60		60

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	98		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories Job Number: 680-57749-1

Client Sample ID: **10050250-02B NCE-14**

Lab Sample ID:	680-57749-2			Date Sampled:	05/05/2010 0000
Client Matrix:	Solid	% Moisture:	34.9	Date Received:	05/19/2010 0923

8141A Organophosphorous Pesticides (GC)

Method:	8141A	Analysis Batch: 680-169462	Instrument ID:	SGO
Preparation:	3550B	Prep Batch: 680-169080	Initial Weight/Volume:	15.20 g
Dilution:	1.0		Final Weight/Volume:	5 mL
Date Analyzed:	05/21/2010 1634		Injection Volume:	2 uL
Date Prepared:	05/19/2010 2200		Result Type:	PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<50		50
Bolstar		<50		50
Chlorpyrifos		<50		50
Coumaphos		<50		50
Demeton-O		<130		130
Demeton-S		<130		130
Diazinon		<50		50
Dichlorvos		<100		100
Dimethoate		<100	*	100
Disulfoton		<100		100
EPN		<50		50
Famphur		<100		100
Fensulfothion		<260		260
Fenthion		<50		50
Malathion		<50		50
Merphos		<76		76
Methyl parathion		<26		26
Mevinphos		<100		100
Ethoprop		<26		26
Monochrotophos		<500	*	500
Naled		<260		260
Ethyl Parathion		<50		50
Phorate		<50		50
Ronnel		<50		50
Stirophos		<50		50
Sulfotepp		<26		26
Thionazin		<50		50
Tokuthion		<50		50
Trichloronate		<50		50

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	89		42 - 128

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

Client Sample ID: **10050250-03B NCE-15**

Lab Sample ID: 680-57749-3

Client Matrix: Solid

% Moisture: 29.9

Date Sampled: 05/05/2010 0000

Date Received: 05/19/2010 0923

8141A Organophosphorous Pesticides (GC)

Method: 8141A

Preparation: 3550B

Dilution: 1.0

Date Analyzed: 05/21/2010 1659

Date Prepared: 05/19/2010 2200

Analysis Batch: 680-169462

Prep Batch: 680-169080

Instrument ID: SGO

Initial Weight/Volume: 15.42 g

Final Weight/Volume: 5 mL

Injection Volume: 2 uL

Result Type: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	RL
Azinphos-methyl		<46		46
Bolstar		<46		46
Chlorpyrifos		<46		46
Coumaphos		<46		46
Demeton-O		<120		120
Demeton-S		<120		120
Diazinon		<46		46
Dichlorvos		<93		93
Dimethoate		<93	*	93
Disulfoton		<93		93
EPN		<46		46
Famphur		<93		93
Fensulfothion		<240		240
Fenthion		<46		46
Malathion		<46		46
Merphos		<69		69
Methyl parathion		<24		24
Mevinphos		<93		93
Ethoprop		<24		24
Monochrotophos		<460	*	460
Naled		<240		240
Ethyl Parathion		<46		46
Phorate		<46		46
Ronnel		<46		46
Stirophos		<46		46
Sulfotepp		<24		24
Thionazin		<46		46
Tokuthion		<46		46
Trichloronate		<46		46

Surrogate	%Rec	Qualifier	Acceptance Limits
Triphenylphosphate	100		42 - 128

General Chemistry

Client Sample ID: **10050250-01B NCE-13**

Lab Sample ID: 680-57749-1

Client Matrix: Solid

Date Sampled: 05/05/2010 0000

Date Received: 05/19/2010 0923

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	46		%	0.010	1.0	Moisture

Analysis Batch: 680-169596 Date Analyzed: 05/25/2010 0905 DryWt Corrected: N

Analytical Data

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

General Chemistry

Client Sample ID: **10050250-02B NCE-14**

Lab Sample ID: 680-57749-2

Client Matrix: Solid

Date Sampled: 05/05/2010 0000

Date Received: 05/19/2010 0923

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	35		%	0.010	1.0	Moisture

Analysis Batch: 680-169596 Date Analyzed: 05/25/2010 0905 DryWt Corrected: N

General Chemistry

Client Sample ID: **10050250-03B NCE-15**

Lab Sample ID: 680-57749-3 Date Sampled: 05/05/2010 0000
Client Matrix: Solid Date Received: 05/19/2010 0923

Analyte	Result	Qual	Units	RL	Dil	Method
Percent Moisture	30		%	0.010	1.0	Moisture

Analysis Batch: 680-169596 Date Analyzed: 05/25/2010 0905 DryWt Corrected: N

DATA REPORTING QUALIFIERS

Client: Southern Petroleum Laboratories | Job Number: 680-57749-1

Lab Section	Qualifier	Description
GC Semi VOA		
	*	LCS or LCSD exceeds the control limits
	*	RPD ofthe LCS and LCSD exceeds the control limits

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

Method Blank - Batch: 680-169080

Method: 8141A
Preparation: 3550B

Lab Sample ID: MB 680-169080/4-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 05/21/2010 1455
Date Prepared: 05/19/2010 2200

Analysis Batch: 680-169462
Prep Batch: 680-169080
Units: ug/Kg

Instrument ID: SGO
Lab File ID: oe21004.d
Initial Weight/Volume: 15.12 g
Final Weight/Volume: 5 mL
Injection Volume: 2 uL
Column ID: PRIMARY

Analyte	Result	Qual	RL
Azinphos-methyl	<33		33
Bolstar	<33		33
Chlorpyrifos	<33		33
Coumaphos	<33		33
Demeton-O	<82		82
Demeton-S	<82		82
Diazinon	<33		33
Dichlorvos	<66		66
Dimethoate	<66		66
Disulfoton	<66		66
EPN	<33		33
Famphur	<66		66
Fensulfothion	<170		170
Fenthion	<33		33
Malathion	<33		33
Merphos	<50		50
Methyl parathion	<17		17
Mevinphos	<66		66
Ethoprop	<17		17
Monochrotophos	<330		330
Naled	<170		170
Ethyl Parathion	<33		33
Phorate	<33		33
Ronnel	<33		33
Stirophos	<33		33
Sulfotepp	<17		17
Thionazin	<33		33
Tokuthion	<33		33
Trichloronate	<33		33

Surrogate	%Rec	Acceptance Limits
Triphenylphosphate	87	42 - 128

Quality Control Results

Client: Southern Petroleum Laboratories

Job Number: 680-57749-1

Lab Control Sample/
Lab Control Sample Dplicate Recovery Report - Batch: 680-169080

Method: 8141A
Preparation: 3550B

LCS Lab Sample ID: LCS 680-169080/5-A	Analysis Batch: 680-169462	Instrument ID:	SGO
Client Matrix: Solid	Prep Batch: 680-169080	Lab File ID:	oe21005.d
Dilution: 1.0	Units: ug/Kg	Initial Weight/Volume:	15.20 g
Date Analyzed: 05/21/2010 1520		Final Weight/Volume:	5 mL
Date Prepared: 05/19/2010 2200		Injection Volume:	2 uL
		Column ID:	PRIMARY

LCSD Lab Sample ID: LCSD 680-169080/6-A	Analysis Batch: 680-169462	Instrument ID:	SGO
Client Matrix: Solid	Prep Batch: 680-169080	Lab File ID:	oe21006.d
Dilution: 1.0	Units: ug/Kg	Initial Weight/Volume:	15.13 g
Date Analyzed: 05/21/2010 1544		Final Weight/Volume:	5 mL
Date Prepared: 05/19/2010 2200		Injection Volume:	2 uL
		Column ID:	PRIMARY

	%Rec.						
Analyte	LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Ethyl Parathion	101	104	35 - 134	3	50		
Thionazin	81	92	31 - 118	13	50		

Surrogate	LCS %Rec	LCSD %Rec	Acceptance Limits
Triphenylphosphate	93	100	42 - 128

SPL, Inc.
8880 Interchange Drive

Houston, TX 77054-2512
(713) 660-0901

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Subcontractor: **Sheila Hoffman**
STL / Test America
5102 La Roche Avenue

Savanna, Georgia 31404

TEL: (912) 354-7858
FAX:

Acct #:

18-May-10

Sample ID	Client Sample	Matrix	Collection Date	Due Date	Requested Tests						
					MISC						
10050150-01B	NCE-13	Soil	05/05/10 0:00	05/18/10	1						
10050150-02B	NCE-14	Soil	05/05/10 0:00	05/18/10	1						
10050150-03B	NCE-15	Soil	05/05/10 0:00	05/18/10	1						

680-57749
2.6°c

Comments: Please analyze for Organophosphorous Compounds by Method 8141A. Send results to Erica at ecardenas@spl-inc.com

Relinquished by: Date/Time 5/18/10 1700 Received by: Date/Time 5/19/10 0923
Relinquished by: Received by:

APPENDIX E

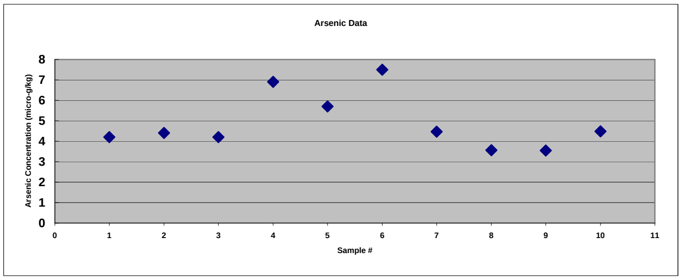
STATISTICAL EVALUATION OF BACKGROUND ARSENIC CONCENTRATIONS

Arsenic Cumulative Probability Plot-Matsuda Property

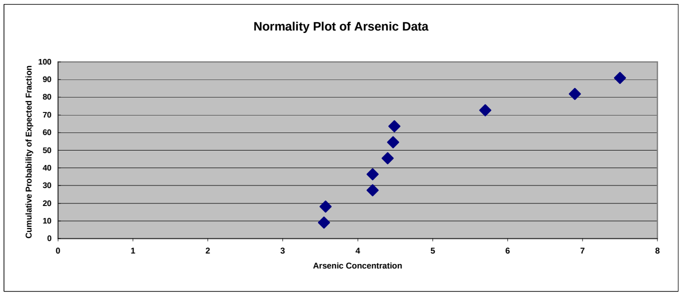
Notes:

bgs = Below ground surface
mg/kg = Milligrams per kilogram
CHHSLs = California Human Health Screening Levels
-- = Not applicable

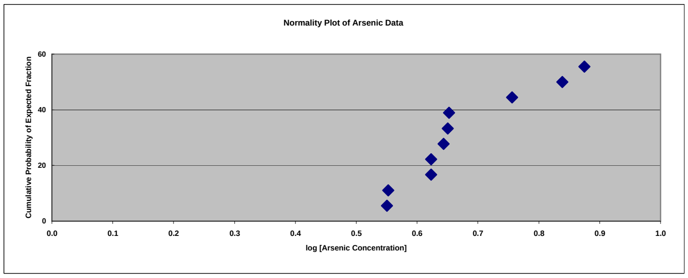
Samle ID.	Date Sampled	Depth (feet, bgs)	**Arsenic (mg/kg)**	
B-1-Surface	6/23/03	--	4.2	1
B-2-Surface	6/23/03	--	4.4	2
B-3-Surface	6/23/03	--	4.2	3
B-4-Surface	6/23/03	--	6.9	4
B-5-Surface	6/23/03	--	5.7	5
B-6-Surface	6/23/03	--	7.5	6
NCE-1-0.5	4/23/2010	0.5	**4.47**	7
NCE-2-0.5	4/23/2010	0.5	**3.57**	8
NCE-3-0.5	4/23/2010	0.5	**3.55**	9
NCE-4-0.5	4/23/2010	0.5	**4.49**	10
		min	**3.6**	
		max	**4.5**	
		mean	**4.0**	
		std dev	**0.5**	
CHHSLs				
Residential (mg/kg)			0.07	
Industrial (mg/kg)			0.24	
--				
PRGs				
Residential (mg/kg)			0.39	
Industrial (mg/kg)			1.6	



arsenic (mg/kg)	order	Probability 100*(i/(n+1))
3.55	1	9
3.57	2	18
4.2	3	27
4.2	4	36
4.4	5	45
4.47	6	55
4.49	7	64
5.7	8	73
6.9	9	82
7.5	10	91



log of concentration		
0.5502	1	6
0.5527	2	11
0.6232	3	17
0.6232	4	22
0.6435	5	28
0.6503	6	33
0.6522	7	39
0.7559	8	44
0.8388	9	50
0.8751	10	56



Descriptive Statistics-Matsuda Property

Data with Outliers

Stats	Values
Sample Size (n)	10.0
Minimum	3.6
Maximum	7.5
Mean	4.9
Median	4.2
Standard Deviation	1.4
Standard Error of the Mean	0.4
Lower Quartile (Q1)	4.2
Upper Quartile (Q3)	5.4
Fourth Spread (fs)	1.2
Lower Outlier	2.4
Upper Outlier	7.2
Number of Outliers	0.0

Data without Outliers

Stats	Values
Sample Size (n)	10
Minimum	3.6
Maximum	7.5
Mean	4.1
Median	4.4
Standard Deviation	1.4
Standard Error of the Mean	0.4
Lower Quartile (Q1)	4.2
Upper Quartile (Q3)	5.4
Upper Limit (UL1-a)	7.4
Rank of the Upper Limit	11.4
Theoretical Upper Limit	4.5
98th Percentile (cleanup goal)	7.4

	LOG10	DATA	Is an outlier? (1 = yes)	No Outliers
9	0.550	**3.55**	0	3.6
10	0.553	**3.57**	0	3.6
11	0.623	**4.2**	0	4.2
12	0.623	**4.2**	0	4.2
13	0.643	**4.4**	0	4.4
14	0.650	**4.47**	0	4.5
15	0.652	**4.49**	0	4.5
16	0.756	**5.7**	0	5.7
17	0.839	**6.9**	0	6.9
18	0.875	**7.5**	0	7.5

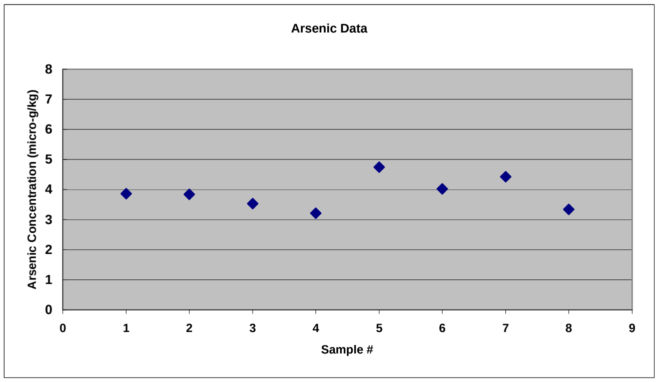
Arsenic Cumulative Probability Chart-Urban Farm Area

Notes:

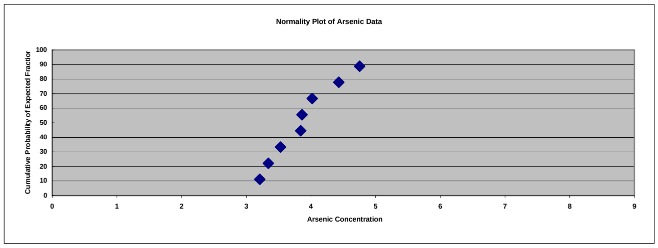
bgs = Below ground surface
mg/kg = Milligrams per kilogram
CHHSLs = California Human Health Screening Levels

Samle ID.	Date Sampled	Depth (feet, bgs)	**Arsenic (mg/kg)**	
NCE-5-0.5	4/23/2010	0.5	**3.86**	1
NCE-6-0.5	4/23/2010	0.5	**3.84**	2
NCE-7-0.5	4/23/2010	0.5	**3.53**	3
NCE-8-0.5	4/23/2010	0.5	**3.21**	4
NCE-9-0.5	4/23/2010	0.5	**4.75**	5
NCE-10-0.5	4/23/2010	0.5	**4.02**	6
NCE-11-0.5	4/23/2010	0.5	**4.43**	7
NCE-12-0.5	4/23/2010	0.5	**3.34**	8
		min	**3.21**	
		max	**4.75**	
		mean	**3.87**	
		std dev	**0.53**	
CHHSLs				
Residential (mg/kg)			0.07	
Industrial (mg/kg)			0.24	

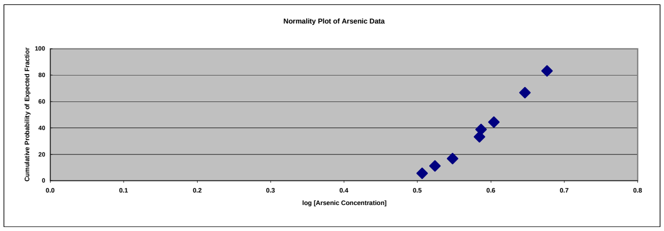
PRGs				
Residential (mg/kg)			0.39	
Industrial (mg/kg)			1.6	



arsenic (mg/kg)	order	Probability 100*(i/(n+1))
3.21	1	11
3.34	2	22
3.53	3	33
3.84	4	44
3.86	5	56
4.02	6	67
4.43	7	78
4.75	8	89



log of concentration		
0.5065	1	6
0.5237	2	11
0.5478	3	17
0.5843	6	33
0.5866	7	39
0.6042	8	44
0.6464	12	67
0.6767	15	83



Descriptive Statistics-Urban Farm Area

Data with Outliers

Stats	Values
Sample Size (n)	8
Minimum	3.21
Maximum	4.75
Mean	3.87
Median	3.53
Standard Deviation	0.53
Standard Error of the Mean	0.19
Lower Quartile (Q1)	3.48
Upper Quartile (Q3)	4.12
Fourth Spread (fs)	0.64
Lower Outlier	2.52
Upper Outlier	5.08
Number of Outliers	0

Data without Outliers

Stats	Values
Sample Size (n)	8
Minimum	3.21
Maximum	4.75
Mean	3.56
Median	3.85
Standard Deviation	0.53
Standard Error of the Mean	0.19
Lower Quartile (Q1)	3.48
Upper Quartile (Q3)	4.12
Upper Limit (UL1-a)	4.82
Rank of the Upper Limit	9.37
Theoretical Upper Limit	3.85
98th Percentile (cleanup goal)	4.71

	LOG10	DATA	Is an outlier? (1 = yes)	No Outliers
1	0.507	**3.21**	0	3.21
2	0.524	**3.34**	0	3.34
3	0.548	**3.53**	0	3.53
4	0.584	**3.84**	0	3.84
5	0.587	**3.86**	0	3.86
6	0.604	**4.02**	0	4.02
7	0.646	**4.43**	0	4.43
8	0.677	**4.75**	0	4.75

APPENDIX F

EARTHTEC'S DOCUMENT ENTITLED
2009 ANNUAL GROUNDWATER MONITORING REPORT, FLORIN-PERKINS LANDFILL, FLORIN-PERKINS ROAD, SACRAMENTO, CALIFORNIA

EARTHTEC, Inc.
GEOTECHNICAL ENGINEERS • SPECIAL INSPECTORS
GEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

January 12, 2010

Mrs. Nancy Cleavinger
5970 First Avenue
Sacramento, California 95817-1802

**RE: 2009 ANNUAL GROUNDWATER MONITORING REPORT
FLORIN-PERKINS LANDFILL
FLORIN-PERKINS ROAD
SACRAMENTO, CALIFORNIA**

PROJECT NO. 303112

Dear Mrs. Cleavinger:

Earthtec, Inc., is pleased to present the results of the Annual groundwater and soil vapor monitoring event for the 2009 sampling year at the Florin-Perkins Landfill, located in the City of Sacramento, Sacramento County, California. Detection monitoring of groundwater is conducted at the subject site in compliance with the Central Valley Regional Water Quality Control Boards Waste Discharge Requirements as outlined in Revised Order No. 95-196. Annual and semi-annual monitoring is conducted at the site to document seasonal fluctuations in groundwater flow direction and gradient and trends in constituent concentrations in groundwater at the site.

The subject property is located in the eastern portion of the City of Sacramento adjacent to the southeast corner of the intersection of Florin-Perkins and Jackson Roads as shown on the Vicinity Map, Figure 1, Appendix A. On November 16 & 17, 2009, the depth to the groundwater surface was measured in all six groundwater monitoring wells (MW-A through MW-F) on the subject site and in the three monitoring wells (MW-1 through MW-3) at the adjacent Jackson Road landfill site. Following depth to water measurements each monitoring well was then purged of standing water and sampled. The locations of the existing groundwater monitoring wells and the site facilities for the Florin-Perkins Landfill are outlined on Site Map, Figure 2, Appendix A. The extended area map encompassing the subject site and adjacent Jackson Road Landfill site with the location of all monitoring wells is outlined in Area Map, Figure 3, Appendix A.

The summary of groundwater measurements and elevations are outlined in Table I with historic groundwater monitoring parameters summarized in Table II. Historic analytical laboratory results for volatile organic compounds and inorganic compounds are summarized in Table III and Table IV respectively (all tables are in Appendix B). The monitoring well pump data sheets from this sampling event are attached in Appendix C. The analytical laboratory test results are attached in Appendix D. Standard observations for the subject site are attached in Appendix E and an up-dated statistical analysis of the groundwater quality trends is attached in Appendix F.

Site Background

The subject property is located at latitude 38° 32' 18" and longitude 121° 23' 5.4", Township 8 north, Range 5 east, Section 24 of the Sacramento East USGS 7.5 minute quadrangle. The subject site is a trapezoidal shaped parcel of property encompassing approximately 160 acres. The property is generally flat lying at an elevation of approximately 45 feet above mean sea level.

Florin-Perkins Landfill, Inc., operated the facility from February 25, 1994 to February 9, 2005. Florin-Perkins Landfill Inc. did not accepted waste for disposal after January 10, 2005. While in operation the landfill accepted only non-hazardous solid waste and inert waste as outlined in California Code of Regulations, Title 27, Sections 20220 and 20230. Operations by Florin-Perkins Landfill, Inc. were suspended as a result of a stipulated judgment for the surrender of the premises pursuant to the owner's unlawful detainer actions. While no waste is being accepted at this time, the landfill owners executed a contract on October 24, 2006 with Zanker Road Resources Management, Ltd., to operate the landfill in the future.

Information regarding the groundwater monitoring well locations, top of casing elevations for each well, and tabulated analytical data from sampling events prior to 2002 were outlined in a report titled "Second Semi-Annual Groundwater Monitoring Report Year 2002" (dated January 22, 2003) by Alisto Engineering Group.

Groundwater Flow Direction and Hydraulic Gradient

On November 16 & 17, 2009, the depth to the groundwater surface was measured in all six groundwater monitoring wells (MW-A through MW-F) on the subject site and in the three monitoring wells (MW-1 through MW-3) at the adjacent Jackson Road landfill site by Veridian Environmental, Inc. Groundwater elevations at the subject site ranged from a high of 14.55 feet below mean sea level in monitoring well MW-E to a low of 18.80 feet below mean sea level in monitoring well MW-F. A summary of present and historic groundwater depth measurements and elevations are presented in Table I, Appendix B. Field groundwater elevation data sheets with discussion of field conditions on site are attached in Appendix C.

Using trigonometric techniques groundwater flow direction and gradient were calculated and then contoured using Surfer, a computer aided triangulation program with linear interpolation methods. The groundwater flow direction at the site was generally toward the southeast with a hydraulic gradient of approximately 0.001 ft/ft (see Groundwater Contour Map, Figure 4, Appendix A). The groundwater flow directions for all past groundwater monitoring events at the subject site since December 1993 are shown graphically in the insert on Figure 4, Appendix A. The direction of groundwater flow at the site over the past 14 years has generally fluctuated between the southeast and the south-southwest. The groundwater gradient and flow direction for this sampling event is generally consistent with past sampling events.

The combined groundwater elevation data from both the Jackson Road landfill site and the Florin-Perkins landfill site indicated a general southeastern groundwater flow direction for the area of both sites (see Groundwater Contour Map 2, Figure 5, Appendix A).

Monitoring wells MW-A and MW-E are clearly up gradient or background wells for the subject site. Monitoring wells MW-A is located down gradient from the Jackson Road landfill area and the water quality in this background well may be influenced by that landfill. Monitoring well MW-E is located in farmland and is directly up gradient of well MW-B, which is situated along the western boundary of the landfill site. Monitoring well MW-B is located down gradient of the farmland area and only cross-gradient to the western most edge of the landfill. Well MW-C is located along the southwestern boundary of the landfill site directly down gradient of both wells MW-E and MW-B and the southwest corner of the landfill. Monitoring well MW-D is located in the north central portion of the landfill and is down gradient of the northwest corner of the fill area. Due to the variation in groundwater flow direction groundwater monitoring well MW-F is located directly down gradient of the eastern portion of the Florin-Perkins landfill area.

Groundwater Sampling

On November 16, 2009, following depth to groundwater measurements each two-inch diameter monitoring well on the subject site was purged of three to five well volumes to allow quality sampling of groundwater that reflects the true aquifer conditions. During purging the physical groundwater characteristics of temperature (^{o}F), electrical conductivity (µS/cm), and pH were measures and recorded using a Horiba U-10 Meter. The purge water was stored on site in 55-gallon drums. Monitoring well pump data sheets are attached in Appendix C.

Groundwater samples were collected from each well using clean, disposable, polyethylene bailers by Veridian Environmental, Inc. The collected groundwater was dispensed into 40-mil glass VOA vials, pre-preserved with HCl for analysis of volatile organic compounds and into (3) plastic bottles [1L-bottle, unpreserved; 500mL bottle-preserved HNO_3; 125mL bottle-$Zn(O_2CH_3)_2$], for metal and ion analysis. All groundwater samples were labeled, sealed in plastic bags, placed on ice in a cooler and transported under chain of custody protocol to a state certified analytical laboratory.

Groundwater Analytical Test and Results

The collected groundwater samples from each well were analyzed for total metals and dissolved iron by EPA Methods 200.7, 200.8, or 245.1. The samples were analyzed for chloride, nitrate (as NO_3), and sulfate (as SO_4) by EPA Method 300, for sulfide by SM4500S-F, for bicarbonates by SM2310B, and for total dissolved solids by SM2540C, specific conductance by EPA Method 120.1, pH by EPA Method 150.1 and turbidity by EPA Method 180.1. Groundwater samples from each monitoring well were also analyzed for the full list of 64 volatile organic compounds by EPA Method 8260B. The analytical results for the 2009 annual groundwater sampling events are summarized on Table I.

Table I
Groundwater Sample Results
November 16, 2009

		MCL	UTI-A	UTI-E	MW-A	MW-B	MW-C	MW-D	MW-E	MW-F
Sulfide	mg/l	---	---	---	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloride	mg/l	250 P	37	38	39	26	*48*	40	29	*45*
Nitrate (NO_3)	mg/l	10 P	32	90	**30**	***42***	***39***	**38**	**56**	**40**
Sulfate(SO_4)	mg/l	250 S	68	76	40	*140*	*110*	92	52	34
Bicarbonate	mg/l	---	217	430	65	170	*650*	*230*	290	*430*
Sp.Conduct.	u/cm	900 S	510	960	378	*707*	***1,590***	654	822	*780*
pH	units	6.5/8.5	6.12/7.78	6.63/7.16	6.8	6.54	6.6	*6.57*	6.69	6.73
TDS	mg/l	500 S	346	640	280	*480*	***920***	490	**500**	**590**
Turbidity	NTU		---	---	26	110	450	480	160	780
$CHCL_3$	µg/l	80 P	---	---	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TCE	µg/l	5 P	---	---	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
TCFM	µg/l	150 P	---	---	<0.50	<0.50	<0.50	4.4	<0.50	9.9
MTBE	µg/l	0.013P	---	---	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aluminum	mg/l	1.0 P	---	---	<0.050	0.72	0.12	**1.4**	0.270	**1.3**
Antimony	mg/l	0.006P	---	---	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Arsenic	mg/l	0.050P	---	---	0.0026	<0.0020	0.0036	0.0024	0.0023	0.0024
Barium	mg/l	1.00 P	0.1	0.24	0.069	*0.130*	*0.170*	*0.170*	0.210	*0.260*
Beryllium	mg/l	0.004P	---	---	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cadmium	mg/l	0.005P	0.01	---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Chromium	mg/l	0.050P	0.083	0.01	***0.050***	<0.010	***0.052***	<0.010	<0.010	<0.010
Cobalt	mg/l	---	---	---	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Copper	mg/l	1.3 P	0.05	---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	mg/l	0.3 S	0.140	0.57	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Lead	mg/l	0.015P	0.01	---	<0.0010	<0.0050	<0.0050	0.0076	<0.0050	<0.0050
Manganese	mg/l	0.050S	0.064	0.12	<0.020	0.041	<0.020	***0.069***	<0.020	0.045
Mercury	mg/l	0.002P	---	---	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.1P	0.05	---	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Silver	mg/l	0.001P	---	---	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Thallium	mg/l	0.002P	---	---	<0.015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Tin	mg/l	---	---	---	<0.100	<0.100	<0.100	<0.100	<0.010	<0.100
Vanadium	mg/l	---	0.05	0.12	0.014	0.011	0.013	0.013	0.013	0.018
Zinc	mg/l	5.0 S	0.0637	0.04	<0.020	<0.020	<0.020	0.024	<0.020	<0.020

MCLs - Maximum Contamination Levels as outlined the report titled "A Compilation of Water Quality Goals" a Staff Report of the California Regional Water Quality Control Boards Central Valley Region dated July 2008. The primary (P) and secondary (S) MCLs are to Drinking Water Standards for the California Department of Health Services. The laboratory results highlighted in bold print are results above the MCL for that constituent.

UTI-A - upper tolerance limit MW-A, UTI-E - upper tolerance limit MW-E. The laboratory results highlighted with italic print indicated detectable levels of the constituent that are above UTI-A or UTI-E.

$CHCL_3$ – Chloroform, TCE – Trichloroethene, TCFM – Trichlorofluoromethane, MTBE – Methyl tert-butyl ether.

Past analytical results are outlined in Tables II, III, and IV, in Appendix B. The laboratory analytical results and data validation findings by Veridian Environmental Inc. are attached in Appendix D.

Soil Gas Analytical Test and Results

On November 17, 2009, landfill gas monitoring well GP-2D located adjacent to groundwater monitoring well MW-F was evacuated of one full well volume and sampled by Veridian Environmental, Inc. The soil vapor sample was collected in a laboratory certified six-liter summa canister, sealed, labeled, and transported under chain of custody protocol to a state certified analytical laboratory. The field procedures for the soil vapor sampling are outlined with the monitoring well data sheets attached in Appendix C.

The collected soil vapor sample was analyzed for volatile organic compounds by EPA Method TO-14A. The analytical results for the Annual 2009 sampling events are summarized on Table II.

Table II
Soil Gas Data from GP-2D
November 17, 2009

Volatile Compounds	ppbv	ug/m^3
acetone	29	70
freon 12	32	160
freon 11	1,800	9,900
carbon disulfide	<6.7	<21
tetrahydrofuran	<6.7	<20
tetrachloroethene	<6.7	<45

ppbv - parts per billion volume, ug/m^3 – micrograms per cubic meter

The analytical results for all other compounds were below the detection limits of 6.7 to 27 parts per billion volume (ppbv) or 15 to 280 micrograms per cubic meter (ug/m^3).

Soil Gas Monitoring Well Head Repair

Earthtec, Inc. repaired the nine soil gas monitoring gas monitoring well heads on November 16, 2009. The repair generally consisted of cutting the well tubing flush and replacing the airtight downsizer connectors in each nested well.

Limited Field Sampling

Earthtec, Inc performed limited field sampling of the soil gas monitoring wells at the Florin-Perkins Landfill on December 28, 2009. At the time of sampling, the weather was overcast and temperature was approximately 43°F. The ground surface adjacent to the wells at the time of measurement was observed to be slightly damp with some morning condensation and/or recent precipitation.

GP1, GP2 & GP3 each contain three nested wells that extend approximately 10, 25 and 40 feet, respectively, below the existing adjacent ground surface. We were unable to sample GP3-40', as the nested well appeared to be clogged at an unknown depth. We attempted to purge the well of ambient gas with a hand-operated pump and was unable to clear the well for sampling. We recommend an attempt to clear this well from the obstruction at a future date.

Earthtec, Inc. obtained CH_4%, CO_2%, O_2% from each of the soil vapor monitoring wells (except GP3-40') using a Landtec GEM2000 Plus Detector™ (Serial # GM11010/08; Manufacturer Calibrated 9/28/09; Field Calibrated 12/28/09).

Table III, below, summarizes the measurements taken on December 28, 2009 at the Florin-Perkins Landfill site.

TABLE III
Florin-Perkins Landfill, Sacramento, California
Field Soil Gas Measurements from GP1, GP2, GP3
December 28, 2009

Soil Vapor Well ID (-feet)	CH_4 (%)	CO_2 (%)	O_2 (%)	Balance of Other Gases (%)
GP1-10'	0	5.1	14.8	80.1
GP1-25'	0	7.3	13.0	79.7
GP1-40'	0	11.1	9.6	79.3
GP2-10'	0	19.8	1.5	78.7
GP2-25'	0	0.2	20.1	79.7
GP2-40'	0.5	20.8	0.1	78.6
GP3-12'	0	9.4	10.9	79.1
GP3-25'	0	14.4	6.1	79.5
GP3-40'	****UNABLE TO SAMPLE WELL****			

Standard Observation

The adopted Waste Discharge Requirement for the Florin-Perkins Landfill, Inc. (WDR Order No. 95-169) directed that standard observations be performed on a weekly basis and include those elements as defined in the Standard Provisions and Reporting Requirements.

The landfill has not accepted waste for disposal since January 10, 2005. Operations were suspended as a result of a stipulated judgment for the surrender of the premises pursuant to the owner's unlawful detainer actions.

The property owner Mrs. Nancy Cleavinger conducted weekly observations at the Florin/Perkins Road landfill site from August 8, 2009 through December 24, 2009 (copies of observations are attached in Appendix E). No standing water was observed at the site and no liquid was observed leaving or entering the landfill.

Statistical Analysis of Groundwater Laboratory Test Results

In accordance with Title 27, Section 20415(e)(7) a data analysis method for evaluating water quality monitoring data is required for the site. The data analysis method is needed in order to determine if a "measurably significant" evidence of any release has occurred from the landfill. Veridian Environmental Inc. completed up-dated statistical an trend analysis as outlined in their report "Groundwater Monitoring Data Analysis Results", December 31, 2009, for the Florin-Perkins Landfill, Sacramento, CA (attached in Appendix F).

Summary

For this sampling event conducted on November 16 & 17, 2009 the groundwater flow direction was toward the south to south-southeast at an average hydraulic gradient of approximately 0.001 ft/ft. The flow direction for this sampling event is generally consistent with past monitoring events. The laboratory results from wells MW-A (located northeast of the subject site) and MW-E (located west of the site) continue to represent the background groundwater quality conditions at the site. The laboratory results highlighted in bold print on Table I are results above the MCL for that constituent. The laboratory results highlighted with italic print on Table I indicated detectable levels of the constituent that are above UTI-A and/or UTI-E.

Conclusion

The next groundwater sampling event should occur in May 2010. We consider this letter provides the information you require at this time. If you have any questions concerning the information presented in this report, then please do not hesitate to contact us.

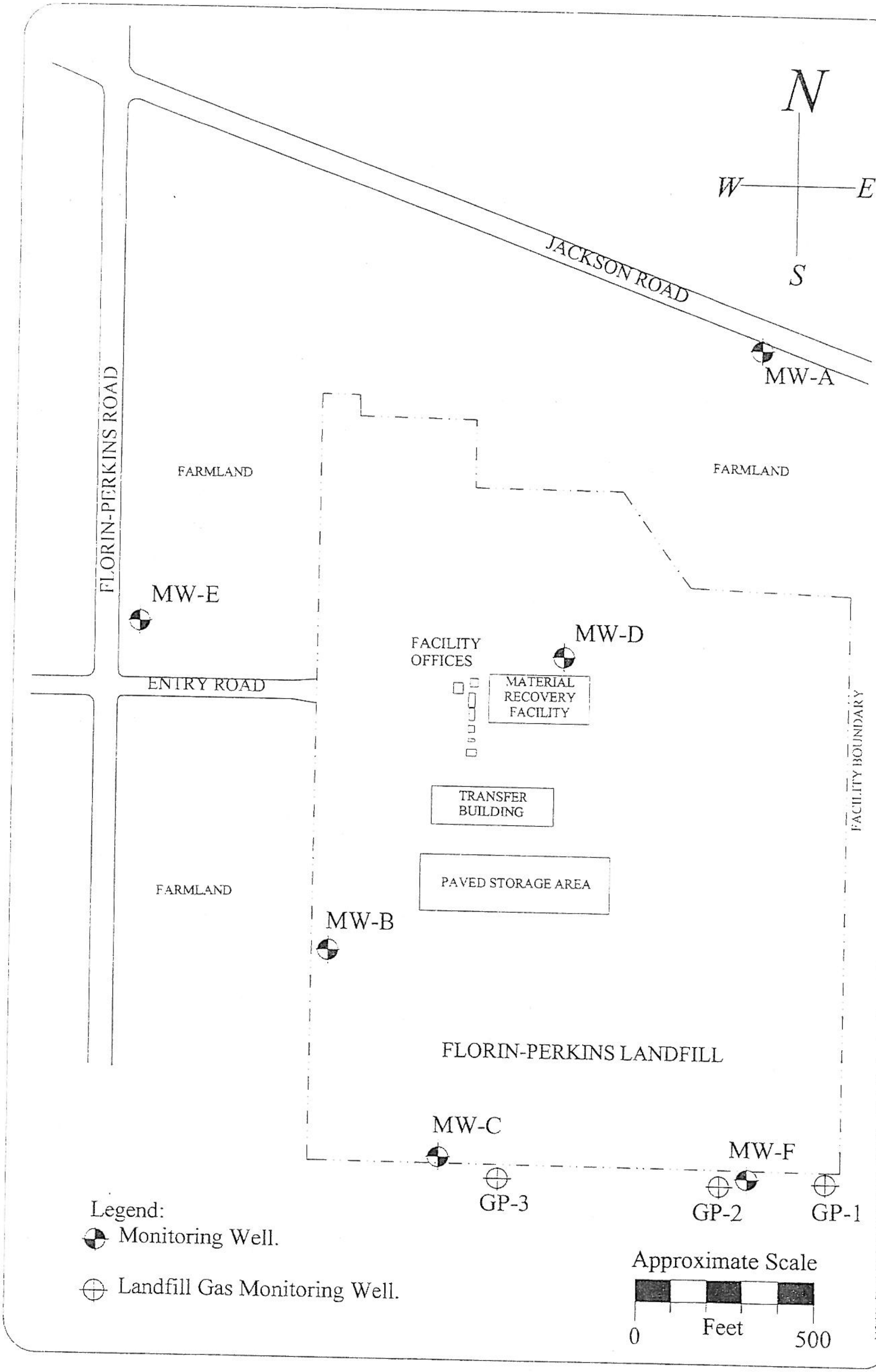
Sincerely,
EARTHTEC, Inc.

02/11
PAUL J. FRY
NO. 8126

Paul Fry
Professional Geologist, #8126 (Exp: 02/11)

PJF/ls

cc: Mr. Craig Wilson, StoelRives, Sacramento, CA
Mr. John Moody– Central Valley Regional Water Quality Control Board
Ms. Charlotte Symms - Veridian Environmental, Inc.



NOTE: Site Map based on map developed by Aliso Engineering Group, Lafayette, California

SITE MAP

December 2009

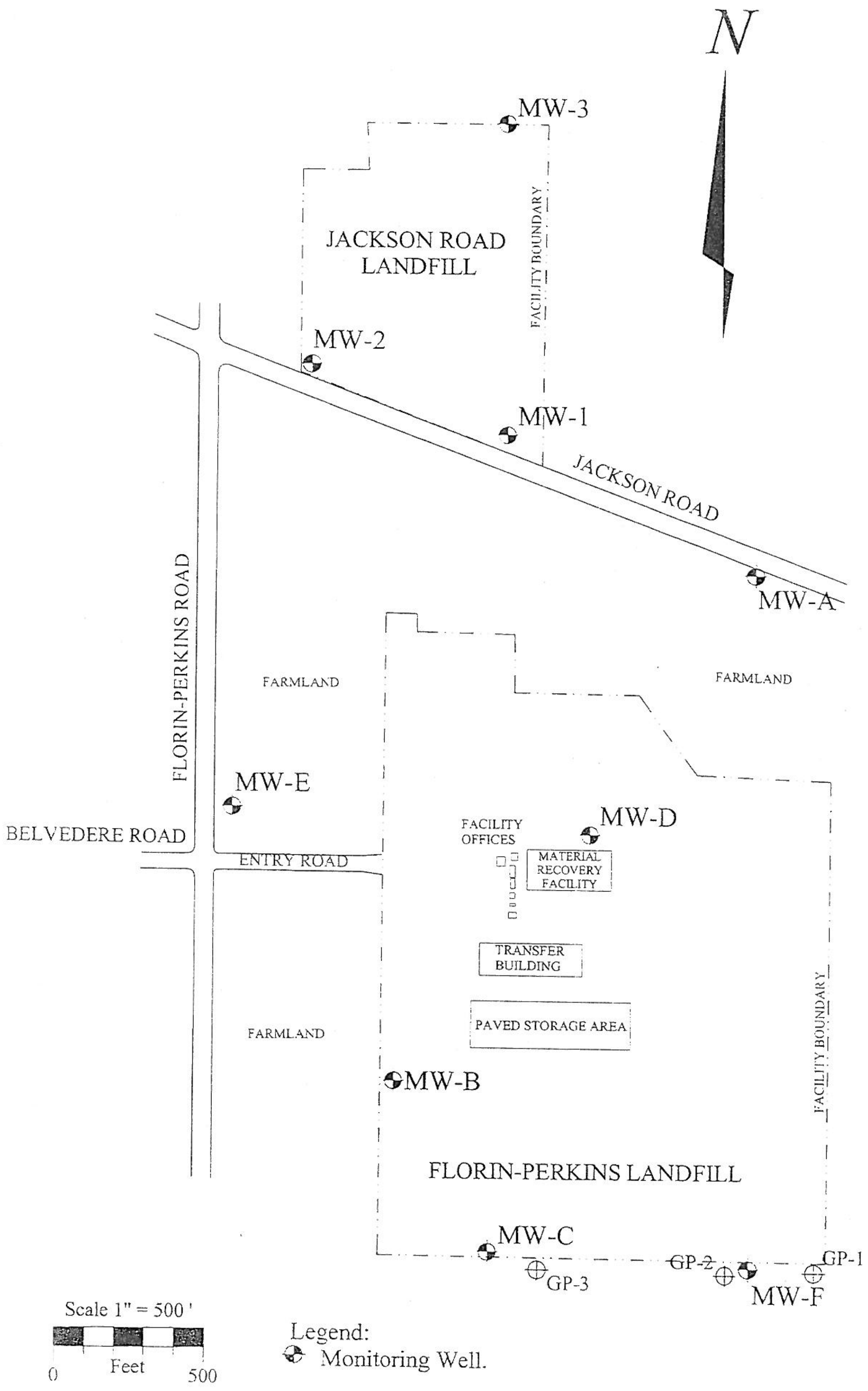
FIGURE 2

PROJECT: 303112

APPENDIX A

FLORIN-PERKINS LANDFILL
FLORIN-PERKINS ROAD
SACRAMENTO, CALIFORNIA

EARTHTEC, Inc.
GEOTECHNICAL ENGINEERS • SPECIAL INSPECTORS
GEOLOGICAL AND ENVIRONMENTAL CONSULTANTS



NOTE: Site Map based on map developed by Alisto Engineering Group, Lafayette, California

EARTHTEC, Inc.
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FLORIN-PERKINS LANDFILL
FLORIN-PERKINS ROAD
SACRAMENTO, CALIFORNIA

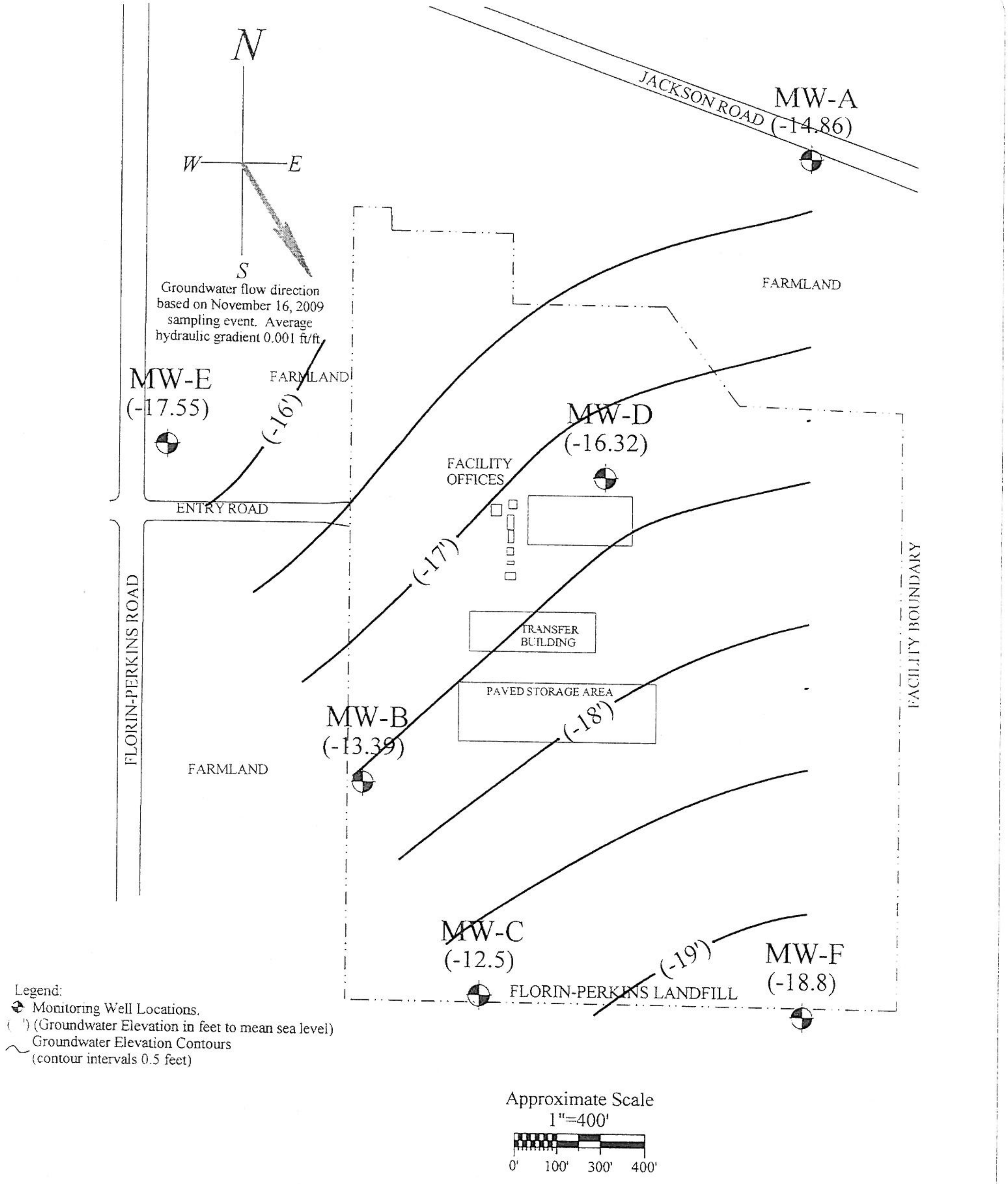
AREA MAP

PROJECT: 303112

December 2009

APPENDIX A

FIGURE 3



NOTE Site Map based on map developed by Alisto Engineering Group, Lafayette, California.

EARTHTEC, Inc.
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GEOLOGICAL AND ENVIRONMENTAL CONSULTANTS

FLORIN-PERKINS LANDFILL
FLORIN-PERKINS ROAD
SACRAMENTO, CALIFORNIA

GROUNDWATER CONTOUR MAP

Project 303112	January 2010
Appendix A	Figure 4

TABLE II

Summary of Groundwater Monitoring Parameters
Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Monitoring Well
MW-D

Date Of Sampling	pH (units)	Specific Conductance (µmhos/cm)	Bicarbonate (mg/l)	Chloride (mg/l)	Dissolved Iron (mg/l)	Nitrate (mg/l)	Sulfate (mg/l)	TDS (mg/l)	Lab
6/30/2002	6.89	536	230	26	<0.05	2.9	51	620	ARG
12/6/2002	7.4	930	400	14	<0.05	<0.10	280	720	ARG
7/23/2003	7.3	860	690	33	<0.10	0.95	70	510	Alpha
12/10/03	7.03	670	300	19	<0.10	3.5	52	500	CEL
5/26/04	6.70	700	270	18	<0.10	5.1	50	450	CEL
7/5/05	6.97	640	260	23	6.9	<0.23	57	510	SEQ
12/20/05	7.01*	544*	230	22	<0.100	34	58	420	CLS
6/19/06	6.87*	680	240	24	<0.100	8.1	60	470	CLS
12/21/06[1]	6.79	1300	310	110	<0.100	110	160	810	CLS
5/23/07[2]	6.53	660	200	27	<0.100	42	71	470	CLS
11/8/07	6.80	697	290	30	<0.100	88	63	550	CLS
5/14/08	6.67	999	170	26	<0.100	27	65	390	CLS
11/17/08	6.77	1300	210	37	<0.100	40	79	480	CLS
5/25/09	6.57	654	210	27	<0.100	29	69	460	CLS
11/16/09	6.99	665	230	40	<0.100	38	92	490	CLS

TABLE II

Summary of Groundwater Monitoring Parameters
Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Monitoring Well
MW-E

Date Of Sampling	pH (units)	Specific Conductance (µmhos/cm)	Bicarbonate (mg/l)	Chloride (mg/l)	Dissolved Iron (mg/l)	Nitrate (mg/l)	Sulfate (mg/l)	TDS (mg/l)	Lab
6/30/2002	7.16	780	300	38	<0.05	17.0	63	580	ARG
12/6/2002	7.1	880	290	33	<0.05	20.0	72	600	ARG
7/23/2003	7.1	960	430	38	<0.10	20	66	560	Alpha
12/10/03	7.08	830	280	28	<0.10	20	65	620	CEL
5/26/04	6.94	900	280	26	<0.10	20	60	540	CEL
7/5/05	6.95	860	310	28	0.57	<0.23	66	640	SEQ
12/20/05	7.02*	798*	340	32	0.430	90	76	600	CLS
6/19/06	6.98*	920	320	31	<0.100	25	66	1,200	CLS
12/21/06[1]	7.14	760	310	29	<0.100	87	65	540	CLS
5/23/07[2]	6.79	860	290	27	580	82	63	580	CLS
11/8/07	7.09	920	290	66	<0.100	88	63	550	CLS
5/14/08	7.00	847	310	31	<0.100	72	60	550	CLS
11/17/08	7.00	638	280	31	<0.100	63	60	510	CLS
5/25/09	6.69	822	290	29	<0.100	56	52	550	CLS
11/16/09	7.31	710	300	33	<0.100	52	56	500	CLS

TABLE II

Summary of Groundwater Monitoring Parameters
Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Monitoring Well
MW-F

Date Of Sampling	pH (units)	Specific Conductance (μmhos/cm)	Bicarbonate (mg/l)	Chloride (mg/l)	Dissolved Iron (mg/l)	Nitrate (mg/l)	Sulfate (mg/l)	TDS (mg/l)	Lab
6/30/2002	7.04	1120	440	110	<0.05	8.0	42	720	ARG
12/6/2002	7.1	1200	450	86	<0.05	8.4	44	720	ARG
7/23/2003	7.1	1300	640	110	<0.10	9.0	42	710	Alpha
12/10/03	7.13	1100	410	96	<0.10	7.9	41	700	CEL
5/26/04	6.96	1100	400	72	<0.10	6.8	31	670	CEL
7/5/05	7.13	1000	390	90	1.7	7.6	33	620	SEQ
12/20/05	7.01*	970*	440	91	<0.100	38	38	660	CLS
6/19/06	7.15*	1000	430	72	<0.100	7.7	33	640	CLS
12/21/06[1]	7.07	850	430	67	<0.100	40	36	600	CLS
5/23/07[2]	6.80	1000	430	60	<0.100	39	33	610	CLS
11/8/07	7.16	1180	440	66	<0.100	39	37	650	CLS
5/14/08	6.96	999	420	52	<0.100	41	33	610	CLS
11/17/08	6.80	1100	400	56	<0.100	39	38	620	CLS
5/25/09	6.73	780	410	44	<0.100	37	30	610	CLS
11/16/09	7.33	1080	430	45	<0.100	40	34	590	CLS

TABLE II

Summary of Groundwater Monitoring Parameters

Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Date Of Sampling	pH (units)	Specific Conductance (µmhos/cm)	Bicarbonate (mg/l)	Chloride (mg/l)	Dissolved Iron (mg/l)	Nitrate (mg/l)	Sulfate (mg/l)	TDS (mg/l)	Lab
Secondary Maximum Contamination Level for Drinking Water									
---	6.5 to 8.5	900	----	250	0.3	10	250	500	---
Upper Tolerance Intervals (from Tables F-2 and F-5, Addendum to Semi-Annual 2009 Monitoring Report, by Veridian Environmental Inc.)									
MW-A	6.12//7.78	510	217	39	0.140	32	68	346	---
MW-E	6.63//7.16	960	430	38	---	90	76	640	---

Abbreviations:

TDS	Total Dissolved Solids
µmhos/cm	micromhos per centimeter
mg/l	milligram per liter
*	Hanna Meter Reading
1	Turbidity all <0.50 NTU
2	*[Turbidity all <0.50 NTU, except MW-A 3.9 NTU and MW-D 0.52 NTU]*

Labs:

CAS	Columbia analytical Services
West	West Laboratories
AAL	AnLab Analytical Laboratories
SEQ	Sequoia Analytical
ASL	Associated Laboratories
ARG	Argon Laboratories
Alpha	Alpha Analytical Laboratories
CEL	Calscience Environmental Laboratories
CLS	California Laboratory Services

TABLE II-B

Summary of Groundwater Monitoring Parameters

Florin-Perkins Landfill
Sacramento, California

Secondary Maximum Contamination Level for Drinking Water				
	Calcium (mg/l)	Magnesium (mg/l)	Potassium (mg/l)	Sodium (mg/l)
(MCL)	---	---	---	20
TOLERANCE INTERVALS				
Upper	---	---	---	---
Lower	--	---	---	---

Abbreviations:
mg/l milligram per liter
Calscience Environmental Lab

Labs:
CEL

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill, Sacramento, California

Monitoring Well
MW-A

Sampling Date	CHCL$_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 Constituents (µg/l)	Lab
12/13/93	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	CAS
2/14/94	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	CAS
8/26/94	<0.5	<0.5	ND	ND	ND	0.42	<0.5	1.4	<0.5	West
12/21/94	1.0	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	AAL
8/22/95	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	West
5/29/96	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	---
2/12/98	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	SEQ
7/30/98	<0.5	<0.5	ND	ND	ND	<0.5	<0.5	<0.5	<0.5	SEQ
6/14/99	<0.18	<0.19	ND	ND	ND	<0.08	<0.11	<0.46	ND	ASL
12/6/99	---	---	---	---	---	---	---	---	---	ASL
6/20/00	---	---	---	---	---	---	---	---	---	ASL
11/8/00	<0.5	<0.5	ND	ND	<0.5	<0.5	1.0	<0.5	<0.5	ARG
4/11/01	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	ARG
6/30/02	<1.2	<1.1	<1.4	<1.2	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	<0.5	<1.0 or <0.50	<0.30	<0.50	<0.50	<0.1 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	2.1*	<1.0	<10 or <0.50	3.7	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	<0.50	<20 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	4.5	<0.50	<1.0	---	CLS
12/21/06	0.65	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	0.53	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

5/26/04-Carbon Disulfide **0.47** ppb

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill, Sacramento, California

Monitoring Well
MW-B

Sampling Date	$CHCL_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 Constituents (µg/l)	Lab
12/13/93	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	CAS
2/14/94	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	CAS
8/26/94	<0.5	<0.5	ND	ND	<0.5	0.36	<0.5	1.3	<0.5	West
12/21/94	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	AAL
8/22/95	<0.5	0.55	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	West
5/29/96	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	---
2/12/98	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	SEQ
7/30/98	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	SEQ
6/14/99	<0.18	<0.19	ND	ND	ND	<0.08	<0.11	<0.46	ND	ASL
12/6/99	---	---	---	---	---	---	---	---	---	ASL
6/20/00	---	---	---	---	---	---	---	---	---	ASL
11/8/00	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	ARG
4/11/01	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	ARG
6/30/02	<1.2	<1.1	<1.4	<1.2	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	<0.50	<1.0 or <0.50	<0.30	<0.50	<0.50	<1.0 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	2.3*	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	<0.50	<20 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	9.3	<0.50	<1.0	---	CLS
12/21/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	<0.50	<0.50	<0.50	0.62	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

5/26/04-Carbon Disulfide 0.73 ppb

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill, Sacramento, California

Monitoring Well
MW-C

Sampling Date	$CHCL_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 Constituents (µg/l)	Lab
12/13/93	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	CAS
2/14/94	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	CAS
8/26/94	<0.5	<0.5	ND	ND	<0.5	0.62	<0.5	2.2	<0.5	West
12/21/94	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	AAL
8/22/95	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	West
5/29/96	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	---
2/12/98	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	SEQ
7/30/98	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	SEQ
6/14/99	<0.18	<0.19	ND	ND	ND	<0.08	<0.11	<0.46	ND	ASL
12/6/99	---	---	---	---	---	---	---	---	---	ASL
6/20/00	---	---	---	---	---	---	---	---	---	ASL
11/8/00	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	ARG
4/11/01	<0.5	<0.5	ND	ND	<0.5	<0.5	<0.5	<0.5	<0.5	ARG
6/30/02	<1.2	<1.1	<1.4	<1.2	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	<0.50	<1.0 or <0.50	<0.30	<0.50	<0.50	<1.0 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	1.9*	<1.0	<10 or <0.50	2.1	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	<0.50	<20 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	6.2	<0.50	<1.0	---	CLS
12/21/06	<0.50	<0.50	<0.50	0.72	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	5.2	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	<0.50	<0.50	<0.50	3.6	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	1.5	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	1.2	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

5/26/04-Carbon Disulfide **0.75** ppb

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-D

Sampling Date	CHCL$_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 Constituents (µg/l)	Lab
6/30/02	<1.2	<1.1	<1.4	<1.2	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	<0.50	<1.0 or <0.50	<0.30	<0.50	<0.50	<1.0 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	2.6*	0.58	<10 or <0.50	1.7	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	<0.50	<1.0 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	1.5	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	1.7	<10 or <0.50	1.6	<0.50	<1.0	---	CLS
12/21/06	<0.50	<0.50	<0.50	1.0	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	1.7	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	2.7	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	3.6	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	3.9	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	4.4	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

5/26/04-Carbon Disulfide 0.33 ppb

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-E

Sampling Date	CHCL$_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 (µg/l)	Lab
6/30/02	<1.2	<1.1	<1.4	<1.2	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	<0.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	<0.50	<1.0 or <0.50	<0.30	<0.50	<0.50	<1.0 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	<1.0	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	2.4*	<1.0	<10 or <0.50	1.4	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	<0.50	<1.0 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	3.2	<0.50	<1.0	---	CLS
12/21/06	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	<0.50	<0.50	<0.50	1.7	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	<0.50	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

5/26/04-Chloromethane 0.97 ppb

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well

MW-F

Sampling Date	$CHCL_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)	Other EPA 601 or 8260B Constituents (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)	EPA 602 Constituents (µg/l)	Lab
6/30/02	<1.2	<1.1	<1.4	7.3	ND	<1.2	<1.1	<1.4	ND	ARG
8/14/02	<1.2	<1.2	<1.4	9.7	ND	<1.2	<1.1	<1.4	ND	ARG
12/26/02	<0.5	<0.5	<0.5	6.5	ND	<0.5	<0.5	<1.0	ND	ARG
7/23/03	<0.50	<0.50	<0.50	6.4	<1.0 or <0.50	<0.30	<0.50	<0.50	<1.0 or <0.50	Alpha
12/10/03	<1.0	<1.0	<5.0	3.4	<10 or <0.50	<1.0	<1.0	<1.0	<10 or <0.50	CEL
5/26/04	<1.0	<1.0	1.9*	0.94	<10 or <0.50	1.8	<1.0	<1.0	---	CEL
7/5/05	<1.0	<0.50	<1.0	1.2	<1.0 or <0.50	<0.50	<0.50	<1.0	---	SEQ
12/20/05	<0.50	<0.50	<0.50	12	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
6/19/06	<0.50	<0.50	<0.50	2.0	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
12/21/06	<0.50	<0.50	<0.50	3.7	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/23/07	<0.50	<0.50	<0.50	4.9	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/8/07	<0.50	<0.50	<0.50	21	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/14/08	<0.50	<0.50	<0.50	8.1	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/17/08	<0.50	<0.50	<0.50	9.0	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
5/25/09	<0.50	<0.50	<0.50	4.7	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS
11/16/09	<0.50	<0.50	<0.50	9.9	<10 or <0.50	<0.50	<0.50	<1.0	---	CLS

7/23/03 - Methyl tert-butyl ether (MTBE)=0.82 µg/l

TABLE III

Summary of Results for Volatile Organic Compounds
Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Maximum Contamination Level for Drinking Water										
	$CHCL_3$ (µg/l)	TCE (µg/l)	Methylene Chloride (µg/l)	TCFM (µg/l)		Toluene (µg/l)	Ethyl-benzene (µg/l)	Xylenes (µg/l)		
	100	5	5	150		150	700	1750		-

Abbreviations:

Method 8260B	Volatile Organic Compounds
$CHCL_3$	Chloroform
TCE	Trichloroethene
TCFM	Trichlorofluoromethane
µg/l	microgram per liter
ND	Not Detected above the method detection limit.
*	Was present in the associated method blank

Labs:

CAS	Columbia analytical Services
West	West Laboratories
AAL	AnLab Analytical Laboratories
SEQ	Sequoia Analytical
ASL	Associated Laboratories
ARG	Argon Laboratories
Alpha	Alpha Analytical Laboratories
CEL	Calscience Environmental Laboratory
CLS	California Laboratory Services

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well

MW-A

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
12/13/93	<0.1	<0.05	<0.05	<0.005	0.034	<0.005	<0.003	<0.05	<0.01	<0.01	<0.002
2/14/94	0.1	<0.05	<0.05	<0.10	0.0222	<0.005	<0.003	<0.005	<0.01	<0.01	<0.05
8/26/94	<0.1	---	---	---	---	---	0.0004	0.11	---	0.061	0.014
12/21/94	<0.1	---	---	---	---	---	0.0001	0.059	---	0.009	0.031
8/22/95	<0.1	---	---	---	---	---	<0.004	0.0094	---	<0.006	<0.003
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	---
7/30/98	---	---	---	---	---	---	---	---	---	---	---
6/14/99	---	---	---	---	---	---	---	---	---	---	---
12/6/99	---	---	---	---	---	---	---	---	---	---	---
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.5	<0.1	<0.006	<0.005	<0.05	<0.004	<0.005	0.024	<0.05	<0.05	<0.005
4/11/01	<0.5	<0.1	<0.006	<0.005	<0.05	<0.004	<0.005	0.083	<0.05	<0.05	<0.005
6/30/02	<0.5	<0.05	<0.002	<0.003	0.087	<0.001	<0.001	0.05	<0.001	0.035	<0.003
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.0692	<0.00100	<0.00500	0.0312	<0.0050	<0.0050	<0.0100
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	<0.050	<0.050	<0.0020	0.071	<0.0050	<0.010	0.028	<0.020	<0.010	<0.0050
12/21/06	<1.0	<0.050	<0.0060	<0.0020	0.069	<0.0050	<0.010	0.043	<0.020	<0.010	<0.0050
5/23/07	<1.0	0.17	<0.0060	<0.0020	0.1	<0.0050	<0.010	0.025	<0.020	<0.010	<0.0050
11/8/07	<1.0	1.4	<0.0060	0.0033	0.1	<0.0050	<0.010	0.051	<0.020	<0.010	<0.0050
5/14/08	<1.0	<0.050	<0.0060	0.0027	0.073	<0.0050	<0.010	0.044	<0.020	<0.010	<0.0050
11/17/08	<1.0	<0.050	<0.0060	0.003	0.064	<0.0050	<0.010	0.055	<0.020	<0.010	<0.0050
5/26/09	<1.0	0.061	<0.0060	0.0025	0.063	<0.0050	<0.010	0.055	<0.020	<0.010	<0.0050
11/16/09	<1.0	<0.050	<0.0060	0.0026	0.069	<0.0050	<0.010	0.050	<0.020	<0.010	<0.0050

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-A

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
12/13/93	0.055	<0.0005	<0.02	<0.005	<0.01	<0.005	<0.05	0.010	0.014	---	CAS
2/14/94	0.027	<0.0005	<0.02	<0.10	<0.01	<0.10	<0.05	0.012	<0.01	---	CAS
8/26/94	---	---	0.12	---	---	---	---	---	0.19	---	West
12/21/94	---	---	0.062	---	---	---	---	---	0.084	---	AAL
8/22/95	---	---	<0.015	---	---	---	---	---	0.015	---	West
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	SEQ
7/30/98	---	---	---	---	---	---	---	---	---	---	SEQ
6/14/99	---	---	---	---	---	---	---	---	---	---	SEQ
12/6/99	---	---	---	---	---	---	---	---	---	---	---
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.05	<0.0008	<0.05	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	---	ARG
4/11/01	<0.02	<0.0008	<0.05	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	<0.01	ARG
6/30/02	<0.03	<0.0010	<0.001	<0.005	<0.01	<0.004	<0.2	0.014	0.043	<0.025	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.0050	<0.00500	<0.005	---	<0.00500	<0.015	<0.05	0.0127	0.0637	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
12/21/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS
5/23/07	0.02	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS
11/8/07	0.064	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.017	<0.020	---	CLS
5/14/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	<0.020	---	CLS
11/17/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.015	<0.020	---	CLS
5/25/09	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.015	<0.020	---	CLS
11/16/09	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.014	<0.020	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-B

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
12/13/93	<0.1	<0.05	<0.05	<0.005	0.160	<0.005	<0.003	0.008	<0.01	<0.01	<0.002
2/14/94	0.2	<0.05	<0.05	<0.10	0.136	<0.005	<0.003	0.006	<0.01	<0.01	<0.05
8/26/94	<0.1	---	---	---	---	---	0.00077	0.17	---	0.081	0.015
12/21/94	<0.1	---	---	---	---	---	0.0002	0.11	---	0.021	0.050
8/22/95	<0.1	---	---	---	---	---	<0.004	0.15	---	0.083	0.016
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	---
7/30/98	---	---	---	---	---	---	---	---	---	---	---
6/14/99	---	---	---	---	---	---	---	---	---	---	---
12/6/99	---	---	---	---	---	---	---	---	---	---	---
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.5	<0.1	<0.006	<0.005	0.053	<0.004	<0.005	<0.02	<0.05	<0.05	<0.005
4/11/01	<0.5	0.19	<0.006	<0.005	<0.05	<0.004	<0.005	<0.02	<0.05	<0.05	<0.005
6/30/02	<0.025	<0.05	<0.002	<0.003	0.068	<0.001	<0.001	0.046	<0.001	<0.001	<0.003
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.0803	<0.001	<0.00500	0.00567	<0.0050	<0.0050	<0.01
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	7.9	<0.050	<0.0020	0.440	<0.0050	<0.010	0.013	<0.020	0.027	<0.0050
12/21/06	<1.0	<0.050	<0.0060	<0.0020	0.100	<0.0050	<0.010	0.010	<0.020	<0.010	<0.0050
5/23/07	<1.0	<0.050	<0.0060	<0.0020	0.100	<0.0050	<0.010	<0.01	<0.020	<0.010	<0.0050
11/8/07	<1.0	0.43	<0.0060	<0.0020	0.130	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
5/14/08	<1.0	<0.050	<0.0060	<0.0020	0.100	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/17/08	<1.0	1.9	<0.0060	<0.0020	0.130	<0.0050	<0.010	0.010	<0.020	<0.010	<0.0050
5/25/09	<1.0	0.44	<0.0060	<0.0020	0.110	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/16/09	<1.0	0.72	<0.0060	<0.0020	0.130	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050

TABLE IV
Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-B

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
12/13/93	0.737	<0.0005	<0.02	<0.005	<0.01	<0.005	<0.05	<0.01	0.020	---	CAS
2/14/94	0.905	<0.0005	<0.02	<0.10	<0.01	<0.10	<0.05	<0.01	<0.01	---	CAS
8/26/94	---	---	0.2	---	---	---	---	---	0.24	---	West
12/21/94	---	---	0.13	---	---	---	---	---	0.13	---	AAL
8/22/95	---	---	0.14	---	---	---	---	---	0.16	---	West
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	SEQ
7/30/98	---	---	---	---	---	---	---	---	---	---	SEQ
6/14/99	---	---	---	---	---	---	---	---	---	---	SEQ
12/6/99	---	---	---	---	---	---	---	---	---	---	SEQ
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.05	<0.0008	<0.05	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	---	ARG
4/11/01	<0.02	<0.0008	<0.05	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	<0.01	ARG
6/30/02	<0.03	<0.0010	<0.001	<0.005	<0.01	<0.005	<0.2	0.011	<0.003	<0.0025	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.0050	<0.00500	<0.005	---	<0.00500	<0.0150	<0.0500	0.00782	<0.010	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	0.440	<0.00020	0.030	---	<0.010	<0.001	<0.100	0.034	0.074	---	CLS
12/21/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS
5/23/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.02	<0.020	---	CLS
11/8/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.0097	<0.020	---	CLS
5/14/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.0081	<0.020	---	CLS
11/17/08	0.110	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.010	<0.020	---	CLS
5/25/09	0.037	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.010	<0.020	---	CLS
11/16/09	0.041	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.011	<0.020	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-C

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
12/13/93	<0.1	<0.05	<0.05	<0.005	0.117	<0.005	<0.003	<0.005	<0.01	<0.01	<0.002
2/14/94	0.1	<0.05	<0.05	<0.10	0.090	<0.005	<0.003	<0.005	<0.01	<0.01	<0.05
8/26/94	<0.1	---	---	---	---	---	0.00059	0.13	---	0.079	0.013
12/21/94	<0.1	---	---	---	---	---	0.0002	0.052	---	0.020	0.028
8/22/95	<0.1	---	---	---	---	---	<0.004	0.020	---	0.011	<0.003
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	---
7/30/98	---	---	---	---	---	---	---	---	---	---	---
6/14/99	---	---	---	---	---	---	---	---	---	---	---
12/6/99	---	---	---	---	---	---	---	---	---	---	---
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.5	<0.1	<0.006	<0.005	<0.05	<0.004	<0.005	<0.02	<0.05	<0.05	<0.005
4/11/01	<0.5	<0.1	<0.006	<0.005	0.11	<0.004	<0.005	0.057	<0.05	<0.05	<0.005
6/30/02	<0.025	<0.05	<0.002	<0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.153	<0.00100	<0.00500	0.0119	<0.0050	<0.005	<0.0100
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	<0.50	<0.050	<0.0020	0.200	<0.0050	<0.010	0.048	<0.020	<0.010	<0.0050
12/21/06	<1.0	<0.050	<0.0060	<0.0020	0.200	<0.0050	<0.010	0.050	<0.020	<0.010	<0.0050
5/23/07	<1.0	<0.050	<0.0060	<0.0020	0.210	<0.0050	<0.010	0.044	<0.020	<0.010	<0.0050
11/8/07	<1.0	0.150	<0.0060	0.0042	0.140	<0.0050	<0.010	0.036	<0.020	<0.010	<0.0050
5/14/08	<1.0	<0.050	<0.0060	0.0038	0.220	<0.0050	<0.010	0.062	<0.020	<0.015	<0.0050
11/17/08	<1.0	<0.050	<0.0060	0.0044	0.230	<0.0050	<0.010	0.060	<0.020	<0.015	<0.0050
5/25/09	<1.0	<0.050	<0.0060	0.0049	0.220	<0.0050	<0.010	0.084	<0.020	<0.015	<0.0050
11/16/09	<1.0	0.120	<0.0060	0.0036	0.170	<0.0050	<0.010	0.052	<0.020	<0.015	<0.0050

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-C

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
12/13/93	0.043	<0.0005	<0.02	<0.005	<0.01	<0.005	<0.05	<0.01	0.014	---	CAS
2/14/94	0.032	<0.0005	<0.02	<0.10	<0.01	<0.10	<0.05	0.010	<0.01	---	CAS
8/26/94	---	---	0.17	---	---	---	---	---	0.18	---	West
12/21/94	---	---	0.11	---	---	---	---	---	0.093	---	AAL
8/22/95	---	---	<0.015	---	---	---	---	---	0.016	---	West
5/29/96	---	---	---	---	---	---	---	---	---	---	---
2/12/98	---	---	---	---	---	---	---	---	---	---	SEQ
7/30/98	---	---	---	---	---	---	---	---	---	---	SEQ
6/14/99	---	---	---	---	---	---	---	---	---	---	SEQ
12/6/99	---	---	---	---	---	---	---	---	---	---	---
6/20/00	---	---	---	---	---	---	---	---	---	---	---
11/8/00	<0.05	<0.0008	0.057	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	---	ARG
4/11/01	<0.02	<0.0008	0.077	<0.005	<0.01	<0.005	<0.1	<0.05	<0.05	<0.01	ARG
6/30/02	<0.03	<0.0010	<0.001	0.011	<0.01	0.0052	<0.2	<0.001	<0.003	<0.0025	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.0050	<0.00500	<0.005	---	<0.00500	<0.0150	<0.0500	0.0123	0.0245	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
12/21/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	<0.020	---	CLS
5/23/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.02	<0.020	---	CLS
11/8/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.011	<0.020	---	CLS
5/14/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS
11/17/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.014	<0.020	---	CLS
5/25/09	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.014	<0.020	---	CLS
11/16/09	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-D

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
6/30/02	<0.025	<0.05	<0.002	<0.003	0.078	<0.001	<0.001	0.0046	<0.001	<0.001	---
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.131	<0.001	<0.005	<0.0050	<0.005	<0.005	<0.01
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	0.068	<0.050	<0.0020	0.120	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
12/21/06	<1.0	<0.050	<0.0060	<0.0020	0.230	<0.0050	<0.010	0.011	<0.020	<0.010	<0.0050
5/23/07	<1.0	<0.050	<0.0060	<0.0020	0.110	<0.0050	<0.010	<0.020	<0.020	<0.010	<0.0050
11/8/07	<1.0	1.2	<0.0060	0.0027	0.160	<0.0050	<0.010	0.015	<0.020	0.015	0.011
5/14/08	<1.0	1.6	<0.0060	0.0024	0.110	<0.0050	<0.010	0.017	<0.020	<0.010	<0.0050
11/17/08	<1.0	1.7	<0.0060	0.0020	0.140	<0.0050	<0.010	0.020	<0.020	<0.010	<0.0050
5/25/09	<1.0	1.1	<0.0060	0.0023	0.140	<0.0050	<0.010	0.022	<0.020	<0.010	0.0076
11/16/09	<1.0	1.4	<0.0060	0.0024	0.170	<0.0050	<0.010	<0.010	<0.020	<0.010	0.0069

MW-D

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
6/30/02	<0.03	<0.0010	<0.001	<0.005	<0.01	<0.004	<0.2	0.0086	<0.003	<0.025	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	0.309	<0.00500	<0.005	---	<0.00500	<0.0150	<0.0500	0.0110	0.0110	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	0.020	---	---
12/21/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.0081	<0.020	---	CLS
5/23/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
11/8/07	0.480	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.014	0.064	---	CLS
5/14/08	0.050	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	0.022	---	CLS
11/17/08	0.043	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.010	0.021	---	CLS
5/25/09	0.083	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	0.027	---	CLS
11/16/09	0.092	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	0.027	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-E

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
6/30/02	<0.025	<0.05	<0.002	<0.003	0.11	<0.001	<0.001	0.0077	<0.001	<0.001	---
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.157	<0.00100	<0.00500	0.00553	<0.005	<0.0050	<0.01
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	<0.050	<0.050	<0.0020	0.210	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
12/21/06	<1.0	<0.050	<0.0060	<0.0020	0.210	<0.0050	<0.010	0.043	<0.020	<0.010	<0.0050
5/23/07	<1.0	<0.050	<0.0060	<0.0020	0.230	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/8/07	<1.0	0.660	<0.0060	0.0026	0.240	<0.0050	<0.010	0.0010	<0.020	<0.010	<0.0050
5/14/08	<1.0	0.140	<0.0060	0.0024	0.210	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/17/08	<1.0	0.550	<0.0060	0.0024	0.220	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
5/25/09	<1.0	0.200	<0.0060	0.0027	0.180	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/16/09	<1.0	0.270	<0.0060	0.0023	0.210	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050

MW-E

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
6/30/02	<0.03	<0.0010	<0.001	<0.005	<0.01	0.0058	<0.2	0.011	<0.003	<0.0	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.005	<0.00500	<0.005	---	<0.00500	<0.0150	<0.0500	0.00966	0.0366	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
12/21/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.011	<0.020	---	CLS
5/23/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
11/8/07	0.120	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	0.023	---	CLS
5/14/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	<0.020	---	CLS
11/17/08	0.027	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS
5/25/09	<0.020	0.00022	<0.020	---	<0.010	<0.001	<0.100	0.012	<0.020	---	CLS
11/16/09	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.013	<0.020	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds
Florin-Perkins Landfill
Sacramento, California

Monitoring Well
MW-F

Sampling Date	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
6/30/02	<0.025	<0.05	<0.002	<0.003	0.16	<0.001	<0.001	0.0033	<0.001	<0.001	---
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.050	<0.050	<0.0150	<0.0150	0.180	<0.00100	<0.00500	0.00542	<0.005	<0.005	<0.01
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	<1.0	<0.050	<0.050	<0.0020	0.210	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
12/20/06	<1.0	<0.050	<0.0060	<0.0020	0.200	<0.0050	<0.010	0.043	<0.020	<0.010	<0.0050
5/23/07	<1.0	<0.050	<0.0060	<0.0020	0.210	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/8/07	<1.0	1.3	<0.0060	0.0023	0.280	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
5/14/08	<1.0	0.150	<0.0060	0.0020	0.190	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
11/17/08	<1.0	0.900	<0.0060	<0.0020	0.230	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050
5/25/09	<1.0	1.100	<0.0060	0.0023	0.230	<0.0050	<0.010	0.010	<0.020	<0.010	<0.0050
11/16/09	<1.0	1.300	<0.0060	0.0024	0.260	<0.0050	<0.010	<0.010	<0.020	<0.010	<0.0050

MW-F

Sampling Date	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	LAB
6/30/02	0.079	<0.0010	<0.001	<0.005	<0.01	0.0078	<0.2	0.0089	<0.003	<0.025	ARG
12/26/02	---	---	---	---	---	---	---	---	---	---	---
7/23/03	---	---	---	---	---	---	---	---	---	---	---
12/10/03	<0.005	<0.00500	<0.005	---	<0.00500	<0.0150	<0.0500	0.00806	<0.01	---	CEL
5/26/04	---	---	---	---	---	---	---	---	---	---	---
7/5/05	---	---	---	---	---	---	---	---	---	---	---
12/20/05	,0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
12/20/06	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.010	<0.020	---	CLS
5/23/07	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	<0.020	<0.020	---	CLS
11/8/07	0.066	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.015	0.050	---	CLS
5/14/08	<0.020	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.011	<0.020	---	CLS
11/17/08	0.025	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.012	<0.020	---	CLS
5/25/09	0.051	0.00020	<0.020	---	<0.010	<0.001	<0.100	0.016	<0.020	---	CLS
11/16/09	0.045	<0.00020	<0.020	---	<0.010	<0.001	<0.100	0.018	<0.020	---	CLS

TABLE IV

Summary of Results for Inorganic Compounds

Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Maximum Contamination Level for Drinking Water											
	Sulfide (incl.H_2S) (mg/l)	Aluminum (mg/l)	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Beryllium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Cobalt (mg/l)	Copper (mg/l)	Lead (mg/l)
---	---	1	0.006	0.05	1	0.004	0.005	0.05	---	1.3	0.015
Upper Tolerance Intervals (from Tables F-2 and F-5, Addendum to Annual 2009 Monitoring Report, by Veridian Environmental Inc.)											
MW-A	---	--- .	---	---	0.1	---	0.01	0.083	---	0.05	0.01
MW-E	---	---	---	---	0.24	---	---	0.01	---	---	---

Maximum Contamination Level for Drinking Water											
	Manganese (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Thallium (mg/l)	Tin (mg/l)	Vanadium (mg/l)	Zinc (mg/l)	Cyanide (mg/l)	
---	0.05	0.002	0.1	0.05	0.1	---	0.002	---	5	0.001	---
Upper Tolerance Intervals (from Tables F-2 and F-5, Addendum to Annual 2009 Monitoring Report, by Veridian Environmental Inc.)											
MW-A	0.064	---	0.05	---	---	---	---	0.05	0.0637	---	
MW-E	0.12	---	---	---	---	---	---	0.12	0.04	---	

TABLE IV

Summary of Results for Inorganic Compounds

Florin-Perkins Landfill
Florin-Perkins Road
Sacramento, California

Abbreviations:

mg/l	milligrams per liter
ug/l	micrograms per liter
ND	Not Detected above method detection limits
---	Not Analyzed

Labs:

CAS	Columbia analytical Services
West	West Laboratories
AAL	AnLab Analytical Laboratories
SEQ	Sequoia Analytical
ASL	Associated Laboratories
ARG	Argon Laboratories
Alpha	Alpha Analytical Laboratories
CEL	Calscience Environmental Laboratory
CLS	California Laboratory Services

APPENDIX G

HDR'S DOCUMENT ENTITLED

FIRST HALF 2010 GROUNDWATER MONITORING REPORT, MAY 2010, TEICHERT ASPEN I PROPERTY, SACRAMENTO, CALIFORNIA, HDR | E2M PROJECT NO.: 141770 (JUNE 15, 2010)

June 15, 2010

Ms. Becky Wood
Manager, Environmental Services
Teichert Materials
3500 American River Drive
Sacramento, CA 95864

Subject: First Half 2010 Groundwater Monitoring Report, May 2010
Teichert Aspen I Property, Sacramento, California
HDR | e^{2}M Project No.: 141770

Dear Ms. Wood:

engineering-environmental Management, Inc. (HDR | e^{2}M), an HDR Company is pleased to submit this *First Half 2010 Groundwater Monitoring Report, May 2010* to document field procedures and results from the groundwater monitoring event conducted on May 5, 2010 at the Teichert Aspen I Property (Site) along its western property boundary (adjacent to the southeast boundary of the Florin-Perkins Landfill and the north boundary of the L&D Landfill).

SCOPE OF WORK

The following Scope of Work outlines the activities conducted during this semiannual monitoring event:

- Recorded static groundwater levels in three monitoring wells on May 5, 2010,
- Collected groundwater samples from the three monitoring wells on May 5, 2010,
- Disposed of purge water in the Aspen 1 storm water collection pond,
- Delivered groundwater samples to Alpha Analytical Inc. in Sparks, NV,
- Analyzed groundwater samples for volatile organic compounds (VOCs), specific conductance or electrical conductivity (EC), total dissolved solids (TDS), chloride, nitrate as nitrogen, sulfate, total alkalinity, bicarbonate as $CaCO_3$, carbonate as $CaCO_3$, and hydroxide as $CaCO_3$, and
- Prepared this *First Half 2010 Groundwater Monitoring Report, May 2010*.

FIELD PROCEDURES

Static groundwater level measurements were obtained from three groundwater monitoring wells on May 5, 2010. Groundwater depths were measured relative to the north side of the well casings using an electronic water level indicator. Prior to taking a measurement, the cap was removed from each well and the water was allowed to equilibrate with atmospheric pressure for approximately 30 minutes. The depth to water data was used in the field to calculate the volume of standing water present in each well and later to determine static groundwater elevations. The water level indicator probe was decontaminated after each use by washing it in an Alconox® detergent solution followed by a tap-water rinse. The depth-to-water measurements were recorded on Monitoring Well Sampling Logs, copies of which are included in Appendix A.

HDR | e^{2}M
HDR Engineering, Inc

2365 Iron Point Road
Suite 300
Folsom, CA 95630-8709

Phone: (916) 817-4700
Fax: (916) 817-4747
www.hdrinc.com

RESULTS

Groundwater Levels

During this sampling event, groundwater elevations on Aspen 1 were -18.19 feet mean sea level (ft.msl) in well MW-1, -19.34 ft.msl in well MW-2, and -20.89 ft.msl in well MW-3. Groundwater was, on average, 53.1 feet below the tops of the casings. Groundwater elevations in wells MW-1, MW-2, and MW-3 increased an average of 1.71 feet since the November 2009 sampling event. Groundwater depth data was integrated with data from the adjoining L&D Landfill property collected on the same day. During this sampling event the groundwater gradient was measured to be 0.011 feet per feet (ft/ft) with a southerly flow direction. This compares to the November 2009 groundwater gradient of 0.0008 ft/ft and south-southwest flow direction. Groundwater elevation data is summarized in Table 1.

Analytical Results

Trichlorofluoromethane was detected only in well MW-2 at 1.2 micrograms per liter (µg/L). Current and historical laboratory analytical results are presented in Table 1. MW-1 showed historical highs in total alkalinity (500 mg/L), bicarbonate (500 mg/L), and chloride (33 mg/L). MW-2 showed historical highs in total alkalinity (260 mg/L), bicarbonate (260 mg/L), nitrate (13mg/L), chloride (89 mg/L), and specific conductance (920 µS/cm). MW-3 showed historical highs in total alkalinity (410 mg/L) and bicarbonate (410 mg/L).

Limitations

This report is based on available information and was prepared in accordance with currently accepted geologic, hydrogeologic, and engineering practices. No other warranty is implied or intended. This report has been prepared for the sole use of Teichert Land Co. and applies only to the subject site. Use of this report by third parties shall be at their sole risk. This report was prepared under the direct supervision of the California Professional Geologist whose signature appears below.

Should you have any questions or concerns, please call Mr. Jacob Ruffing at (916) 817-4756.

Sincerely,
HDR | e2M an HDR company

Charlie O'Neill

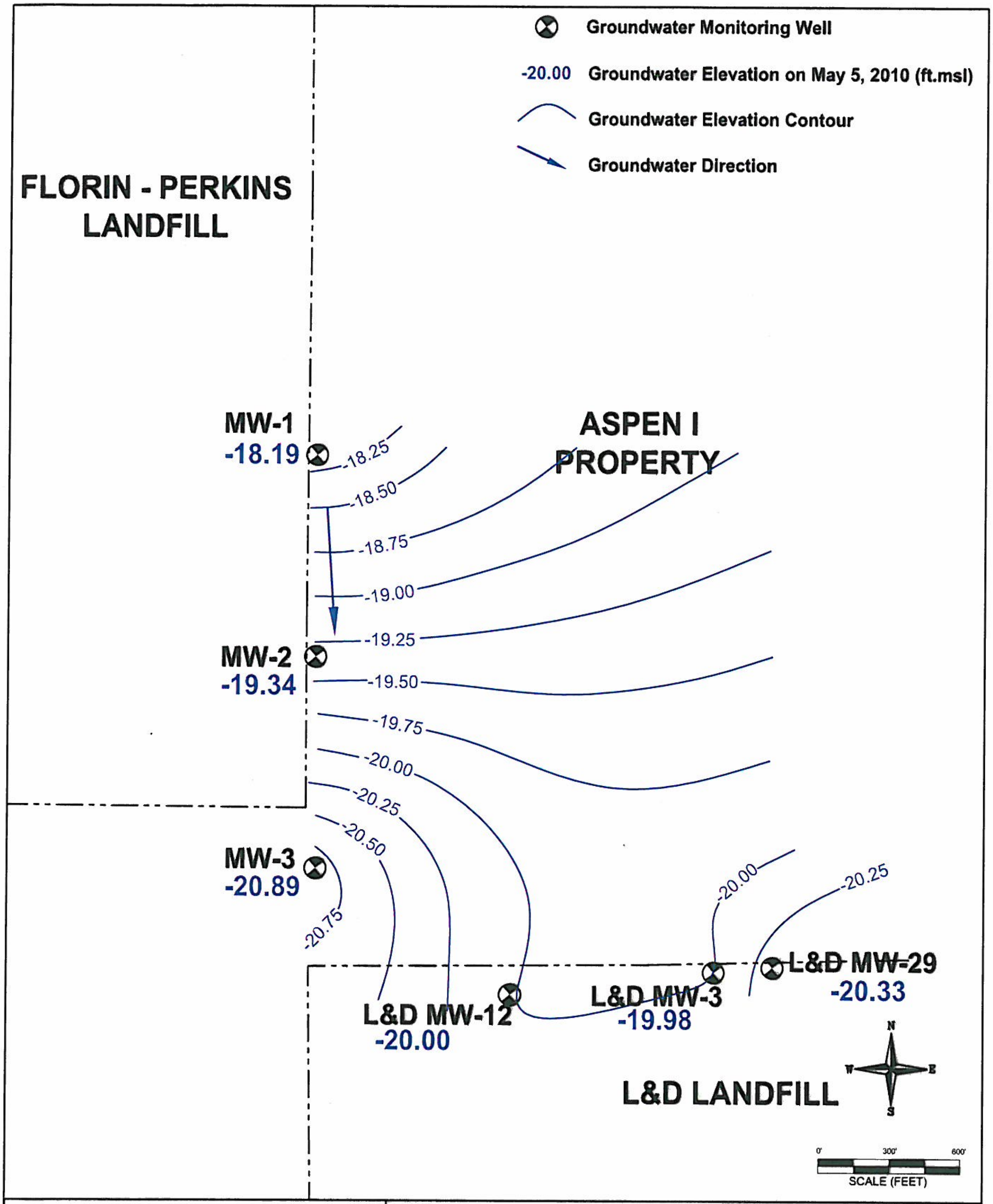
Jacob Ruffing
Project Manager

Charlie O'Neill, P.G.
Senior Professional Geologist #6401

Attachments:

- Table 1. Summary of Historical Groundwater Elevation Data and Analytical Results
- Figure 1. Groundwater Elevation Contour Map
- Appendix A – Monitoring Well Sampling Logs
- Appendix B – Laboratory Analytical Report and Chain-of-Custody Forms

cc: Mark McLoughlin, Stonebridge Properties
John Boss, Consultant



engineering-environmental Management, Inc.

PROJ NO: 141770
DATE: May 26, 2010
FILE: FIGURE 1.dwg
DRAWN BY: CM
CHECKED BY: JR

GROUNDWATER ELEVATION CONTOUR MAP

Teichert Aspen I
Sacramento, California

FIGURE:
1

APPENDIX A

MONITORING WELL SAMPLING LOGS

2365 Iron Point Road, Suite 300 Folsom, CA 95630 | Phone: 916.817.4700 | Fax: 916.852.7836

FIELD REPORT

Project Name: Teichert
Date: 5/5/10
HDR/e^{2}M Personnel: J. Roffing
Signature:
Agency (1):
Contractor (1):
Agency (2):
Contractor (2):

Purpose of Visit:

___Drilling
___Tank Removal/Installation
_X_Groundwater Sampling

___Site Inspection
___O & M Treatment System
___Other -

Time:	Description of Activities:
1200	Start
	-pick up sampling equipment
	-new locks on wells, have to contact people
	to get wells opened
	-Open wells and get water levels
1515	Sample MW-3
1545	Sample MW-2
1625	Sample MW-1
	dispose of purge water in collection pond
	cleanup/leave site/take samples to lab
1800	End

Sheet __ of __

MONITORING WELL SAMPLING LOG

SITE NAME/LOCATION: Teichert

PROJECT #: 141770002

DATE: 5/5/10

SAMPLER'S INITIALS: JR

WELL ID: MW-3

WELL DIAMETER (in): ______

WELL DEPTH (ft): 62

DEPTH TO WATER (ft): 54.77

WATER COLUMN Ht (ft): 7.23

STANDING WATER VOLUME (gal): 1.2

3 VOLUMES (gal): 3.7

To obtain standing volume in gallons, multiply the water column height by 0.17 for 2-inch well or 0.66 for a 4-inch well.

PURGE METHOD: Bailer or Mini-Whaler Pump
(circle the correct method)

SAMPLING METHOD: disposable PE bailer

PURGE MEASUREMENTS

Time	Gallons Purged	Temp (C)	pH	SC µS (~~mS~~)	DO (mg/L)	TDS ppm (~~ppt~~)	Comments
1455	0.5	20.5	7.25	1216	5.80	558	
	2.5	20.6	7.35	891	6.59	4.43	
	3.75	19.2	7.34	972	6.58	484	
							Sample Time/Date: 1515 5/5

WELL ID: MW-

WELL DIAMETER (in): ______

WELL DEPTH (ft): ______

DEPTH TO WATER (ft): ______

WATER COLUMN Ht (ft): ______

STANDING WATER VOLUME (gal): ______

3 VOLUMES (gal): ______

To obtain standing volume in gallons, multiply the water column height by 0.17 for 2-inch well or 0.66 for a 4-inch well.

PURGE METHOD: Bailer or Mini-Whaler Pump
(circle the correct method)

SAMPLING METHOD: disposable PE bailer

PURGE MEASUREMENTS

Time	Gallons Purged	Temp (C)	pH	SC (mS)	DO (mg/L)	TDS (ppt)	Comments
							Sample Time/Date:

APPENDIX B

LABORATORY ANALYTICAL REPORT AND CHAIN-OF-CUSTODY FORMS

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

HDR | E2M
2365 Iron Point Road
Folsom, CA 95630

Attn: Jacob Ruffing
Phone: (916) 852-7792
Fax: (916) 852-7836
Date Received : 05/06/10

Job: Teichert

Anions by IC
EPA Method 300.0

	Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: **MW-1**					
Lab ID : E2M10050602-01A	Chloride	33	0.50 mg/L	05/06/10 12:25	05/06/10 19:43
Date Sampled 05/05/10 16:25	Nitrate (NO3) - N	7.6	0.25 mg/L	05/06/10 12:25	05/06/10 19:43
	Sulfate (SO4)	44	0.50 mg/L	05/06/10 12:25	05/06/10 19:43
Client ID: **MW-2**					
Lab ID : E2M10050602-02A	Chloride	89	50 mg/L	05/06/10 12:25	05/06/10 20:01
Date Sampled 05/05/10 15:45	Nitrate (NO3) - N	13	0.25 mg/L	05/06/10 12:25	05/06/10 20:01
	Sulfate (SO4)	53	0.50 mg/L	05/06/10 12:25	05/06/10 20:01
Client ID: **MW-3**					
Lab ID : E2M10050602-03A	Chloride	17	0.50 mg/L	05/06/10 12:25	05/06/10 20:20
Date Sampled 05/05/10 15:15	Nitrate (NO3) - N	17	0.25 mg/L	05/06/10 12:25	05/06/10 20:20
	Sulfate (SO4)	38	0.50 mg/L	05/06/10 12:25	05/06/10 20:20

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 736-7522 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com

Alpha certifies that the test results meet all requirements of NELAC unless footnoted otherwise.

Alpha Analytical, Inc. currently holds appropriate and available California (#2019) and NELAC (01154CA) certifications for the data reported. Test results relate only to reported samples.

5/13/10
Report Date

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

HDR | E2M
2365 Iron Point Road
Folsom, CA 95630

Job: Teichert

Attn: Jacob Ruffing
Phone: (916) 852-7792
Fax: (916) 852-7836
Date Received : 05/06/10

Specific Conductance at 25°C
EPA Method 120.1

Parameter	Concentration	Reporting Limit	Date Extracted	Date Analyzed
Client ID: **MW-1** Lab ID : E2M10050602-01A Specific Conductance (at 25°C) Date Sampled 05/05/10 16:25	970	10 µS/cm	05/06/10	05/06/10
Client ID: **MW-2** Lab ID : E2M10050602-02A Specific Conductance (at 25°C) Date Sampled 05/05/10 15:45	920	10 µS/cm	05/06/10	05/06/10
Client ID: **MW-3** Lab ID : E2M10050602-03A Specific Conductance (at 25°C) Date Sampled 05/05/10 15:15	940	10 µS/cm	05/06/10	05/06/10

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 736-7522 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com
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5/1~~3~~6/10
Report Date

Alpha Analytical, Inc.

255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

HDR | E2M
2365 Iron Point Road
Folsom, CA 95630
Job: Teichert

Attn: Jacob Ruffing
Phone: (916) 852-7792
Fax: (916) 852-7836

Alpha Analytical Number: E2M10050602-01A
Client I.D. Number: MW-1

Sampled: 05/05/10 16:25
Received: 05/06/10
Extracted: 05/10/10
Analyzed: 05/10/10

Volatile Organics by GC/MS
EPA Method SW8260B

Compound	Concentration	Reporting Limit
1 Dichlorodifluoromethane	ND	1.0 µg/L
2 Chloromethane	ND	2.0 µg/L
3 Vinyl chloride	ND	1.0 µg/L
4 Chloroethane	ND	1.0 µg/L
5 Bromomethane	ND	2.0 µg/L
6 Trichlorofluoromethane	ND	1.0 µg/L
7 1,1-Dichloroethene	ND	1.0 µg/L
8 Dichloromethane	ND	2.0 µg/L
9 trans-1,2-Dichloroethene	ND	1.0 µg/L
10 1,1-Dichloroethane	ND	1.0 µg/L
11 cis-1,2-Dichloroethene	ND	1.0 µg/L
12 Bromochloromethane	ND	1.0 µg/L
13 Chloroform	ND	1.0 µg/L
14 2,2-Dichloropropane	ND	1.0 µg/L
15 1,2-Dichloroethane	ND	1.0 µg/L
16 1,1,1-Trichloroethane	ND	1.0 µg/L
17 1,1-Dichloropropene	ND	1.0 µg/L
18 Carbon tetrachloride	ND	1.0 µg/L
19 Benzene	ND	0.50 µg/L
20 Dibromomethane	ND	1.0 µg/L
21 1,2-Dichloropropane	ND	1.0 µg/L
22 Trichloroethene	ND	1.0 µg/L
23 Bromodichloromethane	ND	1.0 µg/L
24 cis-1,3-Dichloropropene	ND	1.0 µg/L
25 trans-1,3-Dichloropropene	ND	1.0 µg/L
26 1,1,2-Trichloroethane	ND	1.0 µg/L
27 Toluene	ND	0.50 µg/L
28 1,3-Dichloropropane	ND	1.0 µg/L
29 Dibromochloromethane	ND	1.0 µg/L
30 1,2-Dibromoethane (EDB)	ND	2.0 µg/L
31 Tetrachloroethene	ND	1.0 µg/L
32 1,1,1,2-Tetrachloroethane	ND	1.0 µg/L
33 Chlorobenzene	ND	1.0 µg/L
34 Ethylbenzene	ND	0.50 µg/L
35 m,p-Xylene	ND	0.50 µg/L
36 Bromoform	ND	1.0 µg/L
37 Styrene	ND	1.0 µg/L
38 o-Xylene	ND	0.50 µg/L
39 1,1,2,2-Tetrachloroethane	ND	1.0 µg/L
40 1,2,3-Trichloropropane	ND	2.0 µg/L
41 Isopropylbenzene	ND	1.0 µg/L
42 Bromobenzene	ND	1.0 µg/L
43 n-Propylbenzene	ND	1.0 µg/L
44 4-Chlorotoluene	ND	1.0 µg/L
45 2-Chlorotoluene	ND	1.0 µg/L
46 1,3,5-Trimethylbenzene	ND	1.0 µg/L
47 tert-Butylbenzene	ND	1.0 µg/L
48 1,2,4-Trimethylbenzene	ND	1.0 µg/L
49 sec-Butylbenzene	ND	1.0 µg/L
50 1,3-Dichlorobenzene	ND	1.0 µg/L
51 1,4-Dichlorobenzene	ND	1.0 µg/L
52 4-Isopropyltoluene	ND	1.0 µg/L
53 1,2-Dichlorobenzene	ND	1.0 µg/L
54 n-Butylbenzene	ND	1.0 µg/L
55 1,2-Dibromo-3-chloropropane (DBCP)	ND	3.0 µg/L
56 1,2,4-Trichlorobenzene	ND	2.0 µg/L
57 Naphthalene	ND	2.0 µg/L
58 Hexachlorobutadiene	ND	2.0 µg/L
59 1,2,3-Trichlorobenzene	ND	2.0 µg/L
60 Surr: 1,2-Dichloroethane-d4	91	(70-130) %REC
61 Surr: Toluene-d8	103	(70-130) %REC
62 Surr: 4-Bromofluorobenzene	98	(70-130) %REC

ND = Not Detected

Roger Scholl Randy Gardner Walter Hinchman

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5/13/10
Report Date

Alpha Analytical, Inc.
255 Glendale Ave. • Suite 21 • Sparks, Nevada 89431-5778
(775) 355-1044 • (775) 355-0406 FAX • 1-800-283-1183

ANALYTICAL REPORT

HDR | E2M
2365 Iron Point Road
Folsom, CA 95630
Job: Teichert

Attn: Jacob Ruffing
Phone: (916) 852-7792
Fax: (916) 852-7836

Alpha Analytical Number: E2M10050602-03A
Client I.D. Number: MW-3

Sampled: 05/05/10 15:15
Received: 05/06/10
Extracted: 05/10/10
Analyzed: 05/10/10

Volatile Organics by GC/MS
EPA Method SW8260B

	Compound	Concentration	Reporting Limit			Compound	Concentration	Reporting Limit	
1	Dichlorodifluoromethane	ND	1.0	µg/L	36	Bromoform	ND	1.0	µg/L
2	Chloromethane	ND	2.0	µg/L	37	Styrene	ND	1.0	µg/L
3	Vinyl chloride	ND	1.0	µg/L	38	o-Xylene	ND	0.50	µg/L
4	Chloroethane	ND	1.0	µg/L	39	1,1,2,2-Tetrachloroethane	ND	1.0	µg/L
5	Bromomethane	ND	2.0	µg/L	40	1,2,3-Trichloropropane	ND	2.0	µg/L
6	Trichlorofluoromethane	ND	1.0	µg/L	41	Isopropylbenzene	ND	1.0	µg/L
7	1,1-Dichloroethene	ND	1.0	µg/L	42	Bromobenzene	ND	1.0	µg/L
8	Dichloromethane	ND	2.0	µg/L	43	n-Propylbenzene	ND	1.0	µg/L
9	trans-1,2-Dichloroethene	ND	1.0	µg/L	44	4-Chlorotoluene	ND	1.0	µg/L
10	1,1-Dichloroethane	ND	1.0	µg/L	45	2-Chlorotoluene	ND	1.0	µg/L
11	cis-1,2-Dichloroethene	ND	1.0	µg/L	46	1,3,5-Trimethylbenzene	ND	1.0	µg/L
12	Bromochloromethane	ND	1.0	µg/L	47	tert-Butylbenzene	ND	1.0	µg/L
13	Chloroform	ND	1.0	µg/L	48	1,2,4-Trimethylbenzene	ND	1.0	µg/L
14	2,2-Dichloropropane	ND	1.0	µg/L	49	sec-Butylbenzene	ND	1.0	µg/L
15	1,2-Dichloroethane	ND	1.0	µg/L	50	1,3-Dichlorobenzene	ND	1.0	µg/L
16	1,1,1-Trichloroethane	ND	1.0	µg/L	51	1,4-Dichlorobenzene	ND	1.0	µg/L
17	1,1-Dichloropropene	ND	1.0	µg/L	52	4-Isopropyltoluene	ND	1.0	µg/L
18	Carbon tetrachloride	ND	1.0	µg/L	53	1,2-Dichlorobenzene	ND	1.0	µg/L
19	Benzene	ND	0.50	µg/L	54	n-Butylbenzene	ND	1.0	µg/L
20	Dibromomethane	ND	1.0	µg/L	55	1,2-Dibromo-3-chloropropane (DBCP)	ND	3.0	µg/L
21	1,2-Dichloropropane	ND	1.0	µg/L	56	1,2,4-Trichlorobenzene	ND	2.0	µg/L
22	Trichloroethene	ND	1.0	µg/L	57	Naphthalene	ND	2.0	µg/L
23	Bromodichloromethane	ND	1.0	µg/L	58	Hexachlorobutadiene	ND	2.0	µg/L
24	cis-1,3-Dichloropropene	ND	1.0	µg/L	59	1,2,3-Trichlorobenzene	ND	2.0	µg/L
25	trans-1,3-Dichloropropene	ND	1.0	µg/L	60	Surr: 1,2-Dichloroethane-d4	90	(70-130)	%REC
26	1,1,2-Trichloroethane	ND	1.0	µg/L	61	Surr: Toluene-d8	104	(70-130)	%REC
27	Toluene	ND	0.50	µg/L	62	Surr: 4-Bromofluorobenzene	102	(70-130)	%REC
28	1,3-Dichloropropane	ND	1.0	µg/L					
29	Dibromochloromethane	ND	1.0	µg/L					
30	1,2-Dibromoethane (EDB)	ND	2.0	µg/L					
31	Tetrachloroethene	ND	1.0	µg/L					
32	1,1,1,2-Tetrachloroethane	ND	1.0	µg/L					
33	Chlorobenzene	ND	1.0	µg/L					
34	Ethylbenzene	ND	0.50	µg/L					
35	m,p-Xylene	ND	0.50	µg/L					

ND = Not Detected

Roger Scholl Randy Gardner Walter Hinchman

Roger L. Scholl, Ph.D., Laboratory Director • • Randy Gardner, Laboratory Manager • • Walter Hinchman, Quality Assurance Officer
Sacramento, CA • (916) 366-9089 / Las Vegas, NV • (702) 736-7522 / Carson, CA • (714) 386-2901 / info@alpha-analytical.com

Alpha certifies that the test results meet all requirements of NELAC unless footnoted otherwise.

Alpha Analytical, Inc. currently holds appropriate and available California (#2019) and NELAC (01154CA) certifications for the data reported. Test results relate only to reported samples.

5/13/10
Report Date

Date:
11-May-10

QC Summary Report

Work Order:
10050602

Method Blank

Type: **MBLK** Test Code: **EPA Method 300.0**
File ID: **24** Batch ID: **24178** Analysis Date: **05/06/2010 12:37**
Sample ID: **MB-24178** Units : **mg/L** Run ID: **IC_1_100506B** Prep Date: **05/06/2010 12:25**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Chloride	ND	0.5								
Nitrate (NO3) - N	ND	0.25								
Sulfate (SO4)	ND	0.5								

Laboratory Fortified Blank

Type: **LFB** Test Code: **EPA Method 300.0**
File ID: **25** Batch ID: **24178** Analysis Date: **05/06/2010 12:56**
Sample ID: **LFB-24178** Units : **mg/L** Run ID: **IC_1_100506B** Prep Date: **05/06/2010 12:25**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Chloride	53	0.5	50		106	90	110			
Nitrate (NO3) - N	5.14	0.25	5		103	90	110			
Sulfate (SO4)	109	0.5	100		109	90	110			

Sample Matrix Spike

Type: **LFM** Test Code: **EPA Method 300.0**
File ID: **28** Batch ID: **24178** Analysis Date: **05/06/2010 13:51**
Sample ID: **10050603-01ALFM** Units : **mg/L** Run ID: **IC_1_100506B** Prep Date: **05/06/2010 12:25**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Chloride	118	0.5	100	11.35	106	80	120			
Nitrate (NO3) - N	10.2	0.25	10	0	102	80	120			
Sulfate (SO4)	201	0.5	200	0	101	80	120			

Sample Matrix Spike Duplicate

Type: **LFMD** Test Code: **EPA Method 300.0**
File ID: **29** Batch ID: **24178** Analysis Date: **05/06/2010 14:10**
Sample ID: **10050603-01ALFMD** Units : **mg/L** Run ID: **IC_1_100506B** Prep Date: **05/06/2010 12:25**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Chloride	119	0.5	100	11.35	107	80	120	117.8	0.8(15)	
Nitrate (NO3) - N	10	0.25	10	0	100	80	120	10.16	1.1(15)	
Sulfate (SO4)	203	0.5	200	0	101	80	120	201.3	0.6(15)	

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Date:
12-May-10

QC Summary Report

Work Order:
10050602

Method Blank

Type: **MBLK**
Test Code: **EPA Method 120.1 / SM2510B / SW9050A**
File ID:
Batch ID: **W0506CN**
Analysis Date: **05/06/2010 15:40**
Sample ID: **MBLK-W0506CN**
Units : **µS/cm**
Run ID: **WETLAB_100506F**
Prep Date: **05/06/2010 15:40**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Specific Conductance (at 25°C)	ND	10								

Laboratory Control Spike

Type: **LCS**
Test Code: **EPA Method 120.1 / SM2510B / SW9050A**
File ID:
Batch ID: **W0506CN**
Analysis Date: **05/06/2010 14:35**
Sample ID: **LCS-W0506CN**
Units : **µS/cm**
Run ID: **WETLAB_100506F**
Prep Date: **05/06/2010 14:35**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Specific Conductance (at 25°C)	1440	10	1410		102	98	102			

Comments:

Calculations are based off of raw (non-rounded) data. However, for reporting purposes, all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

Date: *12-May-10*

QC Summary Report

Work Order: 10050602

Method Blank
File ID: **10051004.D**
Sample ID: **MBLK MS12W0510A**
Type: **MBLK**
Test Code: **EPA Method SW8260B**
Batch ID: **MS12W0510A**
Run ID: **MSD_12_100510A**
Units : **µg/L**
Analysis Date: **05/10/2010 10:07**
Prep Date: **05/10/2010 10:07**

Analyte	Result	PQL	SpkVal	SpkRefVal	%REC	LCL(ME)	UCL(ME)	RPDRefVal	%RPD(Limit)	Qual
Dichlorodifluoromethane	ND	1								
Chloromethane	ND	2								
Vinyl chloride	ND	1								
Chloroethane	ND	1								
Bromomethane	ND	2								
Trichlorofluoromethane	ND	1								
1,1-Dichloroethene	ND	1								
Dichloromethane	ND	2								
trans-1,2-Dichloroethene	ND	1								
1,1-Dichloroethane	ND	1								
cis-1,2-Dichloroethene	ND	1								
Bromochloromethane	ND	1								
Chloroform	ND	1								
2,2-Dichloropropane	ND	1								
1,2-Dichloroethane	ND	1								
1,1,1-Trichloroethane	ND	1								
1,1-Dichloropropene	ND	1								
Carbon tetrachloride	ND	1								
Benzene	ND	0.5								
Dibromomethane	ND	1								
1,2-Dichloropropane	ND	1								
Trichloroethene	ND	1								
Bromodichloromethane	ND	1								
cis-1,3-Dichloropropene	ND	1								
trans-1,3-Dichloropropene	ND	1								
1,1,2-Trichloroethane	ND	1								
Toluene	ND	0.5								
1,3-Dichloropropane	ND	1								
Dibromochloromethane	ND	1								
1,2-Dibromoethane (EDB)	ND	2								
Tetrachloroethene	ND	1								
1,1,1,2-Tetrachloroethane	ND	1								
Chlorobenzene	ND	1								
Ethylbenzene	ND	0.5								
m,p-Xylene	ND	0.5								
Bromoform	ND	1								
Styrene	ND	1								
o-Xylene	ND	0.5								
1,1,2,2-Tetrachloroethane	ND	1								
1,2,3-Trichloropropane	ND	2								
Isopropylbenzene	ND	1								
Bromobenzene	ND	1								
n-Propylbenzene	ND	1								
4-Chlorotoluene	ND	1								
2-Chlorotoluene	ND	1								
1,3,5-Trimethylbenzene	ND	1								
tert-Butylbenzene	ND	1								
1,2,4-Trimethylbenzene	ND	1								
sec-Butylbenzene	ND	1								
1,3-Dichlorobenzene	ND	1								
1,4-Dichlorobenzene	ND	1								
4-Isopropyltoluene	ND	1								
1,2-Dichlorobenzene	ND	1								
n-Butylbenzene	ND	1								
1,2-Dibromo-3-chloropropane (DBCP)	ND	3								
1,2,4-Trichlorobenzene	ND	2								
Naphthalene	ND	2								
Hexachlorobutadiene	ND	2								
1,2,3-Trichlorobenzene	ND	2								
Surr: 1,2-Dichloroethane-d4	8.8		10		88	70	130			
Surr: Toluene-d8	10.4		10		104	70	130			
Surr: 4-Bromofluorobenzene	9.56		10		96	70	130			

Billing Information :
E2M
9563 S. Kingston Ct.

Englewood, CO 80112

CHAIN-OF-CUSTODY RECORD

Alpha Analytical, Inc.

255 Glendale Avenue, Suite 21 Sparks, Nevada 89431-5778
TEL: (775) 355-1044 FAX: (775) 355-0406

CA

Page: *1 of 1*

WorkOrder : E2M10050602

Report Due By : 5:00 PM On : 13-May-2010

Client:
HDR | E2M
2365 Iron Point Road
Suite 300
Folsom, CA 95630

Report Attention	Phone Number	EMail Address
Jacob Ruffing	(916) 852-7792 x	jacob.ruffing@hdrinc.com

EDD Required : **Yes**

Sampled by : Jacob Ruffing

PO :

Client's COC # : none

Job : Teichert

Cooler Temp	Samples Received	Date Printed
4 °C	06-May-2010	**06-May-2010**

QC Level : S3 = Final Rpt, MBLK, LCS, MS/MSD With Surrogates

				No. of Bottles			Requested Tests								
Alpha Sample ID	**Client Sample ID**	**Matrix**	**Collection Date**	**Alpha**	**Sub**	**TAT**	**300_0_W**	**ALKALINITY_W**	**CONDUCTIVITY**	**TDS_W**	**VOC_W**				**Sample Remarks**
E2M10050602-01A	MW-1	AQ	05/05/10 16:25	5	0	5	NO3, SO4, Cl	Alk (Carb, Bicarb, Total, Hydroxide)	Conductivity	TDS	8260_C				
E2M10050602-02A	MW-2	AQ	05/05/10 15:45	5	0	5	NO3, SO4, Cl	Alk (Carb, Bicarb, Total, Hydroxide)	Conductivity	TDS	8260_C				
E2M10050602-03A	MW-3	AQ	05/05/10 15:15	5	0	5	NO3, SO4, Cl	Alk (Carb, Bicarb, Total, Hydroxide)	Conductivity	TDS	8260_C				

Comments: Security seals intact. Frozen ice. :

	Signature	Print Name	Company	Date/Time
Logged in by:	Elizabeth Adcox	Elizabeth Adcox	**Alpha Analytical, Inc.**	5.6.10 10:11

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.
The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for the report.
Matrix Type : AQ(Aqueous) AR(Air) SO(Soil) WS(Waste) DW(Drinking Water) OT(Other) Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other

APPENDIX H

SCS'S DOCUMENT ENTITLED
SECOND SEMI-ANNUAL AND ANNUAL 2009, MONITORING REPORT, L AND D LANDFILL, SACRAMENTO, CALIFORNIA

SCS ENGINEERS

Second Semi-Annual and Annual 2009 Monitoring Report
L and D Landfill
Sacramento, California

Prepared for:

L and D Landfill Limited Partnership
P.O. Box 255009
Sacramento, CA 95865-5009

Prepared by:

SCS ENGINEERS
3117 Fite Circle, Suite 108
Sacramento, CA 95827

January 29, 2010
File No. 01204084.02, Task 11

Offices Nationwide
www.scsengineers.com

Second Semi-Annual and
Annual 2009
Monitoring Report
L and D Landfill
Sacramento, California

Prepared for:

L and D Landfill Limited Partnership
P.O. Box 255009
Sacramento, CA 95865-5009

Prepared by:

SCS ENGINEERS
3117 Fite Circle, Suite 108
Sacramento, CA 95827

January 29, 2010
File No. 01204084.02, Task 11

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CERTIFICATION

This Second Semi-Annual and Annual 2009 Monitoring Report, L and D Landfill, Sacramento, California was prepared under my direct supervision. I am a California Professional Geologist, pursuant to Section 7850 of the Business and Professional Code.

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 direct knowledge or inquiry of other individuals immediately responsible for obtaining 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.

E. WAYNE
PEARCE
No.4191

E. Wayne Pearce, P.G.
California Professional Geologist No. 4191

1.0 INTRODUCTION

Beginning in the second quarter 2006, SCS Engineers (SCS) assumed duties for monitoring and reporting at the L and D Landfill in Sacramento. These duties were previously completed by ENGEO of Roseville, California. To transition the monitoring and reporting program as smoothly as possible, SCS followed the sampling and analysis plan established by the prior contractor and has prepared this Second Semi-annual and Annual 2009 Monitoring Report in a format similar to previous monitoring reports, which have been acceptable to the Regional Water Quality Control Board (RWQCB). Descriptions of subsurface geological and hydrogeological conditions are based on previous work of others. Certain information in this report, such as solid waste monitoring data and leachate field measurement data, were provided by the facility operator.

Future reports may be modified slightly from this format to conform to SCS's standard of reporting. Also, current field sampling methods will be evaluated and, if appropriate for modification, SCS will prepare a proposed revision to the existing Sampling and Analysis Plan and submit the proposed revision to RWQCB for review and approval.

In September 2009, downhole video logging was performed in Wells 30 and 31 to inspect for possible damage. Results of the investigation confirmed both wells were damaged and could no longer be used for groundwater monitoring purposes, as required in the site's Waste Discharge Requirements (WDRs) and associated Monitoring and Reporting Program (MRP), Order R5-2002-0082. Video logging results and proposed details for decommissioning Wells MW-30 and MW-31 and installing replacement wells MW-30R and MW-31R were included in SCS's *Work Plan to Decommission and Reinstall Groundwater Monitoring Wells 30 and 31* (Jan, 2010). MW-30 and MW-31 could not be sampled during the November 2009 monitoring event due to the wells being damaged.

2.0 WATER QUALITY PROTECTION STANDARD REPORT

The L and D Landfill is located near the corner of South Watt Avenue and Fruitridge Road in the southeastern area of the City of Sacramento, Sacramento County, California. Figure 1 is a vicinity map of L and D Landfill and the surrounding areas. Figure 2 is a schematic map of the L and D Landfill showing the locations of monitoring wells, monitoring points, and other major site features (Figures are presented following the text section of this report). Monitoring at the site is carried out under Regional Water Quality Control Board (RWQCB) Waste Discharge Requirements (WDRs) and Monitoring and Reporting Program (MRP) No. R5-2002-0082.

The infiltration pond in the northeast corner of the site is the only body of surface water that could potentially be affected by failure of the control systems. The infiltration pond would be negatively impacted by a failure of the air stripper to remove volatile compounds in water pumped from the extraction wells. There would likewise be a negative impact on the infiltration pond if the Corrective Action Plan (CAP) extraction wells delivered a non-volatile constituent of concern (COC) to the air stripper. Storm water flows off the landfill areas and into the infiltration pond through constructed ditches. These ditches have storm water monitoring points at the positions shown on Figure 2.

There are two aquifer zones monitored under the WDR/MRP. A stratigraphic horizon exists between approximately –30 and –60 feet Mean Sea Level (MSL) and is largely occupied by a sand and fine gravel aquifer in which the matrix typically grades from relatively coarse material at depth, to fine silty sand at its upper margin. This aquifer is capped with finer-grained overbank deposits that have not been found to contain perched water. This aquifer is the uppermost aquifer at the site where it passes under the waste management units (WMU). It is at risk from any material leaking downward from the WMU. Other more substantial aquifers underlie the uppermost aquifer. Detection monitoring is carried out at four locations in the second aquifer at positions downgradient from the WMU (monitoring wells 8, 9, 11, and 17). Monitoring well 14 (MW-14) is a background well screened in the second aquifer.

The point of compliance for this landfill is the vertical plane penetrating the uppermost aquifer, which is aligned with the southern and western boundaries of the WMU and identified as LF-1. Table 2-1 provides the groundwater monitoring network and the compliance designation either as a background well, point-of-compliance well, groundwater extraction (corrective action) well, or other monitoring point, for both waste management units LF-1 and LF-2, and for the upper and lower aquifers.

In addition to the groundwater monitoring compliance points, monitoring is also conducted for the influent and effluent waters at the air stripping unit, the leachate collection and removal system, and the percolation pond.

TABLE 2-1
L and D LANDFILL GROUNDWATER MONITORING POINTS

WELL NUMBER [1]	AQUIFER DESIGNATION	COMPLIANCE DESIGNATION
LANDFILL UNIT LF-1		
12	Upper	Background
13	Upper	Background
29	Upper	Background
30	Upper	Background
31	Upper	Background
2A	Upper	Point of Compliance
4	Upper	Point of Compliance
5	Upper	Point of Compliance
18	Upper	Corrective Action [2]
19	Upper	Corrective Action [2]
20	Upper	Corrective Action [2]
21	Upper	Corrective Action [2]
22	Upper	Corrective Action [2]
23	Upper	Corrective Action [2]
24	Upper	Corrective Action [2]
15	Upper	Other Monitoring Point [3]
16	Upper	Other Monitoring Point [3]
32	Upper	Other Monitoring Point [3]
14	Lower	Background
8	Lower	Point of Compliance
9	Lower	Point of Compliance
11	Lower	Point of Compliance
17	Lower	Other Monitoring Point [3]
LANDFILL UNIT LF-2		
12	Upper	Background
13	Upper	Background
29	Upper	Background
30	Upper	Point of Compliance
31	Upper	Point of Compliance
16	Upper	Other Monitoring Point [3]
14	Lower	Background
17	Lower	Other Monitoring Point [3]

NOTES:

1 - Some wells are listed more than once because they serve more than one regulatory compliance function.

2 - Corrective action wells are extraction wells and are also along the point of compliance boundary.

3 - Other monitoring points are wells that do not meet the regulatory definition of background wells or point of compliance wells. These are located off-site and downgradient of the facility.

3.0 FACILITY MONITORING REPORT

The L and D Landfill is divided into three major waste management units (WMUs): LF-1 consists of the East Pit and West Pit WMUs, and LF-2 consists of the North Area Expansion WMU.

LF-1 is the original unlined portion of the landfill site and LF-2 is the lined unit consisting of seven modules. The LCRS and liner construction of the seventh and final module were completed in August of 2007. Modules 5, 6, and 7 received waste during 2009. During the first six months of the year, waste deposition was concentrated in the eastern half of Module 5 and all of Module 7. During the second six months of the year, waste deposition was concentrated in modules 5, 6, and 7.

Standard observations for the period are summarized below by WMU. Weekly Standard Observation Reports for the second half of 2009 are given in Appendix A.

3.1 STANDARD OBSERVATIONS – LF-1 EAST PIT WMU

1. For the Unit – there was no evidence of ponded waters, odors, or erosion during the second half of 2009.

2. For the perimeter of the Unit - there was no evidence of liquid leaving or entering the Unit, odors, or erosion for the second half of 2009.

3. Receiving waters - there were no receiving waters in this area during the second half of 2009.

3.2 STANDARD OBSERVATIONS – LF-1 WEST PIT WMU

1. For the Unit – there was no evidence of ponded water, odors, or erosion during the second half of the 2009.

2. For the perimeter of the Unit - there was no evidence of liquid leaving or entering the Unit, nor odors or erosion during the second half of 2009.

3. Receiving waters - there are two High Density Polyethylene (HDPE) lined ponds in the WMU referred to as the “lower pond” and the “upper pond,” which serve as retention ponds during the winter months. Water from both ponds is pumped into drainage channels and gravity-fed to the percolation pond in the NE corner of the landfill. The bottom pond is pumped when the depth at the deepest point approaches 30" and the upper pond is pumped at about 18" in depth. The water is characteristically silty-brown to gray-brown with no odors present. During the first half of 2009, the upper pond was pumped eleven times and the lower pond was pumped seven times. During the second half of 2009, the upper pond was pumped five times, and the lower pond was pumped three times.

3.3 STANDARD OBSERVATIONS – LF-2 NORTH AREA EXPANSION WMU

1. For the Unit – there was no evidence of ponded water, odors, or erosion during the second half of 2009.

2. For the perimeter of the Unit - there was no evidence of liquid leaving or entering the Unit, nor odors or erosion during the second half of 2009.

3. There are two ponding areas within the unit that received water during the second half of 2009: the final percolation pond and one retention pond. One diversion pond from the percolation pond was also used during 2009. The water entering the final pond as overflow from the diversion pond was clear, treated, odorless water from the air stripper, occasionally mixed with storm water run-off from the peripheral drainage system in the East and West Pit WMUs. During the first half of the year the diversion pond was pumped seven times into the final percolation pond prior to reaching an overflow condition. During the second half of 2009, the diversion pond was pumped twice into the final percolation pond prior to reaching an overflow condition. During the summer months, the diversion pond typically does not reach an overflow condition as the site uses the accumulated water for onsite dust control.

4. A lined retention pond was constructed over the waste in the northern corner of Module 7 during the first half of the year to contain storm-water runoff from portions of Modules 5, 6 and 7. During the first half of 2009, this pond was pumped eight times into the diversion pond. During the second half of 2009, waste elevations reached a sufficient elevation to allow surface water drainage into the diversion pond. Therefore, the lined retention pond was not constructed for the second half of 2009.

4.0 SOLID WASTE MONITORING REPORT

Beginning in the second half of 2009, the landfill changed the method of tonnage calculations to be consistent with reporting guidelines of the State of California Board of Equalization. The descriptions utilized in previous monitoring reports have been altered and, in some instances, been moved into separate tables. As with previous reports, the tonnages of all of the materials are still accounted for. The formats for the updated tables will be utilized in subsequent monitoring reports.

Table 4-1 shows the waste material discharged to the landfill that is subject to Board of Equalization fees from January 1, 2009, through December 31, 2009, by type of material for each quarter. Table 4-2 shows the tonnages of waste materials diverted for non-cover beneficial reuse in 2009. Table 4-3 shows the tonnage of waste material diverted for cover or alternate daily cover (ADC). Table 4-4 shows the tonnage of clean dirt diverted for cover for the year. Table 4-5 shows the tonnage of waste material diverted for offsite use or recycling for the year. And Table 4-6 shows the sources of waste by percentage for the year.

TABLE 4-1.
WASTE MATERIAL DISCHARGED TO THE LANDFILL IN 2009
(Subject to Board of Equalization Fees)

TYPE OF WASTE MATERIAL	TONNAGE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Unrecyclable Dirt	3,889.58	4,018.88	4,937.79	6,735.70
Ash	-	-	-	684.30
Paper and Plastic	788.23	799.56	663.30	395.37
Demolition and Construction	14,420.13	16,059.78	15,751.73	15,488.98
Mobile Homes	125.87	137.00	82.00	90.00
Green and Wood Waste	481.75	650.99	636.97	586.66
Miscellaneous	1,589.21	1,593.96	1,904.87	1,812.61
Non-Friable Asbestos	334.17	851.89	892.41	699.66
Tires	730.21	391.37	717.46	2,126.92
Recycling Residuals	2,555.31	3,179.32	3,789.45	3685.48
TOTAL	24,914.46	27,682.75	29,375.98	32,305.68

Total waste discharged for the 1st half of 2009, subject to fees, was 52,597.75 tons.
Total waste discharged for the 2nd half of 2009, subject to fees, was 61,681.66 tons.

Total waste discharged for 2009, subject to fees, was 114,278.87 tons.

TABLE 4-2.
WASTE MATERIAL DIVERTED FOR NON-COVER BENEFICIAL REUSE IN 2009

TYPE OF MATERIAL	TONNAGE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Dirty Concrete	1,339.27	2,767.56	3,335.51	2,510.68
Dirty Asphalt	80.56	99.38	246.17	116.54
Concrete Roof Tile	78.53	60.62	125.09	187.48
Concrete From MRF	784.28	1,024.61	1,066.93	807.04
TOTAL (6c)	2,282.64	3,952.17	4,773.70	3,621.74

Total waste material diverted in the 1st half of 2009 was 6,234.81 tons.
Total waste material diverted in the 2nd half of 2009 was 8,395.44 tons.

Total waste material diverted for non-cover beneficial reuse in 2009 was 14,630.25 tons.

TABLE 4-3.
WASTE MATERIAL DIVERTED FOR COVER OR ADC IN 2009

TYPE OF MATERIAL	TONNAGE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Recyclable Dirt	12,766.79	12,977.26	15,845.80	9,401.70
Tire Chips	415.65	922.99	704.80	92.42
MRF Unders	1,215.95	1,211.79	1,278.12	1,332.57
Sand	261.72	230.57	112.17	133.91
Water Treatment Plant Residuals	511.25	-	596.71	619.46
Dirt from MRF	2,285.66	2,957.72	3,222.96	2,319.76
TOTAL	17,457.02	18,300.33	21,760.56	13,899.82

Total material diverted for cover in the 1st half of 2009 was 35,757.35 tons.
Total material diverted for cover in the 2nd half of 2009 was 35,660.38 tons.

Total material diverted for cover or ADC in 2009 was 71,417.73 tons.

TABLE 4-4.
CLEAN DIRT DIVERTED FOR COVER IN 2009

TYPE OF MATERIAL	TONNAGE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Clean Dirt	253.70	1,667.68	1,705.97	2,032.83
TOTAL	253.70	1,667.68	1,705.97	2,032.83

Total clean dirt received in the 1st half of 2009 was 1,921.38 tons.
Total clean dirt received in the 2nd half of 2009 was 3,738.80 tons.

Total clean dirt received in 2009 was 5,660.18 tons.

TABLE 4-5.
WASTE MATERIAL DIVERTED OFFSITE FOR RECYCLING OR STOCKPILED FOR OFFSITE USE IN 2009

MATERIAL	TONNAGE			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Wood	1,962.63	2,076.54	2,014.33	1,752.63
Metal	721.16	180.07	794.67	566.46
Cardboard	249.30	206.48	183.97	191.15
Greenwaste	323.26	383.32	246.60	617.77
Clean Concrete	1,147.90	1,081.78	1,041.59	789.71
Sheetrock	803.30	825.97	1,097.42	632.78
Clean Asphalt	60.01	70.17	55.39	50.60
PVC Pipe	30.59	54.84	61.81	23.07
E-Waste	10.45	8.57	5.32	-
Consumer Recyclables	1.27	1.52	1.89	1.93
Tires	21.91	33.15	5.93	21.11
Dirt	189.09	-	-	-
TOTAL (5)	5,520.87	4,922.41	5,508.92	4,647.21

Total material recycled in the 1st half of 2009 was 10,443.28 tons.
Total material recycled in the 2nd half of 2009 was 10,156.13 tons.

Total material recycled in 2009 was 20,599.41 tons.

TABLE 4-6.
SOURCE OF WASTE DISCHARGED TO THE LANDFILL IN 2009

SOURCES	PERCENTAGE OF TOTAL (%)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
City of Sacramento	58.8	58.2	60.9	61.4
Sacramento County (excluding the City of Sacramento)	24.6	26.1	29.6	23.4
Outside Sacramento County	16.6	15.7	9.5	15.2
TOTAL	100	100	100	100

4.1 LOAD CHECKING PROGRAM

Every load that is dumped on either the commercial disposal area or the small load disposal area is checked by field personnel for hazardous waste; designated wastes such as refrigerators, TV's, tires, etc.; and universal wastes such as fluorescent light tubes, batteries, etc., and putrescible garbage.

A "daily contents" report is filed on all rejected loads and on two randomly selected loads from each disposal area whether they are acceptable or unacceptable. This system has been in place since 1999. Copies of the reports are available in the administrative office.

At the small load disposal area, there were rejections of hazardous wastes in the form of paint and paint products, poisons, car batteries, etc. Designated wastes are either accepted for an additional fee and separated from the waste stream for off-site disposal, or returned to the customer. Only a fraction of one percent of the commercial loads were rejected or contained hazardous waste.

4.2 MINIMUM DISCHARGE ELEVATION

Waste deposition in 2009 was confined to Modules 5, 6, and 7 with a minimum discharge elevation of 28 feet MSL. Figures 3 and 4 are maps showing the area and elevations which were filled during the first half and second half of 2009, respectively, with a comparison to the final closure design contours.

4.3 CAPACITY OF LANDFILL

Approximately 93,923 cubic yards (cy) of air space was filled at the landfill during the first half of 2009 by discharged solid waste, inert utilization, and daily and intermediate soil cover. During the second half of 2009, approximately 115,143 cy of air space was filled at the landfill by discharged solid waste, inert utilization, and daily and intermediate soil cover. Deducting 115,143 cy from 2,408,827 cy of air space remaining as of June 30, 2009, yields 2,293,684 cy of air space remaining as of December 31, 2009. With an estimated total capacity of 16,000,000 cy, this equates to 14.3% of the landfill space remaining, and converts to a total landfill space utilized of 13,706,316 cy.

5.0 LEACHATE MONITORING

5.1 FIELD PARAMETERS

Landfill staff monitored the leachate collection and removal system (LCRS) per the requirements of WDR R5-2002-0082. This was performed more frequently during the wettest months of the year. The depth-to-liquid is measured to determine the elevation of leachate in the system. Leachate pumped from the sump is recorded as gallons pumped per event and cumulative gallons pumped for the year. Table 5-1 presents the monthly field parameters for pH and electrical conductivity measurements collected by SCS in 2009. A spreadsheet containing leachate level measurements and cumulative leachate volumes for 2009 is contained in Appendix B.

TABLE 5-1.
pH AND ELECTRICAL CONDUCTIVITY MEASUREMENTS
OF THE LCRS – 2009

Date	pH	EC (µmhos/cm)
Jan	NA	NA
Feb	7.40	3,050
March	7.46	2,970
April	7.41	2,860
May	7.28	2,780
June	6.84	2,080
July	7.03	2,420
August	6.99	3,100
September	7.19	3,330
October	7.15	3,220
November	6.50	3,790
December	7.36	3,200

NA = Data Not Available

Figure 5 shows the leachate elevations for 2009 measured by landfill personnel prior to any system pumping. On many of the days shown, the leachate elevation exceeded the -17.25 elevation limit prior to pumping. Figure 6 shows the leachate elevations for 2009 after leachate was pumped from the LCRS. All elevations shown are below the facility leachate elevation limit of -17.25 feet MSL except for one measurement collected in February.

5.2 MONITORING PARAMETERS

The LCRS sump was sampled in May and November 2009, per the Monitoring Parameters as defined in Attachment “C” and “D” of WDR Order No. R5-2002-0082. The certified laboratory reports and chain of custody documentation are included on the CD-ROM in Appendix D.

5.3 ANALYSIS RESULTS

Leachate samples were collected and analyzed for field parameters (discussed above) plus laboratory analysis. Samples collected on May 15, 2009, were analyzed for semi-annual parameters, including general minerals and volatile organic compounds (VOCs). Samples collected on November 5, 2009 were analyzed for annual monitoring parameters (constituents of concern). Constituents of concern included general minerals and VOCs, dissolved inorganics, semi-volatile organic compounds (SVOCs), organochlorine pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, and organophosphorus pesticides, as defined in the MRP. Table 5-2A presents results for the first semi-annual sampling and Table 5-2B presents results for the second semi-annual sampling.

5.4 EVALUATION OF RESULTS

Results for the two leachate samples analyzed in 2009 were generally similar to results seen the previous year. There are a few exceptions, including trace detections of orthophosphate, dissolved cobalt, and dissolved mercury in the November 5, 2009 sample, which were not detected in 2008. Dissolved aluminum and a trace concentration of dissolved lead were detected in the 2008 samples, but were not detected during 2009. Methyl tert-butyl ether (MTBE) was detected during 2009 at similar concentrations to the 2008 samples. Acetone was detected in the 2009 samples at similar concentrations. Acetone was also detected in the November 2009 field equipment and trip blank samples. Benzene, which was previously detected at a trace concentration, was not detected in the 2009 samples.

5.5 EFFECTIVENESS OF LEACHATE CONTROL SYSTEM

Leachate monitoring is accomplished by activating a dedicated pump in the leachate sump. At a minimum, two samples are collected per year from the LCRS and are analyzed for the monitoring parameters specified in MRP R5-2002-0082. Additional samples are collected and analyzed monthly, during the winter months, to conform to the requirements of the Sacramento County Regional Water Treatment Plant, when leachate is sent to the plant. The discharge line from the dedicated pump is fitted with a sampling port, and this has proved to be effective in delivering representative samples for analysis.

The required depth-to-water measurements in the leachate sump are collected weekly. During the winter months, particularly following storms, the measurements are made more frequently to assure that leachate does not rise to unacceptable levels. The measurements are made through the riser pipe, which has a surveyed reference point for the measurements. Since the riser pipe is not vertical, its angle of slope is taken into account when computing the water surface elevation in the sump. The facilities have proved to be effective in providing reliable data for these determinations.

Annual testing of the LCRS laterals was conducted in May 2009 (see remarks in Leachate Elevations After Pumping Table in Appendix B for dates). This was accomplished by flushing leachate into the laterals in sufficient quantity (typically about 2,000 gallons) to verify that the laterals were clear of any obstructions, and confirming later reappearance of the leachate in the sump. Additionally, the 6-inch header was flushed in an attempt to improve flow into the leachate sump. This flushing seems to have improved the header flow.

Table 5-2A
L and D LANDFILL
LEACHATE ANALYTICAL RESULTS
FIRST SEMI-ANNUAL PERIOD 2009

Sample Location	Sample Date	GENERAL MINERALS AND METHODS										DETECTED VOCs[1] EPA 8260	
		Total Dissolved Solids EPA 160.1	Bicarbonate EPA 310.1	Chloride EPA 300.0	Total Alkalinity EPA 310.1	Nitrate (as N) EPA 300.0	Sulfate (as SO4) EPA 300.0	Calcium EPA 200.7	Magnesium EPA 200.7	Potassium EPA 200.7	Sodium EPA 200.7	Acetone	Methyl tert-butyl Ether
		mg/L										µg/L	
LCRS Sump	5/15/2009	1,900	1,400	380	1,200	0.36	27	130	180	41	260	12	12

mg/L - Milligrams per liter

µg/L - Micrograms per liter

[1] Tentatively Identified Compounds:

1-Chloro-1-fluoroethane = 2.8 µg/L
Diethyl ether = 2.0 µg/L
tert-Butyl alcohol = 140 µg/L

Table 5-2B.
L and D LANDFILL
LEACHATE ANALYTICAL RESULTS
SECOND SEMI-ANNUAL 2009

Sample Location	Date of Collection	General Minerals & Dissolved Inorganic/Metals															
		Total Dissolved Solids	Total Alkalinity	Bicarbonate Alkalinity	Chloride	Nitrate as N	Sulfate	Carbonate	Bromide	Flouride	Nitrite as N	Orthophosphate	Sulfite	Dissolved Calcium	Dissolved Magnesium	Dissolved Potassium	Dissolved Sodium
		mg/L															
Leachate Sump	**11/05/09**	2,100	1,200	1,500	470	0.46	19	ND	7	0.45	0.23	0.071	ND	140	200	36	340

Sample Location	Date of Collection	General Minerals & Dissolved Inorganic/Metals (Continued)																						
		Dissolved Aluminum	Dissolved Chromium	Dissolved Cobalt	Dissolved Copper	Dissolved Iron	Dissolved Lead	Dissolved Manganese	Dissolved Antimony	Dissolved Arsenic	Dissolved Barium	Dissolved Beryllium	Dissolved Cadmium	Hexavalent Chromium	Total Cyanide	Dissolved Mercury	Dissolved Molybdenum	Dissolved Nickel	Dissolved Selenium	Dissolved Silver	Total Sulfide	Dissolved Thallium	Dissolved Tin	Dissolved Vanadium	Dissolved Zinc
		µg/l													mg/L	µg/l					mg/L	µg/l			
Leachate Sump	**11/05/09**	ND	5.2J	4.7J	5.3J	170	ND	730	ND	14	1,100	ND	ND	ND	0.015	0.15J	ND	130	9.1J	ND	ND	ND	ND	13	30

Method of Analysis:		8260B		8270C	8141A	8081A	8082	8151A
Sample Location	Date of Collection	VOCs[1]		Semi-Volatile Organic Compounds	Organophosphorus Pesticides	Organochlorine Pesticides	PCBs	Chlorinated Herbicides
		Methyl t-Butyl Ether	Acetone					
		µg/l						
Leachate Sump	**11/05/09**	**11**	**17[a]**	ND	ND	ND	ND	ND

[1] **11/05/09 Tentatively Identified Compounds (TICs):**
1-Chloro-1-fluoroethane = 1.9 µg/l
Diethyl ether = 2.4 µg/l
2,5-Dimethyl-2,5-cyclohexadiene-1,4-dione = 39 µg/l
3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionic aci = 32 µg/l
Hexobarbital-2(or 4)-methyl derivative = 52 µg/l
Tetrahydro-2H-thiopryan = 16 µg/l
Unknown Compd. @ 12.04 R.T. = 30 µg/l
Unknown Compd. @ 6.99 R.T. = 98 µg/l
Unknown Compd. @ 7.56 R.T. = 15 µg/l
Unknown Compd. @ 8.29 R.T. = 17 µg/l
Unknown Compd. @ 8.39 R.T. = 17 µg/l
Unknown Compd. @ 9.44 R.T. = 16 µg/l

Notes:
Only compounds detected in one or more samples are listed in the table, except Tentatively Identified Compounds (TICs) are listed in the notes. For full list of compounds see lab report.
µg/l = micrograms per liter
mg/l = milligrams per liter
J = Estimated value. Result is less than method reporting limit but greater than the method detection limit.
ND = Non detect
a = Acetone detected in associated equipment blank, field blank, and trip blank

6.0 GROUNDWATER ELEVATION MONITORING

6.1 MEASUREMENTS

Depth to groundwater measurements were collected quarterly during the 2009 monitoring period. The water level elevations calculated from these measurements are presented in Table 6-1 and shallow zone monitoring well data from the first, second, third, and fourth quarters 2009 are contoured in Figures 7, 8, 9, and 10, respectively.

During the fourth quarter, erroneous depth-to-water measurements were recorded for monitoring wells MW-12 and MW-31 on November 4, 2009. Depth-to-water measurements were recorded as 70.31 feet below top of casing (ft toc) and 51.40 ft toc for MW-12 and MW-31, respectively. These measurements are not consistent with historic data and are thought to have been inadvertently transposed in the field. Additionally, measurements were not collected from monitoring wells MW-3 and MW-10 on November 4, 2009. Groundwater measurements were re-measured on November 24, 2009, from all of the monitoring wells. Measurements from both dates are presented in Table 6-1, but only measurements from the November 24, 2009 event are contoured in Figure 10.

Water levels in the fourth quarter of 2009 were similar to those observed in the third quarter, with slight fluctuations. Water levels from both the third and fourth quarter 2009 are consistent with those collected during the first and second quarters 2009.

The measuring points at all of the wells were resurveyed on July 6, 2009, and September 10, 2009. The survey data prior to July 6, 2009, was used to calculate the water level elevations for the first quarter 2009. The survey data from July 6, 2009, was used to calculate the second quarter 2009 water level elevations. The survey data from the September 10, 2009 survey was used to calculate the third and fourth quarter 2009 water level elevations.

6.2 GRADIENTS AND GROUNDWATER FLOW VELOCITY

Groundwater flow under the site is generally from the northeast corner of the facility (where the infiltration pond contributes to groundwater recharge) to the extraction wells system along the southern boundary of the site. The highest groundwater elevation for all four quarters occurred in the northeast area of the site at MW-25. The lowest water levels (for extraction wells) occurred in extraction well MW-24 during the first and third quarters, and in MW-20 during the second and fourth quarters.

The following description provides the maximum and minimum elevations each quarter and the calculated groundwater gradient between those points:

> 1Q2009 – Water level maximum in MW-25 (-20.52 feet MSL) to MW-24 (-26.52 feet MSL) = 6.00 feet. Given a separation distance of approximately 3,727 feet, this equates to a groundwater gradient of approximately 0.0016 ft/ft.
>
> 2Q2009 – Water level maximum in well MW-25 (-19.16 feet MSL) to extraction well MW-20 (-25.52 feet MSL) = 6.36 feet. Given a separation distance of

approximately 1,861 feet, this equates to a groundwater gradient of approximately 0.0034 ft/ft.

3Q2009 – Water level maximum in well MW-25 (-21.21 feet MSL) to extraction well MW-24 (-27.02 feet MSL) = 5.81 feet. Given a separation distance of approximately 3,727 feet, this equates to a groundwater gradient of approximately 0.0016 ft/ft.

4Q2009 – Water level maximum in well MW-25 (-21.20 feet MSL) to extraction well MW-20 (-24.58 feet MSL) = 3.38 feet. Given a separation distance of approximately 1,861 feet, this equates to a groundwater gradient of approximately 0.0018 ft/ft.

The groundwater velocity is determined by the strength of the gradient, the hydraulic conductivity, and effective porosity of the aquifer material, according to the Darcy equation. Hydraulic conductivity values measured at L and D Landfill in wells fully penetrating the uppermost aquifer range from about 25 to about 85 feet per day with a modal value of about 50 feet per day. The aquifer matrix is thought to have a porosity of about 0.25. Therefore, the estimated groundwater velocity during the each quarter of 2009 was:

First Quarter 2009: (50 ft/day x 0.0016 ft/ft) ÷ 0.25 = 0.32 feet/day = 102 ft/year.
Second Quarter 2009: (50 ft/day x 0.0034 ft/ft) ÷ 0.25 = 0.68 feet/day = 248 ft/year.
Third Quarter 2009: (50 ft/day x 0.0016 ft/ft) ÷ 0.25 = 0.32 feet/day = 102 ft/year.
Fourth Quarter 2009: (50 ft/day x 0.0018 ft/ft) ÷ 0.25 = 0.36 feet/day = 131 ft/year.

The estimated groundwater velocity for the first and third quarters is similar. However, the estimated velocity for the second and fourth quarters varies. The differences in gradient and velocity for the second and fourth quarters are not a function of the groundwater actually slowing down or speeding up; it is the difference in distance between the wells used to calculate the gradient for the first and third quarters (MW-25 and MW-24) and the second and fourth quarters (MW-25 and MW-20).

TABLE 6-1.
GROUNDWATER ELEVATIONS AT THE L and D LANDFILL
FIRST QUARTER THROUGH FOURTH QUARTER 2009

WELL NUMBER	MP ELEVATION (ft msl) (7/6/09 Survey)*	MP ELEVATION (ft msl) (9/10/09 Survey)*	1 Q 2009		2 Q 2009		3 Q 2009		4 Q 2009 (11/04/09)		4 Q 2009 (11/24/09)[1]	
			DEPTH TO WATER (feet)	WATER ELEVATION (ft msl)	DEPTH TO WATER (feet)	WATER ELEVATION (ft msl)	DEPTH TO WATER (feet)	WATER ELEVATION (ft msl)	DEPTH TO WATER (feet)	WATER ELEVATION (ft msl)	DEPTH TO WATER (feet)	WATER ELEVATION (ft msl)
2A	48.34	47.99	72.88	-24.54	70.46	-22.12	73.16	-25.17	72.30	-24.31	72.21	-24.22
3	32.70	32.62	56.12	-23.42	53.54	-20.84	58.39	-25.77	NC		54.55	-21.93
4	45.78	45.23	69.96	-24.18	68.14	-22.36	70.06	-24.83	69.35	-24.12	69.26	-24.03
5	43.48		67.21	-23.73	65.51	-22.03	68.41	-24.93	66.22	-22.74	66.16	-22.68
6	51.16	50.69	76.10	-24.94	74.19	-23.03	76.49	-25.80	75.28	-24.59	75.23	-24.54
7	50.77	50.45	75.98	-25.21	74.40	-23.63	76.29	-25.84	74.91	-24.46	74.82	-24.37
8	47.50	47.30	72.08	-24.58	70.39	-22.89	72.53	-25.23	71.43	-24.13	71.34	-24.04
9	46.21	46.11	71.81	-25.60	68.44	-22.23	72.18	-26.07	70.00	-23.89	69.89	-23.78
10	48.46	46.69	72.39	-23.93	70.29	-21.83	72.41	-25.72	NC		70.33	-23.64
11	48.46	46.67	70.65	-22.19	70.05	-21.59	71.49	-24.82	70.20	-23.53	70.11	-23.44
12	33.63		56.32	-22.69	54.22	-20.59	56.71	-23.08	Erroneous data collected[2]		55.31	-21.68
13	29.49		52.57	-23.08	50.16	-20.67	52.91	-23.42	51.90	-22.41	51.90	-22.41
14	28.69		53.55	-24.86	50.60	-21.91	54.01	-25.32	52.34	-23.65	52.22	-23.53
15	42.53		67.77	-25.24	66.10	-23.57	68.14	-25.61	66.96	-24.43	66.86	-24.33
16	41.39		67.10	-25.71	64.75	-23.36	67.26	-25.87	66.35	-24.96	65.57	-24.18
17	41.15		67.81	-26.66	65.31	-24.16	68.18	-27.03	65.62	-24.47	66.22	-25.07
18	47.47		72.91	-25.44	71.46	-23.99	73.03	-25.56	71.70	-24.23	71.70	-24.23
19	48.69		74.06	-25.37	72.84	-24.15	74.22	-25.53	72.85	-24.16	72.70	-24.01
20	50.37		75.89	-25.52	75.89	-25.52	76.14	-25.77	74.85	-24.48	74.95	-24.58
21	48.98		74.19	-25.21	73.65	-24.67	74.37	-25.39	73.30	-24.32	73.35	-24.37
22	48.15		73.06	-24.91	72.87	-24.72	73.81	-25.66	72.35	-24.20	72.30	-24.15
23	46.63		72.14	-25.51	72.04	-25.41	72.51	-25.88	70.90	-24.27	70.80	-24.17
24	46.14		72.66	-26.52	71.55	-25.41	73.16	-27.02	69.80	-23.66	69.80	-23.66
25	28.48	28.01	49.00	-20.52	47.64	-19.16	49.22	-21.21	49.23	-21.22	49.21	-21.20
26	34.79	34.47	57.71	-22.92	56.81	-22.02	58.19	-23.72	56.07	-21.60	56.06	-21.59
28	28.77	28.27	50.16	-21.39	48.96	-20.19	50.63	-22.36	49.77	-21.50	49.82	-21.55
29	32.03	31.68	53.56	-21.53	52.52	-20.49	53.79	-22.11	53.87	-22.19	53.78	-22.10
30	70.71		95.20	-24.49	92.89	-22.18	93.14	-22.43	93.94	-23.23	93.90	-23.19
31**	58.96	58.34	70.49	-23.04	80.22	-21.26	80.82	-22.48	Erroneous data collected[2]		81.26	-22.92
32***	44.38		69.13	-24.75	67.16	-22.78	70.31	-25.93	68.79	-24.41	68.67	-24.29

*Measuring points were resurveyed on July 6, 2009 and again on 9/10/09. Previous survey data was used to calculate the 1Q2009 elavations. 7/10/09 survey data was used to calculate the 2Q2009 elevations. 9/10/09 survey data was used to calculate the 3Q2009 and 4Q2009 elevations.

**Casing was extended following the 1Q09 depth to water measurement. Prevous survey elevation of 47.45 ft msl used to calculate groundwater elevation for 1Q09.

***Depth to water was recorded as 76.16 on field sheets for 2Q2009 event, but is believed to be 67.16.

[1] Depth to water readings were collected twice during the fourth quarter because not all wells were accessable and data for wells 12 and 31 appeared erroneous during the 11/04/09 data collection event.

[2] Depth to water measurements were recorded at well 12 (70.35 feet) and well 31 (51.40 feet). These are not believed to represent accurate readings for these locations, and it is possible the data was switched between wells on field data sheets. Depth to water readings were collected again on 11/24/2009.

ft msl - feet above mean sea level

MP - measuring point

NC = Not collected

7.0 DETECTION MONITORING

7.1 UNSATURATED ZONE

The unsaturated zone monitoring device designated LYS-1, and situated next to the access to the LCRS, was checked regularly for fluid throughout the 2009 monitoring period by the facility operator. LYS-1 was dry during the entire period, and therefore, no detection monitoring sample was collected and reported for the unsaturated zone.

7.2 GROUNDWATER

The groundwater monitoring wells were sampled in May and November 2009 for the semi-annual sampling required by the WDRs/MRP. Samples were analyzed for field measurements and monitoring parameters as specified in Attachment “C” of the Waste Discharge Requirements. Purging and sampling protocols were performed in accordance with the Sampling and Analysis Plan submitted by ASE Engineering in January 2003. The field notes describing purging and sampling, and the chain of custody documentation, for the second semiannual 2009 sampling event are presented in Appendix C. The certified laboratory reports are included on a compact disc in Appendix D.

Groundwater samples were collected between May 12 and 15, 2009, for the first semi-annual 2009 event, and on November 4 and 9 through 12, 2009, for the second semi-annual 2009 event. Samples were collected from monitoring wells MW-2A, MW-4, MW-5, MW-8, MW-9, MW-11 through 24, and MW-29 through MW-32 for both events, with the exception of MW-30 and MW-31, which could not be sampled during the second semi-annual 2009 event due to both wells being damaged. Duplicate samples were collected from MW-14 during the first semi-annual event, and MW-9 and MW-32 during the second semi-annual event.

7.2.1 Field Parameter Results

Field parameter results for monitoring well sampling conducted in May and November 2009 are shown on Table 7-1 and are within expected ranges and similar to previous results.

7.2.2 Monitoring Parameters

Monitoring well samples collected in May and November 2009 were analyzed by BC Laboratories for the monitoring parameters defined in Attachment C of MRP No. R5-2002-0082. These parameters include TDS, alkalinity, major anions, major cations, and VOCs. Annual results are shown in Table 7-2.

TABLE 7-1.
2009 GROUNDWATER FIELD PARAMETER RESULTS

Sample Location	Date Sampled	Field Measurements/Observations			
		pH (units)	Specific Conductance (µmhos)	Temperature (ºC)	Turbidity (NTU)
MW-2A	05/13/09	6.91	883	23.3	4
	11/11/09	6.71	775	22.3	28
MW-4	05/13/09	6.95	915	23.5	0
	11/11/09	6.43	1470	25.3	0
MW-5	05/15/09	7.19	915	22.7	0
	11/09/09	6.07	597	23.3	0
MW-8	05/13/09	7.36	391	22.7	0
	11/11/09	7.14	213	22.1	1
MW-9	05/13/09	7.11	351	23.3	0
	11/11/09	7.13	303	24.0	0
MW-11	05/13/09	7.16	879	23.3	0
	11/11/09	6.80	980	22.3	2
MW-12	05/13/09	7.44	1070	23.1	3
	11/09/09	6.73	1270	18.7	26
MW-13	05/14/09	7.06	893	23.7	1
	11/09/09	7.13	707	19.2	22
MW-14	05/14/09	7.36	757	23.7	1
	11/09/09	6.48	637	19.5	0
MW-15	05/15/09	7.46	515	22.9	0
	11/10/09	6.86	300	20.0	1
MW-16	05/15/09	7.56	797	23.7	0
	11/10/09	7.71	160	20.8	1
MW-17	05/15/09	7.06	433	23.1	5
	11/10/09	6.84	1080	20.3	1
MW-18	05/12/09	7.16	747	22.1	0
	11/04/09	6.83	584	22.6	0
MW-19	05/12/09	6.88	905	21.9	0
	11/04/09	7.01	603	23.0	0
MW-20	05/12/09	7.14	819	21.9	16
	11/04/09	6.75	811	23.6	0
MW-21	05/12/09	6.84	817	22.3	0
	11/04/09	6.72	690	22.8	0
MW-22	05/12/09	6.87	771	22.9	0
	11/04/09	6.82	644	22.4	0
MW-23	05/12/09	7.09	931	22.1	12
	11/04/09	6.90	831	24.9	0
MW-24	05/14/09	7.06	985	22.9	0
	11/04/09	6.58	923	22.3	0
MW-29	05/14/09	6.77	753	23.1	0
	11/11/09	7.01	651	18.7	0
MW-30	05/15/09	6.86	1070	23.9	16
MW-31	05/14/09	6.96	1090	22.7	6
MW-32	05/12/09	7.02	719	23.1	0
	11/10/09	6.94	756	20.1	0

TABLE 7-2.
L and D Landfill
2009 Groundwater Analytical Results

Method of Analysis:		SM2320B	SM2540C	300.0				200.7				8260B																								
		Wet Chemistry		Ions				Total Metals				Volatile Organic Compounds															TICs (VOCs)*									
Sample Location	Date of Collection	Total Alkalinity	Total Dissolved Solids	Chloride	Nitrate as N	Bicarbonate	Sulfate as SO4	Calcium	Magnesium	Sodium	Potassium	Chlorobenzene	Chloroform	Chloromethane	1,2-Dichlorobenzene	1,4-Dichlorobenzene	1,1-Dichloroethane	1,2-Dichloroethane	cis-1,2-Dichloroethene	Methylene chloride	Methyl t-butyl ether	Tetrachloroethene	Toluene	Trichloroethene	Trichlorofluoromethane	Vinyl chloride	1,1-Dichloro-1-fluoroethane	1-Chloro-1-fluoroethane	Chlorodifluoromethane	Chlorofluoromethane	Dichlorofluoromethane	Diethyl ether	Dimethyl sulfide	Isopropyl alcohol	Tetrahydrofuran	Unknown compound @ 15.87 r.t.
		mg/L										µg/L																								
MW-2A	05/13/09	350	480	24		430	26	71	44	16	3.2						0.13J		**2.7**										**0.98**							
	11/12/09	350	490	22		430	23	73	46	15	3.3		0.080JB				0.15J		**2.4**									**0.76**	**0.85**			1.5J				
MW-4	05/13/09	110	210	10	1.9	130	5.3	25	9.3	13	2.0																									
	11/11/09	580	840	70		710	52	140	81	29	4.4	0.48J									**0.59**								**3.9**			**2.1**			13J	**0.69**
MW-5	05/15/09	240	430	14	2.3	290	50	62	32	12	2.9											0.46J		0.17J					**1.1**							
	11/09/09	260	440	18	1.5	320	68	72	39	13	3.0						0.11J		0.27J			**0.65**		0.27J	0.19J											
MW-8	05/13/09	87	170	7.9	1.5	110	3.0	19	7.3	12	1.8																									
	11/11/09	92	180	7.6	1.6	110	3.0	20	8.5	12	1.8			**0.74B**																						
MW-9	05/13/09	110	200	10	1.9	130	5.5	25	9.3	14	2.1																							87J		
	11/11/09	130	240	10	1.9	150	7.4	31	12	13	2.2			**0.58B**																						
MW-9D**	11/11/09	130	230	10	1.9	150	7.5	31	12	13	2.2																									
MW-11	05/13/09	470	660	36	2.8	570	43	100	55	29	3.4																									
	11/11/09	410	580	45	0.58	500	22	110	41	27	3.9			**0.75B**			0.19J												**1.7**			1.8J				
MW-12	05/13/09	580	750	18	9.6	710	36	140	62	28	3.8																									
	11/09/09	600	720	13	9.8	730	31	140	67	29	4.1																									
MW-13	05/13/09	290	450	18	6.3	360	24	80	24	24	3.6																									
	11/09/09	250	420	23	1.4	300	36	68	27	18	2.7																									
MW-14	05/14/09	300	460	19	5.2	360	30	91	19	25	4.2																									
	11/09/09	290	470	17	4.9	360	29	89	19	23	4.4																									
MW-14D***	05/14/09	300	410	18	5.0	360	30	88	19	25	4.3																									
MW-15	05/15/09	110	250	7.6	2.0	140	22	23	15	17	2.7																									
	11/10/09	110	250	7.6	2.2	140	22	24	16	15	2.1																									
MW-16	05/15/09	79	170	4.6	1.3	96	4.3	16	6.2	11	2.1																									
	11/10/09	73	160	4.2	1.2	89	1.9	16	5.3	9.6	2.0																									
MW-17	05/15/09	73	150	4.1	1.2	89	1.8	15	4.9	11	1.9																									
	11/10/09	480	440	39	2.1	580	24	110	59	23	4.0						**0.56**		**1.7**			**1.4**		**0.66**												
MW-18	05/12/09	300	440	24	3.3	370	22	63	35	19	2.6						0.40J		**1.0**									**0.77**	**0.34**							
	11/04/09	290	470	22	3.7	350	18	64	37	18	2.7						0.37J		**0.76**			0.24J		0.25J	0.12J			**0.67**	**0.99**							
MW-19	05/12/09	300	430	24	2.2	360	14	60	32	19	2.7						**0.50**		**2.0**			0.36J		0.21J	0.41J		**2.4**	**0.84**	**2.0**		**0.93**					
	11/04/09	310	480	22	2.0	380	12	66	38	17	2.8						0.49J		**1.9**			0.37J			0.35J		**1.6**	**1.4**	**1.5**		**1.7**					
MW-20	05/12/09	420	430	21	1.2	510	26	91	40	23	4.2					0.43J	**2.1**		**1.5**			0.37J		0.28J	0.39J				**6.7**	**2.8**	**4.7**					
	11/04/09	450	630	20	1.1	550	25	110	50	23	4.3					0.47J	**2.1**	0.18J	**1.8**			0.52		0.43J	0.30J				**7.8**	**3.2**	**4.5**	**2.2**				
MW-21	05/12/09	360	460	23	1.6	440	34	76	38	21	3.6						**0.70**		**2.2**			0.32J							**4.3**	**0.68**	**0.95**					
	11/04/09	360	530	21	1.4	440	31	80	43	20	3.7					0.10J	**0.59**		**2.2**			0.28J		0.26J	0.16J				**3.8**		**0.60**	0.89J				
MW-22	05/12/09	320	480	23	0.70	390	32	67	37	18	2.8	0.14J			**1.1**	0.25J	0.13J		**3.0**									**0.29**	**1.2**							
	11/04/09	330	500	22	0.63	400	29	73	43	18	3.0	0.13J			**0.87**	0.19J	0.14J		**2.2**					0.24J		0.15J		**1.2**	**1.3**			0.96J				
MW-23	05/12/09	410	590	37	1.0	510	27	85	47	22	3.1	0.21J							**1.0**										**2.9**							
	11/04/09	440	640	37	0.77	530	27	95	55	24	3.3	0.25J					0.16J		**0.94**		0.15J	0.17J							**3.0**							
MW-24	05/13/09	450	630	40	1.2	550	45	99	54	29	3.2																		**1.0**							
	11/04/09	440	680	36	1.3	540	44	97	56	28	3.2		0.080JB																**1.1**			1.4J				
MW-29	05/14/09	290	430	17	7.2	350	18	74	27	22	3.0																									
	11/11/09	290	420	13	7.7	350	16	74	29	22	3.1		0.080JB																							
MW-30	05/14/09	230	280	12	0.073J	280	0.72J	49	23	14	2.4										**3.2**		0.14J					**13**					**12**			
MW-31	05/14/09	350	510	22	5.4	430	28	85	33	24	3.6																									
MW-32	05/12/09	330	480	42	2.5	400	28	72	39	22	2.9						**5.1**		**0.54**	0.32J		**0.52**		**0.57**	**0.96**				**8.6**	**1.0**	**6.7**					
	11/10/09	340	370	29	2.6	420	21	80	43	22	3.4			**0.99B**			**6.4**		**0.82**			**1.1**		**1.1**	**4.0**						**0.78**					
MW-32D ******	11/10/09	340	360	29	2.6	420	21	80	42	23	3.4						**5.7**		**0.66**			**0.96**		**1.0**	**3.6**						**0.78**					

Blank Cell = Analyte was not detecte

*TIC = Tentatively Identified Compound. The result should be considered an estimated valu

** = Called out as MW-100 in lab repor

*** = Called out as MW-101 in lab repor

**** = Called out as MW-101 in lab repor

J = Detected below the reporting limit but above the method detection limit

mg/L = Milligrams per liter

µg/L - Micrograms per liter

D = Duplicate Sample

B = Compound detected in trip, field, and/or equipment blank

7.2.3 Evaluation of Results

Volatile Organic Compounds have been detected and confirmed in groundwater under the landfill, indicating a release has occurred. The facility is already in corrective action as a result of these detections.

Inorganic parameters for samples collected in May and November 2009 show consistent results, with the exception of MW-4 and MW-17. For both samples, inorganic results were higher in November, but similar to historic data. MW-4 and MW-17 inorganic parameters will be sampled during the first semi-annual 2010 event, and these results will be reviewed to confirm concentrations. For the remaining monitoring wells, the May 2009 results for total alkalinity, TDS, chloride, nitrate as N, bicarbonate, sulfate as SO4, calcium, magnesium, potassium, and sodium were similar to November 2009 results.

VOC results for November 2009 showed all seven extraction wells contained at least one VOC, generally at concentrations similar to those previously detected. Six wells contained at least one VOC above the method reporting limit (MW-24 contained no VOCs over the method reporting limit, besides TICs). The primary VOC detected in the extraction wells continues to be cis-1,2-dichloroethene. Additional VOCs detected above the PQL in the extraction wells include 1,1-dichloroethane and 1,2-dichlorobenzene. Five tentatively identified compounds were also detected in more than one well at low concentrations: 1,1-dichloro-1-fluoroethane, 1-chloro-1-fluoroethane, chlorodifluoromethane, chlorofluoromethane, and dichlorofluoromethane. The VOCs detected during November 2009 are similar to the May 2009 event, and are consistent with historic results.

During the first semi-annual 2009 monitoring event, VOCs were detected above the PQL in monitoring wells MW-2A (cis-1,2-dichloroethane), MW-31 (MTBE), and MW-32 (1,1-dichloroethane, cis-1,2-dichloroethane, tetrachloroethane (PCE), trichloroethane (TCE), and trichlorofluoromethane). During the second semi-annual 2009 monitoring event, VOCs were detected above the PQL in monitoring wells MW-2A (cis-1,2-dichloroethane), MW-4 (MTBE), MW-5 (PCE), MW-8 (chloromethane), MW-9 (chloromethane), MW-11 (chloromethane), MW-17 (1,1-dichloroethane, cis-1,2-dichloroethane, PCE, and TCE), and MW-32 (chloromethane, 1,1-dichloroethane, cis-1,2-dichloroethane, PCE, TCE, and trichlorofluoromethane). Overall, the VOC concentrations are similar from the first semi-annual event to the second semi-annual event, and are similar to historic results. Chloromethane was detected in monitoring wells MW-8, MW-9, MW-11, and MW-32 during the November 2009 event, but not the May 2009 event. Chloromethane was also detected in the field and equipment blanks, and therefore is thought to be a false positive. MTBE was detected in MW-4 during the November 2009 event, but not during the May 2009 event. A trace concentration of MTBE was previously detected during the November 2008 event. MTBE concentrations will be monitored during future sampling events. VOCs were detected in MW-17 during the November 2009 event, but not in the May 2009 event. VOCs were first detected in MW-17 the November 2008 event, followed by the December 2008 confirmatory sampling event. The current VOC compounds and concentrations are consistent with those previously detected.

MTBE was detected in monitoring well MW-30 during the May 2009 event, but, along with MW-31, was not sampled in November since the well was confirmed to be damaged.

7.2.3.1 Evidence For Releases From LF-1

Evidence for a release from LF-1 is based on a comparison of data from the samples collected at MW-30 and MW-31 to the wells at the compliance boundary of LF-1.

Releases from LF-1 were confirmed as early as 1987. The data collected in 2009 indicate the effects of those releases are still discernible. This is primarily evidenced by the presence of VOCs in groundwater at the compliance boundary of LF-1.

Inorganic Parameters

Major Ions-

For the annual 2009 data evaluation, results for conductivity, TDS, and major ions detected in May 2009 from wells MW-30 and MW-31 were added to the historic data for these wells. As discussed above, these monitoring wells were not sampled during the November 2009 event. Therefore, there were no November 2009 data from MW-30 and MW-31 to include in the analysis. The data for the two wells were pooled and a statistical test was completed to compute mean, standard deviation and confidence intervals (CIs). It appears that prior to 2006, the confidence intervals were based on +/- 2 standard deviations from the mean. This would account for approximately 95% of background data in a normally distributed data set. For the 2009 evaluation, the same calculations were made, including the May 2009 data results from wells MW-30 and MW-31. The confidence intervals for +/- 3 standard deviations were also calculated. Both of the calculated confidence intervals are shown on Table 7-3 as CI @ 95% and CI @ 99.5%, along with the mean and standard deviation for each analyte.

The 2009 analytical results obtained for the thirteen point-of-compliance wells were then compared to the confidence intervals. Most of the wells used in these comparisons fully penetrate the uppermost aquifer. MW-2A and MW-4 can be considered with these comparisons, but these two wells only intersect the upper few feet of the uppermost aquifer; therefore, the comparison with wells MW-30 and MW-31 is tenuous. Because the confidence interval previously used appears to have been +/- 2 standard deviations around the mean, this was the interval used for the comparison in Table 7-4. However, it is recommended that +/- 3 standard deviations be used for this comparison, as this accounts for approximately 99.5% of the background data. Otherwise, approximately 5% of the natural background data would be expected to fall outside the calculated concentration limits (confidence intervals). A comparison of 2009 results to the 99.5% confidence interval is shown in Table 7-5. In both Table 7-4 and Table 7-5, lab results that exceed the upper confidence intervals are shown in **bold,** and values below the lower confidence interval are shown in *italics.*

TABLE 7-3.
Calculation of Major Ion Data Confidence Intervals (p= 0.05) for Pooled Values at Wells 30 and 31

Well ID	pH	SC (µmhos/cm)	TDS (mg/l)	Tot Alk (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3-N (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)
30	7.02	670	420	300	30	27	7.7	60	34	22	19
	7.06	670	420	290	31	28	8.1	59	34	22	16
	7.06	670	430	280	31	29	8.1	67	38	23	13
	6.99	670	430	290	32	29	8.3	64	37	22	13
	6.98	690	420	290	32	30	8.3	--	--	--	--
	6.94	720	440	290	33	30	9.0	59	35	20	0.0
	6.92	730	430	300	32	31	8.9	*92*	*64*	*100**	*6.0*
	6.94	620	430	300	24	40	2.0	60	34	18	0.0
	7.00	700	450	310	24	40	2.6	68	39	22	3.7
	7.10	670	470	310	37	34	7.9	74	42	22	2.6
	7.00	680	420	310	36	33	8.5	69	38	21	2.5
	7.46	671	490	310	21	26	5.8	80	39	26	1.5
	7.4	687	460	320	22	19	5.9	80	41	22	2.5
	6.81	763	480	320	31	29	7.6	84	46	24	2.7
	6.71	758	475	340	30	29	7.9	85	44	23	2.6
	7.13	795	488	372	37	36	9.1	93	49	25	2.8
	6.71	745	530	386	39	40	9.6	95	51	26	3.3
	7.09	850	--	358	23	--	6.9	85	43	23	17
	7.28	913	562	443	27	29	7.6	106	56	3.2	26
	- -	915	510	436	26	33	7.6	92	48	23	2.8
	6.86	1070	280	230	12	0.72	0.073	49	23	14	2.4
	Not sampled due to obstruction - 2nd Half 2009										
31	7.01	640	530	360	24	36	8.1	56	31	21	0
	7.02	840	540	360	36	53	11	53	29	20	0
	7.02	840	380	240	37	52	11	55	30	20	0
	7.21	860	520	360	37	53	11	57	31	21	0
	6.99	700	430	320	23	39	2.7	60	34	17	0
	7.03	660	420	310	32	31	8.9	72	40	19	5.9
	7.06	700	390	280	20	18	7.4	67	39	21	0
	7.06	630	410	280	23	39	2.5	64	36	19	2.7
	7.20	490	350	230	23	45	1.9	52	29	17	2.3
	7.20	500	320	230	24	46	1.9	51	27	17	2.1
	7.38	488	370	210	15	31	1.5	54	35	21	2.8
	7.32	500	350	220	17	23	1.2	53	29	18	2.1
	6.78	454	309	164	17	41	0.7	46	25	19	2.1
	7.00	461	448	158	17	43	0.8	48	26	19	3.1
	7.16	526	296	212	20	65	1.1	54	29	21	2.2
	7.16	526	330	216	19	65	1.1	59	29	21	3
	6.81	484	351	208	21	73	1.2	52	28	21	2.6
	7.51	470	349	144	16.4	65	0.82	39	21	18.8	2.3
	7.21	671	--	172	19.4	--	1.2	49	25	22	16
	7.58	966	396	162	18.4	152	0.11	62	33	2.7	24
	6.99	1010	566	420	22.1	32	4.3	79	47	28	3.4
	6.96	1090	510	350	22	28	5.4	85	33	24	3.6
	Not sampled due to obstruction - 2nd Half 2009										
Mean	7.07	701.47	429.27	288	25.9	39.6	5.43	66.4	36.2	20.2	5.20
Std. Dev.	0.20	163.63	73.53	75	7.2	22.8	3.57	16.0	9.1	4.8	6.65
Upper C.I. @ 95%	7.48	1029	576	438	40.3	85.1	12.57	98.3	54.5	29.8	18.51
Lower C.I. @ 95%	6.67	374	282	138	11.5	-6.0	-1.72	34.4	17.9	10.6	-8.11
Upper C.I. @ 99.5%	7.68	1192	650	513	47.5	107.9	16.15	114.3	63.6	34.6	25.17
Lower C.I. @ 99.5%	6.47	211	209	63	4.3	-28.8	-5.30	18.4	8.8	5.8	-14.76

Notes:

* = These data not used in calculation as the results were suspect.

-- = Not analyzed during the associated sampling event

TABLE 7-4
STATISTICAL EVALUATION OF FIRST AND SECOND SEMI-ANNUAL 2009 RESULTS
INORGANIC PARAMETERS
LF-1 AT 95% CONFIDENCE INTERVAL

Well ID	Quarter Sampled	pH (pH units)	SC (µmhos/cm)	TDS (mg/l)	Tot Alk (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO3-N (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)
4th Q 09 upper C.I.		7.48	1029	576	438	40.3	85.1	12.57	98.3	54.5	29.8	18.51
4th Q 09 lower C.I.		6.67	374	282	138	11.5	-6.0	-1.72	34.4	17.9	10.6	-8.11
MW2A	S109	6.91	883	480	350	24	26	- -	71	44	16	3.2
MW2A	S209	6.71	775	490	350	22	23	- -	73	46	15	3.3
MW4	S109	6.95	915	*210*	*110*	*10*	5.3	1.9	*25*	*9.3*	13	2.0
MW4	S209	*6.43*	**1470**	**840**	**580**	**70.0**	52	- -	**140**	**81**	29	4.4
MW5	S109	7.19	915	430	240	14	50	2.3	62	32	12	2.9
MW5	S209	*6.07*	597	440	260	18	68	1.5	72	39	13	3.0
MW15	S109	7.46	515	*250*	*110*	*8.0*	22	2.0	*23*	*15*	17	2.7
MW15	S209	6.86	*300*	*250*	*110*	*7.6*	22	2.2	*24*	*16*	15	2.1
MW16	S109	**7.56**	797	*170*	*79*	*4.6*	4.3	1.3	*16*	*6.2*	11	2.1
MW16	S209	**7.71**	*160*	*160*	*73*	*4.2*	1.9	1.2	*16*	*5.3*	*10*	2.0
MW18	S109	7.16	747	440	300	24	22	3.3	63	35	19	2.6
MW18	S209	6.83	584	470	290	22	18	3.7	64	37	18	2.7
MW19	S109	6.88	905	430	300	24	14	2.2	60	32	19	2.7
MW19	S209	7.01	603	480	310	22	12	2.0	66	38	17	2.8
MW20	S109	7.14	819	430	420	21	26	1.2	91	40	23	4.2
MW20	S209	6.75	811	**630**	**450**	20	25	1.1	**110**	50	23	4.3
MW21	S109	6.84	817	460	360	23	34	1.6	76	38	21	3.6
MW21	S209	6.72	690	530	360	21	31	1.4	80	43	20	3.7
MW22	S109	6.87	771	480	320	23	32	0.70	67	37	18	2.8
MW22	S209	6.82	644	500	330	22	29	0.63	73	43	18	3.0
MW23	S109	7.09	931	**590**	410	37	27	0.96	85	47	22	3.1
MW23	S209	6.90	831	**640**	**440**	37	27	0.80	95	**55**	24	3.3
MW24	S109	7.06	985	**630**	**450**	40	45	1.2	**99**	54	29	3.2
MW24	S209	*6.58*	923	**680**	**440**	36	44	1.3	97	**56**	28	3.2
MW32	S109	7.02	719	480	330	**42**	28	2.5	72	39	22	2.9
MW32	S209	6.94	756	370	340	29	21	2.6	80	43	22	3.4

Notes:

Confidence Intervals calculated for MW-30 and MW-31 data from 2005 through May 2009

Bold indicates result exceeds Upper CI for associated quarter

Italics indicates result is below Lower CI for associated quarter

- - = Analyate not detected

TABLE 7-5
STATISTICAL EVALUATION OF FIRST AND SECOND SEMI-ANNUAL 2009 RESULTS
INORGANIC PARAMETERS
LF-1 AT 99.5% CONFIDENCE INTERVAL

Well ID	Quarter Sampled	pH	SC	TDS	Tot Alk	Cl	SO4	NO3-N	Ca	Mg	Na	K
		(pH units)	(µmhos/cm)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
4th Q 09 upper		7.68	1192	650	513	47.5	107.9	16.15	114.3	63.6	34.6	25.17
4th Q 09 lower		6.47	211	209	63	4.3	-28.8	-5.30	18.4	8.8	5.8	-14.76
MW2A	S109	6.91	883	480	350	24	26	- -	71	44	16	3.2
MW2A	S209	6.71	775	490	350	22	23	- -	73	46	15	3.3
MW4	S109	6.95	915	210	110	10	5.3	1.9	25	9.3	13	2.0
MW4	S209	*6.43*	**1470**	**840**	**580**	**70**	52	- -	**140**	**81**	29	4.4
MW5	S109	7.19	915	430	240	14	50	2.3	62	32	12	2.9
MW5	S209	*6.07*	597	440	260	18	68	1.5	72	39	13	3.0
MW15	S109	7.46	515	250	110	8.0	22	2.0	23	15	17	2.7
MW15	S209	6.86	300	250	110	7.6	22	2.2	24	16	15	2.1
MW16	S109	7.56	797	*170*	79	4.6	4.3	1.30	*16*	*6.2*	11	2.1
MW16	S209	**7.71**	*160*	*160*	73	*4.2*	1.9	1.20	*16*	*5.3*	10	2.0
MW18	S109	7.16	747	440	300	24	22	3.3	63	35	19	2.6
MW18	S209	6.83	584	470	290	22	18	3.7	64	37	18	2.7
MW19	S109	6.88	905	430	300	24	14	2.2	60	32	19	2.7
MW19	S209	7.01	603	480	310	22	12	2.0	66	38	17	2.8
MW20	S109	7.14	819	430	420	21	26	1.2	91	40	23	4.2
MW20	S209	6.75	811	630	450	20	25	1.1	110	50	23	4.3
MW21	S109	6.84	817	460	360	23	34	1.6	76	38	21	3.6
MW21	S209	6.72	690	530	360	21	31	1.4	80	43	20	3.7
MW22	S109	6.87	771	480	320	23	32	0.70	67	37	18	2.8
MW22	S209	6.82	644	500	330	22	29	0.63	73	43	18	3.0
MW23	S109	7.09	931	590	410	37	27	0.96	85	47	22	3.1
MW23	S209	6.9	831	640	440	37	27	0.80	95	55	24	3.3
MW24	S109	7.06	985	630	450	40	45	1.2	99	54	29	3.2
MW24	S209	6.58	923	**680**	440	36	44	1.3	97	56	28	3.2
MW32	S109	7.02	719	480	330	42	28	2.5	72	39	22	2.9
MW32	S209	6.94	756	370	340	29	21	2.6	80	43	22	3.4

Notes:

Confidence Intervals calculated for MW-30 and MW-31 data from 2005 through May 2009

Bold indicates result exceeds Upper CI for associated quarter

Italics indicates result is below Lower CI for associated quarter

- - = Analyate not detected

For the November 2009 data, when compared to the 95% confidence intervals (Table 7-4), six wells (MW-4, MW-16, MW-20, MW-23, MW-24 and MW-32) had exceedences above the upper CIs. In total, there were sixteen exceedences of the upper CI in November 2009. Four wells had exceedences above the upper CIs during May 2009, and there were a total of six exceedences. Variability in exceedences has been observed since 2007; it was previously suggested that the source was due to laboratory error. SCS will evaluate which data, if any, may represent outliers and remove these data from the statistical analysis when more data becomes available.

For the November 2009 data, when compared to the 99.5% confidence intervals (Table 7-5), only three wells (MW-4, MW-16, and MW-24) had exceedences above the upper CIs, with a total of eight exceedences.

Volatile Organic Compounds

For VOCs, background groundwater concentrations are considered to be below the minimum detection level (non-detect). Hence, the evaluation of releases for VOCs from LF-1 is based on the presence or absence of VOCs in the point-of-compliance wells. VOCs have been detected in the LF-1 point-of-compliance wells for the upper aquifer for several years; therefore, VOCs detected in wells MW-2, MW-4, MW-5, as well as the extraction wells MW-18 through MW-23, do not represent a new release from LF-1.

Well MW-4 had no VOCs detected in the May 2009 sample. VOCs were reported in this well in previous sampling events, and again in November 2009.

7.2.3.2 Evidence For Releases From LF-2

Evidence of a release from LF-2 would consist of detections in MW-30 or MW-31 of compounds that were not detected in either MW-12, MW-13, or MW-29, or were found in significantly higher concentrations than in MW-12, MW-13, and MW-29.

One VOC was detected above the PQL in MW-30 (3.2 µg/L MTBE) during the May 2009 sampling event. No VOCs were detected in MW-31 during the May 2009 event. As mentioned above, monitoring wells MW-30 and MW-31 were not sampled in the second half of 2009 due to well damage. VOCs have previously been detected in MW-30 and MW-31. However, follow-up sampling and/or duplicate sampling have never definitively confirmed the presence of VOCs at either of these points. Sampling will resume at MW-30 and MW-31 once the wells are replaced. A plan for abandoning and replacing MW-30 and MW-31 has been submitted to the RWQCB.

No VOCs were detected above the PQL in background wells MW-12, MW-13, and MW-29 during 2009. A trace concentration of chloroform was reported in MW-29 during for the November 2009 event. Chloroform was also detected in the one of the field blanks, indicating the possibility of a false-positive result.

A comparison of inorganic results for background wells MW-12, MW-13 and MW-29 to results for MW-30 and MW-31 show that the background wells generally have similar or higher concentrations (including total alkalinity, chloride, nitrate as nitrogen, sulfate, calcium, magnesium, and sodium) compared to the downgradient compliance wells. While confidence intervals have not been calculated for background wells MW-12, MW-13, and MW-29, the inorganic data are similar and do not indicate a release.

7.3 STORM WATER

SCS collected stormwater samples from the Western Perimeter Channel and Eastern Perimeter Channel locations on January 22, 2009 and October 13, 2009, in accordance with the WDRs/MRP. For the January 2009 samples, the landfill's field meter was not working properly, and field parameters could not be collected during sampling. Field parameters were collected for the October 2009 samples. Samples for both dates were collected and sent to BC laboratories to be analyzed for total suspended solids, general minerals, and VOCs. Field parameter measurements and analytical results are provided on Table 7-6. The chain of custody and analytical results are included on the CD-ROM in Appendix D

For the January 2009 event, results for the Western Perimeter Channel and Eastern Perimeter Channel are generally similar. One exception is total suspended solids was higher in the sample collected from the Western Perimeter Channel. No VOCs were reported in the Eastern Perimeter Channel sample. One VOC was detected above the method detection limit, but below the method reporting limit, in the Western Perimeter Channel (chloroform at 0.26 ug/L “J”), and is likely representative of a false positive result.

For the October 2009 event, the results from the Western Perimeter Channel and Eastern Perimeter Channel are similar, with the exception of total calcium and sulfate (as SO4). Acetone was the only VOC detected, occurring in both the Western and Eastern Perimeter Channels at 23 ug/L and 13 ug/L, respectively. The acetone detection is suspected as a false-positive.

Stormwater sample results cannot be compared to concentration limits since limits have not been established.

Table 7-6.
L and D LANDFILL
STORMWATER ANALYTICAL RESULTS - 2009

		FIELD PARAMETERS			GENERAL CHEMISTRY AND METHODS											VOCs	
					EPA 2540C	EPA 160.1	EPA 310.1		EPA 300.0			EPA 200.7				EPA 8260	
Sample Location	Sample Date	Temperature	Electrical Conductivity	pH	Total Suspended Solids*	Total Dissolved Solids	Bicarbonate	Total Alkalinity	Chloride	Nitrate (as N)	Sulfate (as SO4)	Calcium	Magnesium	Potassium	Sodium	Acetone	Chloroform
		ºC	umhos/cm	pH units	mg/L											µg/L	
West Perimeter Channel	1/22/2009	- -	- -	- -	1,700	370	80	66	12	0.41	170	70	7.9	3.4	14		0.26J
	10/13/2009	15.7	770	8.42	3,100	670	57	47	11	0.48	380	320	50	18	20	23	
East Perimeter Channel	1/22/2009	- -	- -	- -	260	270	120	97	11	0.43	60	36	8.7	5.0	11		
	10/13/2009	15.6	190	8.04	2,900	230	110	93	5.0	0.32	11	67	64	18	12	13	

- - = Not collected due to equipment malfunction
* = Analyzed by laboratory
mg/L - Milligrams per liter
µg/L - Micrograms per liter
J = Detected below the reporting limit but above the method detection limit
Blank cell indicates constituent was non-detect

8.0 CORRECTIVE ACTION MONITORING

8.1 EXTRACTION WELL PUMPING RATES

The target pumping rates from the extraction wells and the average rates actually achieved during 2009 are shown in Table 8-1. The average rates listed in Table 8-1 are computed from the total gallons pumped during each quarter divided by the total minutes. Well pumping details are given in Appendix E.

TABLE 8-1
CORRECTIVE ACTION PLAN EXTRACTION WELLS TARGET PUMPING RATES AND AVERAGE RATES ACHIEVED DURING 2009
(GALLONS PER MINUTE)

Well	Target Rate	Jan – Mar	Apr – Jun	Jul - Sept	Oct - Dec
24	10	8.46	10.02	8.85	8.67
23	10	11.38	9.65	10.00	10.06
19	20	11.30	11.28	9.98	10.73
18	20	12.88	11.03	9.39	7.18
22	20	11.99	9.84	12.79	13.59
21	10	9.10	8.39	7.91	7.90
20	6	3.64	6.34	7.27	5.55
Total	**96**	**68.75**	**66.55**	**66.19**	**63.68**

Some wells require more maintenance than others. One maintenance problem is fouling of the well screens by iron bacteria. This problem is corrected by introducing an 8% chlorine solution into the well and recirculating the water for several hours. The extraction wells were chlorinated on March 5, July 6, and October 2, 2009. A more significant problem is the slow buildup of sand inside the impellers of the pump, restricting the discharge flows. The solution to this problem is to completely pull the pump out of the well, disassemble it and clean and/or replace the impellers.

During 2009, incidences of note for the extraction/treatment system included:

- 1/5/09 Replaced meter on well #20;
- 2/2/09 Replaced pump on well #23;
- 2/20/09 Replaced calcium carbonate cleaning chemical and container;
- 3/5/09 Chlorinated all wells;
- 4/23/09 Pulled and cleaned impeller on well #20;
- 7/6/09 Chlorinated all wells;
- 7/6/09 Replaced calcium carbonate cleaning chemical and container;

- 7/18/09 Cleaned air stripper trays. Air stripper down for 48 hours;
- 9/8/09 Replaced broken pipe on discharge pump. Air stripper down for 4 hours;
- 9/29/09 Shut down Well #19. Cleaned impeller;
- 10/2/09 Chlorinated all wells;
- 10/2/09 Replace meter on Well #19;
- 11/9/09 Power off on well #19. Restored 11/10/09;
- 12/7/09 Well #20 not reading. Removed and cleaned meter;
- 12/11/09 Well #18 not reading. Removed and cleaned meter. Still not reading. Pump was pulled and replacement occurred in Jan. 2010; and
- 12/21/09 Well #20 not reading. Pump was pulled and replaced in Jan. 2010.

8.2 EXTRACTION WELL HYDROGRAPHS

Extraction well hydrographs for 2009 are shown in Figure 11. The construction plans for these seven wells are nearly identical. They each have 30 feet of screen and, at each well, the screen corresponds to the elevation interval -24 feet to -54 feet (±2 feet) msl. The pump intakes are all located at -40 feet (±2 feet) msl.

8.3 EXTRACTION WELL WATER QUALITY

There were no remarkable changes in water quality in the CAP extraction wells for the May and November 2009 samples. Concentration trends, to the extent they are discernible, are described in Section 8.5. VOC detections and concentrations are generally within the historical data provided for each well.

8.4 AIR STRIPPER AND PERCOLATION POND MONITORING

Samples were collected from the air stripper tower influent and air stripper tower effluent May and November 2009; and from the percolation pond in January, May, and November 2009. The November 2009 air stripper influent sample was analyzed for VOCs, and the air stripper effluent, percolation pond, and May 2009 air stripper effluent samples were analyzed for VOCs and general minerals per Attachment “C” of R5-2002-0082. The certified laboratory reports and chain of custody documentation for these samples are presented on a compact disc in Appendix D. Results for the 2009 sampling events are given in Table 8-2.

No VOCs were detected in the percolation pond or air stripper effluent samples during 2009. VOCs were detected in the May and November 2009 air stripper influent samples. In the May 2009 sample, one VOC was detected (1.2 µg/L cis-1,2-dichloroethane). In the November 2009 sample, one VOC was detected (1.1 µg/L cis-1,2-dichloroethane) and two tentatively identified compounds (2.0 µg/L chlorodifluoromethane, and 0.77 µg/L dichlorofluoromethane) were detected.

Data on the flow of water through the air stripper are shown in Table 8-3.

TABLE 8-2.
L and D Landfill
2009 - PERCOLATION POND AND AIR STRIPPER ANALYTICAL RESULTS

Sample Location	Date Sampled	General Minerals										VOCs						
		Total Alkalinity	Bicarbonate Alkalinity	Chloride	Sulfate as SO4	Nitrate as N	Total Dissolved Solids	Calcium	Magnesium	Potassium	Sodium	1,2-Dichlorobenzene	1,4-Dichlorobenzene	1,1-Dichloroethane	cis-1,2-Dichloroethene	Tetrachloroethene	Chlorodifluoromethane *	Dichlorofluoromethane *
		mg/l										µg/L						
PERCOLATION POND	1/27/2009	340	370	24	28	1.9	530	80	45	3.5	22							
	5/12/2009	360	390	24	23	1.5	530	77	42	3.3	22							
	11/11/2009	370	410	25	26	1.4	520	80	45	3.6	21							
AIR STRIPPER INFLUENT	5/12/2009	360	440	27	29	1.7	530	75	40	3.3	21			0.40 J	**1.2**			
	11/5/2009	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	0.16 J	0.11 J	0.39 J	**1.1**	0.18 J	**2.0**	**0.77**
AIR STRIPPER EFFLUENT	5/12/2009	360	430	27	29	1.7	520	75	40	3.3	21							
	11/5/2009	370	430	27	27	1.6	550	85	48	3.7	22							

Notes:

Only volatile organic compounds detected in one or more samples are listed
* Tentatively Identified Compound (TIC)
- - Not Required per WDR/MRP Order No. R5 2002-0082
J - Detected below the reporting limit but above the method detection limit
µg/l - micrograms per liter
mg/l - milligrams per liter

TABLE 8-3.
CUMULATIVE AND COMPUTED AVERAGE DAILY FLOW THROUGH AIR STRIPPER BY MONTH - 2009 (GALLONS)

Month	Cumulative Flow	Average Daily Flow
January	2,620,030	93,573
February	2,413,050	86,180
March	2,888,150	103,148
April	3,448,940	98,541
May	2,740,520	97,876
June	2,615,900	90,203
July	3,242,400	95,365
August	2,711,340	96,834
September	2,630,590	93,950
October	3,317,570	94,788
November	2,618,910	93,533
December	2,720,790	87,767

8.5 CORRECTIVE ACTION PROGRESS REPORT

8.5.1 Containment of Further Migration

Hydrologic data show that on-site groundwater containing the plume is captured by the CAP extraction wells. (See Figure 7 through Figure 10.) Water quality records for monitoring well MW-16, offsite and down-gradient from the landfill, must also be considered. MW-16 showed evidence of contaminants like those at the landfill before the CAP was initiated in its present form. The action of the CAP prevents groundwater containing contaminants from flowing toward MW-16. The long-term effect of the CAP is expected to improve water quality at MW-16 as the flow direction for groundwater flowing past MW-16 changes over time. No VOCs were reported in MW-16 during the May or November 2009 sampling events, which seem to illustrate the positive effects of the CAP extraction system.

VOCs were detected in the May and November 2009 samples from MW-32, south of the extraction wells. The VOCs detected are consistent with previous detections at this well.

8.5.2 Spreading of Plume

There is no indication that the extent of the plume has expanded following initiation of the CAP. In May and November 2009, no VOCs were detected in down-gradient points MW-15 and MW-16. VOCs were detected in down-gradient monitoring well MW-32 during both monitoring events in 2009. During the previous monitoring year, VOCs were non-detect in MW-32 during the June 2008 monitoring event, but detected in the November 2008 event. These data may suggest that the VOCs are declining and detections may become more sporadic due to the CAP extraction wells. Results from future sampling events may help determine if VOCs are still present in the vicinity of MW-15, MW-16, and MW-32

8.5.3 VOC Concentration Trends

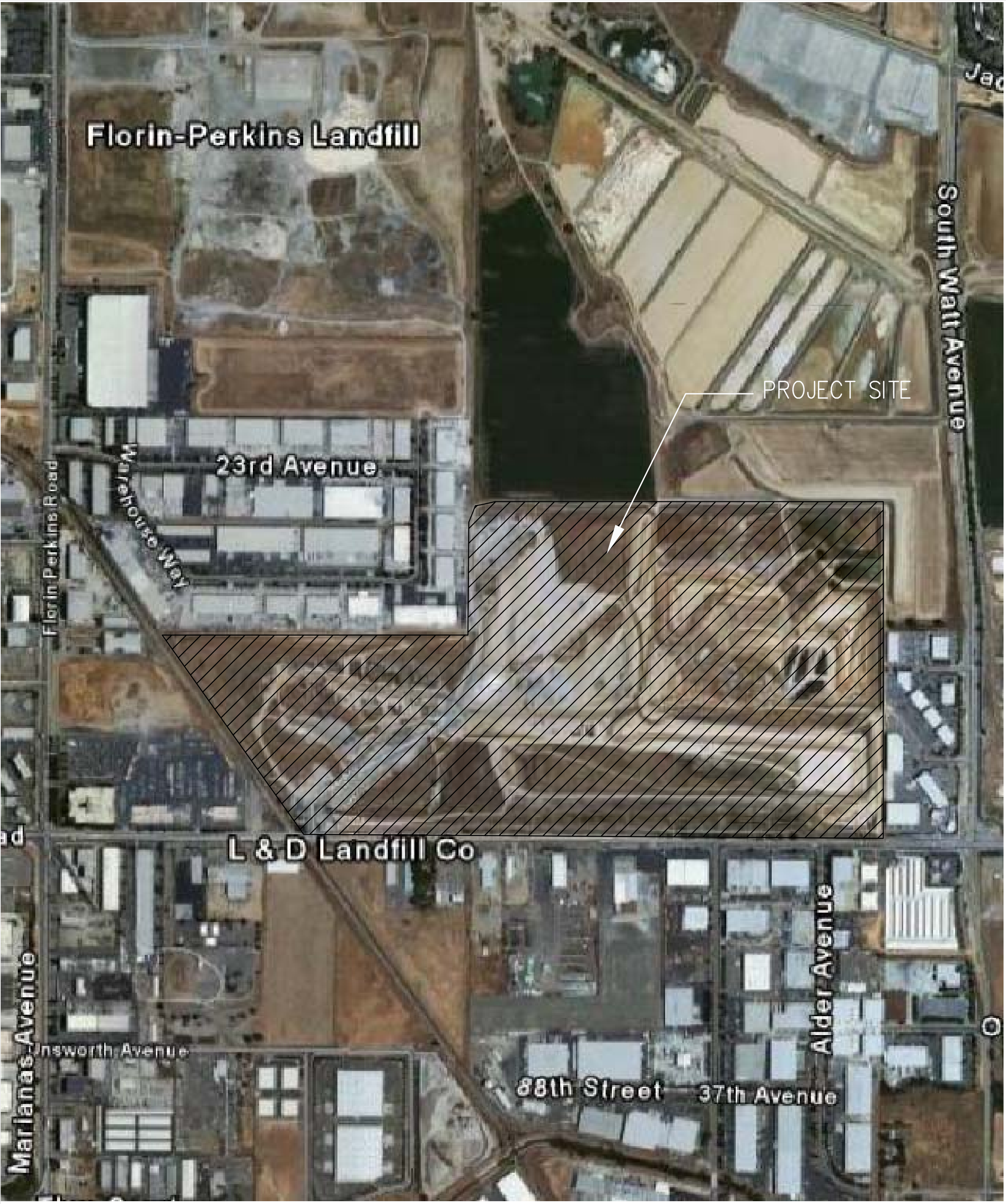
Historical VOC data pertaining to the point-of-compliance wells are presented as time series plots in Appendix F of this report. Most of the apparent trends in VOC concentrations are decreasing following initiation of the CAP in July 2000. In most cases, for which data exist prior to the CAP, VOC concentrations were higher prior to groundwater extraction and treatment and have, since implementation of the CAP, either declined or are detected only sporadically.

8.5.4 Inorganic Monitoring Parameter Concentration Trends

Tables 7-4 and 7-5 indicate which of the upper aquifer detection wells had inorganic constituents detected at concentrations above the confidence intervals in background wells 30 and 31. For the November 2009 data, when compared to the 95% confidence intervals, six wells (MW-4, MW-16, MW-20, MW-23, MW-24 and MW-32) had exceedences above the upper CIs. In total, there were sixteen exceedences of the upper CI in November 2009. Four wells had exceedences above the upper CIs during May 2009, and there were a total of six exceedences. Variability in exceedences has been observed since 2007; it was previously suggested that the source was due to laboratory error. SCS will evaluate which data, if any, may represent outliers and remove these data from the statistical analysis when more data becomes available.

9.0 ELECTRONIC DATA SUBMITTAL

This "*Second Semi-Annual and Annual 2009 Monitoring Report*" is included in Adobe Acrobat format on the CD in Appendix D. Laboratory reports for the first and second semi-annual 2009 monitoring events are also contained on this CD. This report and data has also been uploaded to the Geotracker website.



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PROJ. NO. 01204084.02	DWN. BY: ATV	ACAD FILE: FIG 1 .DWG	
DATE 01/09/08	CHK. BY: EWP	APP. BY: EWP	

SHEET TITLE:

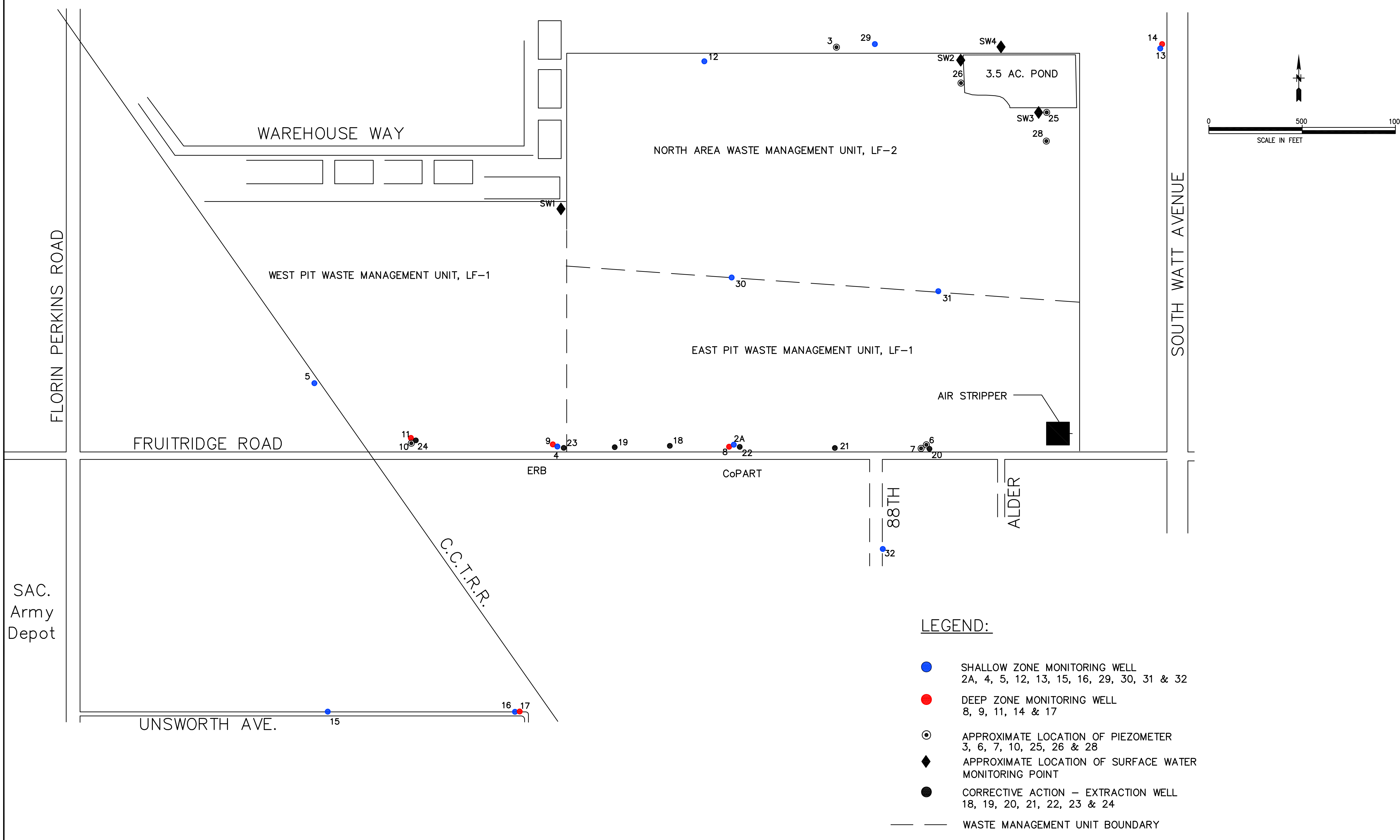
SITE PLAN

PROJECT TITLE:

L AND D LANDFILL
SACRAMENTO, CALIFORNIA

SCALE:
NTS

FIGURE:
1



LEGEND:

- ● SHALLOW ZONE MONITORING WELL 2A, 4, 5, 12, 13, 15, 16, 29, 30, 31 & 32
- ● DEEP ZONE MONITORING WELL 8, 9, 11, 14 & 17
- ◉ APPROXIMATE LOCATION OF PIEZOMETER 3, 6, 7, 10, 25, 26 & 28
- ◆ APPROXIMATE LOCATION OF SURFACE WATER MONITORING POINT
- ● CORRECTIVE ACTION – EXTRACTION WELL 18, 19, 20, 21, 22, 23 & 24
- — — WASTE MANAGEMENT UNIT BOUNDARY

NO. | REVISION | DATE

SHEET TITLE
MONITORING LOCATIONS

PROJECT TITLE
L AND D LANDFILL
SACRAMENTO, CALIFORNIA

L AND D LANFILL
LIMITED PARTNERSHIP
SACRAMENTO, CALIFORNIA

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PROJ. NO. 01202186.02
DWN. BY: ATV
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DSN. BY: EWP
CHK. BY: EWP
APP. BY: EWP

DATE: 1–09–08

SCALE: AS SHOWN

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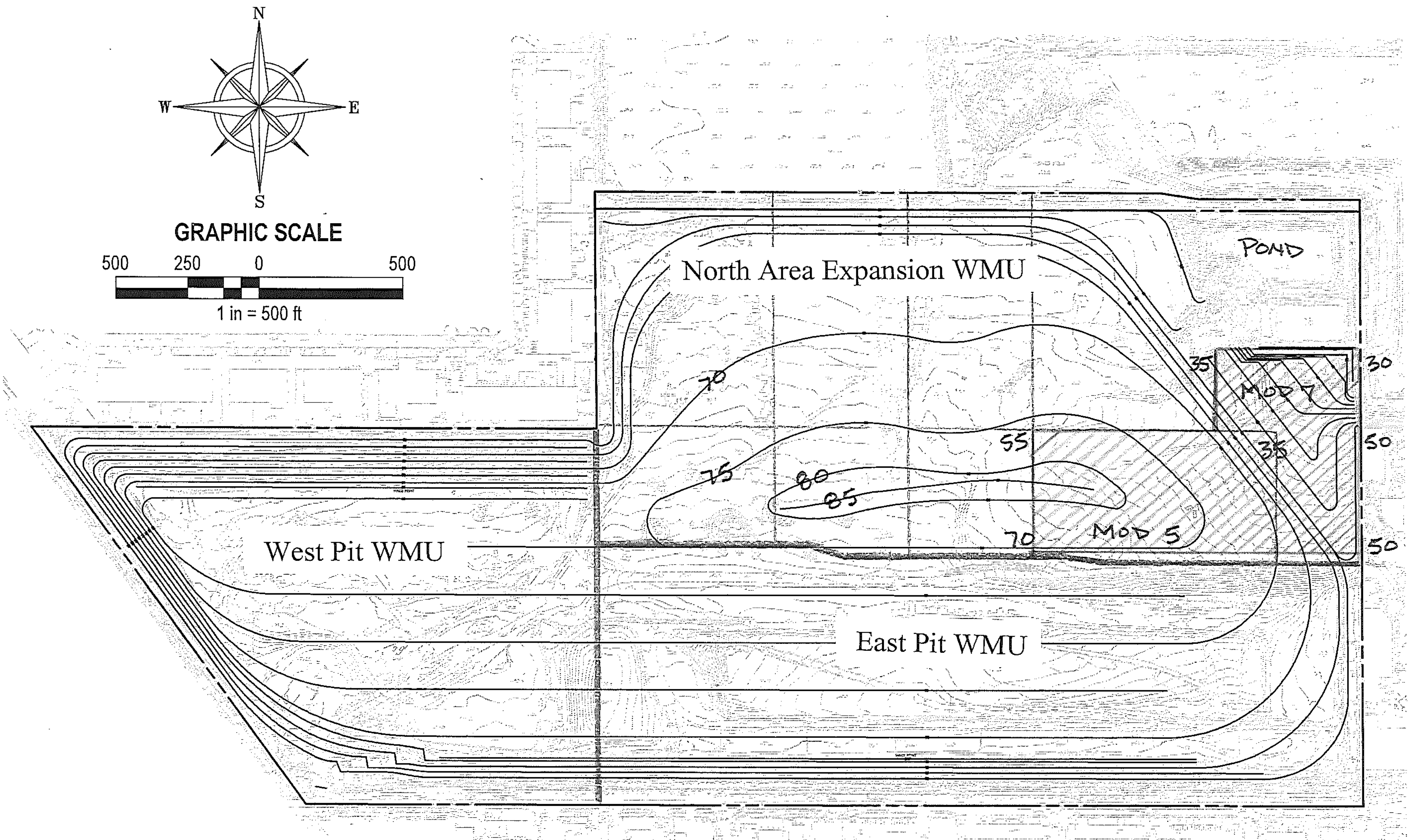
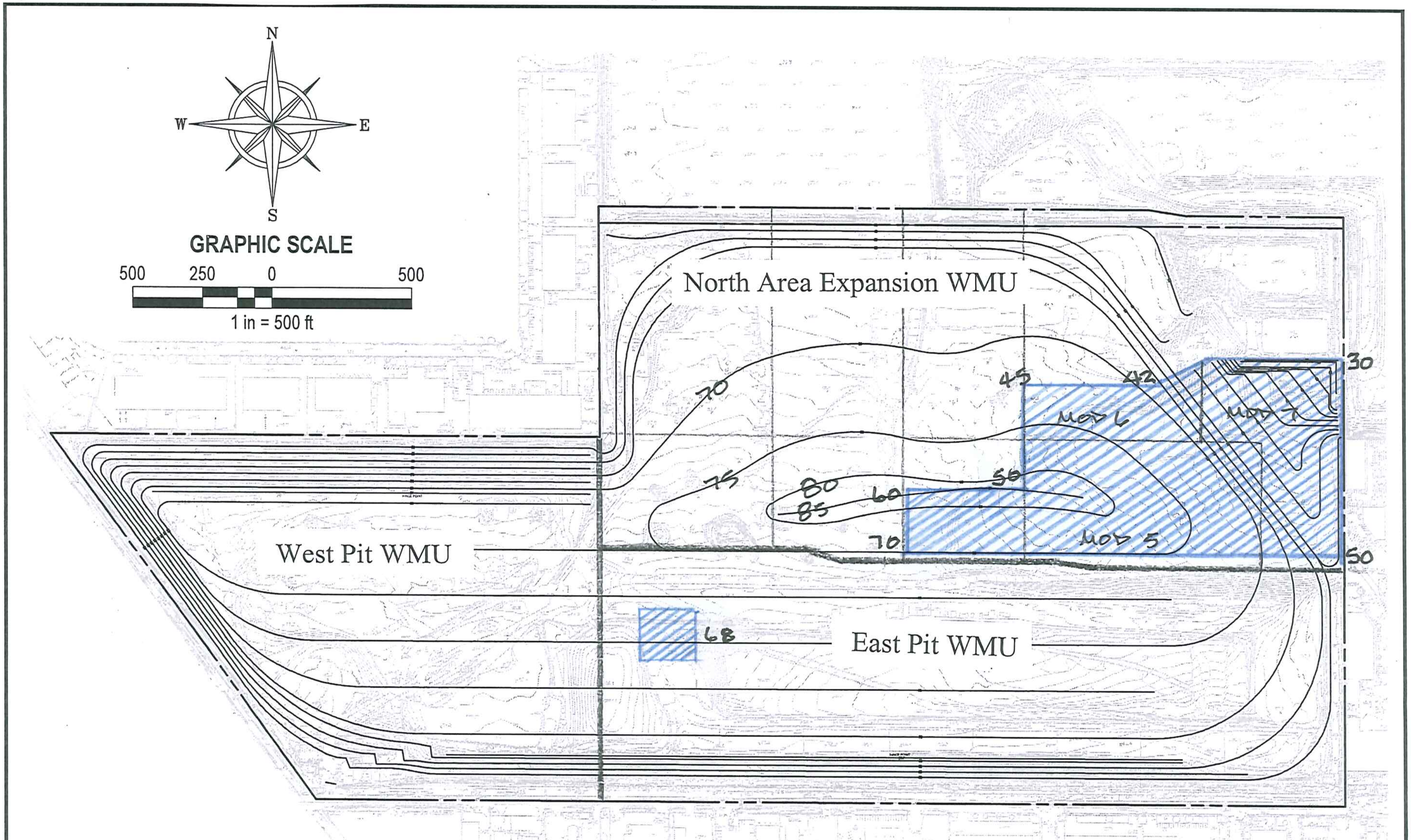


L and D Landfill
8635 Fruitridge Road
Sacramento, CA

Figure 3.
Fill Areas and Top Elevations
January - June 2009

June 2009



L and D Landfill
8635 Fruitridge Road
Sacramento, CA

Figure 4.
Fill Areas and Top Elevations
July - December 2009

DECEMBER 2009

Figure 5
Water Elevation in LCRS Before Pumping
Annual 2009

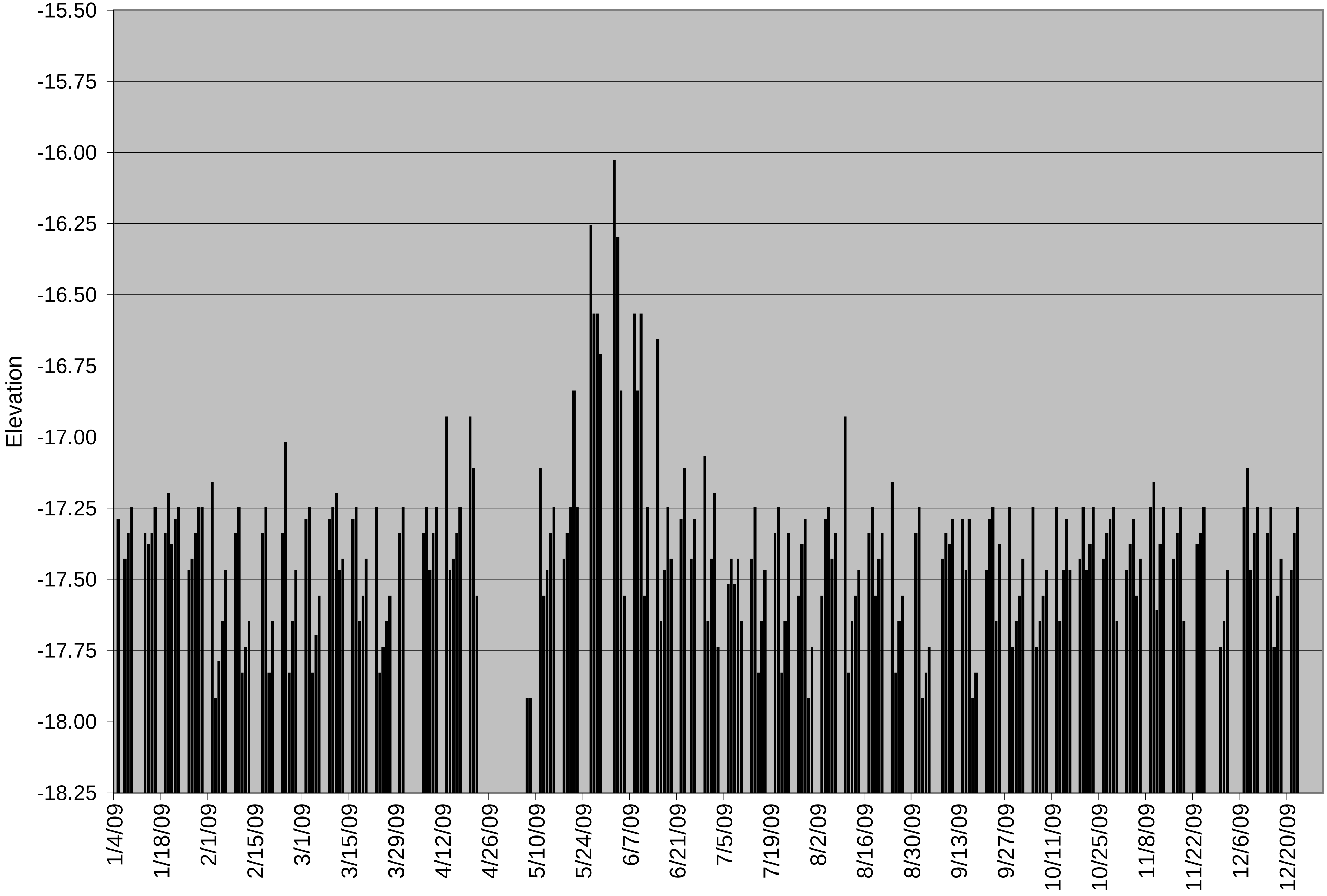
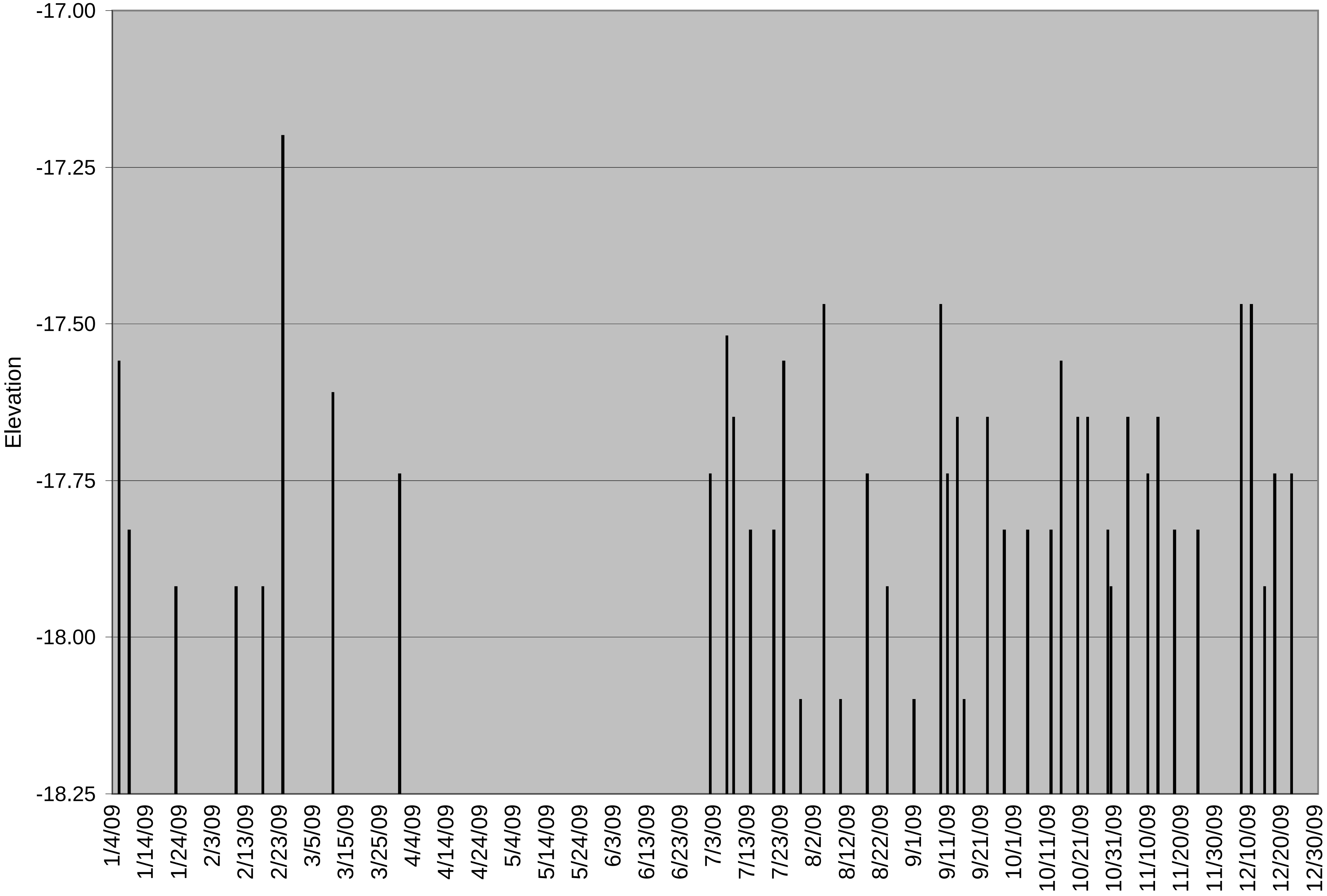
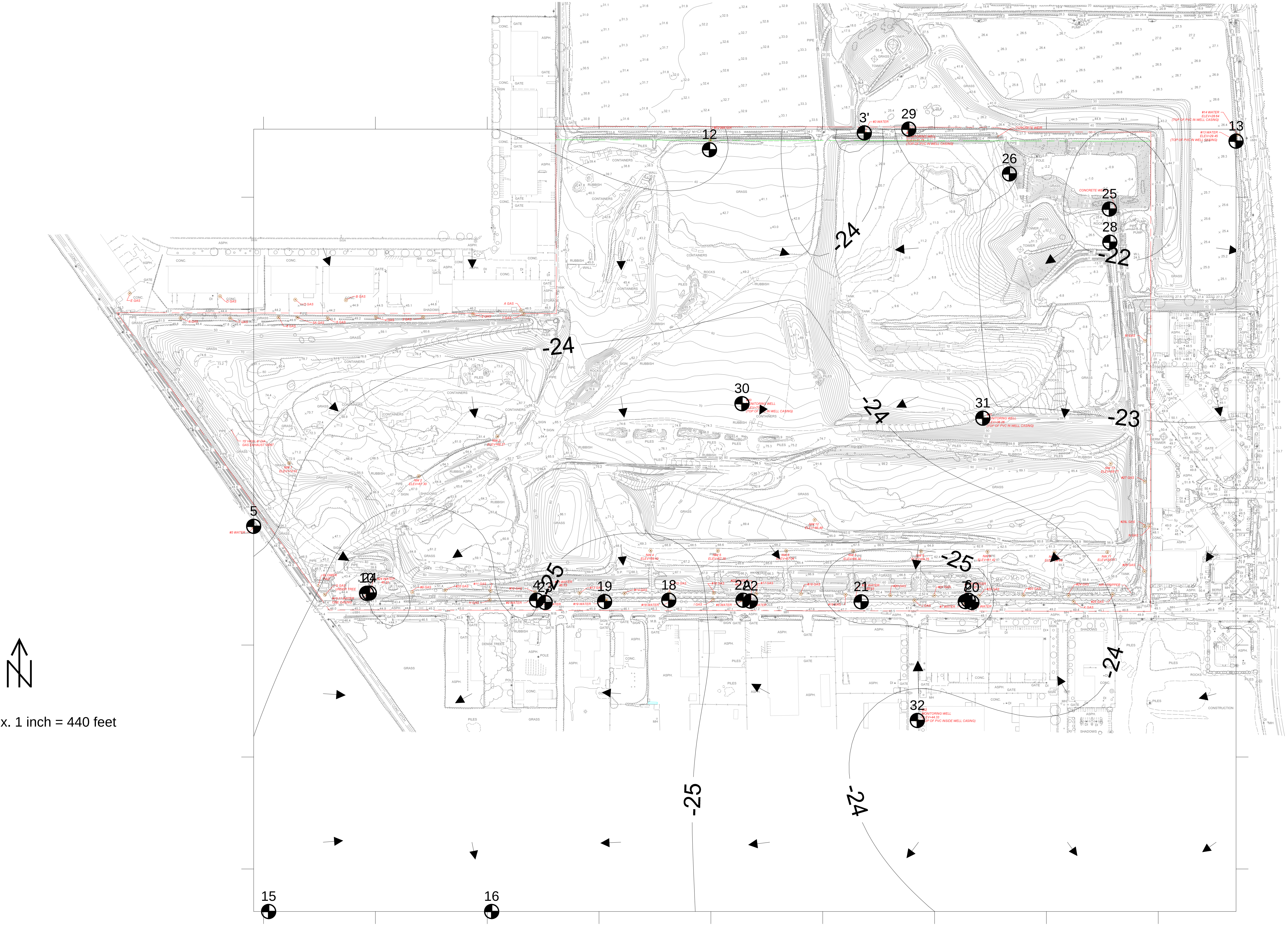


Figure 6
Water Elevation in LCRS After Pumping
Annual 2009

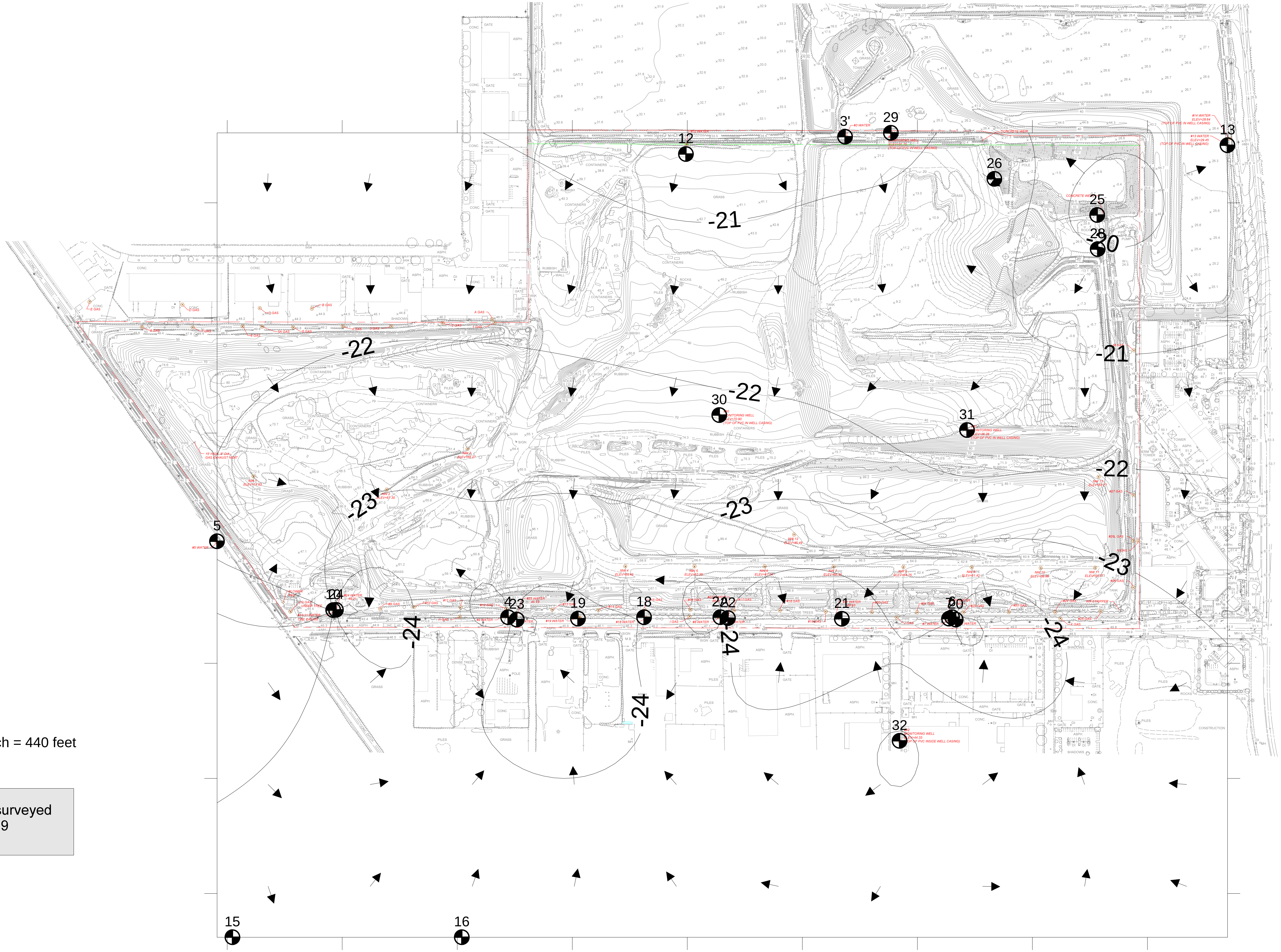




Scale Approx. 1 inch = 440 feet

FIGURE 7
GROUNDWATER CONTOUR MAP - SHALLOW ZONE
1ST QUARTER 2009

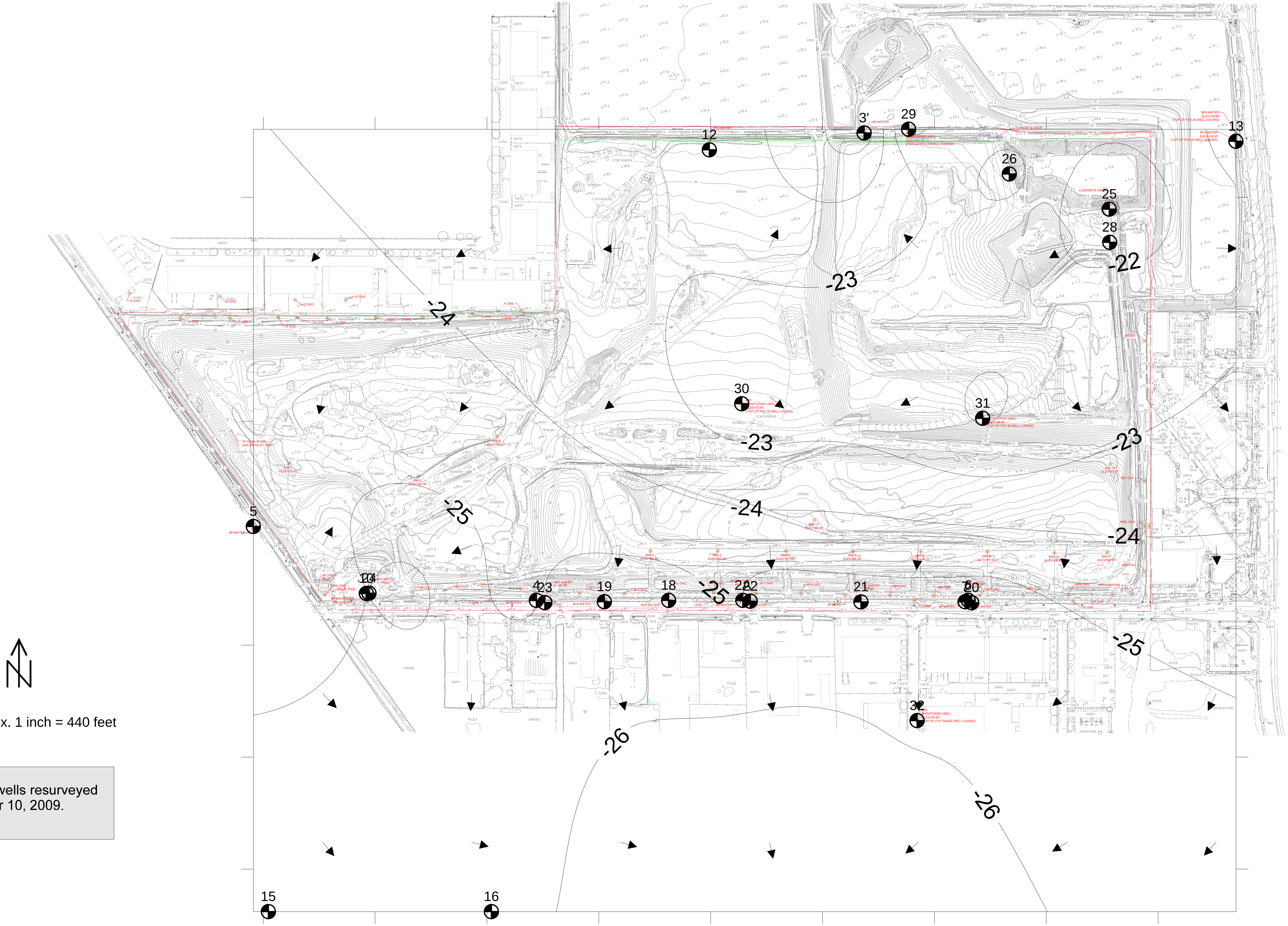
FIGURE 8
GROUNDWATER CONTOUR MAP - SHALLOW ZONE
2ND QUARTER 2009



Scale Approx. 1 inch = 440 feet

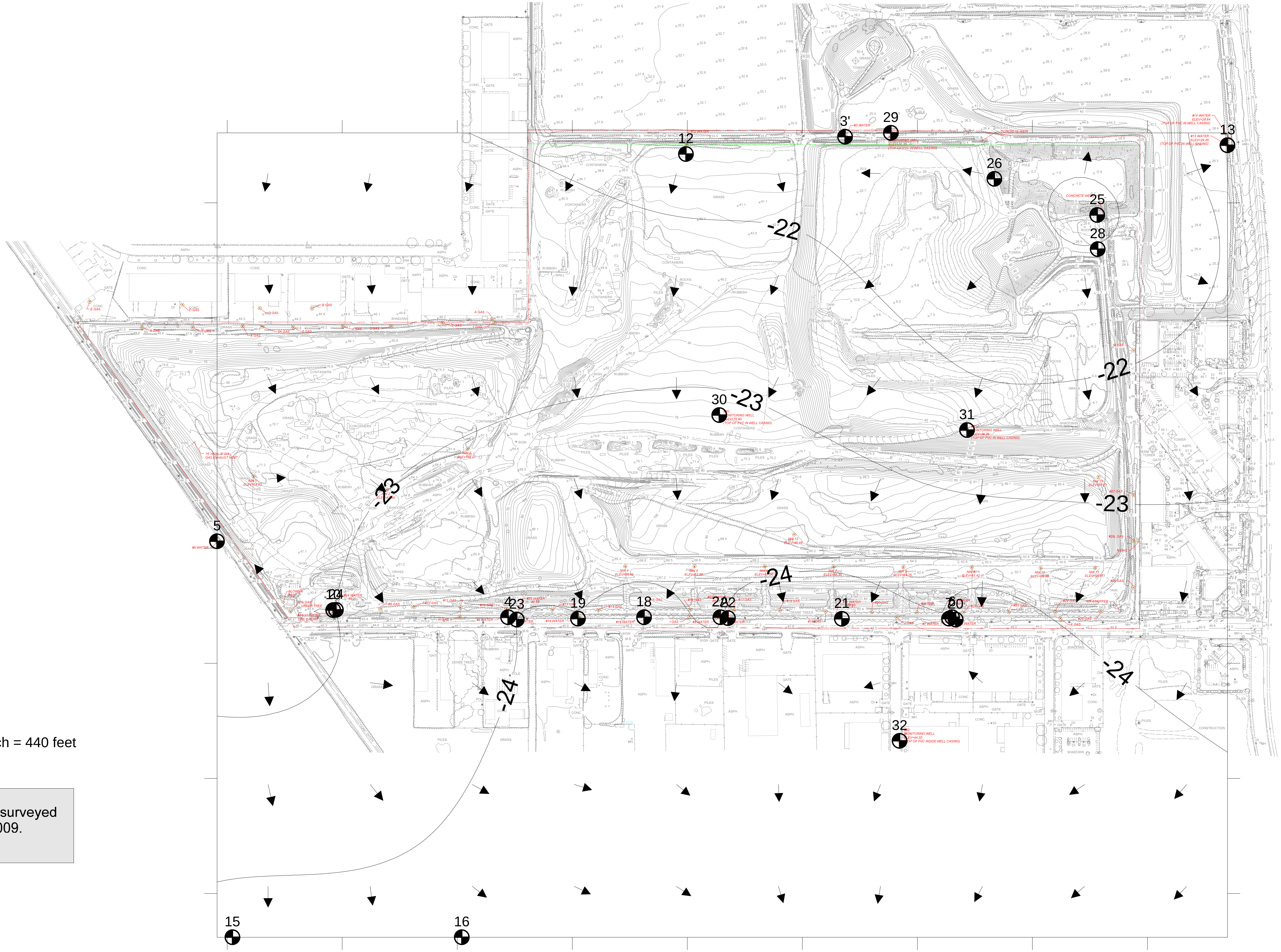
Note: All wells resurveyed
July 6, 2009

FIGURE 9
GROUNDWATER CONTOUR MAP - SHALLOW ZONE
3RD QUARTER 2009



Scale Approx. 1 inch = 440 feet

Note: All wells resurveyed September 10, 2009.

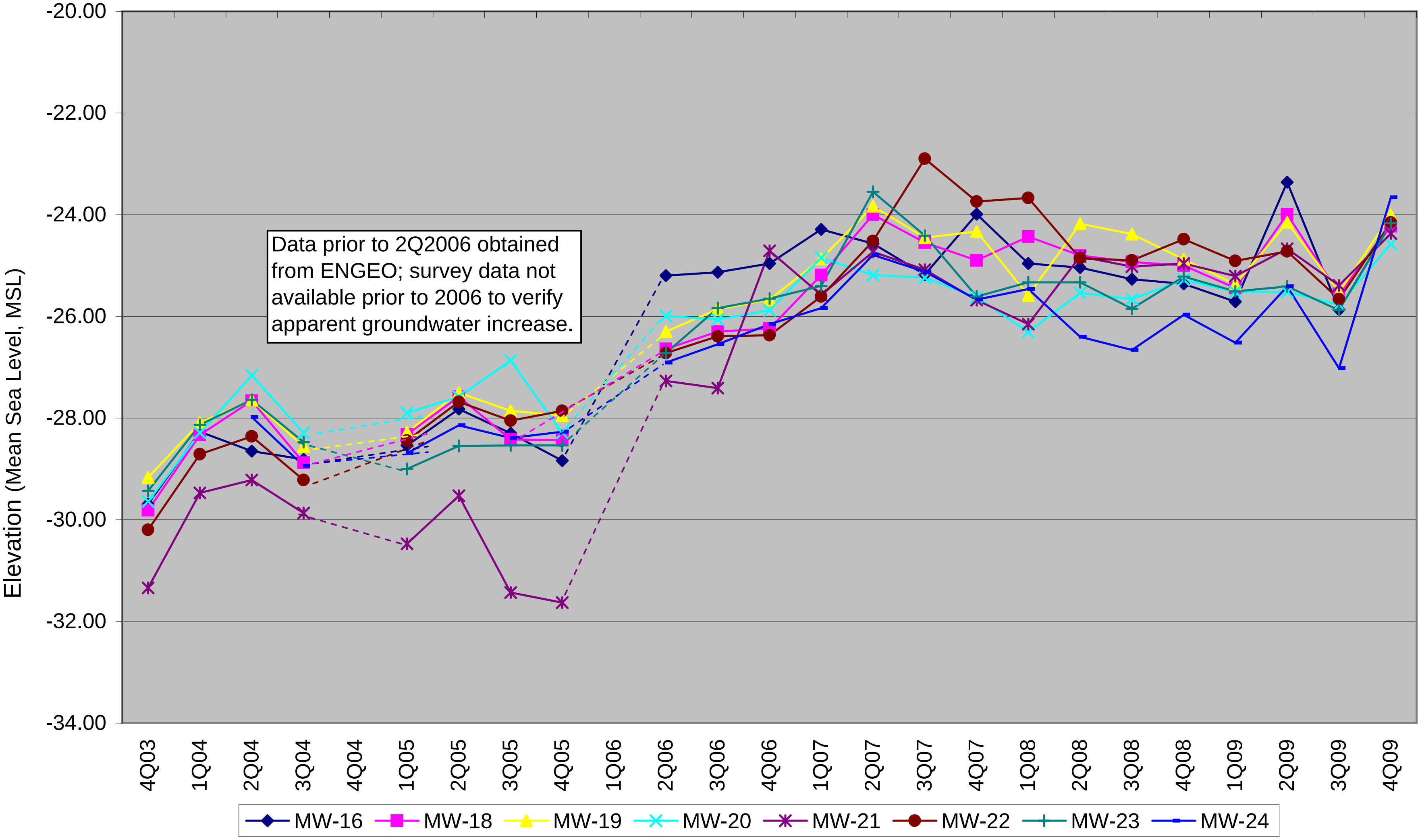


Scale Approx. 1 inch = 440 feet

Note: All wells resurveyed
September 10, 2009.

FIGURE 10
GROUNDWATER CONTOUR MAP - SHALLOW ZONE
4TH QUARTER 2009

Figure 11
L and D Landfill
2009 Corrective Action Plan Extraction Well Hydrographs



APPENDIX I

SCS'S DOCUMENT ENTITLED
SECOND SEMI-ANNUAL ANNUAL 2009, MONITORING REPORT, LFG MIGRATION CONTROL SYSTEM, L AND D LANDFILL, SACRAMENTO, CALIFORNIA

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JAN 29 2010

January 28, 2010
File No. 01204084.02 Task 9

Mr. Jeffrey Mills
L and D Landfill Limited Partnership
P.O. Box 255009
Sacramento, CA 95865-5009

Subject: **Second Semi-Annual 2009 Monitoring Report, LFG Migration Control System, L and D Landfill, Sacramento, California**

Dear Mr. Mills:

On behalf of L and D Landfill Limited Partnership (L and D LP), SCS Engineers (SCS) has prepared the Second Semi-Annual 2009 Monitoring Report for the Landfill Gas (LFG) Migration Control System for the L and D Landfill (L and D) in Sacramento, California. SCS has prepared this report in accordance with the Central Valley Regional Water Quality Control Board (CVRWQCB) reporting requirements for the LFG Migration Control System per SCS's August 24, 2007 letter. This report covers the reporting period of July 1 through December 31, 2009. Figures 1 and 2 show the monitoring locations discussed in this report.

Second Semi-Annual 2009 LFG Extraction Wells Monitoring Results

In accordance with the approved monitoring schedule, Phase 2 LFG extraction wells are to be monitored monthly for the 23-month period following the initial 30-day period, for a total of two years, ending December 31, 2009. Please note that Phase 1 data are also included in this report.

The LFG extraction wells were monitored monthly from July 1 through December 31, 2009. During each monitoring event, extraction wells were tested for methane, carbon dioxide, oxygen, and balance gas (assumed to be nitrogen). LFG flow rates, temperatures, and wellhead pressure were also recorded. Throughout the second semi-annual 2009 reporting period, extraction well flow rates were adjusted as necessary based on field testing and analytical data. Monitoring results for the wells are provided in Table 1 and discussed in the following sections.

Phase 1 - Extraction Wells EW-1 through EW-29

Wells EW-1 through EW-29 are not operational but are monitored monthly to assess whether LFG migration is occurring at the site perimeter. Please see the table below for concentration ranges and average concentrations for wells EW-1 through EW-29.

Wells EW-1 through EW-29

Parameter	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
Concentration Range	0 to 1.75	0.48 to 16.68	1.47 to 20.15
Average Concentration	0.08	3.64	15.21

Methane concentrations in all of the perimeter wells were below 1%, except for EW-1 at 1.75 percent (%). SCS recommends that these wells remain off-line as their function is no longer necessary because the Phase 2 collection and control system is controlling LFG migration. However, periodic monitoring for the presence of gas migration should continue.

Phase 1 - Extraction Wells NW-1 through NW-11

Wells NW-1 through NW-11 are all operational. Concentration ranges and average concentrations of methane, carbon dioxide, and oxygen are provided in the table below.

Wells NW-1 through NW-11

Parameter	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
Well Concentration Range	0.68 – 41.03	2.80 - 36.46	0.00 - 18.77
Well Average Concentration	23.83	28.00	1.16

The second semi-annual 2009 monitoring data indicate that 17 of the 20 wells installed in June 2005 as part of Phase 1 are extracting good quality LFG. Wells NW-01S, NW-04S, and NW08D are extracting low-quality LFG. Monitoring data for NW-8D indicate that NW-8D has extracted most of the LFG in the vadose zone within its area of influence below the lower limit of waste. Although well NW-8D extracts poor quality LFG, it will remain online to help control the migration of volatile organic compounds (VOCs) in groundwater. Lastly, a vacuum will continue to be applied to wells NW-01S and NW-04S, and extraction will continue until monitoring data indicate that LFG is not present in the proximity of these wells.

Phase 2 Wells and Leachate Risers

The Phase 2 Expansion includes18 wells (NW-14, MW-15, NW-16, NW-17D, NW-17S, NW-18, NW-19D, NW-19S, NW-20, NW-21D, NW-21S, NW-22, NW-23D, NW-23S, NW-24, NW-25D, NW-25S and NW-26) and four leachate collection and removal system risers (LCRS-1, -3, -5, and -7).

Concentration ranges and average concentrations of methane, carbon dioxide and oxygen for the 18 wells and four leachate risers for the second semi-annual 2009 monitoring period are provided in the following tables.

Phase 2 Wells

Parameter	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
Well Concentration Range	1.97 – 46.45	16.10 - 36.36	0.00 – 4.88
Well Average Concentration	23.53	28.11	1.06

The second semi-annual 2009 monitoring data indicate that 14 of the 18 Phase 2 wells are extracting good quality LFG. Monitoring results for wells NW-14, NW-15, NW-16, and NW-17D indicate that they are extracting low-quality LFG. A vacuum will continue to be applied to wells NW-14, NW-15, NW-16, and NW-17D to control the migration of VOCs in groundwater along the western perimeter of the site.

Leachate Risers

Parameter	Methane (%)	Carbon Dioxide (%)	Oxygen (%)
Well Concentration Range	18.92 – 35.67	25.21 – 33.13	0.10 – 1.35
Well Average Concentration	24.35	28.10	0.95

Three of the four leachate risers contained average methane concentrations above 20%, (exception is LCRS-3, which had an average methane concentration of 18.92%). All risers contained an average carbon dioxide concentration above 20%. Oxygen concentrations were 1% or less in all risers. The LCRS risers are collecting moderate quality of LFG and should remain on-line.

NW-12 Test Probe

The average methane, carbon dioxide, and oxygen concentrations in observation probe NW-12 for the second semi-annual 2009 reporting period were 1.58%, 2.25% and 18.93%, respectively. Low LFG concentrations detected in NW-12 can be attributed to additional migration control from the Phase 2 LFG system expansion.

During the second semi-annual monitoring period, observation probe NW-12 was also tested weekly for VOCs. An average VOC concentration of 0.39 parts per million by volume (ppmv) for July through December 2009 further supports the conclusion that more LFG has been removed from beneath the site, and migration of LFG is being controlled. VOC test results are included in Table 1.

Second Semi-Annual 2009 LFG Carbon Treatment System Monitoring Results

Visual observations and testing of the LFG carbon vent station were conducted weekly, in accordance with Sacramento Metropolitan Air Quality Management District (SMAQMD) permit requirements. During these events, operating parameters were monitored, and mechanical and electrical components were checked for workability. Throughout the reporting period, the vent system was programmed to operate 24 hours per day. The vent station operated as programmed throughout the reporting period.

The hoses were switched to reverse the flow through the carbon vessel on September 30, 2009, which resulted in a system shutdown of approximately 0.5 hours and one carbon change-out was performed on October 21, 2009, resulting in a system shutdown of approximately 4 hours during the reporting period. Upon completion of each maintenance event, the vent station was restarted and normal operation restored.

Methane, carbon dioxide, and oxygen concentrations were measured at the carbon vent station on a weekly basis. The LFG flow rate, temperature, and pressure were also recorded. As included in the previous report, a Fluid Components Inc. in-line meter was installed in March 2009 to more accurately measure the LFG flow rate.

The second semi-annual 2009 monitoring period average flow rate was 450 standard cubic feet per minute (scfm), with an increased average flow rate of 551 scfm in December 2009. Historically, flow rates have been higher; however higher historical flow rates can likely be attributed to the less accurate flow measurement capability of the pitot tube, which had been used prior to the installation of the current in-line flow meter. In addition, SCS adjusted the LFG flow throughout the monitoring period to maximize the mass of methane collected to increase the heat content (British thermal units (BTUs). Collection of gas with increased methane concentration equates to higher heat input (more energy) for use in a future flare station /energy recovery system. Vent station monitoring results are shown in Table 2.

VOC concentrations in the carbon vent station were measured weekly during the second semi-annual 2009 monitoring period. Inlet VOC concentrations ranged from 0.3 to 29.8 ppmv and vent station outlet VOC concentrations ranged from 0.0 to 1.7 ppmv during the reporting period. Table 2 includes the tabulated VOC test results.

As required by the CVRWQCB, a sample was obtained from the main header at the blower outlet on November 11, 2009 and submitted to a state-certified laboratory for analysis by Environmental Protection Agency (EPA) Method TO-14A on November 11, 2009. VOC concentrations detected in the sample from the blower outlet are representative of typical constituent concentrations in raw LFG. A copy of the laboratory report is provided as Attachment A.

Second Semi-Annual 2009 LFG Probes Monitoring Results

Monitoring probes MP-A through MP-N were monitored quarterly for methane, carbon dioxide, oxygen, VOCs, balance gas (assumed to be nitrogen), and pressure, as required by the CVRWQCB and 27 California Code of Regulation (CCR). Sampling was conducted on July 15 and November 11, 2009. Methane was not detected in any of the probes during the third and fourth quarters of 2009 indicating that the Phase 2 system is effectively controlling gas migration. Table 3 includes the monitoring probe sample results. Additional gas probes are currently being installed to comply with the 27 CCR and will be reported in future reports.

VOCs were detected in 10 of the 24 probes at concentrations ranging from 0.1 to 0.6 ppmv during the July 2009 monitoring event. During the November 2009 sampling event, VOCs were detected in 8 of the 24 probes at concentrations ranging from 0.1 to 0.4 ppmv. Low to non-detectable VOC concentrations detected in the probes in July and November 2009 indicate the collection system is controlling LFG migration thereby reducing VOC concentrations in the vicinity of the monitoring probes and in the vadose zone.

A sample was collected from probe MP-N on November 11, 2009 in accordance with the CVRWQCB reporting requirements. Low concentrations, in most cases only slightly above the laboratory reporting limit, of several VOCs were detected in the sample from probe MP-N. Laboratory results are provided in Attachment A.

Gas Testing Equipment

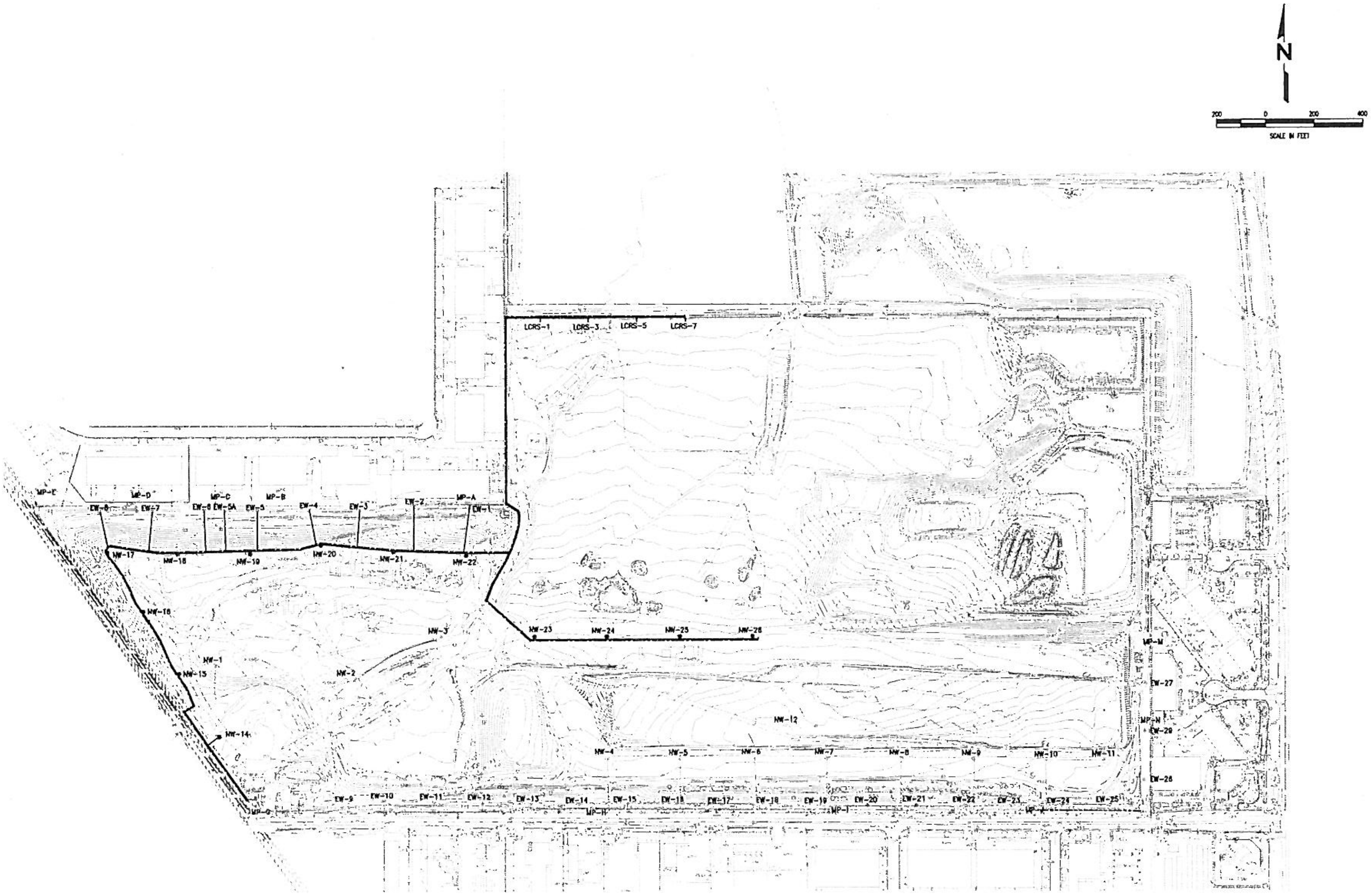
Testing for methane (the combustible component of LFG), oxygen, carbon dioxide, and pressure was performed using either a Landtec GEM 2000 or a Gastech GT-302 Gas Analyzer. Both of these instruments measure combustible gas concentrations in the air directly on either of two scales; the first as a percent by volume of the lower explosive limit (LEL) of methane gas in air (5 percent); the second as a percent by volume (0 to 100 percent) in the gas sampled. Testing for VOC concentrations was performed using a Minirae-2000 photo ionization detector (PID) instrument.

Conclusion

The average LFG flow rate during the second semi-annual 2009 monitoring period of 450 scfm is significantly higher than the average flow rate (278 scfm) prior to the Phase 2 expansion indicating the expanded LFG collection and control system is removing significant quantities of LFG thereby preventing LFG migration. Monitoring probe field data and laboratory data also support this conclusion. More accurate flow measurement and adjustment of the well field LFG flow rate to maximize energy content contribute to a lower flow rate than reported in the previous semi-annual report. SCS recommends that the Phase 2 system continue to operate for another year, which will include the new flare station. System performance should be optimized with the flare in place, and all monitoring should continue as is done currently. Reporting should continue on a semi-annual basis. The Phase 2 system can be re-evaluated in 2010 for possible modifications or expansions.

The monitoring data for the second semi-annual 2009 monitoring period indicate the carbon filtration system is effectively controlling the release of VOCs to the atmosphere and meeting SMAQMD requirements. In accordance with CVRWQCB requirements, quarterly and semi-annual monitoring reports summarizing LFG system operation, monitoring data and LFG probe

FIGURES



NO.	REVISION	DATE
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SHEET TITLE

INDEX SHEET

PROJECT TITLE

L AND D LANDFILL
LFG CONTROL SYSTEM (PHASE II)

CLIENT

L AND D LANDFILL LIMITED
PARTNERSHIP

SACRAMENTO, CA 95865-5009

SCS ENGINEERS
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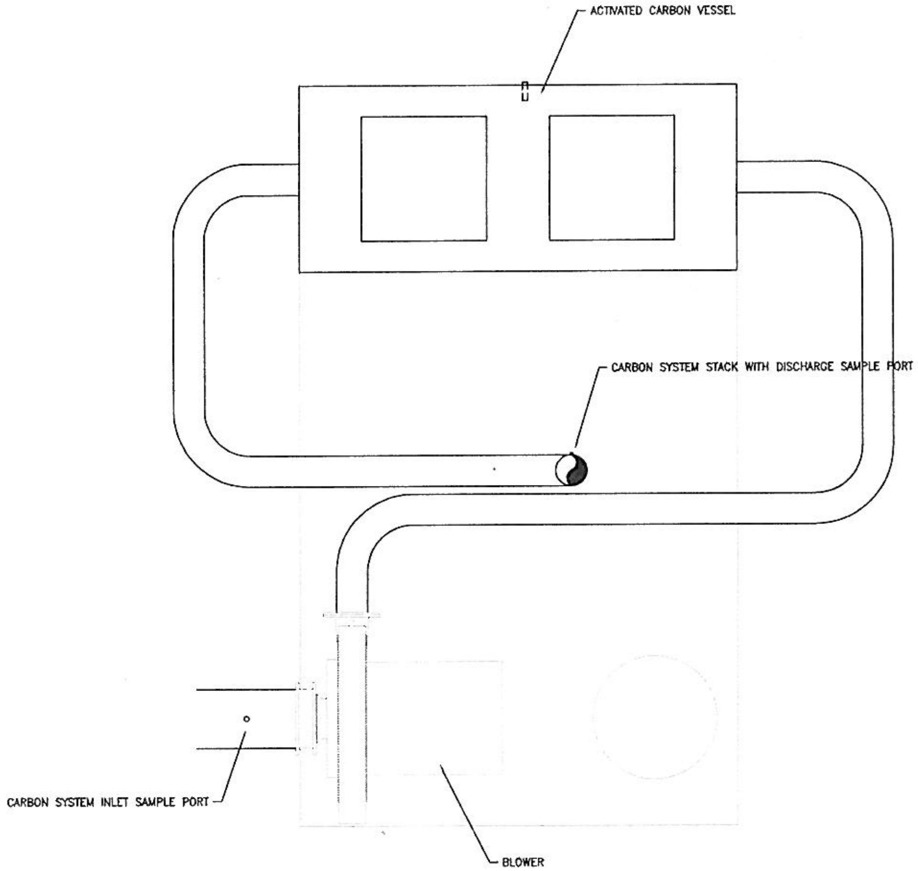
DWN. BY: SCS
ACAD FILE: PLAN SHEETS
DSN. BY: KH
CHK. BY:
APP. BY:

DATE: 8-10-07

DRAWING NO.

FIGURE 1



CARBON SKID AFTER MODIFICATIONS

NO.	REVISION	DATE
△	ISSUED FOR CONSTRUCTION	9-04-2007
△	REVISIONS FOR FLOW IMPROVEMENT	10-3-2007
△		
△		
△		
△		

SHEET TITLE
CARBON SYSTEM MODIFICATIONS

PROJECT TITLE
L AND D LANDFILL
LFG CONTROL SYSTEM (PHASE II)

CLIENT
L AND D LANDFILL LIMITED
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DWN. BY: SCS
ACAD FILE: PLAN SHEETS
DSN. BY: KH
CHK. BY:
APP. BY:

DATE: 9-04-2007

DRAWING NO.
FIGURE 2

TABLES

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Field Technician and Weather Conditions

Technician	Date	Ambient Temp	Barometric Pressure (in - Hg)	General Weather	Wind Speed	Wind Direction
Justin Winters	07/01/2009	82	29.7	Clear	Breezy Wind	SW
Justin Winters	07/09/2009	57	29.8	Clear	Light Wind	SE
Justin Winters	07/15/2009	72	29.7	Clear	Breezy Wind	SE
Justin Winters	07/24/2009	55	29.7	Clear	Breezy Wind	SW
Justin Winters	07/31/2009	56	29.7	Clear	Light Wind	SE

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
EW-1	07/09/2009	10:35	1.2	10.7	3.5	84.6		0	-0.1	80	-
EW-1	07/09/2009	10:39	1.2	11.7	2.9	84.2		-0.7	-2.2	78	-
EW-1	08/05/2009	09:43	1.8	17.5	2.5	78.2		-1.9	-1.9	86	-
EW-1	08/05/2009	09:44	1.8	17.5	2.5	78.2		-1.9	-4.3	86	-
EW-1	09/02/2009	11:51	2.7	17.6	0.6	79.1		-4.2	-4.2	98	-
EW-1	09/02/2009	11:52	2.7	17.6	0.6	79.1		-4.2	-6.1	98	-
EW-1	10/06/2009	13:17	1.6	17.4	1	80		-5.8	-5.7	88	-
EW-1	10/06/2009	13:18	1.6	17.4	1	80		-5.8	-7.1	88	-
EW-1	11/05/2009	11:32	1.7	18.5	0.6	79.2		-3.7	-3.7	75	-
EW-1	11/05/2009	11:38	1.7	18.5	0.6	79.2		-3.7	-4.5	75	-
EW-1	12/05/2009	11:04	1.5	17.9	0.9	79.7		-6.5	-6.4	53	-
EW-1	12/05/2009	11:04	1.5	17.9	0.9	79.7		-6.5	-0.1	53	-
EW-10	07/09/2009	12:59	0	2.3	17.8	79.9		0	0	97	-
EW-10	08/05/2009	13:24	0.1	1.7	18.2	80		0	0	92	-
EW-10	09/02/2009	14:55	0	1.5	17.5	81		0	0.1	109	-
EW-10	10/13/2009	14:45	0	2.5	17.7	79.8		0.6	0.6	59	-
EW-10	11/05/2009	14:59	0	1.9	17.2	80.9		0	0	77	-
EW-10	12/16/2009	12:46	0	2.1	18.3	79.6		0	0	64	-
EW-11	07/09/2009	12:56	0	4	14.8	81.2		0	0	98	-
EW-11	08/05/2009	13:21	0	4.2	14.3	81.5		0.1	0.1	93	-
EW-11	09/02/2009	14:52	0	4	13.1	82.9		0.2	0.2	111	-
EW-11	10/13/2009	14:41	0	4.9	14.1	81		0.6	0.7	59	-
EW-11	11/05/2009	14:56	0	4.7	13.7	81.6		0.2	0.2	77	-
EW-11	12/16/2009	12:43	0	5.2	14.8	80		0.1	0.1	62	-
EW-12	07/09/2009	12:53	0	1.3	18.2	80.5		0	0	96	-
EW-12	08/05/2009	13:14	0	1.9	17.3	80.8		0.1	0.1	94	-
EW-12	09/02/2009	14:50	0	1.6	16.8	81.6		0.2	0.3	112	-
EW-12	10/13/2009	14:38	0	4.3	15	80.7		0.6	0.5	60	-
EW-12	11/05/2009	14:53	0	2.8	16.2	81		0	0.1	83	-
EW-12	12/16/2009	12:39	0	2.8	17.3	79.9		0.2	0.1	63	-
EW-13	07/09/2009	12:46	0.00	4.7	13	82.3		0	0	99	-
EW-13	08/05/2009	13:11	0.00	5.6	11.9	82.5		0.1	0.1	97	-
EW-13	09/02/2009	14:47	0.00	5.2	10.7	84.1		0.3	0.2	113	-
EW-13	10/13/2009	14:35	0.00	5.7	12.5	81.8		0.5	0.5	59	-
EW-13	11/05/2009	14:51	0.00	5.3	12.3	82.4		0.3	0.2	84	-
EW-13	12/16/2009	12:37	0.00	5.8	13.5	80.7		0	0.1	64	-
EW-14	07/09/2009	12:43	0	2.8	15.5	81.7		0	0	98	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
EW-14	08/05/2009	13:09	0.1	2.9	15.1	81.9		0.1	0.1	95	-
EW-14	09/02/2009	14:45	0	2.8	14	83.2		0.1	0.1	111	-
EW-14	10/13/2009	14:32	0	3	15.4	81.6		0.7	0.7	59	-
EW-14	11/05/2009	14:49	0	3.1	15.2	81.7		0.1	0.1	81	-
EW-14	12/16/2009	12:34	0	3.4	16.1	80.5		0	0	64	-
EW-15	07/09/2009	12:40	0	2.2	16.6	81.2		0	0	98	-
EW-15	08/05/2009	13:05	0	2.4	15.8	81.8		0.1	0	93	-
EW-15	09/02/2009	14:42	0	2.3	14.6	83.1		0.1	0.2	111	-
EW-15	10/13/2009	13:48	0	4.6	15.1	80.3		0.7	0.7	60	-
EW-15	11/05/2009	14:46	0	2.4	16	81.6		0	0	79	-
EW-15	12/16/2009	11:50	0	2.3	17.7	80		-0.1	-0.1	61	-
EW-16	07/09/2009	12:37	0	1.8	17.2	81		0	0	98	-
EW-16	08/05/2009	13:02	0	1.8	16.9	81.3		0	0	96	-
EW-16	09/02/2009	14:40	0	2.3	15	82.7		0.2	0.1	110	-
EW-16	10/13/2009	13:51	0	3	16.3	80.7		0.5	0.5	59	-
EW-16	11/05/2009	14:44	0	2.5	16.4	81.1		0.2	0.2	83	-
EW-16	12/16/2009	11:47	0	2.5	17.5	80		-0.1	-0.1	60	-
EW-17	07/09/2009	12:35	0	3.5	15	81.5		0	0.1	96	-
EW-17	08/05/2009	12:59	0	3.5	14.7	81.8		0.1	0	93	-
EW-17	09/02/2009	14:37	0	3.6	13	83.4		0.1	0.2	112	-
EW-17	10/13/2009	13:54	0	4.7	14.1	81.2		0.7	0.6	59	-
EW-17	11/05/2009	14:42	0	4.5	14	81.5		0	0	76	-
EW-17	12/16/2009	11:45	0	4.7	15.3	80		-0.1	-0.1	61	-
EW-18	07/09/2009	12:31	0	3.5	15	81.5		0	0	101	-
EW-18	08/05/2009	12:56	0	3.9	14	82.1		0.1	0	96	-
EW-18	09/02/2009	14:35	0	3.9	12.5	83.6		0.2	0.2	111	-
EW-18	10/13/2009	13:57	0	5	14	81		0.6	0.5	60	-
EW-18	11/05/2009	14:39	0	3.9	14.7	81.4		0	0	79	-
EW-18	12/16/2009	11:42	0	4.1	16.4	79.5		-0.1	-0.1	60	-
EW-19	07/09/2009	12:29	0	1.7	17.2	81.1		0	0	103	-
EW-19	08/05/2009	12:52	0	1.8	17.1	81.1		0	0	101	-
EW-19	09/02/2009	14:32	0	1.8	16.2	82		0	0	109	-
EW-19	10/13/2009	13:59	0	3.3	17.6	79.1		0.3	0.3	60	-
EW-19	11/05/2009	14:37	0	2.2	17.7	80.1		0	0	73	-
EW-19	12/16/2009	11:38	0	2.4	18.7	78.9		0	0	60	-
EW-2	07/09/2009	10:32	0	0	19.9	80.1		0	0	82	-
EW-2	08/05/2009	09:39	0	0	20.1	79.9		0	0	75	-
EW-2	09/02/2009	11:48	0	0.4	20	79.6		0	0	90	-
EW-2	10/06/2009	13:14	0	3.6	18.9	77.5		0	0	74	-
EW-2	11/05/2009	11:22	0	0.3	20.5	79.2		0	0	75	-
EW-2	12/05/2009	10:54	0	0.2	21.1	78.7		0	0.1	46	-
EW-20	07/09/2009	12:26	0	3.4	14.7	81.9		0	0	96	-
EW-20	08/05/2009	12:49	0	3.6	14.1	82.3		0	0	94	-
EW-20	09/02/2009	14:29	0	3.4	13.1	83.5		0.2	0.2	105	-
EW-20	10/13/2009	14:02	0	4.2	14.9	80.9		0.5	0.5	59	-
EW-20	11/05/2009	14:34	0	3.8	15	81.2		0.1	0	72	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
EW-20	12/16/2009	11:35	0	3.8	16.9	79.3		0	0	59	-
EW-21	07/09/2009	12:23	0	0	20	80		0	0	97	-
EW-21	08/05/2009	12:46	0	0.8	19	80.2		0	0	94	-
EW-21	09/02/2009	14:27	0	0.6	18.9	80.5		0	0.1	109	-
EW-21	10/13/2009	14:05	0	3.8	16.1	80.1		0.4	0.3	59	-
EW-21	11/05/2009	14:32	0	0.6	19.8	79.6		0	0	74	-
EW-21	12/16/2009	11:31	0	0.4	20.6	79		0	0	60	-
EW-22	07/09/2009	12:20	0	5	11.9	83.1		0	0	96	-
EW-22	08/05/2009	12:44	0	5.7	11.2	83.1		0	0	94	-
EW-22	09/02/2009	14:24	0	5.6	9.9	84.5		0	0.1	108	-
EW-22	10/13/2009	14:08	0	6.5	12.3	81.2		0.4	0.4	59	-
EW-22	11/05/2009	14:27	0	6.1	11.8	82.1		0	0	73	-
EW-22	12/16/2009	11:29	0	5.9	14.5	79.6		-0.1	-0.1	60	-
EW-23	07/09/2009	12:17	0	4.1	14.2	81.7		0	0	97	-
EW-23	08/05/2009	12:41	0	4.2	13.9	81.9		0	0	95	-
EW-23	09/02/2009	14:22	0	4.3	12.3	83.4		0.2	0.1	109	-
EW-23	10/13/2009	14:11	0	5.4	14.1	80.5		0.5	0.5	59	-
EW-23	11/05/2009	14:29	0	5.7	13	81.3		0.1	0.1	73	-
EW-23	12/16/2009	11:26	0	6.4	14	79.6		-0.2	-0.1	59	-
EW-24	07/09/2009	12:15	0	4.1	14.1	81.8		0	0	95	-
EW-24	08/05/2009	12:39	0	4.5	13.3	82.2		0.1	0.1	94	-
EW-24	09/02/2009	14:19	0	4.6	12	83.4		0	0	109	-
EW-24	10/13/2009	14:13	0	5.6	13.5	80.9		0.5	0.5	59	-
EW-24	11/05/2009	14:22	0	5.2	13.4	81.4		0.1	0.1	76	-
EW-24	12/16/2009	11:23	0	5.2	15.4	79.4		0	-0.1	60	-
EW-25	07/09/2009	12:11	0	3.3	16.3	80.4		0	0	98	-
EW-25	08/05/2009	12:37	0	4	15.4	80.6		0.1	0.1	94	-
EW-25	09/02/2009	14:17	0	4.4	13.9	81.7		0.2	0.2	109	-
EW-25	10/13/2009	14:16	0	3.9	16.1	80		1	1	59	-
EW-25	11/05/2009	14:19	0	10.3	8.9	80.8		0.2	0	81	-
EW-25	12/16/2009	11:20	0	9.3	11.9	78.8		-0.2	-0.3	60	-
EW-26	07/09/2009	12:07	0	4.2	13	82.8		0	0	92	-
EW-26	08/05/2009	12:33	0	4.3	12.6	83.1		0	0	89	-
EW-26	09/02/2009	14:13	0	4.2	11.6	84.2		0	0.1	104	-
EW-26	10/13/2009	14:19	0	5.7	11.8	82.5		0.5	0.6	59	-
EW-26	11/05/2009	14:15	0	5.3	11.7	83		0	0	78	-
EW-26	12/16/2009	11:18	0	5.6	13.3	81.1		0	0	60	-
EW-27	07/09/2009	12:00	0	4.7	12.2	83.1		0	0	84	-
EW-27	08/05/2009	12:27	0	5.1	12.4	82.5		0	0	87	-
EW-27	09/02/2009	14:08	0	5.5	11.5	83		0	0	102	-
EW-27	10/06/2009	14:24	0	6.1	12.9	81		0	0	85	-
EW-27	11/05/2009	14:09	0	5.5	12.9	81.6		0	0.1	77	-
EW-27	12/16/2009	11:12	0	6.4	13.7	79.9		-0.1	0	61	-
EW-29	07/09/2009	12:04	0	3.3	15	81.7		0	0	88	-
EW-29	08/05/2009	12:30	0.1	3.4	14.7	81.8		0.1	0.1	85	-
EW-29	09/02/2009	14:11	0	3.6	13.5	82.9		0	0	102	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
EW-29	10/06/2009	14:26	0	4.4	14.5	81.1		0.2	0.2	84	-
EW-29	11/05/2009	14:12	0	4.2	14.7	81.1		0.2	0.2	79	-
EW-29	12/16/2009	11:15	0	4.2	15.9	79.9		-0.1	0	60	-
EW-3	07/09/2009	10:22	0	0.3	19.1	80.6		0	0	74	-
EW-3	08/05/2009	09:30	0	0.4	19.2	80.4		0	0	71	-
EW-3	09/02/2009	11:35	0	0.5	19.4	80.1		0	0	90	-
EW-3	10/06/2009	13:07	0	1.7	19.4	78.9		0.1	0.1	78	-
EW-3	11/05/2009	11:20	0	0.7	19.5	79.8		0	0	71	-
EW-3	12/05/2009	10:51	0	0.4	20.2	79.4		0	0.1	45	-
EW-4	07/09/2009	10:15	0	1.2	17.6	81.2		0	0	77	-
EW-4	08/05/2009	09:25	0	1	17.9	81.1		0	0	70	-
EW-4	09/02/2009	11:28	0	0.8	18.1	81.1		0	0	89	-
EW-4	10/06/2009	13:01	0	1	18.3	80.7		0.1	0.1	79	-
EW-4	11/05/2009	11:13	0	1.5	18.2	80.3		-0.1	0	73	-
EW-4	12/05/2009	10:43	0	1	19.3	79.7		0	0	47	-
EW-5	07/09/2009	10:13	0	1.7	16.4	81.9		0	0	75	-
EW-5	08/05/2009	09:22	0	1.5	16.8	81.7		0	0	70	-
EW-5	09/02/2009	11:25	0	1.7	16.4	81.9		0	0	89	-
EW-5	10/06/2009	12:58	0	3.4	16.5	80.1		0.1	0	77	-
EW-5	11/05/2009	11:02	0	1.2	17.2	81.6		0	-0.1	73	-
EW-5	12/05/2009	10:40	0	1.8	17.7	80.5		0	0	46	-
EW-5A	07/09/2009	10:03	0	3.7	12.3	84		-0.4	-0.4	76	-
EW-5A	08/05/2009	09:13	0.1	3	13.5	83.4		-0.2	-0.2	71	-
EW-5A	09/02/2009	11:15	0	2	13.9	84.1		-0.4	-0.3	90	-
EW-5A	10/06/2009	12:48	0	0.7	19	80.3		-0.6	0	78	-
EW-5A	11/05/2009	10:59	0	0.3	19.7	80		-0.8	-0.8	76	-
EW-5A	12/05/2009	10:30	0	0.5	20.4	79.1		-0.4	-0.3	48	-
EW-6	07/09/2009	10:01	0	0	20.1	79.9		0	0	73	-
EW-6	08/05/2009	09:10	0	0.1	20.4	79.5		0	0	72	-
EW-6	09/02/2009	11:13	0	0.3	20.1	79.6		0	0	91	-
EW-6	10/06/2009	12:45	0	1.8	19.9	78.3		0.1	0.1	76	-
EW-6	11/05/2009	10:56	0	0.2	20.3	79.5		-0.2	-0.2	76	-
EW-6	12/05/2009	10:27	0	0.5	20.1	79.4		0	0	52	-
EW-7	07/09/2009	09:55	1	7.6	8.8	82.6		0	0	76	-
EW-7	08/05/2009	09:04	0.9	6.7	10.4	82		0	0	72	-
EW-7	09/02/2009	11:03	0.5	4.8	11.4	83.3		0	0	92	-
EW-7	10/06/2009	12:38	0.3	4	12.9	82.8		0	0	79	-
EW-7	11/05/2009	10:47	0.3	3.3	14.3	82.1		-0.1	-0.1	74	-
EW-7	12/05/2009	10:21	0.2	3.2	15.6	81		0	0	50	-
EW-8	07/09/2009	09:51	0	3.8	14.3	81.9		0	0	77	-
EW-8	08/05/2009	09:00	0	3.4	14.8	81.8		0	0	73	-
EW-8	09/02/2009	10:59	0	3.5	14.8	81.7		0	0	89	-
EW-8	10/06/2009	12:35	0	3.8	15.4	80.8		0	0	78	-
EW-8	11/05/2009	10:44	0	3.1	16.3	80.6		-0.2	-0.2	73	-
EW-8	12/05/2009	10:17	0	2.5	16.2	81.3		0	0	46	-
EW-9	07/09/2009	13:02	0	0.5	19.5	80		0	0	99	-

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L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
EW-9	08/05/2009	13:30	0	0.7	19.6	79.7		0	0	96	-
EW-9	09/02/2009	14:58	0	0.6	19	80.4		0.1	0.1	113	-
EW-9	10/13/2009	14:49	0	1.2	19.5	79.3		0.6	0.6	59	-
EW-9	11/05/2009	15:02	0	1.1	18.7	80.2		0.3	0.2	75	-
EW-9	12/16/2009	12:49	0	0.1	20.8	79.1		0	0.1	65	-
LCRS-1	07/09/2009	10:50	19.8	24.9	1.3	54		-0.2	-0.1	78	-
LCRS-1	08/05/2009	09:55	20.2	26	2.1	51.7		-0.2	-0.2	77	-
LCRS-1	08/05/2009	09:56	20.2	26	2.1	51.7		-0.2	-0.1	77	-
LCRS-1	09/02/2009	13:04	22.7	27.1	0.7	49.5		-0.1	0	84	-
LCRS-1	09/02/2009	13:04	22.7	27.1	0.7	49.5		-0.1	-0.1	84	-
LCRS-1	10/06/2009	13:26	19.7	25	1.2	54.1		-0.1	-0.1	78	-
LCRS-1	10/06/2009	13:26	19.7	25	1.2	54.1		-0.1	-0.2	78	-
LCRS-1	11/05/2009	12:46	17.6	24.6	2.3	55.5		-0.1	-0.1	76	-
LCRS-1	11/05/2009	12:46	17.6	24.6	2.3	55.5		-0.1	-0.2	76	-
LCRS-1	12/05/2009	11:12	23.8	26.8	0.5	48.9		-0.2	-0.2	73	-
LCRS-1	12/05/2009	11:13	23.8	26.8	0.5	48.9		-0.2	0	73	-
LCRS-3	07/09/2009	10:55	19.9	24.5	1.6	54		-0.2	-0.2	78	-
LCRS-3	08/05/2009	10:01	19	24.7	2.7	53.6		-0.1	-0.1	77	-
LCRS-3	08/05/2009	10:01	19	24.7	2.7	53.6		-0.1	-0.1	77	-
LCRS-3	09/02/2009	13:09	22.5	27.1	0.4	50		-0.1	0	86	-
LCRS-3	09/02/2009	13:09	22.5	27.1	0.4	50		-0.1	-0.1	86	-
LCRS-3	10/06/2009	13:29	15.2	24.2	1.1	59.5		0	0	78	-
LCRS-3	10/06/2009	13:29	15.2	24.2	1.1	59.5		0	-0.1	78	-
LCRS-3	11/05/2009	12:49	17.4	25.1	1.2	56.3		0	0	76	-
LCRS-3	11/05/2009	12:50	17.4	25.1	1.2	56.3		0	-0.1	76	-
LCRS-3	12/05/2009	11:15	20	25.3	0.8	53.9		-0.3	-0.3	74	-
LCRS-3	12/05/2009	11:16	20	25.3	0.8	53.9		-0.3	0	74	-
LCRS-5	07/09/2009	10:59	40.7	35.2	0.4	23.7		-0.2	-0.2	79	-
LCRS-5	07/09/2009	11:03	43.3	37.5	0.5	18.7		-1.1	-1.1	79	-
LCRS-5	08/05/2009	10:08	37.8	34.5	1.8	25.9		-1.1	-1.2	77	-
LCRS-5	08/05/2009	10:09	37.8	34.5	1.8	25.9		-1.1	-1.9	77	-
LCRS-5	09/02/2009	13:14	36.1	33	0.8	30.1		-1.3	-1.5	83	-
LCRS-5	09/02/2009	13:15	36.1	33	0.8	30.1		-1.3	-2	83	-
LCRS-5	10/06/2009	13:32	31.9	31.1	1.8	35.2		-2.3	-2.3	75	-
LCRS-5	10/06/2009	13:33	31.9	31.1	1.8	35.2		-2.3	-3.2	75	-
LCRS-5	11/05/2009	12:53	28.2	31.4	0.8	39.6		-0.1	-0.1	73	-
LCRS-5	11/05/2009	12:53	28.2	31.4	0.8	39.6		-0.1	-0.2	73	-
LCRS-5	12/05/2009	11:18	38	32.4	0.8	28.8		-1.7	-2.1	68	-
LCRS-5	12/05/2009	11:18	38	32.4	0.8	28.8		-1.7	0	68	-
LCRS-7	07/09/2009	11:06	25.5	28.9	0.1	45.5		-0.1	-0.1	78	-
LCRS-7	08/05/2009	10:14	21.9	28	0.5	49.6		-0.1	-0.1	76	-
LCRS-7	08/05/2009	10:14	21.9	28	0.5	49.6		-0.1	-0.1	76	-
LCRS-7	09/02/2009	13:19	22.7	28.5	0	48.8		0	0	86	-
LCRS-7	09/02/2009	13:19	22.7	28.5	0	48.8		0	-0.1	86	-
LCRS-7	10/06/2009	13:36	19.7	27.5	0	52.8		0	0	76	-
LCRS-7	10/06/2009	13:36	19.7	27.5	0	52.8		0	-0.1	76	-

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Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
LCRS-7	11/05/2009	12:56	20.8	28.7	0	50.5		0	0	74	-
LCRS-7	11/05/2009	12:57	20.8	28.7	0	50.5		0	-0.1	74	-
LCRS-7	12/05/2009	11:21	23.8	28.3	0	47.9		-0.2	-0.2	70	-
LCRS-7	12/05/2009	11:21	23.8	28.3	0	47.9		-0.2	0	70	-
NW-01D	07/09/2009	07:56	24.3	30.1	0	45.6		-1.3	-1.3	77	-
NW-01D	08/05/2009	11:03	22.4	29.1	0.1	48.4		-1.1	-1.1	79	-
NW-01D	08/05/2009	11:04	22.4	29.1	0.1	48.4		-1.1	-1	79	-
NW-01D	09/02/2009	10:27	22.7	29.6	0	47.7		-1	-1.1	83	-
NW-01D	09/02/2009	10:28	22.7	29.6	0	47.7		-1	-1.2	83	-
NW-01D	10/06/2009	14:16	22.2	28.9	0	48.9		-0.8	-0.8	79	-
NW-01D	11/05/2009	13:52	23.7	29.8	0	46.5		-0.6	-0.6	77	-
NW-01D	11/05/2009	13:52	23.7	29.8	0	46.5		-0.6	-0.7	77	-
NW-01D	12/05/2009	12:16	28.1	29.5	0.4	42		-0.8	-0.8	73	-
NW-01D	12/05/2009	12:17	28.1	29.5	0.4	42		-0.8	-1.8	73	-
NW-01S	07/09/2009	07:58	8.9	24	0	67.1		-0.4	-0.3	78	-
NW-01S	08/05/2009	11:06	9.3	23.5	0.5	66.7		-0.3	-0.2	79	-
NW-01S	08/05/2009	11:06	9.3	23.5	0.5	66.7		-0.3	-0.3	79	-
NW-01S	09/02/2009	10:30	10.3	24.8	0	64.9		-0.2	-0.3	82	-
NW-01S	09/02/2009	10:30	10.3	24.8	0	64.9		-0.2	-0.2	82	-
NW-01S	10/06/2009	14:18	9.6	22.6	0	67.8		-0.1	-0.1	80	-
NW-01S	11/05/2009	13:54	9.4	24.5	0	66.1		-0.1	-0.1	78	-
NW-01S	11/05/2009	13:54	9.4	24.5	0	66.1		-0.1	-0.2	78	-
NW-01S	12/05/2009	12:19	10.3	23.1	0	66.6		-0.2	-0.2	74	-
NW-01S	12/05/2009	12:20	10.3	23.1	0	66.6		-0.2	-1.2	74	-
NW-02D	07/09/2009	07:50	34.7	35	0	30.3		-1.8	-1.9	77	-
NW-02D	08/05/2009	10:55	29	31.5	1.6	37.9		-1.4	-1.4	79	-
NW-02D	08/05/2009	10:55	29	31.5	1.6	37.9		-1.4	-1.3	79	-
NW-02D	09/02/2009	10:21	30.5	32.9	0	36.6		-1.3	-1.3	81	-
NW-02D	09/02/2009	10:21	30.5	32.9	0	36.6		-1.3	-1.5	81	-
NW-02D	10/06/2009	14:11	29	32.7	0	38.3		-0.7	-0.7	79	-
NW-02D	11/05/2009	13:45	30.4	33.1	0	36.5		-0.6	-0.6	77	-
NW-02D	11/05/2009	13:45	30.4	33.1	0	36.5		-0.6	-0.6	77	-
NW-02D	12/05/2009	12:00	35.2	33	0	31.8		-0.6	-0.6	73	-
NW-02D	12/05/2009	12:01	35.2	33	0	31.8		-0.6	-1.5	73	-
NW-02S	07/09/2009	07:52	45.4	38.7	0	15.9		-1.9	-1.9	78	-
NW-02S	07/09/2009	07:52	45.4	38.7	0	15.9		-1.9	-2	78	-
NW-02S	08/05/2009	10:58	38.5	36.5	1	24		-1.7	-1.7	79	-
NW-02S	09/02/2009	10:23	38.8	37.1	0	24.1		-1.9	-1.8	80	-
NW-02S	09/02/2009	10:23	38.8	37.1	0	24.1		-1.9	-1.9	80	-
NW-02S	10/06/2009	14:12	38	34.5	0	27.5		-1	-1	79	-
NW-02S	10/06/2009	14:12	38	34.5	0	27.5		-1	-1.1	79	-
NW-02S	11/05/2009	13:47	39.7	36.6	0	23.7		-0.8	-0.9	78	-
NW-02S	11/05/2009	13:48	39.7	36.6	0	23.7		-0.8	-1	78	-
NW-02S	12/05/2009	12:02	44.5	35.4	0	20.1		-0.7	-0.7	74	-
NW-02S	12/05/2009	12:05	44.5	35.4	0	20.1		-0.7	-1.4	74	-
NW-03D	07/09/2009	07:45	34	34.7	0	31.3		-1.2	-1.2	81	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-03D	08/05/2009	10:48	29	31.5	1.3	38.2		-0.8	-0.7	82	-
NW-03D	08/05/2009	10:48	29	31.5	1.3	38.2		-0.8	-0.8	82	-
NW-03D	09/02/2009	10:13	31.5	34.2	0	34.3		-0.8	-0.8	84	-
NW-03D	09/02/2009	10:14	31.5	34.2	0	34.3		-0.8	-0.9	84	-
NW-03D	10/06/2009	14:06	29.8	34.4	0	35.8		-0.3	-0.3	83	-
NW-03D	11/05/2009	13:38	31	33.8	0	35.2		-0.1	-0.1	80	-
NW-03D	11/05/2009	13:39	31	33.8	0	35.2		-0.1	-0.2	80	-
NW-03D	12/05/2009	11:52	38.8	33.3	0	27.9		-0.2	-0.2	78	-
NW-03D	12/05/2009	11:53	38.8	33.3	0	27.9		-0.2	-1.1	78	-
NW-03S	07/09/2009	07:47	31.1	34.5	0	34.4		-8.4	-8.5	77	-
NW-03S	08/05/2009	10:50	24.4	29.1	3	43.5		-7.6	-7.6	79	-
NW-03S	08/05/2009	10:51	24.4	29.1	3	43.5		-7.6	-6.9	79	-
NW-03S	09/02/2009	10:16	27.8	32.5	0	39.7		-7.2	-7.4	82	-
NW-03S	09/02/2009	10:17	27.8	32.5	0	39.7		-7.2	-7.8	82	-
NW-03S	10/06/2009	14:07	26.1	32.4	0	41.5		-5.7	-5.7	80	-
NW-03S	10/06/2009	14:08	26.1	32.4	0	41.5		-5.7	-5.1	80	-
NW-03S	11/05/2009	13:41	27.1	32.9	0	40		-2.7	-2.7	77	-
NW-03S	11/05/2009	13:41	27.1	32.9	0	40		-2.7	-2.2	77	-
NW-03S	12/05/2009	11:55	30.8	32.1	0	37.1		-1.4	-1.4	68	-
NW-03S	12/05/2009	11:56	30.8	32.1	0	37.1		-1.4	-2.2	68	-
NW-04D	07/09/2009	09:00	20.6	26.7	0	52.7		-16.7	-16.8	77	-
NW-04D	07/09/2009	09:02	20.6	26.7	0	52.7		-16.7	-1.2	77	-
NW-04D	08/05/2009	12:16	12.9	17.9	6.3	62.9		0	0	87	-
NW-04D	08/05/2009	12:18	13.7	18.8	5.7	61.8		-1.9	-1.9	87	-
NW-04D	09/02/2009	14:01	20.3	26.4	0	53.3		-1.6	-1.6	98	-
NW-04D	09/02/2009	14:02	20.3	26.4	0	53.3		-1.6	-4.9	98	-
NW-04D	10/06/2009	12:10	18.9	27.7	0.3	53.1		-6.2	-6.2	78	-
NW-04D	11/05/2009	09:43	20.7	30.1	0	49.2		-5	-5	74	-
NW-04D	11/05/2009	09:44	20.7	30.1	0	49.2		-5	-5.7	74	-
NW-04D	12/05/2009	09:52	25	28.4	0	46.6		-5.6	-5.6	63	-
NW-04D	12/05/2009	09:52	25	28.4	0	46.6		-5.6	-5.1	63	-
NW-04S	07/09/2009	09:04	12.3	24.7	0	63		-0.6	-0.6	77	-
NW-04S	07/09/2009	09:05	12.3	24.7	0	63		-0.6	-0.6	77	-
NW-04S	08/05/2009	12:20	13.7	24.5	0.4	61.4		0	-0.1	81	-
NW-04S	09/02/2009	14:03	15.2	24.5	0	60.3		0	0	92	-
NW-04S	09/02/2009	14:04	15.2	24.5	0	60.3		0	0	92	-
NW-04S	10/06/2009	12:12	10.6	24.9	0	64.5		-0.2	-0.2	78	-
NW-04S	11/05/2009	09:46	11.2	25.4	0	63.4		-0.4	-0.5	76	-
NW-04S	11/05/2009	09:46	11.2	25.4	0	63.4		-0.4	-0.6	76	-
NW-04S	12/05/2009	09:54	17.9	26.7	0	55.4		0	-0.1	69	-
NW-05D	07/09/2009	08:53	20.2	26.9	0	52.9		-3.9	-4	76	-
NW-05D	07/09/2009	08:54	20.2	26.9	0	52.9		-3.9	-3.3	76	-
NW-05D	08/05/2009	12:08	18.3	24.7	1.3	55.7		-2.5	-2.5	80	-
NW-05D	08/05/2009	12:08	18.3	24.7	1.3	55.7		-2.5	-1.6	80	-
NW-05D	09/02/2009	13:54	18.4	25.2	0	56.4		-1.1	-1.1	95	-
NW-05D	09/02/2009	13:55	18.4	25.2	0	56.4		-1.1	-2.5	95	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-05D	10/06/2009	12:05	17.9	26.5	0	55.6		-3.2	-3.2	78	-
NW-05D	11/05/2009	09:38	19.2	27.3	0	53.5		-2.8	-2.8	74	-
NW-05D	11/05/2009	09:38	19.2	27.3	0	53.5		-2.8	-3.9	74	-
NW-05D	12/05/2009	09:45	24	27.3	0	48.7		-3.5	-3.6	65	-
NW-05D	12/05/2009	09:46	24	27.3	0	48.7		-3.5	-3	65	-
NW-05S	07/09/2009	08:56	26.4	29.6	0	44		-1.2	-1.3	77	-
NW-05S	07/09/2009	08:58	26.2	28.7	0	45.1		-1.1	-1.1	78	-
NW-05S	08/05/2009	12:13	24.1	27.2	0.7	48		-0.5	-0.5	81	-
NW-05S	08/05/2009	12:13	24.1	27.2	0.7	48		-0.5	-0.4	81	-
NW-05S	09/02/2009	13:57	24.4	27.6	0	48		0	-0.1	92	-
NW-05S	09/02/2009	13:59	24.5	27.7	0	47.8		-0.4	-0.4	91	-
NW-05S	10/06/2009	12:07	24	29.2	0	46.8		-0.7	-0.7	78	-
NW-05S	11/05/2009	09:40	25.4	30.1	0	44.5		-0.8	-0.8	75	-
NW-05S	11/05/2009	09:41	25.4	30.1	0	44.5		-0.8	-0.9	75	-
NW-05S	12/05/2009	09:48	31.5	29.9	0	38.6		-0.6	-0.6	68	-
NW-05S	12/05/2009	09:49	31.5	29.9	0	38.6		-0.6	-0.5	68	-
NW-06D	07/09/2009	08:45	18.1	25.3	0	56.6		-0.6	-0.6	76	-
NW-06D	07/09/2009	08:45	18.1	25.3	0	56.6		-0.6	-0.7	76	-
NW-06D	08/05/2009	12:01	18.5	25.6	0	55.9		-0.1	-0.1	82	-
NW-06D	09/02/2009	13:49	19.3	24.2	0	56.5		0.1	0	92	-
NW-06D	09/02/2009	13:50	19.3	24.2	0	56.5		0.1	0	92	-
NW-06D	10/06/2009	12:00	17.5	26.7	0	55.8		-0.3	-0.4	78	-
NW-06D	11/05/2009	09:32	18.5	27.6	0	53.9		-0.6	-0.6	75	-
NW-06D	11/05/2009	09:32	18.5	27.6	0	53.9		-0.6	-0.6	75	-
NW-06D	12/05/2009	09:37	23	27.2	0	49.8		-0.2	-0.2	69	-
NW-06D	12/05/2009	09:38	23	27.2	0	49.8		-0.2	0	69	-
NW-06S	07/09/2009	08:47	23	27.2	0.1	49.7		-16.7	-16.6	75	-
NW-06S	07/09/2009	08:49	23	27.2	0.1	49.7		-16.7	-1.1	75	-
NW-06S	08/05/2009	12:02	21.1	26.2	1	51.7		-1.3	-1.3	84	-
NW-06S	08/05/2009	12:05	21.1	26.2	1	51.7		-1.3	-1.1	84	-
NW-06S	09/02/2009	13:51	22.1	26.3	0	51.6		-0.4	-0.4	99	-
NW-06S	09/02/2009	13:52	22.1	26.3	0	51.6		-0.4	-7.1	99	-
NW-06S	10/06/2009	12:02	20.6	27.9	0	51.5		-8.2	-8.2	77	-
NW-06S	11/05/2009	09:34	22.1	28.7	0	49.2		-6.4	-6.3	72	-
NW-06S	11/05/2009	09:35	22.1	28.7	0	49.2		-6.4	-8.1	72	-
NW-06S	12/05/2009	09:40	29.1	28.4	0	42.5		-8.9	-8.8	58	-
NW-06S	12/05/2009	09:42	29.1	28.4	0	42.5		-8.9	-6.8	58	-
NW-07	07/09/2009	08:41	19.5	25.6	0	54.9		-0.7	-0.7	75	-
NW-07	07/09/2009	08:41	19.5.	25.6	0	54.9		-0.7	-0.8	75	-
NW-07	08/05/2009	11:55	17.8	25.5	0	56.7		-0.1	-0.2	81	-
NW-07	08/05/2009	11:55	17.8	25.5	0	56.7		-0.1	-0.1	81	-
NW-07	09/02/2009	13:45	17	24.4	0	58.6		0	0.1	92	-
NW-07	09/02/2009	13:46	17	24.4	0	58.6		0	0	92	-
NW-07	10/06/2009	11:58	18.1	26.5	0	55.4		-0.4	-0.5	78	-
NW-07	11/05/2009	09:27	19.2	27.9	0	52.9		-0.6	-0.6	74	-
NW-07	11/05/2009	09:27	19.2	27.9	0	52.9		-0.6	-0.6	74	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-07	12/05/2009	09:33	23.4	26.7	0	49.9		-0.2	-0.3	68	-
NW-07	12/05/2009	09:35	23.4	26.7	0	49.9		-0.2	-0.2	68	-
NW-08D	07/09/2009	08:26	0.3	0.9	19.6	79.2		-16.8	-16.9	70	-
NW-08D	07/09/2009	08:30	0.3	0.9	19.6	79.2		-16.8	-0.7	70	-
NW-08D	08/05/2009	11:50	0.2	0.4	20	79.4		-15.2	-15.3	83	-
NW-08D	08/05/2009	11:51	0.2	0.4	20	79.4		-15.2	0	83	-
NW-08D	09/02/2009	13:38	0.7	2.7	18.1	78.5		-0.5	-0.5	100	-
NW-08D	09/02/2009	13:40	0.7	2.7	18.1	78.5		-0.5	-14.8	100	-
NW-08D	10/06/2009	11:52	1.1	5.1	18	75.8		-14.7	-14.7	80	-
NW-08D	10/06/2009	11:52	1.1	5.1	18	75.8		-14.7	0	80	-
NW-08D	11/05/2009	09:19	1.2	4.9	17.9	76		-0.5	-0.5	66	-
NW-08D	12/05/2009	09:27	1	4.9	18.4	75.7		-0.8	-0.8	42	-
NW-08S	07/09/2009	08:36	24.7	28.8	0.2	46.3		-0.6	-0.6	76	-
NW-08S	08/05/2009	11:52	24.4	28.4	0.2	47		-0.1	-0.1	81	-
NW-08S	09/02/2009	13:42	24.4	27.1	0.2	48.3		0	0	94	-
NW-08S	09/02/2009	13:42	24.4	27.1	0.2	48.3		0	-0.1	94	-
NW-08S	10/06/2009	11:54	20.8	27.2	0	52		-0.4	-0.4	78	-
NW-08S	11/05/2009	09:21	22.2	28.7	0.2	48.9		-0.5	-0.5	74	-
NW-08S	11/05/2009	09:22	22.2	28.7	0.2	48.9		-0.5	-0.6	74	-
NW-08S	12/05/2009	09:29	26.1	27.9	0.1	45.9		-0.2	-0.2	69	-
NW-08S	12/05/2009	09:30	26.1	27.9	0.1	45.9		-0.2	-0.3	69	-
NW-09D	07/09/2009	08:19	23.7	28.8	0	47.5		-5.9	-5.9	75	-
NW-09D	07/09/2009	08:20	23.7	28.8	0	47.5		-5.9	-5.8	75	-
NW-09D	08/05/2009	11:42	20.1	25	2.7	52.2		-5	-5	81	-
NW-09D	08/05/2009	11:44	20.1	25	2.7	52.2		-5	-0.2	81	-
NW-09D	09/02/2009	13:33	12.8	23.3	0	63.9		-0.1	-0.2	96	-
NW-09D	09/02/2009	13:33	12.8	23.3	0	63.9		-0.1	-2.2	96	-
NW-09D	10/06/2009	11:46	19.6	27.3	0	53.1		-2.7	-2.7	77	-
NW-09D	11/05/2009	09:12	22.4	28.5	0	49.1		-2.5	-2.5	71	-
NW-09D	11/05/2009	09:13	22.4	28.5	0	49.1		-2.5	-3.3	71	-
NW-09D	12/05/2009	09:20	28.2	28.5	0	43.3		-2.7	-2.7	62	-
NW-09D	12/05/2009	09:21	28.2	28.5	0	43.3		-2.7	-3.6	62	-
NW-09S	07/09/2009	08:22	18.6	26.5	0	54.9		-0.8	-0.7	76	-
NW-09S	07/09/2009	08:23	18.6	26.5	0	54.9		-0.8	-0.8	76	-
NW-09S	08/05/2009	11:46	17.9	25.2	1	55.9		-0.2	-0.2	81	-
NW-09S	09/02/2009	13:35	18.5	25.3	0	56.2		0	0	94	-
NW-09S	09/02/2009	13:35	18.5	25.3	0	56.2		0	-0.1	94	-
NW-09S	10/06/2009	11:49	22.3	28.4	0	49.3		-0.4	-0.4	78	-
NW-09S	11/05/2009	09:15	23.8	29.8	0	46.4		-0.5	-0.5	74	-
NW-09S	11/05/2009	09:15	23.8	29.8	0	46.4		-0.5	-0.6	74	-
NW-09S	12/05/2009	09:23	30	29.1	0	40.9		-0.2	-0.2	67	-
NW-09S	12/05/2009	09:24	30	29.1	0	40.9		-0.2	-0.3	67	-
NW-10D	07/09/2009	08:12	32.9	33.4	0	33.7		-4.7	-4.7	75	-
NW-10D	07/09/2009	08:13	32.9	33.4	0	33.7		-4.7	-4.7	75	-
NW-10D	08/05/2009	11:33	30.9	31.9	0.9	36.3		-4.1	-4.1	78	-
NW-10D	08/05/2009	11:35	30.9	31.9	0.9	36.3		-4.1	-6.4	78	-

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L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-10D	09/02/2009	13:29	29.8	31	0	39.2		-6	-6	88	-
NW-10D	10/06/2009	11:40	31.1	33.2	0	35.7		-5.8	-5.8	77	-
NW-10D	10/06/2009	11:41	31.1	33.2	0	35.7		-5.8	-6.9	77	-
NW-10D	11/05/2009	09:06	31.5	35	0	33.5		-5.5	-5.5	73	-
NW-10D	11/05/2009	09:07	31.5	35	0	33.5		-5.5	-6.1	73	-
NW-10D	12/05/2009	09:12	36.8	32.4	0	30.8		-5.5	-5.6	67	-
NW-10D	12/05/2009	09:13	36.8	32.4	0	30.8		-5.5	-6	67	-
NW-10S	07/09/2009	08:16	33.8	33.3	0	32.9		-0.9	-0.9	77	-
NW-10S	07/09/2009	08:16	33.8	33.3	0	32.9		-0.9	-0.8	77	-
NW-10S	08/05/2009	11:38	31.4	32.4	1.1	35.1		-0.3	-0.3	80	-
NW-10S	08/05/2009	11:38	31.4	32.4	1.1	35.1		-0.3	-0.3	80	-
NW-10S	09/02/2009	13:30	32.4	32.7	0	34.9		-0.1	0	87	-
NW-10S	09/02/2009	13:31	32.4	32.7	0	34.9		-0.1	-0.1	87	-
NW-10S	10/06/2009	11:43	32.7	34.4	0	32.9		-0.4	-0.4	78	-
NW-10S	10/06/2009	11:44	32.7	34.4	0	32.9		-0.4	-0.6	78	-
NW-10S	11/05/2009	09:09	32.9	35.7	0	31.4		-0.8	-0.7	75	-
NW-10S	11/05/2009	09:09	32.9	35.7	0	31.4		-0.8	-0.8	75	-
NW-10S	12/05/2009	09:15	39.4	33.6	0	27		-0.5	-0.5	71	-
NW-10S	12/05/2009	09:16	39.4	33.6	0	27		-0.5	-0.6	71	-
NW-11	07/09/2009	08:05	34.8	33.8	0	31.4		-1	-0.9	75	-
NW-11	07/09/2009	08:08	34.8	33.8	0	31.4		-1	-0.8	75	-
NW-11	08/05/2009	11:30	35.2	34.5	1	29.3		-0.4	-0.4	77	-
NW-11	09/02/2009	13:26	37.6	35.5	0	26.9		-0.3	-0.3	84	-
NW-11	09/02/2009	13:27	37.6	35.5	0	26.9		-0.3	-0.4	84	-
NW-11	10/06/2009	11:36	34.1	33.4	0.2	32.3		-0.6	-0.6	78	-
NW-11	10/06/2009	11:36	34.1	33.4	0.2	32.3		-0.6	-0.7	78	-
NW-11	11/05/2009	09:02	32.4	34.6	0.1	32.9		-0.7	-0.9	75	-
NW-11	11/05/2009	09:02	32.4	34.6	0.1	32.9		-0.7	-0.8	75	-
NW-11	12/05/2009	09:08	36.7	33.5	0.1	29.7		-0.9	-0.9	71	-
NW-11	12/05/2009	09:09	36.7	33.5	0.1	29.7		-0.9	-1.1	71	-
NW-12 Test Probe	07/01/2009	12:30	0	0.8	19.4	79.8	0.0	-0.1	-0.1	92	-
NW-12 Test Probe	07/09/2009	07:13	0	0	20.9	79.1	0.0	-0.5	-0.5	69	-
NW-12 Test Probe	07/15/2009	08:18	0	0	20.1	79.9	0.0	-0.7	-0.7	81	-
NW-12 Test Probe	07/24/2009	08:11	0	0	20.9	79.1	0.0	-0.7	-0.7	71	-
NW-12 Test Probe	07/31/2009	07:35	0	0.1	20.3	79.6	0.0	-0.6	-0.6	68	-
NW-12 Test Probe	08/05/2009	08:07	0	0	20.9	79.1	0.0	-0.2	-0.2	74	-
NW-12 Test Probe	08/14/2009	09:22	0	0	21	79	0.0	-0.6	-0.6	81	-
NW-12 Test Probe	08/19/2009	13:50	0	0	19.7	80.3	0.0	0.1	0.1	92	-
NW-12 Test Probe	08/27/2009	08:29	0	0.9	20.3	78.8	0.0	-0.5	-0.6	79	-
NW-12 Test Probe	09/02/2009	08:35	0	0.7	20.3	79	0.1	-0.3	-0.3	88	-
NW-12 Test Probe	09/09/2009	09:24	0	0	20.3	79.7	0.0	-1.6	-1.6	85	-
NW-12 Test Probe	09/16/2009	11:56	0	0.1	20.6	79.3	0.0	-0.1	-0.1	89	-
NW-12 Test Probe	09/22/2009	09:01	0	0	20.9	79.1	0.0	-0.5	-0.5	84	-
NW-12 Test Probe	09/30/2009	09:33	0	0.5	20.5	79	0.0	-1.1	-1.2	68	-
NW-12 Test Probe	10/06/2009	10:12	0	0.2	20.5	79.3	0.0	-0.4	-0.4	79	-
NW-12 Test Probe	10/13/2009	13:25	21	26.8	0	52.2	0.8	0.3	0.2	57	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-12 Test Probe	10/22/2009	06:24	0	0.8	20.6	78.6	0.0	-0.5	-0.4	50	-
NW-12 Test Probe	10/28/2009	13:39	0	0.7	19.9	79.4	0.6	0.1	0.1	71	-
NW-12 Test Probe	11/05/2009	08:27	0	0.1	20.7	79.2	0.0	-0.5	-0.5	53	-
NW-12 Test Probe	11/11/2009	08:26	0.1	0.5	20.4	79	0.4	-0.3	-0.3	54	-
NW-12 Test Probe	11/20/2009	08:33	3.2	4.7	17.2	74.9	5.5	0	0	49	-
NW-12 Test Probe	11/25/2009	07:26	0	1	20.5	78.5	0.0	-0.3	-0.3	39	-
NW-12 Test Probe	12/05/2009	08:58	18.4	21.9	2.8	56.9	1.9	0	0	41	-
NW-12 Test Probe	12/09/2009	09:47	0	0.2	20.8	79	0.0	-0.4	-0.5	43	-
NW-12 Test Probe	12/16/2009	09:44	0	0.2	20.5	79.3	0.8	-0.8	-0.8	54	-
NW-12 Test Probe	12/23/2009	09:26	0	0.2	20.2	79.6	0.0	-0.7	-0.7	51	-
NW-12 Test Probe	12/29/2009	08:55	0	0.3	20.9	78.8	0.3	-0.9	-0.9	41	-
NW-14	07/09/2009	09:21	4.4	21	0.2	74.4		-0.2	-0.2	77	-
NW-14	07/09/2009	09:22	4.4	21	0.2	74.4		-0.2	-0.1	77	-
NW-14	08/05/2009	08:34	4.4	22.1	0	73.5		-0.1	-0.1	76	-
NW-14	08/05/2009	08:34	4.4	22.1	0	73.5		-0.1	-0.1	76	-
NW-14	09/02/2009	10:35	5.4	19.2	0	75.4		-0.1	-0.1	87	-
NW-14	09/02/2009	10:36	5.4	19.2	0	75.4		-0.1	-0.1	87	-
NW-14	10/06/2009	12:17	3.8	22	0	74.2		-0.2	-0.1	79	-
NW-14	11/05/2009	09:58	7.4	23.1	0	69.5		-0.2	-0.2	76	-
NW-14	11/05/2009	09:59	7.4	23.1	0	69.5		-0.2	-0.3	76	-
NW-14	12/05/2009	09:59	4	21.5	0	74.5		-0.1	-0.2	69	-
NW-14	12/05/2009	09:59	4	21.5	0	74.5		-0.1	-0.1	69	-
NW-15	07/09/2009	09:25	0.4	12.3	8.2	79.1		0	-0.1	122	-
NW-15	07/09/2009	09:31	2.2	16.7	4.4	76.7		-0.1	-0.1	125	-
NW-15	08/05/2009	08:38	1.5	15	6.7	76.8		0	0	124	-
NW-15	08/05/2009	08:39	1.5	15	6.7	76.8		0	0	124	-
NW-15	09/02/2009	10:40	0.5	16.2	3.9	79.4		0	-0.1	123	-
NW-15	09/02/2009	10:41	0.5	16.2	3.9	79.4		0	0	123	-
NW-15	10/06/2009	12:20	4.6	21.9	0	73.5		0	0	120	-
NW-15	10/06/2009	12:22	4.6	21.9	0	73.5		0	0	120	-
NW-15	11/05/2009	10:04	0.1	9.9	10.8	79.2		0	0	123	-
NW-15	11/05/2009	14:04	3.3	18.1	3.3	75.3		-0.8	-0.9	124	-
NW-15	12/05/2009	10:01	2.2	15	4.5	78.3		-0.9	-0.9	122	-
NW-15	12/05/2009	10:04	2.2	15	4.5	78.3		-0.9	0	122	-
NW-16	07/09/2009	09:38	3.5	23.1	0	73.4		-0.2	-0.2	103	-
NW-16	07/09/2009	09:39	3.5	23.1	0	73.4		-0.2	-0.1	103	-
NW-16	08/05/2009	08:42	3.2	22.9	0	73.9		0	0	101	-
NW-16	08/05/2009	08:43	3.2	22.9	0	73.9		0	0	101	-
NW-16	09/02/2009	10:45	4.6	23.5	0	71.9		-0.4	-0.5	103	-
NW-16	09/02/2009	10:47	4.2	23	0	72.8		-0.1	-0.1	106	-
NW-16	10/06/2009	12:25	2.8	20.8	0	76.4		0	0	104	-
NW-16	10/06/2009	12:27	2.8	20.8	0	76.4		0	0	104	-
NW-16	11/05/2009	10:20	3.5	21.1	0	75.4		0	-0.1	89	-
NW-16	11/05/2009	10:32	3.5	21.1	0	75.4		0	0	89	-
NW-16	12/05/2009	10:07	2	19.3	0	78.7		0	0	107	-
NW-16	12/05/2009	10.08	2	19.3	0	78.7		0	0	107	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-17D	07/09/2009	09:44	7.8	22.4	2.9	66.9		-7.6	-7.6	81	-
NW-17D	07/09/2009	09:45	7.8	22.4	2.9	66.9		-7.6	-6.6	81	-
NW-17D	07/09/2009	09:47	7.8	22.4	2.9	66.9		-7.6	-2.1	81	-
NW-17D	08/05/2009	08:48	6.7	21.4	4.2	67.7		-0.1	-0.1	70	-
NW-17D	09/02/2009	10:51	4.4	15.4	6.6	73.6		-0.2	-0.2	89	-
NW-17D	09/02/2009	10:53	6.7	23.2	0.9	69.2		-1.7	-1.7	90	-
NW-17D	10/06/2009	12:30	5.6	23.1	0.7	70.6		-0.7	-0.7	81	-
NW-17D	11/05/2009	10:34	5.9	24	0.7	69.4		-0.8	-0.8	76	-
NW-17D	11/05/2009	10:35	5.9	24	0.7	69.4		-0.8	-1.7	76	-
NW-17D	12/05/2009	10:11	6.9	23.7	1.3	68.1		-2	-2.1	54	-
NW-17D	12/05/2009	10:12	6.9	23.7	1.3	68.1		-2	-0.7	54	-
NW-17S	07/09/2009	09:49	12.5	24.1	0	63.4		-0.1	-0.1	92	-
NW-17S	08/05/2009	08:57	11.4	23.9	0.5	64.2		0	0	92	-
NW-17S	08/05/2009	08:57	11.4	23.9	0.5	64.2		0	0	92	-
NW-17S	09/02/2009	10:55	13.7	24.3	0	62		0	0	93	-
NW-17S	09/02/2009	10:56	13.7	24.3	0	62		0	-0.1	93	-
NW-17S	10/06/2009	12:32	11	23.9	0	65.1		-0.1	0	91	-
NW-17S	11/05/2009	10:36	11.2	24.2	0	64.6		-0.1	-0.1	91	-
NW-17S	11/05/2009	10:42	10.3	24.3	0	65.4		-0.6	-0.2	93	-
NW-17S	12/05/2009	10:14	10.1	23.3	0	66.6		-0.2	-0.1	90	-
NW-17S	12/05/2009	10:15	10.1	23.3	0	66.6		-0.2	-0.1	90	-
NW-18	07/09/2009	09:57	29.6	30	0.1	40.3		0	0	84	-
NW-18	07/09/2009	09:59	29.6	30	0.1	40.3		0	-0.1	84	-
NW-18	08/05/2009	09:07	24.7	29.6	0.3	45.4		0	0	84	-
NW-18	08/05/2009	09:07	24.7	29.6	0.3	45.4		0	-0.1	84	-
NW-18	09/02/2009	11:06	24.3	29	0	46.7		-0.1	-0.1	85	-
NW-18	09/02/2009	11:07	24.3	29	0	46.7		-0.1	-0.3	85	-
NW-18	10/06/2009	12:41	22.4	28.2	0	49.4		-0.1	-0.1	83	-
NW-18	10/06/2009	12:41	22.4	28.2	0	49.4		-0.1	-0.2	83	-
NW-18	11/05/2009	10:49	22	28.5	0.3	49.2		-0.3	-0.4	83	-
NW-18	11/05/2009	10:50	22	28.5	0.3	49.2		-0.3	-0.4	83	-
NW-18	12/05/2009	10:24	23.8	28.7	0	47.5		-0.2	-0.2	81	-
NW-18	12/05/2009	10:24	23.8	28.7	0	47.5		-0.2	-0.1	81	-
NW-19D	07/09/2009	10:06	17.7	29.5	0.2	52.6		-6.6	-6.7	79	-
NW-19D	07/09/2009	10:07	17.7	29.5	0.2	52.6		-6.6	-1.6	79	-
NW-19D	08/05/2009	09:16	12.7	21.8	5.6	59.9		-0.1	-0.1	71	-
NW-19D	08/05/2009	09:17	12.7	21.8	5.6	59.9		-0.1	-0.1	71	-
NW-19D	09/02/2009	11:18	8.8	14.6	8.2	68.4		-0.1	-0.1	89	-
NW-19D	09/02/2009	11:19	13.5	22.8	2.3	61.4		-1.1	-1.1	90	-
NW-19D	10/06/2009	12:51	18.6	27.2	0.1	54.1		-1	-0.9	79	-
NW-19D	10/06/2009	12:52	18.6	27.2	0.1	54.1		-1	-2.1	79	-
NW-19D	11/05/2009	11:05	21.2	28.5	0.3	50		-2	-2	76	-
NW-19D	11/05/2009	11:05	21.2	28.5	0.3	50		-2	-2.7	76	-
NW-19D	12/05/2009	10:33	23.8	29.2	0.3	46.7		-2.8	-2.8	69	-
NW-19D	12/05/2009	10:34	23.8	29.2	0.3	46.7		-2.8	-0.7	69	-
NW-19S	07/09/2009	10:09	33.2	32.5	0	34.3		-0.1	-0.1	80	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-19S	07/09/2009	10:10	33.2	32.5	0	34.3		-0.1	-0.2	80	-
NW-19S	08/05/2009	09:18	27	31.3	0	41.7		-0.1	-0.1	80	-
NW-19S	08/05/2009	09:19	27	31.3	0	41.7		-0.1	0	80	-
NW-19S	09/02/2009	11:21	35	33.4	0	31.6		0	-0.1	84	-
NW-19S	09/02/2009	11:22	35	33.4	0	31.6		0	-0.1	84	-
NW-19S	10/06/2009	12:54	28.1	31.4	0	40.5		0	0	80	-
NW-19S	10/06/2009	12:55	28.1	31.4	0	40.5		0	-0.1	80	-
NW-19S	11/05/2009	11:07	30.4	32.7	0	36.9		-0.2	-0.2	79	-
NW-19S	11/05/2009	11:10	30.4	32.7	0	36.9		-0.2	-0.3	79	-
NW-19S	12/05/2009	10:36	26.7	30	0	43.3		-0.4	-0.5	79	-
NW-19S	12/05/2009	10:37	26.7	30	0	43.3		-0.4	-0.1	79	-
NW-20	07/09/2009	10:18	38.1	36	0.2	25.7		-0.1	-0.1	80	-
NW-20	07/09/2009	10:19	38.1	36	0.2	25.7		-0.1	-0.1	80	-
NW-20	08/05/2009	09:27	25.2	31.2	0	43.6		-0.1	-0.1	80	-
NW-20	08/05/2009	09:27	25.2	31.2	0	43.6		-0.1	-0.1	80	-
NW-20	09/02/2009	11:30	28.5	31.6	0	39.9		-0.1	-0.1	84	-
NW-20	09/02/2009	11:31	28.5	31.6	0	39.9		-0.1	-0.2	84	-
NW-20	10/06/2009	13:04	28.4	31.5	0.1	40		0	0	81	-
NW-20	10/06/2009	13:05	28.4	31.5	0.1	40		0	-0.1	81	-
NW-20	11/05/2009	11:16	26.5	31.1	0.2	42.2		-0.2	-0.2	79	-
NW-20	11/05/2009	11:17	26.5	31.1	0.2	42.2		-0.2	-0.4	79	-
NW-20	12/05/2009	10:45	23.5	29.2	0.2	47.1		-0.3	-0.3	78	-
NW-20	12/05/2009	10:47	23.5	29.2	0.2	47.1		-0.3	-0.1	78	-
NW-21D	07/09/2009	10:25	14.4	26.7	0.3	58.6		-7.1	-7.1	80	-
NW-21D	07/09/2009	10:26	14.4	26.7	0.3	58.6		-7.1	-0.1	80	-
NW-21D	08/05/2009	09:33	14.4	25.8	2	57.8		-1.2	-1.1	75	-
NW-21D	08/05/2009	09:34	14.4	25.8	2	57.8		-1.2	-0.8	75	-
NW-21D	09/02/2009	11:41	14.8	26.3	0	58.9		-1.1	-1.1	90	-
NW-21D	09/02/2009	11:42	14.8	26.3	0	58.9		-1.1	-3.7	90	-
NW-21D	10/06/2009	13:10	13.3	24.3	0.4	62		-4.8	-4.8	81	-
NW-21D	11/05/2009	11:25	13	25.4	0.5	61.1		-2.9	-3	76	-
NW-21D	11/05/2009	11:26	13	25.4	0.5	61.1		-2.9	-3.6	76	-
NW-21D	12/05/2009	10:56	15.2	26.7	0.5	57.6		-4.5	-4.5	61	-
NW-21D	12/05/2009	10:57	15.2	26.7	0.5	57.6		-4.5	-0.6	61	-
NW-21S	07/09/2009	10:28	29.1	33.3	0	37.6		-0.1	-0.1	87	-
NW-21S	07/09/2009	10:29	29.1	33.3	0	37.6		-0.1	-0.2	87	-
NW-21S	08/05/2009	09:36	22.8	30.5	0.1	46.6		-0.1	-0.1	85	-
NW-21S	08/05/2009	09:36	22.8	30.5	0.1	46.6		-0.1	-0.1	85	-
NW-21S	09/02/2009	11:44	23.9	30.9	0	45.2		-0.1	-0.1	87	-
NW-21S	09/02/2009	11:45	23.9	30.9	0	45.2		-0.1	-0.2	87	-
NW-21S	10/06/2009	13:12	21.3	29.5	0	49.2		-0.1	-0.1	86	-
NW-21S	11/05/2009	11:27	26.1	32.1	0.2	41.6		-0.2	-0.1	85	-
NW-21S	11/05/2009	11:28	26.1	32.1	0.2	41.6		-0.2	-0.3	85	-
NW-21S	12/05/2009	10:59	23.3	29.3	0	47.4		-0.2	-0.2	83	-
NW-21S	12/05/2009	11:00	23.3	29.3	0	47.4		-0.2	0	83	-
NW-22	07/09/2009	10:42	13.6	21.5	4.7	60.2		0	0	113	-

Job No. 01204084.00

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-22	07/09/2009	10:44	15.1	23.4	4	57.5		-0.1	-0.1	113	-
NW-22	08/05/2009	09:47	14.4	23.3	4.6	57.7		0	0	114	-
NW-22	08/05/2009	09:49	14.4	23.3	4.6	57.7		0	0	114	-
NW-22	09/02/2009	11:54	18.2	28.6	0.3	52.9		0	0	107	-
NW-22	09/02/2009	12:01	17.8	27.4	0.7	54.1		-0.1	-0.2	114	-
NW-22	10/06/2009	13:21	13.8	25.9	0.2	60.1		0	0	108	-
NW-22	10/06/2009	13:21	13.8	25.9	0.2	60.1		0	-0.1	108	-
NW-22	11/05/2009	11:41	10.8	19.7	5.4	64.1		-0.1	-0.1	116	-
NW-22	11/05/2009	11:43	11.4	21.3	3.6	63.7		-0.3	-0.3	113	-
NW-22	12/05/2009	11:07	13.6	23	1.7	61.7		-0.5	-0.6	106	-
NW-22	12/05/2009	11:08	13.6	23	1.7	61.7		-0.5	-1	106	-
NW-23D	07/09/2009	07:39	40.5	36.1	0	23.4		-14.1	-14.1	73	-
NW-23D	08/05/2009	10:41	33	31	2.7	33.3		-13	-13	77	-
NW-23D	08/05/2009	10:43	33	31	2.7	33.3		-13	-0.9	77	-
NW-23D	09/02/2009	10:04	29.7	27.4	4.1	38.8		-0.3	-0.3	86	-
NW-23D	09/02/2009	10:05	36.5	30.9	1	31.6		-12.4	-12.4	83	-
NW-23D	10/06/2009	13:59	36.6	32.4	0	31		-8	-8.1	77	-
NW-23D	10/06/2009	14:00	36.6	32.4	0	31		-8	-8.5	77	-
NW-23D	11/05/2009	13:32	37.7	34.6	0	27.7		-3	-3	73	-
NW-23D	12/05/2009	11:45	44.5	34.1	0	21.4		-4.2	-4.2	64	-
NW-23S	07/09/2009	07:41	38.9	35.6	0	25.5		-0.9	-0.9	74	-
NW-23S	08/05/2009	10:45	36.6	34.5	0.6	28.3		-0.4	-0.4	76	-
NW-23S	09/02/2009	10:08	37.6	35.4	0	27		-0.5	-0.6	79	-
NW-23S	09/02/2009	10:08	37.6	35.4	0	27		-0.5	-0.6	79	-
NW-23S	10/06/2009	14:02	36	34.5	0	29.5		0	0	77	-
NW-23S	10/06/2009	14:03	36	34.5	0	29.5		0	-0.1	77	-
NW-23S	11/05/2009	13:35	36.2	34.7	0	29.1		-0.1	-0.2	76	-
NW-23S	11/05/2009	13:35	36.2	34.7	0	29.1		-0.1	-0.2	76	-
NW-23S	12/05/2009	11:47	44.3	34	0	21.7		-0.3	-0.3	73	-
NW-23S	12/05/2009	11:49	44.3	34	0	21.7		-0.3	-1.2	73	-
NW-24	07/09/2009	07:36	44.4	36.3	0	19.3		-1.1	-1.1	76	-
NW-24	07/09/2009	07:36	44.4	36.3	0	19.3		-1.1	-1.2	76	-
NW-24	08/05/2009	10:37	40.9	34.4	0.8	23.9		-0.7	-0.7	77	-
NW-24	09/02/2009	09:57	42.4	35.6	0	22		-0.9	-0.9	78	-
NW-24	09/02/2009	09:58	42.4	35.6	0	22		-0.9	-1	78	-
NW-24	09/02/2009	15:13	42.7	34.4	0	22.9		-0.3	-0.2	81	-
NW-24	09/02/2009	15:14	42.7	34.4	0	22.9		-0.3	-0.4	81	-
NW-24	10/06/2009	13:56	42.7	36.1	0	21.2		-0.5	-0.5	78	-
NW-24	10/06/2009	13:57	42.7	36.1	0	21.2		-0.5	-0.6	78	-
NW-24	11/05/2009	13:29	43.7	35.2	0	21.1		-0.2	-0.2	77	-
NW-24	11/05/2009	13:29	43.7	35.2	0	21.1		-0.2	-0.3	77	-
NW-24	12/05/2009	11:39	52.8	35.4	0	11.8		-0.5	-0.5	75	-
NW-24	12/05/2009	11:41	52.8	35.4	0	11.8		-0.5	-1.4	75	-
NW-25D	07/09/2009	07:29	42	33.2	1.7	23.1		-14.4	-14.4	66	-
NW-25D	08/05/2009	10:24	30.6	26.3	6.6	36.5		-12.9	-12.9	77	-
NW-25D	08/05/2009	10:26	30.6	26.3	6.6	36.5		-12.9	0	77	-

Table 1. LFG Extraction Well Monitoring Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Init Static Press (Inch H2O)	Adj Static Press (Inch H2O)	Init Temp (Deg F)	Comments
NW-25D	09/02/2009	09:47	13	14.1	11.6	61.3		-0.8	-0.7	87	-
NW-25D	09/02/2009	09:50	15.2	16.1	10.2	58.5		-13.5	-13.6	88	-
NW-25D	10/06/2009	13:45	36.4	30.9	1.5	31.2		-8.7	-8.7	80	-
NW-25D	10/06/2009	13:47	36.4	30.9	1.5	31.2		-8.7	-8.7	80	-
NW-25D	11/05/2009	13:20	26.6	22.5	6.9	44		-3.2	-3.2	80	-
NW-25D	11/05/2009	13:24	26.6	22.5	6.9	44		-3.2	-0.2	80	-
NW-25D	12/05/2009	11:29	49.3	33.8	0.1	16.8		-0.5	-0.5	51	-
NW-25D	12/05/2009	11:30	49.3	33.8	0.1	16.8		-0.5	-6.1	51	-
NW-25S	07/09/2009	07:31	46.9	37.2	0	15.9		-1.5	-1.4	80	-
NW-25S	07/09/2009	07:32	46.9	37.2	0	15.9		-1.5	-1.6	80	-
NW-25S	08/05/2009	10:33	43	36.1	0.4	20.5		-1	-1	81	-
NW-25S	08/05/2009	10:33	43	36.1	0.4	20.5		-1	-0.8	81	-
NW-25S	09/02/2009	09:54	43.4	35.9	0	20.7		-1	-0.9	81	-
NW-25S	09/02/2009	09:54	43.4	35.9	0	20.7		-1	-1.1	81	-
NW-25S	09/02/2009	15:10	40.7	34.5	0	24.8		-0.2	-0.4	82	-
NW-25S	09/02/2009	15:11	40.7	34.5	0	24.8		-0.2	-0.4	82	-
NW-25S	10/06/2009	13:50	41	35.8	0	23.2		-0.5	-0.5	81	-
NW-25S	10/06/2009	13:51	41	35.8	0	23.2		-0.5	-0.6	81	-
NW-25S	11/05/2009	13:25	42.5	36.8	0	20.7		-0.7	-0.7	80	-
NW-25S	11/05/2009	13:26	42.5	36.8	0	20.7		-0.7	-0.8	80	-
NW-25S	12/05/2009	11:32	51.5	35.5	0	13		-1.4	-1.4	79	-
NW-25S	12/05/2009	11:33	51.5	35.5	0	13		-1.4	-2.3	79	-
NW-26	07/09/2009	07:24	51.3	37.4	0	11.3		-1.1	-1.1	86	-
NW-26	07/09/2009	07:25	51.3	37.4	0	11.3		-1.1	-1.1	86	-
NW-26	08/05/2009	10:21	44.7	37.1	0.1	18.1		-0.7	-0.7	86	-
NW-26	09/02/2009	09:43	45.2	37.1	0.2	17.5		-0.8	-0.8	86	-
NW-26	09/02/2009	09:43	45.2	37.1	0.2	17.5		-0.8	-0.9	86	-
NW-26	09/02/2009	15:05	42.4	35.3	0.3	22		-0.2	-0.2	87	-
NW-26	09/02/2009	15:05	42.4	35.3	0.3	22		-0.2	-0.3	87	-
NW-26	10/06/2009	13:41	43.1	35.8	0	21.1		-0.5	-0.5	85	-
NW-26	10/06/2009	13:42	43.1	35.8	0	21.1		-0.5	-0.6	85	-
NW-26	11/05/2009	13:05	44.1	36.9	0	19		-0.2	-0.2	85	-
NW-26	11/05/2009	13:06	44.1	36.9	0	19		-0.2	-0.3	85	-
NW-26	12/05/2009	11:26	53.5	35.3	0	11.2		-0.9	-0.9	84	-
NW-26	12/05/2009	11:27	53.5	35.3	0	11.2		-0.9	-1.8	84	-

Table 2. Header and LFG Vent Station Testing Results
L and D Landfill, Sacramento, California

Field Technician and Weather Conditions

Technician	Date	Ambient Temp	Barometric Pressure (in - Hg)	General Weather	Wind Speed	Wind Direction
Justin Winters	07/01/2009	82	29.7	Clear	Breezy Wind	SW
Justin Winters	07/09/2009	57	29.8	Clear	Light Wind	SE
Justin Winters	07/15/2009	72	29.7	Clear	Breezy Wind	SE
Justin Winters	07/24/2009	55	29.7	Clear	Breezy Wind	SW
Justin Winters	07/31/2009	56	29.7	Clear	Light Wind	SE

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Static Press (Inch H2O)	Temp (Deg F)	Flow (scfm)	Comments
North Header	07/01/2009	12:15	32.1	33.5	0.1	34.3		-16.1	102	350	-
North Header	07/09/2009	06:57	32.6	32.8	0	34.6		-18.1	61	379	-
North Header	07/15/2009	08:01	32.4	32.5	0	35.1		-16.9	83	375	-
North Header	07/24/2009	07:48	31.5	31.9	0.6	36		-17.8	64	380	-
North Header	07/31/2009	07:23	27.6	30.9	2.2	39.3		-17.9	63	375	-
North Header	08/05/2009	07:39	25.8	28.6	3.2	42.4		-17.5	67	380	-
North Header	08/14/2009	09:11	31.5	29.1	2.4	37		-17.6	80	327	-
North Header	08/19/2009	13:35	25.4	26.6	4	44		-16.1	104	325	-
North Header	08/27/2009	08:09	31.1	32.5	0	36.4		-18.4	69	335	-
North Header	09/02/2009	08:23	31.8	33.4	0	34.8		-17.8	79	333	-
North Header	09/09/2009	09:03	29.5	29.6	2.5	38.4		-16.7	78	0	-
North Header	09/16/2009	11:47	29.9	32.6	0.2	37.3		-15.4	86	0	-
North Header	09/22/2009	08:25	29.7	33.2	0.5	36.6		-16.4	72	400	-
North Header	09/30/2009	09:12	28.6	31.9	0.8	38.7		-17.2	63	400	-
North Header	10/06/2009	10:51	29.2	32.2	0.2	38.4		-16.3	75	0	-
North Header	10/13/2009	12:55	35.9	35	0	29.1		-15.9	56	0	-
North Header	10/22/2009	06:10	31.8	29.7	0.2	38.3		-15.9	49	0	-
North Header	10/28/2009	13:21	34	30.9	0	35.1		-12.7	69	0	-
North Header	11/05/2009	08:11	28.7	31.8	0.4	39.1		-12.3	50	400	-
North Header	11/05/2009	15:12	25	29.6	0.5	44.9		-8.7	79	415	-
North Header	11/11/2009	08:15	27.6	30.1	0.5	41.8		-9.7	56	445	-
North Header	11/20/2009	08:20	27.1	30.6	0.5	41.8		-11	49	450	-
North Header	11/25/2009	07:09	25.5	27	1.3	46.2		-11.2	41	490	-
North Header	12/05/2009	08:34	28.1	28.5	0.6	42.8		-10.7	45	490	-
North Header	12/05/2009	13:07	37.7	32.6	0.1	29.6		-10.7	59	421	-
North Header	12/09/2009	09:21	35.3	29.8	0	34.9		-12.7	32	480	-
North Header	12/16/2009	09:28	34.9	33.1	0.4	31.6		-11.4	53	410	-
North Header	12/23/2009	09:10	35.3	33.3	0.5	30.9		-12.1	41	445	-
North Header	12/29/2009	08:40	35.4	33.4	0	31.2		-11.4	40	415	-
South Header	07/01/2009	12:17	23.5	29.9	0.2	46.4		-15.9	93	32	-
South Header	07/09/2009	07:00	24.9	29.8	0	45.3		-18	66	30	-
South Header	07/15/2009	08:04	26	29.8	0	44.2		-16.9	80	22	-
South Header	07/24/2009	07:51	25.9	29.4	0.2	44.5		-17.7	67	31	-
South Header	07/31/2009	07:26	23.4	28.9	1	46.7		-17.8	66	33	-
South Header	08/05/2009	07:41	22.3	26.7	2.5	48.5		-17.4	69	31	-
South Header	08/14/2009	09:13	23.4	24.5	4.1	48		-17.4	77	30	-
South Header	08/19/2009	13:37	22.3	25.2	3.3	49.2		-16.3	92	25	-

Table 2. Header and LFG Vent Station Testing Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Static Press (Inch H2O)	Temp (Deg F)	Flow (scfm)	Comments
South Header	08/27/2009	08:11	23.8	28.7	1.1	46.4		-18.3	71	30	-
South Header	09/02/2009	08:25	24.7	28.5	0.8	46		-17.8	78	30	-
South Header	09/09/2009	09:05	20.5	22.8	4.6	52.1		-16.4	80	0	-
South Header	09/16/2009	11:49	23.1	28.5	0.8	47.6		-15.3	82	0	-
South Header	09/22/2009	08:27	23.1	29.5	0.7	46.7		-16.3	72	55	-
South Header	09/30/2009	09:15	22.4	29	0.4	48.2		-17.1	64	55	-
South Header	10/06/2009	10:54	22.2	28.3	0.5	49		-16.2	75	0	-
South Header	10/13/2009	12:58	31.3	32.8	0	35.9		-15.9	58	0	-
South Header	10/22/2009	06:14	26.6	27.9	0	45.5		-15.8	55	0	-
South Header	10/28/2009	13:23	27.8	29.1	0	43.1		-12.7	69	0	-
South Header	11/05/2009	08:13	24	30.2	0	45.8		-12.3	54	30	-
South Header	11/05/2009	15:14	24.4	28.7	0.1	46.8		-8.5	73	45	-
South Header	11/11/2009	08:17	27.5	31.2	0	41.3		-9.5	54	45	-
South Header	11/20/2009	08:23	27.5	30.9	0	41.6		-10.9	48	90	-
South Header	11/25/2009	07:12	25.9	27.3	0.5	46.3		-11.1	41	50	-
South Header	12/05/2009	08:36	29.4	29	0.3	41.3		-10.6	44	45	-
South Header	12/05/2009	13:09	31.2	30	0	38.8		-10.8	57	119	-
South Header	12/09/2009	09:23	27.1	27.4	0	45.5		-12.7	40	120	-
South Header	12/16/2009	09:30	26.6	30.4	0	43		-11.4	52	120	-
South Header	12/23/2009	09:12	27.3	31	0	41.7		-12.1	45	120	-
South Header	12/29/2009	08:42	26.8	31	0	42.2		-11.5	41	120	-
Vent Outlet	07/01/2009	12:10	30.2	32.4	0.1	37.3	0.0	0	108	382	Intermediate = 0.0 ppm -
Vent Outlet	07/09/2009	06:47	30.2	32	0.1	37.7		0.1	70	409	-
Vent Outlet	07/09/2009	13:09	30.7	30.5	0.8	38	0.4	0	108	389	Intermediate = 1.1 ppm -
Vent Outlet	07/15/2009	07:52	31.2	32.1	0	36.7	0.5	0.1	86	397	Intermediate = 1.2 ppm -
Vent Outlet	07/24/2009	07:34	31	32.2	0.3	36.5	0.8	0	71	411	Intermediate = 0.3 ppm -
Vent Outlet	07/31/2009	07:13	26.9	30.9	1.4	40.8	0.8	0	71	408	Intermediate = 0.3 ppm -
Vent Outlet	08/05/2009	07:33	27.7	31.7	0.8	39.8	0.7	0	73	411	-
Vent Outlet	08/05/2009	13:39	30.1	30.6	1.5	37.8		-16.4	105	360	-
Vent Outlet	08/14/2009	09:03	32.6	31.2	0.8	35.4	0.5	0	85	357	-
Vent Outlet	08/19/2009	13:41	30.3	31.6	0.7	37.4	0.3	0.1	110	350	-
Vent Outlet	08/27/2009	08:14	30	32.8	0	37.2	0.2	0	77	365	-
Vent Outlet	09/02/2009	08:14	30.7	33.3	0	36		0	82	363	-
Vent Outlet	09/02/2009	15:34	29	30.2	0.4	40.4	0.4	0	110	441	-
Vent Outlet	09/09/2009	09:00	31.5	32.3	0.2	36	0.3	4.1	80	0	-
Vent Outlet	09/16/2009	11:45	28.6	32.7	0.2	38.5	0.8	5.2	91	0	-
Vent Outlet	09/22/2009	08:12	28.2	32	0.4	39.4	0.0	0	77	455	-
Vent Outlet	09/30/2009	08:59	27	31.4	0.7	40.9	0.5	0	67	455	-
Vent Outlet	10/06/2009	10:41	27.4	30.1	0.3	42.2	1.7	-0.1	79	452	-
Vent Outlet	10/06/2009	14:45	27.8	30.6	0.3	41.3		-14.9	95	480	-
Vent Outlet	10/13/2009	12:44	34.4	34.8	0	30.8	0.6	0	66	510	-
Vent Outlet	10/22/2009	06:02	30.7	29.1	0.4	39.8	0.2	0	63	500	-
Vent Outlet	10/28/2009	13:30	32.1	30.4	0	37.5	0.5	0	75	438	-
Vent Outlet	11/05/2009	08:03	28	32.1	0.4	39.5		0	60	430	-
Vent Outlet	11/05/2009	15:08	24.7	29.4	0.6	45.3	0.8	13.1	88	460	-

Table 2. Header and LFG Vent Station Testing Results
L and D Landfill, Sacramento, California

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Static Press (Inch H2O)	Temp (Deg F)	Flow (scfm)	Comments
Vent Outlet	11/11/2009	08:07	27.9	29.8	0.5	41.8	0.6	0	65	490	-
Vent Outlet	11/20/2009	08:14	27.5	30.2	0.5	41.8	0.9	0	56	540	-
Vent Outlet	11/25/2009	06:59	25.9	26.6	1.1	46.4	0.6	0	51	540	-
Vent Outlet	12/05/2009	08:27	28.3	28.5	0.6	42.6		0	55	535	-
Vent Outlet	12/05/2009	13:01	35.7	31.9	0.2	32.2	0.7	-0.2	64	540	-
Vent Outlet	12/09/2009	09:15	33.1	29.4	0.3	37.2	0.5	0	43	600	-
Vent Outlet	12/16/2009	09:21	33.1	32.7	0.3	33.9	0.9	0	62	530	-
Vent Outlet	12/23/2009	09:01	33.4	33	0.4	33.2	0.6	0	49	565	-
Vent Outlet	12/29/2009	08:33	33.7	33.2	0.1	33	0.9	0	50	535	-
Vent Station Inlet	07/01/2009	12:13	28.8	32.7	0.1	38.4	2.2	-16.2	102	102	-
Vent Station Inlet	07/09/2009	06:54	29.8	31.4	0	38.8	14.9	-18.3	62	409	-
Vent Station Inlet	07/15/2009	07:57	30.7	32.1	0	37.2	10.8	-17.2	81	397	-
Vent Station Inlet	07/24/2009	07:44	30.5	30.8	0.7	38	14.3	-18	64	411	-
Vent Station Inlet	07/31/2009	07:20	26.2	29.4	2.6	41.8	14.3	-17.9	63	408	-
Vent Station Inlet	08/05/2009	07:37	24.9	27.6	3.5	44	13.9	-17.6	66	411	Intermediate = 0.2 -
Vent Station Inlet	08/14/2009	09:08	27.9	26.5	4.1	41.5	8.2	-17.6	79	357	Intermediate = 1.3 -
Vent Station Inlet	08/19/2009	13:32	27.5	29.1	2.3	41.1	3.8	-16.5	101	350	Intermediate = 1.1 -
Vent Station Inlet	08/27/2009	08:07	29.9	32	0.4	37.7	1.2	-18.5	69	365	Intermediate = 0.8 -
Vent Station Inlet	09/02/2009	08:21	30.7	32.8	0	36.5	9.3	-18	78	363	Intermediate = 1.7 ppm -
Vent Station Inlet	09/09/2009	08:56	29.4	29.4	1.8	39.4	8.7	-17.5	77	453	Intermediate = 1.2 ppm -
Vent Station Inlet	09/16/2009	11:41	29.3	32.7	0.4	37.6	17.9	-16.1	89	444	Intermediate = 2.7 ppm -
Vent Station Inlet	09/22/2009	08:21	28.6	32.3	0.4	38.7	0.3	-16.8	71	455	Intermediate = 0.0 ppm -
Vent Station Inlet	09/30/2009	09:09	26.6	31.9	0.5	41	1.4	-17.4	63	455	Intermediate = 0.0 ppm -
Vent Station Inlet	10/06/2009	10:48	27.5	31.2	0.1	41.2	15.7	-16.5	74	452	Intermediate = 0.8 ppm
Vent Station Inlet	10/13/2009	12:53	34.3	35	0	30.7	17.9	-16.2	57	510	Intermediate = 0.7 ppm
Vent Station Inlet	10/22/2009	06:08	30.5	29	0.2	40.3	15.1	-16.1	50	500	Intermediate = 0.0 ppm
Vent Station Inlet	10/28/2009	13:19	32.9	30.2	0	36.9	13.0	-13.5	68	438	Intermediate = 0.0 ppm
Vent Station Inlet	11/05/2009	15:10	24.6	29.8	0.4	45.2	11.8	-8.8	77	460	Intermediate = 0.0 ppm -
Vent Station Inlet	11/05/2009	08:08	28.3	32.1	0.5	39.1		-12.6	51	430	-
Vent Station Inlet	11/11/2009	08:13	27.8	30.2	0.5	41.5	14.8	-9.9	56	490	Intermediate = 0.5 ppm -
Vent Station Inlet	11/20/2009	08:18	27.6	30.5	0.4	41.5	21.2	-11.3	48	540	Intermediate = 2.6 ppm -
Vent Station Inlet	11/25/2009	07:06	25.7	26.9	1.1	46.3	15.7	-11.7	40	540	Intermediate = 1.0 ppm -
Vent Station Inlet	12/05/2009	13:05	36	31.8	0.1	32.1	18.3	-11.2	58	540	Intermediate = 1.2 ppm -
Vent Station Inlet	12/05/2009	08:31	28.5	28.9	0.7	41.9		-11	44	535	-
Vent Station Inlet	12/09/2009	09:18	33	29.1	0.1	37.8	29.8	-13.2	33	600	Intermediate = 0.7 ppm -
Vent Station Inlet	12/16/2009	09:26	32.9	32.5	0.2	34.4	20.4	-11.8	53	530	Intermediate = 1.6 ppm -
Vent Station Inlet	12/23/2009	09:07	33.2	32.8	0.4	33.6	21.7	-12.4	41	565	Intermediate = 1.4 ppm -
Vent Station Inlet	12/29/2009	08:37	33.6	32.4	0	34	20.8	-11.9	40	535	Intermediate = 1.4 ppm -

Third Quarter 2009
Table 3. LFG Monitoring Probe Testing Results with VOC Data
L D Landfill, Sacramento, California

Field Technician and Weather Conditions

Technician	Date	Ambient Temp	Barometric Pressure (in - Hg)	General Weather	Wind Speed	Wind Direction
Justin Winters	07/15/2009	72	29.7	Clear	Breezy Wind	SE

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Relative Press (Inch H2O)	Comments
MP-A High	07/15/2009	10:13	0.0	0.0	20.3	79.7	0.0	0.00	-
MP-A Low	07/15/2009	10:17	0.0	5.1	12.2	82.7	0.0	-0.16	-
MP-A Mid	07/15/2009	10:15	0.0	4.9	12.8	82.3	0.1	-0.17	-
MP-B High	07/15/2009	09:58	0.0	1.6	18.3	80.1	0.1	-0.14	-
MP-B Low	07/15/2009	10:03	0.0	5.3	11.9	82.8	0.0	-0.02	-
MP-B Mid	07/15/2009	10:00	0.0	2.2	18.0	79.8	0.0	-0.15	-
MP-C High	07/15/2009	09:39	0.0	0.0	20.1	79.9	0.0	-0.14	-
MP-C Low	07/15/2009	09:44	0.0	4.9	14.7	80.4	0.0	-0.08	-
MP-C Mid	07/15/2009	09:41	0.0	2.7	17.2	80.1	0.0	-0.13	-
MP-D High	07/15/2009	09:26	0.0	0.1	20.2	79.7	0.0	-0.18	-
MP-D Low	07/15/2009	09:31	0.0	0.1	20.1	79.8	0.0	-0.17	-
MP-D Mid	07/15/2009	09:29	0.0	1.1	18.9	80.0	0.0	-0.14	-
MP-E High	07/15/2009	09:13	0.0	0.2	20.4	79.4	0.0	-0.27	-
MP-E Low	07/15/2009	09:18	0.0	5.1	13.9	81.0	0.0	-0.27	-
MP-E Mid	07/15/2009	09:15	0.0	4.1	14.3	81.6	0.0	-0.28	-
MP-G	07/15/2009	10:31	0.0	1.9	18.0	80.1	0.2	-0.13	-
MP-H	07/15/2009	10:37	0.0	0.8	18.7	80.5	0.4	-0.24	-
MP-I	07/15/2009	10:43	0.0	0.0	20.6	79.4	0.2	-0.15	-
MP-J	07/15/2009	10:51	0.0	1.8	17.9	80.3	0.6	-0.05	-
MP-K	07/15/2009	11:02	0.0	2.2	17.6	80.2	0.1	-0.06	-
MP-M-D	07/15/2009	11:10	0.0	0.5	19.4	80.1	0.0	-0.21	-
MP-M-M	07/15/2009	11:15	0.0	1.9	14.8	83.3	0.1	-0.08	-
MP-M-S	07/15/2009	11:18	0.0	1.0	17.0	82.0	0.1	-0.04	-
MP-N	07/15/2009	11:04	0.0	1.8	16.3	81.9	0.6	-0.06	-

Fourth Quarter 2009
Table 3. LFG Monitoring Probe Testing Results with VOC Data
L and D Landfill, Sacramento, California

Field Technician and Weather Conditions						
Technician	Date	Ambient Temp	Barometric Pressure (in - Hg)	General Weather	Wind Speed	Wind Direction
Justin Winters	11/11/2009	50	29.9	Mostly Cloudy	Light Wind	NE

Name	Date	Time	Methane (% by vol)	Carbon Dioxide (% by vol)	Oxygen (% by vol)	Balance Gas (% by vol)	VOC (ppm)	Relative Press (Inch H2O)	Comments
MP-A High	11/11/2009	11:02	0.0	5.2	12.4	82.4	0.0	-0.04	-
MP-A Low	11/11/2009	11:08	0.0	5.5	12.6	81.9	0.0	0.02	-
MP-A Mid	11/11/2009	11:06	0.0	5.5	12.7	81.8	0.0	0.00	-
MP-B High	11/11/2009	10:47	0.0	1.9	18.2	79.9	0.0	-0.08	-
MP-B Low	11/11/2009	10:51	0.0	6.3	12.6	81.1	0.0	-0.02	-
MP-B Mid	11/11/2009	10:49	0.0	2.7	17.8	79.5	0.2	-0.03	-
MP-C High	11/11/2009	10:24	0.0	2.5	17.5	80.0	0.0	0.02	-
MP-C Low	11/11/2009	10:29	0.0	5.4	13.8	80.8	0.0	-0.09	-
MP-C Mid	11/11/2009	10:27	0.0	3.3	17.1	79.6	0.0	-0.19	-
MP-D High	11/11/2009	10:13	0.0	1.8	17.4	80.8	0.0	-0.04	-
MP-D Low	11/11/2009	10:16	0.0	2.0	17.8	80.2	0.0	-0.05	-
MP-D Mid	11/11/2009	10:14	0.0	1.6	18.1	80.3	0.0	-0.05	-
MP-E High	11/11/2009	09:58	0.0	4.3	14.3	81.4	0.0	-0.03	-
MP-E Low	11/11/2009	10:03	0.0	5.6	13.4	81.0	0.0	-0.07	-
MP-E Mid	11/11/2009	10:01	0.0	4.7	13.9	81.4	0.0	-0.04	-
MP-G	11/11/2009	12:22	0.0	3.1	16.9	80.0	0.0	0.19	-
MP-H	11/11/2009	12:28	0.0	1.3	18.2	80.5	0.0	0.33	-
MP-I	11/11/2009	12:48	0.0	1.1	18.5	80.4	0.3	0.23	-
MP-J	11/11/2009	12:52	0.0	2.4	17.4	80.2	0.2	0.08	-
MP-K	11/11/2009	13:00	0.0	3.0	16.7	80.3	0.1	0.12	-
MP-M-D	11/11/2009	13:13	0.0	1.6	17.2	81.2	0.1	0.55	-
MP-M-M	11/11/2009	13:15	0.0	3.2	13.9	82.9	0.2	0.28	-
MP-M-S	11/11/2009	13:17	0.0	1.5	16.1	82.4	0.2	0.17	-
MP-N	11/11/2009	13:05	0.0	2.8	15.5	81.7	0.4	0.24	-

APPENDIX J

PRINTOUT OF TCFM SCREENING LEVEL UTILIZING EPA SPREADSHEET – (JOHNSON AND ETTINGER MODEL)

TARGET MEDIA CONCENTRATION RESULTS

Screening-Level Johnson and Ettinger Model

Site Name: Aspen 1 Property
Report Date: Mon Jul 12 07:18:36 PDT 2010
Report Generated From: http://www.epa.gov/athens/learn2model/part-two/onsite/JnE_lite.htm
Depth to contamination from bottom of foundation: 50ft +/- 0.2ft
Average ground water temperature: 10C

CHEMICAL PROPERTIES

Chemical of Concern: Trichlorofluoromethane CAS Number: 75694
Molecular Weight: 137.36[g/mole] Henrys Constant: 2.401299[unitless]
Diffusivity in Air: 8.700e-2[cm^2/sec] Diffusivity in Water: 9.700e-6[cm^2/sec]
Unit Risk Factor: 0[$(\mu g/m^3)^{-1}$] Reference Concentration: 0.7[mg/m^3]

SOIL PROPERTIES

Soil Type: Sand Total Porosity: 0.375
Unsaturated Zone Moisture Content:
low= 0.053 best estimate= 0.054 high= 0.055
Capillary Zone Moisture Content: 0.253 Height of Capillary Rise: 0.17[m]
Soil-Gas Flow Rate into Building: 5 [L/min]

BUILDING PROPERTIES

Building Type: Slab-on-Grade Air Exchange Rate: 0.25[hr^{-1}]
Building Mixing Height: 2.44[m] Building Footprint Area: 100[m^2]
Subsurface Foundation Area: 106[m^2] Building Crack Ratio: 0.00038[unitless]
Foundation Slab Thickness: 0.1[m]

EXPOSURE PARAMETERS

Exposure Duration: carcinogens 30 [years] non-carcinogens: 30 [years]
Exposure Frequency: carcinogens 350 [days/year] non-carcinogens: 365 [days/year]
Averaging Time: carcinogens 70 [years] non-carcinogens: 30 [years]
Risk Factor for carcinogens: 1E-6 Target Hazard Quotient for non-carcinogens: 1

JOHNSON & ETTINGER SIMULATION RESULTS

Effective Diffusion Coefficients:
Unsaturated Zone(D_{eff}): 0.01406[cm^2/s]
Unsaturated Zone + Capillary Zone (D^T_{eff}): 0.01109[cm^2/s]

Soil Gas Attenuation Factor (α_{SG}): 0.0005167
Ground Water Attenuation Factor (α_{GW}): 0.0004166
Target Concentrations are based on NON-CANCER risk.
Target Indoor Air Concentration: 700[$\mu g/m^3$] or 124.7[ppbv]

[1]Less Protective Target Concentrations
Soil Gas: 1.372e6[$\mu g/m^3$] or 2.444e5[ppbv]; Ground Water: 706.9[$\mu g/L$]

Best Estimate Target Concentrations
Soil Gas: 1.355e6[$\mu g/m^3$] or 2.413e5[ppbv]; Ground Water: 699.7[$\mu g/L$]

[2]More Protective Target Concentrations
Soil Gas: 1.338e6[$\mu g/m^3$] or 2.382e5[ppbv]; Ground Water: 692.5[$\mu g/L$]

Based on parameter analysis: Advection is the dominant mechanism across foundation. Diffusion through soil is the overall rate-limiting process for groundwater to indoor-air pathway.

[1] "Less Protective" concentrations produced with HIGHEST moisture content and DEEPEST depth to contamination.

[2] "More Protective" concentrations produced with LOWEST moisture content and SHALLOWEST depth to contamination.

APPENDIX K

CALIFORNIA DEPARTMENT OF EDUCATION MINIMUM SITE CRITERIA

California Department of Education Minimum Site Criteria

SIZE/SHAPE

Minimum **net** usable acres:

Grade Level	Acreage Required*
K-6	10 - 12 net acres
7-12	70 - 80 net acres
Continuation	8 - 10 net acres

**A range is listed for the acreage required to provide some flexibility because every site is unique. There are varying constraints such as site shape, park adjacency, street adjacency and circulation patterns. We will evaluate each site on an individual basis during the tentative subdivision map stage. If a stadium is needed at a high school, the site would need to be at the larger end of the range.*

Site should be basically level and rectangular in shape (recommended not more than 3 to 5 width to length ratio).

PROXIMITY TO AIRPORTS

Site should not be located within any aircraft accident exposure or airport safety areas. Site should not conflict with any ALUC, FAA, AICUZ, or California Division of Aeronautics policies or regulations. If the site is within two miles of an existing or potential airport runway or heliport, it must receive California Division of Aeronautics review.

PROXIMITY TO HIGH-VOLTAGE POWER TRANSMISSION LINES

Site should be located at least 100 feet from easements for existing or planned 50-133 kV power lines, 150 feet from easements for existing or planned 220-230 kV power lines, 350 feet from easements for existing or planned 500-550 kV power lines.

PRESENCE OF TOXIC AND HAZARDOUS SUBSTANCES OR OTHER HEALTH HAZARDS

Site should not be in close proximity to current or former dump or landfill areas, chemical plants, oil fields, refineries, fuel storage facilities, nuclear generating plants, abandoned farms and dairies, and agricultural areas where pesticides and fertilizer have been heavily used.

Site should not be located in areas of naturally occurring materials such as asbestos, oil, and gas.

Site should not be significantly affected by any nuisance factors such as odors associated with farms operations, landfills, or sewage treatment plants.

HAZARDOUS AIR EMISSIONS AND FACILITIES WITHIN ¼ MILE

Site should not be within 1/4 mile of any facility that might reasonably be anticipated to emit hazardous or acutely hazardous air emissions.

PROXIMITY TO RAILROAD TRACKS

Site shall be a sufficient distance from a railroad track easement, as ascertained by an analysis of the cargo, speed, grade, curves, and/or type of track (mainline or spur) to determine that it poses no personal injury or property damage risk on the school site in the event of a derailment or other disaster. A professional safety study must be done if a site is proposed within 1,500 feet of a railroad track easement.

PROXIMITY TO PRESSURIZED GAS, GASOLINE, OR SEWER PIPELINES

Site is not traversed by or immediately adjacent to one or more pipelines, situated underground or aboveground, which carry hazardous substances, acutely hazardous materials, or wastes, unless the pipeline is used only to supply natural gas to that school or neighborhood.

PROXIMITY TO HIGH-PRESSURE WATER PIPELINES, RESERVOIRS, OR WATER STORAGE TANKS

Site, whenever possible, should be not situated on or adjacent to water pipelines, reservoirs, or storage tank. When unavoidable, if a site is within 1,500 feet of an easement of this sort, district should obtain information regarding pipe size, type, depth, condition, volume, water pressure, and condition.

PROXIMITY TO PROPANE TANKS

Site, whenever possible, should not be located near propane tanks. If a propane tank is on or near a school site, a safety plan must be established with the assistance of several state agencies.

NOISE

Site should not be located near a freeway or other source of noise. Acoustical engineers should be hired if site is selected near a heavy noise source.

PROXIMITY TO ROADWAYS

Although not mandated by law, site should be located at least 2,500 feet from a highway where explosives might be carried and 1,500 feet where gasoline, diesel, propane, chlorine, oxygen pesticides, and other combustible or poisonous gases are transported.

It is also a requirement that the site not be adjacent to a road or freeway that any site-related traffic and sound level studies have determined will have safety problems or sound levels which adversely affect the educational program.

FLOODING

Site is not located within the 100 year flood plain as indicated on the most recent FEMA Flood Insurance Rate Maps or within flood areas as indicated on local flood maps.

LOCATION IN ATTENDANCE AREA

The site shall be located within the proposed attendance area to encourage student walking and avoid extensive busing unless busing is used to promote ethnic diversity.

ENVIRONMENTAL CONSTRAINTS

Site, and adjacent lands affecting the use of the site, are free of any significant environmental constraints, including but not limited to protected habitats or species, watercourses, wetlands or vernal pools, potentially toxic and hazardous substances, and geologic, seismic, topographic, or soil restrictions. Application of agricultural chemicals on farmlands adjacent to the proposed school site may be considered a constraint.

PARKS AND OTHER PUBLIC SERVICES

If at all possible a park should be planned fully adjacent to a school site. The school site per se should still be the minimum net usable acres as in the above chart. The adjacency should be on one side only. The park should have open fields adjacent to the school but no structures. A fence should extend along the street connecting the school and park to minimize safety concerns.

The site selection should promoted joint use of parks, libraries, museums and other public services.

The site shall be conveniently located for public services including but not limited to fire protection, police protection, public transit and trash disposal whenever feasible.

ACCESS/STREETS

Site is safely and easily accessible to residential neighborhoods by pedestrian, bus, and private automobile traffic on publicly maintained roadways or walkways. Sites adjacent to streets with relatively high traffic volumes are typically not considered acceptable unless other safe access is available for the neighborhood. A new elementary school is not acceptable along existing or proposed major streets. Street accessibility on only two adjacent sides of the school is preferred.

LAND USE PLANS/EASEMENTS

Site is adjacent to compatible existing uses, general plan designations and zones. Industrial and commercial uses are typically not considered compatible adjacent uses for elementary schools. Site is not on land under a Williamson Act Contract. In addition, the site should be designated on the general plan and community plan land use maps as a proposed and eventually as an existing school site.

Site should have a minimum of existing structures to be destroyed or removed and households to be relocated.

Easements on or adjacent to the site shall not restrict access or building placement.

UTILITIES

Site has or will have on a timely basis access to all utilities and services, including sewer, water, gas, electric, and drainage. Utility easements on the site should be avoided.

OTHER CRITERIA

In addition, the site must meet all California Department of Education site review requirements.

The District also requests that if the school site is located in or is proposed to be in a Community Facilities District (CFD), that the site be exempt from these taxes. If the CFD does not exempt public schools from taxes, the site should be zoned to allow the lowest tax rate possible for the site before the district acquires or utilizes the site.

DISTRIBUTION

Environmental Data Evaluation Report
Aspen 1 Property
Sacramento, California

February 2, 2011

Copy No. ____

Copy 1-3:
Mr. Michael G. Isle
Stonebridge Properties, LLC
3600 American River Drive, Suite 160
Sacramento, California 95864-5805

Copy 4:
Ms. Katharine Wagner
Downey Brand
555 Capitol Mall 10th Floor
Sacramento, CA 95814

Copy 5:
Project File

Quality Control Reviewer

Gregory L. Fasiano, P.G. R.E.A.
Principal

APPENDIX L

DRAINAGE REPORT

ASPEN 1

City of Sacramento, California

March 2012

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C Street, Bldg 100-B
Sacramento, California 95816
Tel: 916.341.7760
Fax: 916.341.7767

Watearth
Hydrology/Hydraulics and Sustainable Water Resources

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1. INTRODUCTION

PROJECT TEAM

The Aspen 1 Drainage report (Report) is a joint effort of Wood Rodgers, Inc. and Watearth. Wood Rodgers is the project engineer providing overall project direction, as well as leading the design effort on hydrologic and hydraulic analysis, drainage system modeling, offsite retention basin modeling and assistance with Low-Impact Design/Hydro-Modification (LID/H-M), continuous simulation modeling, and water quality. Watearth leads the design effort on LID/H-M, runoff reduction modeling, continuous simulation modeling, and water quality.

PROJECT

Aspen 1 (Project), located at the southeast corner of Jackson Highway and South Watt Avenue, is a planned mixed-use residential development in the City of Sacramento (City). The Project site is a former aggregate mine site which provided alluvial sand and gravel in the 1960's to the Teichert Perkins Plant. The site is south of Jackson Highway and west of South Watt Avenue, to the north of Jackson Highway is Teichert's Perkins Plant (an active sand and gravel processing and sales facility), to the east of South Watt Avenue is Teichert's Aspen 2 property which is a former mine site, to the south is L&D Landfill and to the west the former Florin Perkins Landfill (see **Figure 1**).

The development will consist of approximately 232.3-acres of low-to-high density residential, commercial, elementary school, urban farm, open space, and park land. It is proposed that the development will drain to the east under South Watt Avenue via a culvert to a retention basin on Teichert property to the east.

OBJECTIVE

The objective of this report is to develop the hydrologic and hydraulic design of the onsite drainage system, including storm-drainage trunks, LID/H-M facilities which encourage retention/detention/reduced runoff, retention basin, and outfall structures for the proposed development.

2. EXISTING CONDITIONS

LAND USE

The site is currently zoned M-2S-R-SWR/M-2S-SWR Heavy Industrial and is vacant. Since the 1960's the site has been utilized primarily for wash ponds, drying beds, and conveyor line access in support of the Teichert Perkins Plant.

TOPOGRAPHY

Due to the former mining activities, topography on the site varies, from elevation 52-feet in the north to elevation 16-feet in the central portion of the site. Vegetation is limited to some scattered small trees and grasses.

FLOODPLAINS

The Federal Emergency Management Agency (FEMA) has prepared a preliminary Flood Insurance Rate Map (FIRM), dated January 31, 2011 as part of FEMA's digital FIRM update. These maps are preliminary and identify the site as Zone X protected by levees.

SOILS

The site is situated on soil characterized mostly as Hydrologic Soil Group "D" soils and a small area of Group "C" soils at the south-eastern portion of the site.

Group "C" soils have a slow rate of water transmission. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately-fine texture or fine texture.

Group "D" soils have a very slow rate of water transmission. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. While much of the site under pre-developed conditions are known, the post-project conditions must factor in the permeability of extended fill areas, and imported fill materials in assessing, and re-classifying as necessary, the hydrologic soil group assignments and associated runoff parameters for the site. Much of the fill material movement and placement was determined through close consultation with Teichert and the Project geotechnical engineer, Treadwell & Rollo.

3. BASE CONDITION

The Project is historically within the Morrison Creek watershed. Due to mining activity, the project has not discharged stormwater to Morrison Creek since the early 1970's. The base condition with respect to discharge from the site, assumes no development with native vegetation onsite. The Project will discharge to a retention basin to the east therefore under the post development conditions, the Project will not discharge to Morrison Creek.

4. PROPOSED IMPROVEMENTS

LAND USE

The development will consist primarily of medium-density, single-family residential units, with three high-density residential (HDR) parcels in the northeast adjacent the commercial site/major streets and one HDR parcel in the southeast adjacent to South Watt Avenue. Commercial development will occur at the northeast corner adjacent Jackson Highway/South Watt Avenue. Residential Mixed Use parcels will be clustered at the intersection of Rock Creek Parkway/Aspen Promenade. A school site is located at the southwest quadrant of Rock Creek Parkway/South Watt Avenue. The remainder of the site will consist of parks, an urban farm, and open-space located in the southwest corner (see **Figure 1**).

GRADING

The site will be graded to drain in a general north-to-south direction towards the collector street Rock Creek Parkway which includes a 74-foot median, turning and draining from west to east as Rock Creek Parkway connects with South Watt Avenue. Streets will provide overland release for flows exceeding the pipe system capacity. The urban farm, open space lots, and community park will be at the lower elevations. The existing site will be mass graded and raised, utilizing import from the off-site retention basin (approximately 1,300,000 cubic yards) (see **Figure 2**).

ONSITE STORM-DRAINAGE TRUNKS

The total area of the Project watershed is 232.3-acres. The proposed preliminary onsite storm drain pipe layout was sized using the Sacramento Method for 10-year design flows, and City pipe and cover requirements. The site is divided into seven major trunk systems with sub-sheds (identified as nodes 100 through 2050, see **Figure 3A and 3B**). The Project drains in a southeasterly direction to a proposed culvert at South Watt Avenue. The Project will discharge to an offsite retention basin east of South Watt Avenue.

The onsite grading is designed for the 100-year flows in excess of the 10-year pipe capacity to flow down the streets and medians towards the intersection of Rock Creek Parkway/South Watt Avenue. The building pads will be set 1.5-feet above the overland control point and 1.2-feet above the adjacent 100-year water surface, whichever is greater.

LID/H-M FACILITIES

The drainage system incorporates LID/H-M principles to reduce urban stormwater runoff, improve water quality and implement the Sacramento Stormwater Quality Partnership Phase 1 Municipal Stormwater Permit regarding hydro modification (run-off reduction).

LID/H-M principles include increasing pervious surfaces, disconnecting impervious cover, increasing use of amended soils to increase storage, infiltration and evapo-transpiration, encouraging infiltration, and providing detention, extended detention, and retention storage. Stormwater from buildings and streets is directed into vegetated areas instead of curbs and drainage inlets. The Project will incorporate LID/H-M facilities to implement these principles. Streets will utilize cross-gutters to keep stormwater at the street grade, so that it can be directed to medians and planter areas instead of immediately entering drainage inlets into the storm drain conveyance system. LID/H-M facilities used in the project include the following:

- Interceptor Trees
- Native/Adapted Vegetation
- Disconnected Impervious Cover
- Open Space Stormwater Planters
- Infiltration Planters (Separated Sidewalk Planters - 8 to 14-feet)
- Vegetated Median Swales (50+feet and 74+feet)
- Hydro Modification Facilities (Detention/Percolation Basins in Open Space)
- Bioretention (Assumed in Commercial, Parks and High-Density Residential Areas)

These facilities are all similar to bioretention and the Stormwater Planter Treatment Control Measure identified in the *Stormwater Quality Design Manual for the Sacramento and South Placer Regions*. The location of proposed LID/H-M facilities is shown on **Figure 4**. **Figures**

6-2 to 6-6 illustrate the components of each LID/H-M facility in profile view. While Bioretention was used to represent flow reductions from commercial, high-density residential and parks land use areas, design standards will allow use of different LID/H-M tools, provided that the modeled hydrologic reductions are met or exceeded.

STREET MODIFICATIONS TO FACILITATE LID/H-M

The Project will require modification of street standards to incorporate LID/H-M facilities. The modifications are required to keep the stormwater flow at the street level and direct the stormwater to the LID/H-M facilities which are landscape planters and medians, rather than allowing the stormwater to enter drainage inlets and pipe systems. These include the following items, most of which facilitate disconnecting the impervious cover from directly draining into the storm drain system. These facilities initially direct flow onto or through vegetated features and LID facilities before entering the storm drain system.

- Median Gutter Drain: Curb cut to allow drainage flow into the planters/median swales.
- Street cross slope to center or one side of street: To allow drainage to flow to median or planter.
- Larger front yard and side yard planters: Increase from 6 feet to 8 feet or 14-feet.
- Larger medians: To increase bio-retention, infiltration, evapo-transpiration and provide detention storage.
- Cross Gutters: To keep drainage at street level to allow drainage to planter or median.
- Modify Driveway discharge to sidewalk planter: Allows lot driveway drainage to enter sidewalk planter versus running directly to curb and gutter.

Figure 5: Aspen 1 Street Standards and Details identifies proposed locations of alley cross gutters, street cross gutters and street cross slopes required to facilitate implementation of LID/H-M facilities. Details of the above facilities are identified in **Figure 6**: Aspen Residential Street w/ Detached sidewalk and LID Swale, **Figure 6-1: LID Components and Processes Modeled, Figure 7**: Rock Creek Parkway, **Figure 8**: Aspen Promenade, **Figure 9**: Aspen 1 Median Intersection Cross Gutter, **Figure 10**: Aspen 1 Alley Product, Sidewalk/ Alley Cross Gutter, and **Figure 11**: Aspen 1 Driveway Product Sidewalk Planter Driveway Cross Gutter. A summary of common facilities is provided on **Figure 12**.

OFFSITE RETENTION

Runoff from the Project site is currently retained onsite and does not discharge offsite in undeveloped conditions. The Project site, as well as the Aspen 2, 3 and Mayhew sites, immediately east of the Project have operated as aggregate mining sites, configured as depressed/excavated areas that collect, infiltrate, and evaporate all rainfall that reaches them. As such, these areas currently act as retention basins.

The proposed Project area can not be efficiently designed to contain all runoff, but is proposed to discharge excess runoff eastward and drain through proposed culverts under South Watt Avenue. These receiving (offsite) lands (Aspen 2, 3 and Mayhew) to the east of South Watt Avenue are private lands (owned by Teichert) in Sacramento County that does not currently discharge to Morrison Creek during storm events.

The Project will utilize the proposed LID/H-M facilities to treat urban runoff and direct the treated urban runoff from the Project area to the retention area. The future extension of

Rock Creek Parkway within Aspen 2, 3 and Mayhew sites will be excavated and function as a lineal retention and conveyance area connecting to a larger retention basin area in the Mayhew site.

The retention area will be designed to retain stormwater runoff at an elevation that is low enough to prevent retained stormwater from hydraulically influencing the Project site. Wood Rodgers has evaluated the flow, storage, infiltration, and evaporation of the offsite lands under historical and design storm conditions, and provides design recommendations to prevent flooding on the Project, while retaining all runoff from both the Project and off-site areas tributary to the existing sites. **Figure 13** identifies the location and general shape of the retention site east of South Watt Avenue.

The proposed offsite retention plan provides a compartmentalized approach by isolating the drainage corridor and retention area for Project runoff, while also isolating separate retention along both sides of the corridor for some of the remaining offsite area within Aspen 2, 3 and Mayhew. This configuration allows for maximizing infiltration and evaporation, while preventing stormwater runoff from backing up and affecting the Project site.

Since the compartmentalized approach relies on the compartments remaining isolated, all areas where retention is proposed were evaluated to determine whether there is sufficient capacity to prevent overflow and interconnection of storage. The off-site retention for the Project within the Mayhew site will be the lowest area and therefore will retain runoff from areas of the Project and portions of Aspen 2, 3 and Mayhew sites. The drainage corridor to convey flow from the Project to the retention basin will be designed to keep the maximum pool elevation below the Project grading and drainage facilities levels.

5. WATER QUALITY APPROACH

Post-construction stormwater quality measures and Best Management Practices (BMP's) for the Project consist primarily of the LID features and facilities discussed briefly in Section 4 and in detail in Section 6. The LID facilities include the following treatment BMP's in addition to Disconnected Impervious Cover, Native/Adapted Vegetation, and Interceptor Trees:

- Open Space Stormwater Planters
- Infiltration Planters
- Vegetated Median Swales
- Hydro Modification Facilities
- Bioretention

While various names are used for this project to identify slight changes in configuration and/or location within the development, these facilities are all similar to bioretention and the Stormwater Planter Treatment Control Measure identified in the *Stormwater Quality Design Manual for the Sacramento and South Placer Regions*. While not required as part of this submittal, the project will also comply with construction-phase BMP's and monitoring requirements from the State's Construction Activities General Permit.

The Project has an associated area of 232.5-acres with a project density that varies as land use includes: low density residential, high-density residential, commercial, parks, schools, roadway, open spaces, and an urban farm. **Table 6-3** lists impervious cover values associated with each drainage shed listed in the table and depicted on **Figures 3A and 3B**. **Figure 3B** also lists pipe materials, sizes, slopes, and invert elevations. While not explicitly shown on these exhibits, 96% of the impervious cover within the Project is disconnected from the storm drain system and discharges directly into vegetation or LID/stormwater BMP features. In the event that runoff bypasses LID facilities, 96% of the impervious cover is anticipated by Wood Rodgers to be disconnected from the storm drain system.

As indicated previously, the Project discharges into a series of retention basins offsite, located within the Aspen 2, 3 and Mayhew sites and do not drain to a municipal storm drain system or receiving waters. The location of the discharge out of the Project is shown on **Figure 3A** and the location of the retention basin/system is shown on **Figure 13**. Proposed site grading and contours are illustrated on **Figure 2**. Inlets, outlet structures, and release points are also included on **Figures 2 and 3A**

Post-construction stormwater quality BMP's or LID facilities are located within every drainage shed within the Project. **Figure 4** illustrates the general layout of LID facilities. **Tables 6-7A to 6-7C** and **Tables 6-8A and 6-8B** list in detail the LID facilities/stormwater quality control measures used in each drainage shed along with the associated volumes up to a maximum depth of 12-inches. **Figures 6-2 to 6-6** illustrate the typical profile view, dimensions, design water surface elevation, and freeboard associated with each type of LID facility used in the Project. The seasonally high groundwater elevations are not shown on these figures as the geotechnical consultant indicates it is more than 40-feet below the existing grades within the Project site.

Most of the roadway slopes within the Project are relatively flat at 0.35% with a few exceptions as high as 5% in the extreme northern portion of the Project. All of the facilities that function similarly to Bioretention (Bioretention, Hydro-Modification, Open Space Stormwater Planters, and Infiltration Planters are anticipated to have flat bottoms (0% slope). Grade breaks are provided on sloped LID facilities (i.e. Vegetated Median Swales) to encourage infiltration in smaller events and overland flow or discharge via stand pipes rather than hydraulically connected culverts to downstream swale segments. As such, water quality calculations are volume-based rather than flow-based.

As such, volume-based calculations were used to determine water quality volume requirements for the Project. The Appendix D-2 Spreadsheet from the *Stormwater Quality Design Manual for the Sacramento and South Placer Regions* is attached as **Appendix A2** and includes the volume-based calculations. The required water quality treatment volume for the Project is 7.46-acre-feet using the California Stormwater Quality Association (CASQA) method and 7.35-acre-feet using the American Society of Civil Engineers and Water Environmental Federation (ASCE/WEF) method.

As shown in **Table 5-1**, a total volume of 10.04-acre-feet is provided, excluding volume within the growing media and drain rock storage layers, which is a significant volume. Because runoff reduction is accounted for through the detailed LID, and continuous simulation modeling described in Section 6 and additional treatment volume of over 2.5-acre-feet is provided in excess of City requirements (see **Table 5-1**), water quality volume calculations did not account for the Runoff Reduction Credit. Even so, **Table 6-1** provides details on the number of evergreen (broad-leaf and coniferous) and deciduous trees in each drainage shed based on tree counts from SWA Group (project Landscape Architect). A maximum storage depth of 12-inches was used in these water quality volume calculations, regardless of actual storage depth within each facility.

The majority of the LID facilities are currently planned for the public right-of-way (ROW) and open spaces, and the exact dimensions and setbacks from property lines and structures varies from facility to facility. Additional information on recommended setbacks to comply with local requirements and building codes are in Section 6.

While the customized growing media to support the plant palette identified in **Appendix A1** has not been formulated for the Project, Watearth anticipates infiltration (hydraulic conductivity) rates to range from a minimum of 0.5 in/hour (in/hr) to a maximum of 2.0 in/hr to balance infiltration goals with the proposed plant palette. As discussed in Section 6, the hydraulic conductivity of 0.43 in/hr associated with Sandy Loam Soils used in the LID modeling may be revised in the future if a higher-infiltration growing media is selected for the project. Sandy Loam texture was selected as it is beneficial for promoting plant growth and aesthetics. Furthermore, it is used in the regional BMP sizing calculator tool developed in the January, 2011 *Sacramento Stormwater Quality Partnership Hydromodification Management Plan*.

Prior to final selection of the growing media, the LID criteria and recommended growing media parameters under development by the Sacramento Stormwater Quality Partnership (Partnership) will be considered. For those LID facilities located within the ROW and expected to have foot traffic resulting in compaction, initial infiltration rates of 2.0 in/hr or higher using mixtures containing gravelly sands may perform better over the long-term. Based on information from SWA Group, irrigation is expected to be minimal and during the dry season only.

Specifications for construction materials along with installation requirements will be included with the final construction documents for the project and will follow City requirements and the latest LID research results. However, construction sequencing is briefly addressed in Section 6.

Based on information included in the Partnership's Municipal Separate Storm Sewer System (MS4) Permit, targeted pollutants for the Sacramento area are listed in **Table 5-2**. This table also addresses the mechanisms used to remove each targeted pollutant. Importantly, the stormwater treatment approach is also used in the Project whereby stormwater runoff flows through multiple BMP's prior to discharging into the retention basin.

In two 2008 studies entitled *Long-Term Characteristics of Infiltration Best Management Practices* and *Multiyear and Seasonal Variation of Infiltration from Storm-Water Best Management Practices* by Clay H. Emerson, and Robert G. Traver Ph.D. P.E., the authors evaluated the performance of a seven-year old bioretention facility. While this study was not a lifespan analysis, the length of record was adequate to determine that the bioretention facility did not show any evidence of systematic degradation and that the design is conducive to long-lasting performance.

The authors concluded that the typical clogging processes related to incoming water quality and infiltration of ponded water are insignificant or balanced by processes that maintain or increase the hydraulic conductivity of the growing media (i.e., use of organics, penetration of plant roots, etc.). For the facility studied, no significant maintenance or rehabilitation had been performed. The authors further concluded that mulching and dense vegetation enhances the long-term functionality of the bioretention facility.

An Operations and Maintenance (O&M) Plan, entitled *Draft Operations & Maintenance Plan for Low Impact Development and Post-Construction Stormwater BMP's in Aspen 1 New Brighton* is attached as **Appendix A**. This O&M Plan addresses vegetative, structural, and growing/filter media elements of the LID facilities. While organic maintenance practices are recommended and use of fertilizers discouraged, minimum Integrated Pest Management practices are required. The use of compost and mulch products containing animal products is also discouraged in stormwater facilities to avoid leaching of nutrients.

As shown in the Emerson and Traver studies, compliance with this O&M Plan is expected to enhance the long-term functionality of the LID facilities to treat stormwater runoff. Additionally, based on recent findings from Dr. Robert Pitt at the University of Alabama regarding extending the life-cycle of Bioretention, those drainage sheds where LID facilities primarily drain roadways or parking lots may be revised during the final design to ensure that the LID facilities (Bioretention) occupies ten-percent of the drainage shed where feasible. While the life-cycle of stormwater BMP's and LID facilities may vary considerably depending on pollutant load, we anticipate life-spans of 20 years or more based upon information contained in the *Stormwater Quality Design Manual for the Sacramento and South Placer Regions*, which is generally consistent with other sources.

To further enhance the long-term functionality of the LID facilities, the landscape component of all LID facilities (i.e., vegetation, mulch, infiltration rate) will be maintained by the Homeowner's Association (HOA). Additionally, a CFD easement is provided over the facilities as contingency for maintenance. The City will be responsible for maintaining the storm drain pipe system, drain inlets, and structural components of the LID facilities. Table 1 in the O&M Plan attached as **Appendix A** provides a break-down of O&M responsibilities and estimated costs for annual O&M for each type of proposed LID facility.

To minimize the risk of vector issues, the O&M Plan specifies removal of excess vegetation and debris from the LID facilities. Inspection is encouraged to assess erosion, ponding, and excessive drain time in the facilities. Additionally, modifications and additional amendments to the growing media are recommended to rectify ponding in excess of three days (72 hours) after the introduction of runoff into the facilities during the peak mosquito-breeding months of April to October.

To reduce pollutants associated with landscape maintenance, organic farming is recommended on the Urban Farm. In addition, homeowner education aimed to reduce or eliminate reliance on chemical pesticides, herbicides, and fertilizers includes educational signage related to water quality and BMP's within the Vegetated Median Swales in the public ROW. For those yards maintained with fertilizer/pesticides, the 8-foot Residential Infiltration Planters provide the first of a series of stormwater BMP's to treat the stormwater runoff from lawns.

6. HYDROLOGIC AND HYDRAULIC ANALYSIS

The onsite hydrology was modeled using the US Environmental Protection Agency Stormwater Management Model (EPA SWMM) program (version 5.0.022) which quantified the sub-drainage areas and their individual runoff contributions based on the proposed soil conditions, which in many areas is imported fill material. The assumed underlying soil conditions were established by Watearth and are explained in more detail under this section. The applied rainfall depth and temporal pattern for design storm events was obtained from the City/County Hydrology Manual via the publicly available SacCalc program. The onsite hydraulics modeling utilized the XPSWMM software to represent the physical flow conveyance facilities with input hydrographs generated from EPA SWMM.

The onsite hydrologic component of the analysis is generally comprised of the applied rainfall distribution for each scenario being modeled and the infiltrative losses that can temporarily trap rainfall and prevent it from entering the peak overland runoff, resulting in each shed's direct runoff response. The hydrology is essentially quantifying the movement of the water vertically from the sky into the ground, and determining how much water diverges and starts accumulating and translating horizontally over the surface as runoff.

It is generally considered best practice to determine peak overland flow conditions using a short-duration design rainfall event, as defined and described in the City's hydrology manual, for smaller urbanized sheds. For smaller and medium sized watersheds, the storm drain pipes and conveyances can see their highest design condition under the highest intensity that can occur over the watershed. When the concentration of flow from all contributing parts of the watershed can occur in a short period of time, shorter more intense rain bursts can be realized. The rainfall pattern currently accepted by the City nests the shortest duration and highest intensity rainfall during the middle of the peak "single cloudburst" event in a "balanced storm hyetograph".

Dispersed storage throughout the watershed can attenuate short duration peak runoff, particularly LID type facilities such as those proposed for this project. Volume can have great impact on reducing very short duration rainfall. As finite storage must be filled first before runoff can occur, it is recommended that a somewhat longer-duration single cloudburst event be evaluated. Without knowing beforehand how much influence the onsite storage will have Wood Rodgers proposes that the highest peak conditions can reasonably be determined by evaluating two design rainfall scenarios; a 6-hour storm duration, and a 24-hour storm duration. Wood Rodgers has therefore evaluated both storm durations under this study.

The watershed's runoff response can also be affected by the preceding storm events and the residual level of soil saturation resulting from these previous events. The level of soil saturation just preceding the design storm event establishes the antecedent conditions for the design storm rainfall being evaluated. The long-term (continuous) simulations performed by Watearth for water quality evaluations are providing the basis for assessing antecedent soil conditions for onsite design of underground (pipes) and aboveground conveyances (streets). Based on discussions with City staff, Watearth is using an average of 50% soil saturation for the 10-year design event and 100% soil saturation for the 100-year design event, based on assessment of the continuous simulation modeling and long-term watershed responses. Watearth has provided justification for the recommendation in this section of the report.

The proposed design intent for aboveground onsite storage areas proposes to drain them within 24-48 hours after the end of a significant storm event. All of the above ground storage onsite will be outfitted with “weeping” outlets to ensure all detained surface stormwater is slowly drained into the storm drain system after the peak has passed, but well before the 48 hour target has been reached. The model parameters identifying this aspect of the receding hydrograph limb are preliminary and during final design will be adjusted to balance outflow opening sizes/configurations with approved design coefficients. Many of the larger onsite storage areas will also be outfitted with an overflow outlet to help restrict and direct peak outflow into the proposed storm drain system through a raised stand pipe overflow before overflow into the street can occur. The final design configuration of this outlet will govern the final opening size/configuration, finalizing the appropriate overflow parameters/coefficients once all safety/structural/aesthetic design elements are fully addressed. Because of this, Wood Rodgers proposes that all above ground storage should be considered empty at the beginning of the design event simulation (for sizing facilities) and Wood Rodgers has reflected this condition in the analysis/modeling.

The hydraulic analysis of onsite conditions includes evaluation of the key elements of conveyance and convergent storage areas, where runoff from multiple areas can combine and be detained. In the hydraulic analysis Wood Rodgers has included the underground pipe system, the overland street conveyance, and the significant aboveground storage comprised of medians and hydro modification cells deeper than 2-feet, with overflow connections to the storm drain network. The basic layout of onsite facilities is shown on **Figure 3B**. In addition to the medians and hydro-modification facilities, the areas described as “Urban Farm” on Figure 3B will be allowed to back-flood and receive some overflow from the Rock Creek Parkway median system under larger events, to provide a pressure relief to the lowest parts of the onsite system draining under South Watt Avenue.

CONTINUOUS SIMULATION MODELING

As requested by City staff, a continuous simulation analysis was performed for the Project LID system using approximately 10-years of historical rainfall data from the 1980s. Use of this relatively wet period reflects a more conservative condition than is typically used in continuous simulation modeling of a longer period of record. The LID analysis performed for this project is a hydrologic analysis both in terms of runoff and LID routing. The hydraulics of the system (storm drain, retention, flood control, unsteady flow routing, etc.) is simulated in an XPSWMM model developed by Wood Rodgers. **Table 6-A** summarizes key parameters and assumptions used in LID modeling for this Project. Additional details are in the following paragraphs and accompanying tables and figures.

TABLE 6-A: ASPEN I SUMMARY OF LID MODELING PARAMETERS AND ASSUMPTIONS

LID Component	Parameters and Assumptions
LID Model	SWMM5.0.022 (Hydrologic Calculations Only)
Rainfall Data	Historical: 1980 - 1990 (City) 10-yr, 6-hr = 1.6507 in (SacCalc) 10-yr, 24-hr = 2.9827 in (SacCalc) 100-yr, 6-hr = 2.5024 in (SacCalc) 100-yr, 24-hr = 4.252 in (SacCalc)
Depression Storage	Pervious = 0.25 in Impervious = 0.06 in
Tree Canopy Interception	Deciduous = 1.00 mm Coniferous = 1.26 mm Broad-Leaf Evergreen = 2.00 mm
Impervious Cover	City-SWMM Table 5-2 Values
Disconnected Impervious Cover	96% to 100%
Manning's Roughness Coefficients (n-values)	Impervious Areas = 0.11 Turf = 0.10 Native/Adapted Veg. = 0.24 Forested/Trees = 0.40 LID Facilities = 0.00 (not used in Bioretention calculations)
Effective Surface Storage Depth (Without Consideration of Freeboard)	Infiltration Planters: 8 in to 15 in Open Space Stormwater Planters: 4 in to 11 in Vegetated Median Swale: 12 in to 24 in Bioretention: 12 in Hydro Modification Facilities: 24 in
Growing Media (Amended Soil)	18 in
Storage Layer (Drain Rock)	12 in
Underdrains	Bottom of Storage Layer (not Elevated) Connected to Storm Drain Not Connected to Storm Drain in 8-foot Residential Infiltration Planters
Hydraulic Conductivity	Native Soil: 0.0638 in/hr Growing Media: 0.43 in/hr Drain Rock[4]: 0.0638 in/hr Native Soil Underlying LID Facilities: 0.0638 in/hr
Initial Growing Media Saturation (0% = Wilting Point of 0.085) (100% = Porosity of 0.453)	Continuous Simulation: 0% 10-yr, 6-hr: 16% 10-yr, 24-hr: 16% 100-yr, 6-hr: 100% 100-yr, 24-hr: 100%

***Table by Watearth, Inc. - December, 2011**

Notes:
1. Additional details provided in text and accompanying detailed tables.
2. Disconnected impervious cover modeled as draining through LID facilities.
3. Infiltration Planters planned to have minimum depth of 8 inches, regardless of street slope.
4. Hydraulic conductivity of drain rock indicates hydraulic conductivity of underlying soil, which is a change in computation for SWMM5.0.022.

As requested by the City, the drainage area and node designations are consistent between the XPSWMM models developed by Wood Rodgers for conveyance and flood control analyses and the LID models developed by Watearth for continuous simulation and design storm event LID analysis. As such, the drainage areas used in the LID modeling exactly match the drainage areas used in the conveyance modeling and are depicted on **Figures 3A and 3B**.

Recent studies by the EPA cited in the report *SUSTAIN – A Framework for Placement of Best Management Practices in Urban Watersheds to Protect Water Quality* found similar results for analysis of aggregated (lumped) LID controls in drainage sub-areas of 100-acres or more as compared to micro-drainage sub-areas for each lot and LID control (distributed approach). Similar positive findings with regards to the aggregated approach were also reported by the City of Portland's Bureau of Environmental Services in a paper entitled *Modeling Non-Directly Connected Impervious Areas in Dense Neighborhoods.*

Since the majority of drainage sheds in this project are less than 5-acres, with the largest less than 20-acres, the lumped approach was used for this project to reduce computation time and model development time for the analysis. This approach also facilitates consistent drainage sheds between the various modeling analyses.

The EPA SWMM was utilized for the LID and continuous simulation modeling in this project. The EPA released SWMM 5.0.021 on September 30, 2010, which includes LID controls and detailed analysis options not previously included in SWMM5. Version 5.0.022, which updated some LID computations is used for this report. The SWMM model is also a publicly-available model and was previously indicated by the City to be an acceptable model for this project. Furthermore, the hydrologic methods used in SWMM are similar to those used in the City SWMM model.

Both the continuous simulation option and the rainfall data provided by the City covering the historical time-period from July 1, 1980 to June 30, 1990 were used in the analysis. The model analyzes the entire time-period and simulates rainfall, runoff, infiltration, evapo-transpiration, and storage within the system.

Figure 6-1 illustrates the processes included in the long-term model computations. Unlike design storm analyses, antecedent moisture conditions are automatically accounted for by the model computations as the underlying soil and LID facilities dry out between rainfall events or remain partially saturated for back-to-back events.

Table 6-1 summarizes parameters related to tree canopy and adapted/native vegetation. Standard depression storage values of 0.06-inches and 0.25-inches were used for impervious and pervious cover, respectively. The estimated tree canopy interception depths were incorporated into the depression storage values. Details on tree canopy and coverage calculations along with typical interception values are also included in **Table 6-1**.

Based on research and recommendations from the United States Forest Service Center for Urban Forest Research, interception values of 1-millimeter, 1.26-millimeters, and 2-millimeters were assigned to deciduous, coniferous, and broad-leaf evergreen trees, respectively. A 2000 study entitled *Winter Rainfall Interception by Two Mature Open-Grown Trees in Davis, California* provides supporting information regarding use of these values. Vegetation coverage, tree counts, and percent turf grass and adapted/native vegetation were based on input from SWA Group, the landscape architect for the project.

Manning's roughness coefficients (n-values) of 0.11 were used for pavement, 0.1 for turf grass, 0.24 for native/adapted vegetation, and 0.40 for trees. For the pervious areas, composite n-values were estimated based on the projected native/adapted vegetation to turf grass ratio. **Table 6-2** lists the n-values on a drainage-shed basis. To comply with current and upcoming regulations related to turf reduction and irrigation reduction, as well as the visual and environmental project goals, turf grass is minimized and substituted with native/adapted vegetation. Furthermore, LID facilities are planned to use native/adapted vegetation. A Preliminary Plant Palette for LID Stormwater Facilities is included in **Appendix A1**.

Table 6-3 summarizes drainage sheds, drainage areas, and impervious cover values associated with each drainage shed. Drainage sheds were delineated by Wood Rodgers based on proposed drainage system design. The impervious cover values were estimated by Wood Rodgers based on Table 5-2 of the City and County of Sacramento Drainage Manual. Average impervious cover values associated with each type of land use in the region were used.

Based on project goals and preliminary design, all impervious surfaces were assumed to be disconnected impervious cover (i.e., roofs and roadways drain to landscape or LID facilities). **Figure 11** illustrates the planned roof and lot drainage patterns. Unlike conventional new developments, roof runoff and lot runoff will not be piped. Instead, these areas drain by sheet flow into the Infiltration Planters at the front of each lot. A similar approach is also required for commercial and high-density areas of the development. As such, 100% of the impervious area within each drainage shed was routed through the pervious areas.

Table 6-4 lists the width (W) and slope (S) values used for this project, which were estimated by Wood Rodgers based on assumed design parameters, and guidance contained on pages 2 through 12 of the *City SWMM Manual*, dated December 2004 as well as review input from City staff. **Figures 3A and 3B** illustrate the layout of the LID facilities and location throughout the Project development. The LID facilities used in the Project include:

- Infiltration Planters (further defined as: 8-foot Residential, 8-foot Non-Residential, and 14-foot)
- Bioretention
- Hydro-Modification Facilities
- Open Space Stormwater Planters
- Vegetated Median Swale

Additional details on the LID geometry, configuration, and components are summarized in **Table 6-5**. The vegetative cover is consistent with the General Vegetation/Plant Plan prepared by SWA Group, which is included in **Appendix A1**.

TABLE 6-5: ASPEN I LID FACILITIES CONFIGURATIONS AND COMPONENTS

LID IMPs	Locations	Average Storage Depth (in)	Veg. Cover (%)	Manning's n-value	Surface Slope (%)	Depth Soil Media (in)	Underdrain?	Drain Rock (in)
Bioretention	Commercial, HDR, Parks, Schools, Open Space	12	90	0	0	18	●	12
Hydromodification Facilities	Open Space	24	75	0	0	18	●	12
Infiltration Planters (14')	In ROW @ Residential Side-Yards	15	90	0	0	18	●	12
Infiltration Planters (8')	In ROW @ Residential Front Yards and Non-Res. Areas	8	90	0	0	18	●[11]	12
Vegetated Median Swales	Rock Creek Parkway + Aspen Promenade	24*	75	0	varies	18	●	12
Open Space Stormwater Planters	Open Space	varies 4 to 11	75	0	0	0		0

***Table by Watearth, Inc. - December, 2011**

1. Green & Ampt hydraulic parameters for growing media (amended soil) listed in Table 6-9.
2. Slope and depth for Median Vegetated Swales based on data provided by Wood Rodgers.
3. Depth, side slope, and bottom width for Open Space Stormwater Planters based on preliminary layout from SWA Group.
4. Surface slope values of 0.0001% were used to simulate flat-bottom or zero-slope facilities.
5. Storage depths for Median Vegetated Swales reflect average depths. A few locations have shallower average depths of 12 inches.
6. Open Space Stormwater Planters have average storage depths of 4, 6, or 11 in, based on input from SWA Group.
7. Additional details on the geometry of LID IMPs on a drainage shed basis are included in Tables 6-7 and 6-8.
8. 14-foot Infiltration Planters included perforated standpipes modeled as connected underdrains to better represent discharge prior to overflow.
9. Manning's n-value parameters set to 0 for facilities modeled as Bioretention in accordance with SWMM5.0.021 guidelines.
10. Infiltration Planters planned to have minimum depth of 8 inches, regardless of street slope.
11. All 8' Infiltration Planters have unconnected underdrains, except for 8' Non-Residential Infiltration Planters in drainage sheds: 142, 632, 660, 670, 840, 1620, and 1630.

Two development scenarios were analyzed and **Table 6-6** lists the various components included in each model. The model entitled *No LID Continuous Simulation* represents developed conditions without LID facilities or disconnected impervious cover benefits; however, this run includes significant tree canopy and adapted/native vegetation to meet irrigation reduction requirements and project aesthetic goals. In addition, the same percent impervious cover values are used for each drainage shed. The model entitled LID Continuous Simulation represents developed conditions with trees and native/adapted vegetation plus extensive LID controls and disconnected impervious cover throughout the Project.

In general, the residential lots and portions of roadways drain into Infiltration Planters within the public ROW and adjacent to the roadway, which eventually overflow into the storm drain system. In some drainage sheds located adjacent to Vegetated Median Swales, the overflow is directly into the Vegetated Median Swale, which extends along Rock Creek Parkway and Aspen Promenade. The Vegetated Median Swale eventually discharges off of the Project into a series of retention areas, which are not modeled in the LID analysis.

While portions of the Vegetated Median Swales are sloped, due to the absence of culvert/roadway crossings, these facilities drain primarily via infiltration into the under drain system, which is connected to the storm drain system. Excess stormwater runoff discharges through a standpipe located within low points in each swale segment

For the commercial, high-density, parks, schools, and other non-residential areas, the actual LID facilities may vary. While bioretention was used to simulate LID controls within these drainage sheds, these non-residential areas will have the flexibility to implement other LID controls to meet or achieve these flow reduction goals.

The Open Space Stormwater Planters, which are located in Open Spaces, typically discharge into Hydro Modification Facilities that in turn tie into the storm drain system. The Open Space Stormwater Planters for this project are flat-bottom facilities built on-contour and intended to reduce velocities, reduce erosion, store runoff, and infiltrate runoff to support vegetation as well as other multi-functional benefits. According to SWA Group, there will be limited, if any, berms on the downhill side of these facilities.

TABLE 6-6: ASPEN I LID MODEL RUNS COMPONENTS IN CONTINUOUS SIMULATION AND DESIGN STORM EVENTS

Model Name	Model Description	Developed	Interceptor Trees	Native/Adapt. Vegetation	Disconnected Impervious	Bioretention	Infiltration Planters (8' + 14')	Open Space Stormwater Planters	Growing Media Saturation (%)	Hydromod. Facilities	Vegetated Median Swale
No LID Continuous Simulation	Continuous Simulation - No LID	●	●	●					---		
LID Continuous Simulation	LID Continuous Simulation	●	●	●	●	●	●	●	0	●	●
10-year, 6-hour	LID 10-year, 6-hour Design Storm	●	●	●	●	●	●	●	50		
10-year, 24-hour	LID 10-year, 24-hour Design Storm	●	●	●	●	●	●	●	50		
100-year, 6-hour	LID 100-year, 6-hour Design Storm	●	●	●	●	●	●	●	100		
100-year, 24-hour	LID 100-year, 24-hour Design Storm	●	●	●	●	●	●	●	100		

***Table by Watearth, Inc. - August, 2011**

Notes:

1. All models are for developed conditions in Aspen 1.
2. Models analyzed in SWMM 5.0.021 released 9/30/2010 with LID control modeling capabilities.
3. In design storm events, Hydromodification Facilities and Vegetated Median Swales modeled in XP-SWMM analysis by Wood Rodgers.
4. Growing media saturation is at beginning of analysis and used for those LID facilities with growing media and included in the referenced model.

Table 6-6A summarizes the disconnected impervious cover within each drainage shed. While approximately 96% of the impervious cover is not directly connected to the storm drain system, the majority of the area drains through various types of LID facilities rather than into pervious landscape without storage.

Tables 6-7A to 6-7C and **6-8A** to **6-8B** provides details on the geometric configuration associated with each LID facility in each of the various drainage sheds. Also included in this table is the percent of the drainage area in each shed treated by each LID facility, as well as whether the LID facility discharges into additional pervious area or into a storm drain system. The length of the various Infiltration Planters and geometric configuration of the Vegetated Median Swales was estimated by Wood Rodgers, while the length of the Open Space Stormwater Planters was estimated by SWA Group.

The 8-foot Residential and 8-foot Non-Residential Infiltration Planters are planned as flat-bottom facilities that overflow via sheet flow into the next downstream Infiltration Planter. The preliminary design for the 8-foot Infiltration Planters provides for a sheet flow release into the street at the end of each block. According to project designers, the Infiltration Planters are planned to have minimum depth of 8 inches, regardless of street slope. While the vast majority of the 8-foot Infiltration Planters do not intercept roadway runoff, most of the 14-foot Infiltration Planters are planned to intercept runoff from the adjacent roadway. Details on the amount of area within each drainage shed planned to be treated by specific LID facilities are included in **Tables 6-7A to 6-7C** and **Tables 6-8A and 6-8B**. All 8-foot Infiltration Planters have unconnected under drains, except for 8-foot Non-Residential Infiltration Planters in the following drainage sheds: 142, 632, 660, 670, 840, 1620, and 1630.

The preliminary design for the downstream end of the 14-foot Infiltration Planters includes an overflow structure (perforated stand pipe and orifice) to convey excess runoff into the storm drain system. Similarly to the 8-foot Residential Infiltration Planters, the 14-foot Infiltration Planters include under drains within the drain rock layer that are not connected to the storm drain system. Due to the perforated stand pipe, which is anticipated to be perforated along the entire length of the stand pipe, under drains were simulated in these facilities to better represent releases from the Planters prior to overflow.

TABLE 6-8A: ASPEN 1 HYDROMODIFICATION PARAMETERS

Drainage Shed	Hydromodification Facilities												
	Surface Area (sq. ft.)	Area @ Design WSEL (sq. ft.)	Area @ WQV (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% of Subcatch	No. of Facilities	Top Width (ft)	% Area Treated	Outflow to Pervious	Depth (in)	Side Slopes (H:V)	Volume (ac-ft)
100	16,000	14,040	12,208	12,272	10,504	20.4	1	100	62%	No	24	4	0.26
112	12,000	10,311	8,751	8,815	7,318	20.1	1	100	100%	No	24	4	0.18
126													
136													
156													
158													
176													
178													
182													
252	6,500	5,274	4,176	4,240	3,206	10.1	1	100	73%	No	24	4	0.08
532	2,500	1,764	1,156	1,220	676	3.1	1	50	38%	No	24	4	0.02
534	2,500	1,764	1,156	1,220	676	2.0	1	50	37%	No	24	4	0.02
614	14,200	12,357	10,643	10,707	9,056	20.0	1	100	78%	No	24	4	0.23
622													
652													
662													
672													
842													
1602													
1612	43,000	39,746	36,620	36,684	33,623	5.0	1	100	22%	No	24	4	0.81
1622													
1624													
1632	31,000	28,247	25,622	25,686	23,125	5.0	1	100	23%	No	24	4	0.56
1922													
1924	23,800	21,396	19,119	19,183	16,971	20.0	1	100	66%	No	24	4	0.41
1942	25,000	22,534	20,196	20,260	17,987	20.0	1	100	55%	No	24	4	0.44
1952	53,700	50,056	46,541	46,605	43,153	20.0	1	100	50%	No	24	4	1.03
1983													
2026	14,600	12,731	10,989	11,053	9,376	20.1	1	100	78%	No	24	4	0.23

***Table by Watearth, Inc. - December, 2011**

Notes:
1. Hydromodification facilities assumed to occupy approximately 20% of Open Space Areas per input from SWA Group.
2. Hydromodification facility in Drainage Shed 252 reduced, based on input by Wood Rodgers regarding area constraints.
3. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in.
4. Surface area is at "top of bank" not design wsel.
5. % of Subcatch based on surface area of LID/water quality facilities as compared to total area in each drainage shed.
6. Top Width assumptions provided for informational purposes only - not used in model as modeled as Bioretention.
7. Square facilities assumed in estimating surface areas at bottom and water quality storage level.
8. Avg. Area parameter used in SWMM5.0.022 model to represent facility as average of design WSEL and bottom of facility.

TABLE 6-8B: ASPEN 1 BIORETENTION PARAMETERS

Drainage Shed	Bioretention Facilities											
	Surface Area (sq. ft.)	Area @ WQV (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% of Subcatch	No. of Facilities	Top Width (ft)	% Area Treated	Outflow to Pervious	Depth (in)	Side Slopes (H:V)	Volume (ac-ft)
100												
112												
126	4,600	3,579	3,132	2,686	10.1	4	25	100%	No	12	4	0.07
136	5,100	4,021	3,546	3,071	10.2	4	25	100%	No	12	4	0.08
156	4,900	3,844	3,380	2,916	10.1	3	25	95%	No	12	4	0.08
158	4,900	3,844	3,380	2,916	10.0	2	25	100%	No	12	4	0.08
176	4,800	3,755	3,297	2,839	10.0	1	25	100%	No	12	4	0.08
178	4,600	3,579	3,132	2,686	10.2	2	25	100%	No	12	4	0.07
182	4,900	3,844	3,380	2,916	10.0	4	25	100%	No	12	4	0.08
252												
532	4,000	3,052	2,642	2,232	10.0	2	25	62%	Yes	12	4	0.06
534	4,300	3,315	2,886	2,458	10.2	3	25	63%	Yes	12	4	0.07
614												
622	3,500	2,617	2,240	1,863	10.0	3	25	100%	No	12	4	0.05
652	4,900	3,844	3,380	2,916	10.0	3	25	80%	No	12	4	0.08
662	4,600	3,579	3,132	2,686	10.1	6	25	100%	No	12	4	0.07
672	4,400	3,403	2,968	2,533	10.0	5	25	100%	No	12	4	0.07
842	4,900	3,844	3,380	2,916	10.0	7	25	95%	No	12	4	0.08
1602	4,300	3,315	2,886	2,458	20.0	5	25	100%	No	12	4	0.07
1612	5,000	3,933	3,463	2,993	15.1	26	25	66%	Yes	12	4	0.08
1622	3,800	2,878	2,481	2,083	10.1	3	25	100%	No	12	4	0.06
1624	4,700	3,667	3,215	2,762	20.1	7	25	100%	No	12	4	0.07
1632	5,200	4,110	3,629	3,148	15.2	18	25	70%	Yes	12	4	0.08
1922	3,300	2,445	2,081	1,718	10.0	2	25	100%	No	12	4	0.05
1924												
1942												
1952												
1983	4,700	3,667	3,215	2,762	10.1	1	25	100%	No	12	4	0.07
2026												

***Table by Watearth, Inc. - December, 2011**

Notes:
1. Bioretention assumed to occupy 10% of Commercial, High-Density, Schools, Parks, and Urban Farm areas per input from StoneBridge/SWA.
2. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in, which is the same as the design WSEL for Bioretention.
3. Surface area is at "top of bank" not design WSEL.
4. % of Subcatch based on surface area of LID/water quality facilities as compared to total area in each drainage shed.
5. Top Width assumptions provided for informational purposes only - not used in model as modeled as Bioretention.
6. Square facilities assumed in estimating surface areas at bottom and water quality storage level.
7. Avg. Area parameter used in SWMM5.0.022 model to represent facility as average of design WSEL and bottom of facility.

Due to the bioretention being conceptual in nature at this point, it was assumed to cover 10-percent of each drainage shed served by bioretention (listed in **Table 6-8 and 6-8B** and illustrated conceptually in **Figure 4**). The Hydro Modification Facilities are primarily located in Open Space drainage areas and assumed to cover 20% of each drainage shed that includes these facilities. One exception is drainage shed 252, which was held to 10% due to size constraints. In Open Space drainage areas also including bioretention, the total was held at 20%. **Tables 6-8A and 6-8B** summarizes Bioretention and Hydro-Modification Facilities details and geometry, which was assumed from input by the entire project team.

The Urban Farm includes Hydro-Modification Facilities, Open Space Stormwater Planters, and Bioretention. While extreme event ponding and detention storage is planned within this area, these features were included in the hydraulic/XPSWMM modeling and not in the LID/hydrologic modeling.

Figures 6-2 to 6-6 illustrate the LID configurations included in the LID model. The typical LID components include: surface storage, growing media (soil), and storage layer (drain rock and under drain – if used). For a summary of dimensions associated with each type of LID control, refer to **Tables 6-5, 6-7 and 6-8**.

The LID modeling assumes that the stormwater runoff is effectively conveyed to the various LID facilities. As such, the system connection and flow path should be verified during the final Project design and lot grading to maintain the intended functionality of the system.

The majority of the LID facilities are currently planned for the public ROW and open spaces. Even so, separation from building foundations is also an important consideration, although it is not explicitly addressed in the modeling. For the final design of the Project, Wood Rodgers recommends that separation distances between building foundations and the LID facilities be a minimum of the largest of those specified in the International Building Code (IBC) or the City requirements in effect at the time of construction. Note that current City criteria require Flow-Through Planters for LID facilities within 10-feet of building foundations. Disconnected downspouts and impervious cover should also meet this separation distance and/or provide positive drainage away from building foundations, even if discharging into vegetation rather than LID facilities.

Additional consideration should be given to the placement of facilities in relation to utility trenches to avoid providing an underground conveyance pathway for runoff. It is also critical for the growing media and drain rock layer with associated under drain features to provide positive drainage to a level below the pavement and/or other structural features in conjunction with recommendations by the geotechnical consultant for this project. Finally, appropriate construction sequencing and proper construction techniques are key to reducing the risk of early sedimentation or construction-related failure.

As illustrated in the figures, 18-inches of amended growing media are proposed for all LID facilities except the Open Space Stormwater Planters. As discussed in Section 5 of this report, a conservative hydraulic conductivity of 0.43 in/hr and other hydraulic parameters associated with Sandy Loam Soils texture are used for the modeling. Prior to final selection of the growing media, the LID criteria and recommended growing media parameters under development by the Partnership will be considered.

While the actual growing media to support the proposed plant palette identified in **Appendix A1** has not been developed, Wood Rodgers recommends minimum infiltration rates of 0.5 in/hr to 2.0 in/hr. For those LID facilities located within the ROW and expected to have foot traffic resulting in compaction, initial infiltration rates of 2.0 in/hr or higher using mixtures containing gravelly sands may perform better over the long-term.

Based on recommendations from the geotechnical consultant, physical parameters from several soil samples (Aspen 2, Aspen 3, and Aspen 4) were averaged to obtain likely Green-Ampt parameters for the “native”/underlying soils anticipated after placement of fill throughout the Project. Even though one sample yielded significantly higher hydraulic conductivity rates, this outlier was not used in estimating the average Green-Ampt parameters.

The hydraulic parameters associated with the “native” soil and amended growing media and required for the Green-Ampt infiltration method used in this project are listed in **Table 6-9**. As discussed previously, the “native” soil parameters are based on the results of the geotechnical testing performed for this project. Because the growing media has not been developed at the time of this analysis, values for the growing media are based on Sandy Loam Soil classification values from Rawls, Brakensiek, and Miller (1983). Note that the system performance should be reevaluated if a different hydraulic conductivity is achieved with the growing media ultimately used for this project.

TABLE 6-9: ASPEN I HYDRAULIC PARAMETERS

Layer Type	Hydraulic Conductivity (in/hr)	Suction Head (in)	Initial Deficit (Fraction)	Porosity (Fraction)	Field Capacity (Fraction)	Wilting Point (Fraction)	Conductivity Slope	Void Ratio		Underdrain		
								Connected Underdrain	Disconnected Underdrain	Drain Coeff. (in/hr)	Drain Exponent	Offset (in)
Native Soil	0.0638	8.66	0.241	---	---	---	---	---	---	---	---	---
Growing Media	0.43	4.33	---	0.453	0.19	0.085	10.0	---	---	---	---	---
Drain Rock[13]	0.0638	---	---	---	---	---	---	0.50	0.75	0.5	0.5	0

***Table by Watearth, Inc. - March, 2011**

Notes:

1. Native soil based on results of geotechnical sampling and testing and parameters recommendations for fill throughout Aspen 1 by Treadwell-Rollo.
2. Growing media parameters based on achieving minimum hydraulic conductivity of 0.5 in/hr in 18-inch layer of growing media based on current plant palette proposed by SWA Group.
3. Growing media parameters conservatively use 0.43 in/hr for hydraulic conductivity and parameters associated with sandy loam from standard tables.
4. Infiltration calculations for runoff and LID facilities based on Green & Ampt method.
5. Native soil also used underneath LID facilities growing media, storage, and drain rock layers.
6. Beginning of simulation started at wilting point as limited irrigation planned for vegetation in LID facilities and dry conditions anticipated at start of rainy season.
7. Growing Media used for Infiltration Planters, Bioretention, Vegetated Median Swales, and Hydromodification Management Facilities.
8. Growing Media not used for Open Space Stormwater Planters. Native underlying soil values used within small slices (0.001 in) of Soil and Storage layers.
9. Drain rock void ratio increased in disconnected underdrain scenario in Infiltration Planters (8') to simulate additional storage in underdrain.
10. Conductivity slope assumed from standard tables in SWMM5.0.022 User's Manual based on sandy loam growing media.
11. Drain exponent and coefficients assumed based on standard values, but may vary with final design. Coefficient matches assumed infiltration rate of growing media.
12. All underdrains assumed at bottom of LID facilities; however, elevating underdrains may improve results in final design.
13. Hydraulic conductivity of drain rock refers to hydraulic conductivity of underlying soil, which is a change in computation for SWMM5.0.022.

Due to soil amendments and growing practices, soils within the Urban Farm are anticipated to be of a higher classification with associated increased hydraulic conductivity and infiltration rates than the typical “native” soil throughout the Project. Additionally, raised gardening beds within the community garden are expected to be constructed with soils that have higher infiltration values. While these soil parameters may be reflected in the LID model in future revisions, the soils are currently simulated with the same “native” soil Green-Ampt parameters as the rest of the Project.

Due to the low hydraulic conductivity rates of the underlying Type D soils, a drain rock layer and associated under drain is used for most of the LID facilities. For the 8-foot Infiltration Planters (Residential), the under drain does not connect into the storm drain system. All 8-foot Infiltration Planters (Non-Residential) have unconnected under drains, except for 8-foot Non-Residential Infiltration Planters in drainage sheds: 142, 632, 660, 670, 840, 1620, and 1630.

For the remaining LID facilities, the under drain connects into the storm drain system. An exception is the Open Space Stormwater Planters, which are micro-features constructed on-slope along the contour lines proceeding downward into the Open Space areas from the adjacent roadways into the development. Neither amended soil nor drain rock is used with these facilities.

A hydraulic conductivity of 10 in/hr is assigned to the drain rock layer. The under drain is located at the bottom of the drain rock layer in all of the LID facilities. Note that the system performance should be re-evaluated if a different drain rock and/or under drain configuration is used in the final design.

The models developed for this project are included on the attached Cdrom found in **Appendix B**. A total of six models are included (four design storm and two continuous simulation) and the names are listed in **Table 6-6**. As discussed, the results of this analysis and the design storm analysis described below were incorporated into the hydraulic and flood control analyses performed by Wood Rodgers.

Table 6-10 presents the water balance for the system over the analysis period. For the LID Continuous Simulation model, total surface runoff is 32.90-inches out of a total precipitation depth of 200.25-inches. Infiltration during the period of simulation is 134.09-inches and evapo-transpiration is 34.69-inches. Even with the extremely low underlying hydraulic conductivity values of the native soil, the infiltration is achieved through use of the growing media and drain rock layer.

TABLE 6-10: ASPEN I CONTINUOUS SIMULATION WATER BALANCE OUTPUT

	Analysis Period Results		Difference	
System Results	**No LID Continuous Simulation**	**LID Continuous Simulation**	**Amount**	**%**
Precipitation (in)	200.250	200.250	0.000	0%
Surface Runoff (in)	73.420	32.902	-40.518	-55%
Infiltration (in)	113.603	134.085	20.482	18%
Evaporation (in)	13.712	34.685	20.973	153%
Surface Runoff (ac-ft)	1,428.6	674.9	-754	-53%
Final Surface Storage (in)	0.000	0.266	0.266	---
Continuity Error (%)	(0.242)	(0.362)	-0.120	---

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Water balance output is for entire Aspen 1 LID system and full continuous simulation run.
2. Initial saturation of 0% (wilting point) used for growing media at start of continuous simulation run.
3. Analysis performed in SWMM5.0.022.

As indicated in **Table 6-11**, 507 rainfall events greater than 0.01-inches occurred during this time-period. An event separation time of 6 hours was used in the statistical analysis. Use of a different separation time may result in changes in event classification and number of rainfall and runoff events. There are 198 runoff events during the time-period for the LID Continuous Simulation scenario, whereas a developed system without LID generates 456 runoff events. **Figures 6-7 and 6-8** illustrate the magnitude and distribution of the historical rainfall events and peak discharge, respectively. There is a demonstrable reduction in peak discharge throughout the period of analysis for the LID system compared to developed conditions without LID. Additionally, **Figure 6-8** illustrates the 57-percent reduction in number of runoff events with the LID system in-place.

TABLE 6-11: ASPEN I NUMBER OF RUNOFF EVENTS FROM CONTINUOUS SIMULATION ANALYSIS

Run	Number Runoff Events
No LID Continuous Simulation	456
LID Continuous Simulation	198

***Table by Watearth, Inc. - December, 2011**

Note: 507 precipitation events > 0.01 in.

As indicated in **Table 6-12**, annual runoff reduction varies from year-to-year depending on rainfall, antecedent moisture conditions, and time between rainfall events. The average reduction in annual runoff volume is 49% for the LID system (LID Continuous Simulation model) as compared to the developed conditions without LID simulated in the No LID Continuous Simulation model.

TABLE 6-12: ASPEN I - COMPARISON OF ANNUAL RUNOFF VOLUMES FROM CONTINUOUS SIMULATION

Year	Runoff (cu. ft.)		
	No LID Continuous Simulation	**LID Continuous Simulation**	**Reduction**
1980	4,722,349	1,899,322	-60%
1981	46,622,620	19,537,162	-58%
1982	113,443,632	69,912,952	-38%
1983	123,659,832	68,347,368	-45%
1984	30,683,828	8,970,061	-71%
1985	40,413,120	18,759,684	-54%
1986	83,209,240	55,853,072	-33%
1987	51,001,136	19,352,146	-62%
1988	32,059,962	12,313,758	-62%
1989	41,955,164	15,197,323	-64%
Total	567,770,883	290,142,848	-49%
Total (ac-ft)	13,034.23	6,660.76	

***Table by Watearth, Inc. - December, 2011**

Notes:

1. 1980 rainfall starts on 10/13/1980 and 1990 ends on 6/1/1990.
2. Results based on continuous simulation analysis from 1980 through 1990 and statistical analysis for calendar years. For example, No LID Continuous Simulation runoff starts on 10/13/1980 and LID Continuous Simulation runoff starts on 11/22/1980.
3. Rainfall data provided by City of Sacramento.
4. SWMM5.0.022 used for analysis.

HYDRO MODIFICATION

As indicated in the *Sacramento Stormwater Quality Partnership Hydro-modification Management Plan* (HMP) submitted on January 28, 2011, the Project is located within an area required to meet future hydro modification management requirements. While we understand that the City's Hydro-Modification Management requirements are not in effect at the time of this submittal, the extensive LID and Hydro-Modification system used in the Project will provide significant hydro-modification management benefits for the project. Furthermore, runoff from the Project terminates into a retention basin, which retains the entire annual volume of runoff and 100-year design storm event. Flows leave this basin through infiltration and evaporation and additional details are provided under the Retention section of this report.

While all flows will be retained on-site in a retention basin, flow duration exceedance curve comparisons for discharge leaving the Project for the LID Continuous Simulation and No LID Continuous Simulation analysis are shown in **Figure 6-9**. **Figure 6-8A** illustrates maximum annual peak flows from the Project under developed conditions with and without LID, respectively. All maximum annual peak flows are lower under the proposed LID scenario. **Figure 6-10** illustrates discharge exceedance frequency curve comparisons for the model scenarios, again representing flows leaving the Project. As illustrated in these curves, flow durations with the LID system are higher and closer to undeveloped conditions than those without the LID system. Discharges from the LID Continuous Simulation model are also generally and consistently lower than those from the No LID Continuous Simulation model.

There are 198 events that produce runoff for the LID Continuous Simulation analysis and 456 events that produce runoff for the system without LID (No LID Continuous Simulation Analysis). The exceedance frequency curves are plotted on a log-scale and are related to the historical period of rainfall data rather than actual design storm events. While no specific LID requirements are in effect at this time, these figures are provided for convenience.

To further address typical HMP items, several historical rainfall events approximating 25% of the 2-year, 5-year, and 10-year synthetic events were culled from the model. These events were selected as they generally match the range of recurrence interval events requiring flow duration control and peak discharge control from the Partnership's HMP, which requires that events ranging from 25 percent of the 2-year up to the 10-year meet hydro modification management requirements.

Table 6-13 lists runoff reduction for specific historical events that approximate these design storm events, while **Table 6-14** indicates peak flows and associated reductions from these historical events. These tables also list the prior two rainfall events, including magnitude and duration, as well as the time lapse between the events to provide a comparison of performance with various antecedent moisture conditions.

Average reduction in event-based runoff volumes for the range of events reported is approximately 50% for the LID Continuous Simulation as compared to the No LID Continuous Simulation scenario. The average reduction in event-based runoff volumes for events approximately equal to 25% of the 2-year is 91%. Reductions approach 30 to 40% for those larger events with greater lapsed time since a prior event with high rainfall values (i.e., dryer antecedent moisture conditions), even for the 10-year event.

Average reduction in event-based peak flows for the range of events reported is approximately 53% for the LID Continuous Simulation run as compared to the No LID Continuous Simulation run. The average reduction for events approximately equal to 25% of the 2-year is 93%. Reductions approach 30 to 50% or higher for those events with greater lapsed time since a prior event with high rainfall values (i.e., dryer antecedent moisture conditions), even for some historical 10-year events. Note that the February 18, 1986 event is nested within the larger 7-day, 9.5-inch event (approximately 100-year magnitude).

SWMM 5.0.022
The SWMM 5.0.022 model developed for the continuous simulation analysis described above was revised for the 10-year and 100-year design storm event analyses. The 6-hour and 24-hour synthetic storm events were analyzed based on input from City staff for a total of four design storm events. Rainfall data for the project site was obtained by Wood Rodgers from the SacCalc model and input into the SWMM 5.0.022 model by Watearth as cumulative rainfall values for the various events.

For all of these events, the Hydro-Modification Facilities and Vegetated Median Swales were removed from the SWMM 5.0.022 hydrologic/LID models and incorporated into the XPSWMM models. Because of the hydraulic interface with the storm drain system, this allowed dynamic hydraulic evaluation for these events used to size the storm drain and flood control systems. Additional information on the hydraulic analysis performed by Wood Rodgers is in the following section.

Within the SWMM 5.0.022 model, adjustments were made to the growing media saturation to reflect typical winter rainfall events that may have antecedent moisture conditions. These adjustments were made to the Infiltration Planters (8-foot Residential, 8-foot Non-Residential, and 14-foot) and Bioretention facilities. Because amended soil/growing media is not planned in the Open Space Stormwater Planters, the adjustments do not apply for those facilities.

Growing media saturation was evaluated just prior to three historical rainfall events similar to the 10-year design storm and one historical event similar to the 100-year event contained in the continuous simulation model. These rainfall events are consistent with those described previously. From the detailed LID reporting results, several Infiltration Planters were evaluated. **Table 6-15** lists typical growing media saturation values. A value of 100% equates to the growing media porosity of 0.453, while a value of zero-percent equates to the wilting point of 0.085. Although this analysis was performed for the initial report submittal and is not updated for the revised draft, similar results are anticipated with the current model.

As indicated in **Table 6-6**, an initial saturation value of 50% is used for the 10-year design storm events as requested by City staff. This value is greater than the average historical 10-year event growing media saturation from the LID Continuous Simulation model described above and greater than the approximately 30% saturation found 72 hours into a 24-hour design 10-year storm event. For the 100-year event, a value of 100-percent saturation was used as requested by City staff (see **Table 6-6**). This represents conservative conditions at the beginning of the 100-year design storm events. As shown in **Table 6-15**, the average historical 100-year event growing media saturation is 69%for the scenario described above for the 8-foot Residential Infiltration Planters, which are the most extensively used LID facility, an average growing media saturation of 70% was noted just prior to the 100-year historical event contained in the LID Continuous Simulation model.

Bioretention was included as a conceptual LID tool in the drainage sheds and it is used in, the ultimate performance similar to the Infiltration Planters. Bioretention was assumed and the same growing media saturation values were used in the design storm models.

Water budget results and peak flows from the entire Project system for the four design storm events are presented in **Table 6-16**. As expected, evaporation is minimal during the design storm events. For the 10-year events, infiltration dominates the hydrologic processes of the LID facilities. For the 100-year events, infiltration and runoff are roughly equivalent. Due to the high initial moisture content (100%) in the LID growing media, the total volume or depth of runoff shown in the water balance exceeds the depth of rainfall by over 0.4-inches for both 100-year events. This adds approximately 19% additional volume in the 100-year, 6-hour event and 11% in the 100-year, 24-hour event.

TABLE 6-16: ASPEN I LID FACILITIES DESIGN STORM EVENTS WATER BUDGET OUTPUT

System Results	10-yr Design Storm		100-yr Design Storm	
	6-hour	24-hour	6-hour	24-hour
Precipitation (in)	1.651	2.983	2.502	4.252
Surface Runoff (in)	0.749	1.403	1.775	2.775
Infiltration (in)	1.012	1.659	1.141	1.871
Evaporation (in)	0.061	0.058	0.063	0.059
Surface Runoff (ac-ft)	14.57	27.30	34.54	54.00
Final Surface Storage	0.152	0.185	0.167	0.187
Continuity Error (%)	(0.403)	(0.213)	(0.412)	(0.206)

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Based on 50% initial saturation for growing media in 10-year events.
2. Based on 100% initial saturation for growing media in 100-year events.
3. Analyzed in SWMM5.0.022.

Runoff hydrographs for the four design storm events depicting the discharge from the Project are illustrated in **Figure 6-11**. Due to the large number of LID facilities contained in the Project drainage system, it is not practical to report results for each feature in each drainage shed. For review purposes, detailed reporting for individual LID facility types in each shed can be generated by specifying an output file location in the LID editor for each drainage shed.

For illustration purposes, **Figures 6-12 to 6-14** provide a graphical representation of the performance of 8-foot Residential Infiltration Planters within drainage shed 204. Surface runoff from these planters generally follows the precipitation patterns for the 6-hour and 24-hour design storm events.

The surface storage acts as a mini-detention reservoir and empties from the maximum level within just over 12 hours after the 6-hour events The drawdown in the 10- and 100-year, 24-hour events is approximately 12 hours after the end of the 24-hour event (i.e., the surface layer empties at approximately hour 36). The storage layer (drain rock) also acts as a mini-detention reservoir with the drain time lagging behind the surface storage because all outflow is by infiltration into the native soil. For those facilities with under drains connected to the storm drain system, the storage layer drains more quickly.

Because the project is currently at the Master Planning phase and to maintain a consistent layout across Aspen 1, some individual LID facilities within particular drainage sheds may not be fully utilized in either the continuous simulation or the design storm events (i.e., the facilities do not fill completely). Significant changes to system design and layout during the detailed design phase should be reevaluated to confirm system performance. In particular, use of LID controls other than Bioretention on the commercial, high-density, schools, and parks areas should be evaluated to confirm similar hydrologic performance.

The SWMM 5.0.022 models developed for this project are included on the Cdrom as **Appendix B**. The names of the design storm models are included in **Table 6-6**.

XPSWMM

As the stormwater flows overland and accumulates it flows through pipes and channels, which are hydraulic features. These facilities, such as the median storage areas, have variable outflow characteristics which are best modeled using a network program such as XPSWMM that accounts for dynamic tailwater and variable inflow in a hydraulically continuous/connected simulation for shorter duration design storm events.

The hydraulic analysis for typical onsite facilities was accomplished primarily using XPSWMM. While some of the LID and hydro-modification facilities have hydraulic overland conveyance components, their infiltrative characteristics were best evaluated using EPA SWMM 5.0.022 under the hydrologic portion of the analysis. Therefore, the output from the LID modeling performed by Watearth was used as input hydrographs for XPSWMM, which was then used to model and size the dynamic storage and conveyance facilities shown on **Figure 3B**.

The analysis shows that the reduction in hydrologic runoff for the 10-year event, coupled with the aboveground storage available within the project area, allows for significant 10-year peak flow reduction along the entire trunk corridors, resulting in reduced pipe sizes onsite depicted on **Figure 3A**. The 10-year analysis is contained within the pipe system, after it passes through the median storage, with HGL's underground as required under current City criteria. Allowing for the use of LID type facilities does require that gutter flow is allowed to convey small amounts of runoff to reach median storage before entering pipe systems. Such a configuration does not impede traffic flow in these areas during the 10-year event as these flows are contained within the gutter portion of the roadway prism. Detailed calculations of gutter flow conditions can be provided upon request.

Overland conveyance during the 100-year analysis was defined along Rock Creek Parkway and Aspen Parkway, to allow overflow from each segment of median storage to the next while maintaining traffic flow capabilities in the roadway segments parallel to the medians. Overland conveyance across Rock Creek Parkway was allowed during the 100-year to overland release in the downstream-most areas immediately west of South Watt Avenue, as all overflow from the project is drained under South Watt Avenue.

All detailed modeling of the onsite storm drains and overflow paths are contained within the digital modeling files found in **Appendix B**. The final results from the XPSWMM Model are summarized on **Figure 14**.

After initial review comments were provided by the Department of Utilities staff from its review of the XPSWMM modeling, and the initial drainage study, Wood Rodgers has included a more in-depth summary and assessment of the hydraulic modeling results using XPSWMM. **Figure 15** provides identification of where street flooding occurs during the 100-year design event, as well as identifies above ground maximum 100-year storage elevations, pad elevations and overland release points. The maximum conditions depicted on **Figure 15** clearly shows the maximum onsite impacts of the 100-year event as well as a logical overflow plan for releasing higher flows offsite without inundating proposed development areas. There are several steeper areas within the site where overland releases re-enter the storm drain and onsite storage system. As such, overland flow may appear somewhat "broken" under the proposed design, however, the capacity of the system as a whole provides flood protection that meets or exceeds the City's requirements. The sensitivity of keeping the 10-year design flow underground afforded some "additional" capacity during the 100-year storm that may not be present in systems with flatter grades, using standard pipe size increments.

Wood Rodgers summarized the travel of storm volume through a portion of the onsite system to provide a detailed diagnosis of the storm routing and losses occurring at a micro-level in both EPA SWMM and XPSWMM. Wood Rodgers traced the volume of initial rain input as it passes into the soil and releases overland in EPA SWMM (hydrology) as runoff, and then is input to XPSWMM and enters the median storage and overflows and drains into the pipe system. Four sheds were analyzed to document each step of volume modification, and they are summarized in a spreadsheet in **Appendix B** under the "Volume Tracking" subdirectory. **Figure 16** is a graphical representation of how the cumulative EPA SWMM losses and runoff add up to the rain volume, and how the XPSWMM modeling translates the EPA SWMM runoff through the hydraulically modeled infrastructure without loss of volume.

At the request of the City, Wood Rodgers also checked the maximum surface velocity and depth conditions to determine if there are any potentially hazardous conditions where flowing runoff could cause humans to lose footing and get injured. The product of the maximum velocity (feet per second) and the maximum depth (feet) was checked, and at no point in the system is this product more than 3.0, which indicates fairly low-risk surface flooding conditions throughout the proposed development. The maximum velocity in the pipes was also checked during the 10-year design event and the velocities all exceed 2-feet per second to maintain flushing action in the network.

It is important to note that the facilities proposed to convey peak runoff under South Watt Avenue account for a very low tailwater condition downstream, allowing for considerably more head differential to build up through the South Watt Avenue crossing, affecting the minimum size required to convey the peak flow. It is also important to note that the entire Project site has a secondary overland release, as shown on **Figure 16**, through an existing conveyor tunnel which will remain as a bike path connection under South Watt Avenue at elevation 22.1-feet.

7. OFFSITE RETENTION HYDROLOGY AND HYDRAULICS

The offsite retention basin(s) must be sufficient to handle both the short-term peak storm flow and volume influences, as well the long-term volume from the accumulation of annual rainfall. To achieve meeting this requirement the offsite retention analysis was developed using the EPA SWMM 5.0.022 software, modeling with long-term applied (historical) rainfall provided by the City. With the approach of modeling long-term rainfall and volume accumulation within the retention basin sites we are also able to account for the long-term runoff volume effects of LID onsite (Project) enhancements, modeled by Watearth. The same method of rainfall and runoff derivation utilized for the continuous simulation assessment for water quality (see Sections 5 and 6) was utilized for the retention basins analysis.

The rainfall time period of July 1, 1980 to June 30, 1990, was simulated within EPA SWMM 5.0.022 with applied rain onto all contributing areas draining into the proposed retention basins.

Wood Rodgers attended a meeting with the City's Department of Utilities, Sacramento County (County) Department of Water Resources staff, and the project proponent regarding this project on June 10, 2010. At this meeting the general concepts for drainage were discussed, including the project's intent to direct runoff from the Project site to the east and into a newly constructed retention basin on privately owned property within the County. The intent is that the proposed retention basin itself will remain privately owned, operated and maintained after the Project is completed.

It is Wood Rodgers' understanding that the City staff has decided to defer the primary responsibility of the design review for the proposed downstream retention basin design to the County, citing it to be under the County's authority. Therefore, in order to satisfy the City's project requirements, the County's Department of Water Resources is being provided the opportunity to review and comment upon the proposed drainage of lands within the County's jurisdiction, including land from the City draining into the County. It is Wood Rodgers' understanding that the City will require some written confirmation from the County in order for the project to proceed.

Figure 13 depicts the Aspen 2, 3 and Mayhew property to the east of South Watt Avenue that was evaluated under the retention basin analysis. The retention corridor for collecting/conveying Project runoff is generally kept separated by proposed grading, allowing some areas to drain into the channel where necessary. Effectively this also isolates retention of direct rainfall accumulation for three distinct basins; north and south of the corridor within Aspen 2 (between South Watt Avenue and Hedge Avenue), and south of the corridor within Aspen 3 (between Hedge Avenue and Mayhew Road).

TOPOGRAPHY

The terrain definitions of these retention areas were derived from County's 2003 LiDAR topography and augmented by future (proposed) grading of the Project retention corridor including all proposed earthwork/excavation. The proposed terrain is shown on **Figure 13**. The geometry of the lowest elevations and increasing storage provide the model with changing infiltrative "bottom area", as well as changing evaporative surface area.

PROJECT DESCRIPTION

The proposed location and development layout of the Project is shown on **Figure 1**. The proposed facilities layout for this site contains numerous on-site runoff reduction measures, and LID and hydro-modification inspired facilities, including front-yard infiltrative planters, large-sized median swale storage/treatment along the main roadways, as well as peripheral storage areas as shown on **Figure 4**.

The development of the site will include significant re-grading (earthwork) to raise large portions of the property to allow for gradual slopes and access from surrounding (elevated) roadways, and to facilitate drainage. The rainfall/runoff will be directed through lot-level LID facilities then overflow through street/gutter systems into median swale storage before being picked up by a conveyance pipe system and conveyed under South Watt Avenue.

ESTABLISHMENT OF PRE-PROJECT FLOODING CONDITIONS

While this project is promoting extensive use of runoff reduction measures, there is no imperative reason to establish a pre-project conditions model with which to compare post-project performance since no runoff currently leaves the site, and no runoff is intended to leave the project area after the project is constructed, thus creating a net-zero effect. With a "self-contained" site there is no "offsite" impact to evaluate with respect to streams or natural waterways. The main imperative is to ensure that post-project drainage conditions keep all proposed and insurable residential/commercial/industrial facilities above the 100-year floodplain, in accordance with City standards, and that the retention facilities operate as designed (with no discharge). The site plan proposes a significant amount of imported fill material to help raise up the lower excavated areas and create higher more developable areas within the Project site. Only post-project evaluations are necessary to ensure that flooding is controlled and proposed structures are outside of the post-project floodplain influences, according to City standards.

RETENTION HYDROLOGY AND SOILS/INFILTRATION

A significant portion of the proposed project will have a significant depth of underlying soils that are imported and amended, rather than relying on in-situ conditions, especially where areas are being built up for development. Treadwell & Rollo provided a comprehensive estimate of the projected infiltrative conditions throughout the site, both west and east of South Watt Avenue, addressing onsite development areas as well as retention basin areas, and areas east of South Watt Avenue. The assessment from the geotechnical consultant can be provided upon request.

Significant soils information (composition/characteristics/compaction) was provided to the consultant Watearth regarding the composition of the proposed surface and subsurface conditions, in order to best represent the short-term and long-term infiltrative capacity of the soil within the Project site. Additional information was collected/selected by Watearth representing the design thickness and infiltrative capacity of to-be-constructed front-yard planters, relating to growing media and planting selection. The evapo-transpiration parameters were evaluated and have been generally agreed upon with the City of Sacramento Department of Utilities.

The lands east of South Watt Avenue were analyzed based upon review of recommended infiltration rates provided by Treadwell & Rollo. Wood Rodgers evaluated the depth of excavation of the channel and retention facility and cross correlated these horizontally and vertically with the geotechnical recommendations.

The proposed “design” infiltrative parameters were determined based on hydraulic conductivity recommendations provided by Treadwell & Rollo (see Section 9 of this report for more detailed discussion of Geotechnical data/analysis). Conservative saturated hydraulic conductivity values were provided to Wood Rodgers, and Watearth correlated these values with Green Ampt values for varying infiltration over long-term wetting and drying conditions, allowing for changing saturation soil levels as the basins are drying. The following Green Ampt parameters used in the model were combined from the Treadwell & Rollo recommendations and published capillary suction values from David R. Maidment’s “Hydrology: “Handbook of Hydrology”.

For the central corridor on Aspen 2 (containing the Aspen 1 Retention Corridor) the saturated hydraulic conductivity was selected as 0.10 with capillary suction at 8.60.

For the northern retention basin on Aspen 2 the saturated hydraulic conductivity was selected as 0.02 with capillary suction at 12.45.

For the southern retention basin on Aspen 2 the saturated hydraulic conductivity was selected as 0.02 with capillary suction at 12.45.

For the central corridor on Aspen 3 (containing the Aspen 1 Retention Corridor) the saturated hydraulic conductivity was selected as 0.02 with the capillary suction at 12.45.

For the southern retention basin on Aspen 3 the saturated hydraulic conductivity was selected as 0.02 with capillary suction at 12.45.

For all areas in Mayhew, including the Aspen 1 Retention Corridor/Basin and the Mayhew basin combined, the saturated hydraulic conductivity was selected as 0.10 with the capillary suction at 8.60.

ANTECEDENT CONDITIONS

As discussed under the soils and infiltration section above, the intent of Watearth was to model the site’s dynamic infiltrative capacity over the long-term to demonstrate how the subsurface system would be expected to respond during years of varying rainfall. The initial antecedent conditions were assumed at the onset of the long-term simulation to give the model a starting point, however, this starting point was not assumed to be representative of antecedent conditions for event modeling. Modeling the continuous historical period from 1980 to 1990 provided an in-depth assessment of the varying soil moisture content. Antecedent conditions for event modeling were developed with input from city staff, while considering the model output of the long-term simulation by identifying similar event storms within the long term record and quantifying their correlating soil moisture prior to each "event". Table 6-15 is provided to define the detailed estimates of soil moisture prior to large events as well as assessment of the site under long-term simulation conditions.

STORM ANALYSIS AND RAINFALL

Since the project drainage configuration is an integration of conveyance-governed and volume-governed design, the project configuration was extensively evaluated for both short-duration peak event storm and long-duration storm performance. The capacity of the system to prevent flooding under high intensity short-burst rainfall events, as well as long extended-volume rainfall periods, is critical to a successful design.

As part of our analysis, Wood Rodgers evaluated the hydraulic performance of the system under 10-year and 100-year design event conditions, for both 6-hour and 24-hour duration storms to ensure protection of structures from flood damage. The hydraulic (conveyance) performance of the system within the Project site was modeled using XPSWMM to gage the maximum height to which flowing water rises, as it flows through and exits eastward under Watt Avenue. All stormwater that is infiltrated on-site is not conveyed downstream and never enters the downstream retention system. The volumes of event rainfall, event excess (runoff to the regional retention basin), and event infiltration onsite for the 100-year 24-hour event for post-project conditions at one example subshed (224) were 1.9-acre-feet, 1.3-acre-feet and 0.6-acre-feet, respectively. Based on this one example shed, approximately 31% of the total volume is infiltrated into the soil.

The overall system performance during long-duration storm conditions was evaluated using historical rainfall data in hourly increments for the period of 1980 to 1990. This historically long period provided the basis of performing an extended (long-term) simulation, accounting for soil moisture storage and infiltration decay and recovery. Typically long-term simulations are performed where discharge is already occurring into a sensitive stream, establishing both the pre-development condition and the basis for assessing mitigation for post-development conditions. For the Project site there has been no recent historical discharge to a stream before the project and, more importantly, there is currently no proposed discharge to a stream after the project. Wood Rodgers did not perform any pre-project retention evaluation because the retention basin will never receive runoff from an undeveloped Project site. Since all the rainfall is either infiltrated or evaporated onsite currently, the redistribution of infiltration within the site was not considered a reportable impact.

While the system has been evaluated for very long and very short periods of rainfall, Wood Rodgers recognizes that the County often evaluates detention basins using the 100-year 10-day event. Wood Rodgers proposes that the rainfall history from 1980 to 1990 contains sufficient short duration and longer duration scenarios within it to evaluate the system sufficiently. According to the rainfall record provided by the City and the currently published rainfall depth/frequency for the County, there was a 10-day event during the period of February 11 to February 21, 1986 where 9.64-inches of rain fell. 9.6-inches of this rainfall event actually fell during an eight day period. Statistical tables represented in the published Sacramento County Drainage Manual show this event to be approximately a 40-year event for the 10-day duration and a 50-year event for a 5-day duration. Interpolation places the 8-day rainfall volume close to a 100-year event. The overall rainfall for the water year period was well above average at 29.75-inches. The 1982 to 1983 data also simulated a very wet year modeling a large amount of annual rainfall, 37.76-inches, which is over double the average annual rainfall for the County in this area (see Figure 4-1 of the City/County Drainage Manual). In Wood Rodgers' professional opinion these rainfall amounts and distributions sufficiently capture the operation of the basin during significantly high volume longer period rainfall, typical of the Sacramento region.

EVAPORATION

The evaporation of stored water can be critical in some areas where infiltration is limited. Wood Rodgers researched available evaporation/transpiration data. Most evaporation data varies in total inches of evaporated water for each month of the year. Climatology sources such as the California Climate Data Archive (CCDA) (a collaboration among Western Regional Climate Center, Scripps Institute of Oceanography and the California Energy Commission), provide site specific location data. Reduced winter evaporation is more likely to occur during wetter-than-normal seasons, rather than average conditions, therefore these published CCDA relative values should be more valid in evaluating peak conditions during wetter-than-normal seasons of rainfall.

The Folsom Dam measurement site provides a total annual average estimate of 66.18-inches of pan evaporation. The Aspen 2, 3, and Mayhew sites are located close to the Folsom Dam location. The adaptation of published pan evaporation data to more natural open water body evaporation requires a reduction factor be applied, as published with the data itself by the CCDA. The reason is that pan evaporation data is measured from an apparatus that is more efficiently evaporating standing water due to the exposure of the sides of the pan to heating from the sun. The following average monthly evaporative values for January through December were utilized in Wood Rodgers EPA SWMM retention basin modeling:

January	0.644 inches
February	1.330 inches
March	2.429 inches
April	3.647 inches
May	5.649 inches
June	6.937 inches
July	7.784 inches
August	6.951 inches
September	5.215 inches
October	3.423 inches
November	1.442 inches
December	0.875 inches
Total Annual Evaporation	46.3 inches (0.7 x 66.18 inches)

DESCRIPTION OF PROPOSED FACILITIES

Figure 13 depicts the proposed conveyance channel and retention basin layout relative to the surrounding contributing lands, as well an outline of the lands tributary to the proposed retention facility. Receiving runoff from the Project development through a set of culverts at the upstream end, the channel is proposed to be excavated from South Watt Avenue eastward underneath Hedge Avenue and Mayhew Road to the location of the retention basin north of Morrison Creek between Mayhew Road and Bradshaw Road.

The facility will hold all runoff onsite while the processes of infiltration and evaporation remove the water from the basin, to recuperate the aboveground storage required for handling subsequent storm surface runoff. For purposes of this study it is assumed that there will be insignificant horizontal seepage of storm runoff infiltrating on adjacent lands and “day-lighting” into the channel/retention system horizontally, i.e. only vertical infiltration will occur. This may need to be validated during design. As evidenced by the mapped terrain (see **Figure 13**) there are also isolated retention areas between South Watt Avenue and Bradshaw Road that will store all local rainfall precipitating directly over these isolated areas, without commingling with Project runoff. All of the individual retention areas were modeled using long term simulation runoff from the Project as input, as well as simultaneous long term rainfall and infiltration, as applicable. The separate areas will be maintained as isolated retention areas, to maximize the exposure of accumulated runoff to soil surfaces and to the sun’s energy for evaporation. There is no benefit to draining these isolated areas to a single (smaller) retention area. However, some areas adjacent to the proposed channel corridor were allowed to drain into the channel to avoid interior berming and forced separation. The lands allowed to drain into the retention system are shown on **Figure 17**.

From Wood Rodgers’ channel modeling of the Morrison Creek system under 100-year, 200-year and 500-year conditions, it is Wood Rodgers’ position that there will be no overflow from the Morrison Creek channel into the retention site(s), as channel bank conditions will be raised a minimum of 2-feet to prevent creek overflow and to preserve retention basin capacity by separating the systems from a hydraulic and structural standpoint.

The location of the proposed retention basin is close to the right bank of the Morrison Creek channel between Mayhew Road and Bradshaw Road. The retention basin will be excavated significantly deeper than the Morrison Creek channel invert. At this time in the process it is assumed that sufficient vertical and horizontal separation will be identified and maintained as part of the design process, ensuring the successful operation of the retention system and the creek system separately during the 100-year design event. All aspects related to seepage and stability will include the appropriate geotechnical analysis and will meet all current standards of care of all local, state, and federal agencies at the time of design.

HYDRAULIC ANALYSIS/RESULTS

The modeling necessary to evaluate the retention system was performed in two stages using the EPA SWMM 5.0.022 software, which can be downloaded for free from the internet. The upstream shed (Project) was separately modeled to focus on quantifying the relative benefits of adding LID measures to the development plan and reducing runoff accordingly. The “developed” site was modeled without LID measures in place, to establish a “base line” condition, from which to evaluate the positive impacts of LID construction. The final Project model, with LID measures in place, represents the developed conditions runoff that will reach Watt Avenue and continue eastward toward retention.

The areas downstream of Watt Avenue are represented in a separate EPA SWMM model that defines the storage pockets and conveyances represented by the proposed grading through the site as shown on **Figure 2**. The inflow to this "downstream" model is the rainfall over the site as well as the outflow from the Project model.

Wood Rodgers did develop an XPSWMM model representing the conveyance system onsite (through Project development) which defines in more detail the hydraulic grade lines of the pipe and median detention systems on site for sizing/design purposes. There is also a somewhat less accurate representation of flow routing through the Project site, in the EPA SWMM model established for evaluating LID facilities developed by Watearth. The XPSWMM model does not represent any hydrologic losses through infiltration or evaporation, but simply takes each individual sub-shed hydrograph from the EPA SWMM model at its appropriate location in the system. In this manner the flow hydrograph output from the EPA SWMM model and the XPSWMM model do not differ in volume contribution downstream, but only in the representation of timing and peak. **Figure 18** provides a comparison of the "outfall" at Watt Avenue from the two models development area models. Since the retention system east of Watt Avenue is heavily driven by storm volume Wood Rodgers' believes that the routing of flow through the developed portion of the project is reasonably represented by the overall output of the EPA SWMM model and does not require a long-term simulation to be run through the XPSWMM pipe system model.

In the model the retention basin system operated very well for the 10 years of long-term simulation data. With the injection of Project long-term runoff for the same period, the maximum accumulated peak water levels were well below the ultimate capacity of the above-ground storage. **Figure 17** depicts the resultant maximum conditions from the long-term simulation and retention analysis. The peak conditions occur consistent with the rainfall patterns, where the heaviest long-term rainfall occurred in February 1986.

The results indicate that the majority of the runoff is captured and infiltrated, with only a small percentage of the total runoff leaving the system via evaporation. The EPA SWMM software does not allow for separation of "losses", when both infiltration and evaporation are being utilized. Due to the storage not remaining aboveground for excessive periods of time, even during winter months where low evaporation is occurring, it is clear the majority of the accumulated runoff is moving into the soil.

The culvert connections to convey the water eastward under Hedge Avenue and Mayhew Road were initially sized using the long-term simulation rainfall analysis. While the retention basin system is intended to operate continuously for the long-term, Wood Rodgers also evaluated the operation of the basin and the connecting channel hydraulics during a short duration 100-year 24-hour event, to evaluate how the retention basin conveyance system would perform with higher more intense rainfall volumes, specifically to verify the Project hydraulic conditions.

The results of the 100-year 24-hour event show that the peak water surface elevation just downstream of South Watt Avenue was 16.86 feet, which does not provide any significant backwater condition for the facilities within the Project system. In this manner, Wood Rodgers verified tail water conditions were not a constraint for the stand-alone hydraulic calculations for the Project onsite, which was modeled using XPSWMM.

Overall, the storage aspect of the retention basin system to the east of South Watt Avenue operated well, allowing for total emptying of all basins each year of operation (for the 10 years of simulation), and providing enough storage to contain and prevent backwater flow constraints for the Project proposed project drainage facilities. The maximum water surface elevation just downstream of South Watt Avenue for the entire 10-year simulation was 17.44 feet, occurring in February 1986. This was more significant volume of inflow over a short period of time, with full drainage of all offsite areas occurring by the end of March 1986.

8. COMMON DRAINAGE SYSTEM

The Project includes a large lot tentative map subdividing the project into 24 large lots. Consistent with City policy the Drainage Master Plan identifies facilities consider to be Common Drainage (those facilities required to serve the 24 large lots). Common drainage facilities include the storm drain trunk pipe system serving the large lot parcels, the box culvert structure at South Watt Avenue and the retention basin east of South Watt Avenue. The Common Drainage facilities onsite are identified on **Figure 12** and the offsite are identified on **Figure 13**. A preliminary cost estimate of Common Drainage Facilities is presented in **Appendix C**.

9. GEOTECHNICAL REPORT

The geotechnical report prepared by Treadwell & Rollo is included as **Appendix D**. The geotechnical report included drilling borings, logging test pits, laboratory testing, collecting samples of compacted drying bed material, down-hole cased falling head testing, engineering analysis, and preparation of a report presenting the results of the investigation. The general approach was to classify both soils onsite of the Project, as well as the material that is expected to be used as imported borrow from the excavation of the offsite retention basin on Aspen 2, 3 and Mayhew sites. The report presents recommendations on the following:

- Subsurface conditions at the site (soil and groundwater)
- Geologic and seismic hazards
- Results of the field and laboratory testing
- Hydrological characteristics of material encountered including moisture content, (in-situ and saturated), dry density, porosity, saturated hydraulic conductivity, field capacity, wilting point, cation exchange potential, USDA soil texture classification.
- Static and seismic slope stability of proposed slopes
- Foundation type (s) for proposed structures and design criteria
- Estimates of total and differential settlement for ground and foundation
- Soil improvement techniques to reduce settlement
- Flexible, rigid, and permeable pavement design
- 2010 California Building Code (CBC) seismic design coefficients
- Earthwork and grading
- Construction considerations

Critical to the drainage report are the hydrological characteristics of the native soil that will be exposed at the bottoms of the proposed improvements, and of fill materials that will be generated from planned excavations for new improvements.

The above testing is to provide design parameters for the hydraulic conductivity, infiltration capacity, and suitability of the soils for the proposed LID/H-M facilities. The report concludes that the proposed LID/H-M improvements at the site are feasible. The material that is expected to be encountered onsite is expected to have a hydraulic conductivity rate of approximately 0.13-inches per hour. This value was determined as an average of several testing locations based on anticipated fill placement throughout the Project site that will underlie structures, roadways, and the LID/H-M facilities. A factor of safety of two was applied to the hydraulic conductivity for onsite soils resulting in hydraulic conductivity of 0.0638-inches per hour for design purposes. The material that is expected to be encountered at the offsite retention channel has an expected hydraulic conductivity rate of 0.15-inches per hour. A factor of safety of 1.5 was applied to the hydraulic conductivity for the offsite retention channel resulting in hydraulic conductivity of 0.1-inches per hour for design purposes. The material that is expected to be encountered at the offsite retention basin has an expected hydraulic conductivity rate of 0.48-inches per hour. A factor of safety of 4.8 was applied to the hydraulic conductivity for the offsite retention basin resulting in hydraulic conductivity of 0.1 inches per hour for design purposes.

Hydraulic parameters determined by the geotechnical testing related to the proposed under lying soils on-site and used in the Green & Ampt infiltration calculations as part of the hydrologic and LID analysis are detailed in Section 6. Section 6 also provides proposed Green & Ampt parameters used to simulate the hydraulic characteristics of the amended soil used as part of the LID facilities.

10. CONCLUSION

The analysis indicates that the proposed design of the onsite drainage system incorporating LID/H-M facilities, combined with the offsite retention basin provides runoff reduction, and the required retention to effectively convey and contain flows of all major storm events, while concurrently meeting goals of water quality enhancement and providing flood safety. Table 6-12 identifies that although annual runoff reduction varies from year-to-year depending on rainfall, antecedent moisture conditions, and time between rainfall events the average reduction in annual runoff volume is 49% with the LIDH-M facilities as compared to no LID/H-M facilities. The project will require modification of street standards to effectively incorporate LID/H-M facilities as identified in Figures 5 through 12.

Changes to the LID/H-M facilities layout or configuration should be evaluated to confirm the system functions as intended during design and construction. In particular, use of facilities other than Bioretention in the commercial, parks, schools, and high-density areas should be evaluated for similar hydrologic performance. Additional refinements to the system layout/configuration may also increase the effectiveness of the LID/H-M facilities and further reduce the storm drain requirements. If the growing media ultimately developed for this project achieves infiltration or hydraulic conductivity values different than those modeled and discussed in this report, it may be advantageous to simulate the effects of this mix on the overall system performance. Additional reductions in peak flows and runoff volumes may be further demonstrated by optimizing the Bioretention and Hydro-Modification Facilities.

TABLES

TABLE 5-1: ASPEN 1 WATER QUALITY VOLUME CALCULATIONS

Drainage Shed	Area (ac)	Impervious Cover (%)	% of Subcatch Occupied by Facilities	Provided Water Quality Volume (WQV) (ac-ft)							
				Bioretention	Hydro-Modification Facilities	Open Space Stormwater Planters	Infiltration Planters (8' Res.)	Infiltration Planters (8' Non-Res.)	Infiltration Planters (14')	Vegetated Median Swales	Total
100	1.80	2%	32.9%	0.00	0.26	0.13	0.00	0.00	0.00	0.00	0.39
110	1.36	93%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
112	1.37	2%	20.1%	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.18
122	1.83	70%	8.4%	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.05
123	1.12	66%	9.1%	0.00	0.00	0.00	0.02	0.01	0.00	0.03	0.03
126	4.20	50%	10.1%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
132	3.41	63%	12.4%	0.00	0.00	0.00	0.04	0.02	0.00	0.21	0.06
133	2.09	64%	14.2%	0.00	0.00	0.00	0.04	0.02	0.00	0.13	0.05
136	4.60	50%	10.2%	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
142	0.63	95%	22.7%	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06
152	0.73	73%	23.2%	0.00	0.00	0.00	0.00	0.01	0.00	0.10	0.01
153	1.43	53%	28.8%	0.00	0.00	0.00	0.00	0.05	0.00	0.22	0.05
156	3.33	66%	10.7%	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.08
158	2.25	70%	10.0%	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
164	0.56	60%	25.9%	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.02
166	0.96	73%	28.5%	0.00	0.00	0.00	0.00	0.05	0.00	0.10	0.05
172	1.02	54%	30.4%	0.00	0.00	0.00	0.00	0.03	0.00	0.18	0.03
173	1.06	60%	25.6%	0.00	0.00	0.00	0.00	0.05	0.00	0.11	0.05
174	2.98	65%	20.0%	0.00	0.00	0.00	0.07	0.04	0.00	0.27	0.11
176	1.10	70%	10.0%	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
178	2.08	70%	10.2%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
182	4.50	64%	10.0%	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08
204	4.70	65%	9.8%	0.00	0.00	0.00	0.09	0.00	0.00	0.19	0.09
206	4.95	65%	7.9%	0.00	0.00	0.00	0.09	0.00	0.00	0.12	0.09
224	5.37	66%	8.4%	0.00	0.00	0.00	0.10	0.00	0.00	0.15	0.10
226	5.33	67%	6.8%	0.00	0.00	0.00	0.10	0.00	0.00	0.07	0.10
244	3.01	66%	4.5%	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
246	3.17	64%	8.1%	0.00	0.00	0.00	0.08	0.00	0.00	0.06	0.08
252	1.48	2%	13.8%	0.00	0.08	0.02	0.00	0.00	0.00	0.00	0.10
420	1.85	68%	4.1%	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03
440	2.39	72%	7.7%	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.09
450	3.14	71%	7.0%	0.00	0.00	0.00	0.04	0.00	0.06	0.00	0.11
460	0.99	69%	7.0%	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03
474	3.96	66%	8.9%	0.00	0.00	0.00	0.09	0.00	0.00	0.09	0.09
476	2.43	66%	11.7%	0.00	0.00	0.00	0.06	0.00	0.00	0.11	0.06
480	2.01	73%	10.1%	0.00	0.00	0.00	0.04	0.00	0.06	0.00	0.10
490	2.67	71%	6.6%	0.00	0.00	0.00	0.03	0.00	0.06	0.00	0.09
500	0.77	72%	5.0%	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
510	0.40	85%	21.1%	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.04
520	0.49	84%	18.6%	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.05

Drainage Shed	Area (ac)	Impervious Cover (%)	% of Subcatch Occupied by Facilities	Provided Water Quality Volume (WQV) (ac-ft)							
				Bioretention	Hydro-Modification Facilities	Open Space Stormwater Planters	Infiltration Planters (8' Res.)	Infiltration Planters (8' Non-Res.)	Infiltration Planters (14')	Vegetated Median Swales	Total
530	2.50	72%	7.4%	0.00	0.00	0.00	0.03	0.02	0.03	0.00	0.08
532	1.83	82%	13.1%	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
534	2.90	71%	12.2%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
612	0.68	69%	4.3%	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
614	1.63	2%	25.5%	0.00	0.23	0.05	0.00	0.00	0.00	0.00	0.28
622	2.40	80%	10.0%	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
632	2.02	61%	5.1%	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
634	3.97	63%	10.2%	0.00	0.00	0.00	0.08	0.00	0.00	0.17	0.08
640	1.80	74%	7.5%	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08
652	3.37	80%	16.3%	0.08	0.00	0.00	0.00	0.03	0.08	0.00	0.19
660	1.01	95%	14.0%	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06
662	6.25	90%	10.1%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
670	0.82	95%	24.6%	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08
672	5.05	90%	10.0%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
710	0.72	95%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
720	0.54	95%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
732	0.68	95%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
810	0.39	95%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
830	0.85	95%	0.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
840	0.97	94%	7.6%	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03
842	7.87	80%	10.4%	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.08
850	0.79	78%	27.5%	0.00	0.00	0.01	0.00	0.00	0.13	0.00	0.14
860	0.90	67%	33.5%	0.00	0.00	0.02	0.00	0.00	0.14	0.00	0.16
1602	2.47	10%	20.0%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
1604	1.72	56%	14.3%	0.00	0.00	0.00	0.00	0.07	0.00	0.07	0.07
1612	19.74	6%	23.0%	0.08	0.81	0.19	0.00	0.00	0.00	0.00	1.07
1620	0.53	83%	18.7%	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.04
1622	2.60	53%	10.1%	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
1624	3.75	10%	20.1%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
1630	1.01	86%	18.0%	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.08
1632	14.18	5%	21.8%	0.08	0.56	0.07	0.00	0.00	0.00	0.00	0.72
1922	1.49	41%	10.2%	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05
1924	2.73	50%	25.1%	0.00	0.41	0.00	0.02	0.04	0.00	0.00	0.47
1932	2.91	68%	5.5%	0.00	0.00	0.00	0.04	0.00	0.03	0.00	0.07
1934	1.84	72%	7.1%	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.06
1942	2.87	38%	24.0%	0.00	0.44	0.00	0.02	0.03	0.00	0.00	0.49
1952	6.15	11%	25.0%	0.00	1.03	0.08	0.01	0.01	0.00	0.00	1.14
1960	1.87	70%	4.8%	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.04
1970	1.17	72%	3.4%	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02
1972	1.17	70%	7.8%	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.05
1983	1.07	5%	10.1%	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
1986	0.92	77%	9.2%	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03
1990	0.53	95%	22.2%	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
2002	2.02	71%	4.0%	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03

Drainage Shed	Area (ac)	Impervious Cover (%)	% of Subcatch Occupied by Facilities	Provided Water Quality Volume (WQV) (ac-ft)							
				Bioretention	Hydro-Modification Facilities	Open Space Stormwater Planters	Infiltration Planters (8' Res.)	Infiltration Planters (8' Non-Res.)	Infiltration Planters (14')	Vegetated Median Swales	Total
2004	2.48	70%	7.5%	0.00	0.00	0.00	0.05	0.00	0.03	0.00	0.08
2010	2.12	73%	8.9%	0.00	0.00	0.00	0.03	0.00	0.07	0.00	0.09
2022	3.67	71%	4.6%	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.08
2026	1.67	2%	25.9%	0.00	0.23	0.03	0.00	0.00	0.00	0.00	0.27
2030	1.23	72%	7.6%	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.04
2040	2.88	69%	4.1%	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
2050	3.24	67%	4.1%	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.05
TOTALS	**233.49**	54%	13.3%	1.49	4.24	0.62	1.72	0.96	1.02	2.48	10.04

***Table by Watearth, Inc. - November, 2011**

Notes:

1. Impervious cover values assigned by Wood Rodgers based on Table 5-2 of the *City and County of Sacramento Drainage Manual* . Drainage sheds also delineated by Wood Rodgers.
2. Impervious cover values are typical average values rather than exact values from a detailed final design, whereas % of subcatch of LID facilities are based on detailed layout of dimensions.
3. Volumes based on maximum ponding depth of 12 in within each LID facility and includes only surface storage.
4. Incorporating drain rock and growing media storage susbtantially increases total provided volume.
5. Refer to Tables 6-7A, 6-7B1, 6-7B2, 6-7B3, 6-7C, 6-8A, and 6-8B in the Grading and Drainage Study for Aspen 1 for additional geometric details used in volume calculations.
6. Most of the LID facilities are planned to have flat-bottoms. Although some portions of Vegetated Median Swales are sloped, drainage is via infiltratio
   via stand pipes rather than hydraulically connected culverts to downstream swale segments. As such, water quality calculations are volume-based rather than flow-based.
7. % of Subcatch based on surface area of LID/water quality facilities as compared to total area in each drainage shed.

TABLE 5-2: TARGET POLLUTANTS FOR SACRAMENTO AREA AND ASPEN 1 TREATMENT MEASURES

Targeted Pollutants	**Infiltration Planters**	**Hydro-Modification**	**Bioretention**	**Vegetated Swales**	**Open Space Swales**	**Retention[3]**	**Mulch**	**Plant Nutrient**	**Phyto-Remediation**	**Education BMPs**	**O&M Practices**
Total Suspended Solids (TSS) and Total Dissolved Solids (TDS)	●	●	●			●	●				
Metals (Copper, Lead, and Mercury)	●	●	●	●		●	●		●		
Coliforms/Pathogens	●	●	●			●					
Total Nitrogen[1]	●	●	●			●		●			
Biological Oxygen Demand (BOD)						●		●			
Total Organic Carbon (TOC)						●		●			
Organophosphate Pesticides (Chrysene[2], Diazinon[2], and Chlorpyrifos)						●			●	●	●

***Table by Watearth, Inc. - March, 2011**

Notes:

1. Nitrate removal can be enhanced with raised underdrain.
2. Phased out of use.
3. Retention basin retains 100% of stormwater runoff on-site. Retention-irrigation systems typically classified as 100% pollutant removal.

TABLE 6-1: ASPEN 1 DEPRESSION STORAGE AND TREE CANOPY INTERCEPTION VALUES

Drainage Shed	Total Area (ac)	Length of Local Streets (lf)	# Trees Local Streets	# Trees Rock Creek Parkway	# Trees Esplanade	Total Roadway Trees	Impervious Area Tree Canopy (ac)	Impervious Area Tree Canopy Interception (in)	Impervious Area Depression Storage (in)	Adjusted Impervious Area Dep. Stor (with Interception) (in)	Open Space Other Tree	# Lots	Avg. Trees/Lot	Residential Tree Count	Pervious Area Tree Count	Pervious Area Tree Canopy (ac)	Pervious Area Depression Storage (in)	Pervious Area Tree Canopy Interception (in)	Adjusted Pervious Area Dep. Stor (with Interception) (in)
100	1.8	0	0	0	0	0	0.00	0.047	0.06	0.060	89	0	4	0	89	0.64	0.25	0.047	0.267
110	1.36	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
112	1.37	0	0	0	0	0	0.00	0.047	0.06	0.060	74	0	4	0	74	0.53	0.25	0.047	0.269
122	1.83	240	8	74	0	82	0.59	0.047	0.06	0.082	0	4	4	16	16	0.12	0.25	0.047	0.260
123	1.12	265	9	17	0	26	0.19	0.047	0.06	0.072	0	5	4	18	18	0.13	0.25	0.047	0.266
126	4.2	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
132	3.41	795	27	56	0	83	0.60	0.047	0.06	0.073	0	16	4	62	62	0.45	0.25	0.047	0.267
133	2.09	350	12	39	0	51	0.37	0.047	0.06	0.073	0	13	4	50	50	0.36	0.25	0.047	0.272
136	4.6	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
142	0.63	950	32	0	0	32	0.23	0.047	0.06	0.078	0	0	4	0	0	0.00	0.25	0.047	0.250
152	0.73	350	12	22	0	33	0.24	0.047	0.06	0.081	0	0	4	0	0	0.00	0.25	0.047	0.250
153	1.43	0	0	69	0	69	0.50	0.047	0.06	0.091	0	0	4	0	0	0.00	0.25	0.047	0.250
156	3.33	0	0	0	0	0	0.00	0.047	0.06	0.060	17	0	4	0	17	0.12	0.25	0.047	0.255
158	2.25	565	19	0	0	19	0.14	0.047	0.06	0.064	0	0	4	0	0	0.00	0.25	0.047	0.250
164	0.56	0	0	0	19	19	0.14	0.047	0.06	0.079	0	0	4	0	0	0.00	0.25	0.047	0.250
166	0.96	405	14	0	19	33	0.24	0.047	0.06	0.076	0	0	4	0	0	0.00	0.25	0.047	0.250
172	1.02	0	0	49	0	49	0.36	0.047	0.06	0.090	0	0	4	0	0	0.00	0.25	0.047	0.250
173	1.06	300	10	41	0	51	0.37	0.047	0.06	0.087	0	0	4	0	0	0.00	0.25	0.047	0.250
174	2.98	600	20	48	0	68	0.49	0.047	0.06	0.072	0	16	4	62	62	0.45	0.25	0.047	0.270
176	1.1	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
178	2.08	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
182	4.5	0	0	0	0	0	0.00	0.047	0.06	0.060	5	0	4	0	5	0.04	0.25	0.047	0.251
204	4.7	1325	0	45	0	45	0.33	0.047	0.06	0.065	0	26	4	104	104	0.75	0.25	0.047	0.271
206	4.95	1415	0	45	0	45	0.33	0.047	0.06	0.065	0	28	4	110	110	0.79	0.25	0.047	0.272
224	5.37	1590	0	45	0	45	0.33	0.047	0.06	0.064	0	30	4	118	118	0.85	0.25	0.047	0.272
226	5.33	1645	0	47	0	47	0.34	0.047	0.06	0.064	0	26	4	104	104	0.75	0.25	0.047	0.270
244	3.01	780	0	30	0	30	0.22	0.047	0.06	0.065	0	15	4	58	58	0.42	0.25	0.047	0.269
246	3.17	500	0	87	0	87	0.63	0.047	0.06	0.074	0	8	4	30	30	0.22	0.25	0.047	0.259
252	1.48	0	0	0	0	0	0.00	0.047	0.06	0.060	147	0	4	0	147	1.17	0.25	0.047	0.288
420	1.85	680	23	0	0	23	0.16	0.047	0.06	0.066	0	11	4	44	44	0.32	0.25	0.047	0.275
440	2.39	960	32	0	0	32	0.23	0.047	0.06	0.066	0	12	4	46	46	0.33	0.25	0.047	0.273
450	3.14	1275	43	0	0	43	0.31	0.047	0.06	0.066	0	15	4	60	60	0.43	0.25	0.047	0.272
460	0.99	315	11	0	0	11	0.08	0.047	0.06	0.065	0	7	4	26	26	0.19	0.25	0.047	0.279
474	3.96	900	30	0	0	30	0.22	0.047	0.06	0.064	0	24	4	96	96	0.69	0.25	0.047	0.274
476	2.43	545	18	0	39	57	0.41	0.047	0.06	0.072	0	9	4	34	34	0.25	0.25	0.047	0.264
480	2.01	950	32	0	0	32	0.23	0.047	0.06	0.067	0	9	4	36	36	0.26	0.25	0.047	0.273
490	2.67	800	27	0	0	27	0.19	0.047	0.06	0.065	0	11	4	44	44	0.32	0.25	0.047	0.269
500	0.77	250	8	0	0	8	0.06	0.047	0.06	0.065	0	4	4	14	14	0.10	0.25	0.047	0.272
510	0.4	400	13	0	0	13	0.10	0.047	0.06	0.073	0	1	4	4	4	0.03	0.25	0.047	0.273
520	0.49	400	13	0	0	13	0.10	0.047	0.06	0.071	0	1	4	4	4	0.03	0.25	0.047	0.267
530	2.5	1200	40	0	0	40	0.29	0.047	0.06	0.068	0	14	4	54	54	0.39	0.25	0.047	0.276
532	1.83	18	1	0	0	1	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
534	2.9	475	16	0	0	16	0.11	0.047	0.06	0.063	128	0	4	0	128	0.85	0.25	0.047	0.297
612	0.68	220	7	0	0	7	0.05	0.047	0.06	0.065	0	4	4	16	16	0.12	0.25	0.047	0.276
614	1.63	0	0	0	0	0	0.00	0.047	0.06	0.060	44	0	4	0	44	0.32	0.25	0.047	0.259
622	2.4	0	0	0	0	0	0.00	0.047	0.06	0.060	30	0	4	0	30	0.21	0.25	0.047	0.271
632	2.02	1200	40	0	39	79	0.57	0.047	0.06	0.081	0	6	4	24	24	0.17	0.25	0.047	0.260
634	3.97	200	7	0	0	7	0.05	0.047	0.06	0.061	0	17	4	68	68	0.49	0.25	0.047	0.266
640	1.8	1000	33	0	0	33	0.24	0.047	0.06	0.068	0	8	4	30	30	0.22	0.25	0.047	0.271
652	3.37	0	0	0	0	0	0.00	0.047	0.06	0.060	15	0	4	0	15	0.11	0.25	0.047	0.257
660	1.01	1500	50	0	0	50	0.36	0.047	0.06	0.078	0	0	4	0	0	0.00	0.25	0.047	0.250
662	6.25	0	0	0	0	0	0.00	0.047	0.06	0.060	156	0	4	0	156	0.63	0.25	0.047	0.297
670	0.82	750	25	0	0	25	0.18	0.047	0.06	0.071	0	0	4	0	0	0.00	0.25	0.047	0.250
672	5.05	0	0	0	0	0	0.00	0.047	0.06	0.060	116	0	4	0	116	0.51	0.25	0.047	0.297
710	0.72	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
720	0.54	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
732	0.68	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
810	0.39	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250

Drainage Shed	Total Area (ac)	Length of Local Streets (lf)	# Trees Local Streets	# Trees Rock Creek Parkway	# Trees Esplanade	Total Roadway Trees	Impervious Area Tree Canopy (ac)	Impervious Area Tree Canopy Interception (in)	Impervious Area Depression Storage (in)	Adjusted Impervious Area Dep. Stor (with Interception) (in)	Open Space Other Tree	# Lots	Avg. Trees/Lot	Residential Tree Count	Pervious Area Tree Count	Pervious Area Tree Canopy (ac)	Pervious Area Depression Storage (in)	Pervious Area Tree Canopy Interception (in)	Adjusted Pervious Area Dep. Stor (with Interception) (in)
830	0.85	0	0	0	0	0	0.00	0.047	0.06	0.060	0	0	4	0	0	0.00	0.25	0.047	0.250
840	0.97	470	16	0	0	16	0.11	0.047	0.06	0.066	0	0	4	0	0	0.00	0.25	0.047	0.250
842	7.87	670	22	0	0	22	0.16	0.047	0.06	0.061	50	0	4	0	50	0.36	0.25	0.047	0.261
850	0.79	850	28	0	0	28	0.20	0.047	0.06	0.076	6	0	4	0	6	0.04	0.25	0.047	0.262
860	0.9	770	26	0	0	26	0.19	0.047	0.06	0.074	11	0	4	0	11	0.08	0.25	0.047	0.262
1602	2.47	0	0	0	0	0	0.00	0.047	0.06	0.060	27	0	4	0	27	0.20	0.25	0.047	0.254
1604	1.72	0	0	0	39	39	0.28	0.047	0.06	0.073	0	0	4	0	0	0.00	0.25	0.047	0.250
1612	19.74	0	0	0	0	0	0.00	0.047	0.06	0.060	141	0	4	0	141	1.02	0.25	0.047	0.253
1620	0.53	670	22	0	0	22	0.16	0.047	0.06	0.077	0	0	4	0	0	0.00	0.25	0.047	0.250
1622	2.6	0	0	0	0	0	0.00	0.047	0.06	0.060	78	0	4	0	78	0.56	0.25	0.047	0.271
1624	3.75	0	0	0	0	0	0.00	0.047	0.06	0.060	18	0	4	0	18	0.13	0.25	0.047	0.252
1630	1.01	1350	45	0	0	45	0.32	0.047	0.06	0.077	0	0	4	0	0	0.00	0.25	0.047	0.250
1632	14.18	0	0	0	0	0	0.00	0.047	0.06	0.060	36	0	4	0	36	0.26	0.25	0.047	0.251
1922	1.49	0	0	0	0	0	0.00	0.047	0.06	0.060	45	0	4	0	45	0.32	0.25	0.047	0.267
1924	2.73	1200	40	0	0	40	0.29	0.047	0.06	0.070	19	0	4	0	19	0.14	0.25	0.047	0.255
1932	2.91	1160	39	0	0	39	0.28	0.047	0.06	0.067	0	17	4	66	66	0.48	0.25	0.047	0.274
1934	1.84	840	28	0	0	28	0.20	0.047	0.06	0.067	0	10	4	40	40	0.29	0.25	0.047	0.276
1942	2.87	800	27	0	0	27	0.19	0.047	0.06	0.068	19	6	4	22	41	0.30	0.25	0.047	0.258
1952	6.15	175	6	0	0	6	0.04	0.047	0.06	0.063	84	4	4	14	98	0.71	0.25	0.047	0.256
1960	1.87	285	10	0	0	10	0.07	0.047	0.06	0.062	0	9	4	34	34	0.25	0.25	0.047	0.270
1970	1.17	485	16	0	0	16	0.12	0.047	0.06	0.067	0	5	4	20	20	0.14	0.25	0.047	0.270
1972	1.17	550	18	0	0	18	0.13	0.047	0.06	0.068	0	6	4	24	24	0.17	0.25	0.047	0.273
1983	1.07	0	0	0	0	0	0.00	0.047	0.06	0.060	44	0	4	0	44	0.32	0.25	0.047	0.265
1986	0.92	530	18	0	0	18	0.13	0.047	0.06	0.068	0	3	4	12	12	0.09	0.25	0.047	0.269
1990	0.53	545	18	0	0	18	0.13	0.047	0.06	0.072	0	0	4	0	0	0.00	0.25	0.047	0.250
2002	2.02	605	20	0	0	20	0.15	0.047	0.06	0.065	0	9	4	36	36	0.26	0.25	0.047	0.271
2004	2.48	1040	35	0	0	35	0.25	0.047	0.06	0.067	0	13	4	52	52	0.38	0.25	0.047	0.273
2010	2.12	770	26	0	0	26	0.19	0.047	0.06	0.066	0	9	4	34	34	0.25	0.25	0.047	0.270
2022	3.67	1450	48	0	0	48	0.35	0.047	0.06	0.066	0	17	4	68	68	0.49	0.25	0.047	0.271
2026	1.67	0	0	0	0	0	0.00	0.047	0.06	0.060	29	0	4	0	29	0.21	0.25	0.047	0.256
2030	1.23	675	23	0	0	23	0.16	0.047	0.06	0.069	0	5	4	20	20	0.14	0.25	0.047	0.269
2040	2.88	1175	39	0	0	39	0.28	0.047	0.06	0.067	0	15	4	58	58	0.42	0.25	0.047	0.272
2050	3.24	1000	33	0	0	33	0.24	0.047	0.06	0.065	0	17	4	66	66	0.48	0.25	0.047	0.271

***Table by Watearth, Inc. - August, 2011**

Notes:

1. Tree Counts and canopy dimensions based on information provided by SWA Group.
2. Assumed 70% deciduous trees, 15% broadleaf evergreen, and 15% coniferous trees based on information from SWA Group.
3. Depression storage values are typical at 0.06 in and 0.25 in for impervious and pervious areas, respectively
4. Average mature tree canopy assumed at 20 ft per SWA Group. Associated surface area = 314 sq. ft

TABLE 6-2: ASPEN 1 MANNING'S ROUGHNESS COEFFICIENTS (n-VALUES)

Drainage Shed	Total Area (ac)	Pervious Area (ac)	% Turf Grass	Pervious Area Turf Grass (ac)	% Native or Adapted Plants	Pervious Area Native or Adapted Plants (ac)	Pervious Area Tree Canopy (ac)	Impervious Cover n-values	Turf/Lawn n-values	Native/Adapted Plants n-value	Trees n-values	Composite Pervious Cover n-values
100	1.8	1.76	30%	0.53	70%	1.23	0.64	0.011	0.1	0.24	0.4	0.256
110	1.36	0.10	30%	0.03	70%	0.07	0.00	0.011	0.1	0.24	0.4	0.198
112	1.37	1.34	30%	0.40	70%	0.94	0.53	0.011	0.1	0.24	0.4	0.262
122	1.83	0.55	30%	0.16	70%	0.38	0.12	0.011	0.1	0.24	0.4	0.232
123	1.12	0.38	30%	0.11	70%	0.27	0.13	0.011	0.1	0.24	0.4	0.252
126	4.2	2.10	70%	1.47	30%	0.63	0.00	0.011	0.1	0.24	0.4	0.142
132	3.41	1.25	30%	0.37	70%	0.87	0.45	0.011	0.1	0.24	0.4	0.255
133	2.09	0.76	30%	0.23	70%	0.53	0.36	0.011	0.1	0.24	0.4	0.274
136	4.6	2.30	70%	1.61	30%	0.69	0.00	0.011	0.1	0.24	0.4	0.142
142	0.63	0.03	30%	0.01	70%	0.02	0.00	0.011	0.1	0.24	0.4	0.198
152	0.73	0.20	30%	0.06	70%	0.14	0.00	0.011	0.1	0.24	0.4	0.198
153	1.43	0.67	30%	0.20	70%	0.47	0.00	0.011	0.1	0.24	0.4	0.198
156	3.33	1.15	30%	0.34	70%	0.80	0.12	0.011	0.1	0.24	0.4	0.215
158	2.25	0.68	30%	0.20	70%	0.47	0.00	0.011	0.1	0.24	0.4	0.198
164	0.56	0.23	30%	0.07	70%	0.16	0.00	0.011	0.1	0.24	0.4	0.198
166	0.96	0.26	30%	0.08	70%	0.18	0.00	0.011	0.1	0.24	0.4	0.198
172	1.02	0.47	30%	0.14	70%	0.33	0.00	0.011	0.1	0.24	0.4	0.198
173	1.06	0.42	30%	0.13	70%	0.30	0.00	0.011	0.1	0.24	0.4	0.198
174	2.98	1.03	30%	0.31	70%	0.72	0.45	0.011	0.1	0.24	0.4	0.267
176	1.1	0.33	30%	0.10	70%	0.23	0.00	0.011	0.1	0.24	0.4	0.198
178	2.08	0.62	30%	0.19	70%	0.44	0.00	0.011	0.1	0.24	0.4	0.198
182	4.5	1.60	30%	0.48	70%	1.12	0.04	0.011	0.1	0.24	0.4	0.202
204	4.7	1.64	30%	0.49	70%	1.14	0.75	0.011	0.1	0.24	0.4	0.271
206	4.95	1.71	30%	0.51	70%	1.20	0.79	0.011	0.1	0.24	0.4	0.272
224	5.37	1.84	30%	0.55	70%	1.29	0.85	0.011	0.1	0.24	0.4	0.272
226	5.33	1.78	30%	0.54	70%	1.25	0.75	0.011	0.1	0.24	0.4	0.265
244	3.01	1.02	30%	0.30	70%	0.71	0.42	0.011	0.1	0.24	0.4	0.264
246	3.17	1.14	30%	0.34	70%	0.80	0.22	0.011	0.1	0.24	0.4	0.228
252	1.48	1.45	30%	0.44	70%	1.02	1.17	0.011	0.1	0.24	0.4	0.310
420	1.85	0.59	30%	0.18	70%	0.41	0.32	0.011	0.1	0.24	0.4	0.285
440	2.39	0.68	30%	0.20	70%	0.48	0.33	0.011	0.1	0.24	0.4	0.276
450	3.14	0.90	30%	0.27	70%	0.63	0.43	0.011	0.1	0.24	0.4	0.275
460	0.99	0.31	30%	0.09	70%	0.21	0.19	0.011	0.1	0.24	0.4	0.296

Drainage Shed	Total Area (ac)	Pervious Area (ac)	% Turf Grass	Pervious Area Turf Grass (ac)	% Native or Adapted Plants	Pervious Area Native or Adapted Plants (ac)	Pervious Area Tree Canopy (ac)	Impervious Cover n-values	Turf/Lawn n-values	Native/Adapted Plants n-value	Trees n-values	Composite Pervious Cover n-values
474	3.96	1.34	30%	0.40	70%	0.94	0.69	0.011	0.1	0.24	0.4	0.281
476	2.43	0.82	30%	0.25	70%	0.58	0.25	0.011	0.1	0.24	0.4	0.246
480	2.01	0.53	30%	0.16	70%	0.37	0.26	0.011	0.1	0.24	0.4	0.276
490	2.67	0.76	30%	0.23	70%	0.53	0.32	0.011	0.1	0.24	0.4	0.265
500	0.77	0.22	30%	0.07	70%	0.15	0.10	0.011	0.1	0.24	0.4	0.272
510	0.4	0.06	30%	0.02	70%	0.04	0.03	0.011	0.1	0.24	0.4	0.276
520	0.49	0.08	30%	0.02	70%	0.06	0.03	0.011	0.1	0.24	0.4	0.255
530	2.5	0.71	30%	0.21	70%	0.49	0.39	0.011	0.1	0.24	0.4	0.286
532	1.83	0.34	30%	0.10	70%	0.24	0.00	0.011	0.1	0.24	0.4	0.198
534	2.9	0.85	30%	0.26	70%	0.60	0.85	0.011	0.1	0.24	0.4	0.310
612	0.68	0.21	30%	0.06	70%	0.15	0.12	0.011	0.1	0.24	0.4	0.286
614	1.63	1.60	30%	0.48	70%	1.12	0.32	0.011	0.1	0.24	0.4	0.230
622	2.4	0.48	30%	0.14	70%	0.34	0.21	0.011	0.1	0.24	0.4	0.269
632	2.02	0.78	70%	0.54	30%	0.23	0.17	0.011	0.1	0.24	0.4	0.178
634	3.97	1.47	30%	0.44	70%	1.03	0.49	0.011	0.1	0.24	0.4	0.252
640	1.8	0.47	30%	0.14	70%	0.33	0.22	0.011	0.1	0.24	0.4	0.271
652	3.37	0.67	30%	0.20	70%	0.47	0.11	0.011	0.1	0.24	0.4	0.223
660	1.01	0.05	30%	0.02	70%	0.04	0.00	0.011	0.1	0.24	0.4	0.198
662	6.25	0.63	30%	0.19	70%	0.44	0.63	0.011	0.1	0.24	0.4	0.310
670	0.82	0.04	30%	0.01	70%	0.03	0.00	0.011	0.1	0.24	0.4	0.198
672	5.05	0.51	30%	0.15	70%	0.35	0.51	0.011	0.1	0.24	0.4	0.310
710	0.72	0.04	30%	0.01	70%	0.03	0.00	0.011	0.1	0.24	0.4	0.198
720	0.54	0.03	30%	0.01	70%	0.02	0.00	0.011	0.1	0.24	0.4	0.198
732	0.68	0.03	30%	0.01	70%	0.02	0.00	0.011	0.1	0.24	0.4	0.198
810	0.39	0.02	30%	0.01	70%	0.01	0.00	0.011	0.1	0.24	0.4	0.198
830	0.85	0.04	30%	0.01	70%	0.03	0.00	0.011	0.1	0.24	0.4	0.198
840	0.97	0.06	30%	0.02	70%	0.04	0.00	0.011	0.1	0.24	0.4	0.198
842	7.87	1.57	30%	0.47	70%	1.10	0.36	0.011	0.1	0.24	0.4	0.235
850	0.79	0.17	30%	0.05	70%	0.12	0.04	0.011	0.1	0.24	0.4	0.239
860	0.9	0.30	30%	0.09	70%	0.21	0.08	0.011	0.1	0.24	0.4	0.240
1602	2.47	2.22	10%	0.22	90%	2.00	0.20	0.011	0.1	0.24	0.4	0.240
1604	1.72	0.75	90%	0.68	10%	0.08	0.00	0.011	0.1	0.24	0.4	0.114
1612	19.74	18.47	10%	1.85	90%	16.63	1.02	0.011	0.1	0.24	0.4	0.235
1620	0.53	0.09	30%	0.03	70%	0.06	0.00	0.011	0.1	0.24	0.4	0.198
1622	2.6	1.23	30%	0.37	70%	0.86	0.56	0.011	0.1	0.24	0.4	0.271
1624	3.75	3.38	10%	0.34	90%	3.04	0.13	0.011	0.1	0.24	0.4	0.232

Drainage Shed	Total Area (ac)	Pervious Area (ac)	% Turf Grass	Pervious Area Turf Grass (ac)	% Native or Adapted Plants	Pervious Area Native or Adapted Plants (ac)	Pervious Area Tree Canopy (ac)	Impervious Cover n-values	Turf/Lawn n-values	Native/Adapted Plants n-value	Trees n-values	Composite Pervious Cover n-values
1630	1.01	0.14	30%	0.04	70%	0.10	0.00	0.011	0.1	0.24	0.4	0.198
1632	14.18	13.47	55%	7.41	45%	6.06	0.26	0.011	0.1	0.24	0.4	0.166
1922	1.49	0.88	30%	0.26	70%	0.62	0.32	0.011	0.1	0.24	0.4	0.256
1924	2.73	1.36	30%	0.41	70%	0.95	0.14	0.011	0.1	0.24	0.4	0.214
1932	2.91	0.94	55%	0.52	45%	0.42	0.48	0.011	0.1	0.24	0.4	0.235
1934	1.84	0.51	30%	0.15	70%	0.36	0.29	0.011	0.1	0.24	0.4	0.288
1942	2.87	1.77	30%	0.53	70%	1.24	0.30	0.011	0.1	0.24	0.4	0.225
1952	6.15	5.50	30%	1.65	70%	3.85	0.71	0.011	0.1	0.24	0.4	0.219
1960	1.87	0.56	30%	0.17	70%	0.39	0.25	0.011	0.1	0.24	0.4	0.268
1970	1.17	0.33	30%	0.10	70%	0.23	0.14	0.011	0.1	0.24	0.4	0.268
1972	1.17	0.35	30%	0.10	70%	0.24	0.17	0.011	0.1	0.24	0.4	0.278
1983	1.07	1.02	30%	0.30	70%	0.71	0.32	0.011	0.1	0.24	0.4	0.248
1986	0.92	0.21	30%	0.06	70%	0.15	0.09	0.011	0.1	0.24	0.4	0.263
1990	0.53	0.03	30%	0.01	70%	0.02	0.00	0.011	0.1	0.24	0.4	0.198
2002	2.02	0.58	30%	0.17	70%	0.40	0.26	0.011	0.1	0.24	0.4	0.270
2004	2.48	0.75	30%	0.23	70%	0.53	0.38	0.011	0.1	0.24	0.4	0.278
2010	2.12	0.57	30%	0.17	70%	0.40	0.25	0.011	0.1	0.24	0.4	0.267
2022	3.67	1.07	30%	0.32	70%	0.75	0.49	0.011	0.1	0.24	0.4	0.271
2026	1.67	1.64	30%	0.49	70%	1.15	0.21	0.011	0.1	0.24	0.4	0.218
2030	1.23	0.35	30%	0.10	70%	0.24	0.14	0.011	0.1	0.24	0.4	0.264
2040	2.88	0.88	30%	0.26	70%	0.62	0.42	0.011	0.1	0.24	0.4	0.274
2050	3.24	1.05	30%	0.32	70%	0.74	0.48	0.011	0.1	0.24	0.4	0.270

***Table by Watearth, Inc. - August, 2011**

Notes:

1. Tree canopy in impervious areas not reflected in n-values, but reflected in interception storage in Table 6-1.
2. % turf grass and % native/adapted vegetation values provided by SWA Group.
3. Composite n-values for pervious areas based on trees located in native/adapted vegetation areas and not in turf grass areas.

TABLE 6-3: ASPEN 1 DRAINAGE SHEDS AND IMPERVIOUS COVER VALUES

Drainage Shed	Total Area	Land Use and Impervious Cover									Average Impervious Cover
		95%	90%	80%	70%	60%	50%	10%	5%	2%	
		Highways, Parking	Commercial, Offices	Apartment, HDR	Condominiums, MDR, RMU	R 8-10 du/ac	R 6-8 du/ac, LDR, School	R 0.2-0.5 du/acre, Ag Res	R <0.2 du/ac, Park	Open Space, Grassland	
	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(%)
100	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2%
110	1.36	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	93%
112	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.37	2%
122	1.83	1.06	0.00	0.00	0.00	0.43	0.00	0.00	0.34	0.00	70%
123	1.12	0.41	0.00	0.00	0.00	0.57	0.00	0.00	0.14	0.00	66%
126	4.20	0.00	0.00	0.00	0.00	0.00	4.20	0.00	0.00	0.00	50%
132	3.41	1.17	0.00	0.00	0.00	1.71	0.00	0.00	0.52	0.00	63%
133	2.09	0.73	0.00	0.00	0.00	1.03	0.00	0.00	0.34	0.00	64%
136	4.60	0.00	0.00	0.00	0.00	0.00	4.60	0.00	0.00	0.00	50%
142	0.63	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
152	0.73	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	73%
153	1.43	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	53%
156	3.33	0.06	0.00	0.00	3.02	0.00	0.00	0.00	0.25	0.00	66%
158	2.25	0.00	0.00	0.00	2.25	0.00	0.00	0.00	0.00	0.00	70%
164	0.56	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	60%
166	0.96	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	73%
172	1.02	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	54%
173	1.06	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	60%
174	2.98	1.16	0.00	0.00	0.00	1.37	0.00	0.00	0.45	0.00	65%
176	1.10	0.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	0.00	70%
178	2.08	0.00	0.00	0.00	2.08	0.00	0.00	0.00	0.00	0.00	70%
182	4.50	0.00	0.00	0.00	4.13	0.00	0.00	0.00	0.00	0.37	64%
204	4.70	1.36	0.00	0.00	0.00	2.92	0.00	0.00	0.42	0.00	65%
206	4.95	1.42	0.00	0.00	0.00	3.12	0.00	0.00	0.42	0.00	65%
224	5.37	1.53	0.00	0.00	0.00	3.42	0.00	0.00	0.42	0.00	66%
226	5.33	1.67	0.00	0.00	0.00	3.23	0.00	0.00	0.43	0.00	67%
244	3.01	0.93	0.00	0.00	0.00	1.83	0.00	0.00	0.25	0.00	66%
246	3.17	1.51	0.00	0.00	0.00	0.95	0.00	0.00	0.47	0.24	64%
252	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.48	2%
420	1.85	0.44	0.00	0.00	0.00	1.41	0.00	0.00	0.00	0.00	68%
440	2.39	0.77	0.00	0.00	0.00	1.63	0.00	0.00	0.00	0.00	72%
450	3.14	1.01	0.00	0.00	0.00	2.13	0.00	0.00	0.00	0.00	71%
460	0.99	0.26	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	69%
474	3.96	1.15	0.00	0.00	0.00	2.53	0.00	0.00	0.27	0.00	66%
476	2.43	0.87	0.00	0.00	0.00	1.28	0.00	0.00	0.27	0.00	66%
480	2.01	0.77	0.00	0.00	0.00	1.24	0.00	0.00	0.00	0.00	73%
490	2.67	0.87	0.00	0.00	0.00	1.80	0.00	0.00	0.00	0.00	71%
500	0.77	0.26	0.00	0.00	0.00	0.51	0.00	0.00	0.00	0.00	72%
510	0.40	0.27	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	85%
520	0.49	0.33	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	84%
530	2.50	0.84	0.00	0.00	0.00	1.66	0.00	0.00	0.00	0.00	72%
532	1.83	0.19	0.00	1.64	0.00	0.00	0.00	0.00	0.00	0.00	82%
534	2.90	0.41	0.00	2.06	0.00	0.00	0.00	0.00	0.00	0.42	71%
612	0.68	0.18	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	69%
614	1.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63	2%
622	2.40	0.00	0.00	2.40	0.00	0.00	0.00	0.00	0.00	0.00	80%
632	2.02	0.84	0.00	0.00	0.00	0.70	0.00	0.00	0.48	0.00	61%
634	3.97	1.18	0.00	0.00	0.00	2.26	0.00	0.00	0.54	0.00	63%
640	1.80	0.71	0.00	0.00	0.00	1.09	0.00	0.00	0.00	0.00	74%
652	3.37	0.00	0.00	3.37	0.00	0.00	0.00	0.00	0.00	0.00	80%
660	1.01	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
662	6.25	0.00	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90%
670	0.82	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
672	5.05	0.00	5.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90%
710	0.72	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
720	0.54	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
732	0.68	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
810	0.39	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
830	0.85	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
840	0.97	0.91	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	94%

TABLE 6-3: ASPEN 1 DRAINAGE SHEDS AND IMPERVIOUS COVER VALUES

Drainage Shed	Total Area	Land Use and Impervious Cover									Average Impervious Cover
		95%	90%	80%	70%	60%	50%	10%	5%	2%	
		Highways, Parking	Commercial, Offices	Apartment, HDR	Condominiums, MDR, RMU	R 8-10 du/ac	R 6-8 du/ac, LDR, School	R 0.2-0.5 du/acre, Ag Res	R <0.2 du/ac, Park	Open Space, Grassland	
	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(ac)	(%)
842	7.87	0.00	0.00	7.87	0.00	0.00	0.00	0.00	0.00	0.00	80%
850	0.79	0.62	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.12	78%
860	0.90	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	67%
1602	2.47	0.00	0.00	0.00	0.00	0.00	0.00	2.47	0.00	0.00	10%
1604	1.72	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	56%
1612	19.74	0.31	0.00	0.00	0.00	0.00	0.00	0.00	19.44	0.00	6%
1620	0.53	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	83%
1622	2.60	0.00	0.00	0.00	1.94	0.00	0.00	0.00	0.00	0.66	53%
1624	3.75	0.00	0.00	0.00	0.00	0.00	0.00	3.75	0.00	0.00	10%
1630	1.01	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	86%
1632	14.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.18	0.00	5%
1922	1.49	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.65	41%
1924	2.73	0.95	0.00	0.00	0.00	0.75	0.00	0.00	0.00	1.03	50%
1932	2.91	0.78	0.00	0.00	0.00	2.04	0.00	0.00	0.00	0.08	68%
1934	1.84	0.62	0.00	0.00	0.00	1.23	0.00	0.00	0.00	0.00	72%
1942	2.87	0.66	0.00	0.00	0.00	0.73	0.00	0.00	0.09	1.39	38%
1952	6.15	0.32	0.00	0.00	0.00	0.40	0.00	0.00	0.07	5.34	11%
1960	1.87	0.53	0.00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	70%
1970	1.17	0.39	0.00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	72%
1972	1.17	0.35	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.00	70%
1983	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	5%
1986	0.92	0.44	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	77%
1990	0.53	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95%
2002	2.02	0.66	0.00	0.00	0.00	1.36	0.00	0.00	0.00	0.00	71%
2004	2.48	0.68	0.00	0.00	0.00	1.80	0.00	0.00	0.00	0.00	70%
2010	2.12	0.77	0.00	0.00	0.00	1.36	0.00	0.00	0.00	0.00	73%
2022	3.67	1.10	0.00	0.00	0.00	2.59	0.00	0.00	0.00	0.00	71%
2026	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.68	2%
2030	1.23	0.43	0.00	0.00	0.00	0.79	0.00	0.00	0.00	0.00	72%
2040	2.88	0.79	0.00	0.00	0.00	2.08	0.00	0.00	0.00	0.00	69%
2050	3.24	0.69	0.00	0.00	0.00	2.55	0.00	0.00	0.00	0.00	67%
TOTALS	**233.49**	**50.43**	**11.30**	**17.43**	**15.37**	**61.45**	**8.80**	**6.22**	**43.97**	**18.54**	**54.5%**

***Table by Watearth, Inc. - August, 2011**

Notes:

1. Drainage sheds delineated by Wood Rodgers.
2. Drainage shed areas determined by Wood Rodgers.
3. Impervious cover values assigned by Wood Rodgers based on Table 5-2 of the *City and County of Sacramento Drainage Manual* .

TABLE 6-4: ASPEN 1 HYDROLOGIC PARAMETERS SLOPE AND WIDTH

Drainage Shed	Area 1 (ac)	Area 2 (ac)	Total Area (ac)	Gamma	Length of Main Drainage Course/Conveyance (ft)	Width (ft)	Backcheck - Approximate Overland Flow Length (ft)	Slope (%)
100	0.87	0.93	1.80	0.03	661	1,300.3	60.20	1.00%
110	0.25	1.10	1.36	0.63	902	1,239.7	47.65	1.00%
112	0.86	0.51	1.38	0.26	636	1,108.0	54.06	1.00%
122	1.83	0.00	1.83	1.00	627	627.4	127.06	1.00%
123	1.12	0.00	1.12	1.00	466	466.0	104.69	1.00%
126	2.36	1.84	4.20	0.12	909	1,705.3	107.16	1.00%
132	3.41	0.00	3.41	1.00	1415	1,415.0	104.97	1.00%
133	2.09	0.00	2.09	1.00	777	777.0	117.17	1.00%
136	2.87	1.73	4.60	0.25	770	1,348.9	148.58	1.00%
142	0.33	0.30	0.63	0.04	448	878.2	31.15	1.00%
152	0.73	0.00	0.73	1.00	585	585.1	54.35	1.00%
153	0.69	0.74	1.43	0.04	403	791.7	78.57	1.00%
156	2.38	0.95	3.33	0.43	726	1,141.6	127.21	1.00%
158	1.46	0.79	2.25	0.30	700	1,190.7	82.24	1.00%
164	0.28	0.28	0.56	0.00	207	413.1	59.47	1.00%
166	0.48	0.48	0.96	0.01	235	468.7	89.41	1.00%
172	0.53	0.49	1.02	0.04	289	566.9	78.22	1.00%
173	1.06	0.00	1.06	1.00	500	499.9	92.37	1.00%
174	2.98	0.00	2.98	1.00	1422	1,422.0	91.29	1.00%
176	0.57	0.53	1.10	0.03	240	471.8	101.19	1.00%
178	0.97	1.11	2.08	0.06	448	867.1	104.39	1.00%
182	2.08	2.42	4.50	0.08	952	1,831.9	106.98	1.00%
204	4.70	0.00	4.70	1.00	1730	1,730.0	118.34	1.00%
206	4.96	0.00	4.96	1.00	1818	1,817.9	118.85	1.00%
224	5.37	0.00	5.37	1.00	1951	1,951.0	119.85	1.00%
226	5.33	0.00	5.33	1.00	2000	1,999.5	116.12	1.00%
244	3.01	0.00	3.01	1.00	1035	1,035.5	126.62	1.00%
246	1.72	1.45	3.17	0.08	577	1,105.9	124.75	1.00%
252	0.40	1.08	1.48	0.45	310	479.1	134.37	1.00%
420	0.84	1.01	1.85	0.09	339	646.9	124.84	1.00%
440	1.71	0.00	1.71	1.00	1044	1,043.8	71.32	1.00%
450	3.14	0.00	3.14	1.00	1338	1,337.8	102.24	1.00%
460	0.15	0.85	1.00	0.70	388	503.7	86.04	1.00%
474	3.96	0.00	3.96	1.00	1463	1,463.0	117.91	1.00%
476	2.43	0.00	2.43	1.00	1027	1,027.4	103.03	1.00%

TABLE 6-4: ASPEN 1 HYDROLOGIC PARAMETERS SLOPE AND WIDTH

Drainage Shed	Area 1 (ac)	Area 2 (ac)	Total Area (ac)	Gamma	Length of Main Drainage Course/Conveyance (ft)	Width (ft)	Backcheck - Approximate Overland Flow Length (ft)	Slope (%)
480	2.01	0.00	2.01	1.00	1009	1,008.8	86.79	1.00%
490	2.67	0.00	2.67	1.00	1158	1,158.2	100.42	1.00%
500	0.66	0.11	0.77	0.72	347	445.2	75.04	1.00%
510	0.18	0.22	0.40	0.10	463	882.4	19.75	1.00%
520	0.21	0.28	0.49	0.14	210	391.1	54.02	1.00%
530	1.38	1.12	2.50	0.10	586	1,111.4	98.14	1.00%
532	0.78	1.05	1.83	0.15	666	1,231.5	64.63	1.00%
534	2.90	0.00	2.90	1.00	1227	1,226.7	102.98	1.00%
612	0.68	0.00	0.68	1.00	259	258.7	114.52	1.00%
614	0.65	0.98	1.63	0.20	429	772.4	91.92	1.00%
622	1.30	1.10	2.40	0.08	784	1,502.8	69.57	1.00%
632	2.02	0.00	2.02	1.00	1082	1,082.0	81.32	1.00%
634	3.97	0.00	3.97	1.00	1430	1,429.6	120.97	1.00%
640	1.22	0.58	1.80	0.36	473	776.4	100.82	1.00%
652	2.11	1.26	3.37	0.25	977	1,707.5	85.97	1.00%
660	0.51	0.50	1.01	0.02	699	1,385.4	31.79	1.00%
662	2.96	3.29	6.25	0.05	989	1,926.9	141.26	1.00%
670	0.44	0.37	0.82	0.09	714	1,364.6	26.05	1.00%
672	1.57	3.48	5.05	0.38	906	1,469.9	149.53	1.00%
710	0.16	0.56	0.72	0.55	344	498.1	62.61	1.00%
720	0.23	0.31	0.54	0.14	279	519.4	45.54	1.00%
732	0.68	0.00	0.68	1.00	458	457.6	64.74	1.00%
810	0.08	0.31	0.39	0.58	264	375.0	45.65	1.00%
830	0.19	0.66	0.85	0.55	593	857.1	43.30	1.00%
840	0.51	0.46	0.97	0.05	634	1,233.0	34.09	1.00%
842	3.31	4.56	7.87	0.16	1222	2,249.7	152.32	1.00%
850	0.30	0.49	0.79	0.23	426	752.0	45.53	1.00%
860	0.26	0.64	0.90	0.42	384	608.0	64.77	1.00%
1602	1.21	1.26	2.47	0.02	284	563.2	191.35	1.00%
1604	0.86	0.86	1.72	0.00	501	1,000.2	74.86	1.00%
1612	9.88	9.86	19.74	0.00	1301	2,600.9	330.57	1.00%
1620	0.30	0.23	0.53	0.13	343	642.9	35.71	1.00%
1622	1.30	1.30	2.60	0.00	638	1,275.5	88.72	1.00%
1624	2.51	1.24	3.75	0.34	417	693.9	235.53	1.00%
1630	0.54	0.48	1.02	0.06	663	1,288.2	34.32	1.00%

TABLE 6-4: ASPEN 1 HYDROLOGIC PARAMETERS SLOPE AND WIDTH

Drainage Shed	Area 1 (ac)	Area 2 (ac)	Total Area (ac)	Gamma	Length of Main Drainage Course/Conveyance (ft)	Width (ft)	Backcheck - Approximate Overland Flow Length (ft)	Slope (%)
1632	8.69	5.49	14.18	0.23	1527	2,709.5	228.02	1.00%
1922	0.60	0.89	1.49	0.20	631	1,139.1	57.02	1.00%
1924	1.27	1.46	2.73	0.07	490	947.2	125.55	1.00%
1932	1.67	1.24	2.91	0.15	478	885.5	143.35	1.00%
1934	0.87	0.98	1.84	0.06	588	1,140.9	70.36	1.00%
1942	1.69	1.18	2.87	0.18	400	730.2	170.97	1.00%
1952	4.03	2.12	6.15	0.31	2458	4,153.6	64.52	1.00%
1960	1.87	0.00	1.87	1.00	728	728.0	111.89	1.00%
1970	0.31	0.87	1.17	0.48	528	803.5	63.43	1.00%
1972	1.17	0.00	1.17	1.00	475	475.1	107.27	1.00%
1983	0.53	0.53	1.07	0.00	207	414.0	112.37	1.00%
1986	0.92	0.00	0.92	1.00	598	597.6	67.06	1.00%
1990	0.32	0.21	0.53	0.21	702	1,257.2	18.23	1.00%
2002	2.02	0.00	2.02	1.00	806	805.6	109.22	1.00%
2004	1.20	1.28	2.48	0.03	671	1,320.7	81.89	1.00%
2010	2.13	0.00	2.13	1.00	988	988.3	93.89	1.00%
2022	3.68	0.00	3.68	1.00	1543	1,542.7	103.91	1.00%
2026	0.33	1.34	1.67	0.61	990	1,378.5	52.84	1.00%
2030	0.26	0.97	1.23	0.58	623	884.3	60.49	1.00%
2040	1.11	1.77	2.88	0.23	912	1,612.2	77.79	1.00%
2050	3.24	0.00	3.24	1.00	1026	1,025.6	137.61	1.00%

***Table by Watearth, Inc. - November, 2011**

Notes:

1. Slope and width hydrologic parameters developed by Wood Rodgers and are used in SWMM 5.0.021 models.
2. Main Drainage Conveyance Length is calculated as the total length of gutter with in the subshed.
3. For undefined commercial lots, main drainage conveyance length is approximated as 1.5 times the longest straight line flow path.

TABLE 6-6A: ASPEN 1 SUMMARY OF DISCONNECTED IMPERVIOUS COVER

	Percent of Impervious Area Draining to Each Type of LID Facility or Pervious Surfaces									Percent
Drainage Shed	Open Space Stormwater Planters	Bioretention	Hydro-Modification Facilities	Infiltration Planters (8' Res.)	Infiltration Planters (14')	Infiltration Planters (8' Non-Res.)	Vegetated Median Swales	Total to LID	Pervious Surfaces	Connected Impervious Cover
100	38%	0%	62%	0%	0%	0%	0%	100%	0%	0%
110	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
112	0%	0%	100%	0%	0%	0%	0%	100%	0%	0%
122	0%	0%	0%	14%	0%	5%	81%	100%	0%	0%
123	0%	0%	0%	41%	0%	5%	54%	100%	0%	0%
126	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
132	0%	0%	0%	42%	0%	5%	53%	100%	0%	0%
133	0%	0%	0%	41%	0%	5%	54%	100%	0%	0%
136	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
142	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
152	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
153	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
156	5%	95%	0%	0%	0%	0%	0%	100%	0%	0%
158	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
164	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
166	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
172	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
173	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
174	0%	0%	0%	37%	0%	5%	58%	100%	0%	0%
176	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
178	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
182	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
204	0%	0%	0%	57%	0%	0%	43%	100%	0%	0%
206	0%	0%	0%	57%	0%	0%	43%	100%	0%	0%
224	0%	0%	0%	58%	0%	0%	42%	100%	0%	0%
226	0%	0%	0%	54%	0%	0%	46%	100%	0%	0%
244	0%	0%	0%	55%	0%	0%	45%	100%	0%	0%
246	0%	0%	0%	28%	0%	0%	72%	100%	0%	0%
252	27%	0%	73%	0%	0%	0%	0%	100%	0%	0%
420	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
440	0%	0%	0%	71%	29%	0%	0%	100%	0%	0%
450	0%	0%	0%	79%	21%	0%	0%	100%	0%	0%
460	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
474	0%	0%	0%	57%	0%	0%	43%	100%	0%	0%
476	0%	0%	0%	47%	0%	0%	53%	100%	0%	0%
480	0%	0%	0%	69%	31%	0%	0%	100%	0%	0%
490	0%	0%	0%	40%	60%	0%	0%	100%	0%	0%
500	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%
510	0%	0%	0%	0%	75%	25%	0%	100%	0%	0%
520	0%	0%	0%	0%	75%	25%	0%	100%	0%	0%
530	0%	0%	0%	78%	12%	10%	0%	100%	0%	0%
532	0%	62%	38%	0%	0%	0%	0%	100%	0%	0%
534	0%	63%	37%	0%	0%	0%	0%	100%	0%	0%
612	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
614	22%	0%	78%	0%	0%	0%	0%	100%	0%	0%
622	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
632	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
634	0%	0%	0%	58%	0%	0%	42%	100%	0%	0%
640	0%	0%	0%	0%	100%	0%	0%	100%	0%	0%
652	0%	80%	0%	0%	10%	10%	0%	100%	0%	0%
660	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%

Drainage Shed	Percent of Impervious Area Draining to Each Type of LID Facility or Pervious Surfaces									Percent Connected Impervious Cover
	Open Space Stormwater Planters	Bioretention	Hydro-Modification Facilities	Infiltration Planters (8' Res.)	Infiltration Planters (14')	Infiltration Planters (8' Non-Res.)	Vegetated Median Swales	Total to LID	Pervious Surfaces	
662	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
670	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
672	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
710	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
720	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
732	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
810	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
830	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
840	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
842	5%	95%	0%	0%	0%	0%	0%	100%	0%	0%
850	5%	0%	0%	0%	95%	0%	0%	100%	0%	0%
860	5%	0%	0%	0%	95%	0%	0%	100%	0%	0%
1602	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
1604	0%	0%	0%	0%	0%	5%	95%	100%	0%	0%
1612	12%	66%	22%	0%	0%	0%	0%	100%	0%	0%
1620	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
1622	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
1624	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
1630	0%	0%	0%	0%	0%	100%	0%	100%	0%	0%
1632	7%	70%	23%	0%	0%	0%	0%	100%	0%	0%
1922	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
1924	0%	0%	66%	29%	0%	5%	0%	100%	0%	0%
1932	0%	0%	0%	89%	11%	0%	0%	100%	0%	0%
1934	0%	0%	0%	85%	15%	0%	0%	100%	0%	0%
1942	0%	0%	55%	40%	0%	5%	0%	100%	0%	0%
1952	5%	0%	50%	40%	0%	5%	0%	100%	0%	0%
1960	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
1970	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
1972	0%	0%	0%	51%	29%	0%	0%	80%	0%	20%
1983	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%
1986	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
1990	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
2002	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%
2004	0%	0%	0%	80%	20%	0%	0%	100%	0%	0%
2010	0%	0%	0%	67%	33%	0%	0%	100%	0%	0%
2022	0%	0%	0%	87%	13%	0%	0%	100%	0%	0%
2026	22%	0%	78%	0%	0%	0%	0%	100%	0%	0%
2030	0%	0%	0%	100%	0%	0%	0%	100%	0%	0%
2040	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%
2050	0%	0%	0%	80%	0%	0%	0%	80%	0%	20%

***Table by Watearth, Inc. - June, 2011**

Notes:

1. While 96-percent of impervious cover within Aspen 1 is disconnected, impervious areas primarily drain through LID facilities.
2. Areas of disconnected impervious cover assigned based on design input from Wood Rodgers.

TABLE 6-7A: ASPEN 1 OPEN SPACE STORMWATER PLANTERS PARAMETERS

Drainage Shed	Length (lf)	Depth (in)	Bottom Width (ft)	Side Slopes (H:V)	Top Width (ft)	Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
100	1,000	11	2.5	4	9.8	9,833	6,167	2,500	38%	Yes	0.13
110											0.00
112											0.00
122											0.00
123											0.00
126											0.00
132											0.00
133											0.00
136											0.00
142											0.00
152											0.00
153											0.00
156	140	6	2.0	4	6.0	840	560	280	5%	Yes	0.01
158											0.00
164											0.00
166											0.00
172											0.00
173											0.00
174											0.00
176											0.00
178											0.00
182											0.00
204											0.00
206											0.00
224											0.00
226											0.00
244											0.00
246											0.00
252	400	6	2.0	4	6.0	2,400	1,600	800	27%	Yes	0.02
420											0.00
440											0.00
450											0.00
460											0.00
474											0.00
476											0.00
480											0.00
490											0.00
500											0.00
510											0.00
520											0.00
530											0.00
532											0.00
534											0.00
612											0.00
614	400	11	2.5	4	9.8	3,933	2,467	1,000	22%	Yes	0.05
622											0.00
632											0.00
634											0.00
640											0.00
652											0.00
660											0.00
662											0.00
670											0.00
672											0.00
710											0.00

TABLE 6-7A: ASPEN 1 OPEN SPACE STORMWATER PLANTERS PARAMETERS

Drainage Shed	Length (lf)	Depth (in)	Bottom Width (ft)	Side Slopes (H:V)	Top Width (ft)	Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
720											0.00
732											0.00
810											0.00
830											0.00
840											0.00
842	400	4	1.0	4	3.7	1,467	933	400	5%	Yes	0.01
850	250	6	2.0	4	6.0	1,500	1,000	500	5%	Yes	0.01
860	435	6	2.0	4	6.0	2,610	1,740	870	5%	Yes	0.02
1602											0.00
1604											0.00
1612	4,085	6	2.0	4	6.0	24,510	16,340	8,170	12%	Yes	0.19
1620											0.00
1622											0.00
1624											0.00
1630											0.00
1632	1,590	6	2.0	4	6.0	9,540	6,360	3,180	7%	Yes	0.07
1922											0.00
1924											0.00
1932											0.00
1934											0.00
1942											0.00
1952	1,840	6	2.0	4	6.0	11,040	7,360	3,680	5%	Yes	0.08
1960											0.00
1970											0.00
1972											0.00
1983											0.00
1986											0.00
1990											0.00
2002											0.00
2004											0.00
2010											0.00
2022											0.00
2026	700	6	2.0	4	6.0	4,200	2,800	1,400	22%	Yes	0.03
2030											0.00
2040											0.00
2050											0.00

***Table by Watearth, Inc. - December, 2011**

Notes:
1. Dimensions provided by SWA Group.
2. Assumed treat five-percent of impervious cover in high-density/commercial areas.
3. Top Width assumptions provided for informational purposes only - not used in model as modeled as Bioretention.
4. Water quality volume estimated based on average of top and bottom widths.
5. Due to length and continuous nature of Open Space Stormwater Planters, bottom length was not adjusted.
6. Avg. Area parameter used in SWMM5.0.022 model to represent facility as average of design WSEL and bottom of facility.

TABLE 6-7B1: ASPEN 1 8' RESIDENTIAL INFILTRATION PLANTERS PARAMETERS

Drainage Shed	8' Residential Infiltration Planters												
	Total Length (lf)	Units (# Lots)	Depth (in)	Top Width (ft)	Bottom Width (ft)	Avg. Top Length Per Lot (lf)	Avg. Bottom Length Per Lot (lf)	Avg. Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
100													0.00
110													0.00
112													0.00
122	280	4	8	8	2	70	65	560	345	129	14%	Yes	0.02
123	240	5	8	8	2	48	43	384	235	85	41%	Yes	0.02
126													0.00
132	540	14	8	8	2	39	33	309	188	66	42%	Yes	0.04
133	480	12	8	8	2	40	35	320	195	69	41%	Yes	0.04
136													0.00
142													0.00
152													0.00
153													0.00
156													0.00
158													0.00
164													0.00
166													0.00
172													0.00
173													0.00
174	930	16	8	8	2	58	53	465	285	106	37%	Yes	0.07
176													0.00
178													0.00
182													0.00
204	1,180	30	8	8	2	39	34	315	191	68	57%	Yes	0.09
206	1,250	32	8	8	2	39	34	313	190	67	57%	Yes	0.09
224	1,350	34	8	8	2	40	34	318	193	69	58%	Yes	0.10
226	1,390	31	8	8	2	45	40	359	219	79	54%	Yes	0.10
244	710	17	8	8	2	42	36	334	203	73	55%	Yes	0.05
246	1,045	9	8	8	2	116	111	929	575	222	28%	Yes	0.08
252													0.00
420	410	11	8	8	2	37	32	298	181	64	80%	No	0.03
440	370	10	8	8	2	37	32	296	180	63	71%	No	0.03
450	570	15	8	8	2	38	33	304	185	65	79%	No	0.04
460	380	7	8	8	2	54	49	434	266	98	80%	No	0.03
474	1,210	28	8	8	2	43	38	346	211	76	57%	Yes	0.09
476	740	13	8	8	2	57	52	455	279	103	47%	Yes	0.06
480	480	9	8	8	2	53	48	427	261	96	69%	No	0.04
490	335	4	8	8	2	84	78	670	413	157	40%	No	0.03
500	210	4	8	8	2	53	47	420	257	94	100%	No	0.02
510													0.00
520													0.00
530	410	13	8	8	2	32	26	252	152	52	78%	No	0.03
532													0.00
534													0.00
612	160	5	8	8	2	32	27	256	155	53	80%	No	0.01
614													0.00
622													0.00
632													0.00
634	1,010	21	8	8	2	48	43	385	235	86	58%	Yes	0.08
640													0.00
652													0.00
660													0.00
662													0.00
670													0.00
672													0.00
710													0.00
720													0.00
732													0.00
810													0.00
830													0.00
840													0.00
842													0.00
850													0.00
860													0.00
1602													0.00
1604													0.00
1612													0.00

TABLE 6-7B1: ASPEN 1 8' RESIDENTIAL INFILTRATION PLANTERS PARAMETERS

Drainage Shed	8' Residential Infiltration Planters												
	Total Length (lf)	Units (# Lots)	Depth (in)	Top Width (ft)	Bottom Width (ft)	Avg. Top Length Per Lot (lf)	Avg. Bottom Length Per Lot (lf)	Avg. Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
1620													0.00
1622													0.00
1624													0.00
1630													0.00
1632													0.00
1922													0.00
1924	280	6	8	8	2	47	41	373	228	83	29%	Yes	0.02
1932	540	17	8	8	2	32	26	254	153	53	89%	No	0.04
1934	380	11	8	8	2	35	29	276	167	58	85%	No	0.03
1942	250	6	8	8	2	42	36	333	203	73	40%	Yes	0.02
1952	110	3	8	8	2	37	31	293	178	63	40%	Yes	0.01
1960	490	11	8	8	2	45	39	356	217	78	80%	No	0.04
1970	220	7	8	8	2	31	26	251	152	52	80%	No	0.02
1972	170	5	8	8	2	34	29	272	165	57	51%	No	0.01
1983													0.00
1986	460	5	8	8	2	92	87	736	455	173	80%	No	0.03
1990	640	3	8	8	2	213	208	1707	1061	416	80%	No	0.05
2002	440	11	8	8	2	40	35	320	195	69	100%	No	0.03
2004	685	12	8	8	2	57	52	457	280	104	80%	No	0.05
2010	360	8	8	8	2	45	40	360	220	79	67%	No	0.03
2022	390	13	8	8	2	30	25	240	145	49	87%	No	0.03
2026													0.00
2030	510	7	8	8	2	73	68	583	359	135	100%	No	0.04
2040	640	17	8	8	2	38	32	301	183	65	80%	No	0.05
2050	720	16	8	8	2	45	40	360	220	79	80%	No	0.05

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Configurations developed collaboratively by project team.
2. Lengths provided by Wood Rodgers.
3. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in.
4. Top width parameters for reference only, but not used for Bioretention in SWMM5.0.021 model.
5. Average bottom length per Lot refers to length along bottom of 8' Residential Infiltration Planters.
6. Avg. Area parameter used in SWMM5.0.022 model to represent facility as average of design WSEL and bottom of facility.

TABLE 6-7B2 ASPEN 1 8' NON-RESIDENTIAL INFILTRATION PLANTERS PARAMETERS

Drainage Shed	8' Non-Residential Planters										
	Total Length (lf)	Units (each side street)	Depth (in)	Top Width (ft)	Bottom Width (ft)	Avg. Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
100											-
110											-
112											-
122	420	1	8	8	2	3,360	2,100	840	5%	Yes	0.03
123	100	1	8	8	2	800	500	200	5%	Yes	0.01
126											-
132	320	1	8	8	2	2,560	1,600	640	5%	Yes	0.02
133	200	1	8	8	2	1,600	1,000	400	5%	Yes	0.02
136											-
142	780	2	8	8	2	3,120	1,950	780	100%	No	0.06
152	180	3	8	8	2	480	300	120	5%	Yes	0.01
153	710	2	8	8	2	2,840	1,775	710	5%	Yes	0.05
156											-
158											-
164	260	2	8	8	2	1,040	650	260	5%	Yes	0.02
166	700	2	8	8	2	2,800	1,750	700	5%	Yes	0.05
172	400	2	8	8	2	1,600	1,000	400	5%	Yes	0.03
173	660	3	8	8	2	1,760	1,100	440	5%	Yes	0.05
174	510	2	8	8	2	2,040	1,275	510	5%	Yes	0.04
176											-
178											-
182											-
204											-
206											-
224											-
226											-
244											-
246											-
252											-
420											-
440											-
450											-
460											-
474											-
476											-
480											-
490											-
500											-
510	180	1	8	8	2	1,440	900	360	25%	No	0.01
520	200	1	8	8	2	1,600	1,000	400	25%	No	0.02
530	270	1	8	8	2	2,160	1,350	540	10%	No	0.02
532											-
534											-
612											-
614											-
622											-
632	560	3	8	8	2	1,493	933	373	100%	Yes	0.04
634											-
640											-
652	410	1	8	8	2	3,280	2,050	820	10%	No	0.03
660	770	3	8	8	2	2,053	1,283	513	100%	No	0.06
662											-
670	1,100	3	8	8	2	2,933	1,833	733	100%	No	0.08
672											-

TABLE 6-7B2 ASPEN 1 8' NON-RESIDENTIAL INFILTRATION PLANTERS PARAMETERS

Drainage Shed	8' Non-Residential Planters										
	Total Length (lf)	Units (each side street)	Depth (in)	Top Width (ft)	Bottom Width (ft)	Avg. Surface Area (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
710											-
720											-
732											-
810											-
830											-
840	400	1	8	8	2	3,200	2,000	800	100%	No	0.03
842											-
850											-
860											-
1602											-
1604	900	2	8	8	2	3,600	2,250	900	5%	Yes	0.07
1612											-
1620	540	2	8	8	2	2,160	1,350	540	100%	No	0.04
1622											-
1624											-
1630	990	2	8	8	2	3,960	2,475	990	100%	No	0.08
1632											-
1922											-
1924	480	1	8	8	2	3,840	2,400	960	5%	Yes	0.04
1932											-
1934											-
1942	380	1	8	8	2	3,040	1,900	760	5%	Yes	0.03
1952	170	1	8	8	2	1,360	850	340	5%	Yes	0.01
1960											-
1970											-
1972											-
1983											-
1986											-
1990											-
2002											-
2004											-
2010											-
2022											-
2026											-
2030											-
2040											-
2050											-

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Configurations developed collaboratively by project team.
2. Lengths provided by Wood Rodgers.
3. Assumed treat five-percent of drainage area in drainage sheds where neither lots nor roadways drain to Infiltration Planters.
4. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in.
5. Top width parameters for reference only, but not used for Bioretention in SWMM5.0.022 model.

TABLE 6-7B3: ASPEN 1 14' SIDE-YARD INFILTRATION PLANTERS

	14' Side-Yard Infiltration Planters														
Drainage Shed	**Total Length (lf)**	**Units (# Lots)**	**Depth (in)**	**Top Width (ft)**	**Bottom Width (ft)**	**Avg. Top Length Per Lot (lf)**	**Avg. WQV Length Per Lot (lf)**	**Avg. Bottom Length Per Lot (lf)**	**Avg. Surface Area (sq. ft.)**	**Area @ WQV (sq. ft.)**	**Avg. Area (sq. ft.)**	**Bottom Area (sq. ft.)**	**% Area Treated**	**Outflow to Pervious**	**Volume (ac-ft)**
100															0.00
110															0.00
112															0.00
122															0.00
123															0.00
126															0.00
132															0.00
133															0.00
136															0.00
142															0.00
152															0.00
153															0.00
156															0.00
158															0.00
164															0.00
166															0.00
172															0.00
173															0.00
174															0.00
176															0.00
178															0.00
182															0.00
204															0.00
206															0.00
224															0.00
226															0.00
244															0.00
246															0.00
252															0.00
420															0.00
440	360	4	15	14	4	90	88	80	1,260	1,056	790	320	29%	No	0.06
450	360	4	15	14	4	90	88	80	1,260	1,056	790	320	21%	No	0.06
460															0.00
474															0.00
476															0.00
480	360	4	15	14	4	90	88	80	1,260	1,056	790	320	31%	No	0.06
490	360	6	15	14	4	60	58	50	840	696	520	200	60%	No	0.06
500															0.00
510	160	2	15	14	4	80	78	70	1,120	936	700	280	75%	No	0.03
520	170	2	15	14	4	85	83	75	1,190	996	745	300	75%	No	0.03
530	185	2	15	14	4	92.5	90.5	82.5	1,295	1,086	813	330	12%	No	0.03
532															0.00
534															0.00
612															0.00
614															0.00
622															0.00
632															0.00
634															0.00
640	420	1	15	14	4	420	418	410	5,880	5,016	3,760	1,640	100%	No	0.08
652	430	1	15	14	4	430	428	420	6,020	5,136	3,850	1,680	10%	No	0.08
660															0.00
662															0.00
670															0.00
672															0.00
710															0.00
720															0.00
732															0.00
810															0.00
830															0.00
840															0.00
842															0.00
850	720	2	15	14	4	360	358	350	5,040	4,296	3,220	1,400	95%	No	0.13
860	750	2	15	14	4	375	373	365	5,250	4,476	3,355	1,460	95%	No	0.14
1602															0.00
1604															0.00
1612															0.00
1620															0.00
1622															0.00
1624															0.00
1630															0.00
1632															0.00
1922															0.00
1924															0.00
1932	190	2	15	14	4	95	93	85	1,330	1,116	835	340	11%	No	0.03
1934	190	2	15	14	4	95	93	85	1,330	1,116	835	340	15%	No	0.03
1942															0.00
1952															0.00
1960															0.00
1970															0.00
1972	185	2	15	14	4	92.5	90.5	82.5	1,295	1,086	813	330	29%	No	0.03
1983															0.00
1986															0.00
1990															0.00
2002															0.00
2004	190	3	15	14	4	63	61	53	887	736	550	213	20%	No	0.03

TABLE 6-7B3: ASPEN 1 14' SIDE-YARD INFILTRATION PLANTERS

Drainage Shed	14' Side-Yard Infiltration Planters														
	Total Length (lf)	Units (# Lots)	Depth (in)	Top Width (ft)	Bottom Width (ft)	Avg. Top Length Per Lot (lf)	Avg. WQV Length Per Lot (lf)	Avg. Bottom Length Per Lot (lf)	Avg. Surface Area (sq. ft.)	Area @ WQV (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
2010	380	4	15	14	4	95	93	85	1,330	1,116	835	340	33%	No	0.07
2022	300	2	15	14	4	150	148	140	2,100	1,776	1,330	560	13%	No	0.05
2026															0.00
2030															0.00
2040															0.00
2050															0.00

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Configurations developed collaboratively by project team.
2. Lengths provided by Wood Rodgers.
3. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in.
4. Top width parameters for reference only, but not used for Bioretention in SWMM5.0.022 model.
5. Average bottom length per lot refers to length along bottom of 14' Side-Yard Infiltration Planters.
6. Avg. Area parameter used in SWMM5.0.021 model to represent facility as average of design WSEL and bottom of facility.
7. Surface area is at "top of bank" and is the same as the design wsel.
8. Water quality volumes based on average of surface areas at bottom and at WQV level.

TABLE 6-7C: ASPEN 1 VEGETATED MEDIAN SWALES PARAMETERS

Drainage Shed	Swale Link	Top Width (ft)	Length (lf)	Side Slopes (H:V)	Bottom Width (ft)	Depth (in)	Surface Area (sq. ft.)	Area @ WQV (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	Slope (%)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
100														0.00
110														0.00
112														0.00
122	230S	41.0	110	4	12	12	1,086	1,086	854	623	0.05%	81%	No	0.02
123	230S	41.0	110	4	12	12	1,717	1,717	1,418	1,118	0.05%	54%	No	0.03
126														0.00
132	250S	38.0	225	4	12	24	11,494	9,843	9,907	8,319	0.60%	53%	No	0.21
133	250S	38.0	225	4	12	24	7,474	6,155	6,219	4,964	0.80%	54%	No	0.13
136														0.00
142														0.00
152	270S	41.0	200	4	12	24	5,950	4,780	4,844	3,738	4.50%	95%	No	0.10
153	270S	41.0	200	4	12	24	12,287	10,577	10,641	8,996	4.50%	95%	No	0.22
156														0.00
158														0.00
164	310S	35.6	160	4	12	24	4,249	3,270	3,334	2,419	0.50%	95%	No	0.07
166	310S	35.6	160	4	12	24	6,302	5,096	5,160	4,018	0.50%	95%	No	0.10
172	410S	41.0	217	4	12	24	10,304	8,744	8,808	7,312	0.25%	95%	No	0.18
173	410S	41.0	217	4	12	24	6,562	5,330	5,394	4,226	0.40%	95%	No	0.11
174	410S	41.0	217	4	12	24	14,388	12,533	12,597	10,806	0.70%	58%	No	0.27
176														0.00
178														0.00
182														0.00
204	705S	48.0	215	4	12	24	10,632	9,046	9,110	7,588	0.49%	43%	No	0.19
206	705S	48.0	215	4	12	24	7,078	5,796	5,860	4,642	0.89%	43%	No	0.12
224	715S	39.0	210	4	12	24	8,752	7,319	7,383	6,014	0.46%	42%	No	0.15
226	715S	39.0	210	4	12	24	4,613	3,590	3,654	2,696	0.84%	46%	No	0.07
244	720S	36.0	120	4	12	24	285	79	143	1	1.70%	45%	No	0.00
246	720S	36.0	120	4	12	12	2,840	2,840	2,446	2,051	5.00%	72%	No	0.06
252														0.00
420														0.00
440														0.00
450														0.00
460														0.00
474	860S	30.8	190	4	12	24	5,638	4,501	4,565	3,491	1.00%	43%	No	0.09
476	860S	30.8	190	4	12	24	6,521	5,293	5,357	4,193	7.00%	53%	No	0.11
480														0.00
490														0.00
500														0.00
510														0.00
520														0.00
530														0.00
532														0.00
534														0.00
612														0.00
614														0.00
622														0.00
632														0.00
634	875S	26.0	320	4	12	24	9,596	8,093	8,157	6,717	3.50%	42%	No	0.17
640														0.00
652														0.00
660														0.00
662														0.00
670														0.00
672														0.00
710														0.00
720														0.00
732														0.00
810														0.00
830														0.00
840														0.00
842														0.00
850														0.00
860														0.00
1602														0.00
1604	320S	35.6	100	4	12	12	3,513	3,513	3,071	2,629	0.05%	95%	No	0.07
1612														0.00
1620														0.00
1622														0.00
1624														0.00
1630														0.00
1632														0.00
1922														0.00
1924														0.00
1932														0.00
1934														0.00
1942														0.00

TABLE 6-7C: ASPEN 1 VEGETATED MEDIAN SWALES PARAMETERS

Drainage Shed	Swale Link	Top Width (ft)	Length (lf)	Side Slopes (H:V)	Bottom Width (ft)	Depth (in)	Surface Area (sq. ft.)	Area @ WQV (sq. ft.)	Avg. Area (sq. ft.)	Bottom Area (sq. ft.)	Slope (%)	% Area Treated	Outflow to Pervious	Volume (ac-ft)
1952														0.00
1960														0.00
1970														0.00
1972														0.00
1983														0.00
1986														0.00
1990														0.00
2002														0.00
2004														0.00
2010														0.00
2022														0.00
2026														0.00
2030														0.00
2040														0.00
2050														0.00

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Vegetated Median Swales dimensions provided by Wood Rodgers.
2. Volumes used for stormwater quality calculations only and based on maximum ponding depth of 12 in.
3. Additional storage above 12 in and/or freeboard not included in volume calculations.
4. Although some portions of Vegetated Median Swales are sloped, drainage is via infiltration in smaller events and overflow via stand pipes rather than hydraullically connected culverts to downstream swale segments. As such, water quality calculations are volume-based rather than flow-based.
5. Swale lengths provided by Wood Rodgers that encompass two drainage sheds are split evenly between two sheds.
6. Swale in drainage shed 1604 length assumed.
7. Surface area parameter is at design wsel where overflow is set and not at top of bank.
8. Avg. Area parameter used in SWMM5.0.022 model to represent facility as average of design WSEL and bottom of facility.
9. Top Width assumptions provided for informational purposes only - not used in model as modeled as Bioretention.

TABLE 6-10: ASPEN I CONTINUOUS SIMULATION WATER BALANCE OUTPUT

System Results	Analysis Period Results		Difference	
	No LID Continuous Simulation	LID Continuous Simulation	Amount	%
Precipitation (in)	200.250	200.250	0.000	0%
Surface Runoff (in)	73.420	32.902	-40.518	-55%
Infiltration (in)	113.603	134.085	20.482	18%
Evaporation (in)	13.712	34.685	20.973	153%
Surface Runoff (ac-ft)	1,428.6	674.9	-754	-53%
Final Surface Storage (in)	0.000	0.266	0.266	---
Continuity Error (%)	(0.242)	(0.362)	-0.120	---

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Water balance output is for entire Aspen 1 LID system and full continuous simulation run.
2. Initial saturation of 0% (wilting point) used for growing media at start of continuous simulation run.
3. Analysis performed in SWMM5.0.022.

TABLE 6-13: ASPEN I EVENT-BASED RUNOFF VOLUME FROM CONTINUOUS SIMULATION ANALYSIS

Start Date	Event Duration (hrs)	Event Depth (in)	Runoff (cu. ft.)		Reduction	Days Since Start Prior Event	Depth Prior Event (in)	Duration Prior Event (hr)	Days Since Start 2nd Prior Event	Depth 2nd Prior Event (in)	Duration 2nd Prior Event (hr)
			No LID Continuous Simulation	LID Continuous Simulation							
100-year (Conveyance) Comparisons											
2/18/1986	7-Day	9.5	45,011,989	37,486,834	-17%	8	0.34	8	10	0.54	11
100-year Average											
10-year (Conveyance) Comparisons											
1/12/1990	15	2.53	17,547,184	14,125,418	-20%	6	0.42	20	11	0.64	7
3/12/1983	31	2.78	14,118,739	11,392,907	-19%	2	0.60	9	6	0.56	11
2/7/1985	14	1.62	6,797,358	4,569,204	-33%	29	0.12	9	31	0.44	16
10-year Average					-24%						
5-year Comparisons											
9/16/1989	12	1.75	6,575,301	4,019,853	-39%	39	0.02	2	39	0.35	13
3/30/1982	26	2.43	12,306,203	9,279,784	-25%	1	0.63	15	2	0.31	7
2/18/1986	17	1.79	9,431,490	8,517,743	-10%	4	6.35	99	7	9.50	168
5-year Average					-24%						
2-year Comparisons											
2/15/1990	22	2.05	9,803,665	7,466,358	-24%	9	0.23	6	12	0.50	11
1/23/1983	15	1.21	4,768,909	3,463,333	-27%	2	0.96	17	5	0.83	12
2/7/1985	14	1.62	6,797,358	4,569,204	-33%	10	0.05	4	12	0.04	4
1/16/1988	6	1.02	4,717,848	2,786,049	-41%	1	0.27	3	14	1.10	59
2/12/1987	21	1.88	9,183,205	5,970,102	-35%	2	0.37	11	10	1.09	14
2-year Average					-32%						

Start Date	Event Duration (hrs)	Event Depth (in)	Runoff (cu. ft.) No LID Continuous Simulation	Runoff (cu. ft.) LID Continuous Simulation	Reduction	Days Since Start Prior Event	Depth Prior Event (in)	Duration Prior Event (hr)	Days Since Start 2nd Prior Event	Depth 2nd Prior Event (in)	Duration 2nd Prior Event (hr)
25% of 2-year Comparisons (24-hr, 12-hr, and 6-hr durations)											
2/12/1983	17	0.46	890,355	168,097	-81%	5	1.42	31	6	0.43	23
10/27/1987	11	0.37	695,428	90,115	-87%	4	0.75	5	177	0.20	8
2/10/1987	11	0.37	536,280	58,732	-89%	8	1.09	14	11	0.34	8
9/17/1985	11	0.37	546,770	56,739	-90%	9	0.26	9	10	0.08	7
3/5/1985	6	0.29	1,802,359	21,782	-99%	27	0.23	11	27	1.62	14
2/5/1983	6	0.29	414,486	31,608	-92%	8	0.90	21	10	1.39	24
25% of 2-year Average					-91%						
Average All Listed Events					-50%						

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Historic events selected to approximate 2-yr, 5-yr, and 10-yr events from Sacramento Drainage Manual Table 4-1 Depth-Duration-Frequency Relationships.
2. 2-year, 6-hour event = 1.06 in.; 2-year, 12-hour event = 1.43 in.; and 2-year, 24-hour event = 1.90 in.
3. 5-year, 6-hour event = 1.40 in.; 5-year, 12-hour event = 1.91 in.; and 5-year, 24-hour event = 2.50 in.
4. 10-year, 6-hour event - 1.65 in.; 10-year, 12-hour event = 2.25 in.; 10-year, 24-hour event = 2.98 in.
5. Small previous events may be omitted in favor of larger previous events in table.
6. 2/18/1986 event part of larger 7-day, 9.5-inch event (approx. 100-year magnitude).
7. 25% of 2-year, 6-hour event = 0.27 in; 12-hour event = 0.36 in; and 24-hour event = 0.48 in.
8. Runoff for several events under LID conditions based on daily values rather than exact event values due to reporting statistics.

TABLE 6-14: ASPEN I EVENT-BASED PEAK FLOWS FROM CONTINUOUS SIMULATION ANALYSIS

Start Date	**Event Duration (hrs)**	**Event Depth (in)**	**Peak Flows (cfs)**		**Reduction**	**Days Since Start Prior Event**	**Depth Prior Event (in)**	**Duration Prior Event (hr)**	**Days Since Start 2nd Prior Event**	**Depth 2nd Prior Event (in)**	**Duration 2nd Prior Event (hr)**
			No LID Continuous Simulation	**LID Continuous Simulation**							
100-year (Conveyance) Comparisons											
2/18/1986	7-Day	9.5	959	830	-13%	8	0.34	8	10	0.54	11
100-year Average											
10-year (Conveyance) Comparisons											
1/12/1990	15	2.53	1,319	1092	-17%	6	0.42	20	11	0.64	7
3/12/1983	31	2.78	614	538	-12%	2	0.60	9	6	0.56	11
2/7/1985	14	1.62	310	258	-17%	29	0.12	9	31	0.44	16
10-year Average					-16%						
5-year Comparisons											
9/16/1989	12	1.75	524	243	-54%	39	0.02	2	39	0.35	13
3/30/1982	26	2.43	371	321	-14%	1	0.63	15	2	0.31	7
2/18/1986	17	1.79	959	830	-13%	4	6.35	99	7	9.50	168
5-year Average					-27%						
2-year Comparisons											
2/7/1985	22	2.05	310	258	-17%	9	0.23	6	12	0.50	11
2/15/1990	15	1.21	544	490	-10%	2	0.96	17	5	0.83	12
1/23/1983	14	1.62	429	67	-84%	10	0.05	4	12	0.04	4
1/16/1988	6	1.02	422	299	-29%	1	0.27	3	14	1.10	59
2/12/1987	21	1.88	335	146	-56%	2	0.37	11	10	1.09	14
2-year Average					-39%						

Start Date	Event Duration (hrs)	Event Depth (in)	Peak Flows (cfs)		Reduction	Days Since Start Prior Event	Depth Prior Event (in)	Duration Prior Event (hr)	Days Since Start 2nd Prior Event	Depth 2nd Prior Event (in)	Duration 2nd Prior Event (hr)
			No LID Continuous Simulation	LID Continuous Simulation							
25% of 2-year Comparisons											
2/12/1983	17	0.46	56	6	-90%	5	1.42	31	6	0.43	23
10/27/1987	11	0.37	71	6	-91%	4	0.75	5	177	0.20	8
2/10/1987	11	0.37	37	0	-100%	8	1.09	14	11	0.34	8
9/17/1985	11	0.37	70	8	-89%	9	0.26	9	10	0.08	7
3/5/1985	6	0.29	67	5	-92%	27	0.23	11	27	1.62	14
2/5/1983	6	0.29	38	3	-93%	8	0.90	21	10	1.39	24
25% of 2-year Average					-93%						
Average All Listed Events					-53%						

***Table by Watearth, Inc. - December, 2011**

Notes:

1. Historic events selected to approximate 2-yr, 5-yr, and 10-yr events from Sacramento Drainage Manual Table 4-1 Depth-Duration-Frequency Relationships.
2. 2-year, 6-hour event = 1.06 in.; 2-year, 12-hour event = 1.43 in.; and 2-year, 24-hour event = 1.90 in.
3. 5-year, 6-hour event = 1.40 in.; 5-year, 12-hour event = 1.91 in.; and 5-year, 24-hour event = 2.50 in.
4. 10-year, 6-hour event - 1.65 in.; 10-year, 12-hour event = 2.25 in.; 10-year, 24-hour event = 2.98 in.
5. Small previous events may be omitted in favor of larger previous events in table.
6. 2/18/1986 event part of larger 7-day, 9.5-inch event (approx. 100-year magnitude).
7. 25% of 2-year, 6-hour event = 0.27 in; 12-hour event = 0.36 in; and 24-hour event = 0.48 in.
8. Runoff for several events under LID conditions based on daily values rather than exact event values due to reporting statistics.

TABLE 6-15: ASPEN I LID FACILITY GROWING MEDIA SATURATION FROM CONTINUOUS SIMULATION ANALYSIS

LID Facility	**Avg. 10-yr Saturation**	**Max. 10-yr Saturation**	**Min. 10-yr Saturation**
14' Infiltration Planters	30%	54%	10%
8' Residential Planters	34%	62%	13%
8' Non-Residential Planters	39%	75%	10%
Bioretention	23%	39%	8%
Average	32%	57%	10%

***Table by Watearth, Inc. - July, 2011**

Notes:

1. 10-year values based on 1/12/1990, 3/12/1983, and 2/7/1985 historical events.
2. 100-year value of 100% saturation used, based on direction from City staff.
3. Results based on 7/4/2011 LID Continuous Simulation model in SWMM5.0.021.

FIGURES

FIGURE 1

SPD - PUD SCHEMATIC PLAN
ASPEN 1 - NEW BRIGHTON

CITY OF SACRAMENTO, CALIFORNIA
SHEET 4 OF 6
JUNE 2010
Revised July 7, 2010

LEGEND

▨	30′ x 90′ Interior (Minimum)*
▨	45′ x 90′ Interior (Minimum)*
▨	50′ x 100′ Interior (Minimum)*
▨	55′ x 100′ Interior (Minimum)*
▨	Multi Family Residential (25 units/net acre target)
▨	Residential Mixed Use (30 units/net acre target)
▨	Commercial (0.25 ~ 2.0 FAR)
▨	School (Underlying Residential Zoning)
▨	Urban Farm
▨	Open Space
▨	Park

*9 units/net acre target

SHEET INDEX

SHEET NO.	EXHIBIT
1.	COVER SHEET/KEY MAP/NOTES/SECTIONS
2.	TENTATIVE SUBDIVISION MAP
3.	LARGE LOT TENTATIVE MAP
4.	PUD SCHEMATIC PLAN
5.	GENERAL PLAN AMENDMENT EXHIBIT
6.	REZONE EXHIBIT

NORTH
100′ 50′ 0 100′ 200′
SCALE: 1" = 100′

SWA
Laguna Beach
Sausalito
San Francisco
Los Angeles
Houston
Dallas
Shanghai

580 Broadway
Suite 200
Laguna Beach CA 92651
Fax 949.494.7861
949.497.5471

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Sacramento, CA 95816 Fax: 916.341.7767

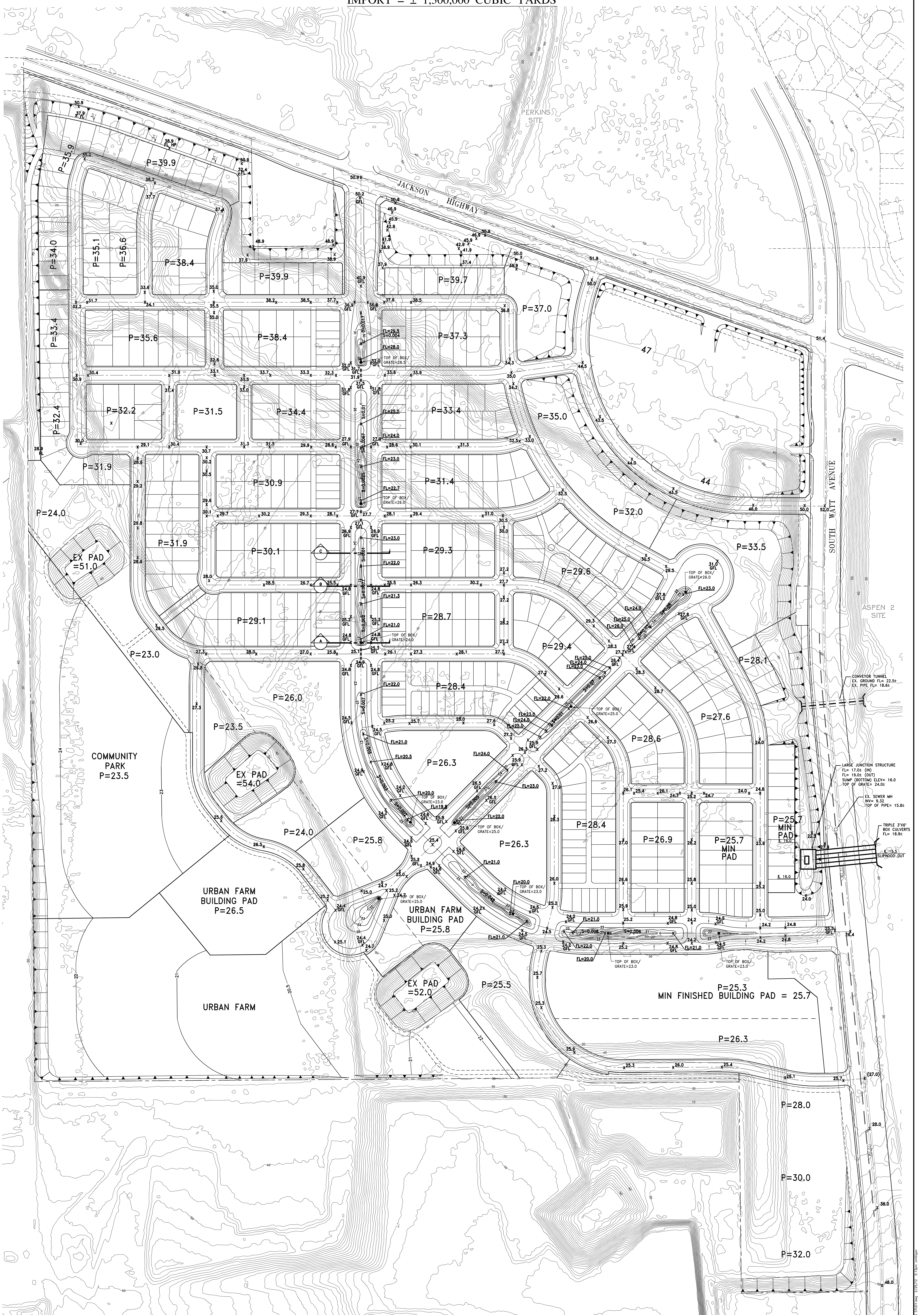
J:\1000-s\1426-RockCreek\Aspen_I\Civil\Studies\Drain\Drain_MP_Figures\FIG-1_PUD_SCHEMATIC_PLAN.dwg 3/22/2012 1:28 PM Stan Mette

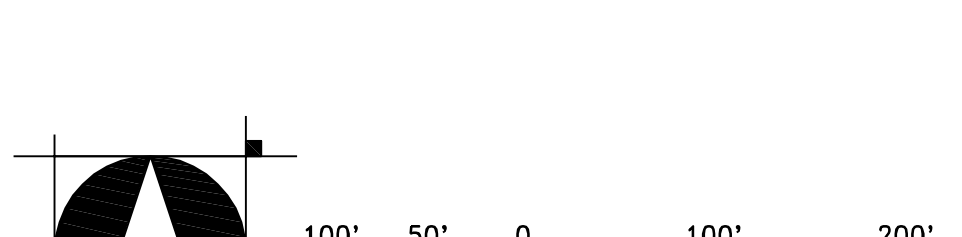
ASPEN 1 - NEW BRIGHTON

PRELIMINARY GRADING STUDY

CITY OF SACRAMENTO, CALIFORNIA
MARCH, 2011

IMPORT = ± 1,300,000 CUBIC YARDS





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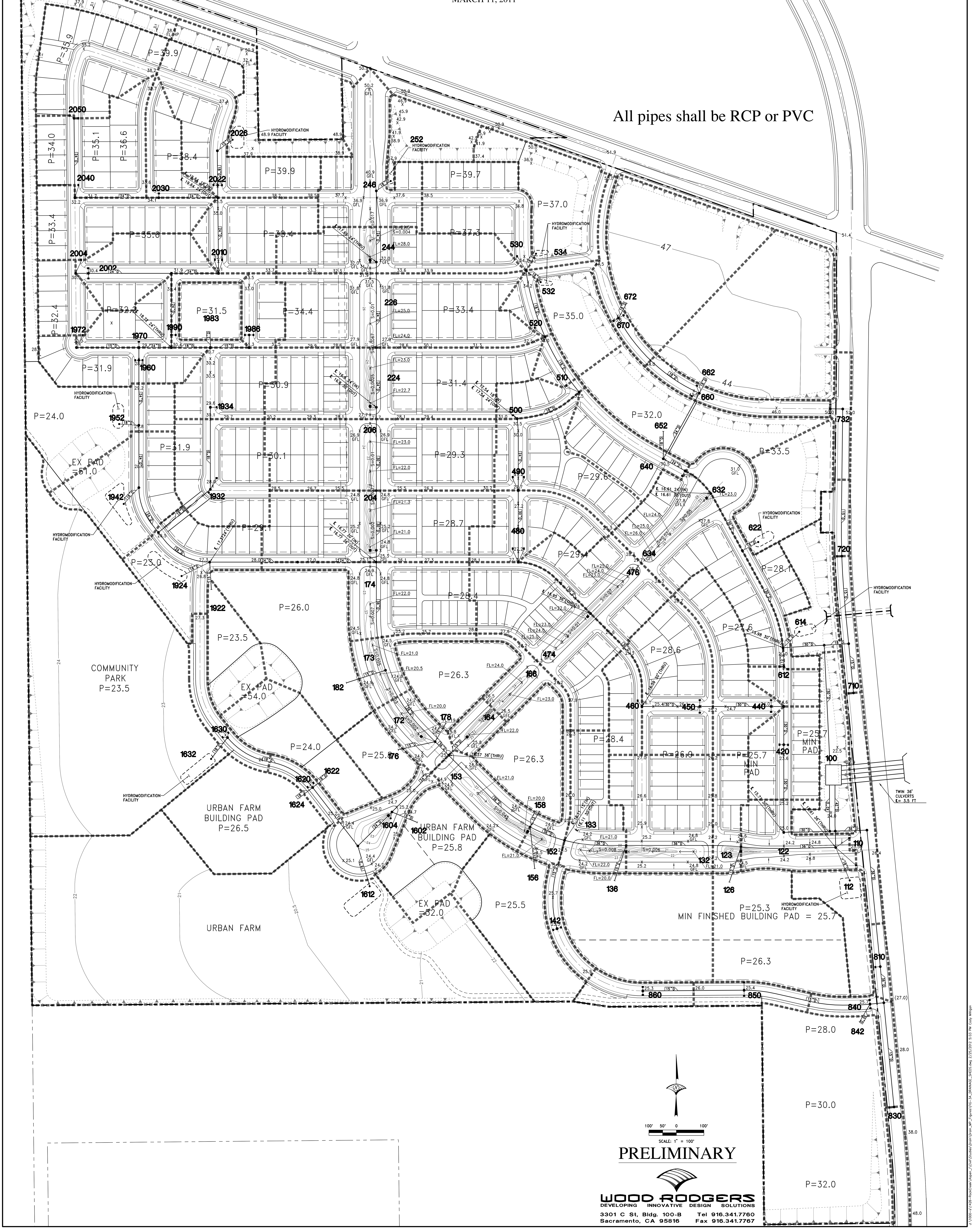
ASPEN 1
DRAINAGE SHEDS
CITY OF SACRAMENTO, CALIFORNIA
MARCH 11, 2011

FIGURE 3A

All pipes shall be RCP or PVC



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ASPEN 1
SHED AREA & NODE ID

CITY OF SACRAMENTO, CALIFORNIA

MARCH 11, 2011

FIGURE 3B

PRELIMINARY

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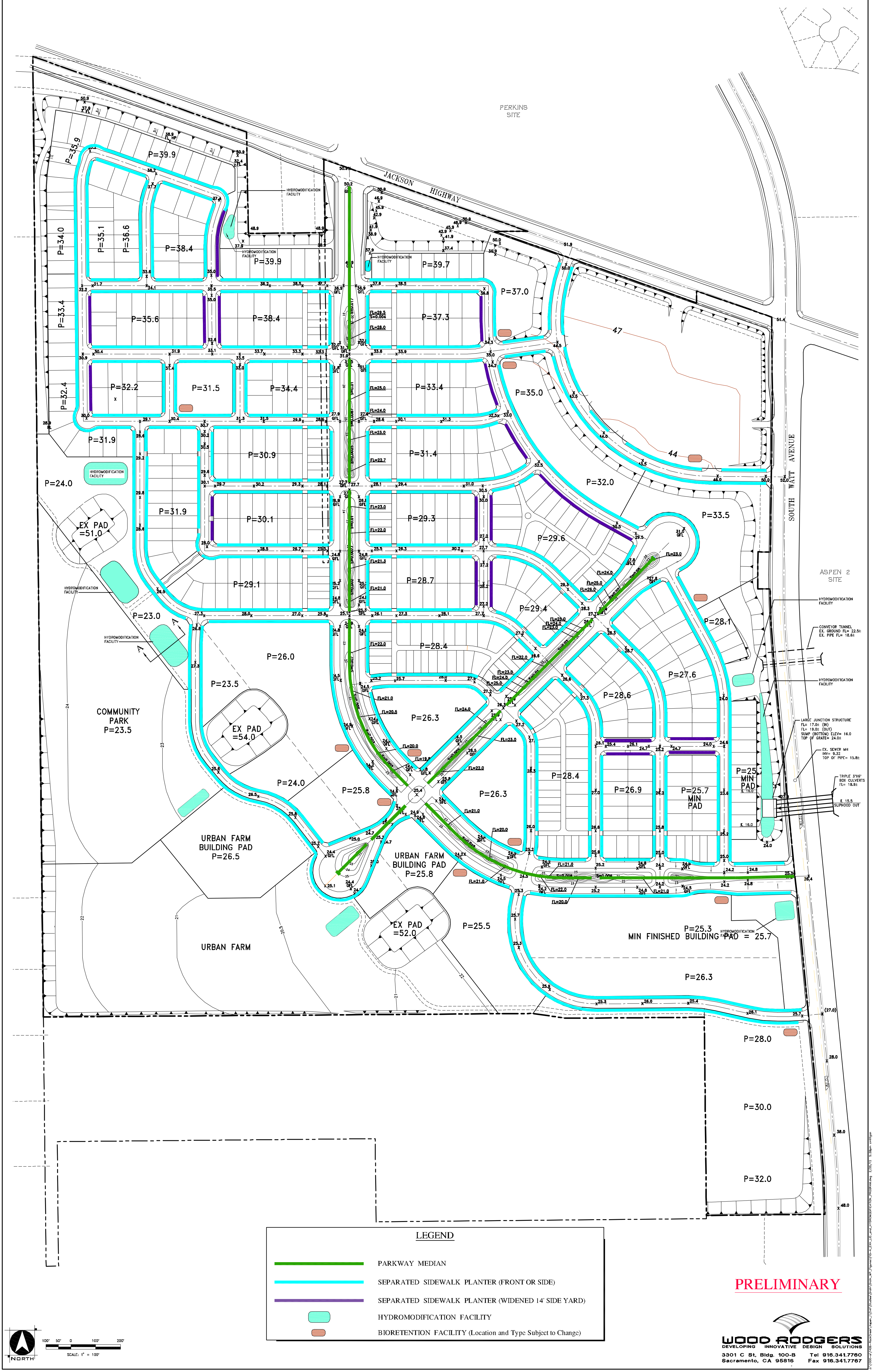
ASPEN 1
L.I.D. & HYDROMODIFICATION PROGRAM

FIGURE 4

CITY OF SACRAMENTO, CALIFORNIA
MARCH 2012



LEGEND

- 🟩 PARKWAY MEDIAN
- 🟦 SEPARATED SIDEWALK PLANTER (FRONT OR SIDE)
- 🟪 SEPARATED SIDEWALK PLANTER (WIDENED 14' SIDE YARD)
- ▬ HYDROMODIFICATION FACILITY
- ▬ BIORETENTION FACILITY (Location and Type Subject to Change)

PRELIMINARY

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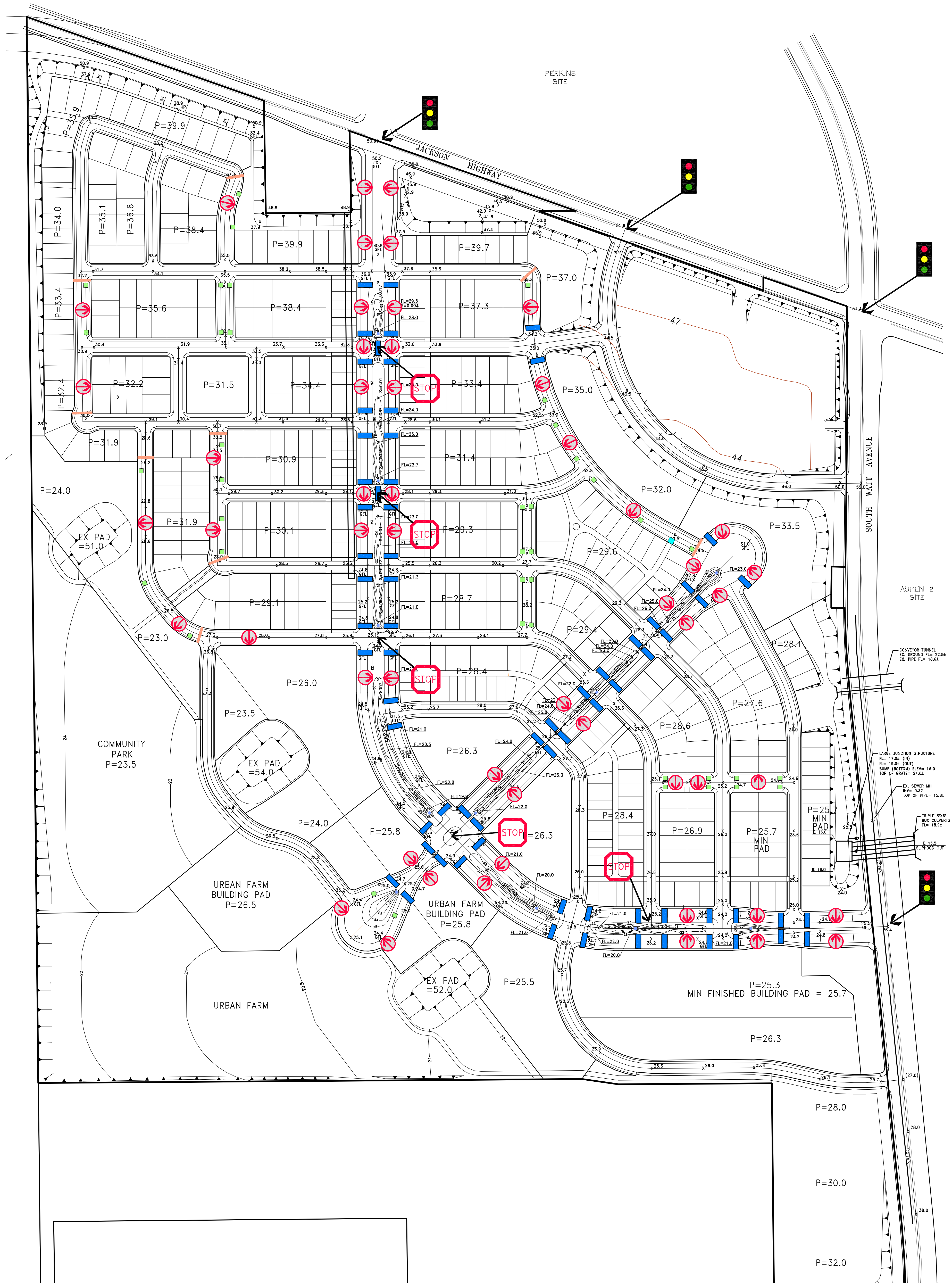
J:\1000-s\1426-RockCreek\Aspen_1\Civil\Studies\Drain\Drain_MP_Figures\FIG-4_EXH_LID_

ASPEN 1
STREET STANDARDS & DETAILS

FIGURE 5

CITY OF SACRAMENTO, CALIFORNIA
MARCH 2012



LEGEND

🚦 TRAFFIC SIGNAL AT INTERSECTION

🛑 STOP SIGN AT INTERSECTION

➔ STREET CROWNED IN ONE DIRECTION(2% CROSS SLOPE)

▬ CONCRETE CROSS GUTTERS W/ CURB CUTS

🟦 ALLEYS W/ CROSS GUTTERS TO LID FACILITY

🟩 CURB CUT

— LIMITS OF STREETS TIPPED IN ONE DIRECTION

PRELIMINARY

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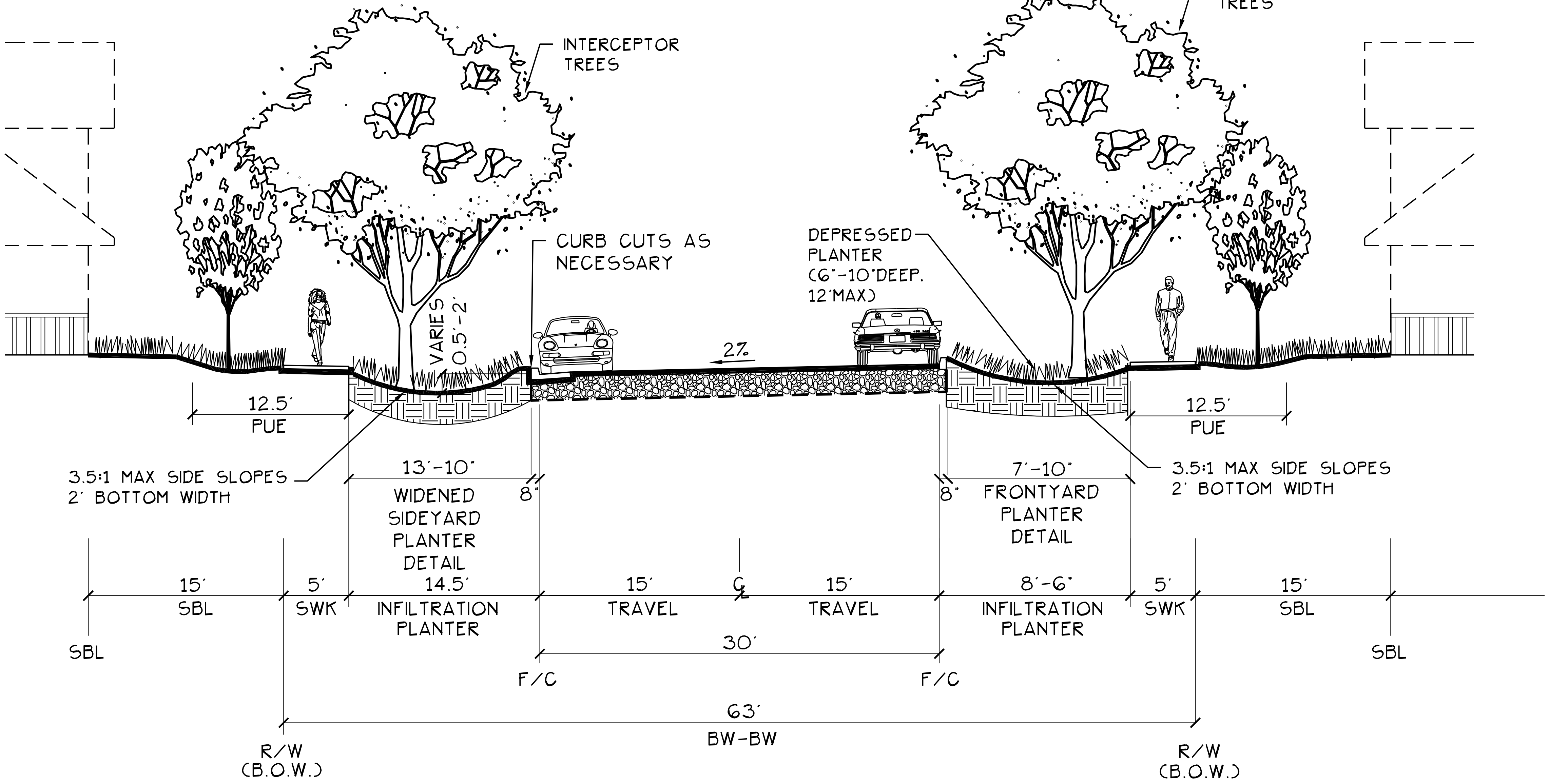
J:\1000-s\1426-RockCreek\Aspen_1\Civil\Studies\Drain\Drain_MP_Figures\FIG-5_EXH_STRE

ASPEN 1
RESIDENTIAL STREET W/DETACHED SIDEWALK & LID SWALE

FIGURE 6

CITY OF SACRAMENTO, CALIFORNIA
MARCH 2012



NOTE:
PLANTER AREA SHALL SAWTOOTH LONGITUDINALLY ALONG STREET FRONTAGE SO THAT EACH HOUSE HAS A 4" DEPRESSION ON HIGH SIDE OF LOT FOR PEDESTRIAN CROSSING + 8" DEEP AT LOW SIDE.

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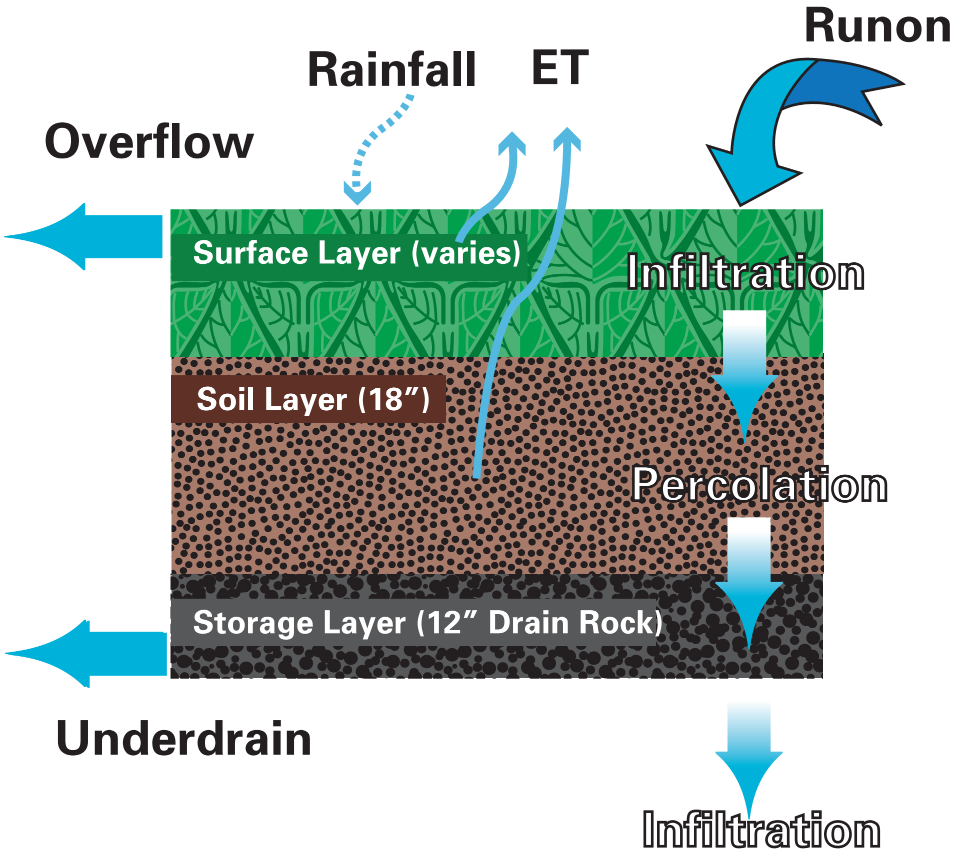
\\sacfile01\Jobs\1000-s\1426-RockCreek\Aspen_I\Civil\Studies\Drain\Drain_MP_Figures\FIG-6-7-8_EXH_TYPICAL_STREET_SECTIONS.dwg 7/29/11 9:07am tkaushagen

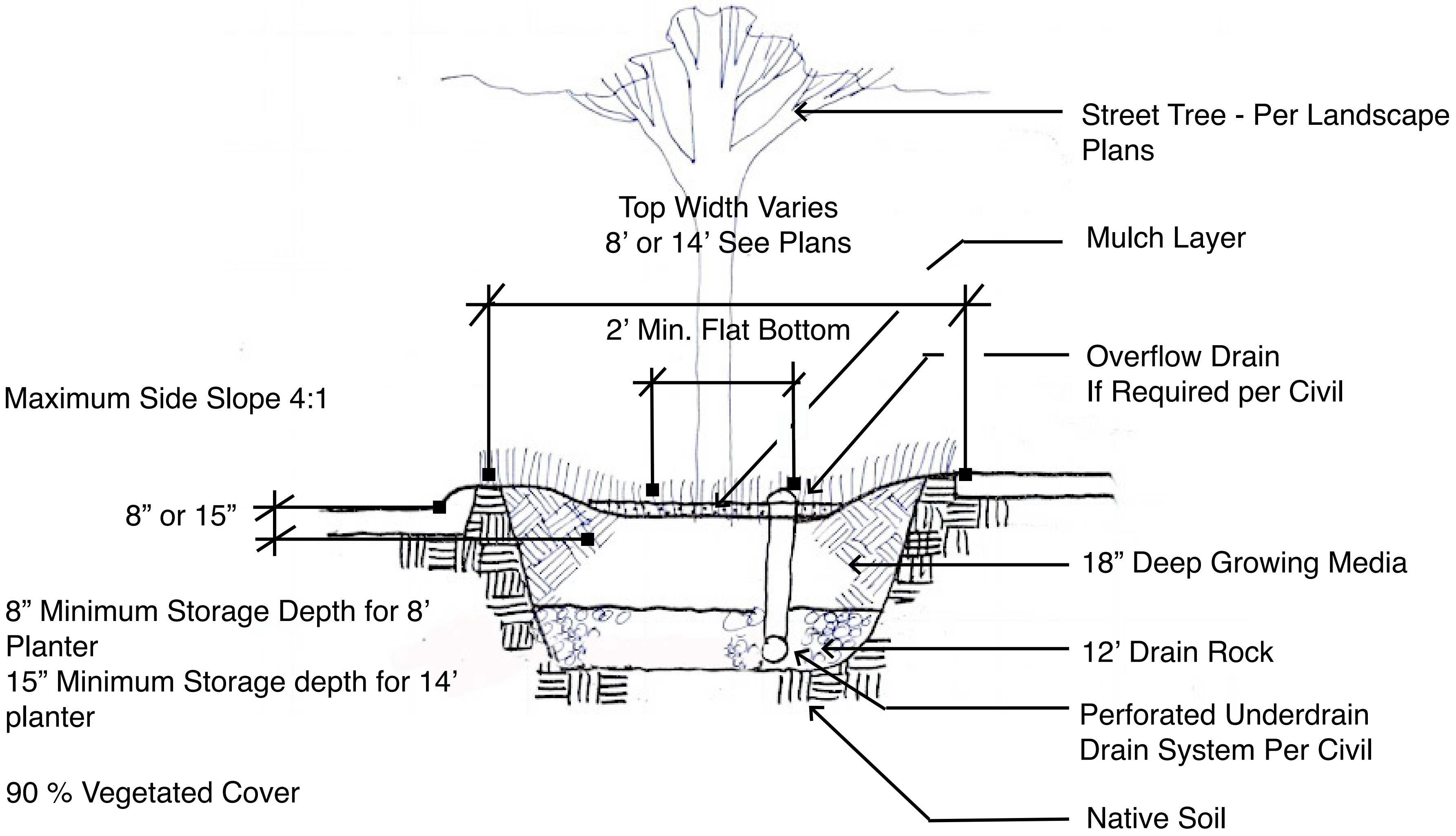
Figure 6-1: LID Components and Processes Modeled



(Not to Scale)

Aspen I
City of Sacramento
March 2012

Watearth™
Hydrology/Hydraulics and Sustainable Water Resources



Maximum Side Slope 4:1

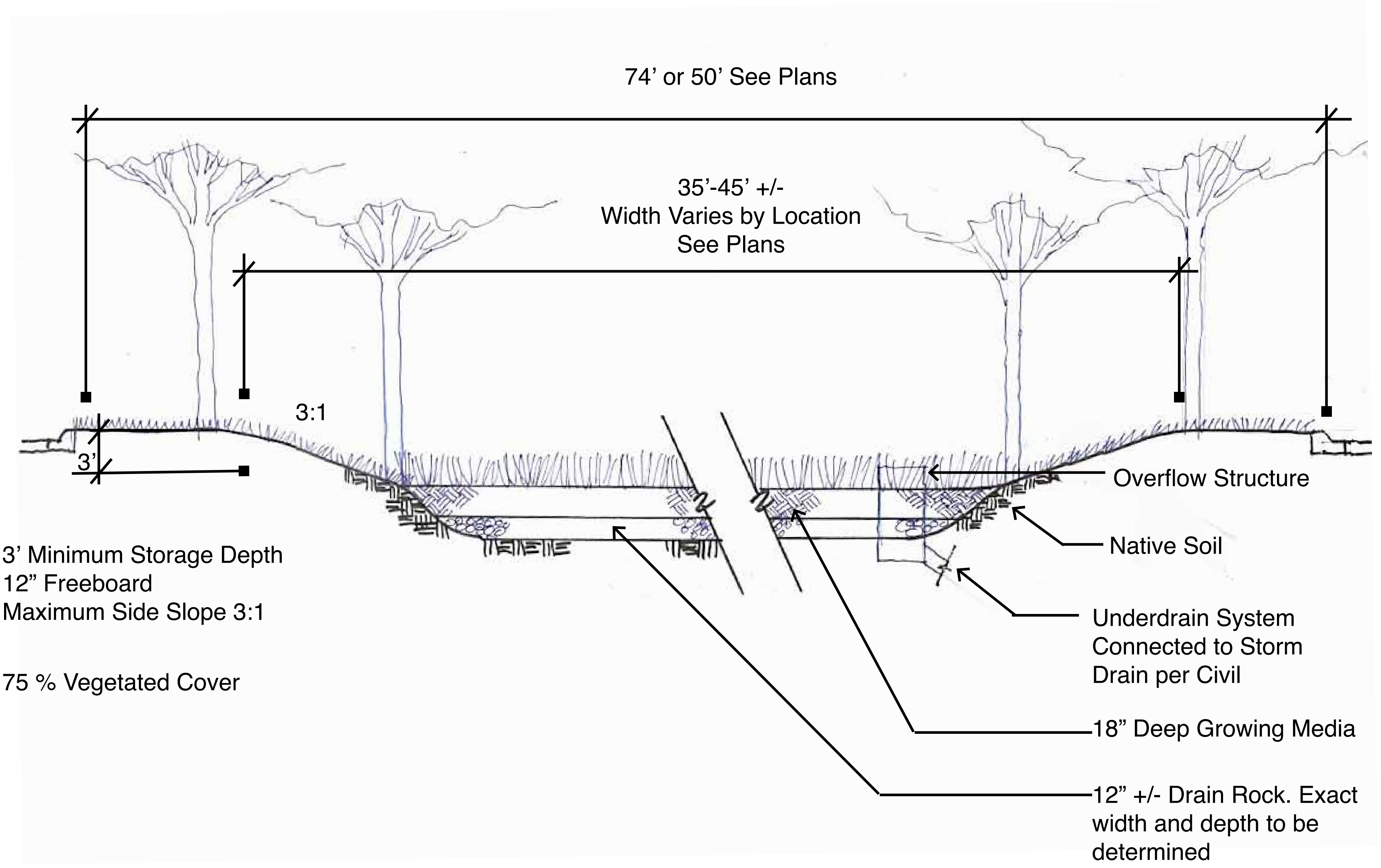
8” Minimum Storage Depth for 8’ Planter
15” Minimum Storage depth for 14’ planter

90 % Vegetated Cover

Figure 6-2 Infiltration Planter
Aspen 1 New Brighton

SWA

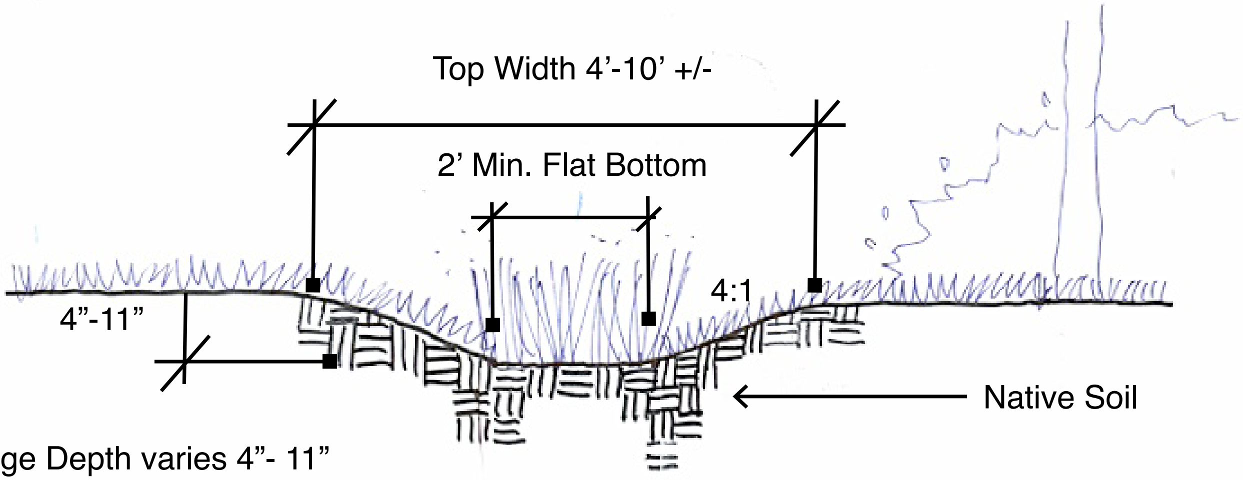
Watearth
Hydrology/Hydraulics and Sustainable Water Resources



3' Minimum Storage Depth
12" Freeboard
Maximum Side Slope 3:1

75 % Vegetated Cover

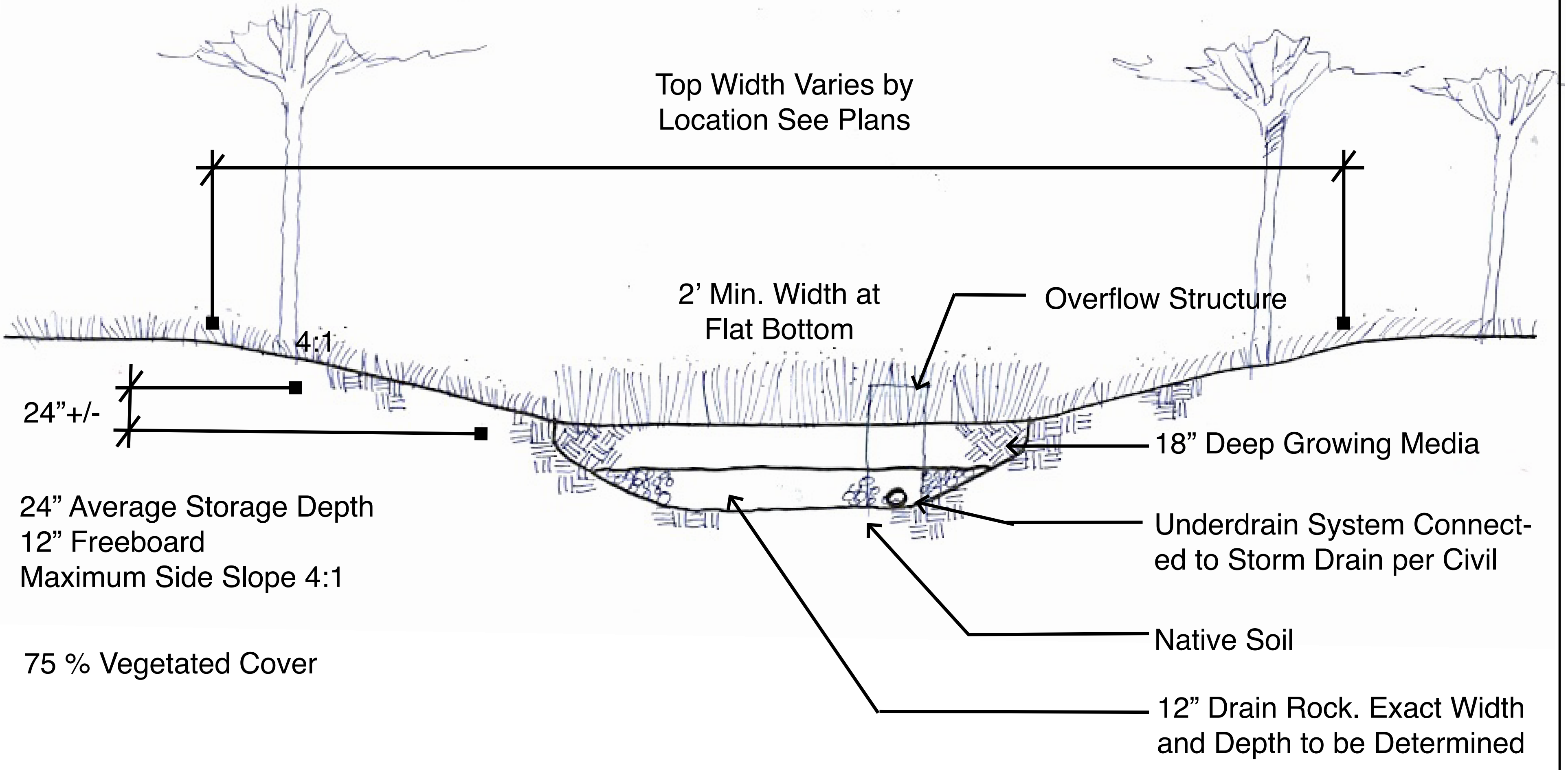
Figure 6-3 Vegetative Median Swale
Aspen 1 New Brighton



Storage Depth varies 4"- 11"
Maximum Side Slope 4:1

75% Vegetated Cover

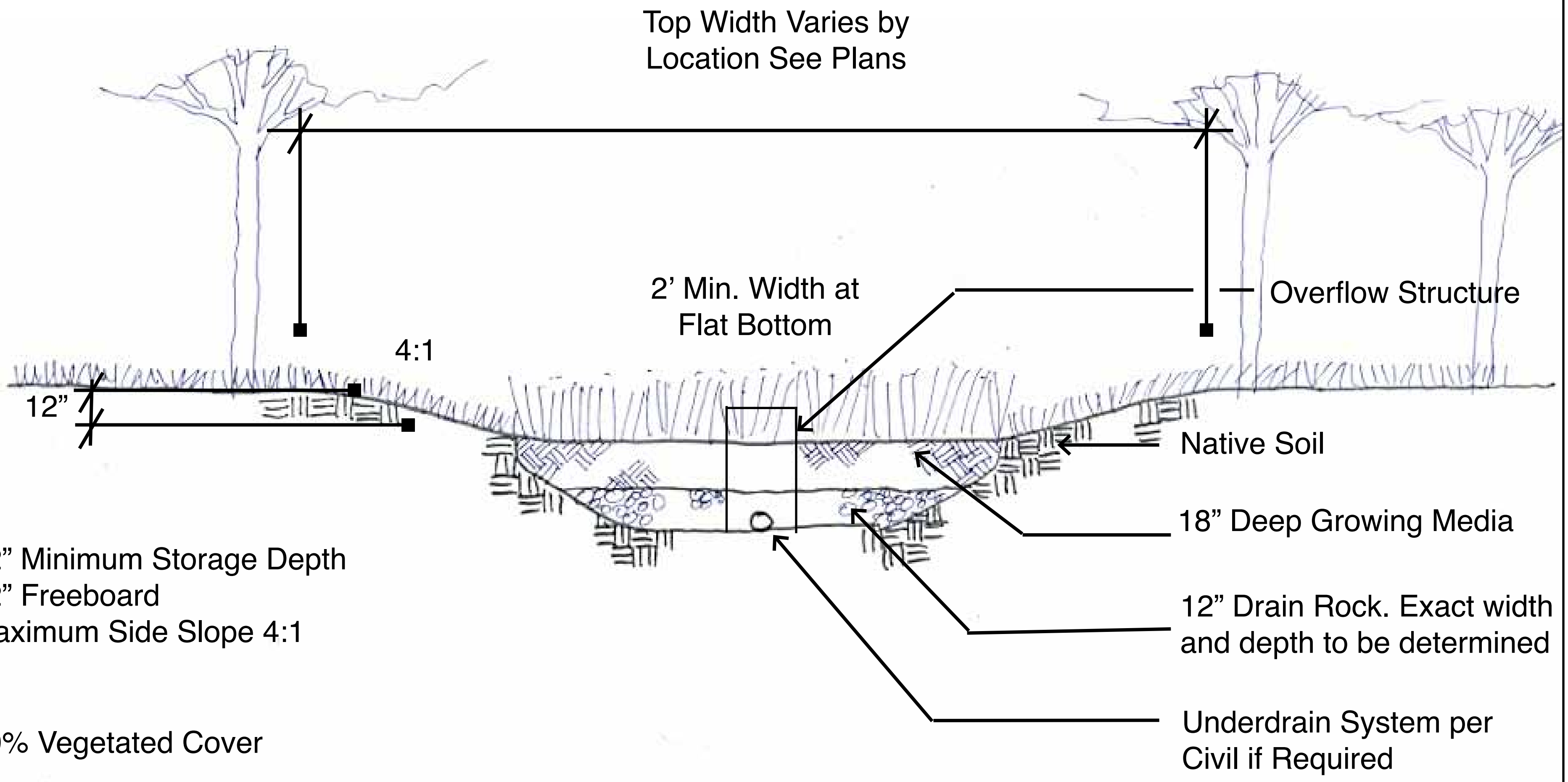
Figure 6-4 Open Space Stormwater Planter
Aspen 1 New Brighton



24" Average Storage Depth
12" Freeboard
Maximum Side Slope 4:1

75 % Vegetated Cover

Figure 6-5 Hydromodification Facility
Aspen 1 New Brighton



12” Minimum Storage Depth
12” Freeboard
Maximum Side Slope 4:1

90% Vegetated Cover

Figure 6-6 Bioretention Facility
Aspen 1 New Brighton

Figure 6-7: Historical Precipitation Used in Aspen 1 Continuous Simulation Analysis

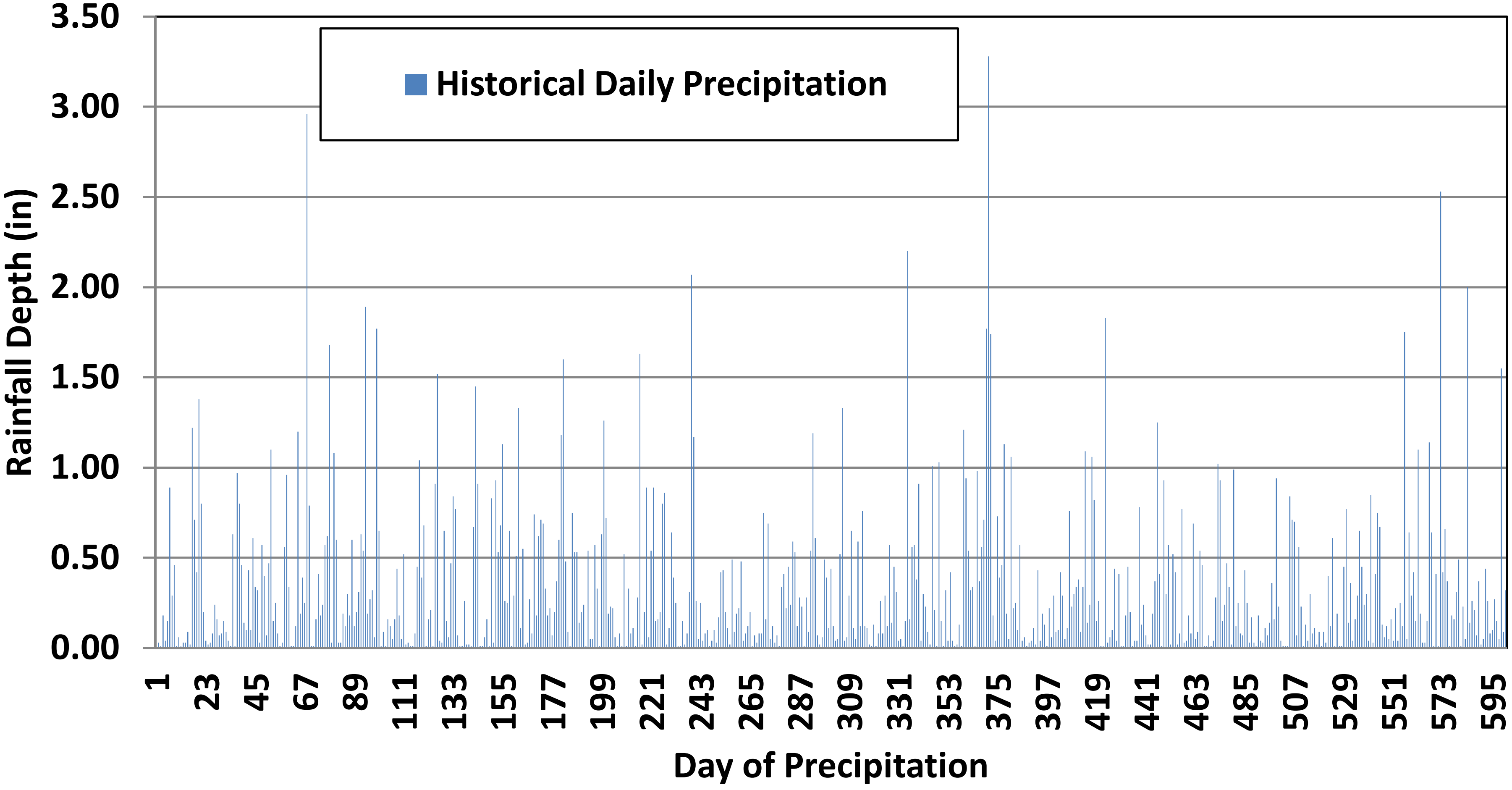


Figure 6-8: Aspen 1 Peak Discharge from Continuous Simulation Analysis

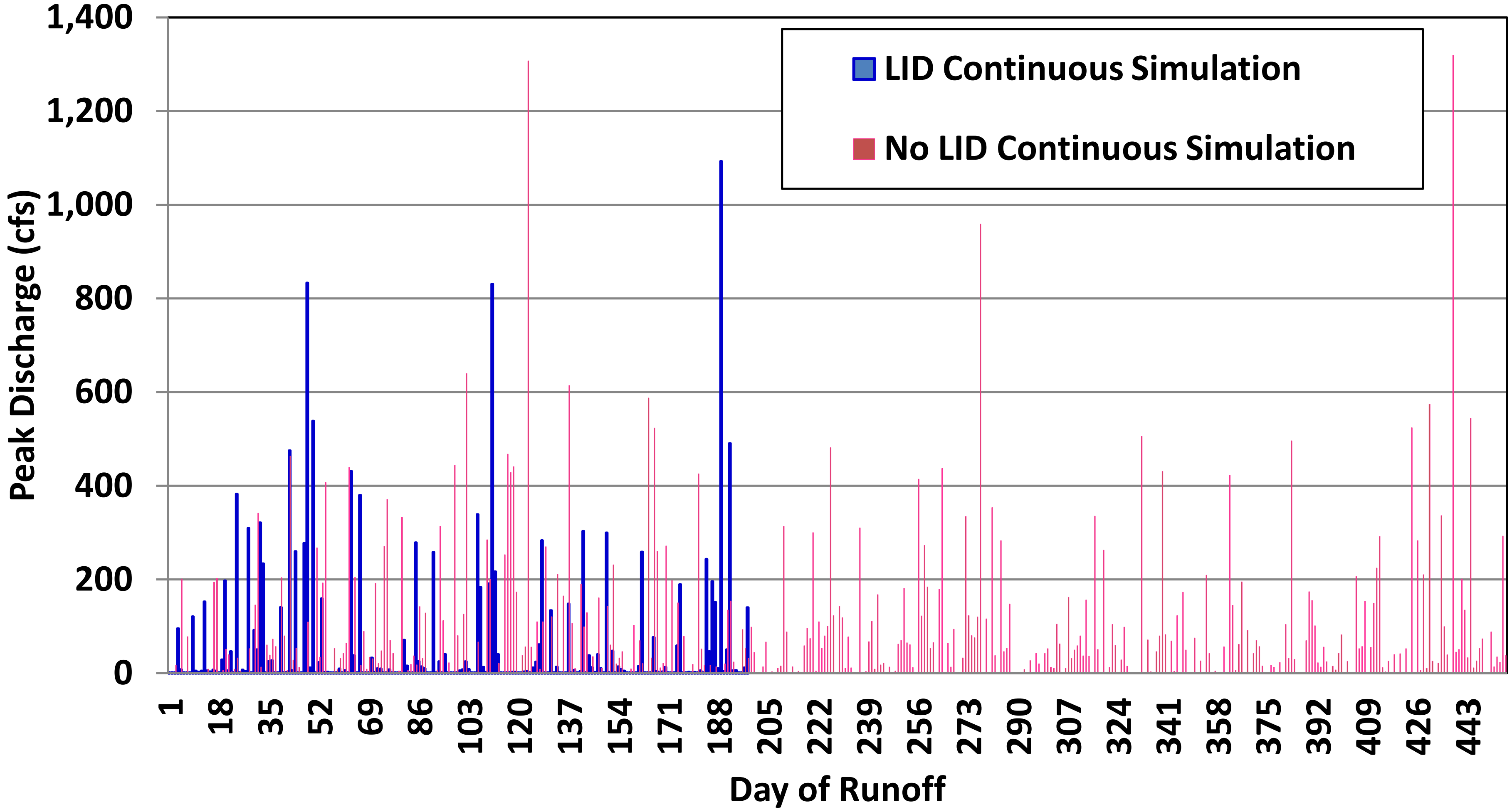


Figure 6-8A: Aspen 1 Maximum Annual Peak Discharge from Continuous Simulation Analysis

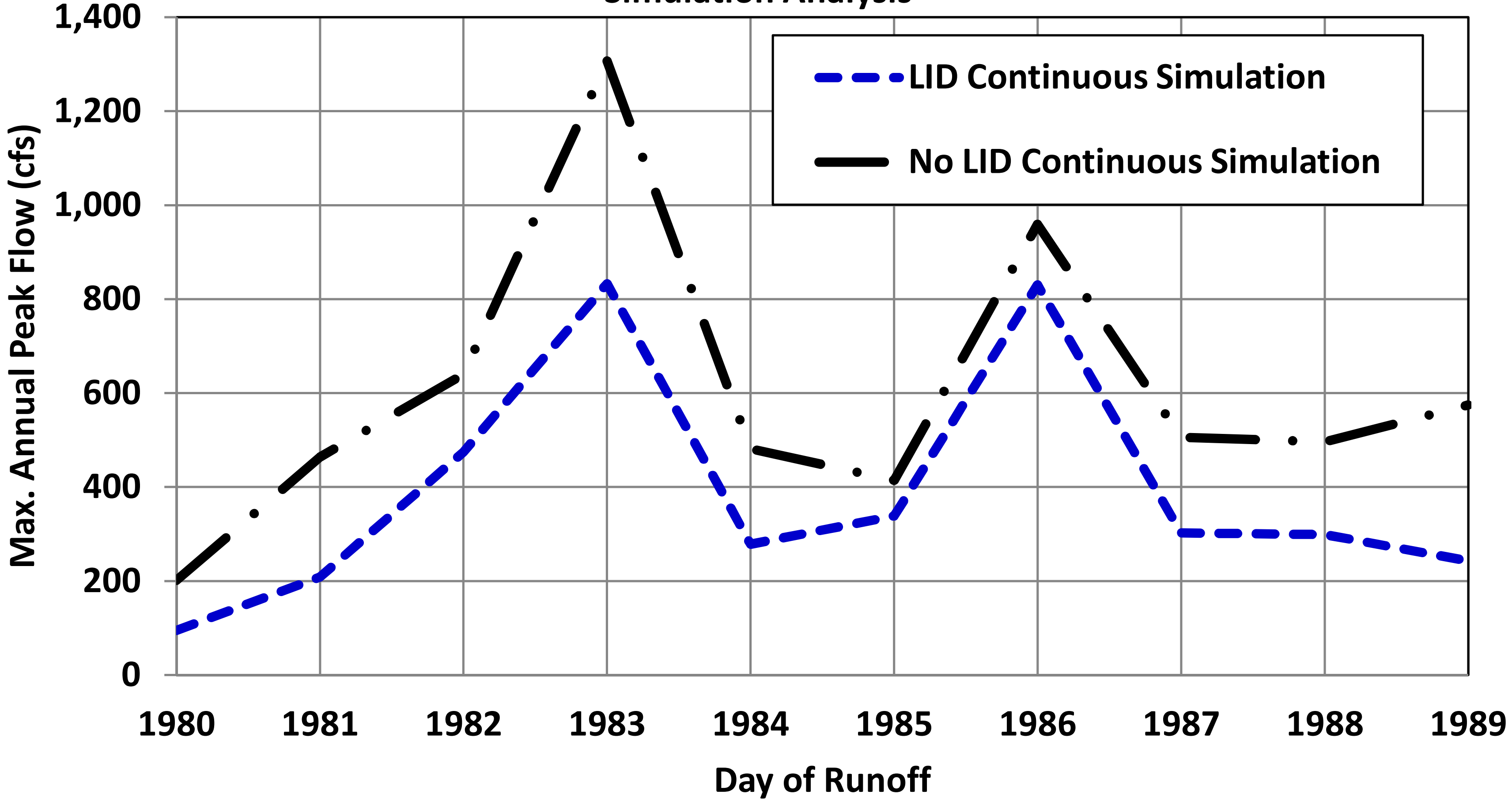


Figure 6-9: Aspen 1 Flow Duration Exceedance Frequency Curves from Continuous Simulation Analysis

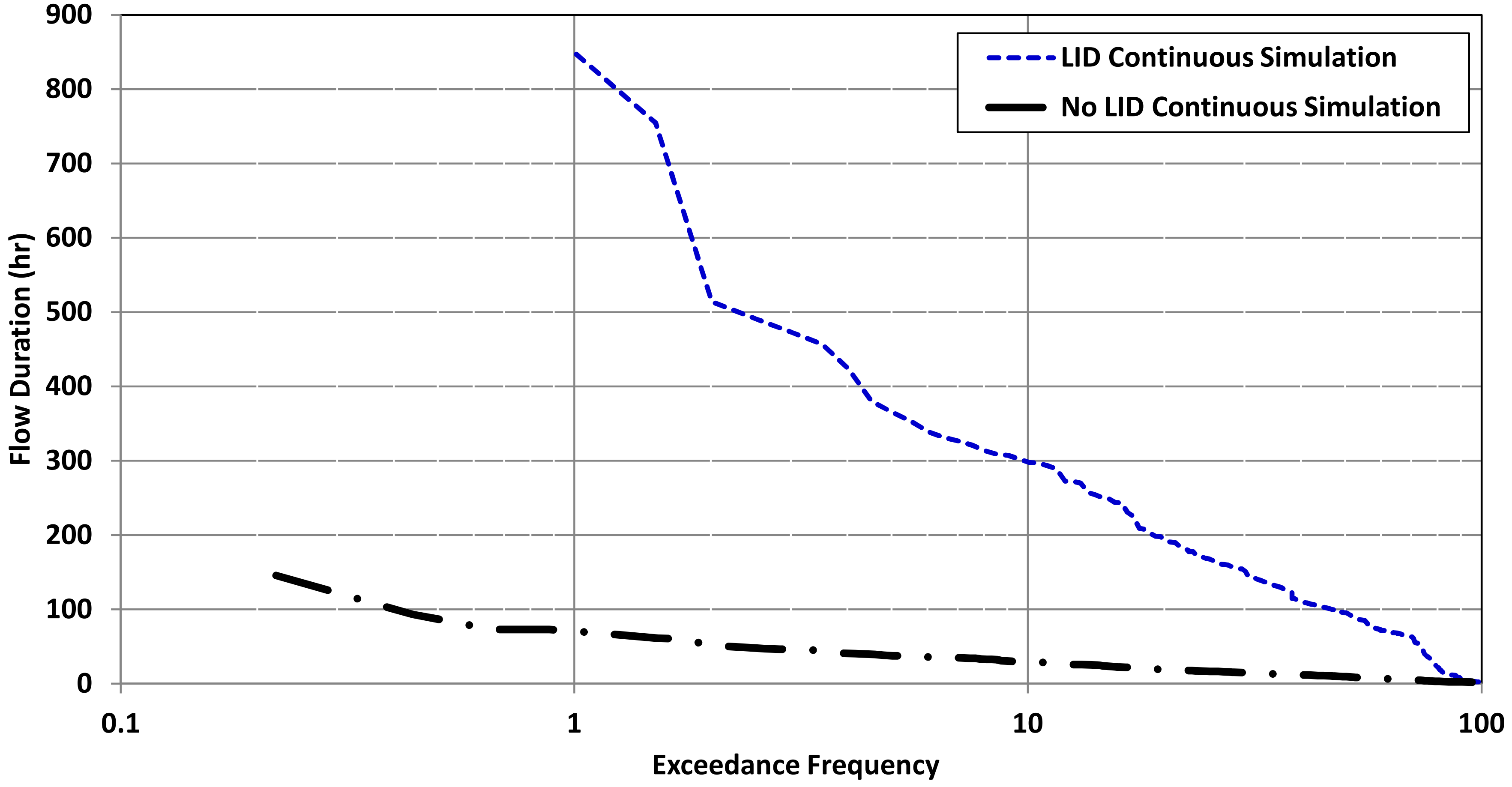


Figure 6-10: Aspen 1 Discharge Exceedance Frequency Curves from Continuous Simulation Analysis

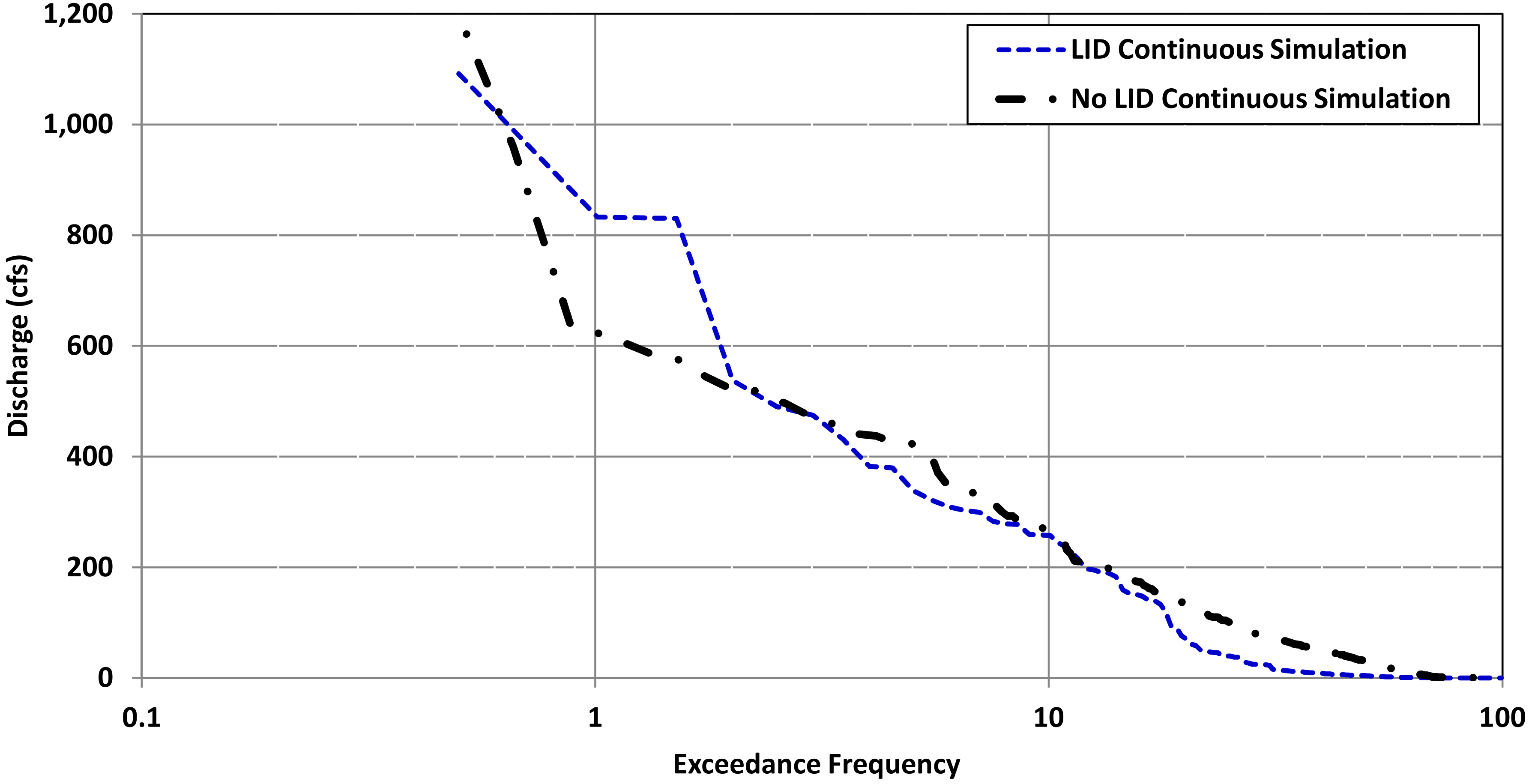


Figure 6-11: Aspen 1 Design Storm Event Runoff Hydrographs from Entire LID System

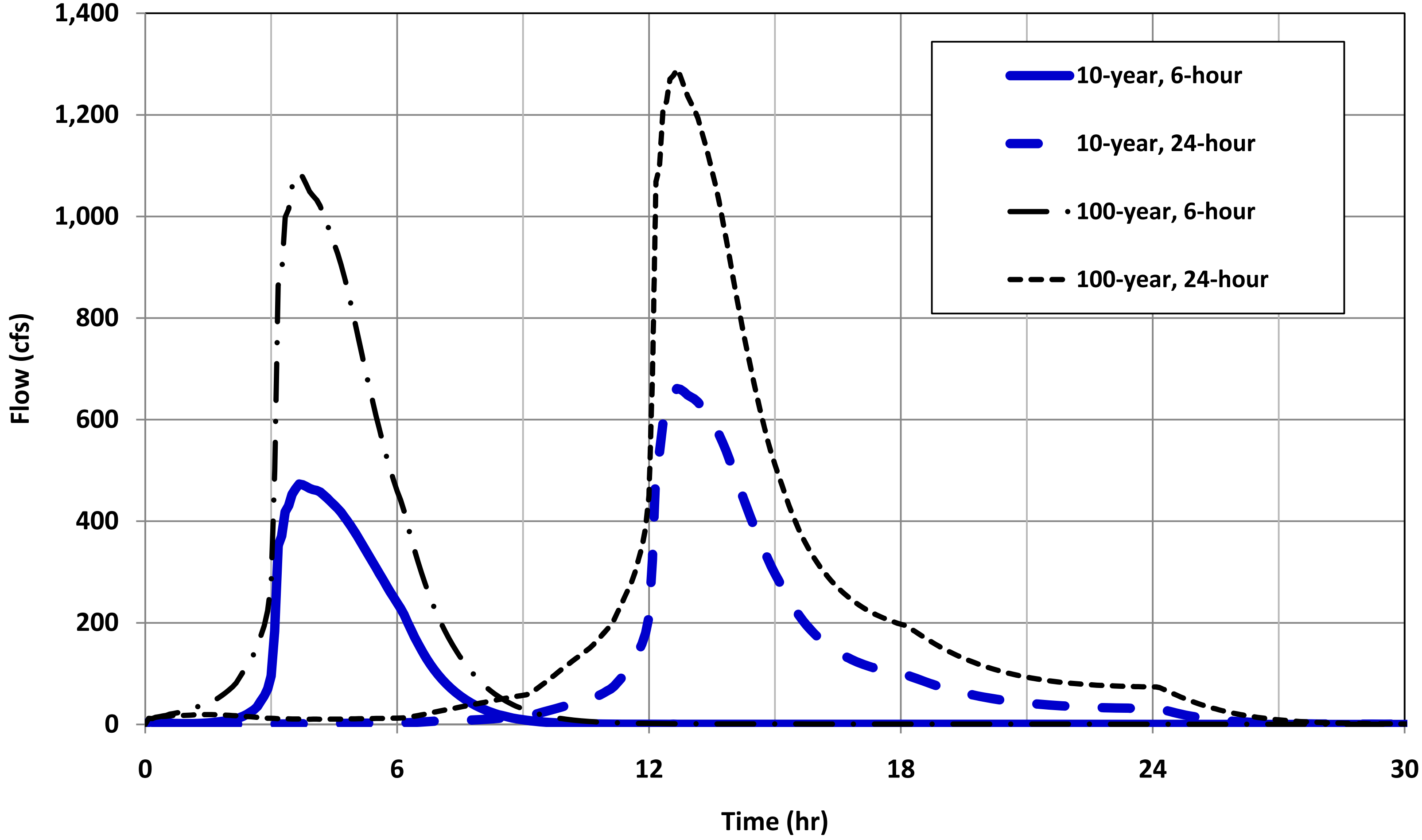


Figure 6-12: Surface Depth in Design Storm Analysis for Shed 204 8' Residential Infiltration Planters

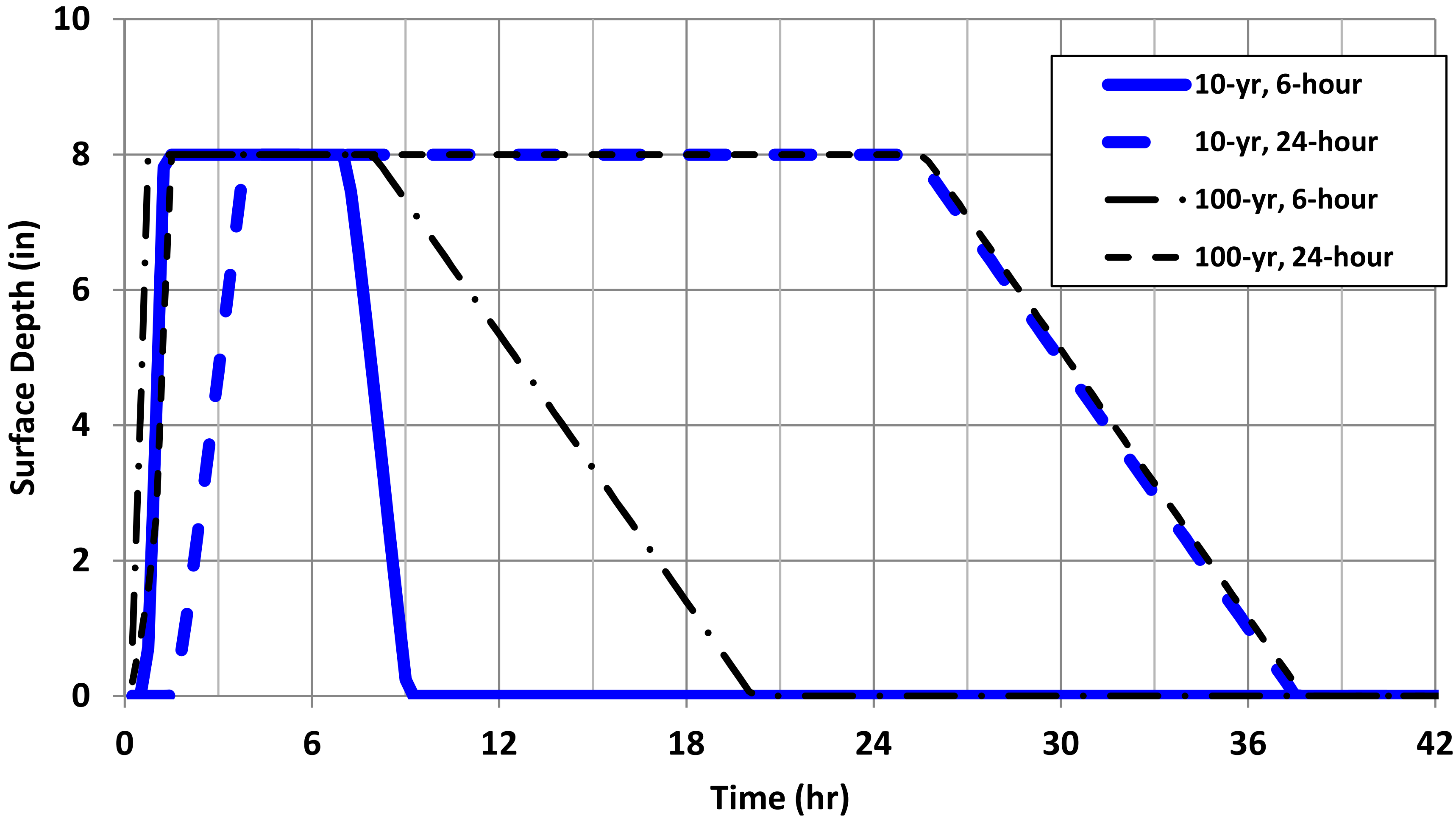


Figure 6-13: Storage Layer (Drain Rock) Depth in Design Storm Analysis for Shed 204 8' Residential Infiltration Planters

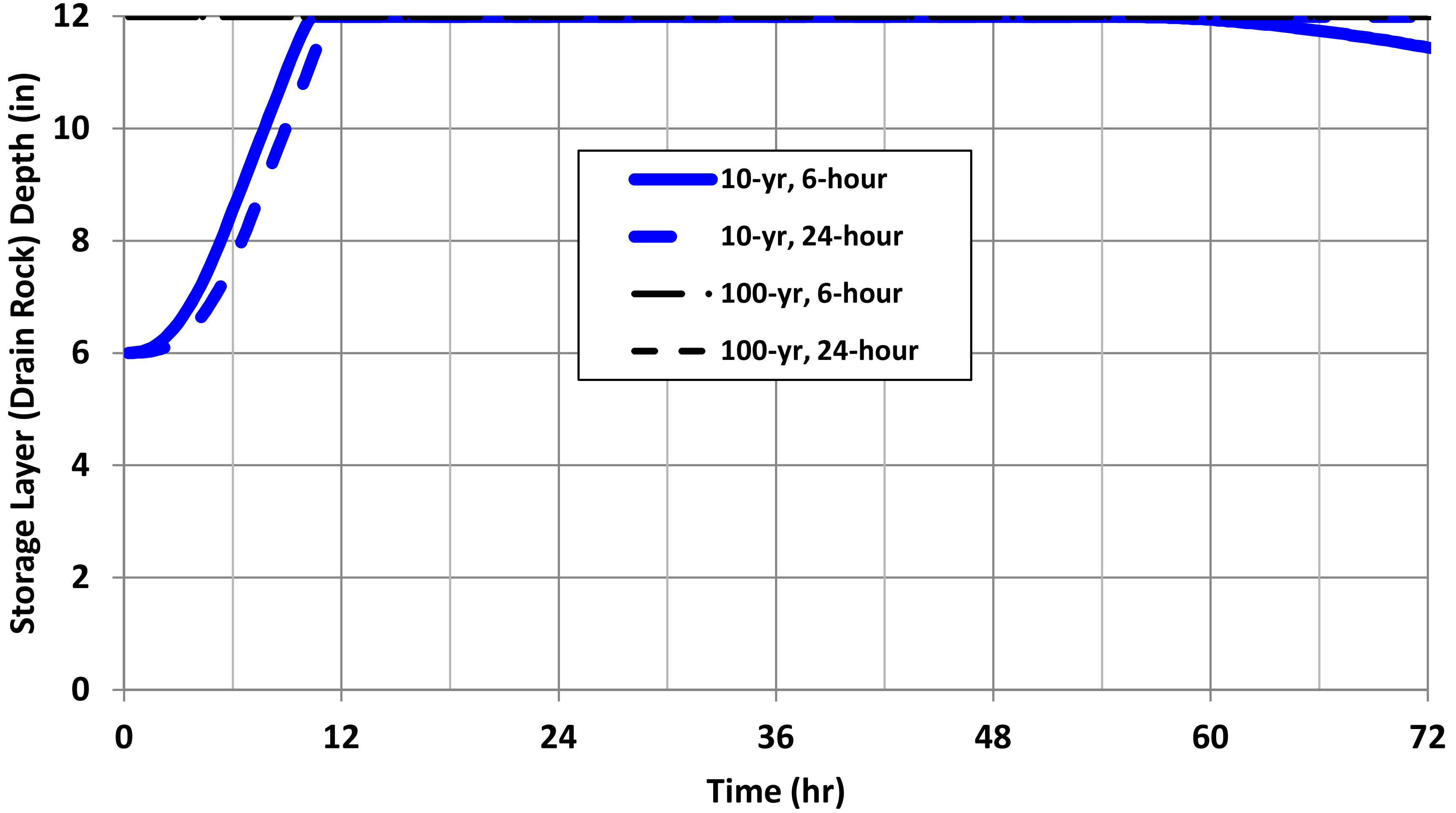
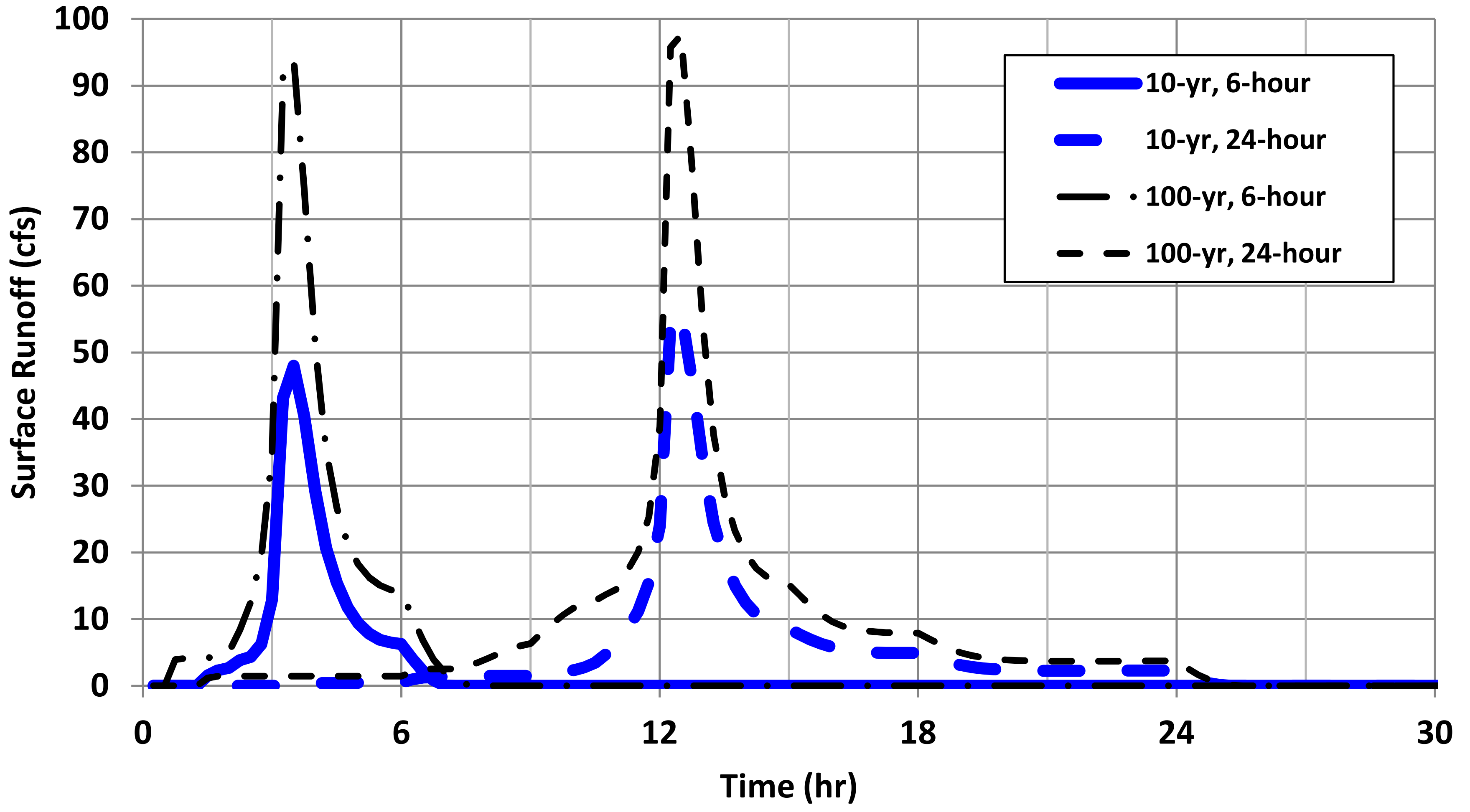


Figure 6-14: Surface Runoff in Design Storm Analysis for Shed 204 8' Residential Infiltration Planters



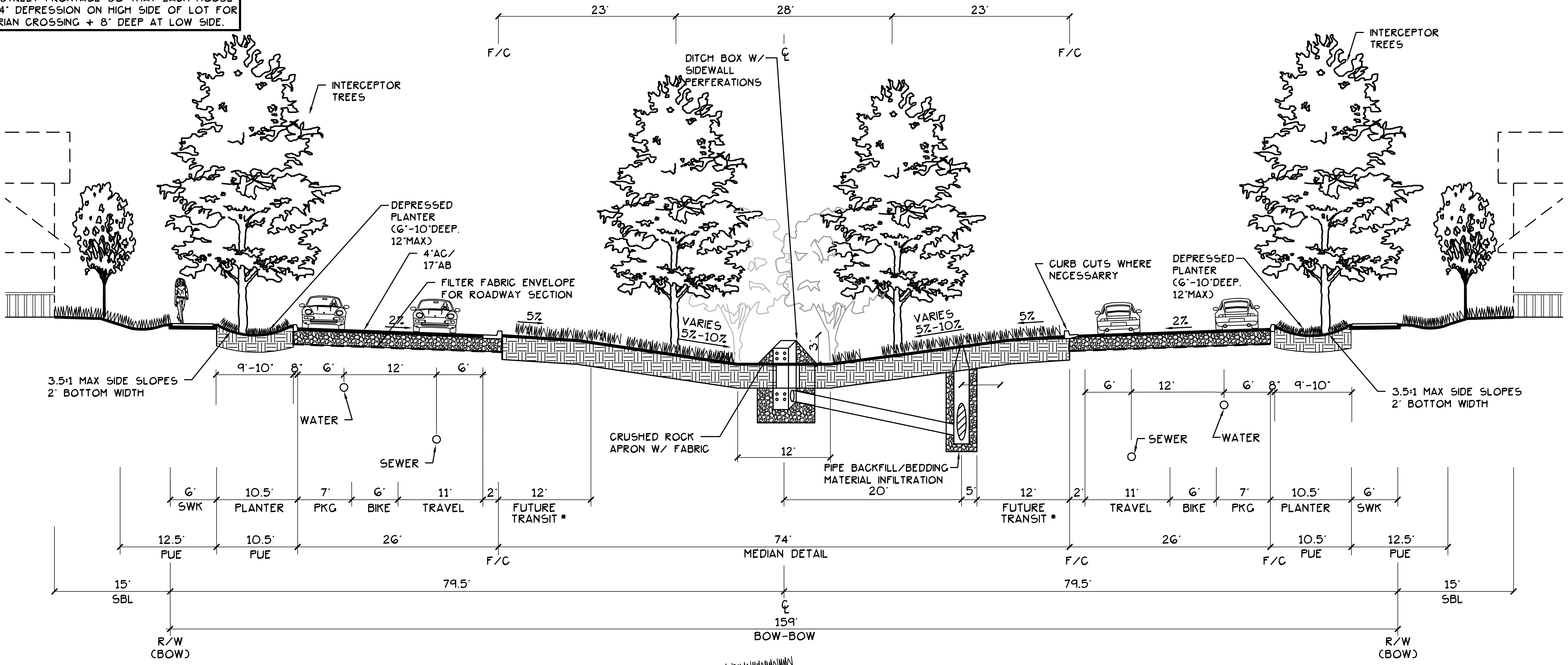
ASPEN 1
ROCK CREEK PARKWAY

FIGURE 7

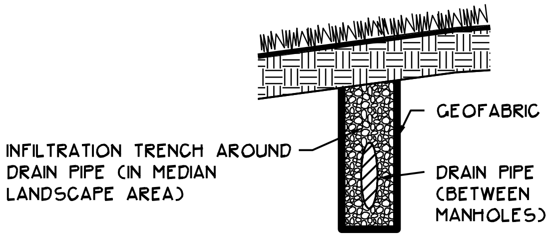
CITY OF SACRAMENTO, CALIFORNIA

MARCH 2012

NOTE:
PLANTER AREA SHALL SAWTOOTH LONGITUDINALLY ALONG STREET FRONTAGE SO THAT EACH HOUSE HAS A 4" DEPRESSION ON HIGH SIDE OF LOT FOR PEDESTRIAN CROSSING + 8" DEEP AT LOW SIDE.



*NOTE: MEDIAN ALLOWS FOR FUTURE TRANSIT ROUTE. THE ALIGNMENT IS TO BE DETERMINED.



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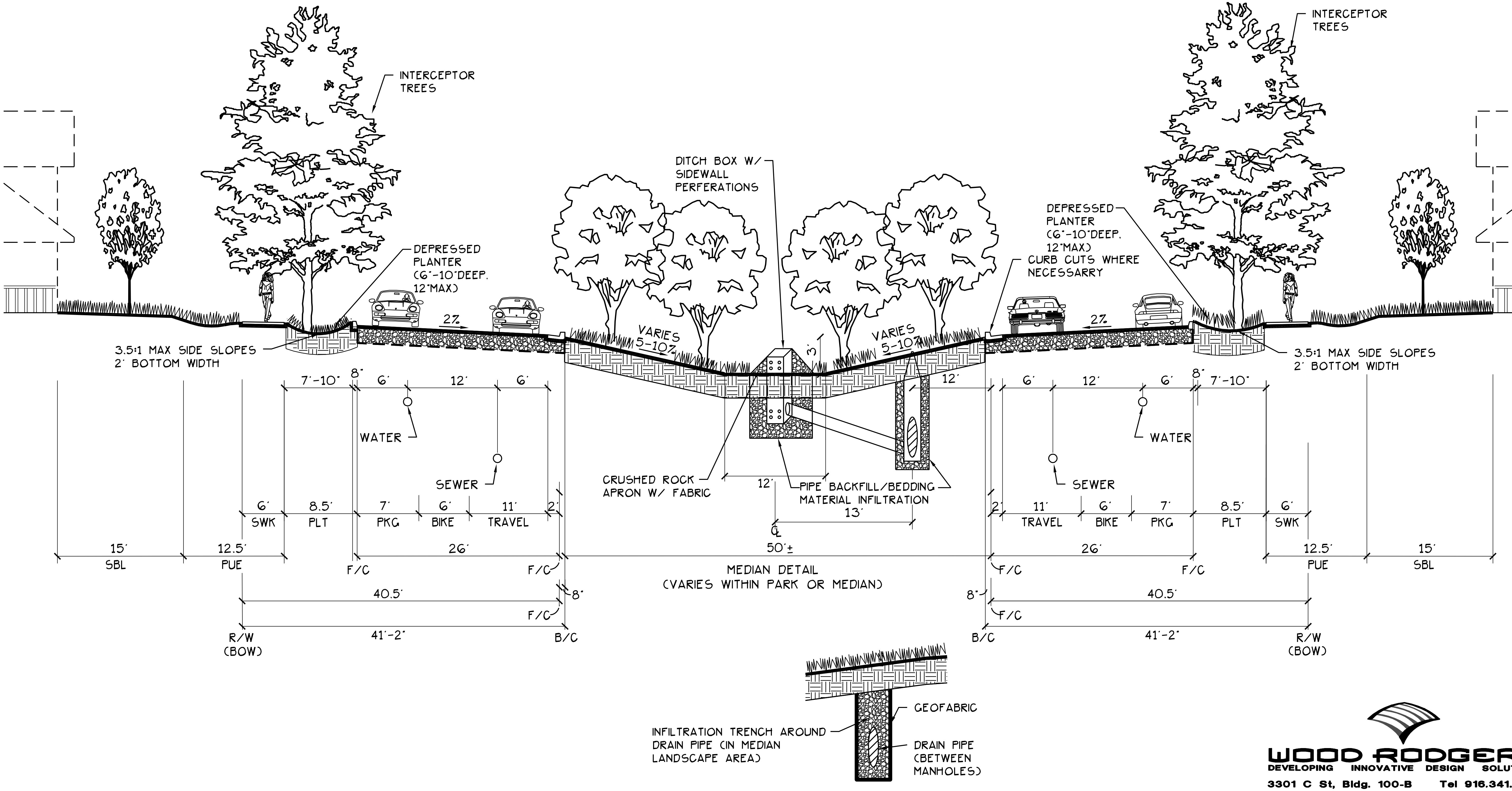
ASPEN 1
ASPEN PROMENADE

FIGURE 8

CITY OF SACRAMENTO, CALIFORNIA
MARCH 2012

NOTE:
PLANTER AREA SHALL SAWTOOTH LONGITUDINALLY ALONG STREET FRONTAGE SO THAT EACH HOUSE HAS A 4" DEPRESSION ON HIGH SIDE OF LOT FOR PEDESTRIAN CROSSING + 8" DEEP AT LOW SIDE.



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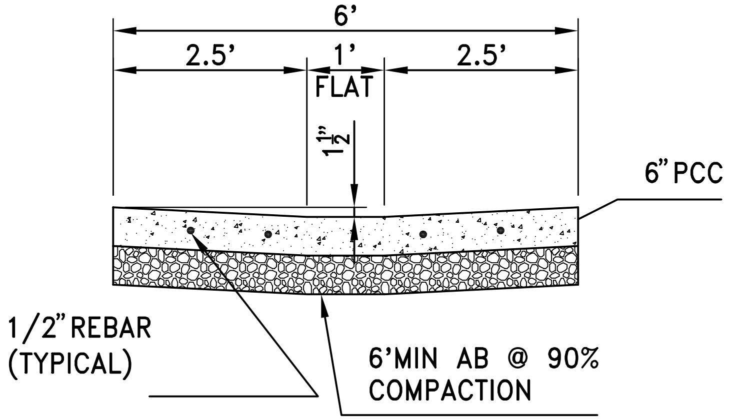
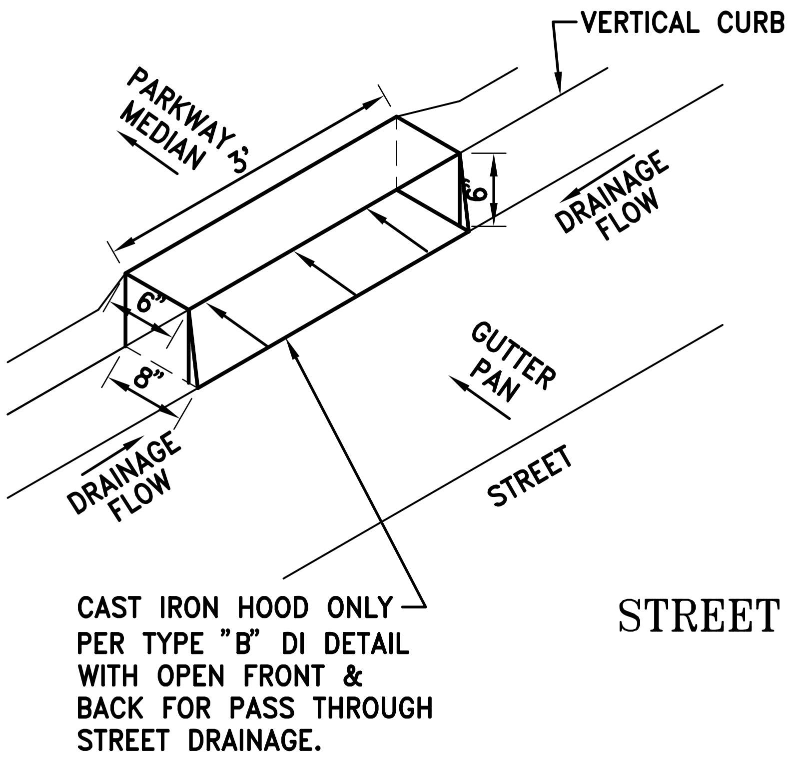
ASPEN 1
MEDIAN INTERSECTION CROSS GUTTER

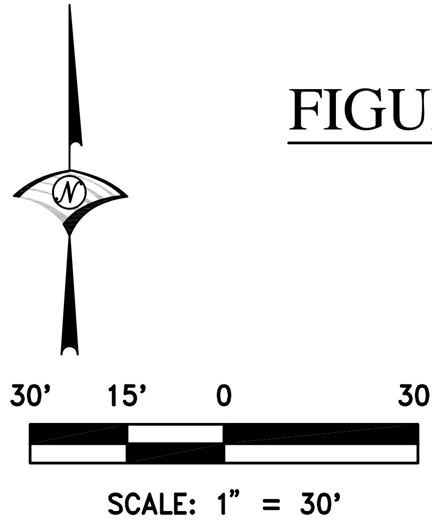
CITY OF SACRAMENTO, CALIFORNIA
MARCH 2012

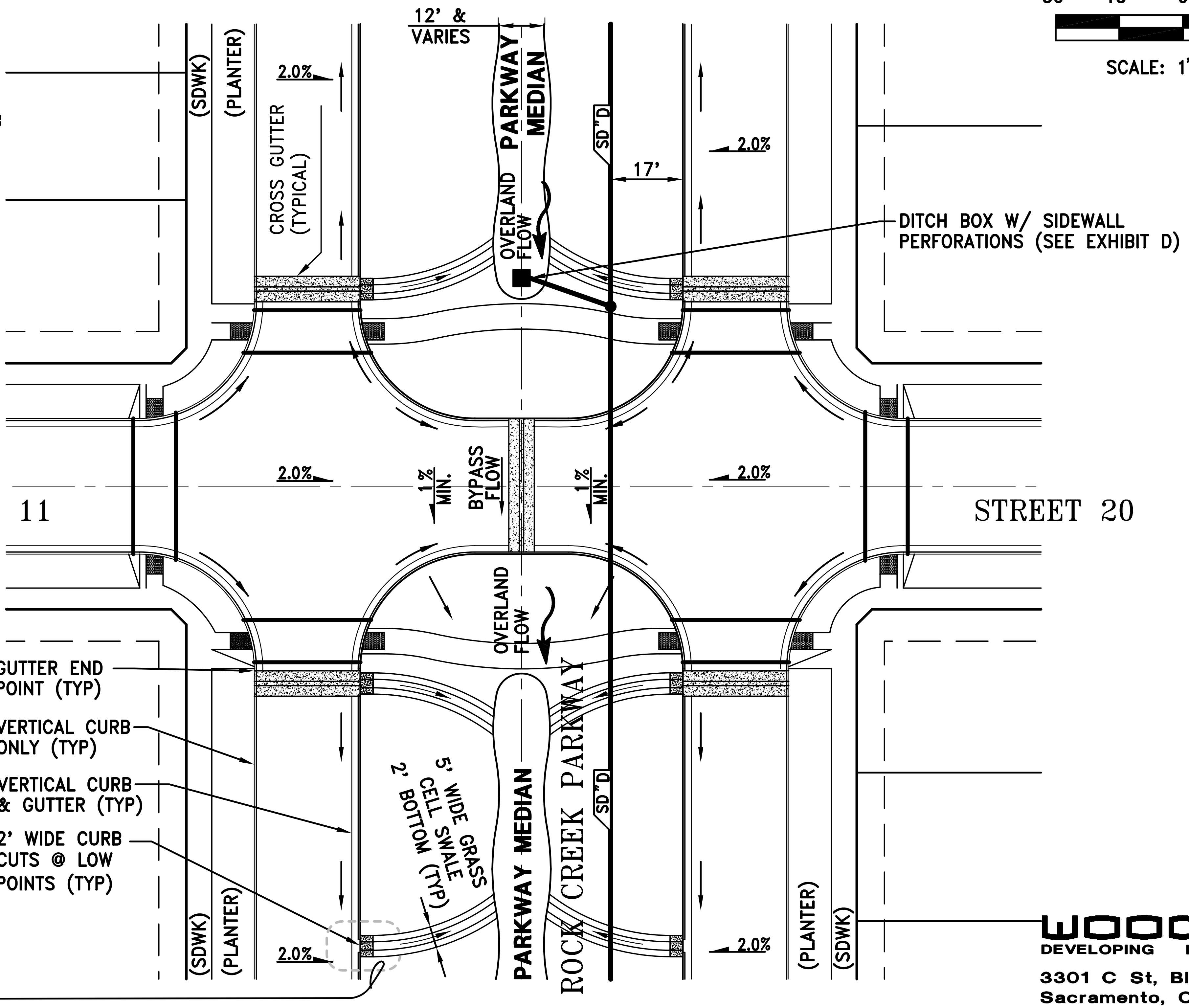
FIGURE 9

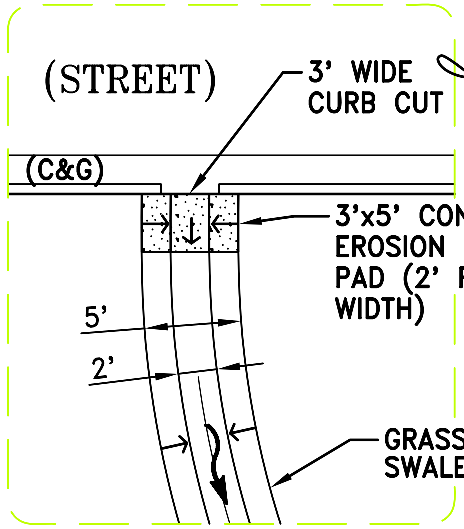


CROSS GUTTER DETAIL









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J:\1000-s\1426-RockCreek\Aspen_1\Civil\Studies\Drain\Drain_MP_Figures\FIG-9_EXH_INTERSECTION_CROSS_GUTTER.dwg 3/09/11 12:12pm stanm

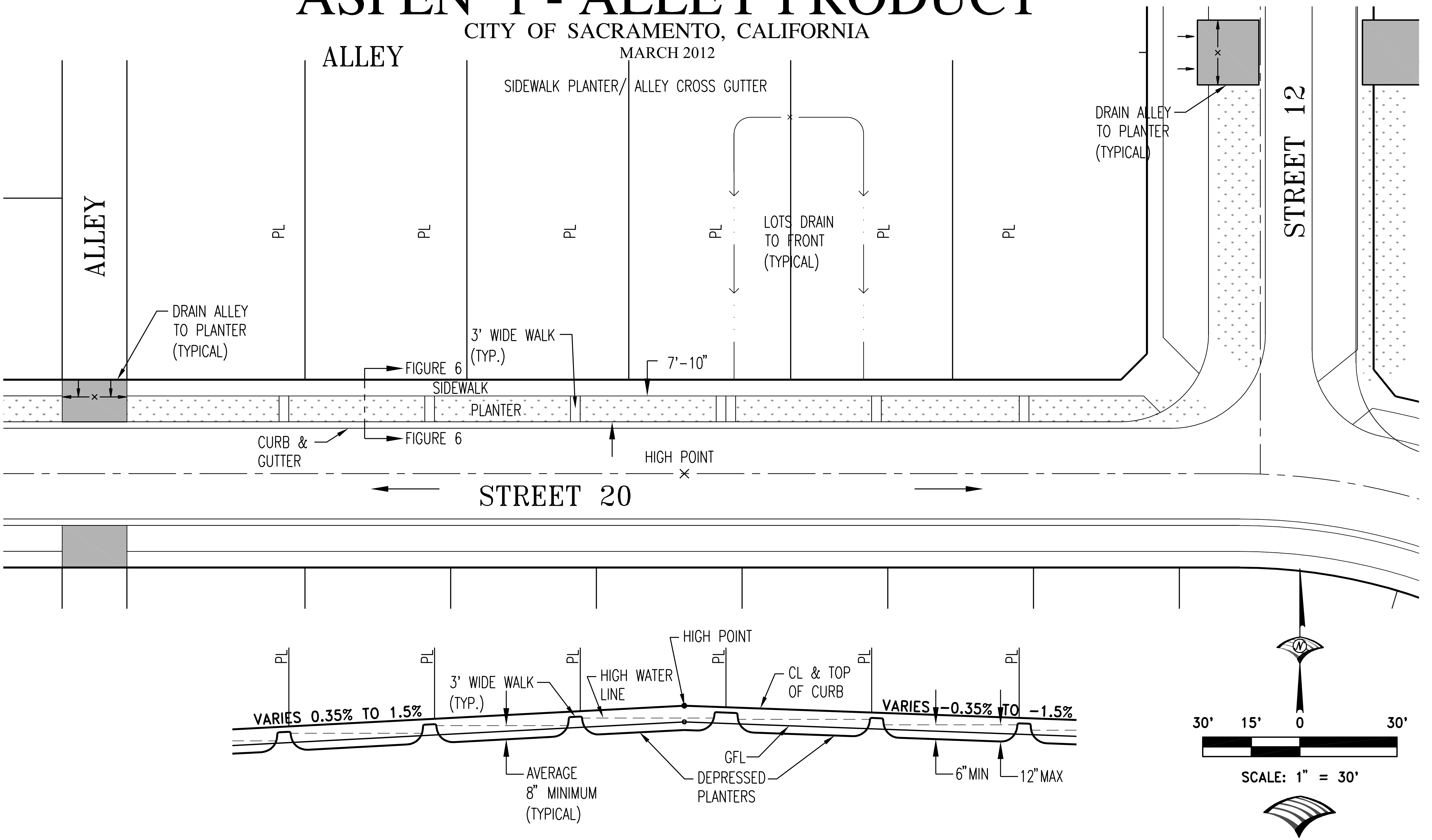
SIDEWALK/ALLEY CROSS GUTTER

ASPEN 1 - ALLEY PRODUCT

CITY OF SACRAMENTO, CALIFORNIA

MARCH 2012

FIGURE 10



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J:\1000-s\1426-RockCreek\Aspen_I\Civil\Studies\Drain\Drain_MP_Figures\FIG-10_EXH_RUN-OFF_REDUCTION-ALLEY.dwg 8/12/11 1:57pm tkaushogen

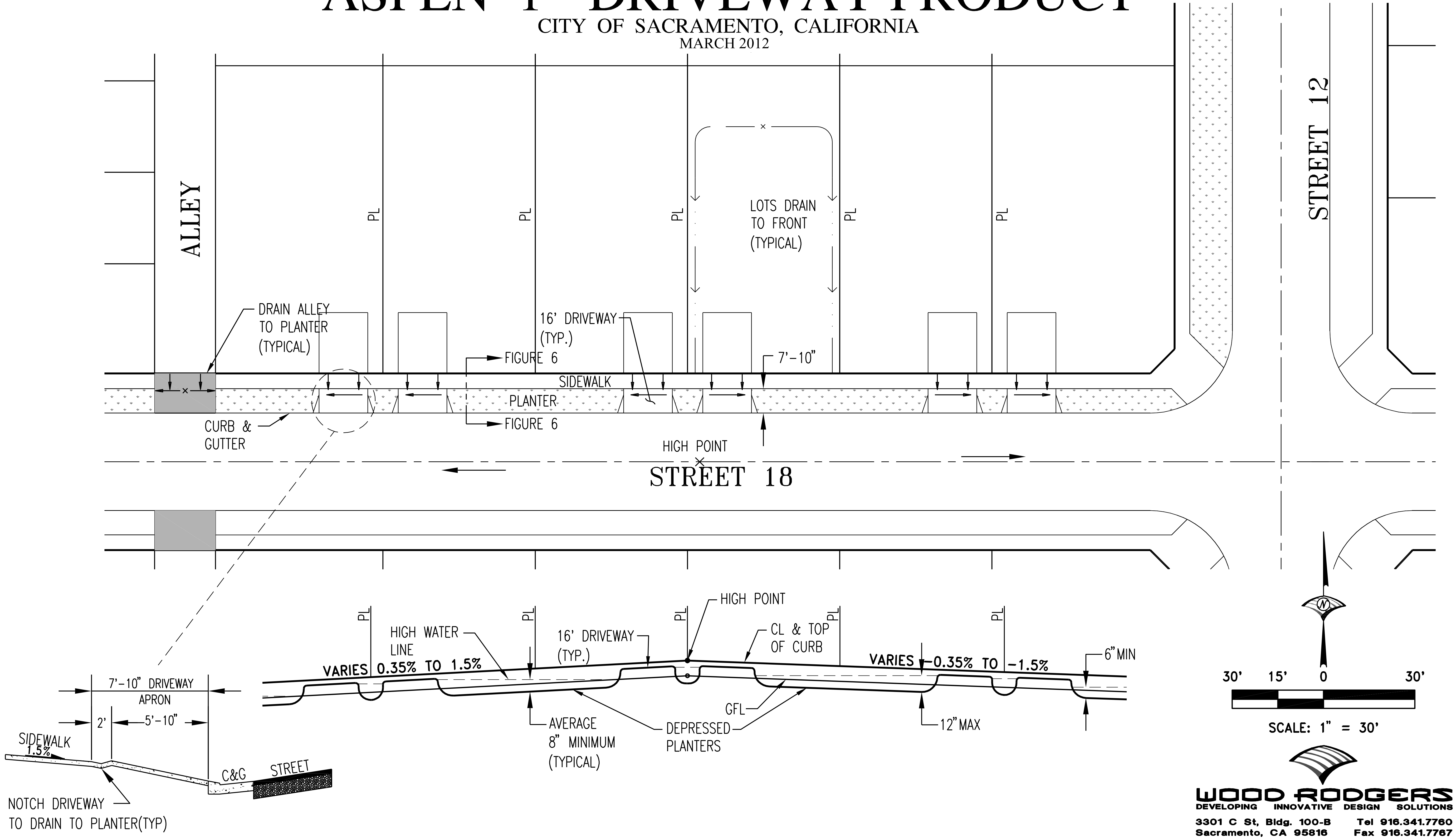
SIDEWALK PLANTER DRIVEWAY CROSS GUTTER

ASPEN 1 - DRIVEWAY PRODUCT

CITY OF SACRAMENTO, CALIFORNIA

MARCH 2012

FIGURE 11



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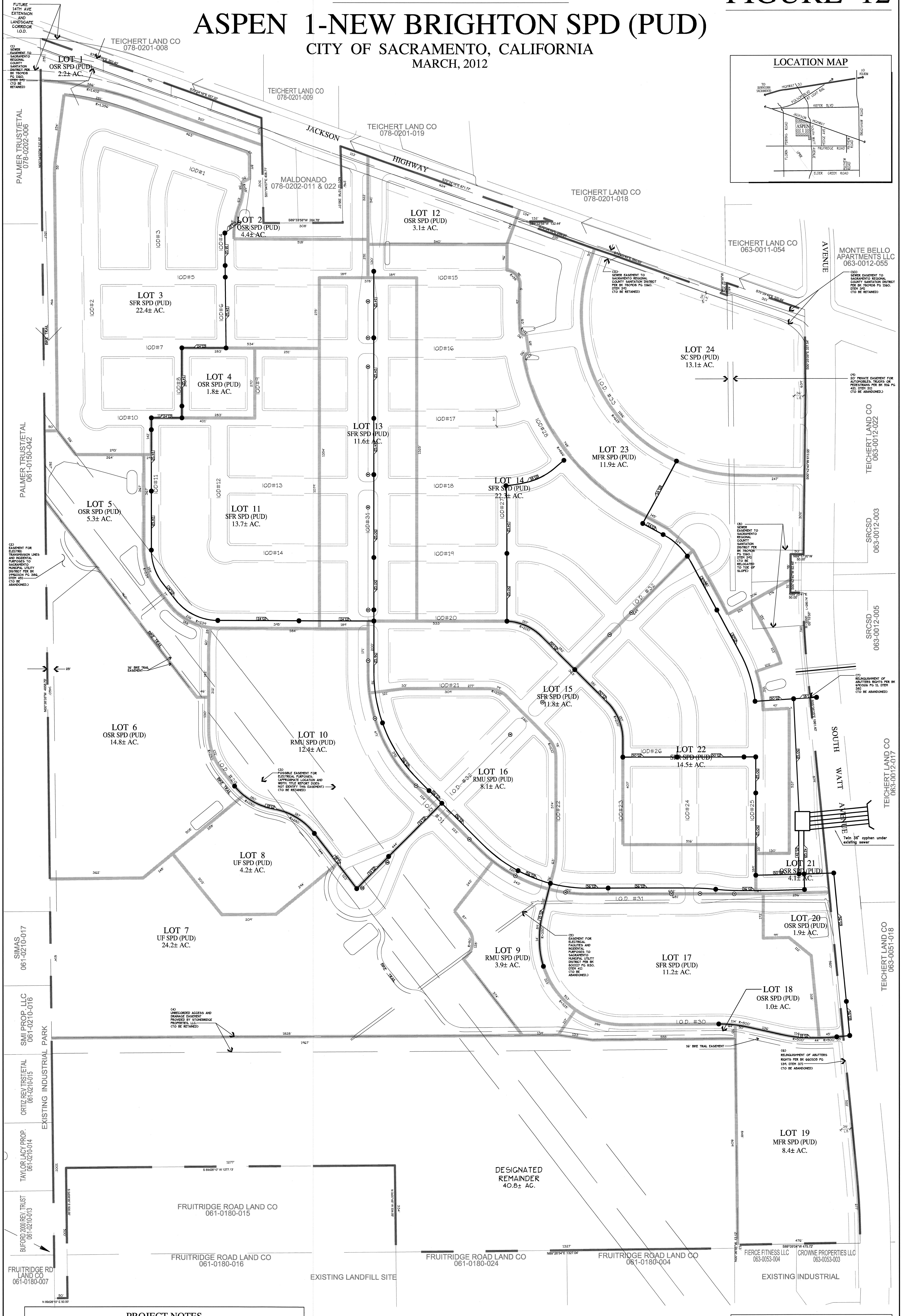
J:\1000-s\1426-RockCreek\Aspen_I\Civil\Studies\Drain\Drain_MP_Figures\FIG-11_EXH_SIDEWALK_PLANTER_DRIVEWAY_CROSS_GUTTER.dwg 8/12/11 1:55pm tkaushagen

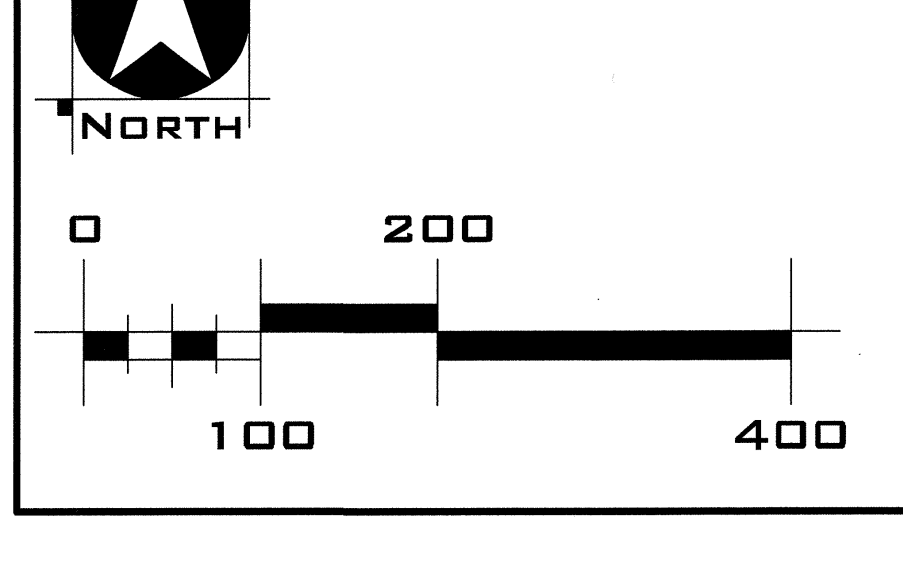
FIGURE 12

COMMON DRAINAGE PLAN

ASPEN 1-NEW BRIGHTON SPD (PUD)

CITY OF SACRAMENTO, CALIFORNIA
MARCH, 2012





PROJECT NOTES

APPLICANT/OWNER
TEICHERT LAND COMPANY/STONEBRIDGE PROPERTIES, LLC/
FRUITRIDGE ROAD LAND COMPANY
3600 AMERICAN RIVER DRIVE, SUITE 160
SACRAMENTO, CALIFORNIA 95864
CONTACT: MIKE ISLE
PHONE: (916) 484-3237

PLANNER/ENGINEER
WOOD RODGERS INC.
3301 'C' STREET, BLDG. 100B
SACRAMENTO, CA 95816
CONTACT: TIMOTHY DENHAM AICP, LEED AP
PHONE: 916 341-7760

ASSESSOR'S PARCEL NO.
078-0202-007, 008, 009, 010 + 013
061-0150-003, 004, 015, 016, 027 + 028
061-0180-003, 017, 025,
063-0014-002, + 006
063-0053-001

AREA
232.3± ACRES GROSS

NUMBER OF LOTS
24 LARGE LOTS

EXISTING USE
AGGREGATE MINING

PROPOSED USE
MASTER PLANNED COMMUNITY

EXISTING ZONING
M-2S + M-2S-R

PROPOSED ZONING
SPD (PUD)

PARK DISTRICT
CITY OF SACRAMENTO

FIRE PROTECTION
CITY OF SACRAMENTO

SCHOOL DISTRICT
ELK GROVE UNIFIED SCHOOL DISTRICT

SEWER
SACRAMENTO REGIONAL SANITATION DISTRICT

STORM DRAIN
CITY OF SACRAMENTO

WATER
CITY OF SACRAMENTO

ELECTRICITY
SMUD

GAS
PG+E

NOTES

1. SUBDIVIDER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS PURSUANT TO SECTION 66456.1(A) OF THE SUBDIVISION MAP ACT.
2. THIS IS AN APPLICATION FOR A DEVELOPMENT PERMIT.
3. A 12.5 FOOT PUBLIC UTILITY EASEMENT WILL BE LOCATED ADJACENT TO ALL RIGHTS OF WAY UNLESS OTHERWISE NOTED OR AS APPROVED BY THE CITY ENGINEER.
4. VILLAGE (LARGE LOT) NUMBERING IS FOR IDENTIFICATION PURPOSES ONLY AND DOES NOT INDICATE PHASING ORDER OF DEVELOPMENT. ULTIMATE DEVELOPMENT PHASING SHALL BE ORDERLY AND WILL BE DETERMINED AT FINAL MAP AND/OR IMPROVEMENT PLAN STAGE.
5. ALL EXISTING STRUCTURES TO BE REMOVED AND ALL EXISTING WELLS TO BE ABANDONED.
6. THE AERIAL TOPOGRAPHY SHOWN HEREON WAS PROVIDED BY LIDAR.
7. THIS EXHIBIT IS FOR TENTATIVE MAP PURPOSES ONLY. ALL SITE CHARACTERISTICS ARE TO BE VERIFIED PRIOR TO FINAL MAP.
8. PURSUANT TO SECTION 66499.20 1/2 OF THE SUBDIVISION MAP ACT, THE LAND SHOWN HEREON AS ASPEN 1 IS HEREBY MERGED AND RESUBDIVIDED.
9. PURSUANT TO SECTION 66434(G) OF THE SUBDIVISION MAP ACT, THE FOLLOWING EASEMENTS ARE HEREBY ABANDONED:

   (2) EASEMENT FOR ELECTRIC TRANSMISSION LINES AND INCIDENTAL PURPOSES TO SACRAMENTO MUNICIPAL UTILITY DISTRICT PER BK 19960104 PG 386. [ITEM 45]

   (5) EASEMENT FOR ELECTRICAL FACILITIES AND INCIDENTAL PURPOSES TO SACRAMENTO MUNICIPAL UTILITY DISTRICT PER BK 800117 PG 830. [ITEM 41]

   (7) RELINQUISHMENT OF ABUTTERS RIGHTS PER BK 690326 PG 11. [ITEM 38]

   (8) SEWER EASEMENT TO SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT PER BK 780908 PG 1160. [ITEM 39]. (TO BE RE-ALIGNED)

LEGEND

▬	BOUNDARY
▬	PROPOSED LARGE LOT LINE
—	PROPOSED I.O.D.
— —	EASEMENT

SHEET INDEX

SHEET NO.	EXHIBIT
1.	COVER SHEET/KEY MAP/NOTES/SECTIONS
2.	TENTATIVE SUBDIVISION MAP
3.	LARGE LOT TENTATIVE MAP
4.	PUD SCHEMATIC PLAN
5.	GENERAL PLAN AMENDMENT EXHIBIT
6.	REZONE EXHIBIT

ENGINEER'S REVIEW

TIMOTHY RYAN CRUSH
No. 41978
Exp.03-31-12

REVIEWED BY — DATE
TIMOTHY R. CRUSH PE 41978, LEED AP

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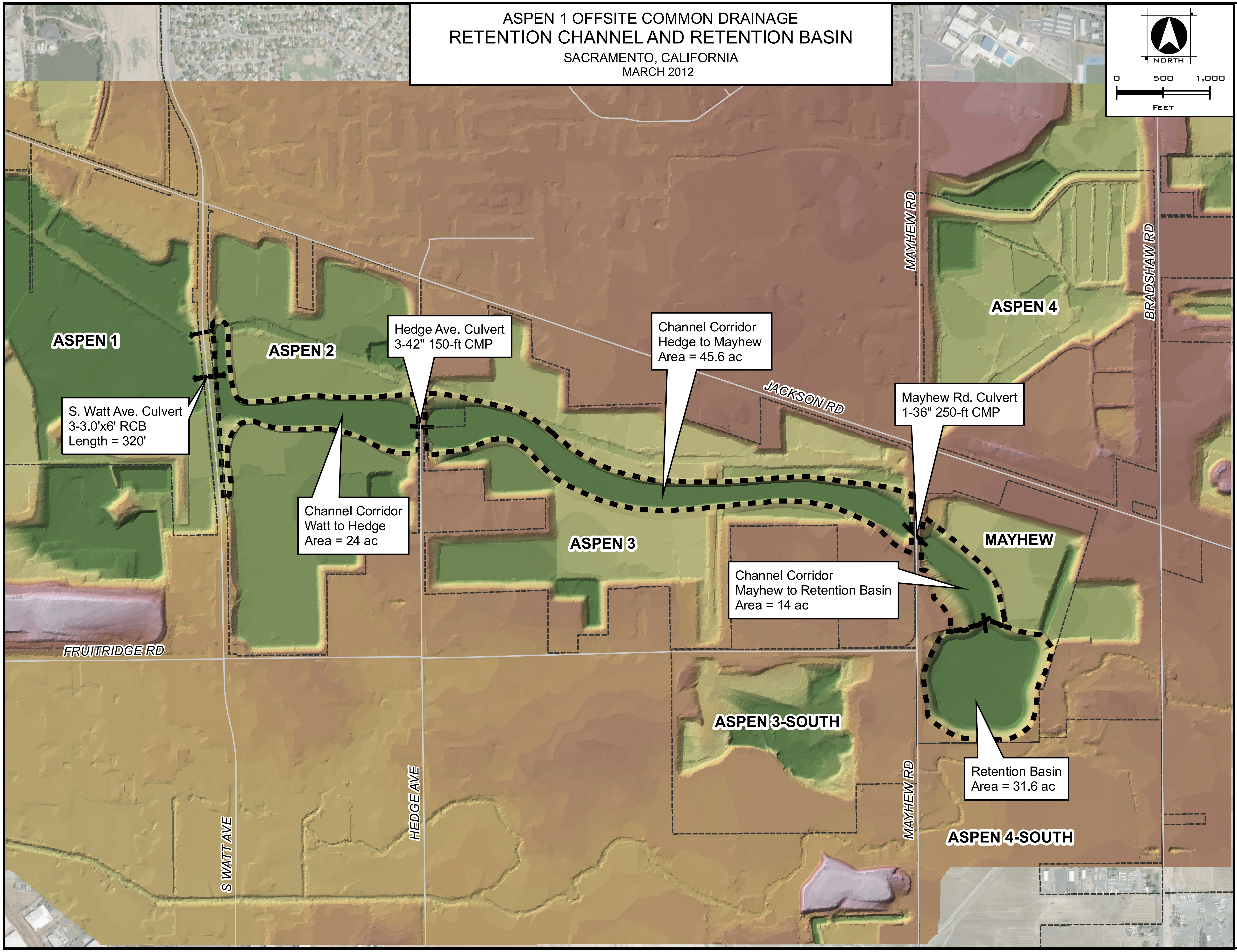
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C St, Bldg. 100-B
Sacramento, CA 95816
Tel 916.341.7760
Fax 916.341.7767

J:\1000-s\1426-RockCreek\Aspen_I\Civil\Studies\Drain\Drain_MP_Figures\FIG-12_COMMON_DRAINAGE_Aspen-1_LargeLot.dwg 3/23/2012 9:28 AM Tyler Kaushagen

FIGURE 13

ASPEN 1 OFFSITE COMMON DRAINAGE
RETENTION CHANNEL AND RETENTION BASIN

SACRAMENTO, CALIFORNIA
MARCH 2012



S. Watt Ave. Culvert
3-3.0'x6' RCB
Length = 320'

Hedge Ave. Culvert
3-42" 150-ft CMP

Channel Corridor
Watt to Hedge
Area = 24 ac

Channel Corridor
Hedge to Mayhew
Area = 45.6 ac

Mayhew Rd. Culvert
1-36" 250-ft CMP

Channel Corridor
Mayhew to Retention Basin
Area = 14 ac

Retention Basin
Area = 31.6 ac

Retention Channel/Basin

Elevation, ft. (NGVD1929)

90 - 108
86 - 90
82 - 86
78 - 82
74 - 78
70 - 74
68 - 70
66 - 68
64 - 66
62 - 64
60 - 62
58 - 60
56 - 58
54 - 56
52 - 54
50 - 52
48 - 50
46 - 48
44 - 46
42 - 44
40 - 42
38 - 40
36 - 38
34 - 36
32 - 34
30 - 32
28 - 30
26 - 28
24 - 26
22 - 24
20 - 22
2 - 20

Property Boundary

Proposed Culverts

NOTE: BACKGROUND IMAGE TAKEN FROM MICROSOFT VIRTUAL EARTH, 2008.

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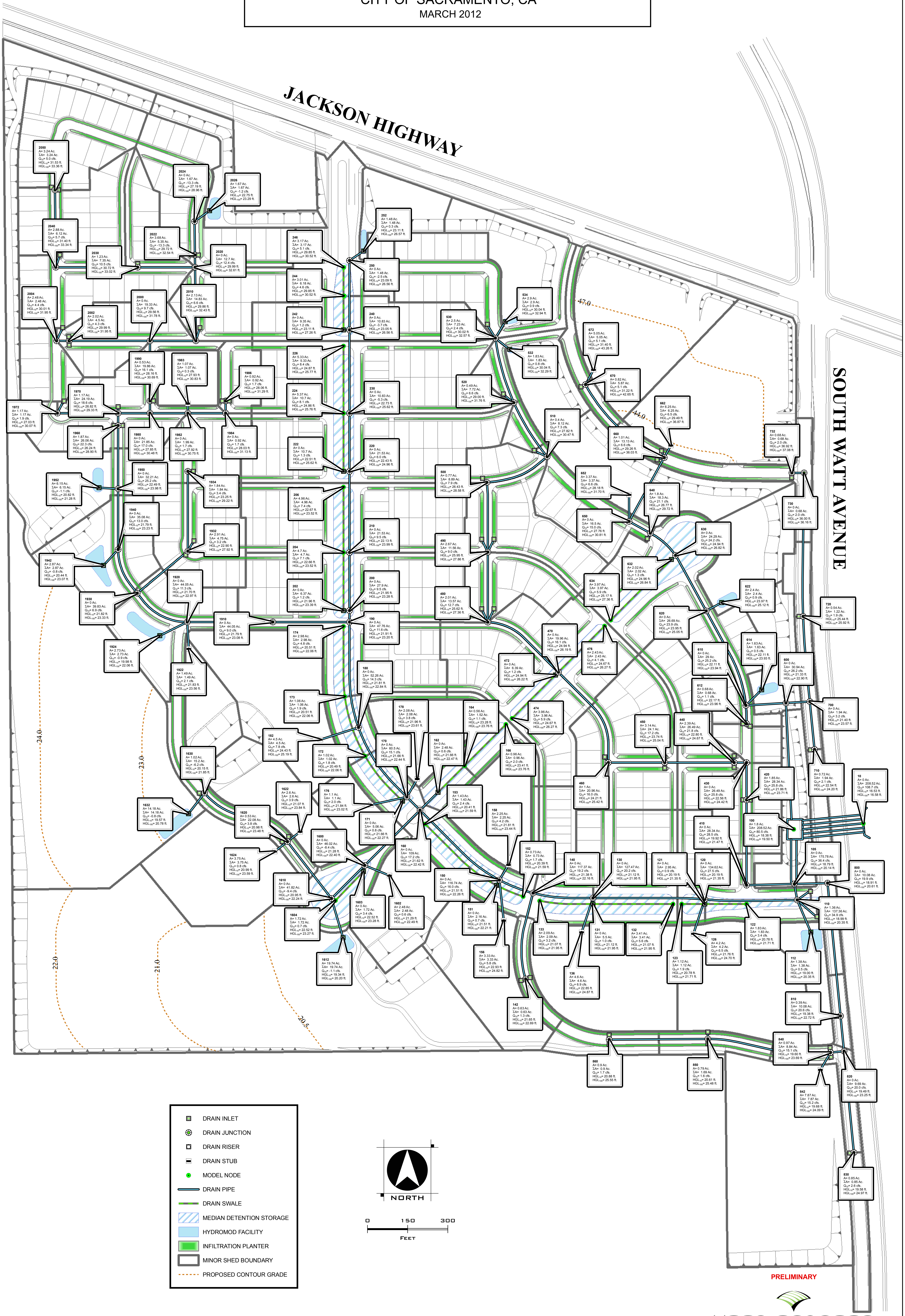
FIGURE 14 - XP SWMM MODEL LAYOUT
ASPEN 1 NEW BRIGHTON PROJECT
CITY OF SACRAMENTO, CA
MARCH 2012



PRELIMINARY

NOTES

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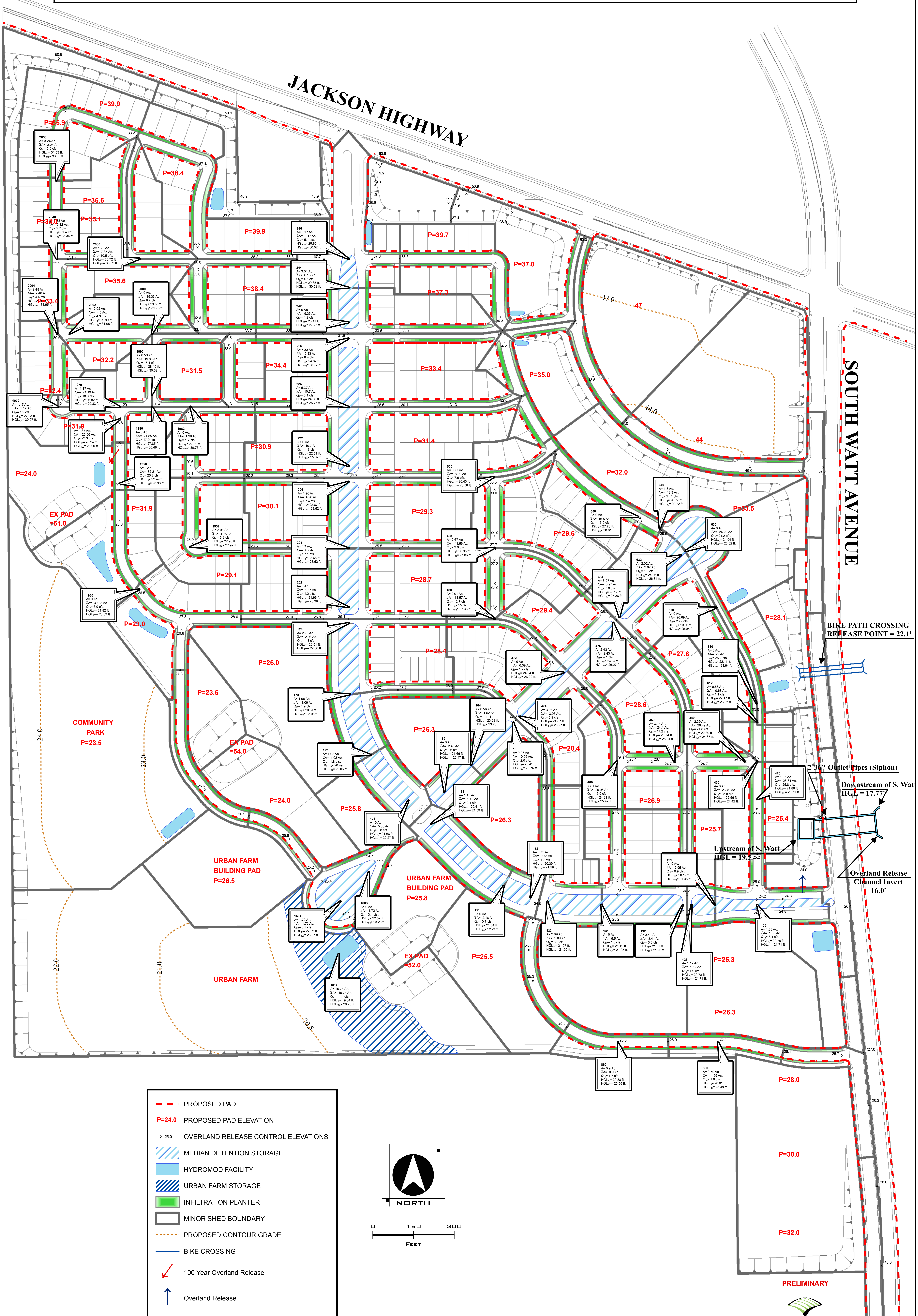
J:\1000-s\1426-RockCreek\Aspen_I\GIS\Tasks\XPSWMM\Drain_Study\Figure 14 - Aspen1_24x36_DRN_20120209_F.mxd 3/1/2012 1:29:18 PM cmilligan

FIGURE 15 - ONSITE FLOOD CONTAINMENT and OVERLAND RELEASE SUMMARY
ASPEN 1 NEW BRIGHTON PROJECT
CITY OF SACRAMENTO, CA
MARCH 2012



NOTES

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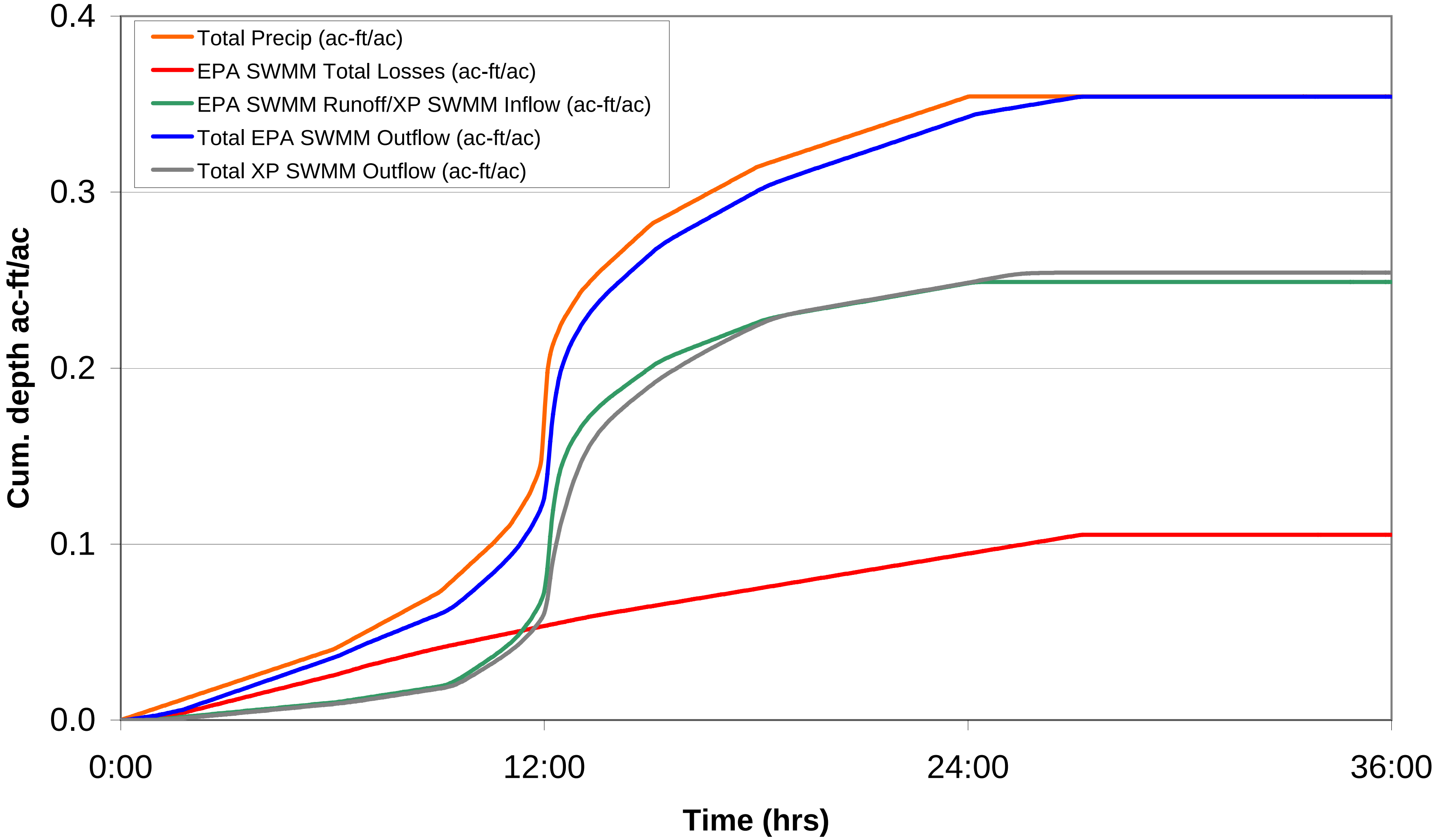
Sacramento, CA 95816 Fax: 916.341.7767

J:\1000-s\1426-RockCreek\Aspen_I\GIS\Tasks\XPSWMM\Drain_Study\Figure 15 - Onsite Flood Control and Overland Release Summary 20120209_V1.mxd 3/1/2012 1:40:53 PM cmilligan

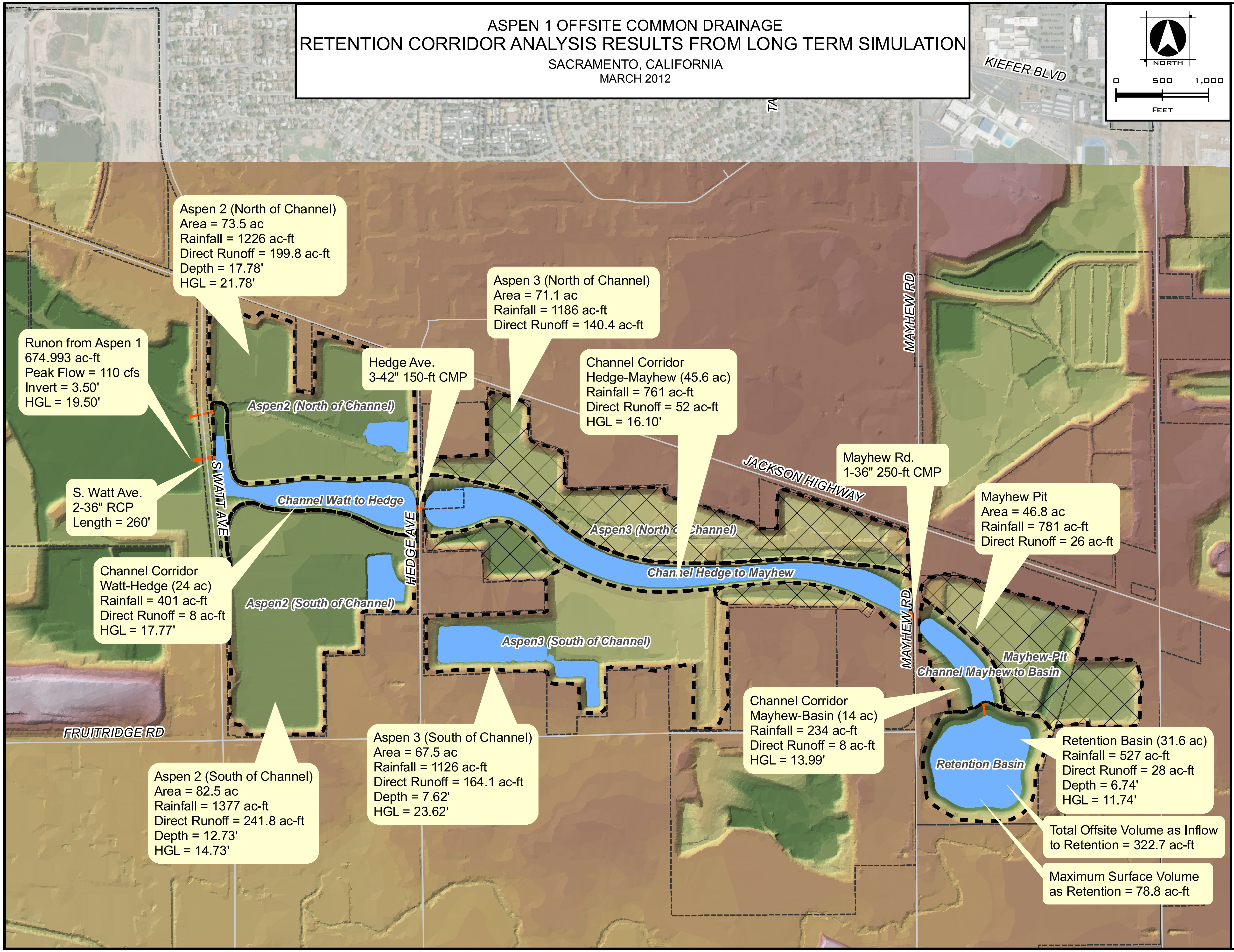
FIGURE 16 - EPA SWMM and XP SWMM Volume Tracking



ASPEN 1 OFFSITE COMMON DRAINAGE
RETENTION CORRIDOR ANALYSIS RESULTS FROM LONG TERM SIMULATION

SACRAMENTO, CALIFORNIA
MARCH 2012

FIGURE 17



Aspen 2 (North of Channel)
Area = 73.5 ac
Rainfall = 1226 ac-ft
Direct Runoff = 199.8 ac-ft
Depth = 17.78'
HGL = 21.78'

Aspen 3 (North of Channel)
Area = 71.1 ac
Rainfall = 1186 ac-ft
Direct Runoff = 140.4 ac-ft

Runon from Aspen 1
674.993 ac-ft
Peak Flow = 110 cfs
Invert = 3.50'
HGL = 19.50'

Hedge Ave.
3-42" 150-ft CMP

Channel Corridor
Hedge-Mayhew (45.6 ac)
Rainfall = 761 ac-ft
Direct Runoff = 52 ac-ft
HGL = 16.10'

Mayhew Rd.
1-36" 250-ft CMP

Mayhew Pit
Area = 46.8 ac
Rainfall = 781 ac-ft
Direct Runoff = 26 ac-ft

S. Watt Ave.
2-36" RCP
Length = 260'

Channel Corridor
Watt-Hedge (24 ac)
Rainfall = 401 ac-ft
Direct Runoff = 8 ac-ft
HGL = 17.77'

Channel Corridor
Mayhew-Basin (14 ac)
Rainfall = 234 ac-ft
Direct Runoff = 8 ac-ft
HGL = 13.99'

Retention Basin (31.6 ac)
Rainfall = 527 ac-ft
Direct Runoff = 28 ac-ft
Depth = 6.74'
HGL = 11.74'

Aspen 2 (South of Channel)
Area = 82.5 ac
Rainfall = 1377 ac-ft
Direct Runoff = 241.8 ac-ft
Depth = 12.73'
HGL = 14.73'

Aspen 3 (South of Channel)
Area = 67.5 ac
Rainfall = 1126 ac-ft
Direct Runoff = 164.1 ac-ft
Depth = 7.62'
HGL = 23.62'

Total Offsite Volume as Inflow
to Retention = 322.7 ac-ft

Maximum Surface Volume
as Retention = 78.8 ac-ft

⊠	Area Draining to Channel
⬚	Property Boundary
🟦	Floodplain
▬ ▬	Offsite Subcatchments
—	Proposed Culverts

Elevation, ft. (NGVD1929)

■	90 - 108
■	86 - 90
■	82 - 86
■	78 - 82
■	74 - 78
■	70 - 74
■	68 - 70
■	66 - 68
■	64 - 66
■	62 - 64
■	60 - 62
■	58 - 60
■	56 - 58
■	54 - 56
■	52 - 54
■	50 - 52
■	48 - 50
■	46 - 48
■	44 - 46
■	42 - 44
■	40 - 42
■	38 - 40
■	36 - 38
■	34 - 36
■	32 - 34
■	30 - 32
■	28 - 30
■	26 - 28
■	24 - 26
■	22 - 24
■	20 - 22
■	2 - 20

NOTE: THE TERRAIN WAS BUILT USING 2003 LiDAR DATA RECEIVED FROM SACRAMENTO COUNTY AUGMENTED BY PROPOSED GRADING OF THE ASPEN 1 RETENTION CORRIDOR.

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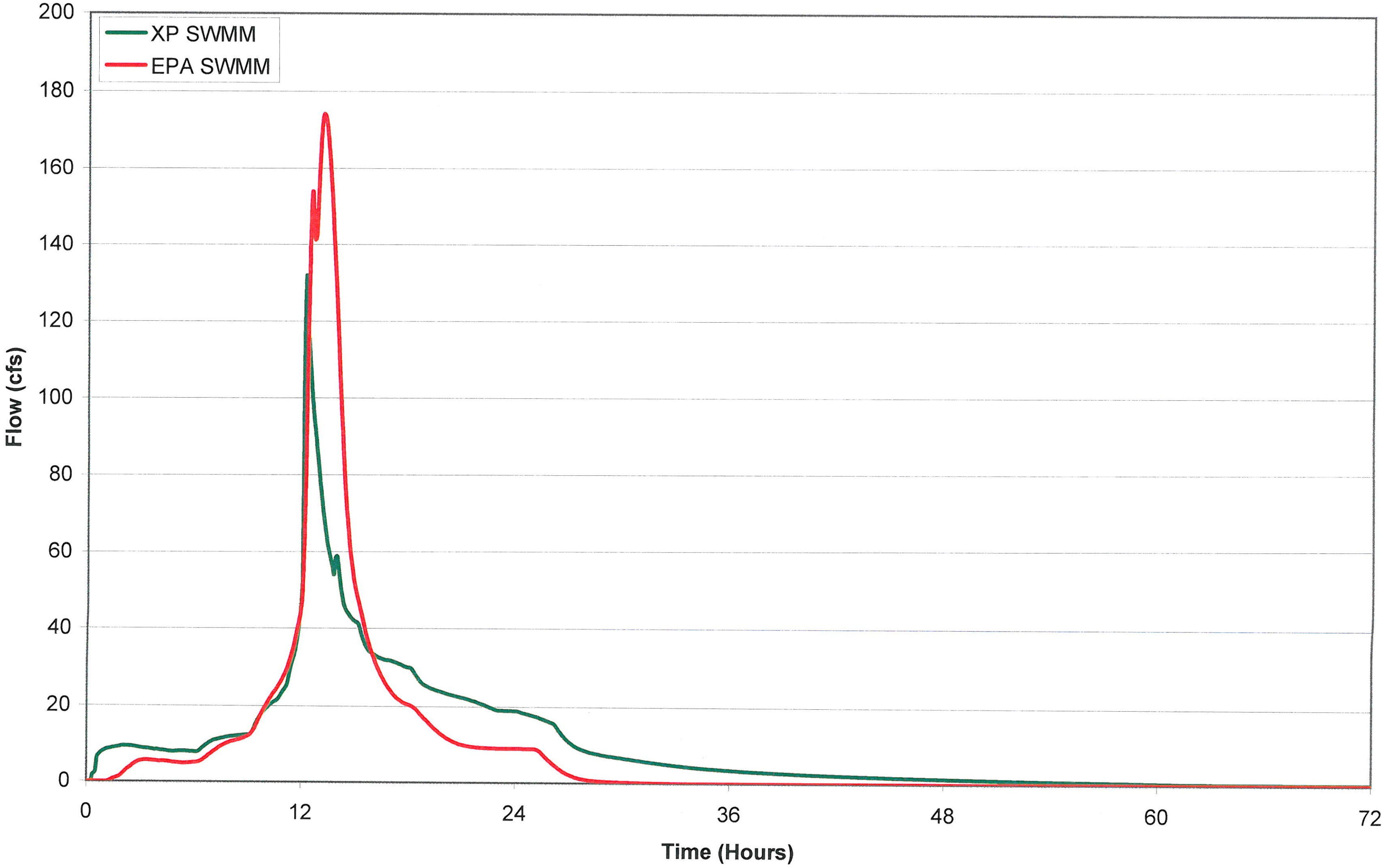
\\Sacfile01\jobs\1000-s\1426-RockCreek\Aspen_I\GIS\Tasks\Figure_17_Aspen1_Offsite_Drainage_20120323_V1.mxd 3/23/2012 8:52:53 AM rsubedi

Figure 18 - EPA SWMM and XP SWMM Outflow Comparison at Watt Avenue



APPENDIX A

Draft Operations & Maintenance Plan for

Low Impact Development & Post-Construction Stormwater BMP's in Aspen 1 – New Brighton

Watearth™
Hydrology/Hydraulics and Sustainable Water Resources

DRAFT OPERATIONS & MAINTENANCE PLAN

for

Low Impact Development and Post-Construction Stormwater BMPs in Aspen 1 – New Brighton

Prepared by:

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Oakland, California 94604
510.529.5552
www.watearth.com

For:

Stone Bridge Properties, LLC
3600 American River Drive, Suite 160
Sacramento, CA 95864

NOTE: DRAFT O&M PLAN IS RELEASED FOR REVIEW UNDER THE AUTHORITY OF
JENNIFER J. WALKER, P.E. C 77079 ON SEPTEMBER 1, 2011
AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION.

OPERATIONS & MAINTENANCE RESPONSIBILITIES FOR LID FACILITIES

As shown in Table 1, the landscape components of the following LID facilities will be maintained by the Homeowner's Association (HOA) with a CFD easement over facilities as a back-up:

- Bioretention (HOA-Owned Parks)
- Hydromodification Management Facilities
- 8-foot Infiltration Planters
- 14-foot Infiltration Planters
- Open Space Stormwater Planters
- Vegetated Median Swales

As indicated, the HOA is responsible for maintaining the landscape component of these LID facilities (i.e., vegetation, mulch, infiltration rate) and the City is responsible for maintaining the "hardscape" components (i.e., storm drain pipe system, drain inlets, and structural components of the LID facilities). Although significant "hardscape"/structural components are not anticipated for the Open Space Stormwater Planters, these facilities will be maintained fully (including any structural components) by the HOA.

The following LID facilities will be maintained in full (both landscape and "hardscape" components) by the City:

- Bioretention (City Dedicated Parks)

The following LID facilities will be maintained in full (both landscape and "hardscape" components) by the Owners:

- Bioretention (High-Density Residential)
- Bioretention (Commercial)

Table 1 at the end of this document indicates the entity responsible for maintenance for each type of LID facility and also presents annual O&M costs and expected life-cycles. Exhibit 1, which follows Table 1, illustrates geographic distribution of the LID facilities listed in this table throughout Aspen 1-New Brighton.

BIORETENTION AND HYDROMODIFICATION MANAGEMENT FACILITIES

What To Look For	What To Do as Required
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
➢ Clogged inlets or outlets	➢ Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes to maintain at least 50% conveyance capacity at all times.
➢ Cracked drain pipes or grates	➢ Repair/seal cracks. Replace when repair is insufficient.
➢ Check dams	➢ Maintain as designed (if present).
Vegetation shall cover 90% of the facility for Bioretention and 75% of the facility for Hydromodification facilities.	
➢ Dead or strained vegetation	➢ Replant per original planting plan, or substitute from plant list in Landscape Specifications and construction documents.
➢ Grasses and vegetation	➢ Irrigate and mulch as needed (shredded hardwood mulch preferred). The use of fertilizers, herbicides, or pesticides is discouraged as these are water quality facilities and stormwater runoff typically contains nutrients. At a minimum, follow Integrated Pest Management (IPM) practices. ➢ Cut back grass based at frequency recommended for specific species. Do not mow more than 1/3 of height during single mowing.
➢ Trees ➢ Weeds	➢ Prune other vegetation overgrowth. ➢ Prune to allow sight lines and foot traffic. ➢ Prune trees as required per Owner's Tree Maintenance Program. ➢ Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours of introduction of runoff, especially during peak mosquito-breeding months (April to October) without isolated ponding areas or pockets.	
➢ Gullies	➢ Fill, lightly compact, and install plant vegetation to disperse flow.
➢ Erosion	➢ Repair inlet gravel/rock or other erosion control elements.
➢ Slopes	➢ Stabilize 3:1 (maximum slope) slopes/banks with plantings from original planting plan or substitute from bioretention plant list.
➢ Ponding	➢ Rake, till or amend to restore infiltration rate. ➢ Inspect annually upstream facilities and/or land use that may contribute to sediment loading issues. ➢ Use compost and mulch without animal products to avoid leaching of nutrients in stormwater facilities.

Note: Refer to Landscape Specifications for project for additional details on plant lists and species-specific maintenance.

See Low Impact Development (LID) Maintenance Schedule and Inspection Guidelines on page six of this Operations and Maintenance (O&M Plan) for additional details.

OPEN SPACE STORMWATER PLANTERS

What To Look For	What To Do as Required
Vegetation shall cover 75% of the facility.	
➢ Dead or strained vegetation ➢ Grasses and vegetation ➢ Trees ➢ Weeds	➢ Replant per original planting plan, or substitute from plant list in Landscape Specifications and construction documents. ➢ Irrigate and mulch as needed (shredded hardwood mulch preferred). The use of fertilizers, herbicides, or pesticides is discouraged as these are water quality facilities and stormwater runoff typically contains nutrients. At a minimum, follow Integrated Pest Management (IPM) practices. ➢ Cut back grass based at frequency recommended for specific species. Do not mow more than 1/3 of height during single mowing. ➢ Prune other vegetation overgrowth. ➢ Prune to allow sight lines and foot traffic. ➢ Prune trees as required per Owner's Tree Maintenance Program. ➢ Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours of introduction of runoff, especially during peak mosquito-breeding months (April to October) without isolated ponding areas or pockets.	
➢ Gullies ➢ Erosion ➢ Slopes ➢ Ponding	➢ Fill, lightly compact, and install plant vegetation to disperse flow. ➢ Repair inlet gravel/rock or other erosion control elements. ➢ Stabilize 3:1 (maximum slope) slopes/banks with plantings from original planting plan or substitute from bioretention plant list. ➢ Rake, till or amend to restore infiltration rate. ➢ Inspect annually upstream facilities and/or land use that may contribute to sediment loading issues. ➢ Use compost and mulch without animal products to avoid leaching of nutrients in stormwater facilities.

Note: Refer to Landscape Specifications for project for additional details on plant lists and species-specific maintenance.

See LID Maintenance Schedule and Inspection Guidelines on page six of this O&M Plan for additional details.

INFILTRATION PLANTERS

What To Look For	What To Do as Required
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
➢ Clogged inlets or outlets	➢ Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes to maintain at least 50% conveyance capacity at all times.
➢ Cracked drain pipes or grates	➢ Repair/seal cracks. Replace when repair is insufficient.
➢ Check dams	➢ Maintain as designed (if present).
Vegetation shall cover 90% of the facility.	
➢ Dead or strained vegetation	➢ Replant per original planting plan, or substitute from plant list in Landscape Specifications and construction documents.
➢ Grasses and vegetation	➢ Irrigate and mulch as needed (shredded hardwood mulch preferred). The use of fertilizers, herbicides, or pesticides is discouraged as these are water quality facilities and stormwater runoff typically contains nutrients. At a minimum, follow Integrated Pest Management (IPM) practices. ➢ Cut back grass based at frequency recommended for specific species. Do not mow more than 1/3 of height during single mowing.
➢ Trees	➢ Prune other vegetation overgrowth. ➢ Prune to allow sight lines and foot traffic. ➢ Prune trees as required per Owner's Tree Maintenance Program.
➢ Weeds	➢ Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours of introduction of runoff, especially during peak mosquito-breeding months (April to October) without isolated ponding areas or pockets.	
➢ Gullies	➢ Fill, lightly compact, and install plant vegetation to disperse flow.
➢ Erosion	➢ Repair inlet gravel/rock or other erosion control elements.
➢ Slopes	➢ Stabilize 3:1 (maximum slope) slopes/banks with plantings from original planting plan or substitute from bioretention plant list.
➢ Ponding	➢ Rake, till or amend to restore infiltration rate. ➢ Inspect annually upstream facilities and/or land use that may contribute to sediment loading issues. ➢ Use compost and mulch without animal products to avoid leaching of nutrients in stormwater facilities.

Note: Refer to Landscape Specifications for project for additional details on plant lists and species-specific maintenance. These maintenance guidelines apply to all Infiltration Planters, regardless of dimensions.

See LID Maintenance Schedule and Inspection Guidelines on page six of this O&M Plan for additional details.

VEGETATED MEDIAN SWALES

What To Look For	What To Do as Required
Structural Components, including inlets and outlets/overflows, shall freely convey stormwater.	
➢ Clogged inlets or outlets	➢ Remove sediment and debris from catch basins, trench drains, curb inlets, and pipes to maintain at least 50% conveyance capacity at all times.
➢ Cracked drain pipes or grates	➢ Repair/seal cracks. Replace when repair is insufficient.
➢ Check dams	➢ Maintain as designed (if present).
Vegetation shall cover 75% of the facility.	
➢ Dead or strained vegetation	➢ Replant per original planting plan, or substitute from plant list in Landscape Specifications and construction documents.
➢ Grasses and vegetation	➢ Irrigate and mulch as needed (shredded hardwood mulch preferred). The use of fertilizers, herbicides, or pesticides is discouraged as these are water quality facilities and stormwater runoff typically contains nutrients. At a minimum, follow Integrated Pest Management (IPM) practices. ➢ Cut back grass based at frequency recommended for specific species. Do not mow more than 1/3 of height during single mowing. ➢ Prune other vegetation overgrowth. ➢ Prune to allow sight lines and foot traffic.
➢ Trees	➢ Prune trees as required per Owner's Tree Maintenance Program.
➢ Weeds	➢ Manually remove weeds. Remove all plant debris.
Growing/Filter Medium, including soil and gravels, shall sustain healthy plant cover and infiltrate within 72 hours of introduction of runoff, especially during peak mosquito-breeding months (April to October) without isolated ponding areas or pockets.	
➢ Gullies	➢ Fill, lightly compact, and install plant vegetation to disperse flow.
➢ Erosion	➢ Repair inlet gravel/rock or other erosion control elements.
➢ Slopes	➢ Stabilize 3:1 (maximum slope) slopes/banks with plantings from original planting plan or substitute from bioretention plant list.
➢ Ponding	➢ Rake, till or amend to restore infiltration rate. ➢ Inspect annually upstream facilities and/or land use that may contribute to sediment loading issues. ➢ Use compost and mulch without animal products to avoid leaching of nutrients in stormwater facilities.

Note: Refer to Landscape Specifications for project for additional details on plant lists and species-specific maintenance.

See LID Maintenance Schedule and Inspection Guidelines on page six of this O&M Plan for additional details.

LID MAINTENANCE SCHEDULE AND INSPECTION GUIDELINES

The following apply to Hydro-Modification Facilities, Bioretention, Open Space Stormwater Planters, Infiltration Planters, and Vegetated Median Swales:

Maintenance/Replacement/Reconstruction:
Inspect and maintain facilities to ensure proper function and aesthetic appearance. Provide adaptive management to determine reconstruction or replacement of the facilities. Use adaptive management to restore original or revised design and function or hydrologic equivalent.

Maintenance Schedule as Required:
Summer. Make any structural repairs. Improve filter medium as needed. Clear drain. Irrigate as needed.
Fall. Replant exposed soil and replace dead plants. Remove sediment and plant debris.
Winter. Monitor infiltration/flow-through rates. Clear inlets and outlets/overflows to maintain conveyance. Prune/mulch as needed.
Spring. Remove sediment and plant debris. Replant exposed soil and replace dead plants. Remove and replace mulch to maintain/restore pre-treatment capacity for sediment and metals removal.
All seasons. Weed as necessary. Remove litter and debris.

Access: Maintain ingress/Egress, including access roads, to design standards.

Infiltration/Flow Control: All facilities shall drain within three days (72 hours) after introduction, especially during the peak mosquito breeding months of April through October. Use practices specified under Growing/Filter Medium maintenance to restore capacity, if needed. While not specifically noted in the May, 2007 *Stormwater Quality Design Manual for the Sacramento and Placer County Regions*, exceptions may exist for longer-duration or extreme events (i.e., events greater than 24 hours, including the 100-year, 10-day event). Comply with *Sacramento County Low Impact Development Criteria Manual* criteria regarding drain-down time. Manual is anticipated for release in 2012. At a minimum, facilities are expected to drain within three days after introduction for events up to and including the 100-year, 24-hour event.

Pollution Prevention: Implement best management practices to prevent hazardous or solid wastes or excessive oil and sediment from contaminating stormwater. Use compost and mulch without animal products to avoid leaching of nutrients in stormwater facilities, where feasible.

Vectors (Mosquitoes & Rodents): Stormwater facilities shall be in compliance with the local jurisdictions so as to not cause a public nuisance or undermine the facility structure. Note holes/burrows in and around facilities. Current criteria require that the facilities be capable of completely passing runoff through the structure within three days (72 hours) after introduction, especially during the peak mosquito breeding months of April through October. Comply with *Sacramento County Low Impact Development Criteria Manual* criteria regarding vector control. Manual is anticipated for release in 2012.

INTERCEPTOR TREES

What To Look For	What To Do as Required
Trees and Understory Vegetation.	
➢ Dead or strained vegetation	➢ Replant per original planting plan, or substitute from tree list in Landscape Specifications and construction documents. ➢ Irrigate as needed. Reduce water consumption through use of mulch.
➢ Trees	➢ Reduce fertilizers through use of mulch (see below). The use of fertilizers, herbicides, or pesticides is discouraged as these are water quality facilities and stormwater runoff typically contains nutrients. At a minimum, follow Integrated Pest Management (IPM) practices.
➢ Lawn	➢ Prune for safety purposes, to protect structures, or to improve the health and structure of the tree.
➢ Weeds	➢ Prune trees as required per Owners Tree Maintenance Program. Use certified arborist or similarly qualified professional to ensure the protection of interception canopy of all Trees, especially evergreens. ➢ Keep turf a minimum of 24 inches from tree trunks to avoid competition and maintenance damage.
➢ Ponding Water	➢ Manually remove weeds. Remove all plant debris.
➢ Erosion or Exposed Roots	➢ Re-grade by hand in vicinity of trees, if required. Use mulch rather than excess fill to tree roots. Correct cause of ponding water (i.e., compacted soils, leaking irrigation system, etc.) ➢ Apply mulch (see below) and correct cause of erosion.
Shredded Hardwood Mulch.	
➢ Mulch	➢ Apply 4 to 6 inches of mulch as required around trees (shredded hardwood mulch preferred due to water quality and soil-building benefits)
➢ Litter and Debris	➢ Do NOT place mulch within 6 inches of the trunk of the tree ➢ Remove litter and debris

Note: Refer to Landscape Specifications for project for additional details on plant lists and species-specific maintenance.

See Interceptor Trees LID Maintenance Schedule and Inspection Guidelines on page eight of this O&M Plan for additional details.

INTERCEPTOR TREES MAINTENANCE SCHEDULE AND INSPECTION GUIDELINES

The following apply to Interceptor Trees:

Replacement/Removal:
Replace trees that are removed or die with similar species from the landscape specifications and construction documents for project.

Maintenance Schedule as Required:
Summer. Irrigate as needed.
Fall. Replant and replace dead trees.
Winter. Provide safety inspections and prune (if needed) in accordance with above.
Spring. Remove plant debris. Replant and replace dead trees. Mulch (shredded hardwood preferred).
All seasons. Weed as necessary. Remove litter and debris. Fallen leaves and debris from tree foliage should be raked and removed regularly to prevent the material from being washed into the storm water facilities. Nuisance vegetation around trees should be removed when discovered. Dead vegetation should be pruned from the tree as required per Owner's Tree Maintenance Program.

TABLE 1: ANNUAL O&M COSTS AND O&M RESPONSIBILITIES FOR ASPEN 1 LID FEATURES

Item	Responsible Party			Annual O&M for Landscape Elements ($/sq. ft.)	Anticipated Minimum Life-Cycle (yrs.)
	Landscape Maintenance	Hardscape/Structural Maintenance & Reconstruction	Landscape Reconstruction		
Bioretention (Commercial)	Owner	Owner	Owner	$0.20	20
Bioretention (High-Density Residential)	Owner	Owner	Owner	$0.18	20
Bioretention (Parks)[1]	City/HOA	City	City/HOA	$0.18	20
Hydromodification Management Facilities	HOA	City	HOA	$0.16	20
8-foot Infiltration Planters	HOA	City	HOA	$0.18	20
14-foot Infiltration Planters	HOA	City	HOA	$0.18	20
Open Space Stormwater Planters	HOA	HOA	HOA	$0.18	20
Vegetated Median Swales	HOA	City	HOA	$0.16	20

***Table by Watearth, Inc. - September, 2011**

Notes:

1. For City dedicated parks, the City of Sacramento is the responsible party for Landscape Maintenance and Reconstruction
   For HOA-owned facilities, the HOA is the responsible party for Landscape Maintenance and Reconstruction.
2. Costs in 2010 dollars and approximately based on conceptual/planning-level cost estimates.
3. No structural components in Open Space Stormwater Planters.
4. Anticipated life-cycle estimated based on data in the May, 2007 *Stormwater Quality Design Manual for Sacramento and Placer Counties* .
5. Life cycles assume LID facilities receiving runoff from paved areas are a minimum of 10% of paved area, based on research from Pitt/University of Alabama.
6. Although significant “hardscape”/structural components are not anticipated for the Open Space Stormwater Planters, these facilities will be maintained fully (including any structural components) by the HOA.

Low Impact Development and Post Construction Stormwater BMP's

Exhibit 1

Note: Facility locations shown are diagramatic.

LEGEND

- ▬ Bioretention
- ● Hydromodification Management Facilities
- ▨ Open Space Stormwater Planters
- ━ 14 - Foot Infiltration Planters
- ━ 8 - Foot Infiltration Planters
- 🟩 Vegetated Median Swales

SWA

Aspen 1 New Brighton

Prepared for Stonebridge Properties, LLC

Watearth

Hydrology/Hydraulics and Sustainable Water Resources

WOOD RODGERS

DEVELOPING INNOVATIVE DESIGN SOLUTIONS

September 7, 2011

0 100 200 400'

APPENDIX A-1

Preliminary Plant Palatte for

LID Stormwater Facilities

S W A

David Berkson
Sean O'Malley
Robert Jacob
Richard Law

Gerdo P Aquino
Kinder Baumgardner
David Bickel
Rene Bihan
William Callaway
Scott Cooper
John E. Cutler
Marco Esposito
Tom Fox
Cinda Gilliland
Loreen Hjort
Ying-Yu Hung
Roy Inamura
Robert Jacob
Hui-Li Lee
James Lee
Margaret Leonard
John S. Loomis
Charles S. McDaniel
Ross Nadeau
Timothy Peterson
Lawrence Reed
R. Joseph Runco
Kevin Shanley
Elizabeth Shreeve
Scott Slaney
David P. Thompson
Corazon Unana
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Appendix A
5/11/11

Watearth, Inc.
P.O. Box 537
Oakland, California 94604

Attention: Jennifer J. Walker, P.E., D.WRE, CFM President

Dear Jennifer:

The purpose of this appendix is to provide a general description of appropriate plant materials for the Aspen 1 New Brighton Low Imapct Development and Stormwater BMP facitlites.

Vegetated Swale and Hydromodification Facilities

Plants in a vegetated swale slow water movement, which assists with the sedimentation of coarse solids and increases infiltration through a layer of topsoil. Therefore, a vegetated swale should be planted with the intent of slowing water flow, retaining pollutants associated with solids that settle out, and stabilizing the topsoil. Species can include grass and herbaceous species. All plants should be tolerant of extended periods of dry conditions. However, species tolerant to periodic inundation should be concentrated within the center of the swale where the soil will be saturated for a longer duration Trees and shrubs may be planted on the side slopes.

Bioretention Facilities and infiltration Planters

Plants for these areas should be able to withstand periods of inundation as well as extended periods of drought. Emergent, grass and herbaceous species can be planted in the bioretention area, while shrub and tree species should be concentrated on the outer edges. Grasses can also be planted along the exterior to slow the velocity of flow and allow the sedimentation of coarse solids, which helps minimize clogging of the bioretention area. Supplemental irrigation will be necessary to maintain emergent species during extremely dry conditions.

Shrubs and trees can be planted in planters as well as low growing grasses. Recommended minimum soil depth for shrubs is 18”, and for small trees is 36”. Plant species should be adapted to well- drained soils. Irrigation will be required to supplement dry periods, but selecting plants adapted to extended dry periods can reduce irrigation requirements.

Preliminary Plant Palette for Stormwater Facilities

The plant list is intended to be a guide of the general types of plants that will be used within stormwater facilities. Specific design factors for each facility will determine final plant choices in addition to inundation period, expected flow of water and access and maintenance requirements.

Vegetative coverage is planned at 90% for Bioretention and Infiltration Planters and a minimum of 75% for Vegetated Swales and Hydro-Modification Facilities.

Trees

Botanical Name	Common Name
Acer negundo 'variegatum'	Variegated Box Elder
Aesculus californica	California Bucheye
Alnus rhombifolia	White Aldar
Cercis Occidentalis	Western Redbud
Fraxinus latifolia	Oregon Ash
Lagerstoemia spp	Crepe Myrtle
Platanus racemosa	California Sycamore
Populus fremontii	Western Cottonwood
Prunus cascade snow	Cascade Snow Cherry
Quercus agrifolia	Coast live Oak
Quercus lobata	Valley Oak
Salix laevigata	Red Willow
Salix lasiolepis	Arroyo willow

Shrubs/Ground Covers

Botanical Name	Common Name
Aesculus californica	California Buckeye
Arctostaphylus spp	Manzanita
Baccharis pilularis	Coyote Bush
Baccharis pilularis twin Peaks	Drwarf Coyote Bush
Ceanothus gloriosis	California Lilac
Cephalanthus occideltalis	bottonbush
Cistus spp	Rockrose
Dietes spp	Fortnight Lily
Heteromeles arbutifolia	Toyon
Lavandula stoechas	Spanish lavender
Lavatera spp	Rose Mallow
Lupinus albifrons	Silver Bush Lupine
Mahonia aquifolium	Oregon Grape
Myrtus communis	True Myrtle
Philadelphus lewisii	Wild Mock Orange
Pittosporum tobira	Mock Orange
Rhamnus californica	Coffeeberry
Ribes malvaceum	Chaparral Currant
Rosa californica	California Wild Rose
Rosmarinus officinalis varietals	Rosemary
Salvia spp	Sage

Sambucus mexicana	Blue Elderberry

Grasses/Emergents

Botanical Name	Common Name
Aristida purpurea	Purple Three Awn
Bromus carinarus	California Brome
Carex spp	Sedge
Elymus spp	NCN
Festuca californica	Calfornia Fescue
Festuca mairei	Atlas fescue
Iris douglasiana	Doulas Iris
Juncus patens	Common Rush
Juncus textills	Basket Rush
Muhlenbergia rigens	Deer Grass
Pennisetum spp	Fountain Grass
Scirpus spp	Tule

Reference: Alameda County C3 Stormwater Technical Guidance

APPENDIX A-2

Water Quality Volume Calculations from Appendix D-2 Spreadsheet of the

Stormwater Quality Design Manual for the Sacramento
& South Placer Regions

Appendix D-2: Commercial and Multi-Family Sites*: Runoff Reduction Credits and Treatment BMP Sizing Calculations

Name of Drainage Shed: Aspen 1

Fill in Highlighted boxes

Location of project: Sacramento

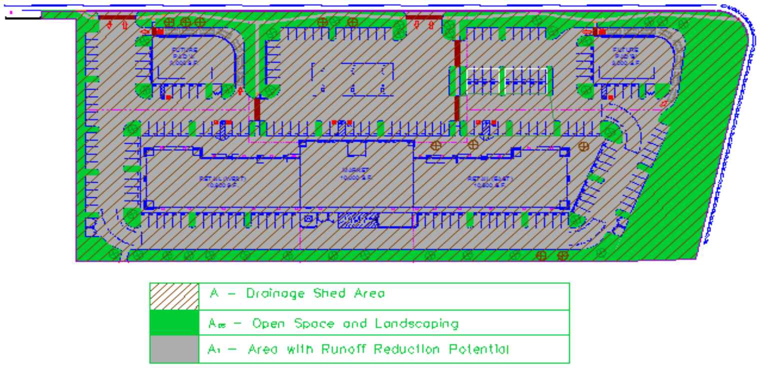
Step 1 - Calculate Area Requiring Treatment

Drainage Shed Area		233.49	acres	A
Open Space Acreage and Landscaped Areas**		62.51	acres	A_{OS}
Area with Runoff Reduction Potential	$A - A_{OS}$ =	170.98	acres	A_T
Assumed Initial Impervious Fraction	A_T / A =	0.73		I

see area example below

*. Includes apartments, condominiums, and townhouses

**. Includes all areas maintained in a natural state and planned for landscaping



Step 2 - Calculate Impervious Area Treatments

Runoff Reduction Treatments	Impervious Area Managed			Efficiency Factor		Effective Area Managed (A_C)	
Porous Pavement:							
Option 1: Porous Pavement (see Fact Sheet, excludes porous pavement used in Option 2)	0	acres	x	1	=	0.000	acres
Option 2: Disconnected Pavement (see Fact Sheet, excludes porous pavement used in Option 1)	use Form D-2a for credits	→				0.00	acres
Landscaping used to Disconnect Pavement (see Fact Sheet)	0	acres			=	0.00	acres
Disconnected Roof Drains (see Fact Sheet and/or Table D-2b for summary of requirements)	0	acres			=	0.00	acres
Ecoroof (see Fact Sheet)	0	acres			=	0.00	acres
Interceptor Trees (see Fact Sheet)	use Form D-2b for credits	→				0.00	acres
Total Effective Area Managed				A_C		0.00	acres
Adjusted Area for Flow-Based Treatment	$A_T - A_C$ = 170.98			A_{AT}			
Adjusted Impervious Fraction	A_{AT} / A = 0.73			I_A			

Table D-2a

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete/Asphalt Pavement	0.60
Modular Block Pavement & Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

Table D-2b

Maximum roof size	Minimum travel distance
≤ 3,500 sq ft	21 ft
≤ 5,000 sq ft	24 ft
≤ 7,500 sq ft	28 ft
≤ 10,000 sq ft	32 ft

Check the website for the electronic version at www.sactostormwater.org click on "new development"

Form D-2a: Disconnected Pavement Worksheet

See Fact Sheet for more information regarding Disconnected Pavement credit guidelines

Effective Area Managed (A_C)

Pavement Draining to Porous Pavement

2. Enter area draining onto Porous Pavement 0.00 acres Box K1

3. Enter area of Receiving Porous Pavement 0.00 acres Box K2
(excludes area entered in Step 2 under Porous Pavement)

4. Ratio of Areas   (Box K1 / Box K2) 0.00 Box K3

5. Select multiplier using ratio from Box K3 and enter into Box K4

Ratio (Box D)	Multiplier
Ratio is ≤ 0.5	1.00
Ratio is > 0.5 and < 1.0	0.83
Ratio is > 1.0 and < 1.5	0.71
Ratio is > 1.5 and < 2.0	0.55

1 Box K4

6. Enter Efficiency of Porous Pavement (see table below) 1.00 Box K5

Porous Pavement Type	Efficiency Multiplier
Cobblestone Block Pavement	0.40
Pervious Concrete Asphalt Pavement	0.60
Modular Block Pavement Porous Gravel Pavement	0.75
Reinforced Grass Pavement	1.00

7. Multiply Box K2 by Box K5 and enter into Box K6 0.00 acres Box K6

8. Multiply Boxes K1,K4, and K5 and enter the result in Box K7 0.00 acres Box K7

9. Add Box K6 to Box K7 and enter the Result in Box K8 0.00 acres Box K8
This is the amount of area credit to enter into the "Disconnected Pavement" Box of Form D-2

Form D-2b: Interceptor Tree Worksheet

See Fact Sheet for more information regarding Interceptor Tree credit guidelines

New Evergreen Trees

1. Enter number of new evergreen trees that qualify as Interceptor Trees in Box L1. 0 trees Box L1

2. Multiply Box L1 by 200 and enter result in Box L2 0 sq. ft. Box L2

New Deciduous Trees

3. Enter number of new deciduous trees that qualify as Interceptor Trees in Box L3. 0 trees Box L3

4. Multiply Box L3 by 100 and enter result in Box L4 0 sq. ft. Box L4

Existing Tree Canopy

5. Enter square footage of existing tree canopy that qualifies as Existing Tree canopy in Box L5. 0 sq. ft. Box L5

6. Multiply Box L5 by 0.5 and enter the result in Box L6 0 sq. ft. Box L6

Total Interceptor Tree EAM Credits

Add Boxes L2, L4, and L6 and enter it into Box L7 0 sq. ft. Box L7

Divide Box L7 by 43,560 to get the number of acres effectively managed and enter the result in Box L8 0.00 acres Box L8

This is the amount of area credit to enter into the "Interceptor Trees" Box of Form D-2

Check the website for the electronic version at www.sactostormwater.org click on "new development"

Step 3 - Calculate Flow or Volume Requiring Treatment

Form D-2c Treatment - Flow-Based (Rational Method)

Calculate treatment flow (cfs): Flow = Runoff Coefficient x Rainfall Intensity x Area

Look up value for i in Table D-2c (Rainfall Intensity) 0.18 i

Obtain A_{AT} from Step 2 170.98 A_{AT}

Use C = 0.95 0.95 C

Flow = 0.95 * i * A_{AT} 29.24 cfs

Table D-2c

Rainfall Intensity			
Roseville	i =	0.20	in/hr
Sacramento	i =	0.18	in/hr
Folsom	i =	0.20	in/hr

Form D-2d Treatment - Volume-Based (CASQA)

do not use form D-2d contiue to form D2-e

Calculate treatment volume (Acre-Feet): Treatment Volume = Area x (Storage Volume ÷ Conversion Factor)

Determine Adjusted C_A using Table D-2d (for CASQA Method) and the Adjusted Impervious Fraction (I_A) from Step 2 0.52 C_A

Determine Unit Basin Storage Volume (Figure D-2a) using C_A 0.38 SV

A from Step 1 233.49 A

Treatment volume = A x (SV / 12) 7.46 Acre-Feet

Form D-2e Treatment - Volume-Based (ASCE-WEF)

Calculate water quality volume (Acre-Feet): WQV = Area x Maximized Detention Volume (P_0)

Obtain A from Step 1 233.49 A

12 hrs Specified Draw Down time

Obtain P_0: Maximized Detention Volume from figures E-1 to E-4 in Appendix E of this manual using I_A from Step 2. 0.38 P_0

Calculate treatment volume (acre-ft):

Treatment volume = A x (P_0 / 12) 7.35 Acre-Feet

Notes:

'1. Open space area of 62.51 based on Parks and Open Space, Grasslands land use categories from Table 6-3.

APPENDIX B

Digital Modeling of Onsite & Offsite Storm Drains / Overflows

Cdrom

APPENDIX C

Common Drainage Cost Estimates

March 22, 2012
Wood Rodgers, Inc./TM

ASPEN 1
LID FACILITIES
PRELIMINARY ENGINEER'S ESTIMATE

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
A	*Infiltration Basins- Bioretention Basins*				
	(Commercial, School, etc.)				
1	Excavation	14,000	CY	$ 7.00	$ 98,000.00
2	16" Growing Media	85,200	SF	$ 2.50	$ 213,000.00
3	12" Crushed Rock (for drainage)	85,200	SF	$ 2.00	$ 170,400.00
4	Perforated Standpipe/ Ditchbox	12	EA	$ 10,000.00	$ 120,000.00
5	12" Drain Pipe (connect to drain system)	600	LF	$ 100.00	$ 60,000.00
	Subtotal Bioretention				***$ 661,400.00***
	Cost per Square Foot				***$ 7.76***
B	Infiltration Basins- Hydromod Facilities				
	(Open Space, Park, Farm)				
1	Excavation	35,000	CY	$ 7.00	$ 245,000.00
2	16" Growing Media	172,400	SF	$ 2.50	$ 431,000.00
3	12" Crushed Rock (for drainage)	172,400	SF	$ 2.00	$ 344,800.00
4	Perforated Standpipe/ Ditchbox	11	EA	$ 10,000.00	$ 110,000.00
5	12" Drain Pipe (connect to drain system)	550	LF	$ 100.00	$ 55,000.00
	Subtotal Hyromod Facilities				***$ 1,185,800.00***
	Cost per Square Foot				***$ 6.88***
C	*Infiltration Basins- Parkway Medians*				
1	Excavation	28,000	CY	$ 7.00	$ 196,000.00
2	16" Growing Media	141,300	SF	$ 2.50	$ 353,250.00
3	12" Crushed Rock (for drainage)	141,300	SF	$ 2.00	$ 282,600.00
4	Perforated Standpipe/ Ditchbox	11	EA	$ 25,000.00	$ 275,000.00
5	12" Drain Pipe (connect to drain system)	550	LF	$ 100.00	$ 55,000.00
	Subtotal Parkway Median				***$ 1,161,850.00***
	Cost per Square Foot				***$ 8.22***
D	*Infiltration Planters*				
	Frontyard or Sideyard Planters (8' Wide)				
1	Excavation	35,000	CY	$ 10.00	$ 350,000.00
2	16" Growing Media	365,800	SF	$ 2.50	$ 914,500.00

March 22, 2012
Wood Rodgers, Inc./TM

ASPEN 1
LID FACILITIES
PRELIMINARY ENGINEER'S ESTIMATE

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
3	12" Crushed Rock (for drainage)	365,800	SF	$ 2.00	$ 731,600.00
4	6" Perforated Pipe (Not connected to drain)	45,700	LF	$ 12.00	$ 548,400.00
	Subtotal Planters				***$ 2,194,500.00***
	Cost per Square Foot				***$ 6.00***
E	*Infiltration Planters*				
	Widened Sideyard Planters (14' Wide)				
1	Excavation	5,200	CY	$ 10.00	$ 52,000.00
2	16" Growing Media	51,000	SF	$ 2.50	$ 127,500.00
3	12" Crushed Rock (for drainage)	51,000	SF	$ 2.00	$ 102,000.00
4	Perforated Standpipe/ Ditchbox	18	EA	$ 5,000.00	$ 90,000.00
5	12" Drain Pipe (connect to drain system)	900	LF	$ 100.00	$ 90,000.00
6	6" Perforated Pipe (Not connected to drain)	3,600	LF	$ 12.00	$ 43,200.00
	Subtotal Widened Planters				***$ 504,700.00***
	Cost per Square Foot				***$ 9.90***
F	*Vegetated Swales*				
	(Ave. 7' Wide x 4,500 LF Long)				
1	Excavation	750	CY	$ 10.00	$ 7,500.00
2	Vegetated Cover (in lieu of turf grass)	31,500	SF	$ 1.50	$ 47,250.00
	Subtotal Vegetated Swales				***$ 54,750.00***
	Cost per Square Foot				***$ 1.74***
G	*Interceptor Trees/ Disconnected Roof Drains*	No Cost			
	DRAIN FACILITY SUBTOTAL				**$ 5,763,000.00**
	CONTINGENCY 10%				**$ 576,300.00**
	TOTAL				**$ 6,339,300.00**

APPENDIX D

Geotechnical Report

Cdrom

PRELIMINARY GEOTECHNICAL INVESTIGATION
ASPEN 1 – NEW BRIGHTON PROJECT
Sacramento, California

StoneBridge Properties LLC
Sacramento, California

1 April 2011
Project No. 730438107

Treadwell&Rollo
A LANGAN COMPANY

Treadwell&Rollo
A LANGAN COMPANY

1 April 2011
Project 730438107

Mr. Mark McLoughlin
StoneBridge Properties LLC
3600 American River Drive, Suite 160
Sacramento, California 95864

Subject: Preliminary Geotechnical Investigation
ASPEN 1 – New Brighton Project
Sacramento, California

Dear Mr. McLoughlin:

Treadwell & Rollo, Inc. A Langan Company (T&R) is pleased to present this report presenting the results of our preliminary geotechnical investigation for the proposed ASPEN 1 – New Brighton Project in Sacramento, California. The site includes ASPEN 1, and portions of ASPEN 2, ASPEN 3, and Mayhew properties located south of the Jackson Highway (Highway 16), east of Florin Perkins Landfill, and west of the former Sacramento Cement Company property.

The majority of the site has previously been mined for aggregate. The mining activities have resulted in the ground surface within the properties that are approximately 20 to 30 feet lower than the surrounding ground surface and roadways. Portions of the site are currently occupied by aggregate processing and storage facilities consisting of retention ponds, drying beds, unimproved roadways, conveyor belt, aggregate stockpiles, and agricultural fields.

This geotechnical investigation was performed to provide information regarding the general subsurface conditions at the site, collect hydrological data, identify potential geotechnical issues that may affect the design of proposed improvements, and provide conclusion and recommendations for the design of the proposed improvements.

The results of our field exploration indicate that the site is underlain by fill, generally consisting of stiff to hard clay, sandy clay, and clayey silts with varying amounts of silt and sand. Portions of the ASPEN 1, ASPEN 2, and ASPEN 3 properties are being used as drying beds. The drying bed material consists of saturated clays and silts. The fill and drying beds are underlain by native soil consisting of stiff to hard clay with varying amounts of sand, silt, gravel and cobbles, and silt with varying amounts of sand, gravel, cobbles and clay, interbedded with layers of medium dense to very dense sand and silty sand with varying amounts of silt and clay. Groundwater was not encountered during our subsurface exploration; however, based upon our review of available groundwater data, the groundwater table is anticipated to be at elevations ranging from -22 to -58 feet (corresponding to approximate depths of 30 to 100 feet below the existing ground surface).

Based on the results of our studies completed to date, we conclude the primary geotechnical concerns affecting the design and construction of the proposed improvements are the presence of low permeability fine grained soil at the anticipated bottom of the proposed improvements, undocumented fill and soft/deleterious material in existing retention ponds, settlement of drying bed material and existing fill due to the weight of new fills and foundation loads, and the potential for granular layers being exposed in slope faces. This report contains preliminary information regarding subsurface conditions and soil characteristics at the site. We should be allowed to review preliminary development plans and verify that our assumptions and conclusions are correct and revise our recommendations as appropriate.

9608 KIEFER BOULEVARD, SUITE 7 SACRAMENTO CALIFORNIA 95827 **T** 916 476 6790 **F** 916 476 6792 www.treadwellrollo.com

We appreciate the opportunity to be of service to you on this project. If you have any questions, please call.

Sincerely yours,
Treadwell & Rollo, A Langan Company

REGISTERED PROFESSIONAL ENGINEER
HAZE M. RODGERS
NO. 2818
Exp. 6/30/12
GEOTECHNICAL
STATE OF CALIFORNIA

Haze Rodgers, G.E.
Project Engineer

730438107.08 HMR_Ltr

REGISTERED PROFESSIONAL ENGINEER
RICHARD D. RODGERS
No. 732
Exp. 3/31/11
GEOTECHNICAL
STATE OF CALIFORNIA

Richard D. Rodgers

Richard D. Rodgers, G.E.
Senior Principal

PRELIMINARY GEOTECHNICAL INVESTIGATION
ASPEN 1 – NEW BRIGHTON PROJECT
Sacramento, California

StoneBridge Properties LLC
Sacramento, California

1 April 2011
Project No. 730438107

Treadwell&Rollo
A LANGAN COMPANY

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APPENDIX D

PRELIMINARY GEOTECHNICAL INVESTIGATION
ASPEN 1 – NEW BRIGHT PROJECT
Sacramento, California

1.0 INTRODUCTION

This report presents the results of the preliminary geotechnical investigation performed by Treadwell & Rollo, A Langan Company (T&R) for the ASPEN 1 – New Brighton Project (Project) located in Sacramento, California. T&R prepared a progress report dated 19 November 2010 that presented the data and information available at that time. The progress report primarily addressed the proposed retention channel and basin portions of the project. The information, conclusions and recommendations presented herein supersede those presented in the progress report.

2.0 BACKGROUND

The Project site includes the ASPEN 1, and portions of the ASPEN 2, ASPEN 3 and Mayhew properties located south of the Jackson Highway (Highway 16), east of Florin Perkins Landfill, and west of the former Sacramento Cement Company property (Figure 1). As shown in Figure 1 three public roadways pass through the project site (South Watt Avenue, Hedge Avenue, and Mayhew Road). The majority of the site has previously been mined for aggregate resulting in the ground surface within properties being approximately 20 to 30 feet lower than the surrounding ground surface and roadways (roadway elevations vary from approximately 51 to 62 Feet[1]). The current ground surface within the mined area varies from approximately Elevation 8 to 41 Feet. Portions of the site are currently occupied by aggregate processing and storage facilities consisting of retention ponds, drying beds, earthen berms, unimproved roadways, conveyor belt, aggregate stockpiles, agricultural fields, and unimproved vacant lots. An exception is the northeast portion of the ASPEN 1 property (Former Matsuda Lease Site, Figure 1) which was previously occupied by a commercial nursery.

3.0 PROJECT DESCRIPTION

We understand the proposed improvements will include an organic farm, commercial space, offices, retail space, residential developments (multi and single family), recreation facilities including sports fields and courts, open space, a school, and necessary infrastructure (roadways and underground utilities) for the

---

[1] Elevations referenced to topographic surveys provided by Teichert Construction dated 27 August 2009.

developments. In addition, to collect and dispose of storm water, the project will utilize low impact design (LID) and hydro modification (H-M) facilities which encourage retention, detention, and therefore reduce storm water runoff. Both on- and off-site LID and H-M facilities are planned. The on-site LID and H-M facilities include retention ponds/areas in open space areas, infiltration planters along planned roadways and within the parkway medians. retention channel The off-site LID and H-M facilities include a retention channel that will extend east of the ASPEN 1 property and pass through the ASPEN 2 and ASPEN 3 properties, which ultimately ends in a retention basin on the Mayhew property (Figure 2). The retention channel and basin are anticipated to have bottom elevations varying from approximately 12 to 15 Feet, and 5 to 12 Feet respectively.

A significant amount of cuts and fills are required to raise the majority of the ASPEN 1 property to the appropriate grades. The ground surface in portions of the southwest and northeast areas will be lowered by approximately 5 to 10 feet. We anticipate that new fill thicknesses will range from approximately 15 to 30 feet in the central portion of the ASPEN 1 property. We understand current plans are to generate the fill from several sources including: a) material generated from lowering the southwest and northeast areas of the ASPEN 1 property, b) from construction of the retention channel, and c) currently unidentified offsite sources.

Preliminary design loads, and/or new underground utility locations were not available at the time of this report was prepared.

4.0 PREVIOUS GEOTECHNICAL INVESTIGATIONS

Subsurface explorations were previously performed for portions of the ASPEN 1 property by Wallace Kuhl & Associates, Inc. (WKA 2005 and 2006). These previous studies were limited to the northeast (Former Matsuda Lease Site) and southeast (Previous District 1A Office Site) portions of the site (see Figures 1 and 3). These explorations identified several geotechnical issues that could impact the proposed development. These issues include the presence of relatively thick deposits of undocumented fill (20 to 30 feet), low to moderately expansive near-surface soil, and near-surface soil with a relatively low permeability. The approximate locations of the borings and test pits previously performed at the site are shown on Figure 3. Logs of the borings and test pits, and laboratory test results presented in the reports prepared by WKA are presented in Appendix B. The results of the previous geotechnical studies performed at the site data have been incorporated into this report, where applicable.

5.0 SCOPE OF SERVICES

Our scope of services was outlined in our proposals dated 5 April and 5 August 2010. Our services included reviewing available subsurface information and historical aerial photographs, drilling borings, logging test pits, performing laboratory tests, collecting samples of compacted drying bed material, performing down-hole cased falling head tests, performing engineering analyses, and preparing this report presenting the results of our studies. Furthermore, this report presents our preliminary conclusions and recommendations regarding the following:

- soil and groundwater conditions at the site
- geologic and seismic hazards
- results of the field and laboratory testing
- hydrological characteristics of material encountered including moisture content (in-situ and saturated), dry density, porosity, saturated hydraulic conductivity, field capacity, wilting point, cation exchange potential, USDA soil texture classification
- static and seismic slope stability of proposed slopes
- foundation type(s) for proposed new structures, including shallow and deep foundations, as appropriate
- design criteria for foundation type(s), including vertical and lateral capacities
- estimates of total and differential foundation settlement
- estimates of total and differential ground settlement under the weight of existing and new fill
- soil improvement techniques to reduce settlement, if appropriate
- flexible, rigid, and permeable pavement design
- 2010 California Building Code (CBC) seismic design coefficients
- earthwork and grading
- construction considerations.

6.0 SITE HISTORY AND AERIAL PHOTOGRAPH REVIEW

We reviewed stereo-paired historical aerial photographs for evidence of past grading and quarry operations to provide a limited history of past land use. Five sets of paired aerial photographs ranging from 1953 to 1997 were reviewed to evaluate the prevailing site conditions, and document the development history of the property. A list of the aerial photographs reviewed is presented in Table 1.

TABLE 1
List of Reviewed Aerial Photographs

Date	Photo Number	Scale
7-19-1953	AV-93-115-15 and -16	1:20,000
5-11-1985	AV-2641-08-10 and -11	1:36,000
4-4-1989	AV-3528-0218-07 and -08	1:6,600
4-22-1995	KAV-4813-11-18 and -19	1:24,000
8-28-1997	AV-5498-10-09 and -10	1:24,000

In the 1953 photographs, no quarrying activity has yet begun on the site. The site is occupied by several small farm plots and two farm complexes, each comprised of a house, barn, and various outbuildings located in the northern portion of the site. The adjacent property east of the site has also not been quarried. A large quarry pit is in operation northwest of the subject site.

By 1985, quarry operations had begun. The 1985 photographs reveal an active quarry pit in the southern portion of the western third of the site, and a fluid-filled larger pit in the central northern portion of the site. A processing plant near the northwest property corner is present, along with a long conveyor that traverses the property in a northwest-southeast direction leading from the property adjacent to the eastern property boundary to the processing plant in the western side of the site. A U-shaped pit excavation is open on the property east of the subject site, just east of the termination of the conveyor. The conveyor appears to be located atop an earth-fill levee. A graded road is present along the east side of the fluid-filled pit in the central portion of the site.

By 1989, quarry operations had expanded to include a new square-shaped pit in the northern portion of the western third of the site. This pit is relatively deep, with fluid in the bottom of the excavation. The previously excavated southern pit is now characterized by planted trees around a small pond. The larger pit in the central northern of the portion of the site is open, and excavation of a new pit on the east side of the levee and roadway that bounds the east end of the central northern pit has begun.

By 1995, the pits in the western and central northern portions of the site are full of fluid and appear connected as one large pond. There appear to be on-going activities in the pit shown in 1989 photos in the eastern side of the site, and it appears to be relatively shallow and laterally does not extend to the eastern property limits.

By 1997, there are three ponds and one pit present on the site: the southern pond in the west area (surrounded by trees), a square-shaped pit full of water in the northwest corner of the site; the larger central northern pond; and the eastern pit. The eastern pit has much less fluid in it, and vehicles are present indicating active quarry operations in this area.

In all of the photographs, four electrical towers trending northwest-southeast are present crossing the property. Quarry operations have been mostly restricted to the northern portion of the property, north of the levee and conveyor except for the southern pit in the western portion of the site (the oldest pit). The current topographic survey indicates that the site appears mostly as it did in the 1997 photographs, except for the northwest corner of the property where the square-shaped pit first observed in 1989 appears to have been filled.

7.0 FIELD INVESTIGATION AND LABORATORY TESTING

The subsurface conditions at the Project site were explored by drilling 15 test borings and 12 hand auger borings within the ASPEN 1 property, and 13 test borings within the proposed alignment of the retention channel and basin (Figure 2). The characteristics of the potential fill material was evaluated by excavating and logging seven test pits, and collecting disturbed and undisturbed samples of compacted drying bed material from three drying beds. The approximate locations of the test borings and test pits are shown on Figure 3.

7.1 Test Borings

Test borings were drilled by Western Strata Exploration, Inc. of Clarksburg, California, on 4 August through 22 September 2010. The borings were drilled using a truck-mounted drill rig equipped with hollow stem auger drilling equipment to depths ranging from approximately 5 to 56.5 feet below ground surface (bgs) (Elevations 20 to -11.5 feet). The hand auger borings were performed by our field engineer on 30 August and 1 September 2010. The hand auger borings were advanced to depths ranging from 3.4 to 8.2 feet bgs (Elevations 14.5 to 7.6 feet). During drilling, our field engineer logged the soil encountered and obtained samples for visual classification and laboratory testing. Logs of the borings are presented on Figures A-1 through A-40 in Appendix A. The materials encountered during drilling were classified according to the soil classification system described on Figure A-48.

Soil samples obtained from the test borings were collected using a Sprague and Henwood (S&H) split-barrel sampler with a 3.0-inch outside diameter and 2.5 inch inside diameter (with 2.43-inch-inside-diameter brass liners), a Standard Penetration Test split-barrel sampler (SPT) with a 2.0-inch outside diameter and a 1.5-inch inside diameter (without liners), and thin walled Shelby Tubes with a 3.0-inch outside diameter. The S&H and SPT samplers were driven with a 140-pound hammer falling approximately 30 inches per drop. The blow counts required to drive the S&H sampler the final 12 inches of an 18-inch drive were converted to approximate SPT N-values using a conversion factor of 0.6. The approximate SPT N-values are also shown on the boring logs. Where an SPT sampler was used, the actual blow counts are presented on the boring logs.

Upon completion of drilling, the test borings were backfilled with cement grout. The soil cuttings were spread on the ground next to the borings. The hand auger borings were backfilled with the soil cuttings.

7.2 Test Pits

Seven test pits were excavated using a backhoe provided by Teichert Construction on 10 September 2010. The test pits were excavated to depths ranging from approximately 13 to 15 feet bgs (Elevations 20 to 8.5 feet). During excavation of the test pits, our field engineer logged the soil encountered and obtained samples for visual classification and laboratory testing. Logs of the test pits are presented on Figures A-41 through A-47 in Appendix A. Upon completion of the test pits the excavations were backfilled with the excavated soil. The materials encountered in the test pits were classified according to the soil classification system described on Figure A-48.

7.3 Drying Bed Samples

Samples of compacted drying bed material were collected from three drying beds to evaluate the engineering characteristic of this material. Samples were collected from Bed 2A in ASPEN 2, Bed 3G1 in ASPEN 3, and Bed 4B in ASPEN 4. Prior to collecting the samples a visual site reconnaissance of the drying beds was performed to select the drying beds to be evaluated. Disturbed and undisturbed samples were collected using a hand driven sampler.

7.4 Laboratory Testing

The soil samples were re-examined in our office to confirm field classifications, and representative samples were selected for testing. Laboratory tests were performed on selected soil samples to measure dry density and moisture content, porosity, specific gravity, gradation, Atterberg limits, laboratory compaction, shear strength, field capacity and wilting point (1/3 plus 15 Bar), cation exchange potential (ammonium saturated), and hydraulic conductivity (undisturbed and remolded samples). The laboratory hydraulic conductivity tests were performed using both rigid and flexible wall permeameters. Samples of the drying bed material were tested using rigid wall permeameters, and samples from the borings were tested using flexible wall permeameters. Flow through the test specimens is vertical (no horizontal flow) using either permeameter, and therefore only measures the vertical saturated hydraulic conductivity of the sample. The laboratory test results are presented on the boring logs in Appendix A and in Appendix C.

7.5 Down-hole Cased Falling Head Tests

Following completion of the test borings, five down-hole cased falling head tests were performed at selected locations. These tests were performed to evaluate the in-place infiltration rate of selected soil layers. Cased falling head tests were performed at borings MTR-05 at 20 and 30 feet bgs, MTR-06 at 5 feet bgs, 3TR-03 at 19.8 feet bgs, and 3TR-06 at 24.5 feet bgs. The cased falling head tests were performed in general accordance with the procedure described in Appendix F2 of the Portland Storm Water Management Manuel dated 1 February 2010. Each falling head test consisted of drilling a boring using a 12-inch hollow stem auger, setting a 4.5- to 6-inch diameter PVC casing down the hole prior to removing the auger and backfilling the annulus around the casing. The bottom two feet of the annulus around the casing was filled with hydrated bentonite pellets and the remainder was backfilled using soil cuttings. Each falling head test was pre-saturated with two feet of water. After pre-saturation, water was added as necessary to re-gain the two feet of water in the casing. Periodic water level measurements were taken at selected intervals for approximately two hours. The average infiltration rate for the final test at each location is presented in Table C-1 in Appendix C. It is important to note that the hydraulic conductivities obtained from the field falling head tests are generally higher than those obtained from laboratory tests. Although the set up and procedure of the field falling head test attempts to reduce horizontal flow from the bottom of the casing, it is difficult to eliminate horizontal flow, and the therefore the resulting saturated hydraulic conductivity is generally higher than laboratory test performed on samples taken at the same depth.

8.0 SUBSURFACE CONDITIONS

The results of our subsurface investigation indicate the site is underlain by fill. The thickness of the fill is highly variable ranging from zero to approximately 39 feet. The estimated fill thickness for each area of the site is presented in Table 2.

TABLE 2
Undocumented Fill Thickness

Location (Figure 1)	Undocumented Fill Thickness (Feet)	Elevation of Bottom of Fill (Feet)
ASPEN 1 – Former Matsuda Lease Site	28.5 to 39	9 to 22.5
ASPEN 1 – Previous District 1A site	14 to 20	7 to 13
ASPEN 1 – Southwest Corner	24 to 33	3 to 8
ASPEN 1 – Drying Bed A	7.5 to 5.5	12.5 to 13.5
ASPEN 1 – Drying Bed B	4 to 5.5	12.5 to 13
ASPEN 1 – Drying Bed C	2	10 to 12
ASPEN 1 – Drying Bed D	4	6.6 to 9.6
ASPEN 1 – Drying Bed E	1	11 to 12
ASPEN 1 – Drying Bed F	5	9.7 to 10.7
ASPEN 1 – Drying Bed G	5	7.8 to 9.8
ASPEN 1 – Drying Bed H	2	13 to 16
ASPEN 1 – Drying Bed I	4.5	10.5 to 12.5
ASPEN 1 – Drying Bed J	5.5	12.5 to 13.5
ASPEN 1 – Drying Bed K	4.5	10.5 to 12.5
ASPEN 1 – Drying Bed L	4.5	9.5 to 11.5
ASPEN 1 – Unimproved Roadways & Earthen Berms	7 to 16	5 to 10
ASPEN 1 – Northwest Corner	21 to 24	8
ASPEN 2 – Retention channel Alignment	13 to 14.5	10.5 to 11
ASPEN 3 – Retention channel Alignment	2.5 to 10	20.5 to 30

The fill generally consists of stiff to hard clay, sandy clay, and clayey silts with varying amounts of sand. Isolated layers of medium dense to very dense silty sand, clayey sands, and gravels were also encountered in the fill. The drying bed material encountered was generally soft to medium stiff, wet, and considered to be moderately compressible under new loads from fill or foundations. Because of the state in which it was placed, the drying bed material has a very high moisture content and is saturated. The fill and drying bed material is underlain by native soil consisting of stiff to hard clay with varying amounts of sand, gravel and cobbles, and clay, and silt with varying amounts of sand, gravel, and cobbles. Native layers of medium dense to very dense sand and silty sand with varying amounts of silt and clay were encountered to the maximum explored depth (Elevation -11.5 feet). The fine grained soil (silts and clays) generally have a low to moderate expansive potential.

Groundwater was not encountered in any of the borings or test pits. Based on our review of available groundwater data published by the Sacramento County, and California Departments of Water Resources, the groundwater table beneath the site varies. The groundwater is generally shallower on the north side of the project and slopes down to the south/southwest. Based on our review of the available groundwater data from spring 2000 through spring 2010 the groundwater beneath the site varied from approximate elevation -59 to -22 feet (corresponding to approximate depths of 30 to 100 feet bgs) The average groundwater elevation of the data reviewed is approximately -28 feet (corresponding to a depths of 36 to 49 feet bgs).

9.0 REGIONAL SEISMICITY

The major active faults in the area are the Great Valley, Hunting Creek-Berryessa, and Concord-Green Valley Faults. For each of the active faults, within 100 kilometers, the distance from the site and estimated mean characteristic Moment magnitude[2] [2007 Working Group on California Earthquake Probabilities (WGCEP) (2007) and Cao et al. (2003)] are summarized in Table 3.

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[2] Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

TABLE 3
Regional Faults and Seismicity

Fault Segment	Approx. Distance from fault (km)	Direction from Site	Mean Characteristic Moment Magnitude
Great Valley 4a, Trout Creek	54.0	West	6.6
Great Valley 4b, Gordon Valley	57.0	West	6.8
Great Valley 5, Pittsburg Kirby Hills	59.0	West	6.7
Great Valley 3, Mysterious Ridge	61.0	West	7.1
Green Valley Connected	72.0	West	6.8
Hunting Creek-Berryessa	72.0	West	7.1
Greenville Connected	83.0	Southwest	7.0
West Napa	86.0	West	6.7
Great Valley 7	90.0	South	6.9
Mount Diablo Thrust	93.0	Southwest	6.7
Total Calaveras	97.2	Southwest	7.0

Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836, an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale (Figure 4) occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated Moment magnitude, $M_{w,}$ for this earthquake is about 6-1/4. In 1838, an earthquake occurred with an estimated intensity of about VIII-IX (MM), corresponding to an M_w of about 7-1/2. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Northern California area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 430 kilometers in length. It had a maximum intensity of XI (MM), a M_w of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The most recent large earthquake to affect Northern California was the Loma Prieta Earthquake of 17 October 1989 with an M_w of 6.9. The epicenter of the earthquake was in the Santa Cruz Mountains approximately 173 km from the site.

In 1868, an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated M_w for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably an M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake (M_w = 6.2).

The Coast Ranges-Central Valley Fault (Great Valley) system is characterized by a poorly defined series of thrust faults and blind thrust faults. The fault system is defined by diffuse seismicity, distinct geomorphic expression of mountain-front faulting, and seismic reflection profiles. The thrust system trends northwest-southeast and is believed to extend 640 kilometers, forming the western boundary of the Sacramento and San Joaquin Valleys. In general, the fault system dips westward. An earthquake on the Coast Ranges-Central Valley Fault system could cause low to moderate seismic shaking at the project site. A number of large historic earthquakes have occurred on this fault system, including the 1892 Vacaville (M_w = 6.8), 1889 Antioch (M_w = 6.3), and the 1983 Coalinga (M_w = 6.5) earthquakes. Geologists have estimated a slip rate ranging from 0.2 to 3 mm/yr. Estimated moment magnitudes of earthquakes along the thrust fault system are between 6.0 and 6.7.

The Concord and Green Valley faults consist of a highly complex zone with a potential for either one major event or two smaller events to the northwest and southeast of Suisun Bay. A single event model involving a rupture along the Concord and Green Valley faults is estimated to be capable of producing an M_w 6.9 event every 180 years. An alternate model involves independent Concord and Green Valley fault ruptures that would produce a M_w 6.5 event every 110 years and an M_w 6.7 event every 150 years, respectively (USGS 2000).

The Mount Diablo blind thrust underlying the Livermore and Sycamore Valleys is the source of major fold structures, including the Mount Diablo and Tassajara anticlines (Unruh and Sawyer 1997). The folds and the underlying fault are assumed to be active because they deform late Pleistocene and early Holocene sediments. The geometry and slip rate on the thrust are inferred largely from structural modeling, although the existence of the thrust is consistent with seismic reflection data from the southeastern Tassajara Hills (Unruh 2000). Unruh and Sawyer (1997) hypothesize that this system has formed a left-stepping transpressional step-over between the right-lateral Greenville and Concord-Green Valley faults, and propose a kinematic model in which slip on the Greenville fault is transferred via the Mount Diablo thrust to the Concord Fault. Present modeling results constrain estimates for the minimum slip rate on the Mount Diablo thrust to a range of 1.3 to 2.4 mm/yr.

10.0 DISCUSSIONS AND CONCLUSIONS

From a geotechnical standpoint, we conclude the site can be developed as planned, provided the recommendations presented in this report are incorporated into the project plans and specifications, and implemented during construction. The primary geotechnical issues to be addressed during site development are:

- relatively low permeability fine grained borrow material proposed for use as on-site fill,
- presence of relatively low permeability fine grained soil at the bottom of the proposed retention channel,
- presence of undocumented fill, and soft/deleterious material in existing retention ponds,
- settlement of drying bed material and existing undocumented fill under the weight of new fill and building loads,
- potential for exposed granular layers in retention basin side slopes,
- and construction considerations.

These and other geotechnical issues as they pertain to the proposed development are discussed in following sections.

10.1 Potential Borrow Materials

The results of the field exploration and laboratory tests performed on the material that will be excavated from southwest and northeast portions of the ASPEN 1 Property, the proposed retention channel alignment, and retention basin are generally silty clay with sand, gravel and cobbles, and silty sand with clay and gravel. Laboratory tests indicate that the material has a low to moderate expansion potential. The material is considered acceptable for use a general fill at the Project site.

10.2 LID and H-M Facilities

10.2.1 On-Site LID and H-M Facilities

As discussed above we anticipate that the compacted fill placed to raise the project site grades to their final elevations will generally consist of silty clay with sand, gravel and cobbles, and silty sand with clay and gravel. Based on the results of our laboratory testing on re-molded samples of the potential borrow material (Table C-1) this material is anticipated have saturated hydraulic conductivities ranging from 0.002 to 0.68 in/hr. The average saturated hydraulic conductivity of the laboratory tests is approximately 0.13 in/hr. Table C-1 also presents the results of the Cation Exchange, field capacity, wilting point, moisture contents (in-situ and saturated), porosity, and dry unit weight of selected soil samples. We conclude that the infiltration rate of the fill will be slow; however the proposed on-site LID and H-M facilities are feasible provided the design and construction consider the appropriate hydrologic characteristics of the soil encountered (Table C-1), and recommendations presented in this report.

10.2.2 Off-Site LID and H-M Facilities

Based on the results of our subsurface exploration at the site the proposed retention channel is expected to be bottomed in fine grained sandy silt or silty clay. The results of laboratory hydraulic conductivity tests indicate that this material will have saturated hydraulic conductivities ranging from 0.0003 to 0.5 in/hr, with and average of approximately 0.15 in/hr. Discontinuous sand layers were encountered below the retention channel alignment.

Borings within and near the proposed retention basin indicate the top of a relatively continuous sand layer is present below the proposed bottom. The top of the sand layer was encountered at Elevations ranging from 5 to 6.5 Feet (approximately 0 to 5.5 below the proposed basin bottom), and appears to vary in thickness from six to greater than 10 feet. The results of the field falling head tests indicate that the sand below the retention basin has a saturated hydraulic conductivity of approximately 0.48 in/hr. The fine grained material near the bottom of the proposed retention basin has a saturated hydraulic conductivity similar to that of the retention channel discussed above. Considering the relatively low permeability of the fine grained soil at the proposed bottom of the retention channel, the infiltration rate will be slow; however since the proposed basin bottom will be near or within the underlying sand layer the infiltration rate will be relatively quick in areas that expose the sand layer, and relatively slow in areas that are bottomed in fine grained soil.

We conclude that the proposed off-site LID and H-M facilities are feasible provided the design and construction consider the appropriate hydrologic characteristics of the soil encountered (Table C-1), and recommendations presented in this report.

10.3 Seismic Hazards

The site is not within a state-designated seismic hazard zone. However, during a major earthquake on a segment of one of the regional faults, low to moderate shaking is expected to occur at the site.

We evaluated the potential of seismic hazards at the site, such as those associated with soil liquefaction, lateral spreading,[3] and cyclic densification.[4] We used the results of our preliminary geotechnical investigation to evaluate the potential of these phenomena occurring at the site. The results of our evaluation indicate that in general the fill and native soils at the site are not saturated and are sufficiently stiff and dense to resist soil liquefaction, lateral spreading, and cyclic densification with the exception of the undocumented fill at encountered in boring TR-4. The undocumented fill material encountered in this boring is a loose silty sand, and the results of our analyses indicate that this material may densify and settle approximately ¼ inch during strong earthquake. Therefore, we conclude the potential for seismic hazards at the site is low.

10.3.1 Ground Shaking

The seismicity of the site is governed by the activity of the Great Valley, Hunting Creek-Berryessa, and Concord-Green Valley Faults. However, ground shaking from future earthquakes on any of the regional faults could be felt at the site. The intensity of earthquake ground motions at the site will depend upon the characteristics of the generating fault, distance from the rupture, magnitude and duration of the earthquake, and specific subsurface conditions. We judge ground shaking at the site during a major earthquake on one of the nearby regional faults will be low to moderate. To reduce the potential for damage associated with earthquake-induced ground shaking, new structures should be designed in accordance with the current CBC seismic design requirements. Geotechnical soil profile type and near-source factors are presented in the preliminary recommendations section of this report.

10.3.2 Fault Rupture

Historically, ground surface displacements closely follow the trace of geologically young faults. The site is not within an Earthquake Fault Zone, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, and no active faults have been mapped at the site. Therefore, we conclude that the risk for fault rupture at the site is low.

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[3] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[4] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is densified by earthquake vibrations, causing ground-surface settlement.

10.4 Building Foundations

Preliminary design loads were not available at the time of this report. We understand the structures will be single and two story wood-framed residential structures, and two to three story commercial, office, and retail buildings. Based on the results of our studies our preliminary conclusion is that shallow foundations systems such as post tensioned slabs (P-T slabs), conventional continuous and spread footings, and/or reinforced mat foundations are the most appropriate foundations for the planned structures at the site. Differential fill thickness below the planned structures should be limited to a maximum of 5 feet. Lots and/or building pads spanning or located near cut/fill transitions may require additional over-excavation and fill placement to create acceptable transitions.

Tall or heavy structures may require deep foundations. The foundation systems should be determined once building types, location and foundation loads become available; depending on the type and anticipated foundation loads of the proposed structures supplemental geotechnical explorations and/or recommendations may be required.

10.5 Settlement

Settlements at the site will be result from compression of the new fills due to self weight, existing fill and underlying native material due to the weight of new fills and foundation pressures, and consolidation related settlement of the drying bed materials. The magnitude and rate of settlement are dependant upon many factors including the amount of new fill placed, type of foundation system, foundation loads, and thickness of drying bed material (if present). Preliminary estimates of the magnitude and rate at which these settlements are estimated to occur at the site are discussed in the following sections.

10.5.1 Compression from New Fill

Using the results of our subsurface exploration we estimated the amount of post construction settlement that may occur due to the placement of new fill. As discussed above we understand the existing site grade may be raised as much as 30 feet. The magnitude of the actual post construction settlement will be related to the amount of new fill placed, weather or not the area is underlain by a drying bed and the compressibility of the underlying soil. Areas where new fill is placed on top of drying beds will have additional settlement due to consolidation of the drying bed material. The estimated additional consolidation related settlements of the drying bed material is discussed in Section 10.5.2 below.

The results of our analyses indicate that settlement of the new fill may occur due to the self weight of new fill and re-compression of the underlying native material. Our estimates include the settlement of the underlying native materials and properly re-compacted undocumented fill, as well as elastic compression of the new fill due to self weight. The Results of our evaluation are presented in Figure 5. We anticipate that the majority of the compression shown in Figure 5 will occur during and shortly following construction (within 1 to 2 years). If the magnitude of the estimated compression, and/or if the time required to allow the settlement to occur is excessive, the relative compaction of new fill placed deeper than 10 feet from finished grade can be increased and the estimated compression and time required for the compression to occur will be reduced somewhat.

10.5.2 Additional Drying Bed Consolidation Settlement

As discussed above in Sections 8 and 10.5.1, the drying bed material is saturated and considered compressible. Based on the preliminary finished grades and the existing topographic information provided by Teichert Construction, we anticipate that the site grades over the drying beds will be raised approximately 7 to 20 feet, except for a small area in the northeast corner of the ASPEN 1 Property which will be increase by approximately 30 feet. We estimated the magnitude of settlement that may occur in areas underlain by the drying beds considering the anticipated finished grades. The estimated magnitudes of post construction consolidation settlement of the drying bed material due to the weight of the proposed fill are presented in Figure 6. As shown in Figure 6 the estimated post construction settlement of the drying bed material due to the weight of the proposed fills ranges from approximately 1.5 to 11.5 inches. The amount of settlement is dependant upon the thickness of drying bed material and amount of proposed fill.

The rate at which the drying bed material will settle depends upon the thicknesses of the drying bed material and new fill. Figures 7 and 8 present the estimated time to reach 90 and 95 percent, respectively, of the settlements presented in Figure 6. As shown in Figures 7 and 8 we anticipate 90 to 95 percent of the estimated drying bed settlement will be completed within approximately 2 years after placement of the new fill. The estimated amount of settlement remaining after 90 and 95 percent of the total drying bed settlement (Figure 6) is presented in Figures 9 and 10 respectively.

10.5.3 Additional Foundation Settlement

Additional foundation settlement will occur primarily from compression of new and existing fills, and from consolidation of drying bed material. Building foundations underlain by 15 or more feet new fill are not anticipated to have additional settlement due to applied foundation loads. The magnitude and rate the foundation settlement will depend on the type of foundation, magnitude of foundation loads, and thickness of drying bed material (if present). We estimated preliminary foundation settlements for the wood framed residential structures considering isolated and continuous spread footings, and mat foundations (P-T slabs, and stiffened shallow foundations). Our evaluations considered 24 inch square isolated and 18 inch wide, isolated and continuous spread footings, respectively with an applied bearing pressure of 2,000 pounds per square foot (psf). We also considered a 30 foot square mat foundation with an applied bearing pressure of approximately 100 psf.

The results of our evaluations indicate that approximately ½ inch of total and differential settlement may occur in areas underlain by existing fill and native soil. Areas with less than 15 feet of new fill underlying building foundations and underlain by drying bed material may settle an additional ¼ to 2/3 inches. Since the thickness of the drying bed material within each drying bed is relatively uniform, the estimated additional settlement for areas underlain by a single drying bed is anticipated to be relatively uniform (negligible increase to the estimated differential settlement). Building pads that span between two drying beds, or a drying bed and existing fill would have increased differential settlement (up to an additional inch, estimate maximum differential settlement 1.5 inches).

Compression of the new and existing fill material due to foundation loads is anticipated to occur relatively quickly following construction of the structures. Approximately 90 to 95 percent of the consolidation settlement of the drying bed material is anticipated to occur within 2 years of completion of the structures.

10.5.4 Estimating Total Settlement Magnitudes

As discussed above the amount of settlement depends upon many factors including the amount of new fill placed, type of foundation system, foundation loads, and thickness of drying bed material (if present). The estimated settlements presented in the sections above consider only the individual material discussed. The total amount of settlement for areas where new fill will be placed over existing drying beds will be a sum of the compression of the new fill and native material and consolidation of the drying bed material. For example; if approximately 10 feet of new fill is placed on a drying bed with approximately 4 feet of drying bed material the total estimated settlement is 4.6-inches (0.6-inches plus 4-inches from Figures 5 and 6 respectively). As discussed above the majority of this settlement is anticipated to occur within 1 to 2 years following placement of the new fill.

10.6 Undocumented Fill

As discussed above in Section 8, undocumented fill of varying thickness covers the majority of the site. The deeper fills located in the northeast, southeast, and southwest portion of the ASPEN 1 Property appear to have been in place for at least 20 years, and based on the results of our subsurface exploration primarily consist of stiff to hard silt and clay. Also, we understand the proposed final grades, the elevation of the northeast, southeast, and southwest areas will remain the same or be lowered. Therefore we conclude that the majority of settlement due to the self weight of the fills has occurred. Additional settlement due to building foundations and/or new fill loads may occur; however, settlements associated with new fill or building loads will primarily be due to elastic compression of the near surface materials. Provided the preliminary recommendations presented in this report are incorporated into the design and construction of the proposed improvements, significant over-excavation of the deeper fills is not anticipated.

As discussed in Section 6.0, a relatively deep (20 to 23 feet) filled retention pond may be present in the northwest corner of the ASPEN 1 Property (Figure 3). This area may receive new fill to achieve the planned site grades. Because of the presence of the conveyor system, this area could not be explored as part of this investigation. This area should be explored further to evaluate whether undocumented fill is present, and if so, determine the depth and characteristics of the fill. For preliminary planning purposes we recommend that this material be removed and re-compacted in accordance with the recommendations presented in Section 11.1 of this report.

Shallow undocumented fills were encountered within the lower portion of the ASPEN 1 Property, earthen berms, unimproved roadways, and within the retention channel alignment within ASPEN 2 and ASPEN 3. These thin undocumented fills are not considered suitable for support of new fill, and/or settlement sensitive improvements (buildings, underground utilities, etc.). The thin undocumented fills in areas to receive new fill, or settlement sensitive improvements should be removed and properly re-compacted in accordance with the recommendations presented in Section 11.1.

10.7 Expansive Soil Considerations

The existing near-surface soil, and the potential borrow material generated from excavation of the retention channel generally consists of sand, clay, and silt with a low to moderate expansion potential. Moisture fluctuations in expansive soil could cause the soil to expand or contract resulting in deflection and potential damage to foundations, slabs, and pavements. Potential causes of moisture fluctuations include seasonal changes, drying during construction, and subsequent wetting from rain, capillary rise, and landscape irrigation. The actual expansion potential of the foundation subgrade should be determined during grading once the finished grades have been reached. Although not anticipated, if material with a higher expansion potential is encountered during grading, this material should not be placed within 10 feet of finish grade.

To limit the amount of differential movement of the expansive soil due to changes in moisture content, proposed slab-on-grade floors, exterior slabs, and pavements should be underlain by at least 12 inches of non-expansive, select fill or chemically treated on-site soil. Mat foundations or post-tensioned (P-T) slabs should be checked to ensure they can resist movements associated with seasonal moisture changes, however, it is not necessary to place select fill beneath mats or P-T slabs.

10.8 Demolition of Existing Improvements & Retention Ponds

Existing foundations, pavements, and underground utilities to be abandoned should be removed, and the resulting excavations properly backfilled in accordance with the recommendations presented in Section 11.1. Existing retention ponds are likely to have soft compressible soil, vegetation and other deleterious material in them. Soft and deleterious material, if encountered, should be removed and properly disposed of. The ponds and resulting excavations should be properly backfilled in accordance with the recommendations presented in Section 11.1.

10.9 Slope Stability

Based on our understanding of the proposed improvements, we anticipate that cut and fill slopes will be constructed as part of the site grading. Filling the central portion of the ASPEN 1 Property will result in slopes ranging in height from approximately 5 to 17 feet with variable inclinations, the steepest of which will be inclined at approximately 3:1 (horizontal to vertical). The proposed retention channel slopes will range in height from approximately 4 to 30 feet with variable inclinations with the steepest slopes also at approximately 3:1. The proposed retention basin in the Mayhew property will have side slopes varying in height from 24 to 53 feet inclined at approximately 2.6:1.

We performed static and seismic slope stability analyses using the existing and preliminary proposed grades and the subsurface data and laboratory test results from our subsurface investigations at the site. We evaluated two generalized cross sections within the ASPEN 1 Property, and three generalized cross sections at the proposed retention basin. The approximate locations of the cross-sections used for our slope stability analysis are shown on Figure 3. We selected these cross-sections because in our opinion they represented the tallest and steepest slopes proposed for the project. The geometries of the generalized slopes evaluated are presented in Table 4 below.

TABLE 4
Generalize Slope Geometries

Location	Cross-section	Slope Height (Feet)	Slope Inclination (Horizontal : Vertical)
ASPEN 1 – Property	A-A'	13	3.0 : 1.0
	B-B'	14	3.9 : 1.0
Mayhew – Property	C-C' North	24	3.6 : 1.0
	C-C' South	51	4.0 : 1 (overall) 3.0 : 1.0 (steepest portion)
	D-D'	45	2.6 to 1.0
	E-E'	53	3.6 to 1.0 (overall) 3.0 to 1 (steepest portion)

We performed our slope stability analysis using the program SLOPE W version 6.22 developed by GEOSLOPE International. The cross-sections and the results of our slope stability analysis are presented in Appendix D. Details of the slope stability analysis performed are discussed below in the following sections.

10.9.1 Static Slope Stability

We performed static slope stability analyses considering total stress (saturated), and drained strength parameters. Total stress strength parameters were considered for the fine grained (clay and silt), and drained (frictional) strength parameters were considered for the granular materials (sand and gravel). These strengths were based on the results of our field and laboratory tests, and our professional judgment. The soil parameters considered in our analyses are presented in Table 5.

TABLE 5

Soil Parameters for Slope Stability Analyses

Material	Total Unit Weight (pcf)	Cohesion (psf)	Friction Angle (Degrees)
Cross-sections A-A' and B-B'			
Fill	120	1,500	0
Silt/Clay	110	1,500	0
Sand and Gravel	125	0	45
Clayey Silt/Silt	125	3,500	0
Cross-sections C-C', D-D', and E-E'			
Fill	120	1,500	0
Silty & Clayey Sand	120	0	32
Silty Sand	125	0	35 - 36
Gravel	125	0	45
Sandy Silt/Silt	110	1,000 - 1,500	0
Silt/Clayey Silt/Clay	100 – 105	1,600	0
Sandy Silt/Silty Sand	125	0	36

Our static analysis considered a tension crack completely filled with water forming at the top of the slope. In addition, our evaluation of the retention basin slopes considered the following surface and groundwater scenarios: 1) empty basin (no ground- or surface water); 2) full basin (assumed groundwater/water surface elevation 22 feet within the slope and basin); 3) simplified rapid drawdown condition (Groundwater at elevation 22 and 5 to 12 feet in slope and within the basin respectively). The results of our slope stability analysis are presented in Appendix D. Based on the results of our static slope stability analyses, we conclude that the proposed slopes for the ASPEN 1 property and the retention basin will have factors of safety of at least 1.6 against deep seated failure. It should be noted that if granular material (sand and gravel) is exposed in the retention basin side slopes this material may be susceptible to erosion and shallow surficial instability such as sloughing or slumping. These types of failures are expected to be generally less than 5 feet thick and pose no risk to the overall stability of the retention basin slopes; they can be mitigated by installing slope armor such as rip rap, or by performing routine maintenance.

10.9.2 Seismic Slope Stability

Our seismic slope stability analyses considered reduced total stress (saturated-undrained) strength parameters (80 percent of the strength considered in the static analyses). In addition, for the retention basin slopes we considered the simplified rapid drawdown scenario since this was determined to be the more critical situation. We evaluated the potential permanent lateral displacement of the proposed slopes due to an earthquake with a moment magnitude of 6.6, generating a peak horizontal ground acceleration (U_{max}) of 0.28 times gravity (g's) which corresponds to the 2010 CBC Maximum Considered Earthquake (MCE). We used the Makdisi and Seed (1978) approach to estimate the permanent lateral displacement of the slopes. The results of our slope stability analysis are presented in Appendix D. These results indicate that the yield accelerations of the proposed slopes ranges from 0.17 to greater than 0.3 times gravity, and is greater than the average slide mass acceleration (K_{max}) due to the MCE earthquake, and the risk of permanent lateral displacement of the proposed slopes during a strong earthquake is low. As discussed previously, if granular layers are exposed in the slope face there is an increased risk for shallow surficial slope instability, however these issues can be mitigated by slope armoring or routine maintenance.

10.10 Construction Considerations

Existing improvements to be abandoned at the site and soft weak and/or deleterious material in the existing retention ponds should be removed and properly disposed of. The resulting excavations should be properly backfilled in accordance with the recommendations presented in Section 11.1. Any loose or weak existing utility trench backfill material encountered during future site grading should be removed and replaced with properly compacted fill. Fill slopes constructed against existing slopes should be benched into the existing slopes. The benches should be made only in competent stable material any existing weak or loose material should be removed prior to cutting the bench. Benches should be limited to a maximum vertical height of 5 feet and may be constructed as the fill slope is built.

If site grading is performed during wet weather, the exposed soil subgrade may become wet and difficult to compact. The grading contractor should be prepared to repair the weak and wet subgrade, if required.

11.0 PRELIMINARY RECOMMENDATIONS

Preliminary recommendations for grading, pavements, underground utilities, and preliminary recommendations for foundation design, retaining walls, slabs-on-grade, and other geotechnical aspects for the Project are presented in the following sections.

11.1 Site Preparation and Grading

11.1.1 Demolition and Utility Abandonment

Demolition in areas to be developed should include removal of existing pavement and underground obstructions, including foundations of existing structures. Any vegetation and organic topsoil should be stripped in areas to receive new site improvements. Stripped organic soil can be stockpiled for later use in landscaped areas, if approved by the owner and architect; organic topsoil should not be used as compacted fill.

If acceptable from an environmental standpoint, demolished asphalt and concrete at the site may be crushed to provide recycled construction materials, including sand, free-draining crushed rock, and Class 2 aggregate base (AB). Where crushed rock will be used beneath vapor retarders and in other applications where free-draining materials are required, it should have no greater than six percent of material passing the 3/8-inch sieve and meet the other requirements presented in Section 11.7. Where recycled Class 2 AB will be used beneath pavements, it should meet requirements of the Caltrans Standard Specifications. Recycled Class 2 AB that does not meet the Caltrans specifications should not be used beneath City streets, however, it is acceptable for use as select fill within building pads and beneath concrete flatwork, provided it meets the requirements for select fill as presented in a subsequent section of this report.

Existing underground utilities in areas to receive new improvements should be removed or abandoned in-place by filling them with cement grout. The procedure for in-place abandonment of utilities should be evaluated on a case-by-case basis, and will depend on location of utilities relative to new improvements. However, in general, existing utilities within four feet of final grades should be excavated and removed, and the resulting excavation should be properly backfilled.

11.1.2 General Earthwork and Grading

In general subgrade exposed at the bottom of the excavations, as well as other portions of the site that will receive new fill or site improvements, should be scarified to a depth of at least eight inches, moisture-conditioned to above the optimum moisture content, and compacted to at least 90 percent relative compaction[5] where the exposed material consists of low to moderately expansive soil. Exceptions to this general procedure occur within proposed pavement areas, and in fill 10 feet below finished grade. The upper six inches of the pavement subgrade and fill placed deeper than 10 feet below finished grade should be compacted to at least 95 percent relative compaction. Fill material should be placed in loose lifts not exceeding eight-inches in loose thickness, and compacted to at least 90 percent relative compaction except as discussed above in pavement areas.

Fill containing oversized material (cobbles, rocks, debris, or clumps greater than 4-inches in maximum dimension) should not be placed within five feet of the bottom of building foundations, and placed in a manner that prevents clusters of oversized particles. Special care and/or special techniques may be required during compaction of fill with oversized material to ensure adequate compaction of the material. In addition, the maximum differential fill thickness beneath building pads should be limited to five feet.

11.1.2 LID and H-M Facilities

The hydraulic conductivity of fill materials is partially dependant upon how compact/dense the material is. Fill placed within the planned LID and H-M facilities be compacted to between 85 and 90 percent relative compaction. Care will need to be taken to make sure the fill within the LID and H-M facilities is not overly compacted (greater than 90 percent relative compaction). Overly compacted fill should be removed and replaced with properly compacted material. The growing media used in the LID and H-M facilities should be compacted in accordance with the recommendations and/or specifications prepared by the project hydrologist and/or landscape architect.

11.1.3 Cut and Fill Slopes

Fill slopes constructed against existing slopes should be benched into the existing slopes. The benches should be made only in competent stable material and any existing weak or loose material should be removed prior to cutting the bench. Benches should be limited to a maximum vertical height of 5 feet and may be constructed as the fill slope is built. Although not anticipated, if water seeps are encountered during the benching operations, subdrains connecting to a suitable facility may be required to collect and properly dispose of the collected water.

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[5] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by the ASTM D1557-00 laboratory compaction procedure.

Slope faces should be compacted and seeded or planted with drought resistant plants as soon as practical to reduce the potential for erosion. Benches and drainage ditches should be constructed as required by local earthwork and grading regulations, and/or building codes. Benches and horizontal areas should be graded such that surface water drains away from the face of slope towards a suitable drainage structure. If granular material is exposed in the slope faces, armoring such as rip rap may be required to prevent erosion and surficial sloughing and erosion. As an alternative to armoring, routine periodic maintenance may be performed to repair areas that have sloughed.

11.1.4 Building Pad Preparation

After clearing and grubbing are completed, the proposed building areas should be excavated to accommodate at least a two-foot thick layer of compacted fill beneath the planned building foundations and slab-on-grade floors. For example, if conventional continuous and/or spread footings are used, the two-foot-thick layer of compacted soil should extend beneath the bottoms of the proposed footings. If a mat or P-T slab is selected, the two-foot-thick layer of compacted soil should extend beneath the moisture barrier system that lies below the mat or slab. The proposed excavations should extend a lateral distance of at least five feet beyond the planned building footprints. Fill containing oversized material (cobbles, rocks, debris, or clumps greater than 4-inches in maximum dimension) should not be placed within five feet of the bottom of building foundations. In addition, the maximum differential fill thickness beneath building pads should be limited to five feet. Alternatively, if a deep foundation option is selected, the proposed building sites need only be cut to the proposed final subgrade elevations.

The subgrade exposed at the bottom of the proposed building pad excavations should be scarified to a depth of at least eight inches, moisture-conditioned above the optimum moisture content, and compacted to at least 90 percent relative compaction where the exposed material consists of low to moderately expansive soil.

The soil subgrade should be kept moist during construction to prevent desiccation cracks.

11.1.5 Imported and Select Fill

Samples of on-site and proposed import fill materials should be submitted to the geotechnical engineer for approval at least three business days prior to use at the site. The grading subcontractor should also provide analytical test results or other suitable environmental documentation to the project environmental consultant for approval prior to importing fill to the site. Any select fill placed during grading should meet the following criteria:

- be non-hazardous
- be free of organic matter
- contain no rocks or lumps larger than three inches in greatest dimension
- have a low expansion potential (defined by a liquid limit of less than 40 and plasticity index lower than 12)
- be non-corrosive
- be approved by the geotechnical engineer.

All select fill should be moisture-conditioned to above optimum moisture content, placed in horizontal lifts not exceeding eight inches in loose thickness, and properly compacted to at least 90 percent relative compaction. Where used, sand containing less than 10 percent fines (particles passing the No. 200 sieve) should be compacted to at least 95 percent relative compaction.

11.1.6 Unstable Subgrade

If unstable, wet, weak or soft subgrade is encountered during grading, it should be repaired using one of the following options:

Subgrade Repair Option 1 – Moisture-Conditioning and Compaction

Scarify the exposed subgrade to a depth of 12 inches, moisture-condition (wetting or drying) the soil to the appropriate moisture content, and properly compacting the soil to the recommended relative compaction (see Section 11.1.2). Typically, this option is the least expensive to implement, but it requires several days to weeks of dry, warm weather to facilitate the moisture-conditioning process.

Subgrade Repair Option 2 – Lime or Cement Admixture for Drying Wet Subgrade

Thoroughly mix a lime- or Portland-cement-based admixture into the subgrade at a concentration of 4 to 5 percent by dry weight of the soil being treated; allowing the admixture to react with the wet soil for at least 12 hours, re-mixing and moisture-conditioning the soil to above the optimum moisture content, and compacting the lime- or cement-treated material to at least 90 percent relative compaction.

Subgrade Repair Option 3 – Overexcavation and Filling

Weak wet soil can be excavated and removed to expose firm subgrade or excavated to a depth of up to 24 inches bgs (or as recommended by our field engineer). If at a depth of 24 inches poor soil still exists, a layer of geotextile tensile fabric (Mirafi 500X or equivalent) can then be placed over the sides and bottom of the excavation and the excavation backfilled with Caltrans Class 2 AB that has been compacted to at least 95 percent relative compaction. Alternatively, the excavation can be backfilled with Controlled Density Fill (CDF), sand-cement slurry, or lean cement with a 28-day unconfined compressive strength of at least 50 pounds per square inch (psi).

The appropriate subgrade repair option will depend on the time of year when site grading is performed and the time available to allow drying of the soil. We will provide recommendations for subgrade stabilization on a case-by-case basis. We recommend a non-vibratory roller be used to compact weak and/or wet subgrade soil and fill placed over wet subgrades.

11.1.7 Selective Grading

Depending upon how the contractor plans to excavate the retention channel and basin, ,and place fill at the ASPEN 1 site, it may be possible to segregate and stockpile granular material (sand, gravel, silty and clayey sands and gravels) excavated from the channel and basin by performing selective grading. If possible this material should be stockpiled for use within the LID and H-M facilities, since the hydrological characteristics will likely have a higher saturated hydraulic conductivity than the samples of the potential fill material tested in our studies (Table C-1).

11.2 Settlement Monitoring

To verify that the magnitude of post construction settlement will be acceptable, we recommend that the finished ground surface be monitored for at least 18 months prior to the construction of settlement sensitive improvements (underground utilities, buildings, etc.) Settlement monuments should be installed, and periodic elevation measurements should be taken during the monitoring period. Based on the results of our settlement evaluations presented in Section 10.5, we recommend the following monitoring schedule: once a month for the first 6-months, once every 2 months for the following 12 months. The monitoring measurements will allow us to compare our estimated settlements to the actual settlements, confirm that the remaining amount of settlement is acceptable, and provide supplemental recommendations, if deemed necessary.

11.3 Foundations

The following sections present preliminary foundation recommendations for the Project. As discussed above, the planned structures will be founded on fill material that is anticipated to have a low to moderate potential for expansion. The fill thickness will vary across the site. We recommend the proposed 2- to 3-story buildings be supported on shallow foundation systems such as conventional continuous and isolated spread footings, P-T slabs, or stiffened mat foundations. Larger buildings may require deep foundations to reduce post construction settlements to acceptable magnitudes.

11.3.1 Conventional Continuous and Isolated Spread Footings

The proposed buildings may be supported on continuous and/or individual spread footings bearing on the native clay or compacted fill. Continuous footings should be at least 18 inches wide and isolated spread footings should be at least 24 inches wide. We recommend that perimeter footings be bottomed at least 24 inches below the lowest adjacent soil subgrade. Interior footings should extend at least 18 inches below the lowest adjacent soil subgrade (measured from the top of the select fill). The footings may be designed using allowable bearing pressures of 2,000 pounds per square foot (psf) for dead plus live loads. This value contains a factor of safety of at least 2.0 and may be increased by one-third for total loads, including wind or seismic forces.

Lateral loads may be resisted by a combination of passive pressure on the vertical faces of the footings and friction between the bottoms of the footings and the supporting soil. To compute lateral resistance, we recommend using an allowable passive pressure (uniform distribution) of 600 psf. The upper foot of soil should be ignored unless confined by a slab or pavement. Frictional resistance should be computed using a base friction coefficient of 0.20. The passive pressure and frictional resistance values include a factor of safety of at least 1.5.

Footing excavations should be free of standing water, debris, and disturbed materials prior to placing concrete. The bottoms and sides of the footing excavations should be moistened following excavation and maintained in a moist condition until concrete is placed. If the foundation soil dries during construction, the footing will eventually heave, which may result in cracking and distress. We should check footing excavations prior to placement of reinforcing steel.

11.3.2 Stiffened Shallow Foundations

Stiffened shallow foundation systems should bear on at least a two-foot-thick layer of compacted fill. A stiffened shallow foundation system may consist of either interconnected, continuous spread-type footings, a reinforced concrete mat, or a P-T slab. Preliminary recommendations for stiffened shallow foundation systems are presented in the following sections.

11.3.2.1 Interconnected Continuous Footings and Mats

Interconnected continuous footings and mats that bear on at least a two-foot-thick layer of compacted fill may be designed using an allowable bearing pressure of 2,000 psf for dead plus live loads. This value contains a factor of safety of at least 2.0 and may be increased by one-third for total loads, including wind or seismic forces. The maximum applied bearing pressures will likely occur only in the vicinity of columns and walls. To evaluate the pressure distribution beneath the continuous footings or mat, we recommend using a modulus of vertical subgrade reaction of 15 pounds per cubic inch (pci). In addition, we recommend the stiffened shallow foundation system be designed to span an unsupported area of 10 feet in diameter at any location within the building interior, and cantilever a distance of five feet along the edges and corners. If continuous spread footings are used, they should be at least 18 inches wide and should extend at least 24 inches below the lowest adjacent grade. If a mat is selected, the edges of the mat should be thickened, such that the foundation edge is bottomed at least 12 inches below the adjacent exterior grade or six inches below the bottom of the capillary moisture break and vapor retarder system, whichever is lower.

Lateral loads can be resisted by a combination of passive pressures on the embedded vertical faces of the footings or mat, and friction along the base of the foundation elements. Passive resistance may be computed using an allowable passive pressure (uniform distribution) of 600 psf. The upper foot of soil should be ignored unless confined by slabs or pavement. Frictional resistance should be computed using a base friction coefficient of 0.20 for footings and mats bearing on soil subgrade. A base friction value of 0.15 should be used for mats bearing on waterproofing or a vapor retarder. The passive resistance and friction values include a factor of safety of about 1.5 and may be used in combination without reduction.

The foundation subgrade should be kept in a moist condition until covered. We should observe the mat or footing excavations prior to placement of reinforcing steel. If the subgrade consists of clayey soil and is allowed to dry during construction, it will be necessary to scarify the upper 8 to 12 inches of the foundation subgrade, moisture-condition the soil to above the optimum moisture content, and compact the soil in accordance with the recommendations presented in Section 11.1. The foundation excavations should be free of standing water, debris, and disturbed materials prior to placing concrete.

11.3.2.2 Post-Tensioned (PT) Slab-on-Grade Foundations

P-T slabs can be used in lieu of a grid or mat foundation where stiffened mat foundations or where estimated differential settlements are high. As discussed in Section 10.5, we estimate differential settlements (both static and seismic) of the ground may be on the order of one inch in 30 feet if the building pads span drying beds, or a transition between fill and a drying bed. Differential settlement will depend on the rigidity of the P-T slab. For preliminary design of P-T slabs, we recommend using the parameters presented in Table 6.

Considering the settlement issues discussed above in Section 10.5, and the presence of potentially expansive soil, the design of the P-T slab may be controlled by differential settlements rather than the potential for seasonal differential movement. Therefore, we recommend the slabs be checked for the edge-lift condition using special “no-swell” design equations specified by the Post Tensioning Institute (2008). For this procedure, we recommend the soil differential movement value be 1.5 inch in 30 feet.

TABLE 6
P-T Slab Design Parameters

Parameter	**Value**
Thornwaite Moisture Index	-20
Edge moisture variation distance	
edge lift	5.1 feet
center lift	9.0 feet
Depth to constant soil suction	9 feet
Constant soil suction	4.0 pF
Soil differential movement	
edge lift	1.5 inches
center lift	0.4 inches

The P-T slabs should be at least ten inches thick, with a thickened edge that is embedded at least 12 inches below the lowest adjacent outside grade or six inches below the water vapor retarder (part of capillary break), whichever is lower. The maximum bearing pressure beneath the P-T slabs should not exceed 2,000 psf for dead plus live loads. This value contains a factor of safety of at least 2.0 and may be increased by one-third for total loads, including wind or seismic forces.

We should check the P-T subgrade prior to placing reinforcing steel or a moisture barrier, if required. The exposed subgrades and excavations for the deepened edge should be free of standing water, debris, and disturbed materials prior to placing concrete. The bottom of the excavation should be kept moist before concrete is placed. We should check the subgrade after cleaning, but prior to placement of crushed rock to check that loose to disturbed material has been removed and the subgrade is firm and non-yielding. If loose, disturbed, or otherwise undesirable material is observed at the subgrade, it should be overexcavated to firm, competent material and replaced with either engineered fill or concrete.

Resistance to lateral loads can be mobilized by a combination of passive pressure acting against the vertical faces of the P-T slab and friction along the base. Passive resistance may be calculated using an allowable passive pressure (uniform distribution) of 600 psf. Frictional resistance should be computed using a base friction coefficient of 0.2. These values include a factor of safety of about 1.5 and may be used in combination without reduction.

Moisture is likely to condense on the underside of concrete floors. To reduce water vapor transmission through the floor slabs of habitable areas, we recommend installing a capillary moisture break and a water vapor retarder beneath the P-T slab, as discussed in Section 11.3.4 (unless the slab is waterproofed).

To reduce shrinkage and swelling beneath the P-T slab, we recommend a clay or concrete plug be installed where utilities enter beneath the building, as recommended in Section 11.4.

11.3.3 Foundation Setback Considerations

At the time of this report the type, location, and preliminary foundation loads for the proposed structures were not available; however, we anticipate that some of the structures will be located near the tops of existing slopes, and relatively close to underground utilities and backfilled trenches. The recommendations above are for foundations located at least 10 feet from the crest of a slope, and bearing below an imaginary plane projected upwards at an angle of 1.5 to 1 (horizontal to vertical) from the bottom edge of utility trenches. Once more detailed development plans, and/or building locations and loads become available we should confirm that our preliminary foundation recommendations are still appropriate, and if necessary provide supplemental or modified recommendations.

11.3.4 Concrete Floors

The soil subgrade beneath slab-on-grade floors should be prepared and covered with a select fill layer (if required) as described in Section 11.1. The concrete mats or P-T slabs should be supported on properly compacted and moisture-conditioned soil. The subgrade should not be allowed to dry during construction. If previously compacted soil subgrade is disturbed during foundation and utility excavation, the subgrade should be scarified, moisture-conditioned, and rerolled to provide a firm, unyielding surface prior to placement of the capillary break material.

To reduce water moisture transmission through the floor slab, we recommend installing a capillary moisture break and a Class C water vapor retarder beneath the floor. A capillary moisture break consists of at least four inches of clean, free-draining gravel or crushed rock. A capillary moisture break and water vapor retarder are generally not required beneath garage slabs. We recommend garage slabs be underlain by six inches of AB compacted to at least 95 percent relative compaction if a capillary break and vapor retarder are not used below the slabs.

The vapor retarder should be placed in general accordance with the requirements of ASTM E1643-98. These requirements include overlapping seams by six inches, taping seams, and sealing penetrations in the vapor retarder. The vapor retarder should be covered with two inches of sand to aid in curing the concrete and to protect the vapor retarder during slab construction. The particle size of the gravel/crushed rock and sand should meet the gradation requirements presented in Table 7.

TABLE 7
Gradation Requirements for Capillary Moisture Break

Sieve Size	Percentage Passing Sieve
Gravel or Crushed Rock	
1 inch	90-100
3/4 inch	30-100
1/2 inch	5–25
3/8 inch	0-6
Sand	
No. 4	100
No. 200	0-5

The sand overlying the membrane should be moist at the time concrete is placed; however, it should not contain free water. Excess water trapped in the sand could eventually be transmitted as vapor through the slab. If the sand becomes wet, concrete should not be placed until the sand has been dried or replaced.

We recommend P-T slabs-on-grade be underlain by a vapor retarder meeting the requirements for Class B vapor retarders stated in ASTM E1745-97 (15-mil Stego Wrap or equivalent). The vapor retarder should be placed in accordance with the requirements of ASTM E1643-98. The vapor retarder should be covered with two inches of sand with less than five percent fines to protect the vapor retarder during slab construction. In some cases, it is cost effective to omit both the sand and gravel from the capillary break and vapor retarder system used beneath mats or P-T slabs. If it is desired to eliminate these materials from the under slab system, we recommend a Class A vapor retarder be used in lieu of a Class B or C vapor retarder. Class A vapor retarders have a lower inherent permanence rating and are less prone to accidental puncture. An examples of Class A vapor retarders are Moiststop Ultra A polyolefin sheeting, although any equivalent system can be used.

Concrete mixes with high water/cement (w/c) ratios result in excess water in the concrete, which increases the cure time and results in excessive vapor transmission through the slab. Therefore, concrete for the floor slab should have a low w/c ratio - less than 0.50. If approved by the project structural engineer, the sand can be eliminated beneath the slabs-on-grade and the concrete can be placed directly over the vapor retarder, provided the w/c ratio of the concrete does not exceed 0.45 and water is not added in the field. If necessary, workability should be increased by adding plasticizers. In addition, the slab should be properly cured.

Before the floor covering is placed, the contractor should check that the concrete surface and the moisture emission levels (if emission testing is required) meet the manufacturer's requirements.

11.4 Underground Utilities

We anticipate that excavations for utility trenches can be readily made with a backhoe. Despite careful site preparation, unexpected obstructions may be encountered. All trenches should conform to the current CAL-OSHA requirements. Underground utilities should be located above an imaginary plane inclined at 1.5 to 1 (horizontal to vertical) from the bottom outside edge of foundation elements. If trench backfill is present within this area, additional settlement or reduced bearing capacities could result.

The thickness and type of bedding material required for utility conduits will depend on the soil conditions at the utility trench bottom. As a minimum, bedding should have a thickness of at least D/4 (with D equal to the outside pipe diameter) below the bottom of the pipe, and a minimum thickness of four inches. Clean sand, rod mill, or pea gravel bedding material are acceptable for use as bedding materials in shallow trenches above the groundwater level.

Soil backfill for utility trenches should be compacted according to the recommendations presented in Section 11.1. In streets to be dedicated to the City of Sacramento, the upper three feet of utility trench backfill (measured below the top of pavement) should be compacted to at least 95 percent relative compaction. Jetting and flooding of trench backfill should not be allowed. If sand containing less than 10 percent fines is used for backfill, it should be compacted to at least 95 percent relative compaction. Special care should be taken when backfilling utility trenches in pavement areas. Poor compaction may cause excessive settlements, resulting in damage to the pavement section.

Where utility trenches enter the building pad, an impermeable plug consisting of lean concrete at least three feet in length, should be installed where the trenches enter the building footprint. Furthermore, where sand- or gravel-backfilled trenches cross planter areas and pass below asphalt or concrete pavements, a similar plug should be placed at the edge of the pavement. The purpose of these recommendations is to reduce the potential for water to become trapped in trenches beneath the buildings or pavements. This trapped water can cause heaving of soils beneath slabs and softening of subgrade soil beneath pavements.

As previously discussed, the fill thickness will vary significantly across the project site, and depending upon the amount time that passes between the completion of grading activities and the installation of the underground utilities the potential for total and differential settlements varies. The sooner the utilities are installed following grading activities the higher the potential for large total and differential settlements. New utilities should be designed to tolerate the estimated settlements, as presented on Figures 5 through 10. At the time this report was being prepared, utility layout plans were not available for review; therefore, we were unable to estimate settlements along the proposed utility pipe alignments.

11.5 Drainage and Landscaping

Positive surface drainage should be provided around the buildings to direct surface water away from the foundations. To reduce the potential for water ponding adjacent to the buildings, we recommend the ground surface within a horizontal distance of five feet from the buildings be designed to slope down and away from the buildings with a surface gradient of at least two percent in unpaved areas and one percent in paved areas. In addition, roof downspouts should be discharged into controlled drainage facilities to keep the water away from the foundations. These preliminary gradients should be checked once final grading plans and anticipated cut/fill thicknesses are known.

The use of water-intensive landscaping around the perimeter of the buildings should be avoided to reduce the amount of water introduced to the subgrade. In addition, irrigation of landscaping around the building should be limited to drip or bubbler-type systems. The purpose of these recommendations is to avoid large differential moisture changes adjacent to the foundations, which have been known to cause large differential movement over short horizontal distances in expansive soil, resulting in cracking of slabs and architectural damage.

To reduce the potential for irrigation water entering the pavement section, vertical curbs adjacent to landscaped areas should extend at least six inches below the bottom of the base rock into the subgrade. As an alternative to deepened curbs an impermeable root barrier may be placed at the back of the curbs provided the root barrier extends at least 6-inches below the bottom of the pavement base rock. Where heavily watered areas, such as lawns, are adjacent to vertical curbs, it may also be necessary to install a subdrain behind the curb to intercept excess irrigation water.

11.6 Design of LID and H-M Facilities

The design of the on- and off-site LID and H-M facilities should consider the appropriate hydrological characteristics of the soil within the facilities. The results of the hydraulic conductivity testing of representative samples of the anticipated on-site fill material and material that anticipated to be exposed at the bottom of the retention channel and basin are presented in Table C-1 in Appendix C. The hydraulic conductivities presented in Table C-1 do not consider reductions for clogging or siltation. The appropriate saturated hydraulic conductivity is dependant upon many factors including the actual material exposed, variability of the exposed materials, the potential for siltation, planned maintenance, and design life of the facilities. The project hydrologist should consider the results of our subsurface exploration, the hydraulic conductivity test results presented in Table C-1. Considering the items above and test methods, the project hydrologist should determine the appropriate reduction factors and/or factor of safety to apply to the hydrological parameters presented in Table C-1.

It may be possible to improve the infiltration rate in portions of the retention basin that are bottomed above the underlying sand layer. Installing vertical gravel columns, or interconnected gravel drains extending into the underlying sand may increase the infiltration rate. Also, where siltation within the LID and H-M facilities is possible, routine maintenance that includes removal of accumulated sediments will be required to maintain adequate infiltration.

11.7 Retaining Walls

Where retaining walls are used they should be designed to resist both static lateral earth pressures, and if warranted, lateral earth pressures caused by earthquakes. For cantilever walls retaining level backfill, we recommend designing the walls for active lateral pressures corresponding to an equivalent fluid unit weight of 40 pcf. Walls that are restrained from rotation at the top should be designed using at-rest pressures corresponding to an equivalent fluid unit weight of 60 pcf. Where traffic is expected within a distance equal to the height of the walls, the walls should be designed for an additional uniform lateral pressure of 100 psf to be applied over the entire height of the wall or 10 feet, whichever is less.

Although the site is in a seismically active area, since the peak horizontal ground surface acceleration due to the Design Earthquake (DE) (Section 11.10) is less than 0.4 time gravity, the seismic earth pressure on retaining walls may be neglected for retaining walls with a factor of safety of at least 1.5 (Lew et al. 2010).

If the adjacent building foundations bear above an imaginary 2:1 (horizontal to vertical) line extending up from the base of the wall, the proposed wall should be designed to resist an additional lateral surcharge load equal to 0.5 times the applied bearing pressure of the adjacent foundations. For walls supported on footings, lateral forces can be resisted by a combination of friction along the base and passive resistance against the embedded vertical faces of the footings. Refer to the recommendations for conventional shallow foundations in Section 11.3.1 for the appropriate allowable bearing pressure and lateral load resistance values.

The lateral earth pressures recommended above apply to level backfill conditions and a retaining wall that is properly backdrained to prevent the buildup of hydrostatic pressure. One acceptable method for backdraining the wall is to place a prefabricated drainage panel against the back of the wall. The drainage panel should extend down to a four-inch-diameter perforated PVC collector pipe at the base of the walls. The pipe should be surrounded on all sides by at least four inches of Caltrans Class 2 permeable material (see Caltrans Standard Specifications Section 68-1.025) or wrapped in filter fabric (Mirafi 140N or equivalent). We should check the manufacturer’s specifications regarding the proposed prefabricated drainage panel material to verify it is appropriate for the intended use. The pipe should be connected to a suitable discharge point.

As an alternative to using prefabricated drainage panels, the wall maybe drained using Caltrans Class 2 permeable material (Caltrans Standard Specifications Section 68-1.025) or clean drain rock wrapped in a geotextile filter fabric (Mirafi 140N or equivalent). The gravel drain should be at least 12 inches wide and should extend up the back of the wall to within about two feet below the ground surface; compacted fill consisting of on-site fine-grained soil should be placed above the granular fill to reduce the potential for surface water infiltration into the wall backdrain system. A four-inch-diameter perforated PVC collector pipe should be placed near the base of the wall to collect and redirect the water to a suitable discharge point. The pipe should be surrounded on all sides by at least four inches of Caltrans Class 2 permeable material or drain rock.

11.8 Flexible (Asphalt Concrete) Pavement

We understand that the project may be required to use the minimum pavement structural sections presented in Section 15 of the City of Sacramento Design and Procedures Manual dated July 2009. For comparison purposes we have used the current Caltrans flexible pavement design method to develop the alternative recommended asphalt concrete pavement sections based on the anticipated subgrade soil. We expect the final soil subgrade in asphalt-paved areas will generally consist of silts and clays with varying amounts of sand, silt, clay, sand, and gravel. Based on the laboratory test results, and our professional judgment we selected an R-value of 10 for use in our pavement design calculations. If imported fill is used below the proposed pavements, the fill material should have an R-value of at least 10. Additional testing should be performed on the proposed pavement subgrade material during grading operations to confirm the assumed R-value and if necessary provide updated recommendations.

We have developed preliminary pavement sections for traffic indices (TIs) ranging from 4.5 to 8.0. These appropriate TIs should be determined by the project civil engineer. Table 8 presents the City of Sacramento Minimum and our alternative preliminary recommendations for asphalt pavement sections.

TABLE 8
Pavement Section Design

TI	City of Sacramento Minimum		Preliminary Alternative (R-Value = 10)	
	Asphalt Concrete (inches)	Class 2 Aggregate Base R = 78 (inches)	Asphalt Concrete (inches)	Class 2 Aggregate Base R = 78 (inches)
4.5	4.0	8.0	2.5	8.5
5.0	4.0	8.0	3.0	9.0
5.5	4.0	9.0	3.0	11.0
6.0	4.0	12.5	3.5	11.5
6.5	4.0	14.0	4.0	12.5
7.0	4.0	16.0	4.0	14.5
7.5	5.0	16.0	4.5	15.0
8.0	5.0	17.5	5.0	16.0

Pavement components should conform to the current Caltrans Standard Specifications. The upper six inches of the soil subgrade and aggregate base in pavement areas should be moisture-conditioned to above optimum moisture content, compacted to at least 95 percent relative compaction, and rolled to provide a smooth non-yielding surface. The soil subgrades should be kept moist until covered. To reduce the potential for irrigation water to enter the pavement section, curbs or an impermeable root barrier adjacent to landscaped areas should extend through the aggregate base layer and at least six inches into the underlying subgrade as discussed in Section 11.5.

11.9 Rigid (Portland Cement) Concrete Pavement

Concrete pavement design is based on a maximum single-axle load of 20,000 pounds and a maximum tandem axle of 32,000 pounds. The recommended rigid pavement section for these axle loads is six inches of Portland cement concrete over six inches of Class 2 aggregate base.

The modulus of rupture of the concrete should be at least 500 psi at 28 days. Contraction joints should be constructed at 15-foot spacing. Where the outer edge of a concrete pavement meets asphalt pavement, the concrete slab should be thickened by 50 percent at a taper not to exceed a slope of 1 in 10. For loading docks, we recommend the slab be reinforced with a minimum of No. 4 bars at 16-inch-spacing in both directions. Recommendations for subgrade preparation and aggregate base compaction for concrete pavement are the same as those we have described for asphalt pavement in Section 11.7.

11.10 Exterior Concrete Slabs

The exposed subgrade should be scarified, moisture-conditioned, and compacted as described in Section 11.1. Exterior concrete slabs, such as sidewalks, courtyards, and patios, should be underlain by at least four inches of Class 2 aggregate base that has been moisture-conditioned to above optimum moisture content and compacted to at least 95 percent relative compaction to provide a smooth, non-yielding surface.

11.11 Seismic Design

For seismic design in accordance with the provisions of 2010 California Building Code (CBC), we recommend the following:

- Maximum Considered Earthquake (MCE) S_s and S_1 of 0.52g and 0.23g, respectively.
- Site Class D
- Site Coefficients F_A and F_V of 1.38 and 1.95
- Maximum Considered Earthquake (MCE) spectral response acceleration parameters at short periods, S_{MS}, and at one-second period, S_{M1}, of 0.72g and 0.44g, respectively.
- Design Earthquake (DE) spectral response acceleration parameters at short period, S_{DS}, and at one-second period, S_{D1}, of 0.48g and 0.30g, respectively.

12.0 ADDITIONAL GEOTECHNICAL SERVICES

The preliminary geotechnical recommendations presented in this report should be re-evaluated and finalized by Treadwell & Rollo a Langan Company (T&R) once a specific grading plan and building designs are available for our review. Prior to construction, T&R should review the project plans and specifications to check that they are in general conformance with the intent of our recommendations. During construction, we should observe site preparation, abandonment of existing underground utilities (if any), grading of the site, and the installation of new foundations. We should also observe the placement of fill and perform field density tests to check that adequate compaction and moisture conditioning has been achieved. If selective grading is performed we should observe the material excavated from the retention channel and basing to determine if it appropriate for stockpiling and re-use in the on-site LID and H-M facilities. Following mass grading activities and during the settlement monitoring period, we should review the monitoring data. These observations will allow us to compare actual with anticipated soil conditions, and to check that the contractor's work conforms with the geotechnical aspects of the plans and specifications.

13.0 LIMITATIONS

The conclusions and recommendations presented in this report result from limited engineering studies based on our interpretation of the existing geotechnical conditions and available subsurface data. Actual subsurface conditions may vary. More detailed information concerning the proposed structures and site development is required to further refine design and foundation recommendations. If any variations or unforeseen conditions are encountered during construction, or if the proposed construction will differ from that which is described in this report, T&R should be notified so that supplemental recommendations can be made.

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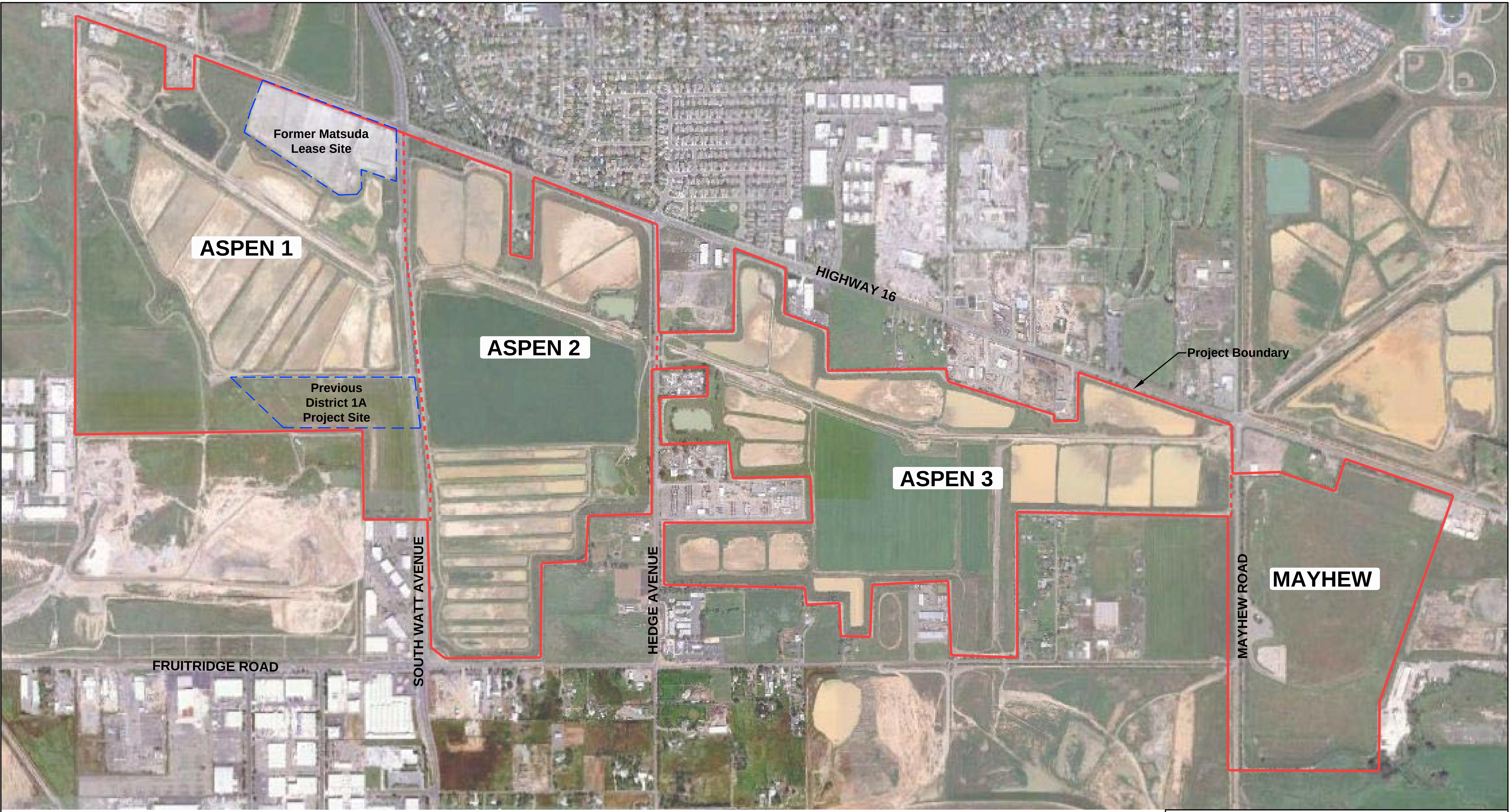
FIGURES



Approximate scale

Reference: Base map from Google Earth, 2010.

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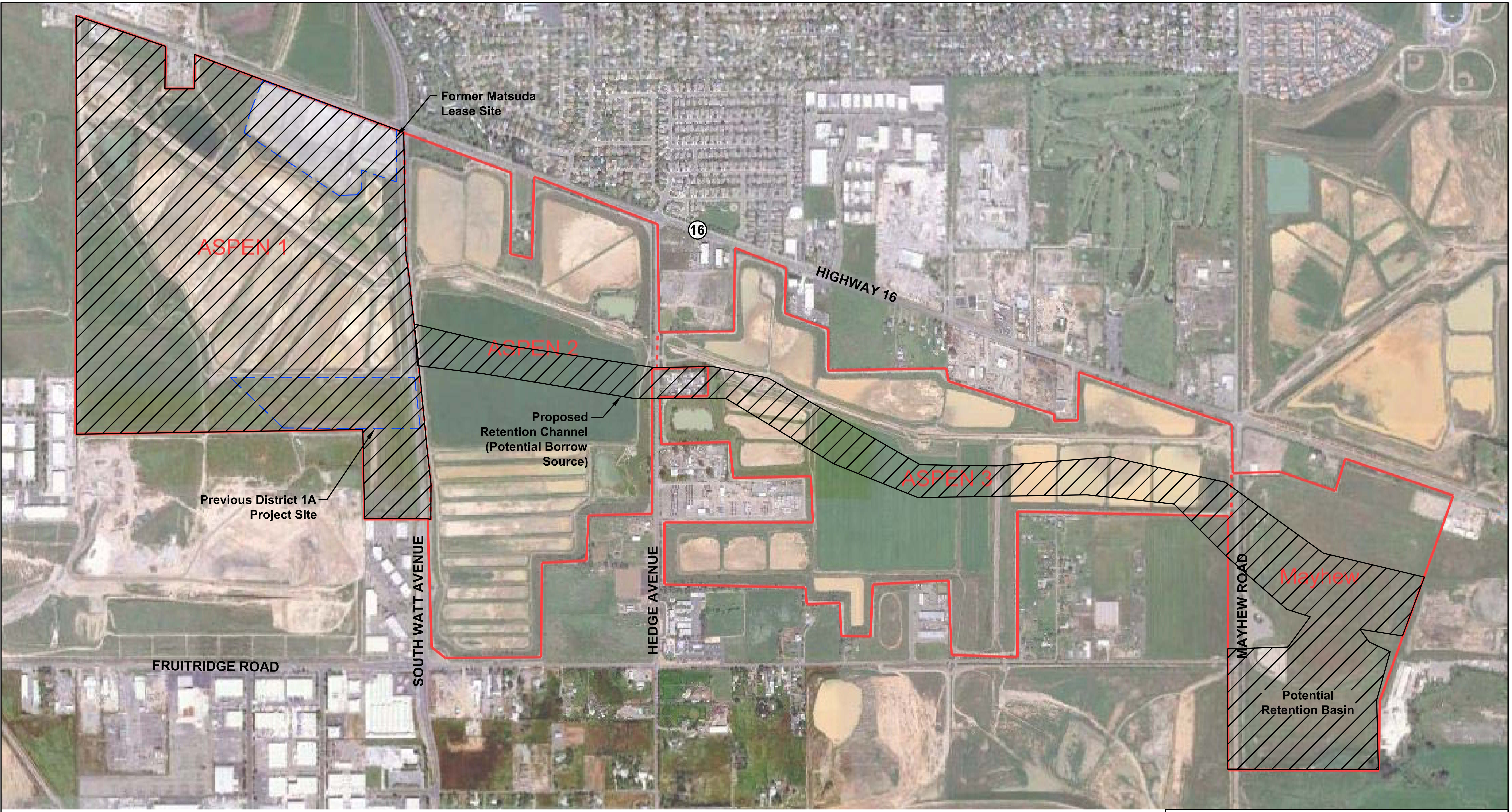
ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

SITE LOCATION MAP

Date 01/18/11	Project No. 730438107	Figure 1

Treadwell&Rollo
A LANGAN COMPANY



EXPLANATION

▨ Approximate Project Limits

Reference: Base map from Google Earth, 2010.

0 900 Feet

Approximate scale

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

PRELIMINARY PROJECT LIMITS MAP

Date 01/18/11	Project No. 730438107	Figure 2

Treadwell&Rollo
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R:\Trgraphics\4300'S\4381.07\4381.07 Site Location Plan.dwg 3/28/11

Reference: Topographic Surveys provided by Techert Construction.

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

SITE PLAN

Date 01/19/11	Project No. 730438107	Figure 3

Treadwell&Rollo
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R:\Trgraphics\4300'S\4381.07\4381.07 Site Plan.dwg 1/21/11

I **Not felt by people, except under especially favorable circumstances. However, dizziness or nausea may be experienced.**

Sometimes birds and animals are uneasy or disturbed. Trees, structures, liquids, bodies of water may sway gently, and doors may swing very slowly.

II **Felt indoors by a few people, especially on upper floors of multi-story buildings, and by sensitive or nervous persons.**

As in Grade I, birds and animals are disturbed, and trees, structures, liquids and bodies of water may sway. Hanging objects swing, especially if they are delicately suspended.

III **Felt indoors by several people, usually as a rapid vibration that may not be recognized as an earthquake at first. Vibration is similar to that of a light, or lightly loaded trucks, or heavy trucks some distance away. Duration may be estimated in some cases.**

Movements may be appreciable on upper levels of tall structures. Standing motor cars may rock slightly.

IV **Felt indoors by many, outdoors by a few. Awakens a few individuals, particularly light sleepers, but frightens no one except those apprehensive from previous experience. Vibration like that due to passing of heavy, or heavily loaded trucks. Sensation like a heavy body striking building, or the falling of heavy objects inside.**

Dishes, windows and doors rattle; glassware and crockery clink and clash. Walls and house frames creak, especially if intensity is in the upper range of this grade. Hanging objects often swing. Liquids in open vessels are disturbed slightly. Stationary automobiles rock noticeably.

V **Felt indoors by practically everyone, outdoors by most people. Direction can often be estimated by those outdoors. Awakens many, or most sleepers. Frightens a few people, with slight excitement; some persons run outdoors.**

Buildings tremble throughout. Dishes and glassware break to some extent. Windows crack in some cases, but not generally. Vases and small or unstable objects overturn in many instances, and a few fall. Hanging objects and doors swing generally or considerably. Pictures knock against walls, or swing out of place. Doors and shutters open or close abruptly. Pendulum clocks stop, or run fast or slow. Small objects move, and furnishings may shift to a slight extent. Small amounts of liquids spill from well-filled open containers. Trees and bushes shake slightly.

VI **Felt by everyone, indoors and outdoors. Awakens all sleepers. Frightens many people; general excitement, and some persons run outdoors.**

Persons move unsteadily. Trees and bushes shake slightly to moderately. Liquids are set in strong motion. Small bells in churches and schools ring. Poorly built buildings may be damaged. Plaster falls in small amounts. Other plaster cracks somewhat. Many dishes and glasses, and a few windows break. Knickknacks, books and pictures fall. Furniture overturns in many instances. Heavy furnishings move.

VII **Frightens everyone. General alarm, and everyone runs outdoors.**

People find it difficult to stand. Persons driving cars notice shaking. Trees and bushes shake moderately to strongly. Waves form on ponds, lakes and streams. Water is muddied. Gravel or sand stream banks cave in. Large church bells ring. Suspended objects quiver. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Plaster and some stucco fall. Many windows and some furniture break. Loosened brickwork and tiles shake down. Weak chimneys break at the roofline. Cornices fall from towers and high buildings. Bricks and stones are dislodged. Heavy furniture overturns. Concrete irrigation ditches are considerably damaged.

VIII **General fright, and alarm approaches panic.**

Persons driving cars are disturbed. Trees shake strongly, and branches and trunks break off (especially palm trees). Sand and mud erupts in small amounts. Flow of springs and wells is temporarily and sometimes permanently changed. Dry wells renew flow. Temperatures of spring and well waters varies. Damage slight in brick structures built especially to withstand earthquakes; considerable in ordinary substantial buildings, with some partial collapse; heavy in some wooden houses, with some tumbling down. Panel walls break away in frame structures. Decayed pilings break off. Walls fall. Solid stone walls crack and break seriously. Wet grounds and steep slopes crack to some extent. Chimneys, columns, monuments and factory stacks and towers twist and fall. Very heavy furniture moves conspicuously or overturns.

IX **Panic is general.**

Ground cracks conspicuously. Damage is considerable in masonry structures built especially to withstand earthquakes; great in other masonry buildings - some collapse in large part. Some wood frame houses built especially to withstand earthquakes are thrown out of plumb, others are shifted wholly off foundations. Reservoirs are seriously damaged and underground pipes sometimes break.

X **Panic is general.**

Ground, especially when loose and wet, cracks up to widths of several inches; fissures up to a yard in width run parallel to canal and stream banks. Landsliding is considerable from river banks and steep coasts. Sand and mud shifts horizontally on beaches and flat land. Water level changes in wells. Water is thrown on banks of canals, lakes, rivers, etc. Dams, dikes, embankments are seriously damaged. Well-built wooden structures and bridges are severely damaged, and some collapse. Dangerous cracks develop in excellent brick walls. Most masonry and frame structures, and their foundations are destroyed. Railroad rails bend slightly. Pipe lines buried in earth tear apart or are crushed endwise. Open cracks and broad wavy folds open in cement pavements and asphalt road surfaces.

XI **Panic is general.**

Disturbances in ground are many and widespread, varying with the ground material. Broad fissures, earth slumps, and land slips develop in soft, wet ground. Water charged with sand and mud is ejected in large amounts. Sea waves of significant magnitude may develop. Damage is severe to wood frame structures, especially near shock centers, great to dams, dikes and embankments, even at long distances. Few if any masonry structures remain standing. Supporting piers or pillars of large, well-built bridges are wrecked. Wooden bridges that "give" are less affected. Railroad rails bend greatly and some thrust endwise. Pipe lines buried in earth are put completely out of service.

XII **Panic is general.**

Damage is total, and practically all works of construction are damaged greatly or destroyed. Disturbances in the ground are great and varied, and numerous shearing cracks develop. Landslides, rock falls, and slumps in river banks are numerous and extensive. Large rock masses are wrenched loose and torn off. Fault slips develop in firm rock, and horizontal and vertical offset displacements are notable. Water channels, both surface and underground, are disturbed and modified greatly. Lakes are dammed, new waterfalls are produced, rivers are deflected, etc. Surface waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown upward into the air.

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Sacramento, California

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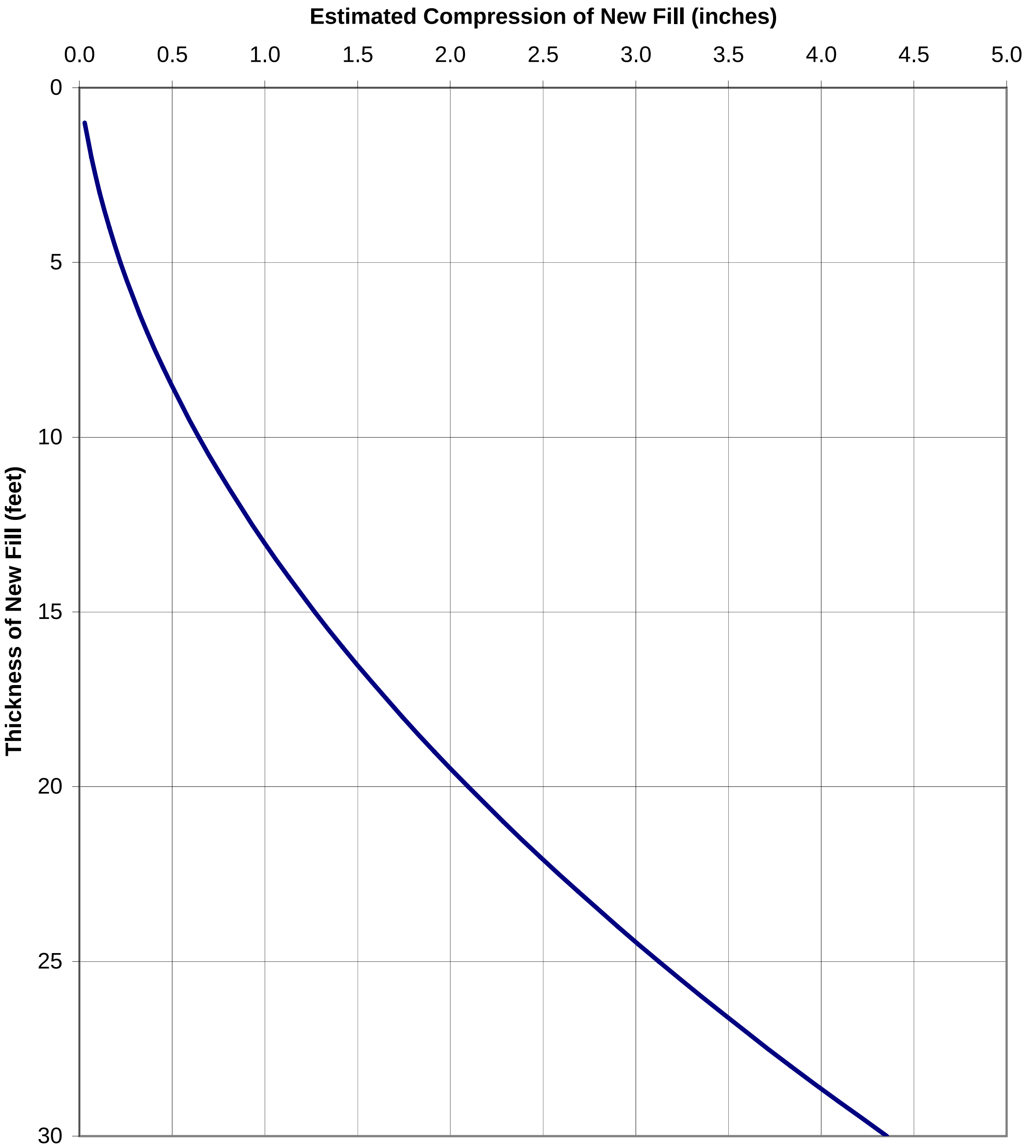
MODIFIED MERCALLI INTENSITY SCALE

Date 01/10/11 | Project No. 730483907 | Figure 4



Notes:
1. Assumes compression due to weight of new fill and self weight.
2. Assumes a new fill is compacted to approxmately 90 percent relative compaction (per ASTM D1557), total unit weight of approximatley 125 pounds per cubic foot.
3. Fill compacted to a higher relative compaction may settle less than indicated above.
4. The majority of compression is anticipated to occur during or shortly after construction.
5. Does not include additional settlement from foundation loads or consolidation of drying bed material.

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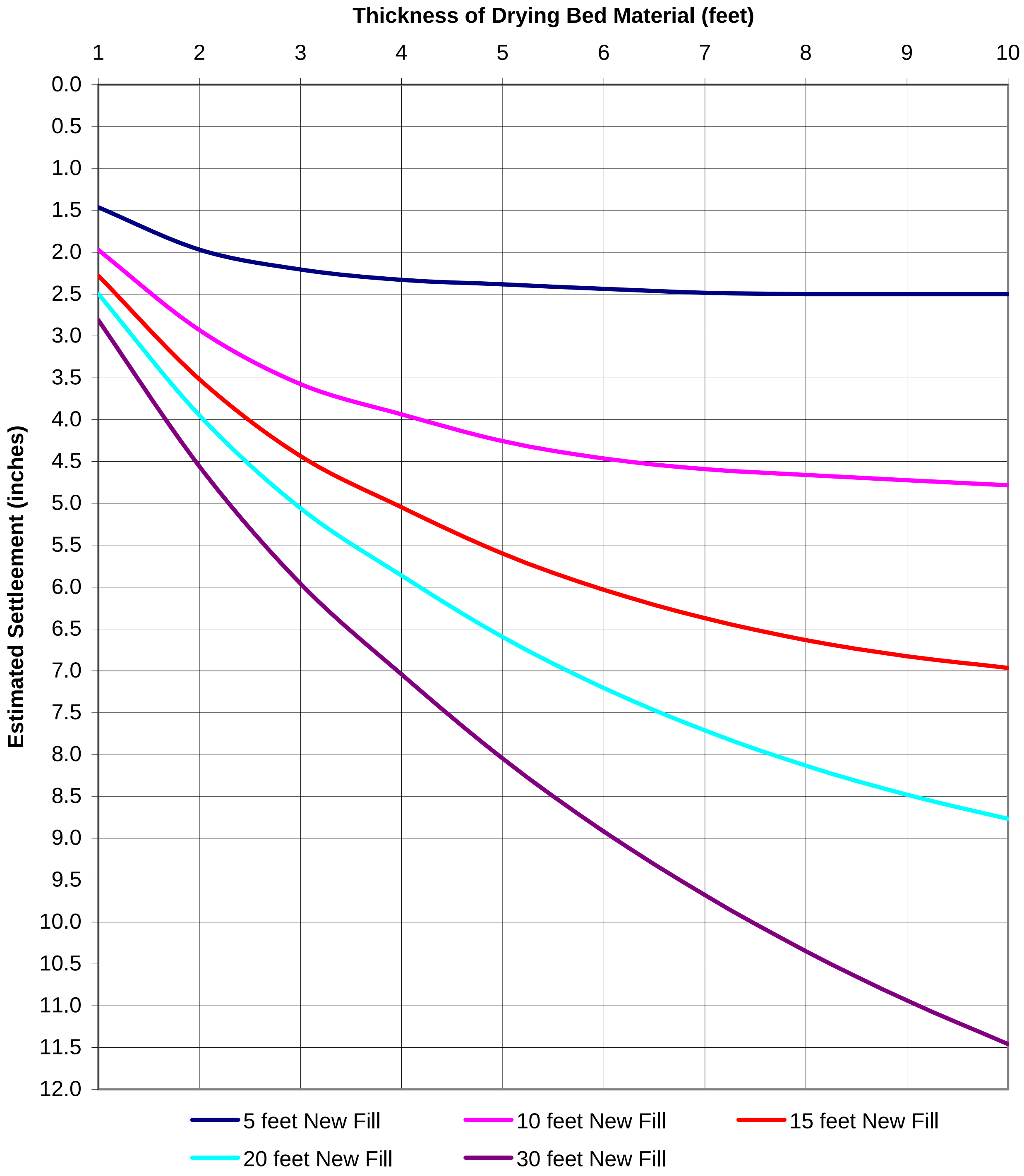
ESTIMATED COMPRESSION OF NEW FILL

Date 01/20/11

Project No. 730438107

Figure 5



Notes:
1. Assumes typical characteristics of drying bed material (Cce =0.15, OCR = 2.5).
2. Assumes drying bed material is saturated.
3. Compression of new fill and/or settlement from foundation loads should be added to the settlement estimated in this figure.

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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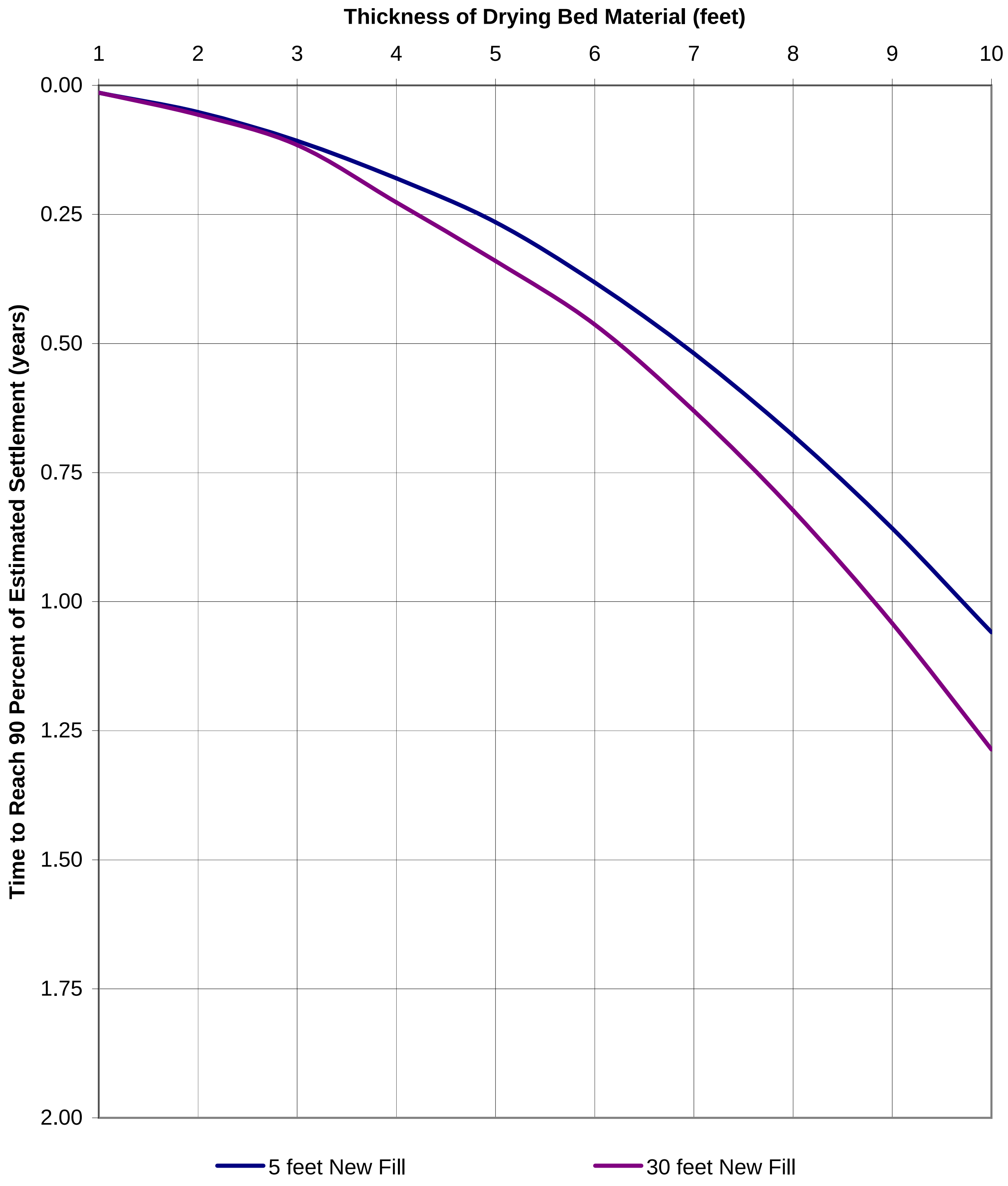
ESTIMATED SETTLEMENT OF DRYING BED MATERIAL DUE TO WEIGHT OF NEW FILL

Date 01/20/11

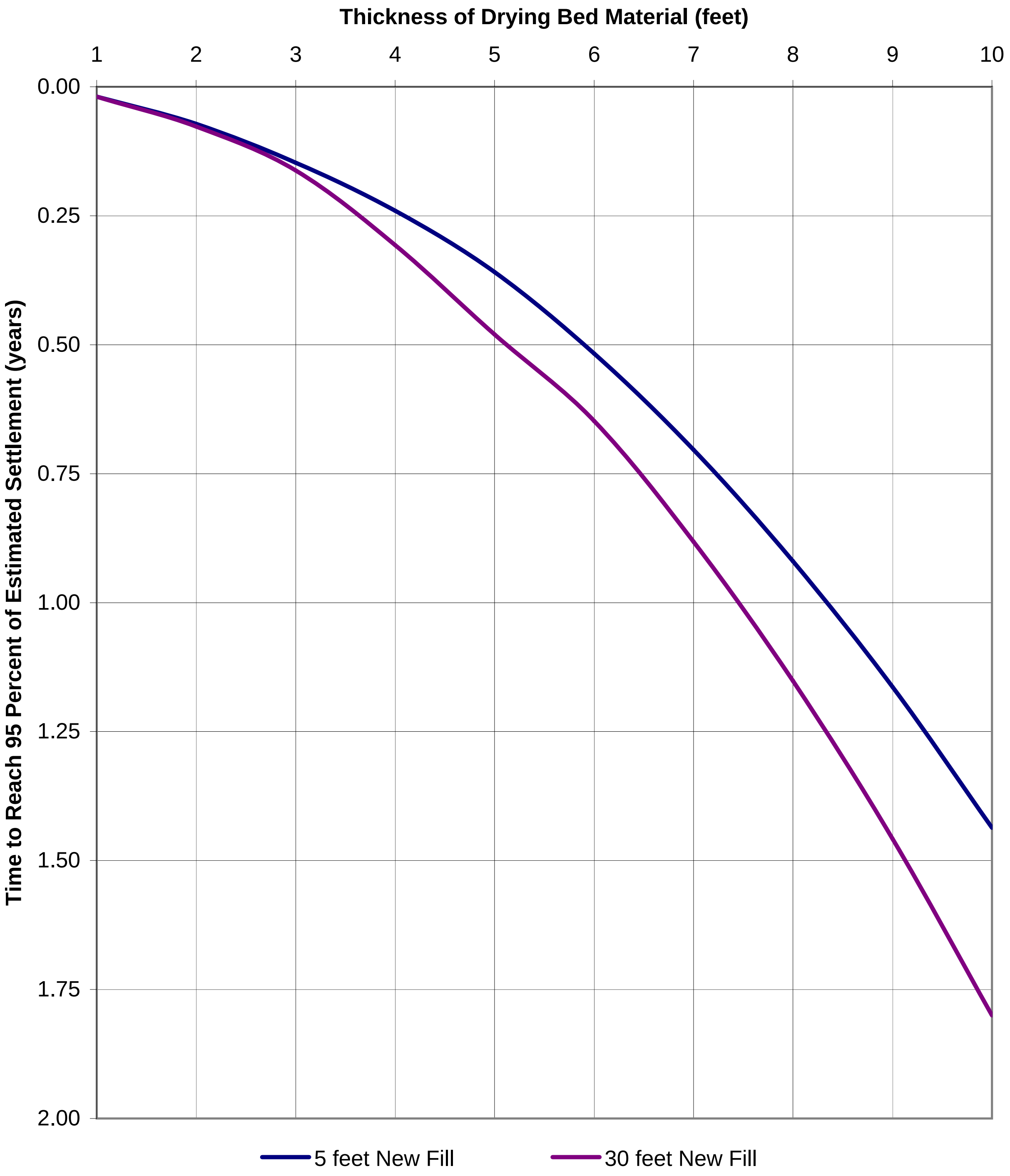
Project No. 730438107

Figure 6



Notes:
1. Assumes typical characteristics of drying bed material (Cce =0.15, OCR = 2.5).
2. Assumes drying bed material is saturated.

ASPEN 1 - NEW BRIGHTON PROJECT **Sacramento, California**	**ESTIMATED TIME TO REACH 90 PERCENT OF ESTIMATED DRYING BED SETTLEMENT DUE TO PLACEMENT OF NEW FILL**
Treadwell&Rollo A LANGAN COMPANY	Date 01/20/11 Project No. 730438107 Figure 7



Notes:
1. Assumes typical characteristics of drying bed material (Cce =0.15, OCR = 2.5).
2. Assumes drying bed material is saturated.

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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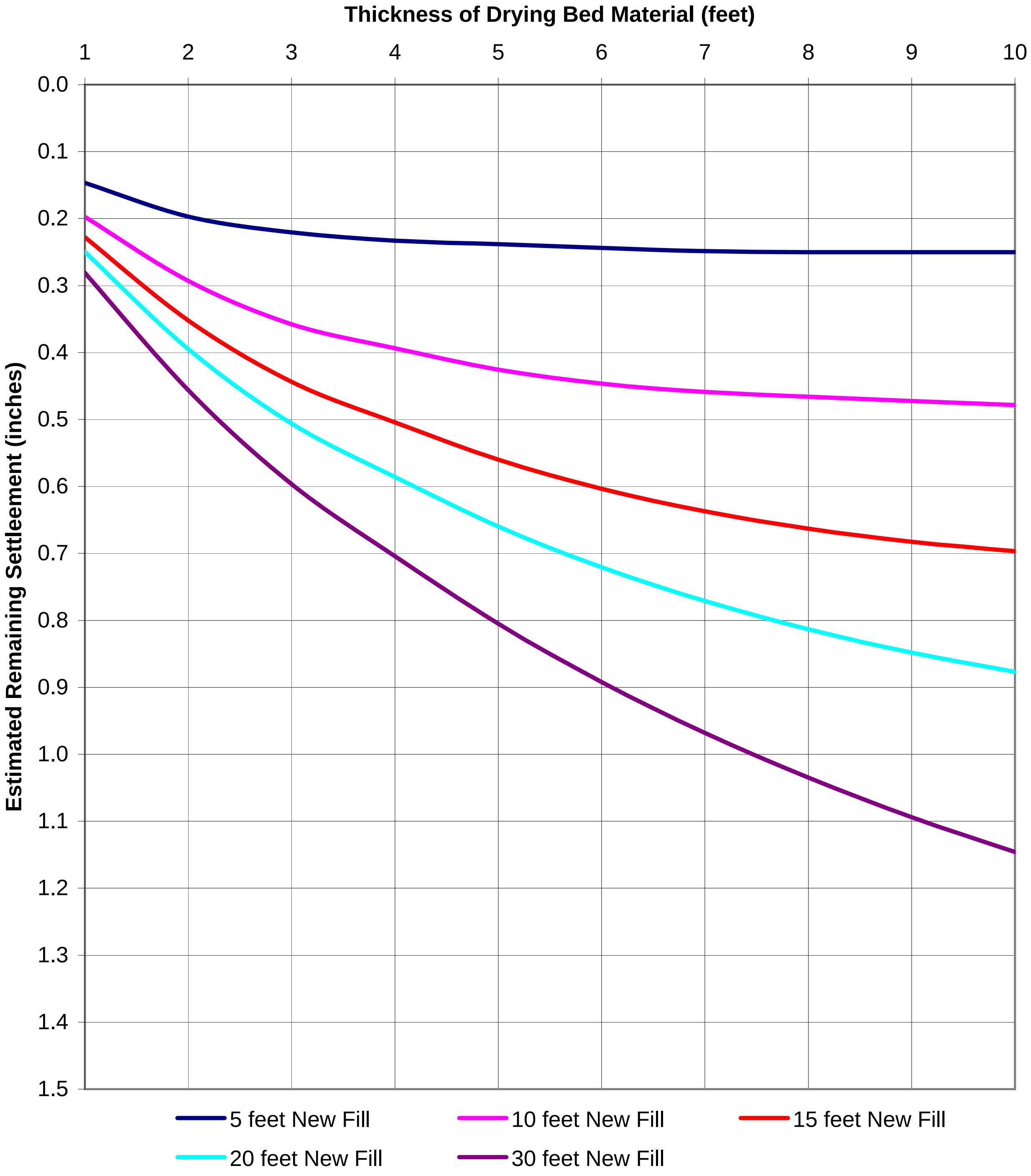
ESTIMATED TIME TO REACH 95 PERCENT OF ESTIMATED DRYING BED SETTLEMENT DUE TO PLACEMENT OF NEW FILL

Date 01/20/11	Project No. 730438107	Figure 8



Notes:
1. Assumes typical characteristics of drying bed material (Cce =0.15, OCR = 2.5).
2. Assumes drying bed material is saturated.
3. Compression of new fill and/or settlement from foundation loads should be added to the settlement estimated in this figure.
4. Assumes 90 percent of estimated settlement has occurred.

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ESTIMATED SETTLEMENT OF DRYING BED MATERIAL REMAINING AFTER 90 PERCENT HAS OCCURED

Date 01/20/11	Project No. 730438107	Figure 9

APPENDIX A
Logs of Borings and Test Pits

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-1

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Logged by: R. Severn
Date started: 8/4/10
Date finished: 8/4/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 48 feet[2]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						GRAVEL (GP) gray, dry						
2					GP							
3												
4												
5												
6	S&H	▨	31 12 11	14		SILT with CLAY (ML) yellow-brown, stiff, moist, trace fine-grained sand to red-brown LL - 26, PI = 5, see Figure C-6						
7					ML							
8												
9						SILTY CLAY (CL) red-brown, stiff, moist						
10						Shear Strength Test, see Figure C-10						
11	S&H	▨	6 6 11	10	CL		TxUU	1,094	1,267		21.6	105
12												
13												
14						SILT with CLAY and SAND (ML) red-brown, very stiff, moist, pockets of light brown sand						
15						FILL						
16	S&H	▨	8 20 12	19								
17					ML							
18												
19												
20	S&H	▨	21 50/5"	30/5"		SILT with CLAY and SAND (ML) hard						
21												
22					ML							
23												
24						SANDY SILT with CLAY (ML) red-brown with trace white spots, very stiff, moist, fine- to medium-grained sand						
25												
26	SPT	◪	9 11 11	22								
27					ML							
28												
29												
30												

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Project No.: 730438107
Figure: A-1a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-1

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
31	SPT	◪	12 12 15	27	ML/CL	CLAYEY SILT/ SILTY CLAY (ML/CL) mottled brown and red-brown with some black spots, increase clay content, trace gravel, trace sand						
32												
33												
34												
35						FILL						
36	SPT	◪	6 7 15	22								
37												
38												
39					SM	SILTY SAND (SM) red-brown, medium dense, moist, trace clay						
40												
41	SPT	◪	10 10 12	22						44.7	13.9	
42												
43												
44												
45	SPT	◪	28 50/4"	50/4"	SP-SM	SAND with SILT (SP-SM) mottled red-brown and light brown, very dense, moist						
46												
47												
48												
49												
50						yellow-brown, dense, no silt (SP)						
51	SPT	◪	10 19 24	43								
52												
53												
54					ML	CLAYEY SILT (ML) mottled red and yellow-brown, hard, moist						
55												
56	SPT	◪	17 22 35	57								
57												
58												
59												
60												

Boring terminated at a depth of 56.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-1b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-2

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Date started: 8/5/10 | Date finished: 8/5/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches | Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Logged by: R. Severn

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 45 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–5					GP	GRAVEL (GP) gray, dry						
5–6	S&H	▨	14 15 20	21	ML	CLAYEY SILT (ML) red-brown, very stiff, moist, with fine-grained sand LL = 23, PI = 1, see Figure C-6						
8.5						SILT with SAND (ML) red-brown, stiff, moist						
11	S&H	▨	6 6 9	9		Shear Strength Test, see Figure C-11	TxUU	1,094	1,570		14.8	95
16	S&H	□	14 13 29	25		with cobbles						
19	S&H	▨	7 11 12	14	ML	Shear Strength Test, see Figure C-12	TxUU	1,900	2,937		15.8	98
21	S&H	▨	15 22 31	32		hard, increase sand content						
26	S&H	□	17 18 25	26		with cobbles						
30												

FILL

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Figure: A-2a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-2

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
31	S&H	■	12 12 13	15	ML	SILT with SAND (ML) (continued) some clay FILL				54.2	17.1	101
32					SM-ML	SILTY SAND (SM)/SANDY SILT (ML) red-brown, medium dense/stiff, moist						
33												
34					ML	SANDY SILT (ML) red-brown and brown, very stiff, moist to wet, trace gravel						
35												
36	S&H	■	11 12 14	16								
37												
38												
39												
40												
41	S&H	■	17 23 25	29		very stiff to hard, pockets of brown sand						
42												
43					ML	SANDY CLAYEY SILT (ML) red-brown, hard, moist						
44												
45	SPT	◩	50/2"	50/2"								
46												
47												
48					ML	CLAYEY SILT (ML) light brown, hard, moist, trace fine-grained sand						
49												
50	SPT	◩	26 50/4"	50/4"								
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 51 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-2b

PROJECT:	**ASPEN 1 - NEW BRIGHTON PROJECT** Sacramento, California

Log of Boring TR-3

PAGE 1 OF 1

Boring location:	See Site Plan, Figure 2	Logged by:	R. Severn
Date started:	8/5/10	Date finished:	8/5/10
Drilling method:	Hollow Stem Auger		
Hammer weight/drop:	140 lbs./30 inches	Hammer type:	Down Hole
Sampler:	Sprague & Henwood (S&H), Standard Penetration Test (SPT)		

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 25 feet[2]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SANDY SILT with GRAVEL (ML) red-brown, stiff, moist						
1												
2					ML	FILL						
3		☒				hard drilling						
4	DIST											
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107	Figure: A-3

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-4

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 8/5/10
Date finished: 8/5/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: R. Severn

Ground Surface Elevation: 20 feet[2]

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–15					SM	SILTY SAND with GRAVEL (SM) brown, loose, dry to moist FILL						
5–6.5	S&H	▨	6 4 4	5						24.9	5.7	102
10–11.5	S&H	▨	11 5 8	8		fine- to coarse-grained sand, bottom of sample wet, trace clay						
15–21					ML	CLAYEY SILT (ML) red-brown with trace dark brown spots, very stiff, moist, trace fine-grained sand						
15–16.5	SPT	◪	5 7 10	17								
20–21.5	S&H	▨	18 33 50/5"	56		very stiff to hard, trace gravel						
21–21.5					ML	SILT (ML) light brown, hard, moist						

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-4

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-5

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Logged by: R. Severn
Date started: 8/5/10
Date finished: 8/5/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 19 feet[2]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
					GP	~1-inch GRAVEL (GP) gray						
1						SILT with CLAY and SAND (ML) red-brown, hard, moist, with fine-grained sand						
2												
3												
4												
5	S&H	⊡	30 50/3"	30/3"								
6					ML	FILL						
7												
8												
9												
10												
11	SPT	◪	6 9 9	18		very stiff						
12	SPT	—	50/0"			with gravel/cobbles						
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 12.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-5

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-6

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 8/6/10
Date finished: 8/6/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: R. Severn

Ground Surface Elevation: 27 feet[2]

DEPTH (feet)	SAMPLES: Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–14					ML	SANDY SILT (ML) yellow-brown, hard, damp to moist, trace coarse-grained gravel, fine- to medium-grained sand	FILL						
5	S&H		28 50/5"	30/5"								17.7	95
10	S&H		50/6"	30/ 6"									
11	SPT		12 11 13	24		fine-grained sand, trace clay					58.2	19.1	
14–19					CL	SILTY CLAY with SAND (CL) grades red-brown to olive-gray, hard, moist	FILL?						
16	S&H		28 33 50/4"	50/ 10"									
17	SPT		10 10 12	22									
19	SPT		50/1"	50/1"		with cobbles							

Boring terminated at a depth of 19 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-6

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-7

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 8/6/10
Date finished: 8/6/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: R. Severn

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]		Ground Surface Elevation: 26 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY SILT (ML) yellow brown, hard, dry to moist, fine-grained sand						
2												
3												
4					ML							
5												
6	S&H		28 36 43	47		LL = 26, PI = 8, see Figure C-6				53.1	14.2	102
7												
8												
9						SANDY SILT (ML) red-brown, hard to very stiff to hard, moist						
10						FILL						
11	S&H		15 22 25	28								
12												
13												
14					ML							
15						stiff, trace gravel						
16	S&H		11 11 15	17								
17												
18												
19						increased gravel content						
20	SPT		50/2"	50/2"	SM	SILTY SAND with GRAVEL (SM) brown, very dense, moist, rounded gravel and cobbles						
21	SPT		50/1"	50/1"								
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 21 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-7

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-8

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Date started: 8/6/10
Date finished: 8/6/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: R. Severn

LABORATORY TEST DATA

Ground Surface Elevation: 33 feet[2]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY SILT (ML) yellow-brown, very stiff, damp to moist, with some rounded gravel, with organics, fine-grained sand						
2												
3												
4												
5		▨	13			Non Plastic						
6	S&H	▨	22	29							17.2	108
			27									
7												
8												
9												
10		▨	6			yellow-brown to red-brown, stiff, pockets of increased sand content						
11	S&H	▨	8	14							18.3	97
			15									
12					ML	FILL						
13												
14												
15		▨	11			red-brown, very stiff, trace clay						
16	S&H	▨	13	24								
			27									
17												
18												
19												
20		▨	13			hard						
21	S&H	▨	22	30								
			28									
22												
23												
24												
25		▨	13			very stiff, trace gravel, mottled red-brown and orange						
26	S&H	▨	18	23								
			20									
27												
28						FILL?						
29												
30												

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

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Figure: A-8a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-8

PAGE 2 OF 2

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
31	S&H	■	12 13 15	17		SILTY CLAY (CL) red-brown and dark brown, very stiff, moist with some wet areas, fine- to coarse-grained gravel and cobbles						
32					CL							
33						increase gravel content at 32' to 33'						
34						SANDY SILT with CLAY (ML) yellow-brown, hard, moist, fine-grained sand						
35		◪	15		ML							
36	SPT		18 32	50								
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 36.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-8b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-9

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Date started: 8/6/10 | Date finished: 8/6/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches | Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Logged by: R. Severn

Ground Surface Elevation: 33 feet^2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value^1	LITHOLOGY	MATERIAL DESCRIPTION		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–1					SILTY SAND (SM) yellow-brown, medium dense, damp to moist, trace organics	FILL (0 to 24.5 ft)						
5–6	S&H	13 13 19	19	SM	Particle Size Analysis, see Figure C-1					37.8	9.2	93
10–11	S&H	18 24 27	31		dense						13.5	97
13.5					SANDY SILT (ML) yellow-brown to red-brown, very stiff, moist, fine-grained sand LL = 29, PI = 3, see Figure C-6							
15–16	SPT	9 9 16	25									
19				ML								
20–21	S&H	12 14 19	20		mottled yellow-brown and red-brown, with trace black spots, fine- to medium-grained sand Shear Strength Test, see Figure C-13		TxUU	2,102	2,448		17.0	99
23					with gravel							
24.5–26	S&H	15 18 22	24	SM	SILTY SAND (SM) yellow-brown, dense, moist, fine- to medium-grained					32.2	15.9	87
26.5–30				ML	SILT (ML) mottled yellow-brown, red-brown and black, very stiff, moist							

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PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-9

PAGE 2 OF 2

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT	▬	50/1"	50/1"	ML	SILT (ML) (continued)						
31												
					SM	SILTY SAND (SM) brown, moist, medium grained, with gravel/cobbles						
32												
33	SPT	◩	18 32 50/5"	92	ML	SANDY SILT (ML) light brown, hard, moist						
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 33.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-9b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-10

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Logged by: R. Severn

Date started: 8/6/10

Date finished: 8/6/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 32 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND (SM) light brown, medium dense, damp, with organics						
1												
2												
3					SM							
4												
5												
6	S&H	■	15 23 27	30		SANDY SILT/ SILTY CLAY (ML/CL) red-brown, hard, moist						
7												
8												
9												
10												
11	S&H	■	15 19 25	26		very stiff, varying amounts of fine-grained sand LL - 34, PI = 12, see Figure C-6						
12						FILL						
13												
14												
15					ML/ CL							
16	S&H	■	10 25 50/2"	45/ 7"		hard LL = 35, PI = 15, see Figure C-6						
17												
18												
19												
20						very stiff, with varying amounts of clay						
21	S&H	■	9 11 15	16								
22												
23												
24						SILTY CLAY with GRAVEL (CL) mottled dark brown and olive-gray, very stiff, moist, fine- to coarse-grained gravel and cobbles, with sand						
25												
26	S&H	■	5 11 17	17								
27					CL							
28												
29												
30												

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Figure: A-10a

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PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-10

PAGE 2 OF 2

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	S&H	▨	18 30 50/2"	48/8"	ML	SANDY SILT (ML) light brown with rust staining, hard, moist, trace gravel, sand interbedded with poorly graded sand						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
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51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 31 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-10b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-11

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Date started: 8/9/10
Date finished: 8/9/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: R. Severn

Ground Surface Elevation: 30 feet^2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–1						CLAYEY SILT with SAND (ML) yellow brown, hard, moist, fine-grained sand, trace gravel	FILL (0–25)						
4					ML								
5–6	S&H	■	19 30 37	40		Shear Strength Test, see Figure C-14 LL = 27, PI = 9, see Figure C-7		TxUU	504	2,750		18.8	96
8.5						SILTY CLAY (CL) mottled red-brown and yellow-brown, very stiff, moist, trace sand							
10–11	S&H	■	13 18 21	23									
15–16	S&H	■	13 15 17	19		red-brown Shear Strength Test, see Figure C-15		TxUU	1,598	2,830		21.3	104
17					CL								
20–21	S&H	■	7 18 20	23									
25–26	S&H	■	15 17 19	22		mottled red-brown and dark brown, some black spots	FILL? (25–28.5)						
28						with gravel/cobbles from 28'- 29'							
28.5–30					SP	SAND with CLAY (SP) light brown and yellow brown, very dense, moist,							

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Project No.: 730438107
Figure: A-11a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-11

PAGE 2 OF 2

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	S&H	▨	50/6"	30/6"	ML	SAND with CLAY (SP) (continued) fine- to coarse-grained sand						
						SANDY SILT (ML) light brown, hard, moist, fine-grained sand						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 30.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-11b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-12

Boring location: See Site Plan, Figure 2	Logged by: R. Severn
Date started: 8/9/10 · Date finished: 8/9/10	
Drilling method: Hollow Stem Auger	
Hammer weight/drop: 140 lbs./30 inches · Hammer type: Down Hole	
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)	

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]		Ground Surface Elevation: 32 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SANDY SILT (ML) yellow-brown, hard, damp to moist, fine-grained sand						
1												
2												
3												
4												
5	S&H	▨	17 37 50/4"	52/ 10"								
6						Non Plastic						
7												
8												
9												
10	S&H	▨	37 50/5"	30/5"		with cobbles over 4 inches greatest dimension						
11												
12					ML	FILL						
13												
14												
15	S&H	▨	10 12 14	16		yellow-brown and red-brown, very stiff						
16												
17												
18												
19												
20	S&H	▨	10 10 9	11		stiff						
21												
22												
23												
24						SILTY SAND (SM) brown, dense, moist, fine-grained sand						
25	S&H	▨	12 25 38	38								
26					SM							
27						with gravel/cobbles from 27' to 30'						
28						SANDY CLAY with GRAVEL (CL) brown, hard, moist to wet, with sand pockets						
29					CL							
30												

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PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-12

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]			Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	S&H	■	50/1"	30/1"		SANDY CLAY with GRAVEL (CL) (continued)						
31												
32					CL							
33												
34	S&H	■	42 50/1"	30/2"	ML	SANDY SILT (ML) light brown, hard, moist						
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 34.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-12b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-13

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 8/9/10

Date finished: 8/9/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Logged by: R. Severn

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]		Ground Surface Elevation: 19 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY SILT/ SILTY CLAY (ML/CL) yellow-brown, hard, dry						
2	S&H	■	27 50/6"	30/6"		LL - 29, PI = 13, see Figure C-7					9.6	93
3					ML/ CL	FILL						
4												
5						moist						
6												
7						SILTY SAND (SM) yellow-brown, dense, moist						
8												
9	SPT	◩	12 14 15	29								
10					SM							
11												
12												
13												
14					CL	SANDY CLAY with GRAVEL (CL) red-brown and brown, hard, moist						
15	SPT	▬	50/2"	50/2"								
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 15 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-13

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-14

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: R. Severn

Date started: 8/9/10

Date finished: 8/9/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

DEPTH (feet)	SAMPLES: Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 21 feet[2]		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SANDY SILT (ML) yellow-brown, very stiff, moist							
1													
2													
3													
4													
5		■	12		ML		FILL						
6	S&H	■	21 21	25									
7													
8													
9													
10		■	29			brown, hard, with varying clay and sand content							
11	S&H	■	29 29	35									
12													
13							FILL?						
14													
15		■	13			yellow-brown and light brown, very stiff							
16	S&H	■	14 15	17									
17						SILT with CLAY (ML) mottled yellow-brown and orange, hard, moist							
18													
19					ML								
20		◩	24										
21	SPT	◩	27 38	65									
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-14

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring TR-15

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: R. Severn

Date started: 8/9/10

Date finished: 8/9/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION — Ground Surface Elevation: 19 feet[2]	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND with GRAVEL (SM) yellow-brown, very dense, moist, fine-grained sand, trace clay						
1												
2												
3												
4												
5	S&H	▨	50/ 6"	30/6"	SM	FILL?						
6												
7												
8												
9												
10	S&H	▨	25 38 50/2"	53/8"		SILTY SAND with GRAVEL (SM) yellow-brown, very dense, moist abundant gravel and cobbles						
11					SM							
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 12.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-15

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-Aa

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 9/1/10
Date finished: 9/1/10
Drilling method: Hand Auger
Hammer weight/drop: NA
Hammer type: NA
Sampler: Sprague & Henwood (S&H)
Logged by: S. Magallon

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 20 feet[1]		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) light-brown, dry	FILL						
2	HA	☒											
3					SM	SILTY SAND (SM) brown, moist, fine sand, thin layer of silty clay at 3 feet							
4	HA	☒			CL	SILTY CLAY (CL) brown, moist, medium plasticity LL = 48, PI = 25, see Figure C-7 Consolidation Test, see Figure C-22						50.5	71
5													
6	HA	☒											
7													
8					SM	SILTY SAND with GRAVEL (SM) red-brown, moist, fine to medium sand, fine rounded gravel							
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 8.2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

---

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-16

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-Ab

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 9/1/10
Date finished: 9/1/10
Drilling method: Hand Auger
Hammer weight/drop: NA
Hammer type: NA
Sampler: Sprague & Henwood (S&H)
Logged by: S. Magallon

Ground Surface Elevation: 20 feet[1]

DEPTH (feet)	SAMPLES: Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) light-brown, dry surface crack ~4 inches deep	FILL						
2	HA	☒			ML	SANDY SILT (ML) yellow-brown to brown, moist fine sand Shear Strength Test, see Figure C-20		UC		514		32.0	53
3													
4	HA	☒			ML	CLAYEY SILT (ML) brown, moist, low plasticity							
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 5.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

---

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-17

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-Ba

PAGE 1 OF 1

Boring location:	See Site Plan, Figure 2		
Date started:	9/1/10	Date finished:	9/1/10
Drilling method:	Hand Auger		
Hammer weight/drop:	NA	Hammer type:	NA
Sampler:	Sprague & Henwood (S&H)		

Logged by: S. Magallon

LABORATORY TEST DATA

Ground Surface Elevation: 18 feet[1]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) light-brown, dry, ripped surface						
2	HA	☒			SM/ ML	SILTY SAND/ SANDY SILT (SM/ML) brown, moist, very fine sand stiff LL = 40, PI = 19, see Figure C-7 Shear Strength Test, see Figure C-21 FILL	UC		2,434		26.7	95
3												
4	HA	☒			ML	SANDY SILT (ML) brown, to red-brown, moist, fine sand						
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107	Figure: A-18

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-Bb

Boring location: See Site Plan, Figure 2

Date started: 9/1/10

Date finished: 9/1/10

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Logged by: S. Magallon

Ground Surface Elevation: 18 feet[1]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION
1					SM	SILTY SAND (SM) light-brown, dry, ripped surface
2	HA	☒			SM	SILTY SAND (SM) light-brown to brown, moist, fine sand
3					ML/ CL	SANDY SILT/ CLAY (ML/CL) brown, stiff, moist, fine sand
4	HA	☒			SM	SILTY SAND with GRAVEL (SM) red-brown, moist, fine sand, fine gravel, not cohesive
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

FILL

LABORATORY TEST DATA

Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft

Boring terminated at a depth of 5.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

---

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-19

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-Bc

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 9/1/10

Date finished: 9/1/10

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Logged by: S. Magallon

Ground Surface Elevation: 17 feet[1]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) light-brown, dry, fine sand, location covered in weeds	FILL						
2	HA	☒			SP	SAND with GRAVEL (SP) red brown to brown, moist, fine to coarse sand, fine rounded to subrounded gravel, cemented sand about 3/4 inch diameter							
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 4 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-20

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-D

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 8/30/10

Date finished: 8/30/10

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Logged by: S. Magallon

LABORATORY TEST DATA

Ground Surface Elevation: 11 feet[1]

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) brown, moist, fine sand FILL						
2	HA	☒										
3					SM	SILTY SAND (SM) yellow-brown, moist, encountered a rock						
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 3.4 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-21

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-F

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 9/1/10
Date finished: 9/1/10
Drilling method: Hand Auger
Hammer weight/drop: NA
Hammer type: NA
Sampler: Sprague & Henwood (S&H)
Logged by: S. Magallon

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 16 feet[1]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) light-brown, dry, fine sand, large 18-inch deep cracks						
2												
3	HA	☒			ML	CLAYEY SILT (ML) brown, moist FILL						
4						low plasticity						
5	HA	☒			SM	SILTY SAND (SM) red-brown to brown, moist, fine sand						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5.3 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

Treadwell&Rollo
A LANGAN COMPANY

Project No.: 730438107
Figure: A-22

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-G

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 8/30/10 | Date finished: 8/30/10

Drilling method: Hand Auger

Hammer weight/drop: NA | Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Logged by: S. Magallon

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 16 feet[1]		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND (SM) yellow-brown, moist, fine sand	FILL						
1													
2					SM								
3	HA	☒				thin layer of gray fine sand							
4	HA	☒			SM	SILTY SAND (SM) brown, moist, fine sand							
5													
6					ML	CLAYEY SILT (ML) yellow-brown, moist							
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 6.2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

Treadwell&Rollo
A LANGAN COMPANY

Project No.: 730438107 | Figure: A-23

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-I

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: S. Magallon

Date started: 8/30/10 | Date finished: 8/30/10

Drilling method: Hand Auger

Hammer weight/drop: NA | Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Ground Surface Elevation: 17 feet[1]

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					ML	SANDY SILT (ML) brown, moist, fine sand						
2	HA	☒				SILTY SAND with GRAVEL (SM) brown to red-brown, fine sand, fine rounded gravel FILL						
3	HA	☒			SM							
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 4.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

---

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

Treadwell&Rollo
A LANGAN COMPANY

Project No.: 730438107

Figure: A-24

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-J

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: S. Magallon

Date started: 8/30/10 | Date finished: 8/30/10

Drilling method: Hand Auger

Hammer weight/drop: NA | Hammer type: NA

Sampler: Sprague & Henwood (S&H)

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 19 feet[1]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND (SM)/ SANDY SILT (ML)						
1	HA	☒										
2					SM							
3	HA	☒				FILL						
4												
5	HA	☒			SM/ ML	SILTY SAND (SM) red-brown, moist fine to medium sand						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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A LANGAN COMPANY

Project No.: 730438107

Figure: A-25

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-K

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 8/30/10

Date finished: 8/30/10

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Sprague & Henwood (S&H)

Logged by: S. Magallon

	SAMPLES					MATERIAL DESCRIPTION	LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	Ground Surface Elevation: 17 feet[1]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SILTY SAND (SM)/SANDY SILT (ML) moist						
2	HA	☒			SM/ML	FILL						
3	HA	☒										
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 4.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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A LANGAN COMPANY

Project No.: 730438107

Figure: A-26

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 1-L

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 8/30/10
Date finished: 8/30/10
Drilling method: Hand Auger
Hammer weight/drop: NA
Hammer type: NA
Sampler: Sprague & Henwood (S&H)
Logged by: S. Magallon

Ground Surface Elevation: 17 feet[1]

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	LABORATORY TEST DATA Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA Fines %	LABORATORY TEST DATA Natural Moisture Content, %	LABORATORY TEST DATA Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) yellow brown, dry, fine sand, surface cracks						
2	HA	☒				CLAYEY SILT (ML) brown, moist FILL						
3					ML							
4	HA	☒				LL = 42, PI = 19, see Figure C-7 Consolidation Test, see Figure C-23					36.0	85
5					SM	SILTY SAND with GRAVEL (SM) red-brown, moist, fine gravel						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

[1] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-27

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 2TR-01

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Logged by: S. Magallon
Date started: 9/22/10
Date finished: 9/22/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]		Ground Surface Elevation: 25 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND (SM) yellow-brown to light brown, dry vegetation						
1												
2					SM							
3												
4												
5	S&H	■	50	30		SILTY SAND (SM) brown, very dense, moist , trace gravel						
6												
7						FILL						
8												
9					SM							
10	SPT	⊡	50/3"	50								
11												
12												
13												
14												
15	S&H	■	17 20 50/2"	42/8"		SANDY CLAY (CL) brown, hard, moist						
16												
17					CL							
18												
19												
20						CLAYEY SILT (ML) brown, very stiff, moist						
21	S&H	■	12 14 32	28							34.5	83
22												
23												
24												
25					ML	Hydraulic Conductivity Test, see Table C-1						
26	SPT	◩									22.9	91
27												
28												
29												
30												

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Project No.: 730438107
Figure: A-28a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 2TR-01

PAGE 2 OF 2

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
31	S&H	■	7 20 50/3"	42/9"		SILTY SAND (SM) brown, very dense, moist Particle Size Analysis, see Figure C-1				30.2	21.1	94
32												
33					SM							
34												
35												
36	SPT	◩	14 20 25	45								
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 36.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

Treadwell&Rollo
A LANGAN COMPANY

Project No.: 730438107

Figure: A-28b

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-01

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 9/10/10 | Date finished: 9/10/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches | Hammer type: Down Hole Safety

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

Logged by: S. Magallon

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 35 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0						GRAVELLY SILT yellow-brown, dry, vegetation: grasses FILL						
1					GP	GRAVEL (GP) with trace cobble						
5	SPT	◩	25 50	50/4"	ML	SILT with GRAVEL (ML) yellow-brown, hard, dry to moist						
10	SPT	◩	25 12 12	24	CL	SANDY CLAY (CL) red-brown, moist, very stiff, trace gravel LL = 28, PI = 7, see Figure C-7						
15	SPT	▭	50/2"	50/2"	CL	hard no recovery						
20	S&H	■	50/6"	30/6"		lost shelby tube, moved North 3 feet						
21					CL	SANDY CLAY (CL) brown, hard, moist, trace gravel						
25	S&H	—	50/0'									
27						interbedded coble/gravel and clay						
28	S&H	■			SP	SAND (SP) brown mottled black and olive, moist Particle Size Analysis, see Figure C-1				5.5		
30												

Boring terminated at a depth of 28.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107 | Figure: A-29

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-02

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Logged by: S. Magallon
Date started: 9/21/10
Date finished: 9/21/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

LABORATORY TEST DATA

Ground Surface Elevation: 33 feet^2

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value^1	LITHOLOGY	MATERIAL DESCRIPTION		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–5					ML	SANDY SILT (ML) light-brown, moist, vegetation: grasses, weeds	FILL						
5	SPT	◪	11 14 18	32	CL	SILTY CLAY (CL) brown, hard, moist, trace gravel							
10	S&H	■	7 9 13	13	CL	SANDY CLAY (CL) red-brown, stiff, moist, coarse sand, fine gravel LL = 32, PI = 14 , see Figure C-8							
15	S&H	■	11 50/5"	30/5"		hard							
17						encountered gravel layer							
20	S&H	■	18 41 42	50	SM	SILTY SAND (SM) brown, very dense, moist Particle Size Analysis, see Figure C-1					34.1		
25	ST	◨	800 psi										
26	S&H	■	50	50/6"	ML	SANDY SILTY (ML) olive, hard, moist						41.0	73
30													

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Project No.: 730438107
Figure: A-30a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-02

PAGE 2 OF 2

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	S&H	▨	17 50/5"	30/5"	ML	SANDY SILT (ML) (continued) mottled white						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 35 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-30b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-03

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Date started: 9/21/10
Date finished: 9/21/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)
Logged by: S. Magallon

LABORATORY TEST DATA

Ground Surface Elevation: 32 feet[2]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SANDY SILT (ML) light-brown, moist, vegetation: grasses and weeds						
1												
2												
3					ML							
4												
5						SILTY SAND (SM) light-brown to brown, dense, moist FILL						
6	SPT	◩	20 21 21	42								
7					SM							
8												
9												
10						SILTY SAND (SM) red-brown, medium dense, moist LL = 22, PI = 2, see Figure C-8						
11	SPT	◩	5 10 18	28								
12												
13						encountered gravel layer						
14												
15					SM	unable to sample, due to gravel						
16												
17												
18												
19												
20						SILTY CLAY (CL) brown mottled red-brown, hard, moist LL = 34, PI = 11, see Figure C-8						
21	SPT	◩	22 23 28	51								
22					CL							
23												
24												
25						SANDY SILT (ML) brown mottled olive-brown, hard, moist Hydraulic Conductivity Test, see Table C-1						
26	S&H	■	12 40 50/3"	54/9"							31.2	89
27					ML							
28												
29												
30												

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Project No.: 730438107
Figure: A-31a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-03

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]			Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
31	ST	◧	1200 psi		SP	SAND (SP) brown, very dense, moist						
32												
33												
34												
35	S&H	■	24 50/5"	30/5"	SM-SP	SILTY SAND (SM) & SAND (SP) on top, brown, very dense, moist; on bottom, brown mottled dark brown, very dense moist Particle Size Analysis, see Figure C-2				16.3	21.9	92
36												
37												
38												
39												
40	SPT	◪	7 20 32	52	CL	SANDY CLAY (CL) olive-gray mottled red-orange, hard, moist						
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 41.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-31b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-04

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Logged by: S. Magallon

Date started: 9/21/10

Date finished: 9/21/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole Safety

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 27 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1–4					SM	SILTY SAND (SM) light-brown, dry, trace gravel FILL						
5	S&H	■	32 50	30/6"	ML	SANDY SILT (ML) yellow-brown to brown, hard, moist, trace gravel LL = 30, PI = 11, See Figure C-8						
10	SPT	◩	11 12 15	27	CL	SANDY CLAY (CL) brown, moist, very stiff, trace gravel LL = 27, PI = 10, see Figure C-8						
15	S&H	■	22 50/5"	30/ 5"		hard more gravel						
20	S&H	■	7 50/5"	30/ 5"	CL	SANDY CLAY (CL) brown, hard, moist					30.8	88
25	S&H	■	22 50/5"	30/ 5"	ML	SANDY SILT (ML) light brown, hard, moist, trace gravel					14.3	104
30												

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-04

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
	S&H	▭	50/2"	30/ 2"		SANDY SILT (ML) (continued)						
31												
32					ML							
33												
34												
35			15			CLAYEY SILT with SAND (ML) red-brown to brown, hard, moist						
36	SPT	◪	27 40	67	ML							
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 36.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

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[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-32b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-05

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Date started: 9/22/10
Date finished: 9/22/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)
Logged by: S. Magallon

LABORATORY TEST DATA

Ground Surface Elevation: 27 feet[2]

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY SILT (ML) yellow-brown, hard, dry						
2												
3												
4												
5	S&H	⊡	50/5"	30/5"	ML							
6												
7												
8												
9												
10	SPT	◪	17 50/ 6"	50/ 6"		CLAYEY SILT with SAND (ML) brown, hard, moist, fine sand LL = 25, PI = 7, see Figure C-8						
11					ML							
12												
13	SPT	▬	50/2"	50/ 2"	ML	encountered gravel layer SANDY SILT with GRAVEL (ML) yellow-brown, hard, moist, typical gravel						
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 13.25 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-33

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-06

Boring location: See Site Plan, Figure 2
Date started: 9/21/10 | Date finished: 9/21/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches | Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

Logged by: S. Magallon

LABORATORY TEST DATA

Ground Surface Elevation: 41 feet[2]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0–5					SM	SILTY SAND with GRAVEL (SM) light-brown, moist						
5	S&H		37 50/4"	30/4"	SM	SILTY SAND (SM) brown, very dense, moist Cation Exchange Capacity, see Table C-1 Field Capacity and Wilting Point Test, see Table C-1						
10	S&H		8 14 19	20	ML	CLAYEY SILT (ML) dark-brown mottled dark gray, very stiff, moist LL = 26, PI = 6, see Figure C-9						
15	S&H		7 22 39	37	SC	CLAYEY SAND (SC) red-brown to brown, dense, moist Particle Size Analysis, see Figure C-2				16.9		
20	S&H		50/6"	30/6"	CL	SANDY CLAY (CL) brown mottled red-brown, hard, moist						
25	ST		1200 psi		ML	SANDY SILT (ML) brown to red-brown, hard, moist Hydraulic Conductivity Test, see Table C-1					26.6	90
30												

FILL (0 to 10 feet)

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Project No.: 730438107
Figure: A-34a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring 3TR-06

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
31	S&H	▨	19 32 50/4"	99/ 11"		SANDY SILT (ML) (continued)						
32												
33					ML							
34												
35	S&H	▨	17 50/5"	30/5"	ML	SANDY SILT (ML) brown, hard, moist					27.8	71
36					ML	SANDY SILT (ML) gray-brown mottled red-brown, hard, moist						
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 36.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-34b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-01

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Date started: 9/16/10 Date finished: 9/17/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches Hammer type: Down Hole Safety

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Logged by: S. Magallon

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 58.5 feet[2]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILTY SAND with GRAVEL (SM) light brown, dry, rounded coarse gravel, vegetation						
1												
2					SM							
3												
4						SANDY SILTY with GRAVEL (ML) yellow-brown to light brown, hard, moist, medium to coarse rounded gravel						
5	S&H	■	23 50	30/6"							17.1	105
6												
7												
8												
9					ML							
10	S&H	■	34 50	30/6"		light-brown, less gravel than above						
11												
12												
13												
14						gravel						
15	S&H	■	50 50 35	51		SILTY SAND (SM) yellow-brown, very dense, moist, trace fine gravel						
16												
17					SM							
18												
19												
20	SPT	◩	12 25 25	50		SILTY SAND (SM) brown, very dense, moist						
21												
22					SM							
23												
24												
25	SPT	◩	12 18 18	36		CLAYEY SILT (ML) brown, hard, moist, trace fine gravel						
26												
27					ML							
28												
29												
30												

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Project No.: 730438107

Figure: A-35a

TEST GEOTECH LOG 438107.GPJ TR.GDT 1/19/11

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-01

PAGE 2 OF 2

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT	◩	50	50/ 5.5"	ML	SANDY SILT with GRAVEL (ML) brown, hard, moist, coarse gravel, encountered a gravel that prevented retention of sample						
31												
32												
33						gravel, rounded to subrounded coarse gravel						
34												
35	SPT	◩	50	50/3"	SM	SILTY SAND with GRAVEL (SM) brown, very dense, moist, rounded to subrounded coarse gravel, prevented full sample				32.1	6.2	
36												
37												
38												
39						layer of gravel, poorly graded round, coarse gravel						
40	SPT	⊡	50	50/6"						42.4	7.3	
41						dense layer of gravel, unable to penetrate with auger						
42					SM	SILTY SAND with GRAVEL (SM) brown, moist						
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 42 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.
[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-35b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-02

Boring location: See Site Plan, Figure 2
Date started: 9/17/10
Date finished: 9/17/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: S. Magallon

LABORATORY TEST DATA

MATERIAL DESCRIPTION

Ground Surface Elevation: 58.5 feet[2]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SILT- SAND with GRAVEL (ML-SP) light brown, dry, medium rounded gravel						
1												
2												
3					ML-SP							
4												
5												
6	S&H	■	7 11 11	13		SILTY CLAY (CL) red-brown to brown, stiff, moist					12.9	120
7												
8					CL							
9												
10												
11	S&H	■	5 10 10	12		CLAY with SAND (CL) red-brown to brown, stiff, moist, coarse sand Shear Strength Test, see Figure C-16	TxUU	1,000	2,023		17.6	109
12												
13					CL							
14												
15												
16	S&H	■	17 22 24	28		SILTY SAND (SM) olive-brown mottled yellow, medium dense, moist Particle Size Analysis, see Figure C-2				16.5	9.6	102
17												
18					SM							
19												
20												
21	S&H	■	10 10 13	14		SAND with SILT (SP) olive-brown, medium dense, moist						
22					SP							
23												
24						SANDY SILT (SM) red-brown, loose, moist						
25												
26	SPT	◩	3 4 4	8		Non-plastic				47.9	19.1	
27					SM							
28												
29												
30												

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Project No.: 730438107
Figure: A-36a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-02

PAGE 2 OF 2

DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SAMPLES						LABORATORY TEST DATA					
31	S&H	■	3 3 4	4		SILTY SAND with GRAVEL (SM) red-brown to brown, moist fine gravel LL = 30, PI = 7, see Figure C-9						
32					SM							
33						encountered gravel						
34						SANDY GRAVEL (GP) brown, very dense, moist coarse gravel, coarse sand						
35	SPT	◪	19 50	50/6"								
36												
37												
38												
39					GP							
40	SPT	□	50/4"	50/4"		encountered gravel, unable to sample						
41												
42						drilled through gravel layer						
43												
44												
45	S&H	■	50/5"	30/3"		SILTY CLAY (CL) red-brown to brown, hard, moist						
46												
47					CL							
48												
49												
50		□	50/2"	30/2"	CL	CLAY (CL) brown, hard, moist, clay refusal						
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 51 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-36b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-03

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2

Date started: 9/17/10

Date finished: 9/17/10

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Down Hole Safety

Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Logged by: S. Magallon

LABORATORY TEST DATA

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 57.5 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SILTY SAND with GRAVEL (SM) light-brown, dry, rounded fine gravel						
2					SM							
3												
4												
5						SILTY SAND (SM) red-brown to brown, very dense, moist, sand						
6	SPT	◪	20 25 27	52								
7												
8												
9												
10					SM	dense more silt with depth, trace gravel						
11	S&H	■	20 27 29	34								
12												
13												
14												
15												
16	S&H	■	20 30 30	36		CLAYEY SAND (SC) red-brown, hard, moist (top of sample SP) LL = 25, PI = 6, see Figure C-9				18.1	12.0	
17												
18					SC							
19												
20						SILTY SAND (SM) brown, medium dense, moist, few roots						
21	SPT	◪	8 10 10	20								
22					SM							
23												
24												
25						SANDY SILT (ML) brown, very stiff, moist						
26	S&H	■	5 13 17	18								
27												
28					ML							
29												
30												

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-03

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
31	SPT	◩	7 8 9	17	ML	SANDY SILT (ML) light-brown, stiff, moist LL = 27, PI = 4, see Figure C-9				62.3	13.5	
32												
33												
34												
35	SPT	◩	30 50	50/6"	SM	SILTY SAND with GRAVEL (SM) brown, very dense, moist, fine to coarse gravel						
36												
37												
38												
39												
40	SPT	◩	50/2"	50/2"		typical fine to coarse gravel less gravel						
41												
42												
43												
44												
45	S&H	■	30 45	27/6"	CL	SILTY CLAY (CL) red-brown mottled olive, hard, moist Shear Strength Test, see Figure C-17	TxUU	4,500	3,350		28.4	90
46												
47												
48												
49												
50	S&H	■	17 19 27	28	SM	SILTY SAND (SM) brown, medium dense, moist to wet, fine grained sand Particle Size Analysis, see Figure C-2				48.9		
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 51 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-37b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-04

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Logged by: S. Magallon
Date started: 9/17/10
Date finished: 9/17/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 31.5 feet[2]	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SILTY SAND (SM) yellow to light-brown, dry, vegetation: thistle and grasses						
2												
3					SM							
4												
5		■	17									
6	S&H	■	20 36	34		CLAYEY SILT (ML) yellow-brown, hard, moist						
7												
8					ML							
9						rounded , coarse gravel						
10	SPT	◪	50/ 3'	50/3"		SANDY SILT with GRAVEL (ML) light-brown, hard, moist, fine sand, typical coarse gravel						
11												
12					ML							
13												
14												
15		◪	17			SAND (SP) red-brown mottled yellow, dense, moist						
16	SPT	◪	20 27	47								
17					SP							
18												
19												
20		■	10			SILT (ML) yellow-brown, moist						
21	S&H	■	12 12	14		Hydraulic Conductivity Test, see Table C-1 Cation Exchange Capacity Test, see Table C-1						
22					ML	Field Capacity and Wilting Point Test, see Table C-1						
23												
24												
25		■	8			SILTY SAND (SM) yellow-brown, medium dense, moist						
26	S&H	■	10 12	13		Particle Size Analysis, see Figure C-3				37.3	17.1	88
27					SM							
28												
29												
30												

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Project No.: 730438107
Figure: A-38a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-04

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
31	S&H	▨	9 12 13		SM	SILTY SAND (SM) brown, medium dense, moist Cation Exchange Capacity Test, see Table C-1 Field Capacity and Wilting Point Test, see Table C-1					24.5	80
32	SPT	◩	17 14 30	49	ML	SILT (SM) brown mottled yellow brown, hard, moist Particle Size Analysis, see Figure C-3				72.7		
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 33 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-38b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-05

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Logged by: S. Magallon
Date started: 9/20/10
Date finished: 9/20/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

Ground Surface Elevation: 30.5 feet[2]

DEPTH (feet)	SAMPLES: Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					SM	SILTY SAND (SM) yellow-brown, moist, vegetation: thistle and grass						
2												
3												
4												
5					SM	SILTY SAND (SM) brown, dense, moist, trace gravel, medium rounded gravel						
6	SPT	◩	18 16 14	30								
7												
8												
9												
10												
11	S&H	■	17 25 38	33	SM	SILTY SAND (SM) red-brown to brown, dense, moist						
12												
13												
14												
15	S&H	■	35 50	30/6"	ML	SILT (ML) brown, hard, moist				74.1	28.7	
16												
17												
18												
19												
20												
21	S&H	■	15 17 20	22	ML	CLAYEY SILT (ML) brown, very stiff, moist Particle Size Analysis, see Figure C-3 Hydraulic Conductivity Test, see Table C-1 Shear Strength Test, see Figure C-18	TxUU	1,300	2,650	84.2	37.4	75
22												
23												
24												
25					SM	SILTY SAND (SM) yellow-brown, dense, moist Particle Size Analysis, see Figure C-3						
26	S&H	■	18 17 22	39						47.2	27.0	86
27												
28												
29												
30												

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Project No.: 730438107
Figure: A-39a

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-05

PAGE 2 OF 2

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
31	SPT	◩	17 35 47	82	SP	SAND (SP) red-brown, very dense, moist, interbedded silt Cation Exchange Capacity Test, see Table C-1 Field Capacity and Wilting Point Test, see Table C-1 light brown						
32												
33												
34												
35												
36	SPT	◩	15 23 28	51	SP	SAND (SP) brown mottled light-brown, very dense, moist, coarse sand						
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 36.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107

Figure: A-39b

PROJECT: **ASPEN 1 - NEW BRIGHTON PROJECT**
Sacramento, California

Log of Boring MTR-06

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2
Logged by: S. Magallon
Date started: 9/20/10
Date finished: 9/20/10
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Down Hole Safety
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT), Shelby Tube (ST)

Ground Surface Elevation: 16 feet[2]

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SILTY SAND (SM) light-brown dry, vegetation: thistle and grass						
2					SM							
3												
4												
5						SANDY SILT (ML) brown, stiff, moist						
6	ST	◧				Particle Size Analysis, see Figure C-4 Hydraulic Conductivity Test, see Table C-1 Shear Strength Test, see Figure C-19	TxUU	300	1,630	61.4	17.0	83
7												
8					ML							
9												
10												
11	S&H	■	15 20 25	27		SAND/ SILTY SAND (SP-SM) brown mottled light-brown, medium dense, moist Particle Size Analysis, see Figure C-4				6.2		
12												
13												
14												
15												
16	SPT	◩	12 16 24	40	SP-SM	dense, trace gravel						
17												
18												
19												
20												
21	S&H	■	15 20 25	27	SP	SAND (SP) brown with olive and gray specs, medium dense, moist						
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 21.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

---

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.6 and 1.0, respectively to account for sampler type and hammer energy.

[2] Elevations based on Topographic Surveys provided by Teichert Construction.

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Project No.: 730438107
Figure: A-40

Treadwell&Rollo
A LANGAN COMPANY

APPENDIX B
Logs of Boring and Test Pits, and Laboratory Test Results from Previous Explorations

Boring Logs from Report Titled:
Preliminary Geotechnical Engineering Report, ASPEN 1 - Matsuda Lease Site
Dated: 24 October 2006
Prepared By: Wallace Kuhl & Associates Inc.

BORING NUMBER: D1
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC	▨	Brown, clayey fine sand
	◪	D1-1I	19	97	12.9			▨	
5	◪	D1-2I	11	96	17.7			▨	fine to medium sand
10	◪	D1-3I	9	101	19.3			▨	fine to coarse sand, with fine gravel increased clay content
15	◪	D1-4I	16				SM	▥	Brown, silty fine to medium sand
							CL	▨	Dark brown, fine sandy clay
20	◪	D1-5I	14	112	16.0			▨	
25	◪	D1-6I	13					▨	fine to coarse sandy clay
30									

FILL

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D1

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 3

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D2
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC	▩	Brown, clayey fine sand
	◩	D2-1I	16	100	16.2		CL	▨	Dark brown, fine sandy clay
5	◩	D2-2I	8	103	17.3			▨	
							SM	▥	Dark brown, silty fine sand
10	◩	D2-3I	9	92	25.6		SC	▩	Brown, clayey fine sand
							CL	▨	Reddish-brown, fine sandy clay
15	◩	D2-4I	12	91	28.7			▨	brown FILL
20									
25									
30									

Notes:

1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D2

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 4

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D3
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							CL	▨	Black, fine sandy clay
									dark brown
	◩	D3-1I	16	90	23.5		SC	░	Brown, clayey fine to medium sand
							CL	▨	Brown, fine sandy clay
5	◩	D3-2I	29	94	28.5				
10	◩	D3-3I	13	86	33.5				
15							SM	▥	Brown, silty fine sand
	◩	D3-4I	16				CL	▨	Brown, fine sandy clay
							SM	▥	Brown, silty fine sand
20	◩	D3-5I	17				CL	▨	Brown, fine sandy clay FILL
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D3

ASPEN I - MATSUDA LEASE SITE

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FIGURE 5

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D4
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							CL	▨	Dark brown, fine sandy clay
	◩	D4-1I	9	106	20.3			▨	black
5	◩	D4-2I	11	113	17.5			▨	dark brown
								▨	brown
10	◩	D4-3I	21	96	28.2			▨	
								▨	fine to coarse sandy clay
15	◩	D4-4I	21	86	32.7			▨	
								▨	light brown
20	◩	D4-5I	19					▨	
							SM	⠿	Brown, silty fine to medium sand
25	◩	D4-6I	13	89	14.5			⠿	FILL
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D4

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 6

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D5
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC	▨	Dark brown, clayey fine to medium sand
	◪	D5-1I	27	106	20.7	TR		▨	
5								▨	
	◪	D5-2I	12	99	20.6			▨	
10								▨	
	◪	D5-3I	13					▨	brown, decreased clay content
15								▨	
	◪	D5-4I	16	100	21.8			▨	dark brown, fine to coarse sand
20								▨	
	◪	D5-5I	7	101	18.8			▨	fine sand FILL
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D5

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 7

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D6
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC		Dark brown, clayey fine to coarse sand, with fine gravel and asphalt
	◪	D6-1I	16	106	16.1				
							CL		Dark brown, fine sandy clay
							SC		Dark brown, clayey fine sand
5	◪	D6-2I	12	105	20.0				
							CL		Dark brown, fine sandy clay
									brown, fine to coarse sandy clay
10	◪	D6-3I	8	93	26.9				
									fine sandy clay
15	◪	D6-4I	12	93	27.8				FILL
20									
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D6

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 8

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D7
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC	▨	Brown, clayey fine to coarse sand, with fine gravel
	◢	D7-1I	19	100	15.1			▨	
5	◢	D7-2I	13	92	25.9			▨	clayey fine to medium sand
10	◢	D7-3I	7	109	17.6			▨	reddish-brown
15	◢	D7-4I	7	100	18.6			▨	
20	◢	D7-5I	16					▨	FILL
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D7

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 9

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D8
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SC		Dark brown, clayey fine to coarse sand
		D8-1I	18	98	20.3				increased clay content
5		D8-2I	12						
							CL		Black, fine sandy clay
10		D8-3I	6	109	17.8				
							SC		Dark brown, clayey fine to medium sand
15		D8-4I	18				CL		Reddish-brown, fine to coarse sandy clay
20		D8-5I	13				SC		Dark brown, clayey fine to coarse sand
							CL		Black, fine sandy clay
25		D8-6I	12	102	18.7		SC		Dark brown, clayey fine sand FILL
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D8

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 10

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D9
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							CL	▨	Reddish-brown, fine sandy clay
	◩	D9-1I	12	90	25.7			▨	
5	◩	D9-2I	12	99	25.7			▨	brown
10	◩	D9-3I	8	109	19.3			▨	fine to medium sandy clay
							SC	░	Brown, clayey fine to medium sand
15	◩	D9-4I	12	102	19.6			░	
							CL	▨	Brown, fine sandy clay
20	◩	D9-5I	26					▨	
25	◩	D9-6I	30					▨	black reddish-brown FILL
30									

Notes:

1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D9

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 11

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D10
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							CL	▨	Red-brown, fine sandy clay
	◩	D10-1I	25	110	14.9			▨	
								▨	fine to medium sandy clay
5	◩	D10-2I	22	111	16.7			▨	
							SC	▨	Brown, clayey fine to coarse sand
10	◩	D10-3I	6	100	13.5			▨	
								▨	with fine gravel
15	◩	D10-4I	13						FILL
20									
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.

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LOG OF BORING D10

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 12

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D11
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
HOLLOW STEM AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0									
5									
10									
15									
20									
25									FILL
							SM	▒	Reddish-brown, silty fine to medium sand
30	◪	D11-1I	11					▒	
35	◪	D11-2I	24					▒	
								▒	silty fine sand
40	◪	D11-3I	38						
45									
50									

Notes:

1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.
4. Soil type was not classified until the approximate depth of 30'.

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LOG OF BORING D11

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 13

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

BORING NUMBER: D12
DATE DRILLED: 8/31/06
LOGGED BY: ML

DRILL RIG/METHOD:
CME-55/6-INCH
HOLLOW STEM AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0									
5									
10									
15									
20									
25									
30									↑ FILL
35	◩	D12-1I	13	104	23.4		CL	▨	Brown, fine sandy clay
							SM	░	Brown, silty fine sand
40									
45									
50									

Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Figure 15.
4. Soil type was not classified until the approximate depth of 35'.

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LOG OF BORING D12

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 14

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		SYMBOL	CODE	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS (More than 50% of coarse fraction > no. 4 sieve size)	GW	⁂	Well graded gravels or gravel - sand mixtures, little or no fines
		GP	⁂	Poorly graded gravels or gravel - sand mixtures, little or no fines
		GM	▥	Silty gravels, gravel - sand - silt mixtures
		GC	▧	Clayey gravels, gravel - sand - clay mixtures
	SANDS (50% or more of coarse fraction < no. 4 sieve size)	SW	░	Well graded sands or gravelly sands, little or no fines
		SP	░	Poorly graded sands or gravelly sands, little or no fines
		SM	▥	Silty sands, sand - silt mixtures
		SC	▧	Clayey sands, sand - clay mixtures
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML	▥	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	▧	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	▤	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL ≥ 50	MH	▥	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	▨	Inorganic clays of high plasticity, fat clays
		OH	▨	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	▤	Peat and other highly organic soils
ROCK		RX	▦	Rocks, weathered to fresh

OTHER SYMBOLS

◩ = Drive Sample: 2-1/2" O.D. Modified California sampler

▱ = Drive Sample: no recovery

◪ = SPT Sample

▽i = Initial Water Level

▼f = Final Water Level

— — — = Estimated or gradational material change line

——— = Observed material change line

Laboratory Tests

PI = Plasticity Index

EI = Expansion Index

UCC = Unconfined Compression Test

TR = Triaxial Compression Test

GR = Gradational Analysis (Sieve)

K = Permeability Test

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse (c) fine (f)	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND coarse (c) medium (m) fine (f)	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

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UNIFIED SOIL CLASSIFICATION SYSTEM

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE 15

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

Boring Logs from Report Titled:
Geotechnical Engineering Report, ASPEN 1A – District Office
Dated: 18 January 2005
&
Supplemental Geotechnical Engineering Conclusions
Teichert ASPEN 1A District Office Retention Basin, South Watt Avenue, Sacramento, California
Dated: 24 March 2005
Prepared By: Wallace Kuhl & Associates Inc.

BORING NUMBER: D1
DATE DRILLED: 12/23/04
LOGGED BY: TWK

DRILL RIG/METHOD:
CME 55 / 6 inch
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SM/ ML		Light brown, silty fine sand / fine sandy silt
	◩	D1-1I	33	105	17.7				
							SM		Light brown, silty fine sand
5	◩	D1-2I	20						
10							ML		Light reddish brown, slightly clayey, fine sandy silt
	◩	D1-3I	13	102	17.5				
15									more fine sand
									FILL
	◩	D1-4I	17						
20									
25									
30									

Notes:

1. This log depicts conditions only at the boring location, see Plate No. 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Plate No. 8

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GEOLOGIC & ENVIRONMENTAL SERVICES

LOG OF BORING D4

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 3

BORING NUMBER: D2
DATE DRILLED: 12/23/04
LOGGED BY: TWK

DRILL RIG/METHOD:
CME 55 / 6 inch
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SM		Light brown, silty fine sand
	◪	D2-1I	23						
							ML		Light brown, fine sandy silt
5	◪	D2-2I	20	97	20.1				
10	◪	D2-3I	30						
15	◪	D2-4I	22	91	27.5				FILL
20									
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Plate No. 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Plate No. 8

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GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

LOG OF BORING D4

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 4

BORING NUMBER: D3
DATE DRILLED: 12/23/04
LOGGED BY: TWK

DRILL RIG/METHOD:
CME 55 / 6 inch
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SM	▨	Light brown, silty fine sand
	◩	D3-1I	34	100	16.0			▨	
5								▨	
							ML	▥	Light brown, fine sandy silt
	◩	D3-2I	16	84	20.8			▥	
10								▥	
	◩	D3-3I	16					▥	
15								▥	
								▥	very moist
								▥	FILL
20									refusal due to gravel and cobbles
25									
30									

Notes:
1. This log depicts conditions only at the boring location, see Plate No. 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Plate No. 8

WALLACE • KUHL & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

LOG OF BORING D4

TEICHERT ASPEN 1A DISTRICT OFFICE
Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 5

BORING NUMBER: D4
DATE DRILLED: 12/23/04
LOGGED BY: TWK

DRILL RIG/METHOD:
CME 55 / 6 inch
SOLID FLIGHT AUGERS

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	SOIL DESCRIPTION AND REMARKS
0							SM		Light brown, silty fine sand
		D4-1I	16	12.5	19.5				
5		D4-2I	22	94	12.6				
							ML		Light brown, fine sandy silt
10		D4-3I	20						
15		D4-4I	15						FILL
20									
25									
30									

Notes:

1. This log depicts conditions only at the boring location, see Plate No. 2, and only on the date of field exploration.
2. Ground water was not encountered in the boring.
3. For an explanation of the symbols used in the boring log, see Plate No. 8

WALLACE • KUHL & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

LOG OF BORING D4

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 6

LOGS OF TEST PITS

TEST PIT 1

0' to 11'	Light brown, silty fine sand with fine to course gravel and cobbles (SM)
11' to 12'	Light reddish brown, fine sandy, clayey silt with fine to course gravel and cobbles (ML)
12' to 14'	Light brown, fine sandy silt (ML)
	Bottom of test pit at 14 feet

TEST PIT 2

0' to 3'	Light brown, silty fine sand with coarse gravel (SM)
3' to 3½'	Light reddish brown, fine sandy, silty clay (CL)
3½' to 6½'	Light brown, slightly clayey, fine sandy silt with cobbles (ML)
6½' to 7'	Light brown, silty fine sand (SM)
7' to 14½'	Light brown, slightly clayey, fine sandy silt (ML)
	Bottom of test pit at 14½ feet

TEST PIT 3

0' to 8'	Light brown, silty fine sand with minor gravel (SM)
8' to 14'	Light brown, fine sandy silt (ML)
	Bottom of test pit at 14 feet

TEST PIT 4

0' to 7'	Light brown, silty fine sand with minor gravel (SM)
7' to 12'	Light brown, fine sandy silt (ML)
12' to 13½'	Light brown, silty fine sand (SM)
	Bottom of test pit at 13½ feet

TEST PIT 5

0' to 6'	Light brown, silty fine sand (SM)
6' to 12½'	Light brown, fine sandy silt (ML)
	Bottom of test pit at 12½ feet

TEST PIT 6

0' to 7'	Light brown, silty fine sand with minor cobbles (SM)
7' to 11'	Light brown, fine sandy silt (ML)
	Bottom of test pit at 11 feet

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LOG OF TEST PITS

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01

DATE: 1/05

PLATE NO: 7

LOGS OF TEST PITS

TEST PIT 7

0' to 6'	Light brown, silty fine sand with minor cobbles (SM)
6' to 12'	Light brown, fine sandy silt (ML) Bottom of test pit at 12 feet

TEST PIT 8

0' to 8'	Light brown, silty fine sand with cobbles (SM) increased cobbles at 7 feet
8' to 10'	Light brown, fine sandy silt (ML)
10' to 14'	Light reddish brown, silty fine sand (SM) Bottom of test pit at 14 feet

TEST PIT 9

0' to 13'	Light brown, silty fine sand with minor cobbles (SM) no cobbles at 5 feet Bottom of test pit at 13 feet

TEST PIT 10

0' to 9'	Light brown, silty fine sand with minor cobbles (SM) no cobbles at 4 feet
5' to 12½'	Light brown, fine sandy silt (ML) Bottom of test pit at 12½ feet

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GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

LOG OF TEST PITS

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 8

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		SYMBOL	CODE	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS (More than 50% of coarse fraction > no. 4 sieve size)	GW	▨	Well graded gravels or gravel - sand mixtures, little or no fines
		GP	▨	Poorly graded gravels or gravel - sand mixtures, little or no fines
		GM	▨	Silty gravels, gravel - sand - silt mixtures
		GC	▨	Clayey gravels, gravel - sand - clay mixtures
	SANDS (50% or more of coarse fraction < no. 4 sieve size)	SW	▨	Well graded sands or gravelly sands, little or no fines
		SP	▨	Poorly graded sands or gravelly sands, little or no fines
		SM	▨	Silty sands, sand - silt mixtures
		SC	▨	Clayey sands, sand - clay mixtures
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML	▨	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	▨	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	▨	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL ≥ 50	MH	▨	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	▨	Inorganic clays of high plasticity, fat clays
		OH	▨	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	▨	Peat and other highly organic soils
ROCK		RX	▨	Rocks, weathered to fresh

OTHER SYMBOLS

◪ = Drive Sample: 2-1/2" O.D. Modified California sampler
▯ = Drive Sample: no recovery
◣ = SPT Sample
▽i = Initial Water Level
▼f = Final Water Level
— — — = Estimated or gradational material change line
——— = Observed material change line

Laboratory Tests

PI = Plasticity Index
EI = Expansion Index
UCC = Unconfined Compression Test
TR = Triaxial Compression Test
GR = Gradational Analysis (Sieve)
K = Permeability Test

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse (c) fine (f)	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND coarse (c) medium (m) fine (f)	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

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GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

UNIFIED SOIL CLASSIFICATION SYSTEM
TEICHERT ASPEN 1A DISTRICT OFFICE
Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: 9

LOG OF BORING

LOG OF BORING D1

0' to 7'	Light brown, moist, fine sandy silt (ML)
7' to 10'	Light brown, moist, silty fine sand (SM)
	Bottom of boring at 10'

Laboratory Results from Report Titled:
Preliminary Geotechnical Engineering Report, ASPEN 1 - Matsuda Lease Site
Dated: 24 October 2006
Prepared By: Wallace Kuhl & Associates Inc.

C. LABORATORY TESTING

Selected undisturbed soil samples were tested to determine dry unit weight (ASTM D2937), natural moisture content (ASTM D4643), and triaxial compression strength (ASTM D4767). The results of the unit weight, and moisture content tests are included on the boring logs at the depth each sample was obtained. The results of the triaxial compression strength test are presented on Figure A1.

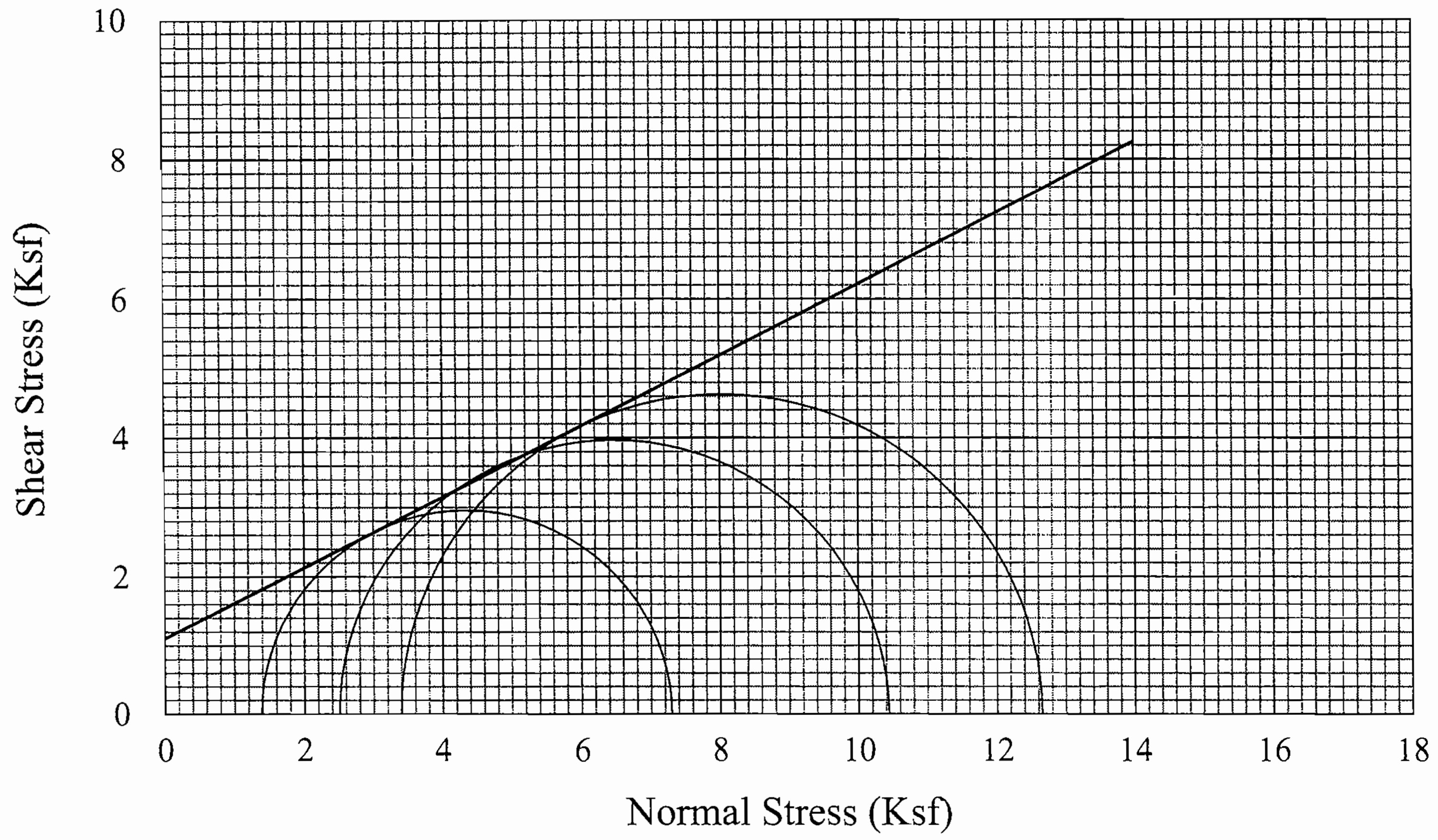
One representative bulk sample was subjected to Expansion Index testing (ASTM D4829); the results of the expansion index test are presented on Figure A2.

One representative bulk sample of anticipated pavement subgrade soils was subjected to Resistance-value testing in accordance with California Test 301. Results of the Resistance-value test are contained on Figure A3.

Two representative samples of soil were submitted to Sunland Analytical of Rancho Cordova, California, for corrosivity testing in accordance with California Test (CT) No. 643 (Modified Small Cell), CT 532, CT 422 and CT 417. Copies of the analytical results are provided on Figures A4 and A5.

TRIAXIAL COMPRESSION TEST

ASTM D4767-04



SAMPLE NO. :	D5-1I
SAMPLE CONDITION :	Undisturbed
SAMPLE DESCRIPTION :	Dark brown, clayey fine to medium sand

DRY DENSITY (PCF) :	106.4
INITIAL MOISTURE (%) :	17.4
FINAL MOISTURE (%) :	20.7
ANGLE OF INTERNAL FRICTION (ø) :	27°
COHESION (PSF) :	1150

WALLACE-KUHL &
ASSOCIATES, INC.

TRIAXIAL COMPRESSION TEST

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE	A1
DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06
WKA NO.	5222.06

EXPANSION INDEX TEST RESULTS

UBC Standard No. 18-2

ASTM D4829-03

MATERIAL DESCRIPTION: Black, fine sandy clay

LOCATION: B2

Sample Depth	Pre-Test Moisture (%)	Post-Test Moisture (%)	Dry Density (pcf)	Expansion Index *
0'-2'	13.6	29.3	95.2	**60**

CLASSIFICATION OF EXPANSIVE SOIL **

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

* Corrected to 50% Saturation

** From UBC Table 18-I-B

WALLACE-KUHL &
ASSOCIATES, INC.

EXPANSION INDEX TEST RESULTS

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE A2

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Dark brown, fine sandy clay

LOCATION: B3 (0'-2')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion Pressure		R Value
				(dial)	(psf)	
1	102	28.7	458	31	134	55
2	105	30.2	237	22	95	20
3	107	28.2	526	36	156	62

R-Value at 300 psi exudation pressure = 33

Equivalent R-Value at design Traffic Index of 4.5 = 20

WALLACE-KUHL &
ASSOCIATES, INC.

RESISTANCE VALUE TEST RESULTS

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE A3

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 09/15/2006
Date Submitted 09/12/2006

To: Mauricio Luna
Wallace-Kuhl & Associates
P.O. Box 1137
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 5222.06/ASPEN I Site ID : MATSUDA B1.
Your purchase order number is 1533.
Thank you for your business.

* For future reference to this analysis please use SUN # 48818-97233.

EVALUATION FOR SOIL CORROSION

Soil pH	6.92		
Minimum Resistivity	2.20	ohm-cm (x1000)	
Chloride	20.8 ppm	00.00208	%
Sulfate	29.0 ppm	00.00290	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

WALLACE-KUHL &
ASSOCIATES, INC.

CORROSION TEST RESULTS

ASPEN I - MATSUDA LEASE SITE

Sacramento, California

FIGURE A4

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 09/15/2006
Date Submitted 09/12/2006

To: Mauricio Luna
Wallace-Kuhl & Associates
P.O. Box 1137
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 5222.06/ASPEN I Site ID : MATSUDA B5.
Your purchase order number is 1533.
Thank you for your business.

* For future reference to this analysis please use SUN # 48818-97234.

EVALUATION FOR SOIL CORROSION

Soil pH	7.54		
Minimum Resistivity	1.96	ohm-cm (x1000)	
Chloride	12.4 ppm	00.00124	%
Sulfate	19.1 ppm	00.00191	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

WALLACE-KUHL &
ASSOCIATES, INC.

CORROSION TEST RESULTS
ASPEN I - MATSUDA LEASE SITE
Sacramento, California

FIGURE A5

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	10/06

WKA NO. 5222.06

Laboratory Results from Report Titled:
Geotechnical Engineering Report, ASPEN 1A – District Office
Dated: 18 January 2005
&
Supplemental Geotechnical Engineering Conclusions
Teichert ASPEN 1A District Office Retention Basin, South Watt Avenue, Sacramento, California
Dated: 24 March 2005
Prepared By: Wallace Kuhl & Associates Inc.

C. LABORATORY TESTING

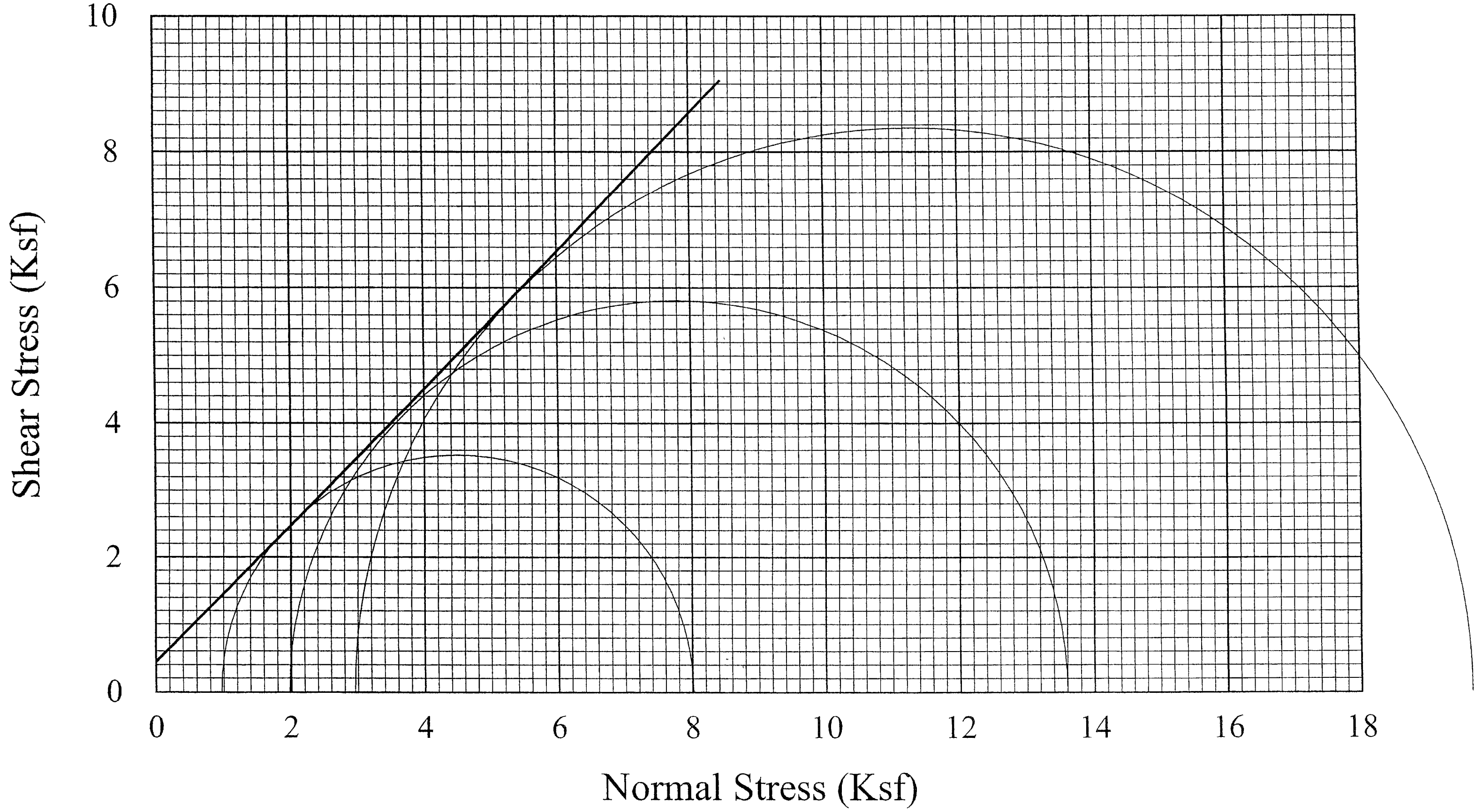
Selected undisturbed soil samples were tested to determine dry unit weight (ASTM D2937), natural moisture content (ASTM D2216) and triaxial compressive strength (ASTM D4767). The results of the unit weight and moisture content are included on the boring logs at the depth each sample was obtained. The results of the triaxial test are presented on Plate No. A1.

One representative bulk sample of anticipated pavement subgrade soils was subjected to Resistance-value testing in accordance with California Test 301. Results of the Resistance-value test, which were used in the pavement design, are contained on Plate No. A2.

Two representative samples of soil were submitted to Sunland Analytical of Rancho Cordova, California, for corrosivity testing in accordance with California Test (CT) No. 643 (Modified Small Cell), CT 532, CT 422 and CT 417. Copies of the analytical results are provided on Plates No. A3 through A4.

TRIAXIAL COMPRESSION TEST

ASTM D4767-95



SAMPLE NO. : D2-1I
SAMPLE CONDITION : Undisturbed
SAMPLE DESCRIPTION : Brown silty fine sand

DRY DENSITY (PCF) : 102
INITIAL MOISTURE (%) : 14
FINAL MOISTURE (%) : 15.1

ANGLE OF INTERNAL FRICTION (ø) : 45°
COHESION (PSF) : 445

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GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

Drawn By: PVT
Checked By: TWK

TRIAXIAL COMPRESSION TEST
TEICHERT ASPEN 1A DISTRICT OFFICE
Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: A1

RESISTANCE VALUE TEST RESULTS
(California Test 301)

MATERIAL DESCRIPTION: Light brown, silty fine sand

LOCATION: TP7 (0-2')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion Pressure		R Value
				(dial)	(psf)	
1	102	22.3	231	25	108	12
2	110	21.4	279	34	147	13
3	110	19.7	478	55	238	31

R-Value at 300 psi exudation pressure = 62

WALLACE • KUHL & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

RESISTANCE VALUE TEST RESULTS

TEICHERT ASPEN 1A DISTRICT OFFICE

Sacramento, California

WKA NO: 6351.01

DATE: 1/05

PLATE NO: A2

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 01/07/2005
Date Submitted 01/03/2005

To: Troy Kamisky
Wallace-Kuhl & Associates, Inc.
3050 Industrial Blvd.
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney RH
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 6351.01\TEICHERT 1A Site ID : TP3 @ 2-4'.
Your purchase order number is 5432.
Thank you for your business.

* For future reference to this analysis please use SUN # 43686-85843.

EVALUATION FOR SOIL CORROSION

Soil pH	6.70	
Minimum Resistivity	7.50 ohm-cm (x1000)	
Chloride	9.9 ppm	00.00099 %
Sulfate	0.2 ppm	00.00002 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

WALLACE • KUHL & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING
GEOLOGIC & ENVIRONMENTAL SERVICES

CORROSION TEST
TEICHERT ASPEN 1A DISTRICT OFFICE
Sacramento, California

WKA NO: 6351.01
DATE: 1/05
PLATE NO: A3

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 01/07/2005
Date Submitted 01/03/2005

To: Troy Kamisky
Wallace-Kuhl & Associates,Inc.
3050 Industrial Blvd.
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 6351.01\TEICHERT 1A Site ID : TP7 @ 0-2'.
Your purchase order number is 5432.
Thank you for your business.

* For future reference to this analysis please use SUN # 43686-85844.

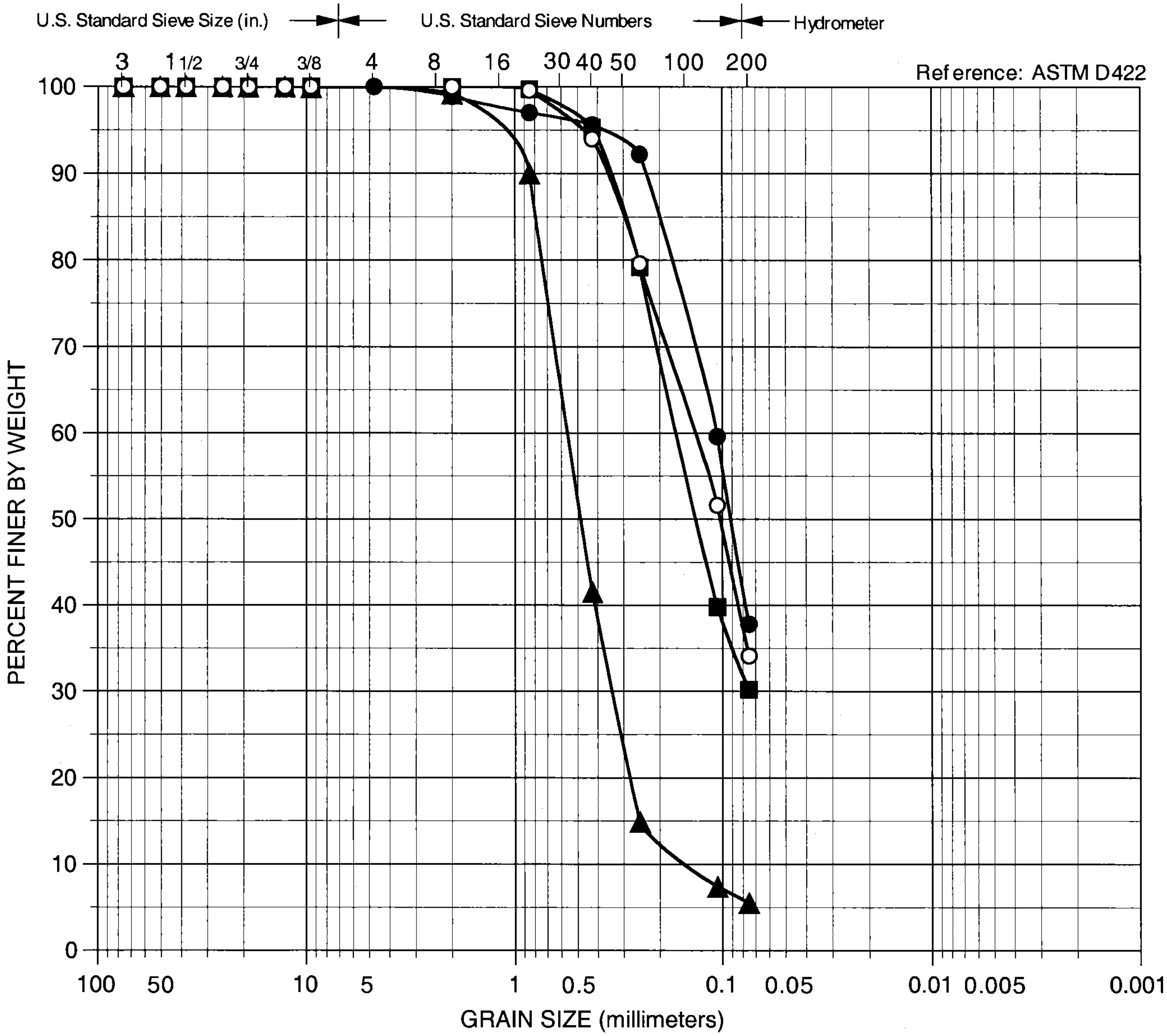
EVALUATION FOR SOIL CORROSION

Soil pH	6.16	
Minimum Resistivity	4.82 ohm-cm (x1000)	
Chloride	19.4 ppm	00.00194 %
Sulfate	6.6 ppm	00.00066 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

WALLACE • KUHL & ASSOCIATES, INC. GEOTECHNICAL ENGINEERING GEOLOGIC & ENVIRONMENTAL SERVICES	**CORROSION TEST** TEICHERT ASPEN 1A DISTRICT OFFICE Sacramento, California	WKA NO: 6351.01 DATE: 1/05 PLATE NO: A4

APPENDIX C
Geotechnical Laboratory Test Results



	% Gravel		%Sand			% Fines	
Sample	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
TR-09	0.0	0.0	1.1	3.3	57.8	37.8	
2TR-01	0.0	0.0	0.3	4.4	65.1	30.2	
3TR-01	0.0	0.0	0.0	2.2	84.5	5.5	
3TR-02	0.0	0.0	0.4	5.6	59.9	34.1	

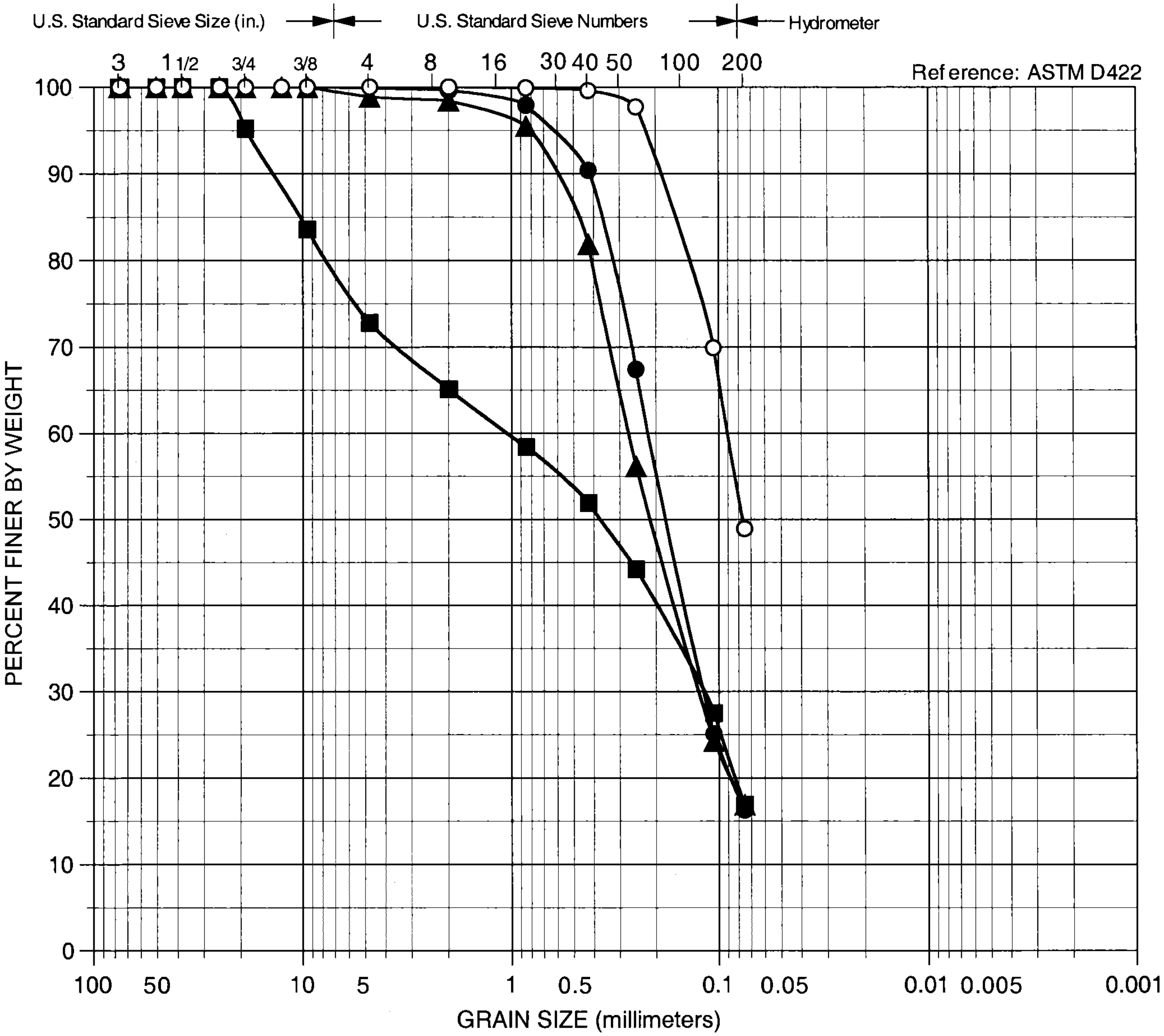
Symbol	Sample Source	Classification
●	TR-09 at 5 feet	SILTY SAND (SM), yellow-brown
■	2TR-01 at 31 feet	SILTY SAND (SM), brown
▲	3TR-01 at 28 feet	SAND (SP), brown
○	3TR-02 at 20 feet	SILTY SAND (SM), brown

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

Treadwell&Rollo
A LANGAN COMPANY

PARTICLE SIZE ANALYSIS

Date 11/04/10	Project No. 730438107	Figure C-1



	% Gravel		%Sand			% Fines	
Sample	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
3TR-03	0.0	0.0	2.1	7.5	74.1	16.3	
3TR-06	4.8	22.4	14.1	6.5	35	16.9	
MTR-02	0.0	1.1	3.4	13.6	65.4	16.5	
MTR-03	0.0	0.0	0.1	0.3	50.7	48.9	

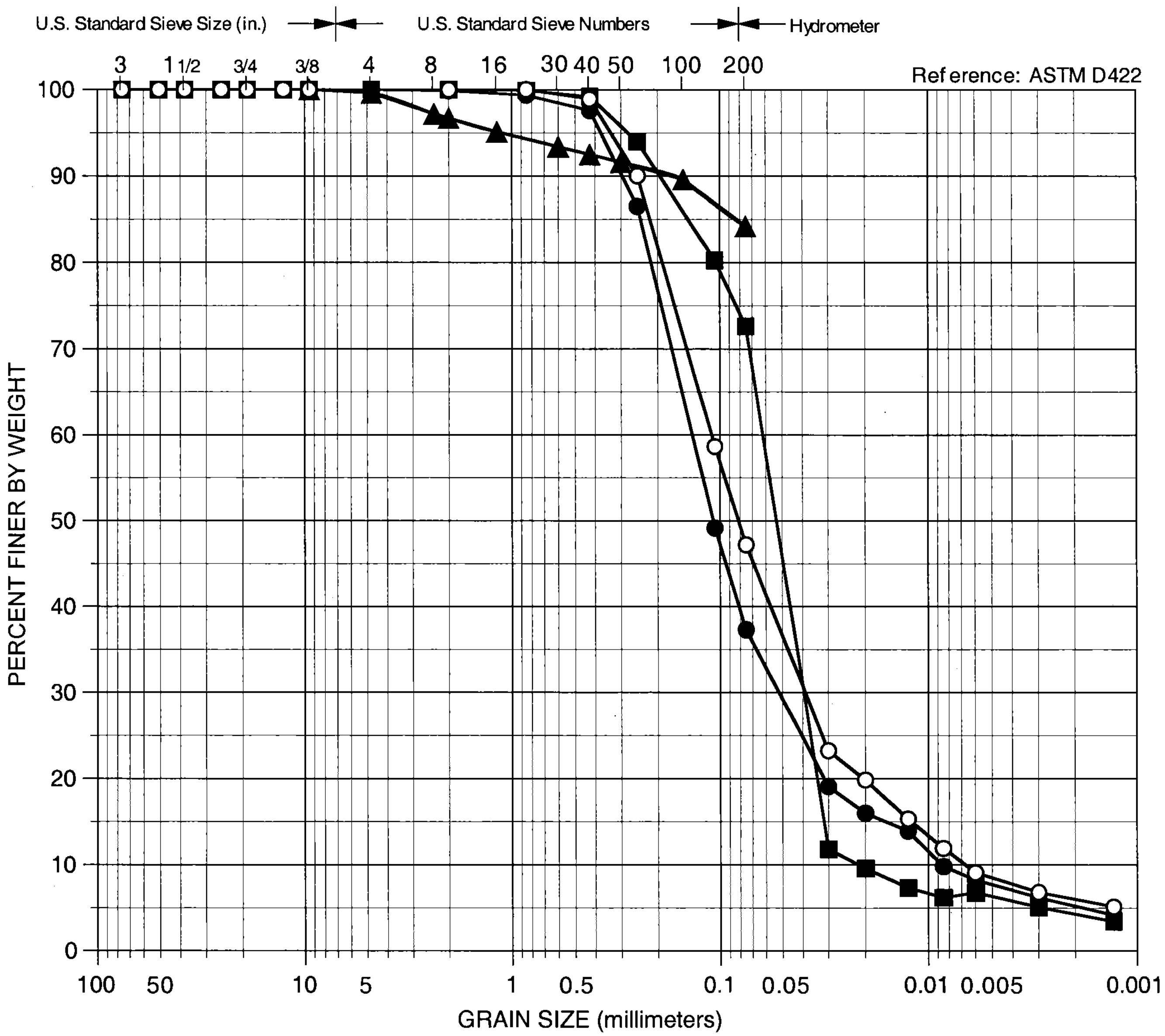
Symbol	Sample Source	Classification
●	3TR-03 at 35 feet	CLAYEY SAND (SC), brown
■	3TR-06 at 15 feet	CLAYEY SAND (SC), red-brown
▲	MTR-02 at 15 feet	SILT SAND (SM), olive-brown mottled yellow
○	MTR-03 at 50 feet	SILTY SAND (SM), brown

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

Treadwell&Rollo
A LANGAN COMPANY

PARTICLE SIZE ANALYSIS

Date 11/04/10 | Project No. 730438107 | Figure C-2



	% Gravel		%Sand			% Fines	
Sample	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
MTR-04	0.0	0.0	0.1	.2.3	60.3	29	8.3
MTR-04	0.0	0.0	0.0	0.8	26.6	65.9	6.8
MTR-05	0.0	0.4	2.9	4.2	8.3	84.2	
MTR-05	0.0	0.0	0.0	1.1	51.7	38.1	9.1

Symbol	Sample Source	Classification
●	MTR-04 at 25 feet	SILTY SAND (SM), yellow-brown
■	MTR-04 at 31 feet	SANDY SILT (ML), brown
▲	MTR-05 at 20 feet	CLAYEY SILT (ML), brown
○	MTR-05 at 25 feet	SILTY SAND (SM), yellow-brown

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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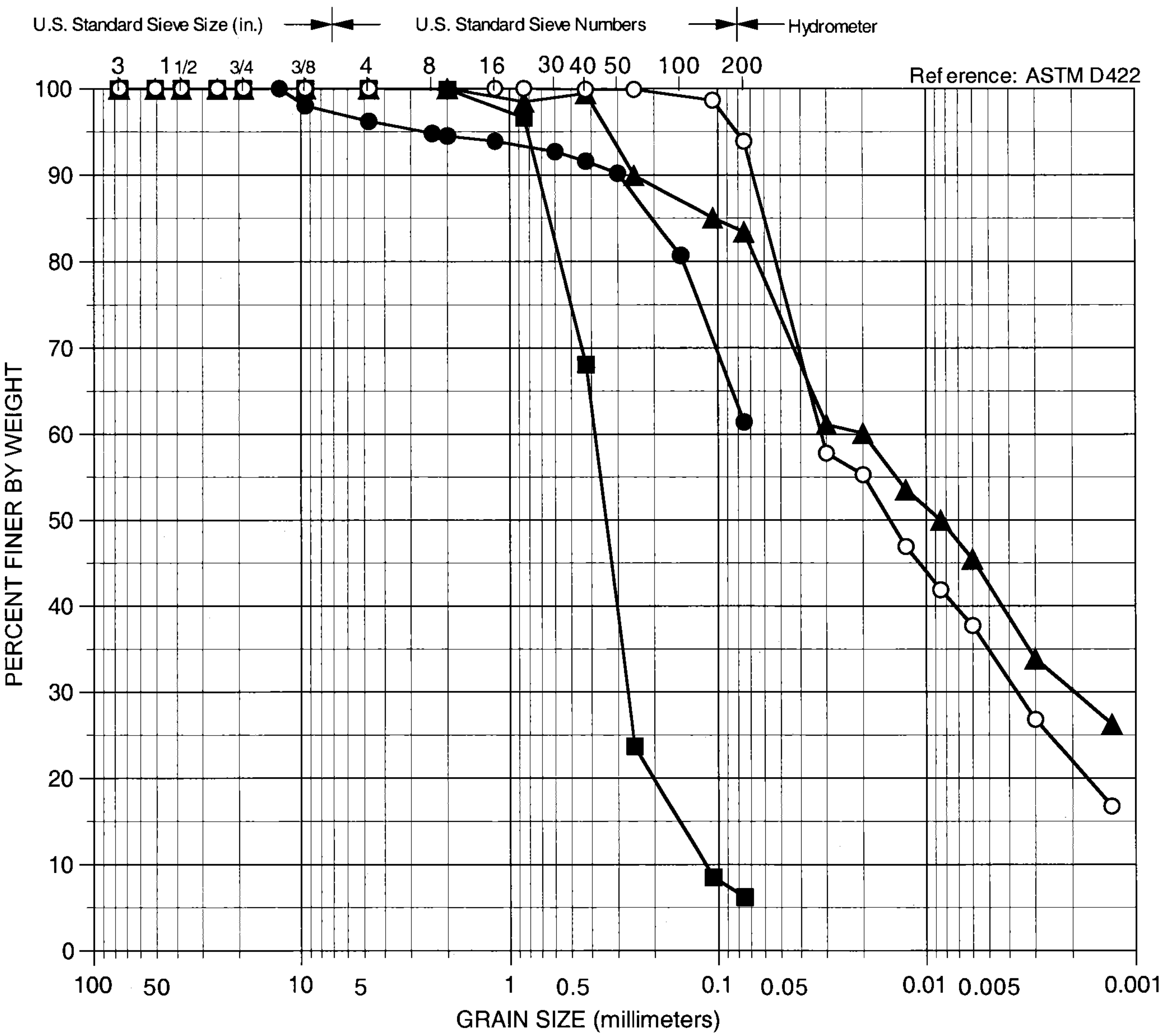
PARTICLE SIZE ANALYSIS

Date 11/04/10 | Project No. 730438107 | Figure C-3



	% Gravel		%Sand			% Fines	
Sample	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
MT R-06	0.0	3.8	1.7	2.9	30.2	61.4	
MTR-06	0.0	0.0	3.4	28.5	61.9	6.2	
Aspen2 2A-A	0.0	0.0	0.0	5.1	11	38	45.5
Aspen2 2A-B	0.0	0.0	0.0	0.1	6.0	52	41.9

Symbol	Sample Source	Classification
●	MTR-06 at 5 feet	SANDY SILT (ML), brown
■	MTR-06 at 10 feet	SAND/ SILTY SAND (SP-SM), brown
▲	Aspen2 2A-A at 0.5 feet	SILTY CLAY with SAND (CL)
○	Aspen2 2A-B at 0.5 feet	CLAYEY SILT with SAND (ML)

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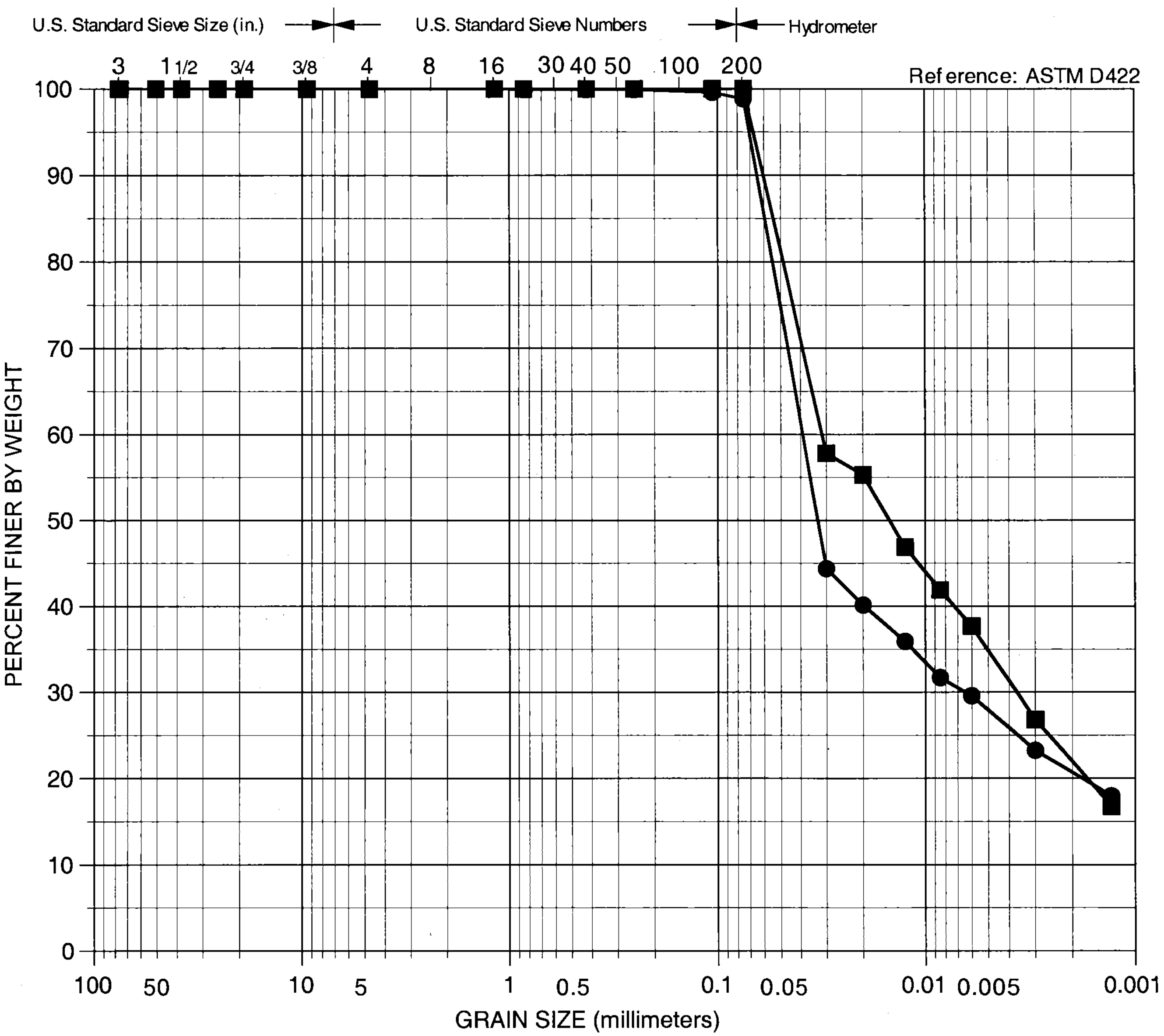
PARTICLE SIZE ANALYSIS

Date 11/04/10 | Project No. 730438107 | Figure C-4



	% Gravel		%Sand			% Fines	
Sample	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
Aspen3 3G1-B	0.0	0.0	0.0	0.1	1.1	69.3	29.6
Aspen 4B-A	0.0	0.0	0.0	0.3	1.62	44.5	53.6

Symbol	Sample Source	Classification
●	Aspen3 3G1-B	CLAYEY SILT with SAND (ML)
■	Aspen 4B-A	SILTY CLAY with SAND (CL)

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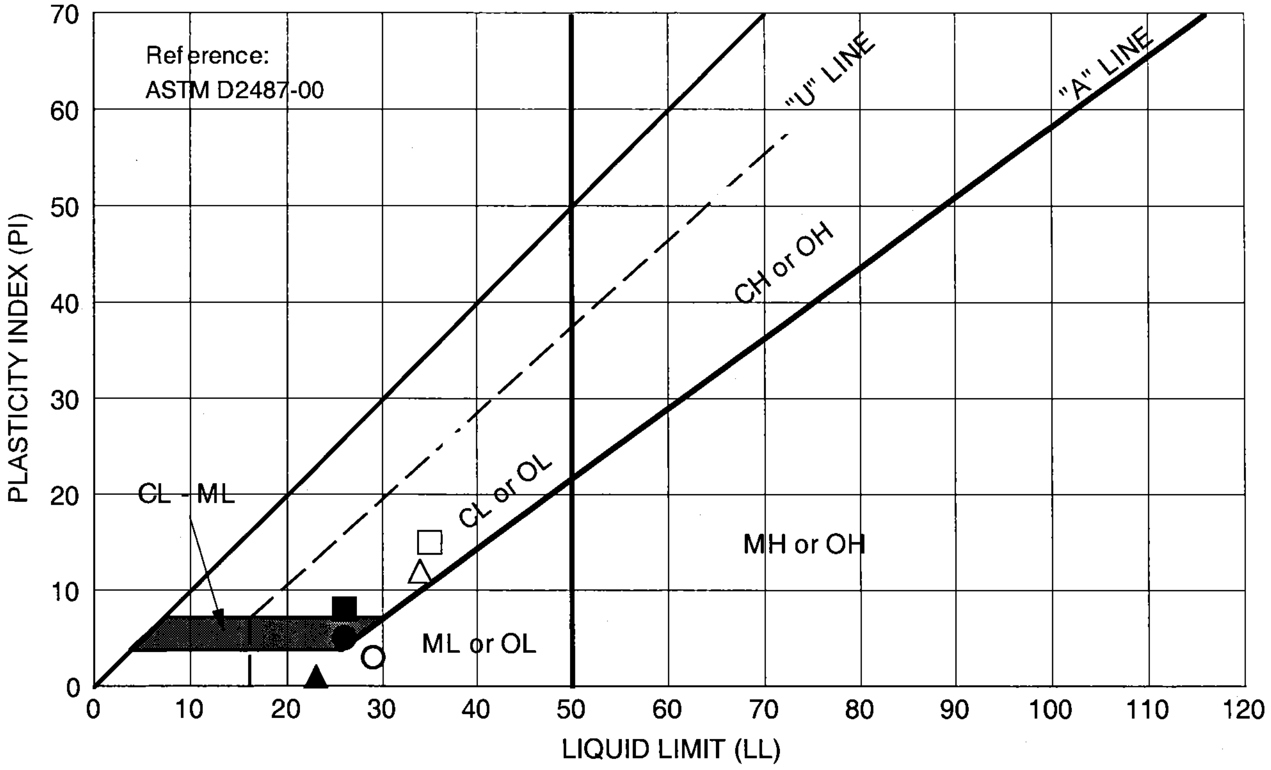
PARTICLE SIZE ANALYSIS

Date 11/04/10	Project No. 730438107	Figure C-5



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	TR-01 at 5 feet	SILT with CLAY (ML), yellow-brown	--	26	5	--
▲	TR-02 at 5 feet	CLAYEY SILT (ML), red-brown	--	23	1	--
■	TR-07 at 5 feet	SANDY SILT (ML), yellow-brown	14.2	26	8	53.1
○	TR-09 at 15 feet	SANDY SILT (ML), yellow-brown to red-brown	--	29	3	--
△	TR-10 at 10 feet	SANDY SILT/ SILTY CLAY (ML/CL), red-brown	--	34	12	--
□	TR-10 at 15 feet	SANDY SILT/ SILTY CLAY (ML/CL), red-brown	--	35	15	--

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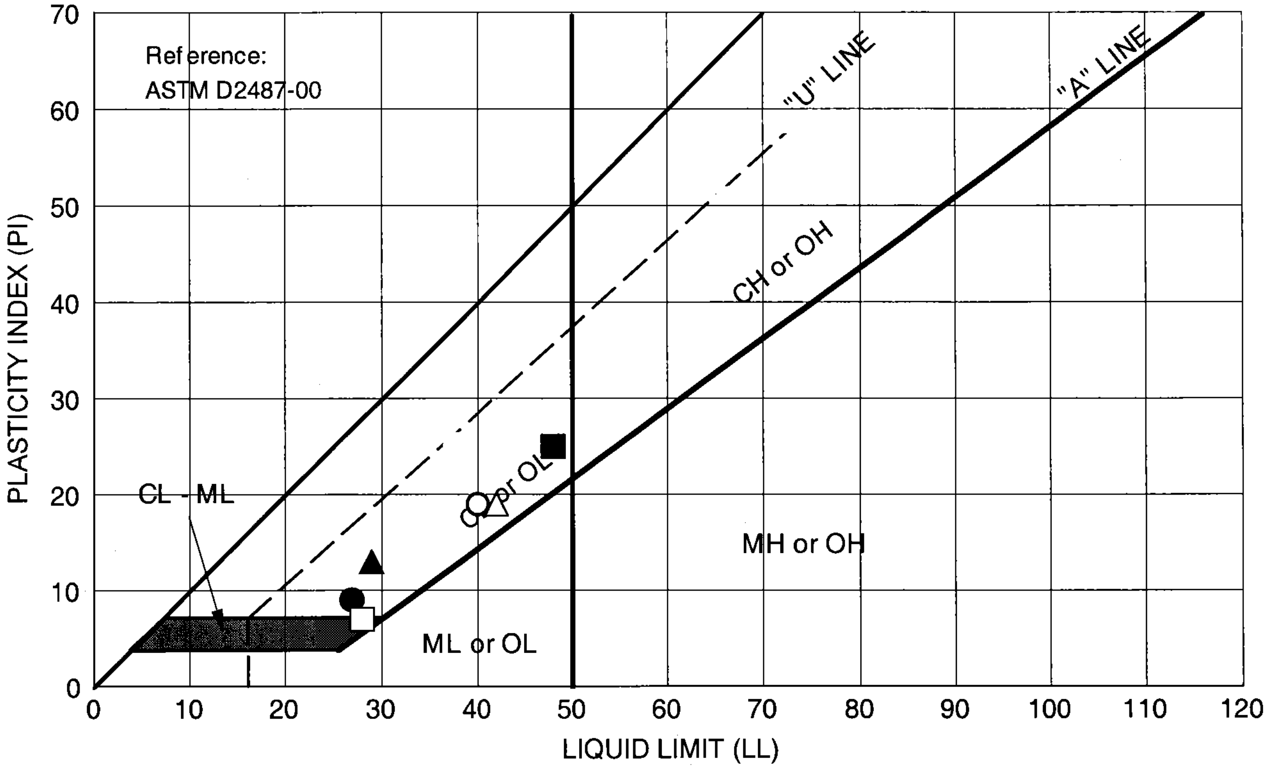
PLASTICITY CHART

Date 11/04/10 | Project No. 730438107 | Figure C-6



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	TR-11 at 5 feet	CLAYEY SILT with SAND (ML), yellow-brown	18.8	27	9	--
▲	TR-13 at 2.5 feet	SANDY SILT/ SILTY CLAY(ML/CL), red-brown	9.6	29	13	--
■	1-Aa at 4 feet	SILTY CLAY (CL), brown	50.5	48	25	--
○	1-Ba at 2 feet	SILTY SAND/ SANDY SILT (SM/ML), brown	26.7	40	19	--
△	1-L at 4 feet	CLAYEY SILT (ML), brown	36	42	19	--
□	3TR-01 at 10 feet	SANDY CLAY (CL), red-brown	--	28	7	--

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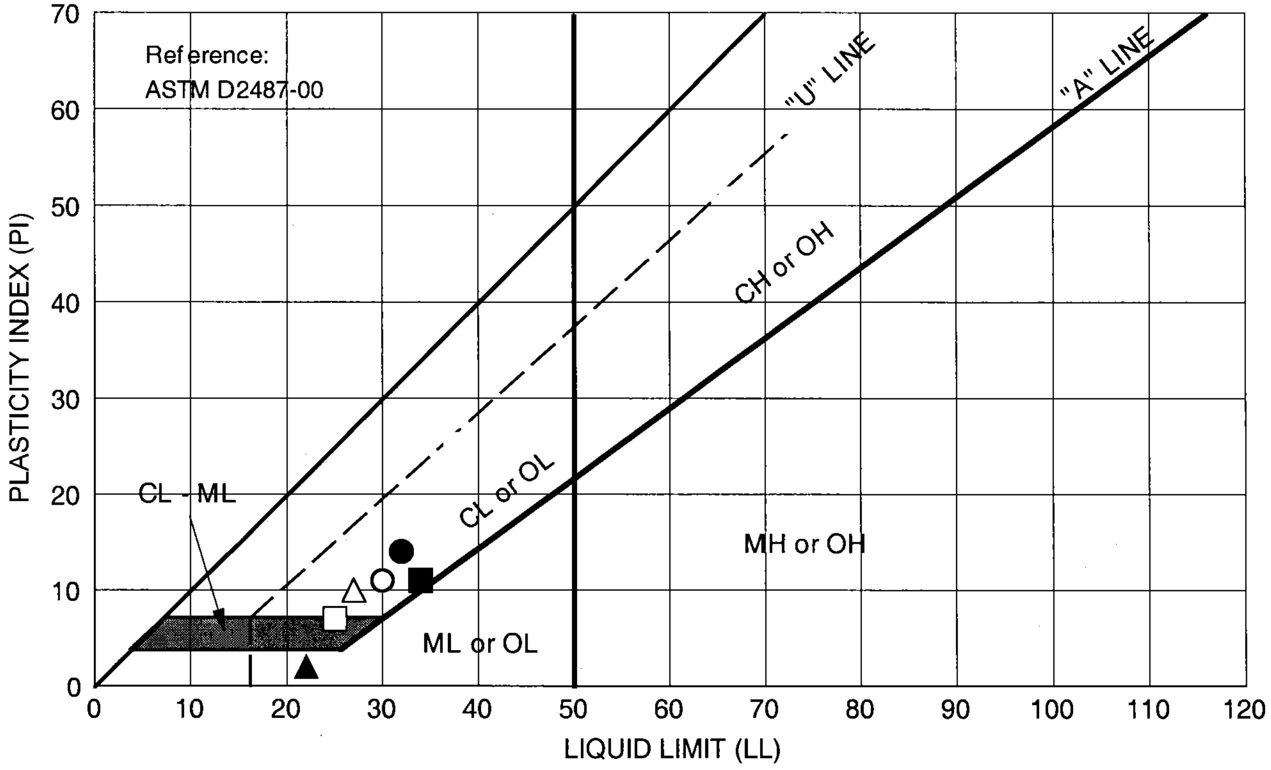
PLASTICITY CHART

Date 11/04/10 | Project No. 730438107 | Figure C-7



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	3TR-02 at 10 feet	SANDY CLAY (CL), red-brown	--	32	14	--
▲	3TR-03 at 10 feet	SILTY SAND (SM), red-brown	--	22	2	--
■	3TR-03 at 20 feet	SILTY CLAY (CL), brown, mottled red-brown	--	34	11	--
○	3TR-04 at 5 feet	SANDY SILTY (ML), yellow-brown to brown	--	30	11	--
△	3TR-04 at 10 feet	SANDY CLAY (CL), brown	--	27	10	--
□	3TR-05 at 10 feet	CLAYEY SILT with SAND (ML), brown	--	25	7	--

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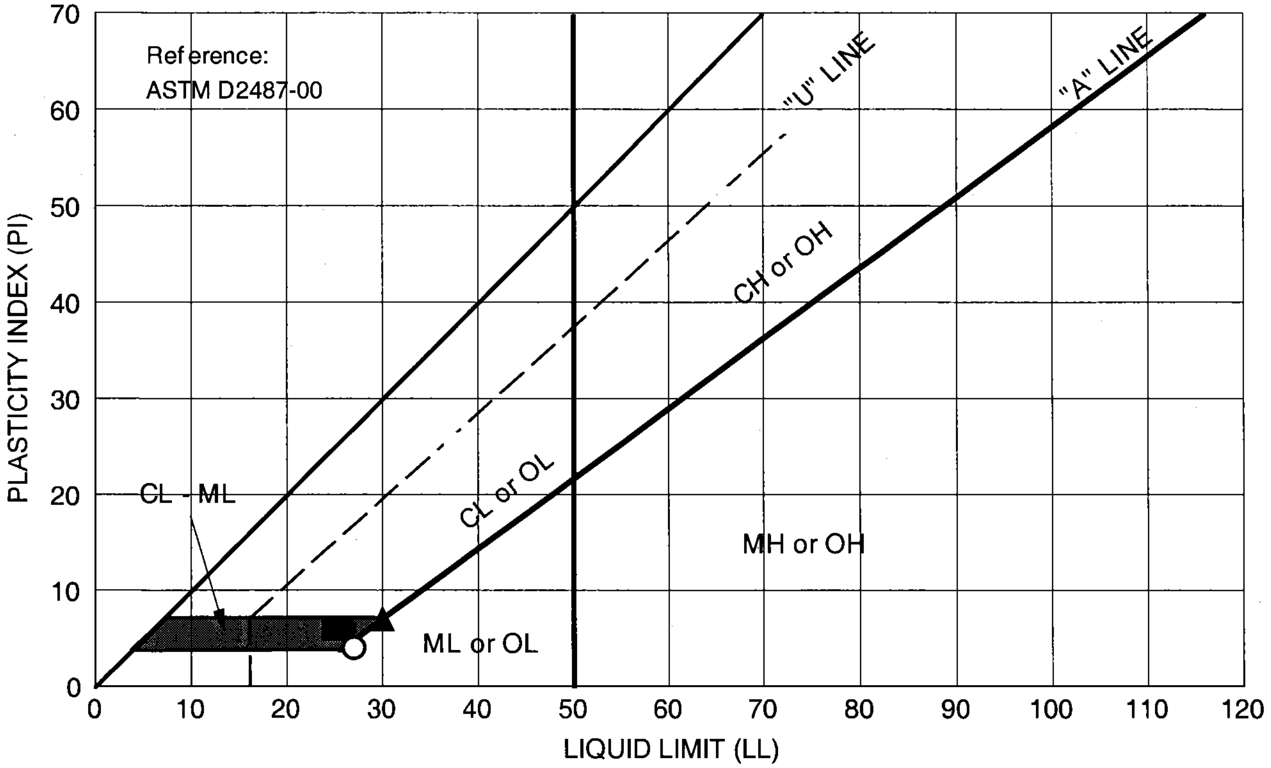
PLASTICITY CHART

Date 11/04/10 | Project No. 730438107 | Figure C-8



Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	3TR-06 at 10 feet	CLAYEY SILT (ML), dark brown, mottled dark gray	--	26	6	--
▲	MTR-02 at 31 feet	SILTY SAND with GRAVEL (SM), red-brown to brown	--	30	7	--
■	MTR-03 at 15 feet	CLAYEY SAND (SC), red-brown	12.0	25	6	18.1
○	MRT-03 at 30 feet	SANDY SILT (ML), light brown	13.5	27	4	62.3

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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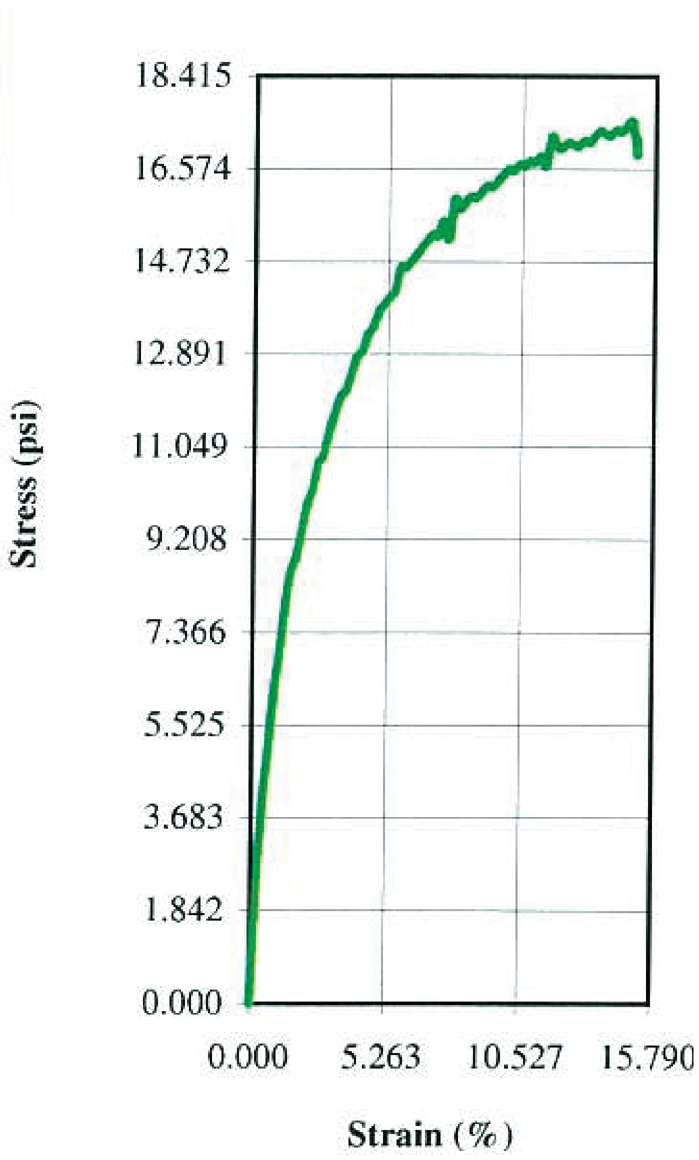
PLASTICITY CHART

Date 11/04/10 | Project No. 730438107 | Figure C-9



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	1,267 psf
DIAMETER (in) 2.41	HEIGHT (in) 4.81	STRAIN AT FAILURE	14.8 %
MOISTURE CONTENT	21.6 %	CONFINING PRESSURE	1,094 psf
DRY DENSITY	105 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SILTY CLAY (CL), red-brown			SOURCE TR-1 at 10 feet

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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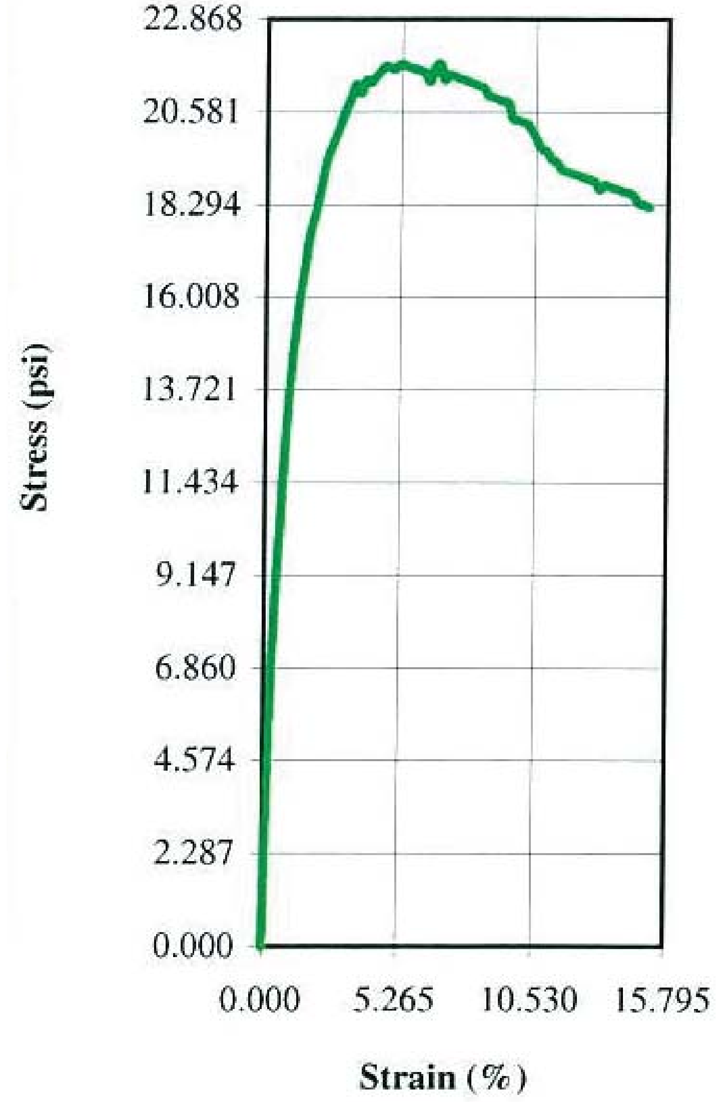
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-10



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	1,570 psf
DIAMETER (in) 2.37	HEIGHT (in) 5.30	STRAIN AT FAILURE	5.2 %
MOISTURE CONTENT	14.8 %	CONFINING PRESSURE	1,094 psf
DRY DENSITY	95 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SILT with SAND (ML), red-brown			SOURCE TR-2 at 11 feet

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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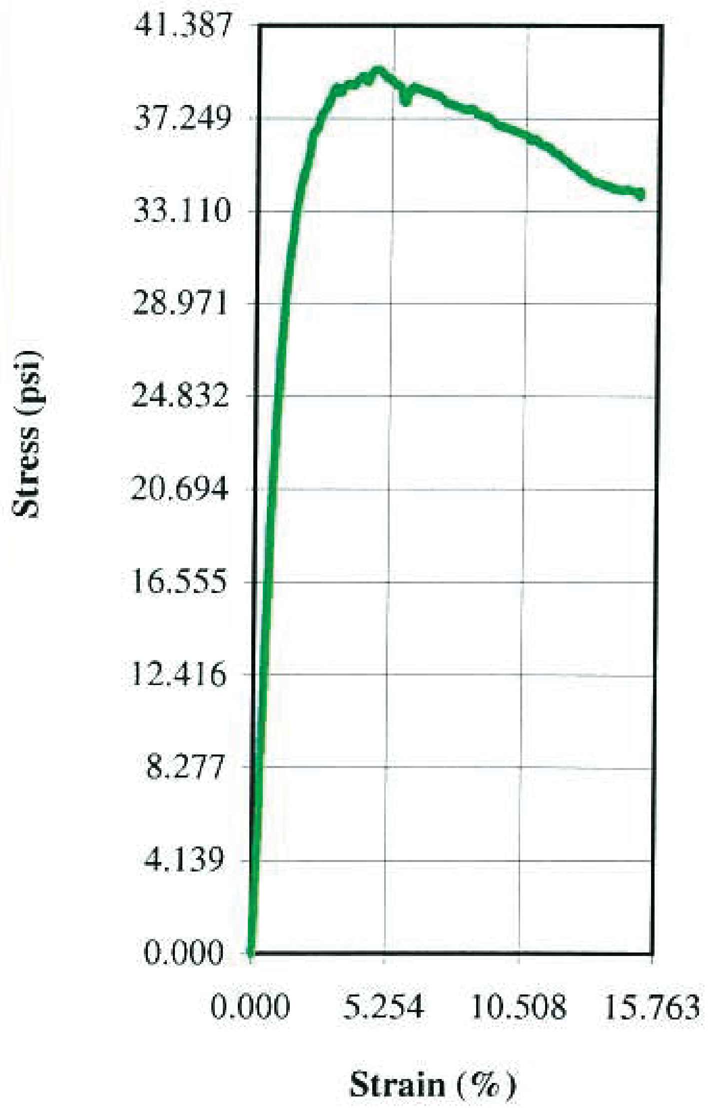
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-11



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	2,937 psf
DIAMETER (in) 2.40	HEIGHT (in) 5.70	STRAIN AT FAILURE	4.7 %
MOISTURE CONTENT	15.8 %	CONFINING PRESSURE	1,900 psf
DRY DENSITY	98 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SILT with SAND (ML), red-brown		SOURCE TR-2 at 18 feet	

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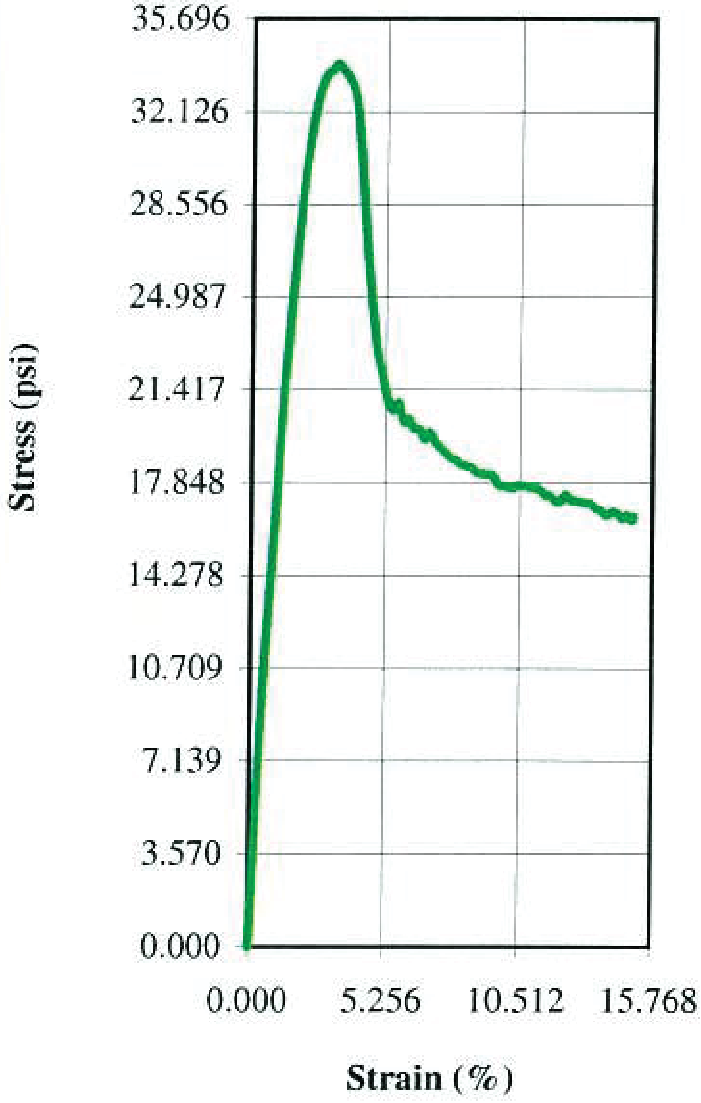
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-12



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	2,448 psf
DIAMETER (in) 2.40	HEIGHT (in) 4.97	STRAIN AT FAILURE	3.3 %
MOISTURE CONTENT	17.0 %	CONFINING PRESSURE	2,102 psf
DRY DENSITY	99 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SANDY SILT (ML), mottled yellow-brown and red-brown		SOURCE TR-9 at 20 feet	

ASPEN 1 - NEW BRIGHTON PROJECT
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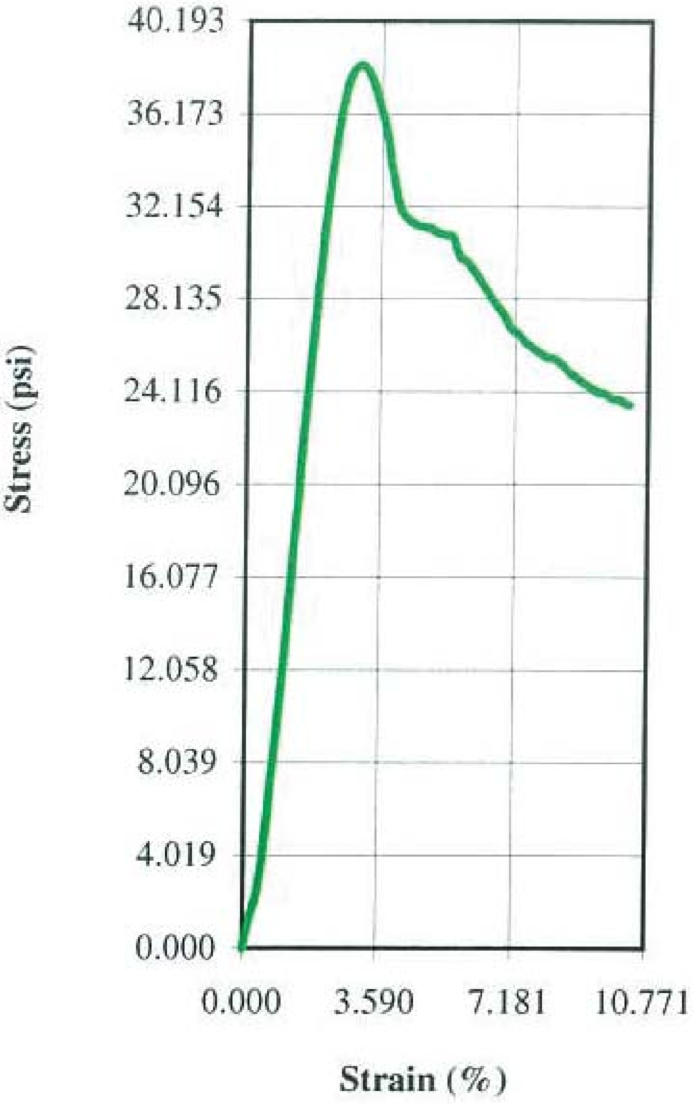
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-13



SAMPLER TYPE Sprague & Henwood

DIAMETER (in) 2.43 | HEIGHT (in) 5.20

MOISTURE CONTENT 18.8 %

DRY DENSITY 96 pcf

SHEAR STRENGTH 2,750 psf

STRAIN AT FAILURE 2.9 %

CONFINING PRESSURE 504 psf

STRAIN RATE 0.04 in/min

DESCRIPTION CLAYEY SILT with SAND (ML), yellow brown

SOURCE TR-11 at 5 feet

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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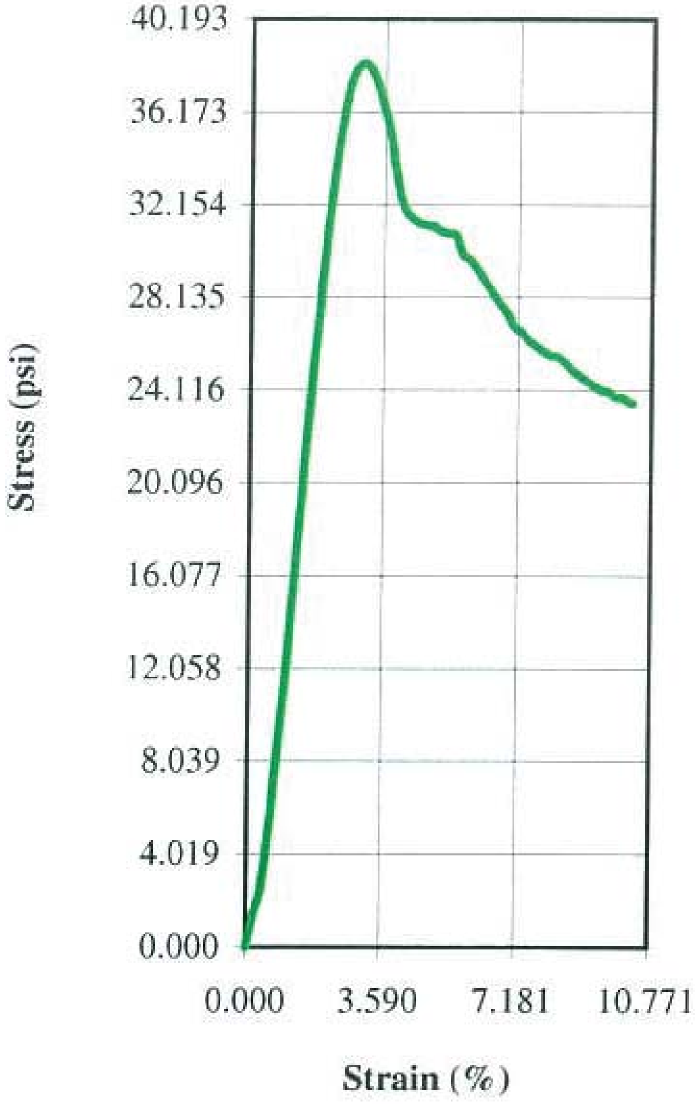
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-14



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH 2,830 psf
DIAMETER (in) 2.40	HEIGHT (in) 5.65	STRAIN AT FAILURE 7.4 %
MOISTURE CONTENT 21.3 %		CONFINING PRESSURE 1,598 psf
DRY DENSITY 104 pcf		STRAIN RATE 0.04 in/min
DESCRIPTION SILTY CLAY (CL), red-brown		SOURCE TR-11 at 15 feet

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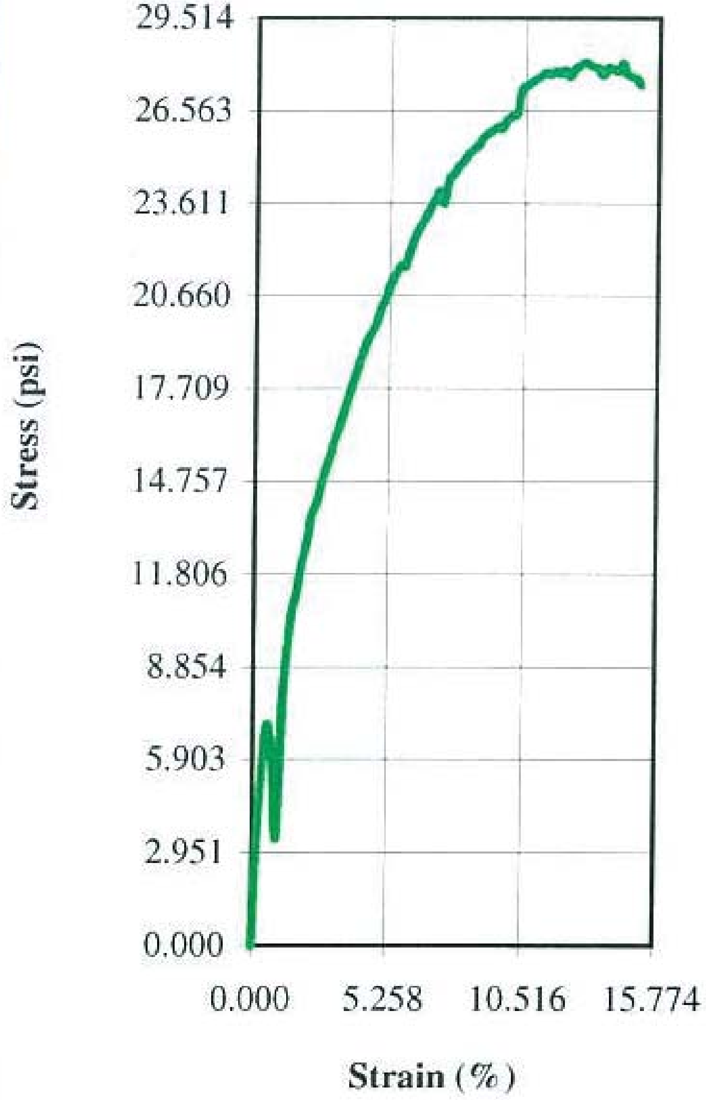
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-15



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	2,023 psf
DIAMETER (in) 2.40	HEIGHT (in) 5.41	STRAIN AT FAILURE	12.8 %
MOISTURE CONTENT	17.6 %	CONFINING PRESSURE	1,000 psf
DRY DENSITY	109 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION CLAY with SAND (CL), red-brown to brown		SOURCE MTR-02 at 10 feet	

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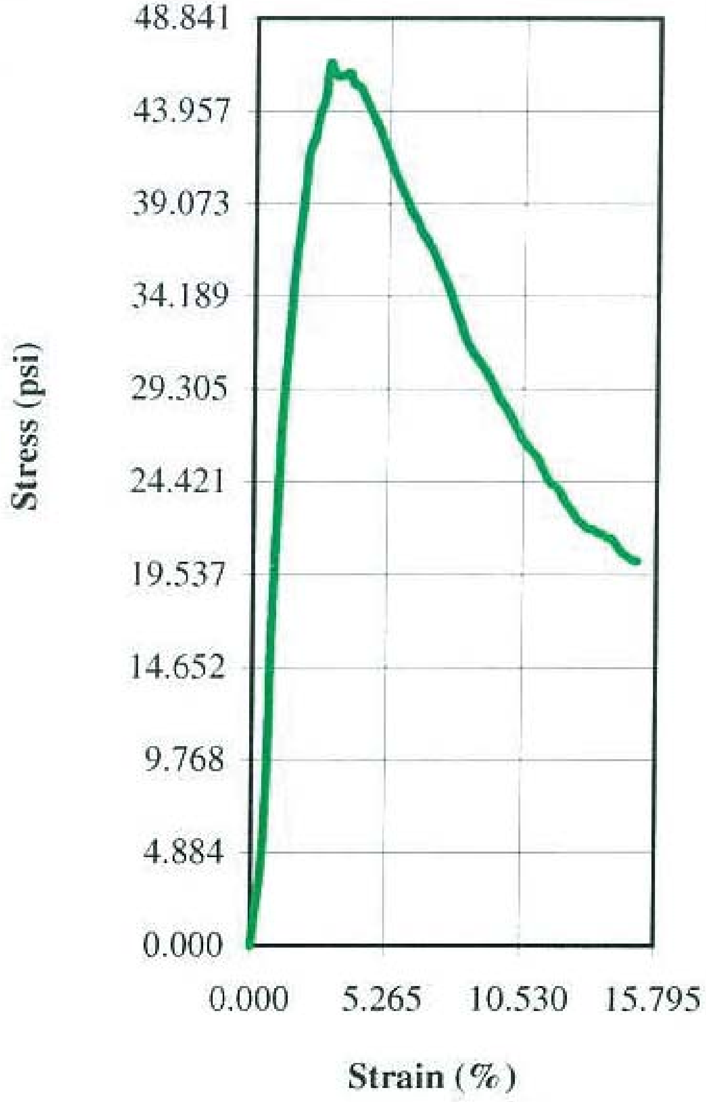
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-16



SAMPLER TYPE Sprague & Henwood		SHEAR STRENGTH	3,350 psf
DIAMETER (in) 2.40	HEIGHT (in) 5.30	STRAIN AT FAILURE	2.8 %
MOISTURE CONTENT	28.4 %	CONFINING PRESSURE	4,500 psf
DRY DENSITY	90 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SILTY CLAY (CL), red-brown			SOURCE MTR-03 at 45 feet

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Sacramento, California

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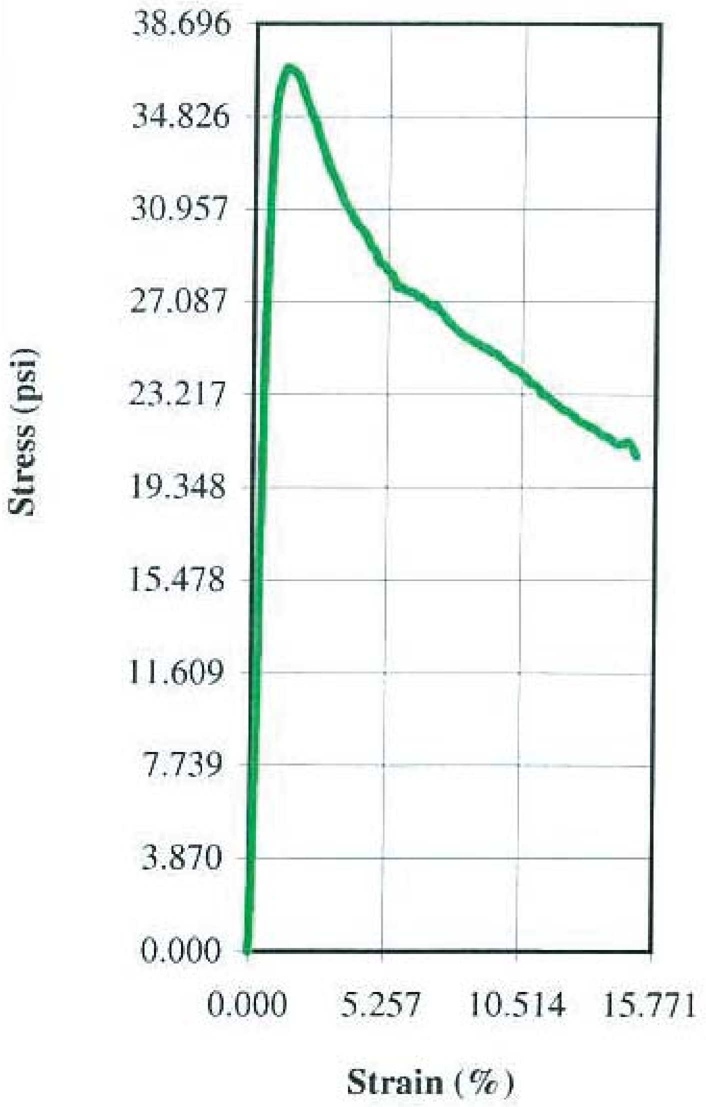
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-17



SAMPLER TYPE Shelby Tube		SHEAR STRENGTH	2,650 psf
DIAMETER (in) 2.90	HEIGHT (in) 6.03	STRAIN AT FAILURE	1.2 %
MOISTURE CONTENT	37.4 %	CONFINING PRESSURE	1,300 psf
DRY DENSITY	75 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION CLAYEY SILT (ML), brown			SOURCE MTR-05 at 20 feet

ASPEN 1 - NEW BRIGHTON PROJECT
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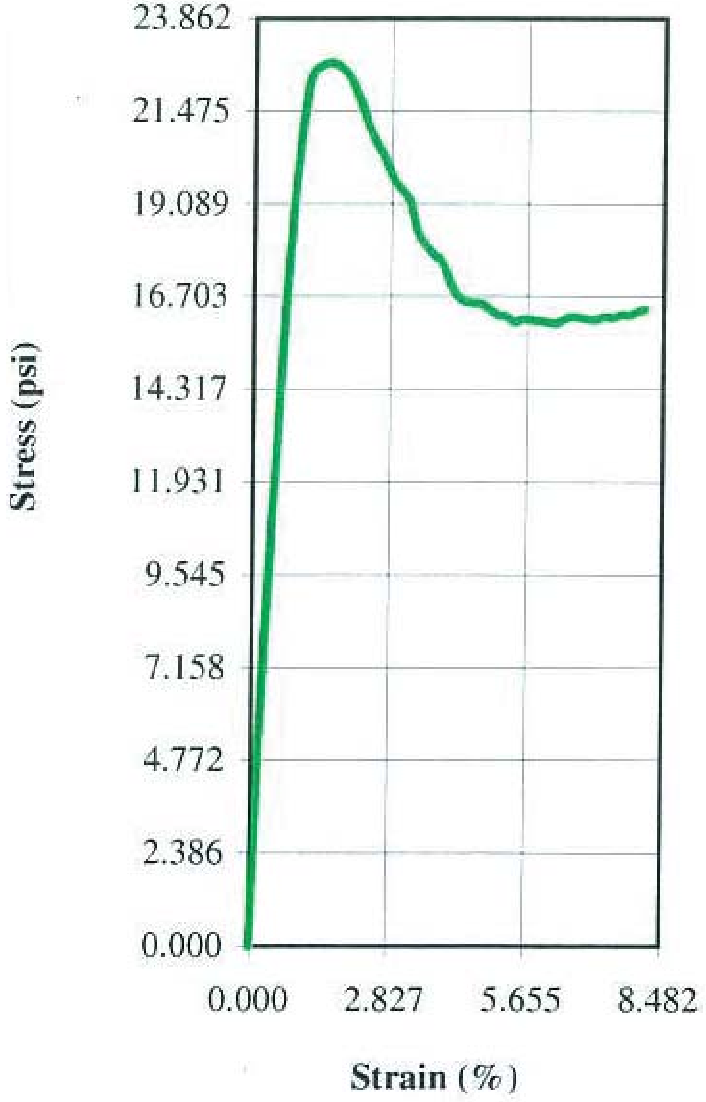
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-18



SAMPLER TYPE Shelby Tube		SHEAR STRENGTH	1,630 psf
DIAMETER (in) 2.90	HEIGHT (in) 6.05	STRAIN AT FAILURE	1.5 %
MOISTURE CONTENT	17.0 %	CONFINING PRESSURE	300 psf
DRY DENSITY	83 pcf	STRAIN RATE	0.04 in/min
DESCRIPTION SANDY SILT (ML), brown			SOURCE MTR-06 at 5 feet

ASPEN 1 - NEW BRIGHTON PROJECT
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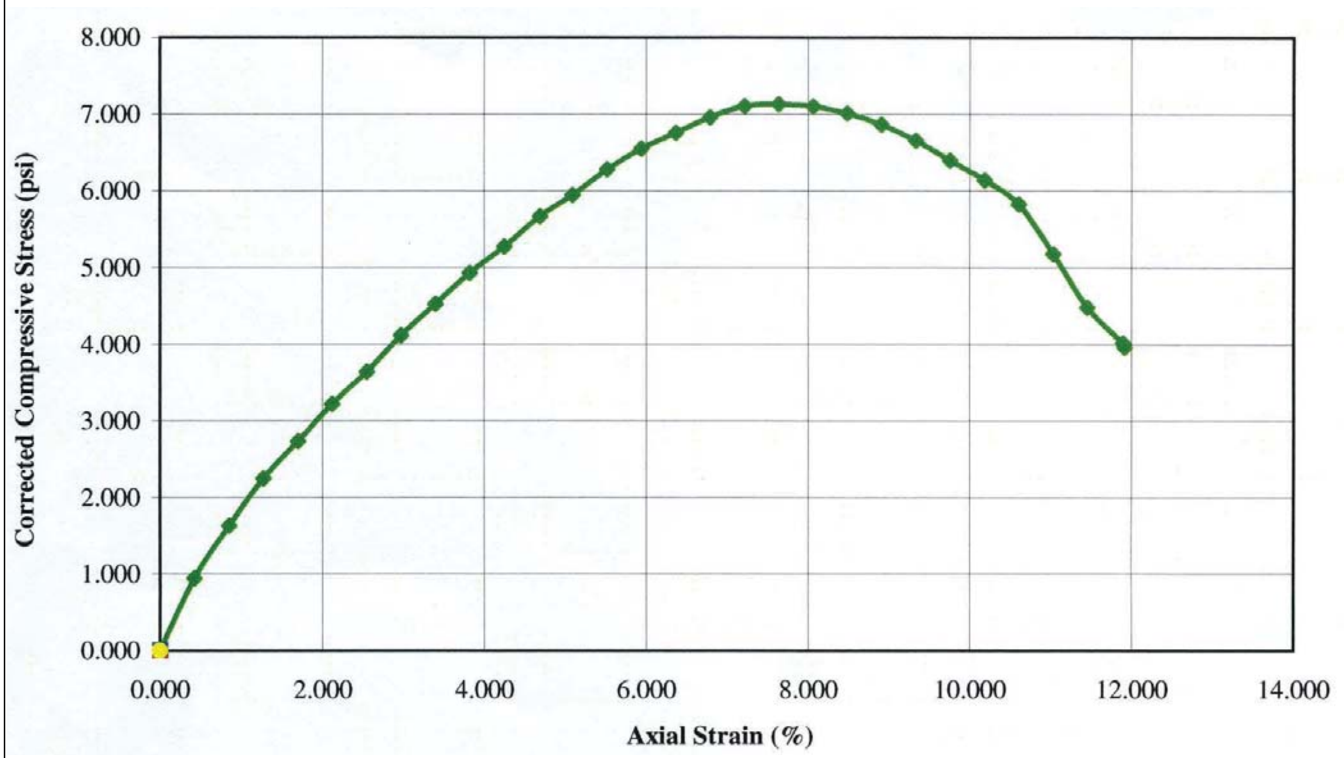
UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-19



SAMPLER TYPE	Sprague & Henwood	SHEAR STRENGTH	514 psf
DIAMETER (in) 2.40	HEIGHT (in) 4.07	STRAIN AT FAILURE	7.6 %
MOISTURE CONTENT	32.0 %	CONFINING PRESSURE	-- psf
DRY DENSITY	53 pcf	STRAIN RATE	0.05 in/min.
DESCRIPTION	SANDY SILT (ML), yellow-brown to brown	SOURCE	1-Ab at 2 feet

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Sacramento, California

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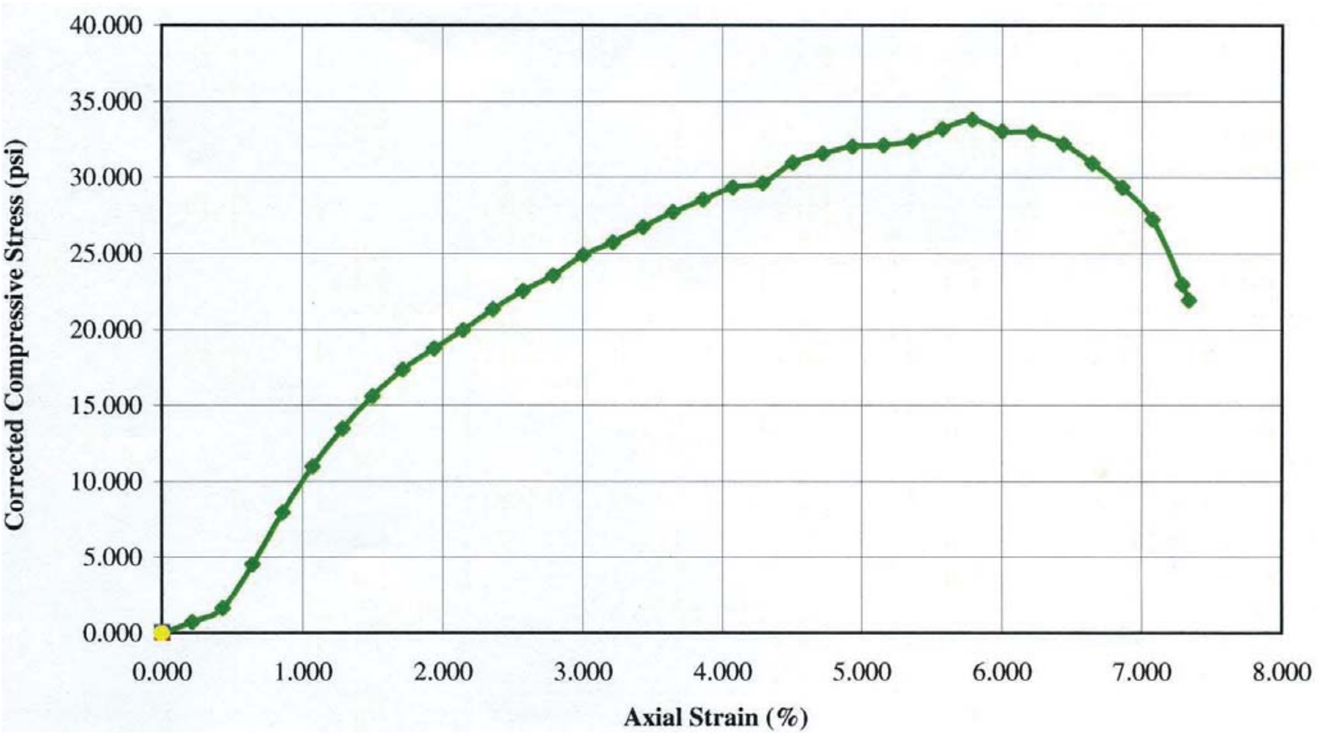
UNCONFINED COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-20



SAMPLER TYPE	Sprague & Henwood	SHEAR STRENGTH	2,434 psf
DIAMETER (in) 2.40	HEIGHT (in) 4.75	STRAIN AT FAILURE	5.8 %
MOISTURE CONTENT	26.7 %	CONFINING PRESSURE	-- psf
DRY DENSITY	95 pcf	STRAIN RATE	0.05 in/min.
DESCRIPTION	SILTY SAND/ SANDY SILT (SM/ML), brown	SOURCE	1-Ba at 2 feet

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

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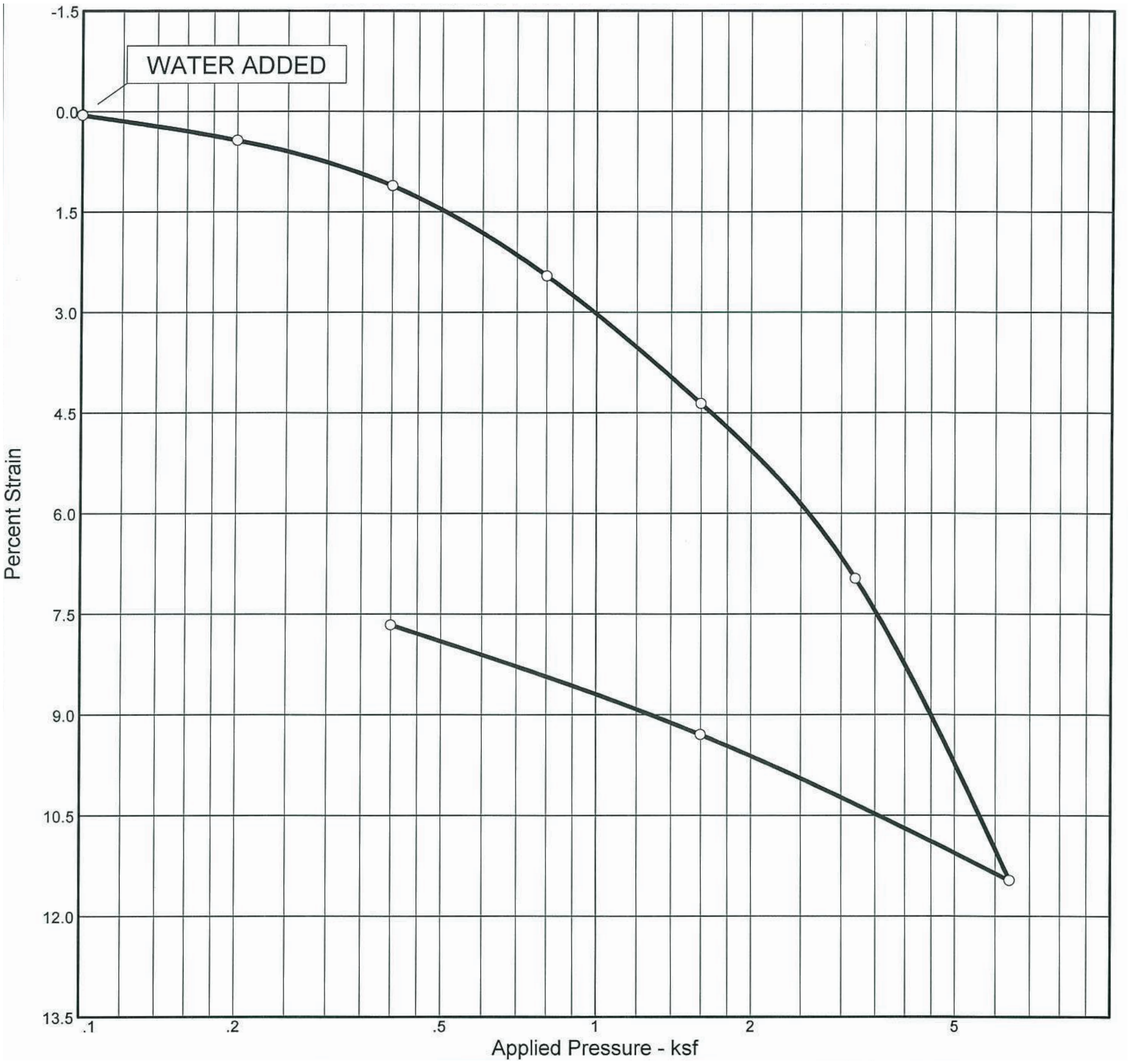
UNCONFINED COMPRESSION TEST

Date 11/04/10 | Project No. 730438107 | Figure C-21



Sampler Type	Sprague & Henwood	Condition		Before test		After test
Diameter (in) 2.40	Height (in) 1.00	Water Content	w_o	50.5 %	w_f	44.3 %
Overburden Pressure, P_o	427 psf	Void Ratio	e_o	1.38	e_f	1.193
Preconsol. Pressure, P_c	3,190 psf	Saturation	S_o	99.1 %	S_f	100 %
Compression Ratio, C_{ec}	0.15	Dry Density	g_d	71 pcf	g_d	77 pcf

LL 48	PL 73	PI 25	G_s 2.70 (assumed)

Classification SILTY CLAY (CL), brown	Source 1-Aa at 4 feet

ASPEN 1 - NEW BRIGHTON PROJECT
Sacramento, California

CONSOLIDATION TEST REPORT

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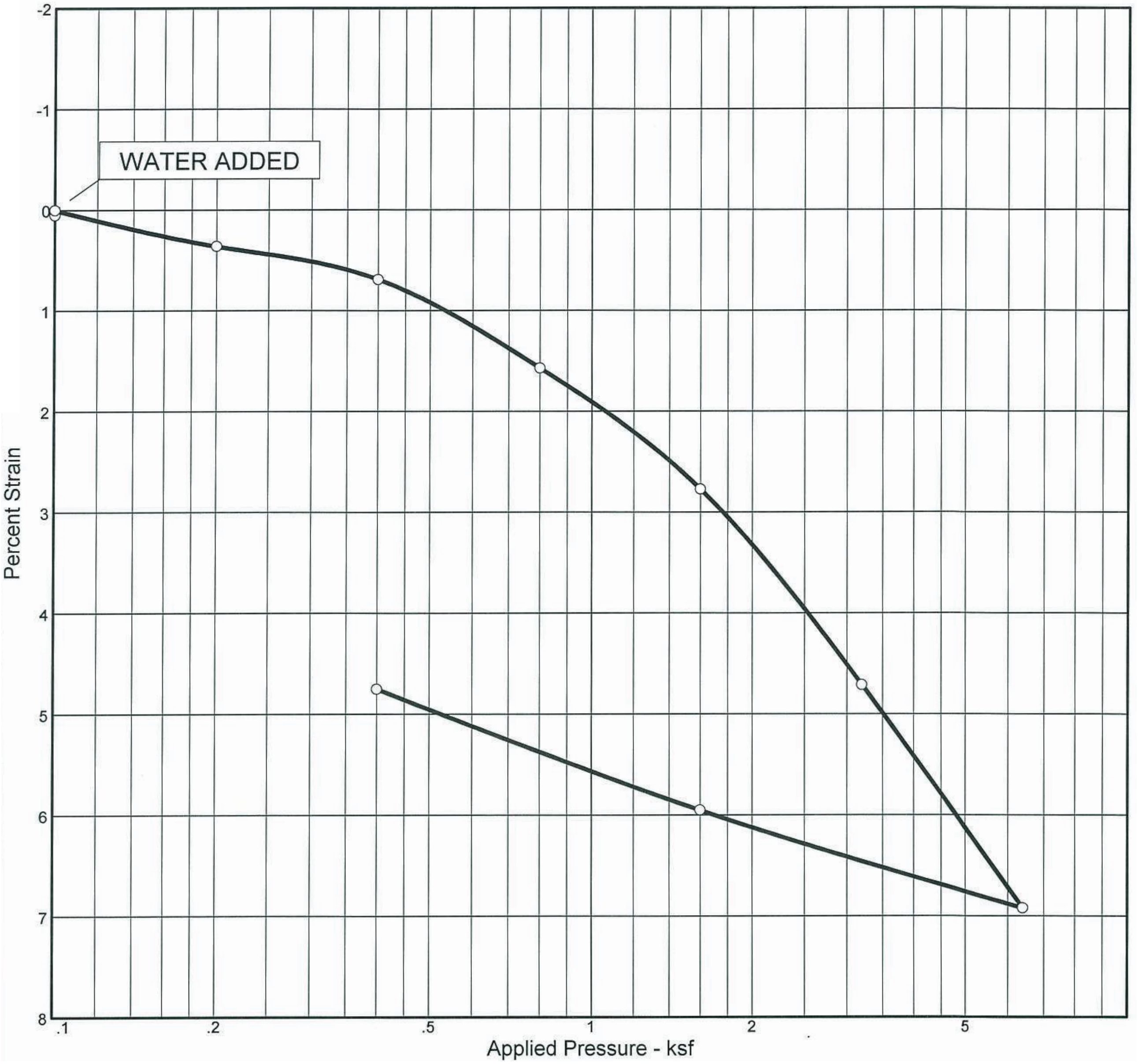
Date 11/04/10	Project No. 730438107	Figure C-22



Sampler Type Sprague & Henwood		Condition		Before test		After test
Diameter (in) 2.40	Height (in) 1.00	Water Content	w_o	36.0 %	w_f	33.9 %
Overburden Pressure, P_o	404 psf	Void Ratio	e_o	0.98	e_f	0.88
Preconsol. Pressure, P_c	1,400 psf	Saturation	S_o	99.6 %	S_f	100 %
Compression Ratio, C_{ec}	0.08	Dry Density	g_d	85 pcf	g_d	89 pcf

LL 42	PL 61	PI 19	G_s 2.70 (assumed)
Classification CLAYEY SILT (ML), brown		Source 1-L at 3.5 feet	

ASPEN 1 - NEW BRIGHTON PROJECT
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CONSOLIDATION TEST REPORT

Date 11/04/10 | Project No. 730438107 | Figure C-23

Table C-1
Saturated Hydraulic Conductivity Test Results
ASPEN 1 - New Brighton Project
Sacramento, California

Material Source	Soil Description (USCS)	USDA Soil Texture	Test Type (Lab or Field)	Saturated Hydraulic Conductivity (in/hour)	Cation Exchange Capacity (meq/100g)	Field Capacity (%)	Wilting Point (%)	In-situ Moisture Content (%)	Saturated Moisture Content (%)	Porosity (%)	Dry Unit Weight (pcf)
ASPEN 1 Fill											
Parkway Test Pits (TP-1, and TP-3) Horizontal Composite	Silty CLAY/Clayey SILT (CL/ML), brown, stiff - very stiff	Clay LOAM/Silty clay LOAM	Lab	0.0019	26.2	33.1	17.3	17.5	27.0	41.9	96.8
Parkway Test Pits (TP-3, and TP-6) Vertical Composite	Sandy SILT with Clay and Gravel (ML), brown, stiff - very stiff	Silt LOAM/Silty Clay LOAM	Lab	0.0849	16.5	17.7	9.3	14.4	22.4	37.5	104.2
Parkway Test Pits (TP-4, and TP-5) Vertical Composite	Sandy SILT with Clay and Gravel (ML), brown, stiff - very stiff	Silt LOAM/Silty Clay LOAM	Lab	0.0940	14.0	17.9	9.3	9.9	17.2	31.5	114.2
Parkway Test Pits (TP-3) Vertical Composite	Sandy SILT with Clay and Gravel (ML), brown, stiff - very stiff	Silt LOAM/Silty Clay LOAM	Lab	0.3359	11.5	16.5	8.6	14.5	21.3	36.3	106.2
ASPEN 3 - 3TR-3 @ 5 ft bgs (El. 36 ft)	Silty SAND (SM), brown, very dense	Sandy LOAM	-	ND	13.2	23.2	12.2	ND	ND	ND	ND
ASPEN 2 - Pond 2A	Sandy SILT with Clay (ML), brown, stiff - very stiff	Clay LOAM	Lab	0.1000	22.9	48.4	37.7	32.1	40.7	52.3	80.3
ASPEN 2 - Pond 2A	Sandy SILT with Clay (ML), brown, stiff - very stiff	LOAM	Lab	0.6800	9.4	28.8	18.2	12.9	32.8	47.0	89.3
ASPEN 2 - Pond 2A	Sandy SILT with Clay (ML), brown, stiff - very stiff	Clay LOAM	Lab	0.1500	20.8	55.5	44.8	39.7	56.1	60.2	67.0
ASPEN 3 - Pond 3G1	Sandy SILT with Clay (ML), brown, stiff - very stiff	LOAM	Lab	0.0800	25.4	63.4	52.6	13.4	35.4	48.9	86.1
ASPEN 3 - Pond 3G1	Sandy SILT with Clay (ML), brown, stiff - very stiff	LOAM	Lab	0.0600	26.7	52.9	42.2	14.8	30.6	45.3	92.2
ASPEN 3 - Pond 3G1	Sandy SILT with Clay (ML), brown, stiff - very stiff	LOAM	Lab	0.0700	27.2	65.0	54.3	13.5	37.2	50.2	84.0
ASPEN 4 - Pond 4B	Sandy SILT with Clay (ML), brown, stiff - very stiff	Silt LOAM	Lab	0.0100	28.5	42.1	31.5	32.1	44.3	54.5	76.7
ASPEN 4 - Pond 4B	Sandy SILT with Clay (ML), brown, stiff - very stiff	Silt LOAM	Lab	0.0300	26.2	43.9	33.2	50.4	80.9	68.6	52.9
ASPEN 4 - Pond 4B	Sandy SILT with Clay (ML), brown, stiff - very stiff	Silt LOAM	Lab	0.0100	28.0	41.9	31.3	23.2	33.6	47.6	88.3
Retention Channel & Basin											
ASPEN 2- 2TR-1 @ 25 ft bgs (EL. 0.0 ft)	Clayey SILT (ML), brown, very stiff	Silty Clay LOAM	Lab	0.2040	ND	ND	ND	22.9	31.3	45.8	91.3
ASPEN 3 - 3TR-3 @ 25 ft bgs (El. 7.0 ft)	Sandy SILT (ML), brwon mottled olive-brown, hard	Silt LOAM/Silty Clay LOAM	Lab	0.0218	ND	ND	ND	31.2	33.2	47.3	88.8
ASPEN 3 - 3TR-3 @ 19.8 ft bgs (El. 12.2 ft)	Silty CLAY(CL), brown, hard	Silty CLAY/Silty Clay LOAM	Field	0.2400	ND	ND	ND	ND	ND	ND	ND
ASPEN 3 - 3TR-6 @ 25 ft bgs (El. 16.0 ft)	Sandy SILT (ML), brwon, hard	Silt LOAM/Silty Clay LOAM	Lab	0.1587	ND	ND	ND	26.6	32.5	46.8	89.7
ASPEN 3 - 3TR-6 @ 25.5 ft bgs (El. 16.5 ft)	Sandy SILT (ML), brwon, hard	Silt LOAM/Silty Clay LOAM	Field	0.1800	13.2	23.2	12.2	ND	ND	ND	ND
Mayhew Property - MTR-04 @ 20 ft bgs (El. 10.5 ft)	SILT (ML), yellow-brown, stiff	Silt LOAM/Silty Clay LOAM	Lab	0.4989	18.0	32.9	17.2	39.4	50.7	57.5	70.8
Mayhew Property - MTR-04 @ 31 ft bgs (El. 0.5 ft)	Silty SAND (SM), brown, medium dense	Sandy LOAM	-	ND	10.9	24.4	13.8	ND	ND	ND	ND
Mayhew Property - MTR-05 @ 20 ft bgs (El. 10.5 ft)	Clayey SILT (ML), brown, very stiff	Silt LOAM/Silty Clay LOAM	Lab	0.0520	ND	ND	ND	36.1	41.6	52.6	78.9
Mayhew Property - MTR-05 @ 20 ft bgs (El. 10.5 ft)	Clayey SILT (ML), brown, very stiff	Silt LOAM/Silty Clay LOAM	Field	0.5300	ND	ND	ND	ND	ND	ND	ND
Mayhew Property - MTR-05 @ 30.2 ft bgs (El. 0.3 ft)	SAND (SP), Yellow-brown, Dense	Sandy LOAM/Loamy SAND	Field	0.4800	ND	ND	ND	ND	ND	ND	ND
Mayhew Property - MTR-05 @ 30 ft bgs (El. 0.5 ft)	SAND (SP), Yellow-brown, Dense	Sandy LOAM/Loamy SAND	-	ND	18.4	30.0	19.4	ND	ND	ND	ND
Mayhew Property - MTR-06 @ 5 ft bgs (El. 11.0 ft)	Sandy SILT (ML), brown	Clay LOAM/LOAM	Lab	0.0003	ND	ND	ND	17.0	37.4	50.0	83.31
Mayhew Property - MTR-06 @ 5 ft bgs (El. 11.0 ft)	Sandy SILT (ML), brown	Clay LOAM/LOAM	Field	0.3000	ND	ND	ND	ND	ND	ND	ND

Notes:

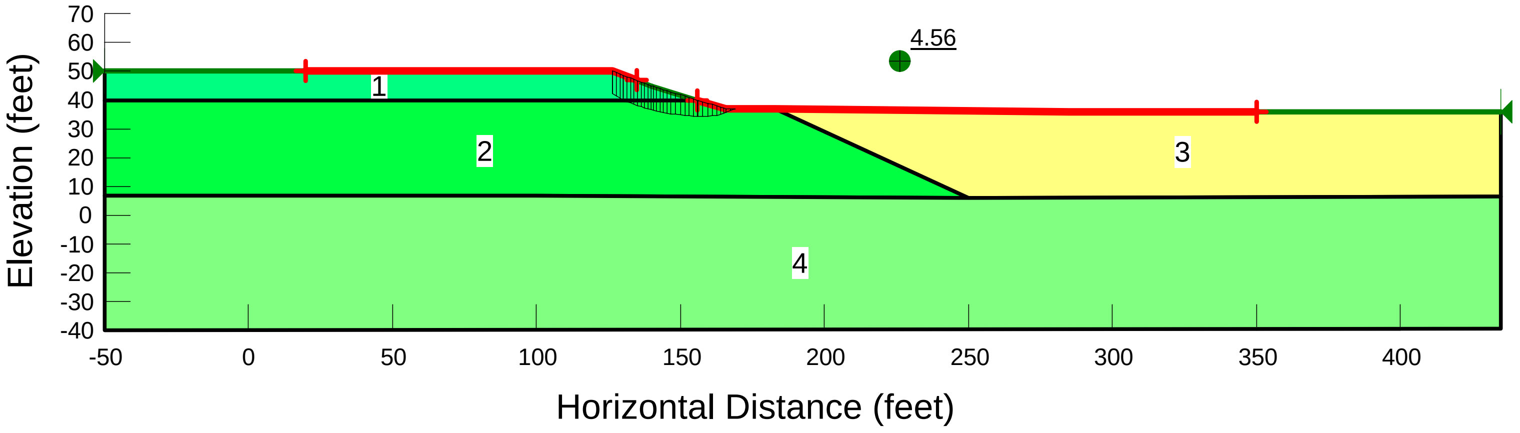
1.) Elevation Datum referenced to ASPEN property topographic surveys povided by Teichert Construction
2.) ND = Not Determined
3.) USCS = Unified Soil Classification System
4.) USDA = United States Department of Agriculture

APPENDIX D
Slope Stability Analyses

Static Slope Stability Analysis

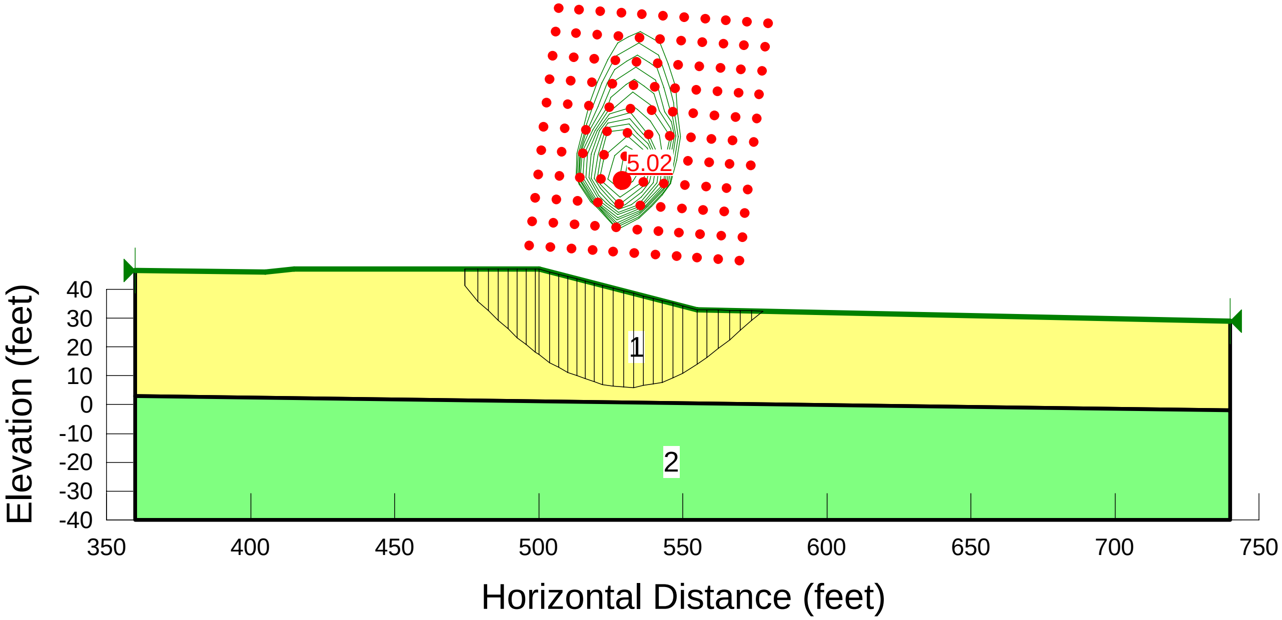
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section A-A'
File Name: Aspen 1 A-A' Static.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 4.56

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILT/CLAY	110	1500	0
2	SAND/GRAVEL	125	0	45
3	FILL: CLAY/SILT	120	1500	0
4	CLAYEY SILT/SILT	125	3500	0



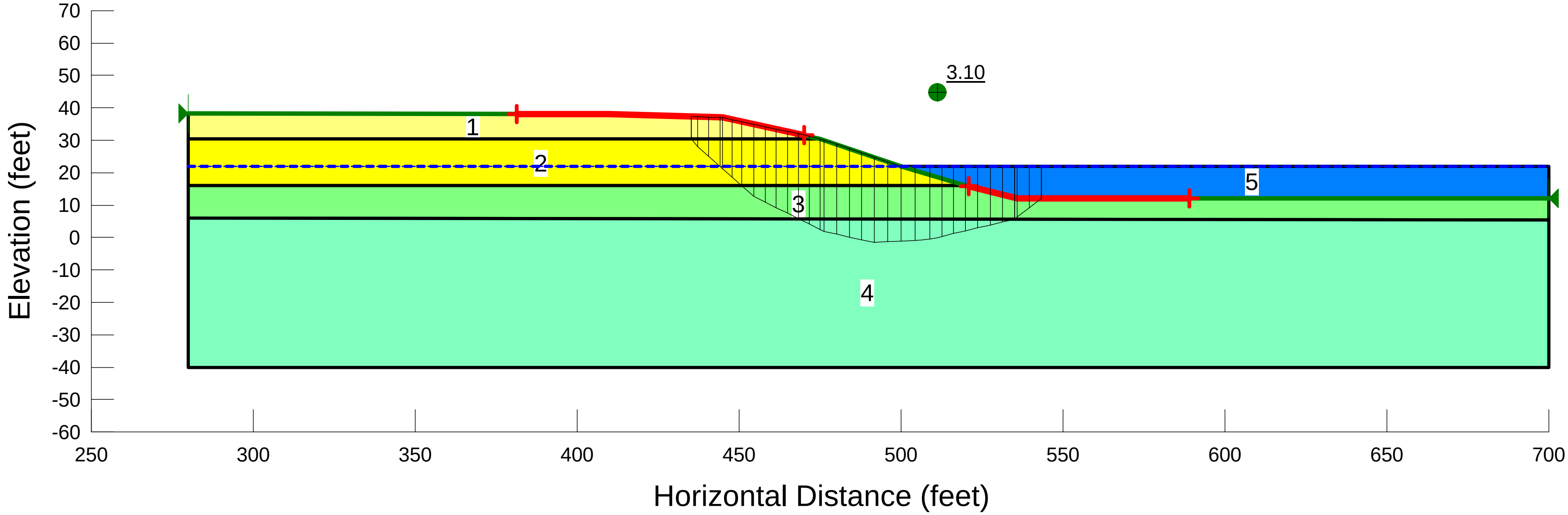
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section B-B'
File Name: Aspen 1 B-B'_static.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 5.02

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	FILL: CLAY/SILT	120	1500	0
2	CLAYEY SILT/SILT	125	3500	0



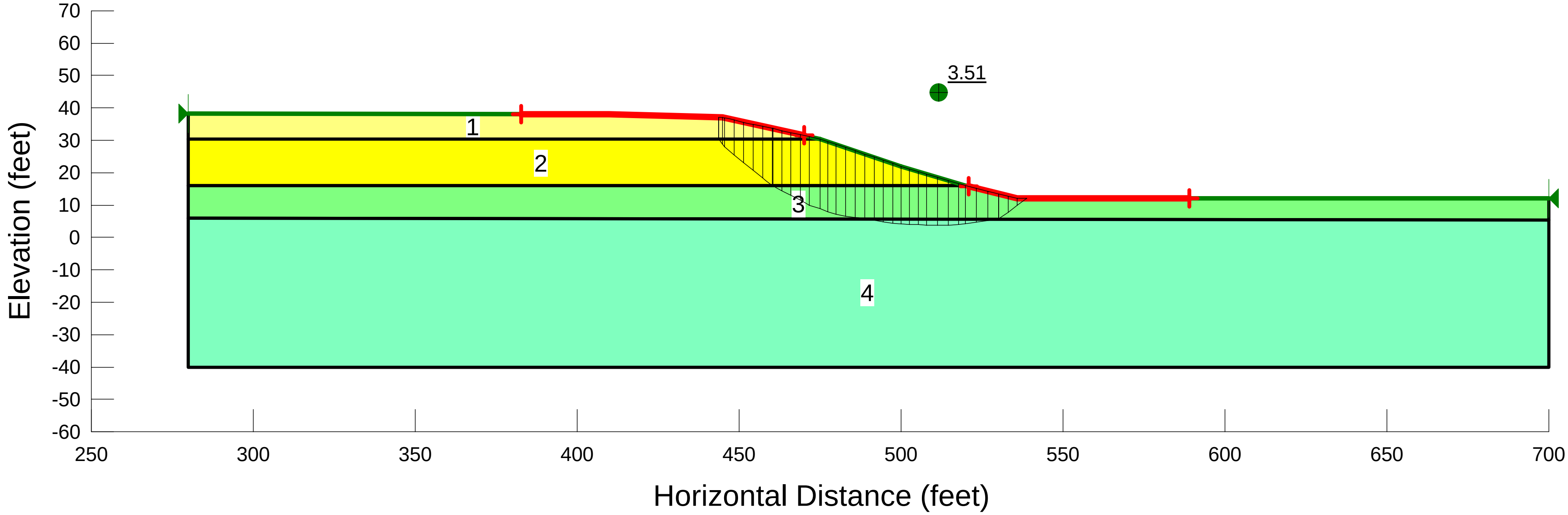
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Full.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 3.10

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1500	0
2	SILTY SAND	125	0	36
3	SILT	105	1600	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4	______	______



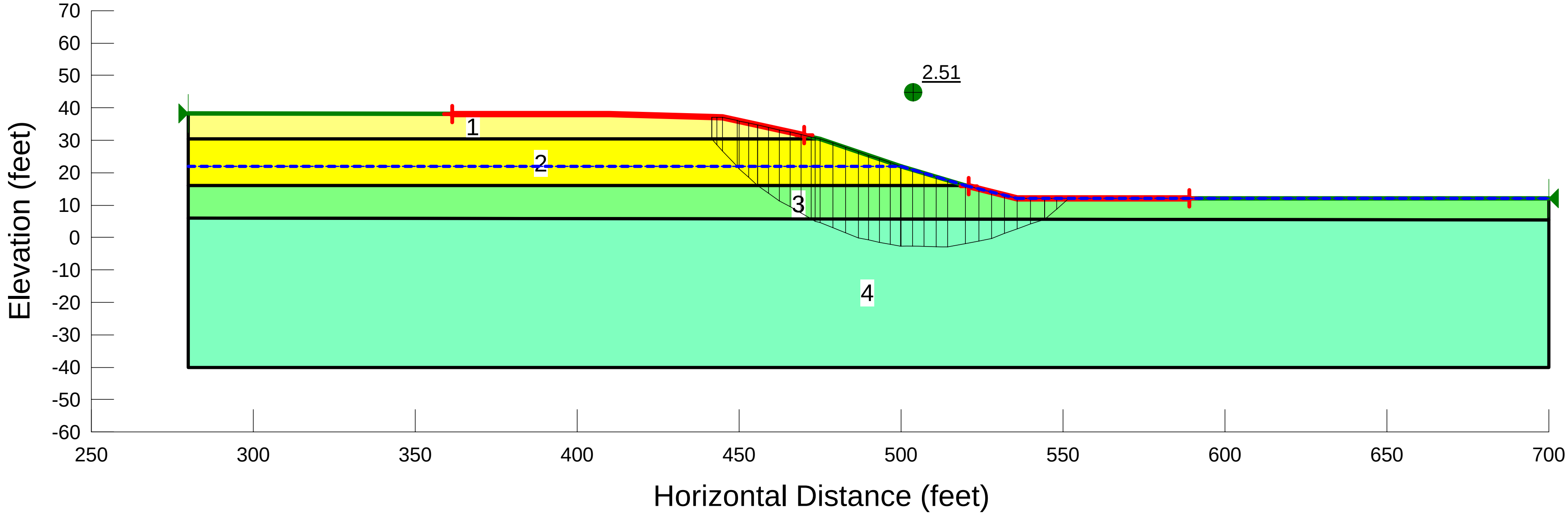
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Empty.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 3.51

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1500	0
2	SILTY SAND	125	0	36
3	SILT	105	1600	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4		



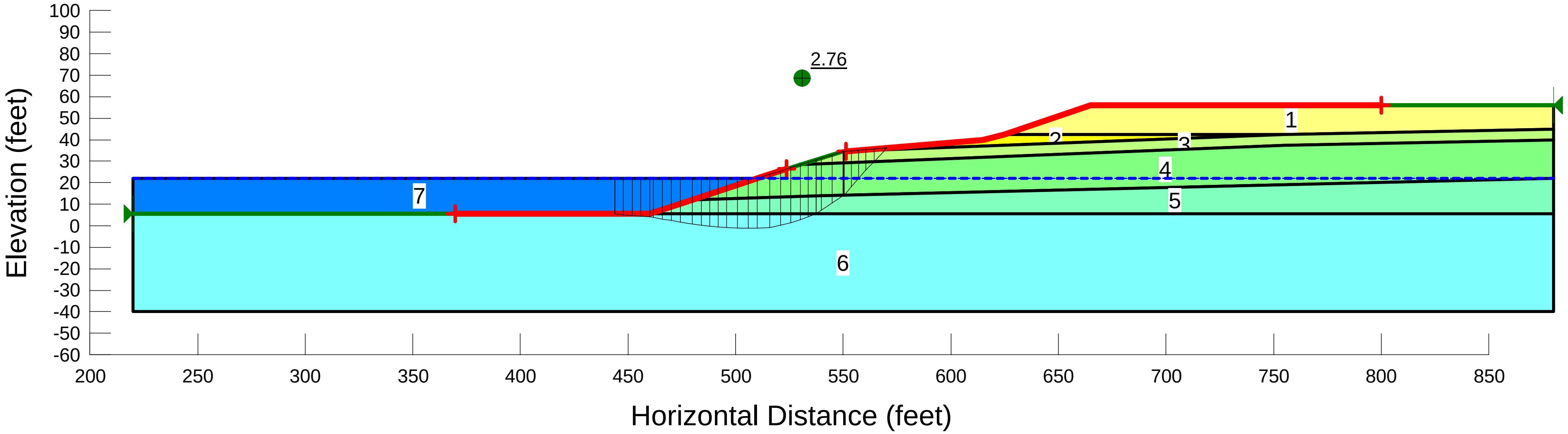
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Drawdown.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 2.51

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1500	0
2	SILTY SAND	125	0	36
3	SILT	105	1600	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4	______	______



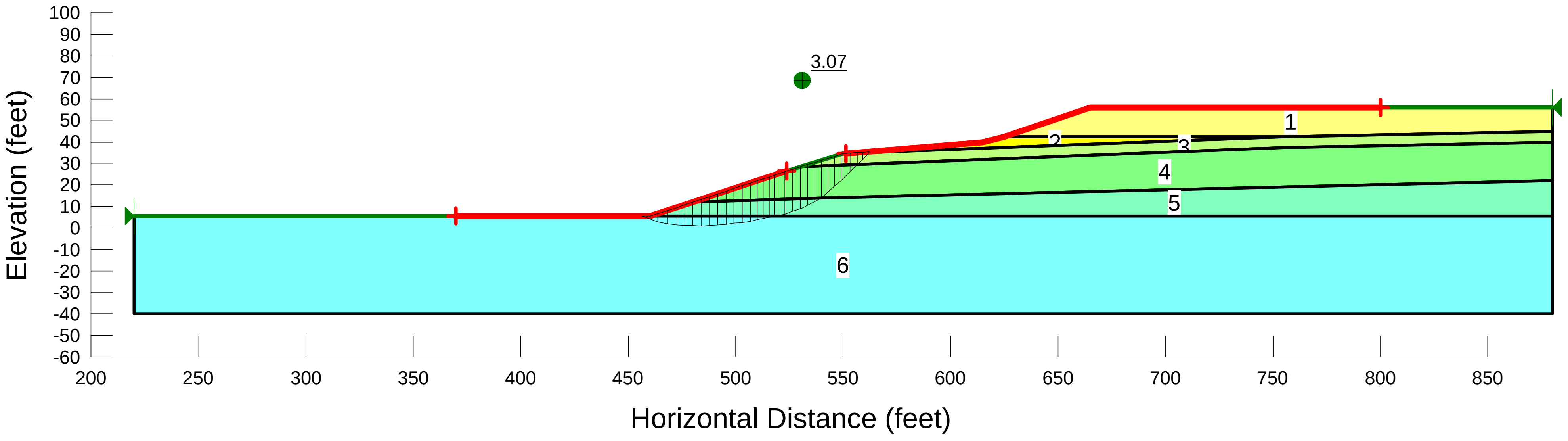
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Overall_Full A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 2.76

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	1000	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	—	—



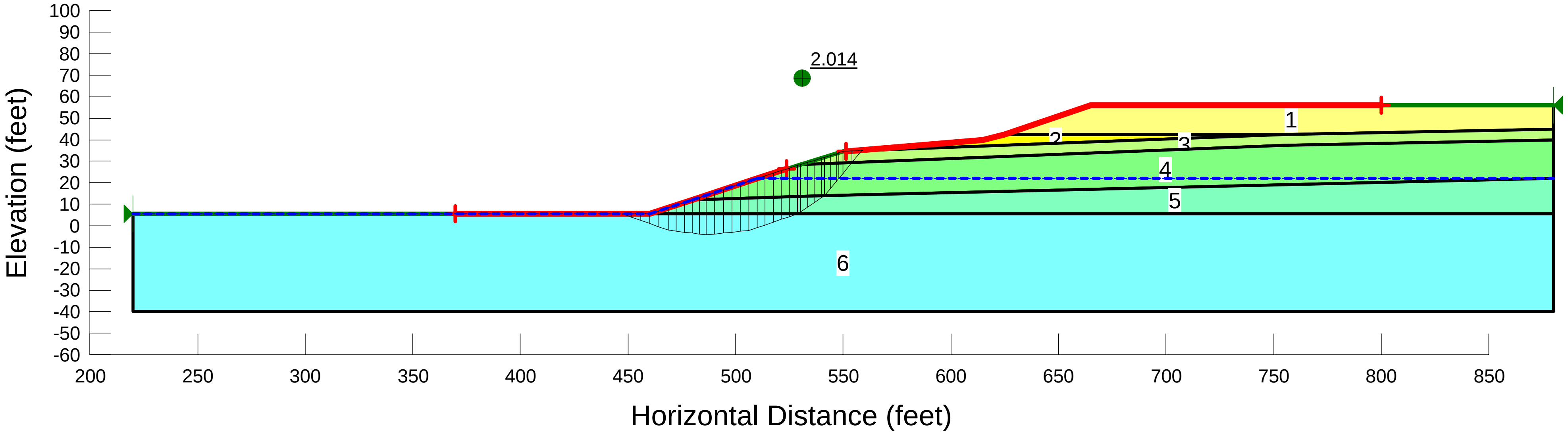
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Overall_empty A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 3.07

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	1000	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	___	___



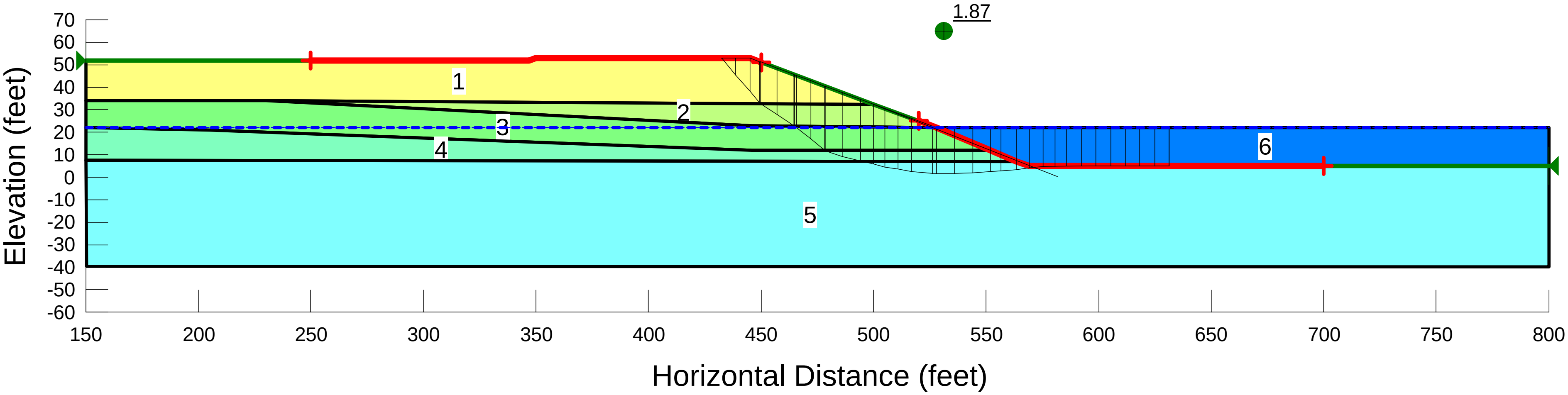
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Overall_Drawdown.gsz
Date: 3/28/2011
Method: Spencer
Tension Crack Option: Search
Percentage Wet: 1
Horizontal Seismic Load: 0 g
Factor of Safety: 2.014

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	1000	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	—	—



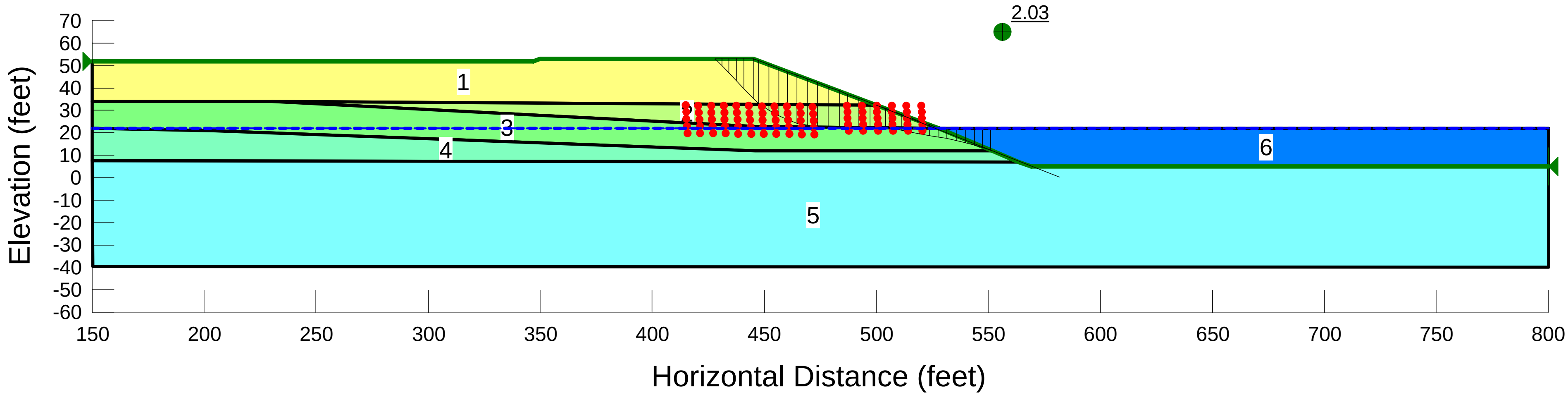
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Full A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 1.87

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	1000	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1600	0
5	SILTY SAND	125	0	36
6	Water	62.4		



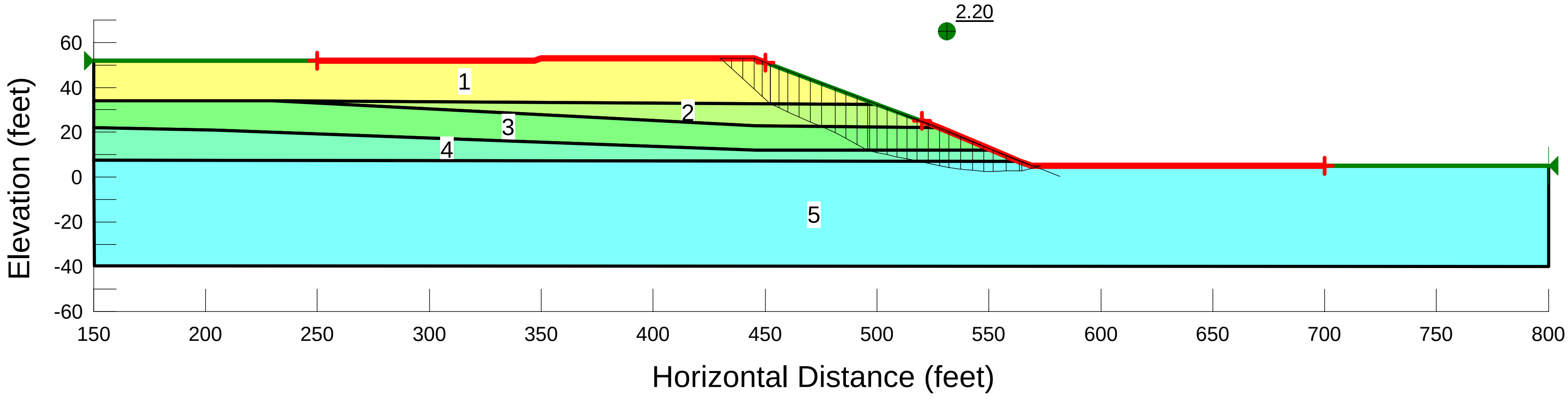
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Full b.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.03

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	1000	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1600	0
5	SILTY SAND	125	0	36
6	Water	62.4		



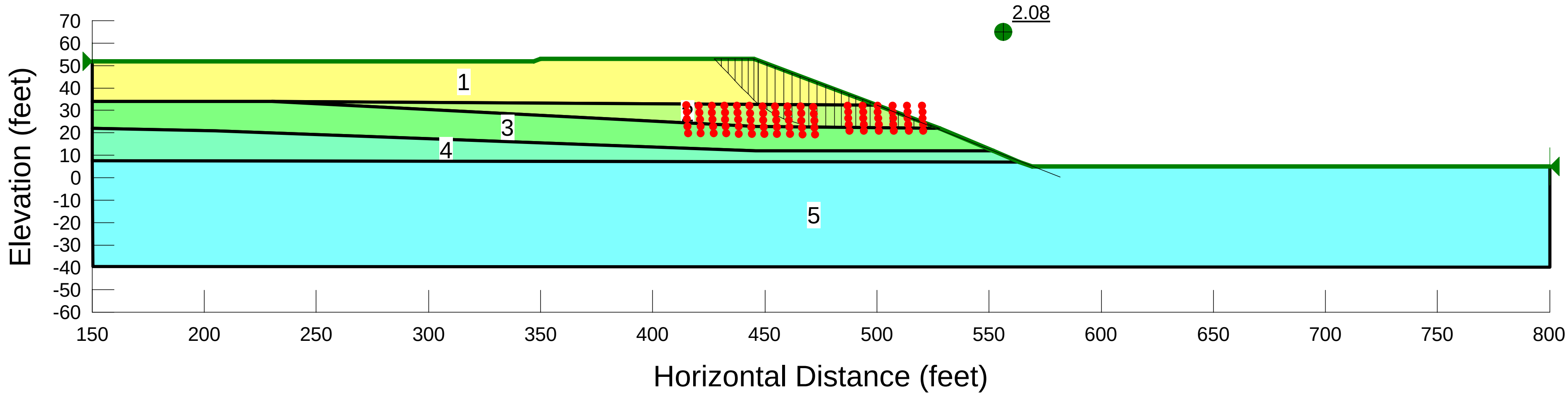
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Empty A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.20

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	1000	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1600	0
5	SILTY SAND	125	0	36
6	Water	62.4		



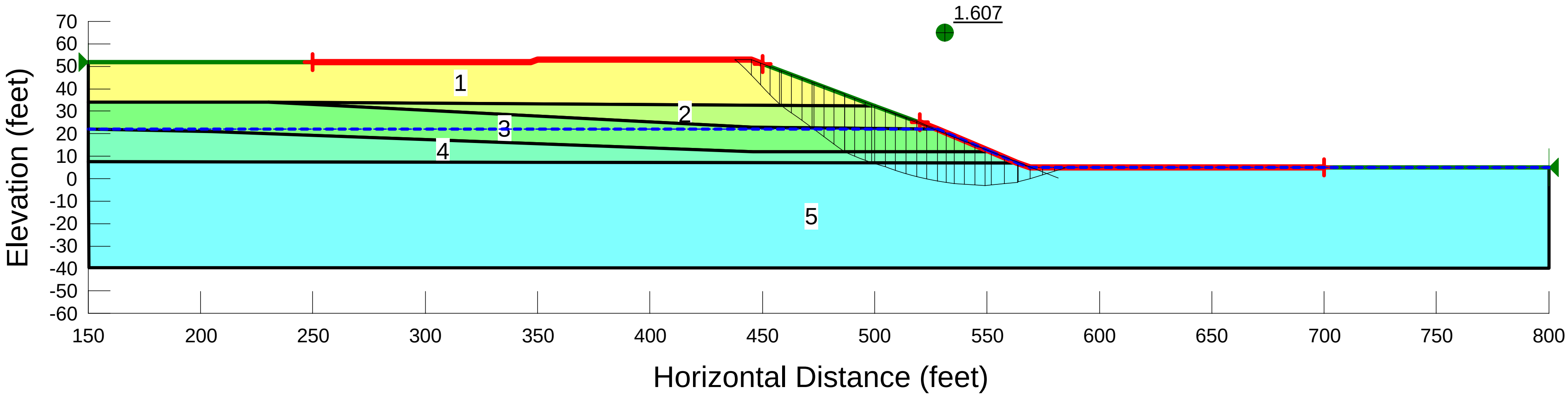
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Empty B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.08

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	1000	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1600	0
5	SILTY SAND	125	0	36
6	Water	62.4		



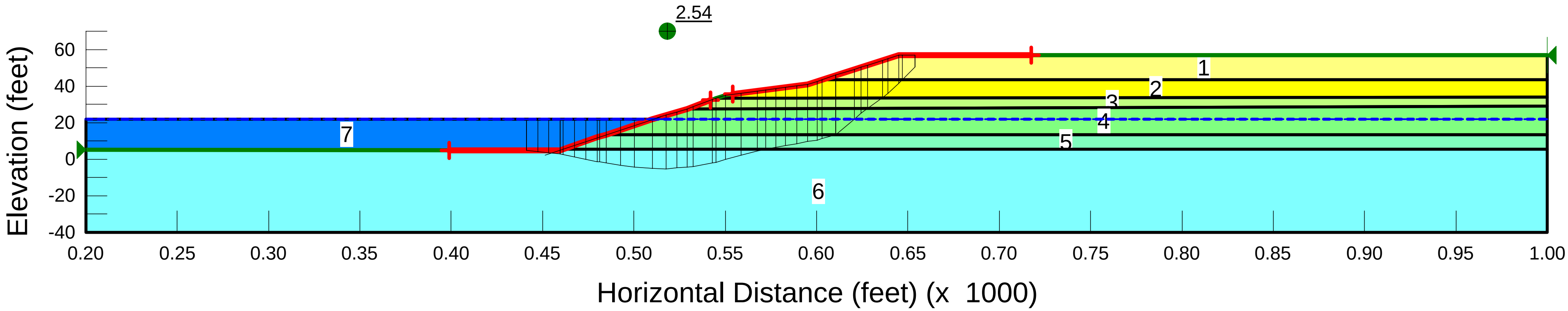
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Drawdown.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 1.607

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	1000	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1600	0
5	SILTY SAND	125	0	36
6	Water	62.4		



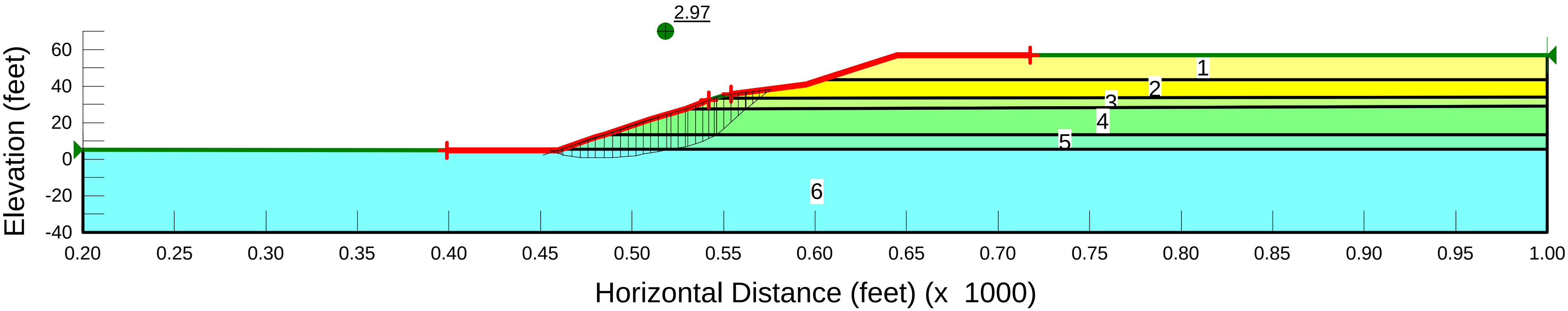
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static drawdown B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.54

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	1000	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



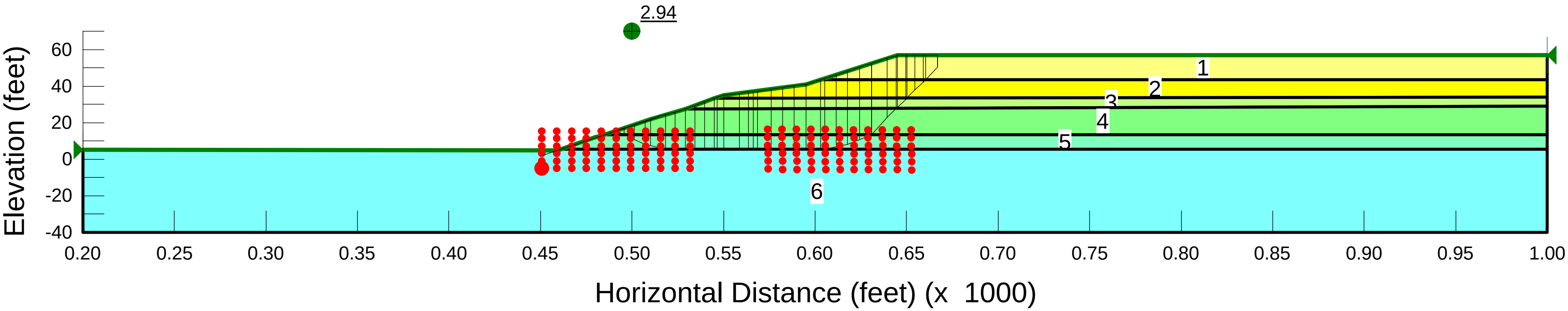
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static Empty A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.97

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	1000	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



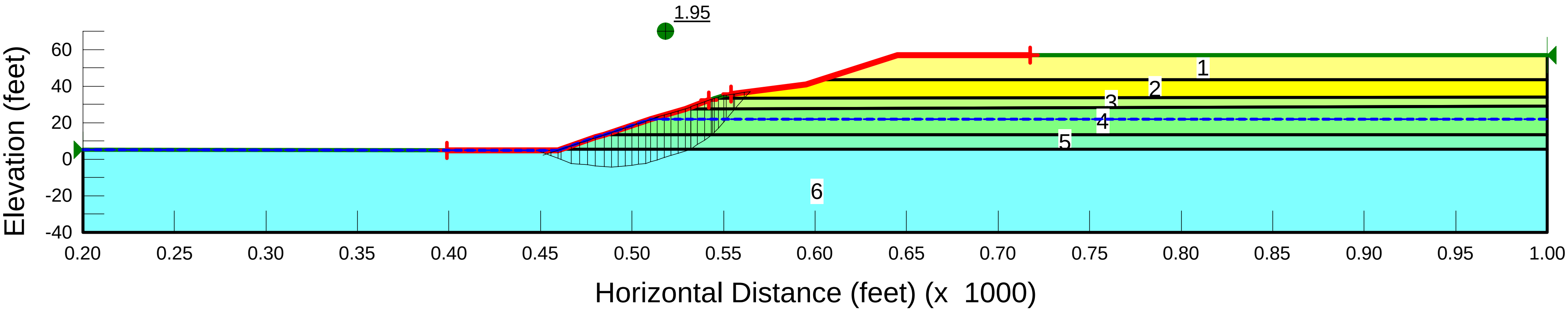
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static Empty B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 2.94

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	1000	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static drawdown B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0 g
Factor of Safety: 1.95

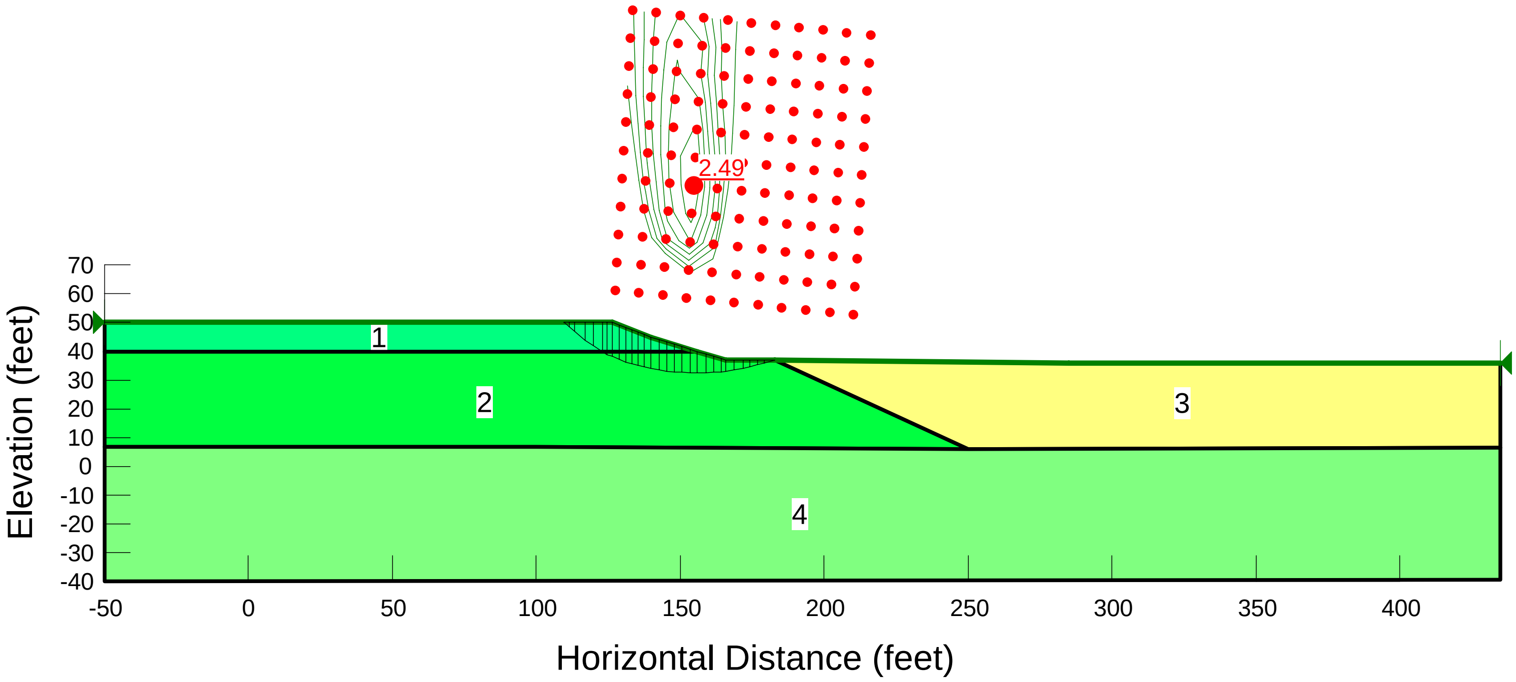
Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1500	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	1000	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1600	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



Seismic Slope Stability Analysis

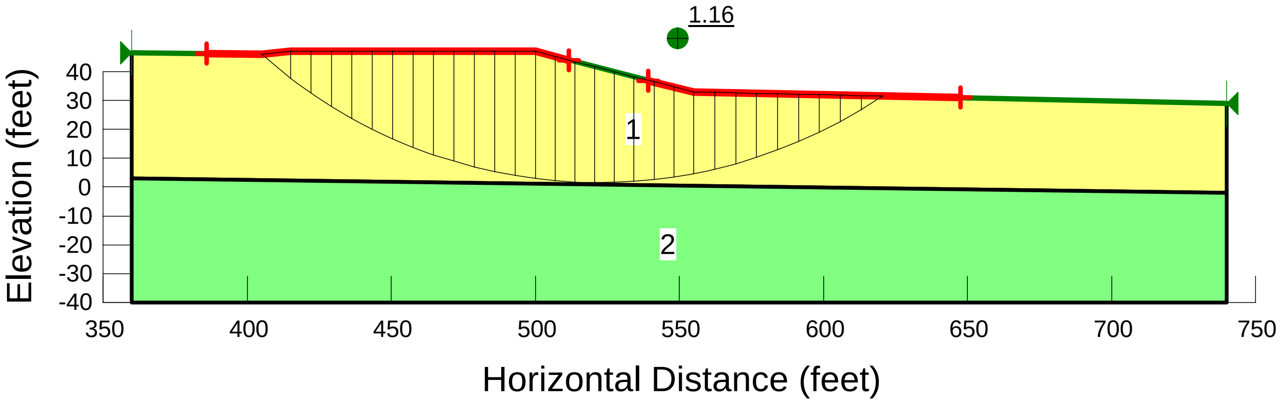
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section A-A'
File Name: Aspen 1 A-A' Yield.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 2.49

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILT/CLAY	110	1200	0
2	SAND/GRAVEL	125	0	45
3	FILL: CLAY/SILT	120	1200	0
4	CLAYEY SILT/SILT	125	2800	0



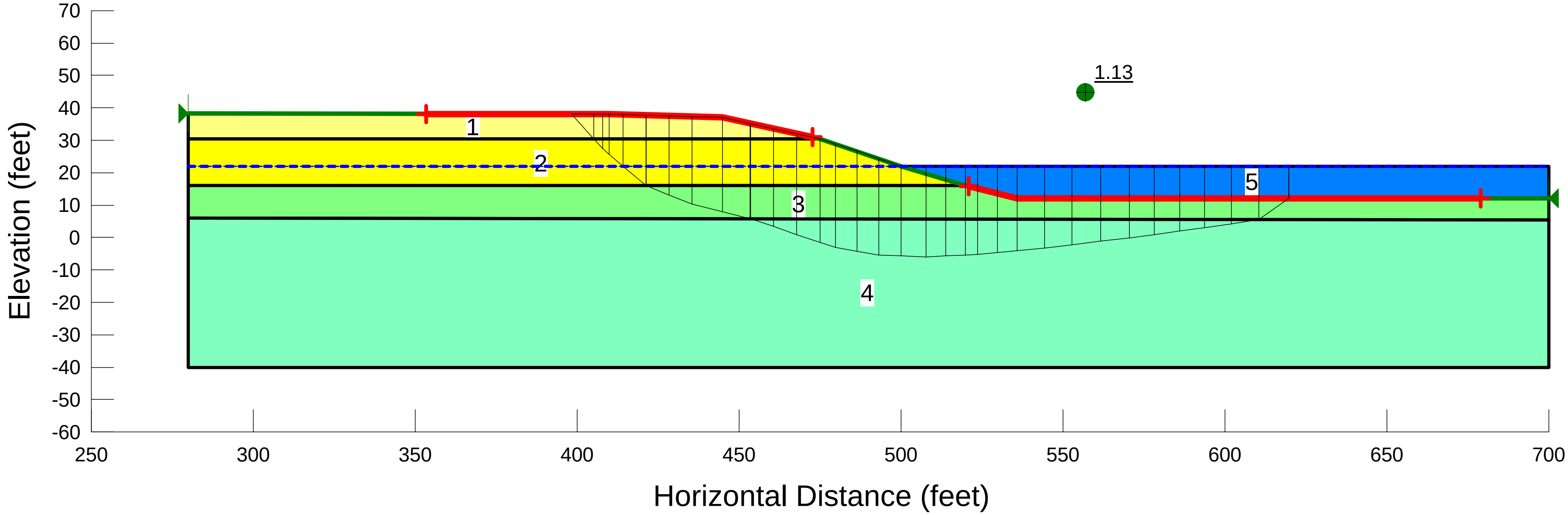
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section B-B'
File Name: Aspen 1 B-B'_Yield.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.16

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	FILL: CLAY/SILT	120	1200	0
2	CLAYEY SILT/SILT	125	2800	0



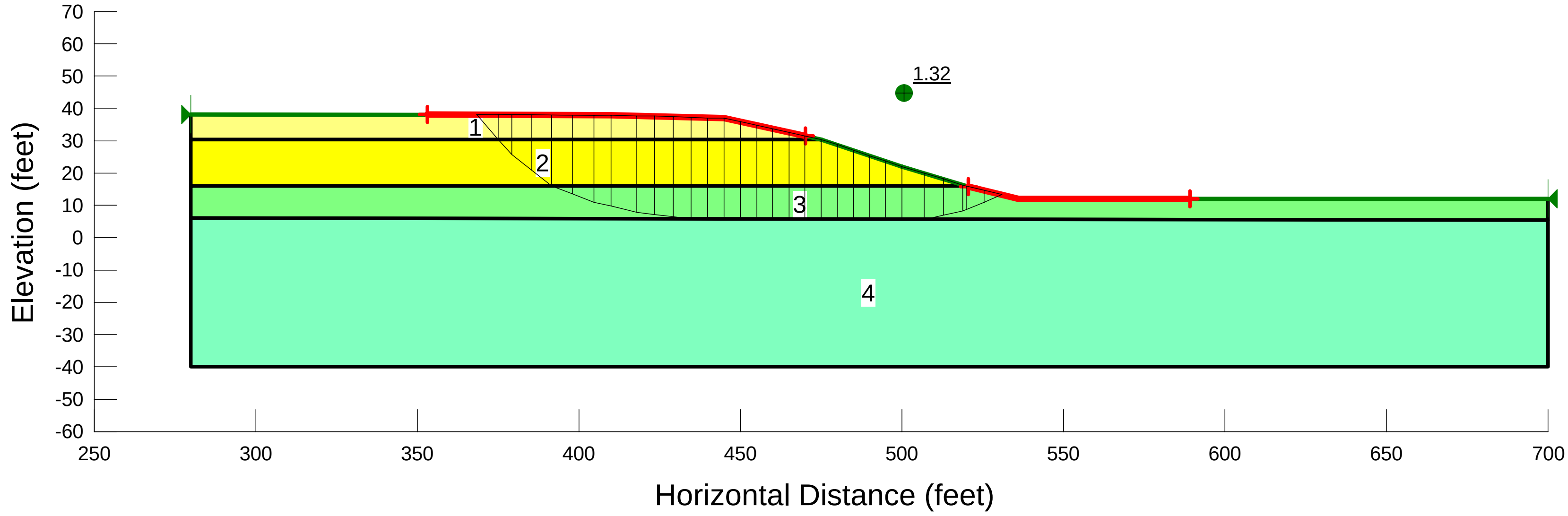
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Full Yield.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.13

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1200	0
2	SILTY SAND	125	0	36
3	SILT	105	1280	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4		



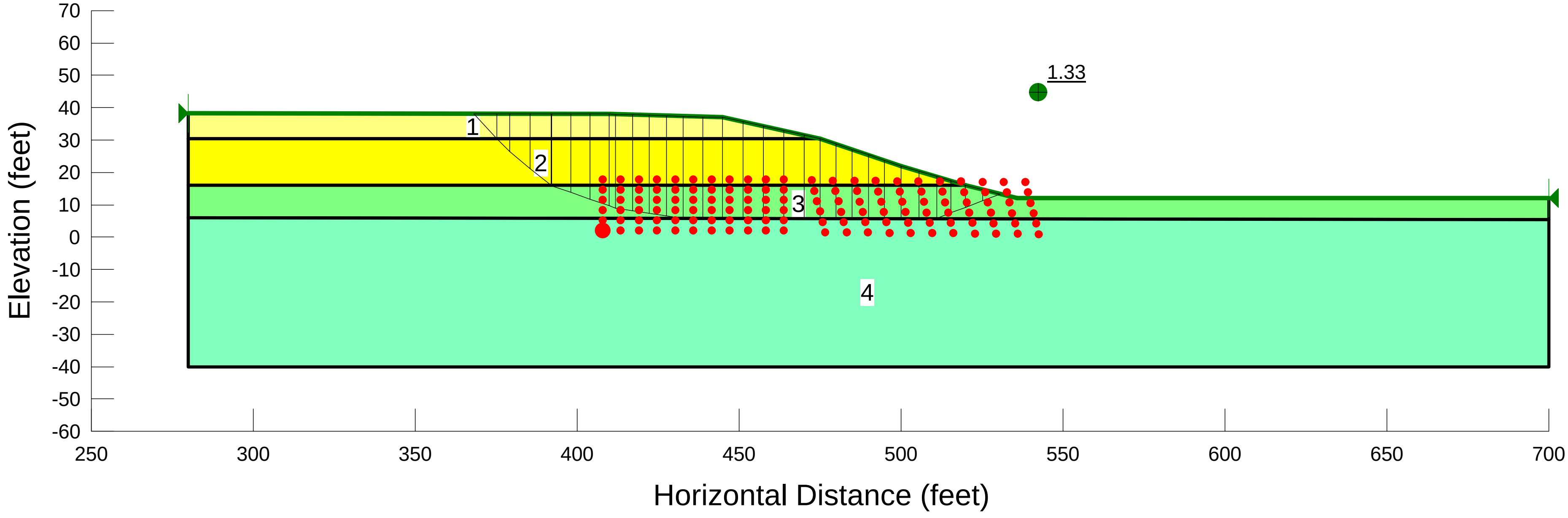
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Empty Yield.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.32

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1200	0
2	SILTY SAND	125	0	36
3	SILT	105	1280	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4		



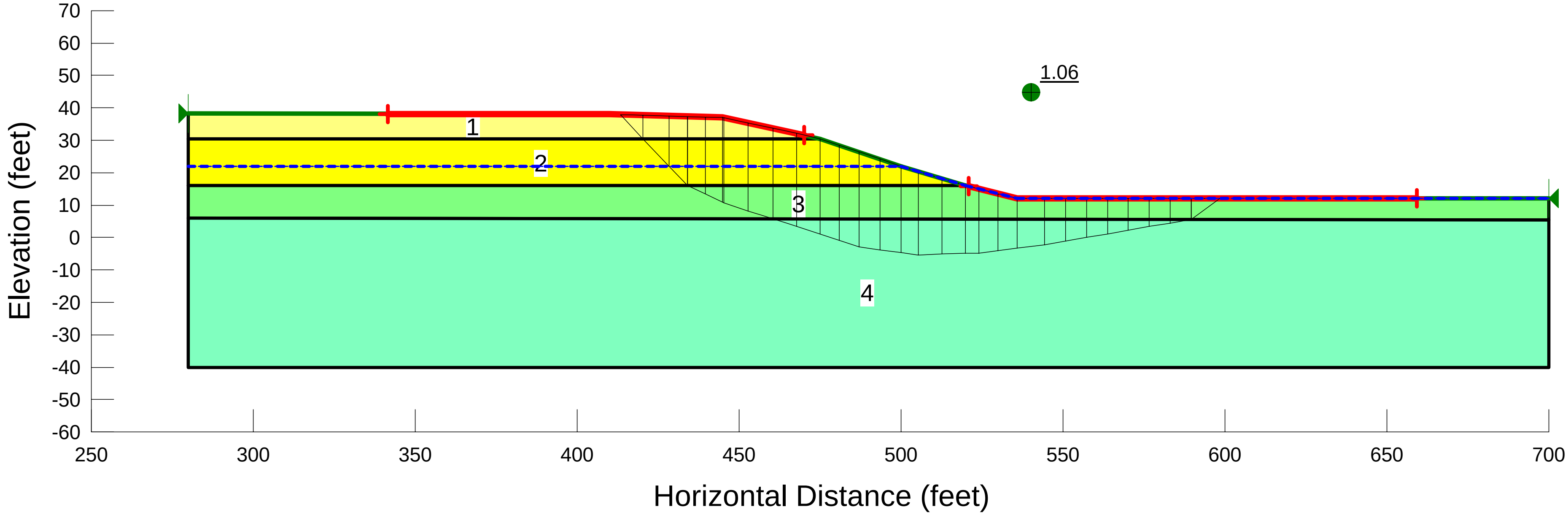
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Empty Yield 2.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.33

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1200	0
2	SILTY SAND	125	0	36
3	SILT	105	1280	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4		



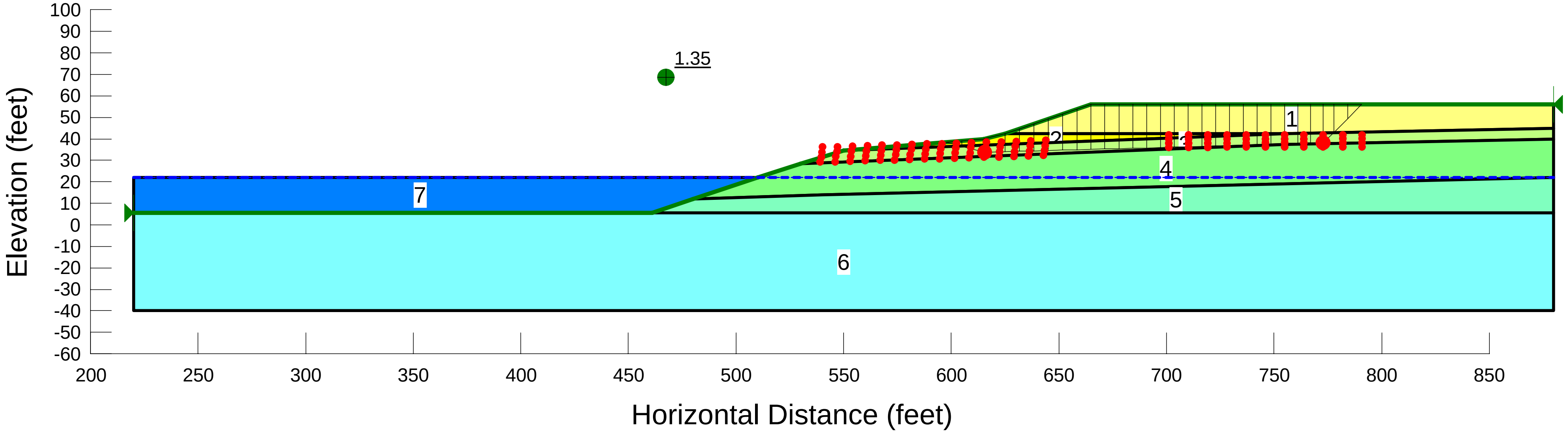
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section C-C' North
File Name: Mayhew C-C' North_Drawdown Yield.gsz
Date: 1/13/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.06

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	NEW FILL	120	1200	0
2	SILTY SAND	125	0	36
3	SILT	105	1280	0
4	SAND/SILTY SAND	125	0	36
5	Water	62.4		



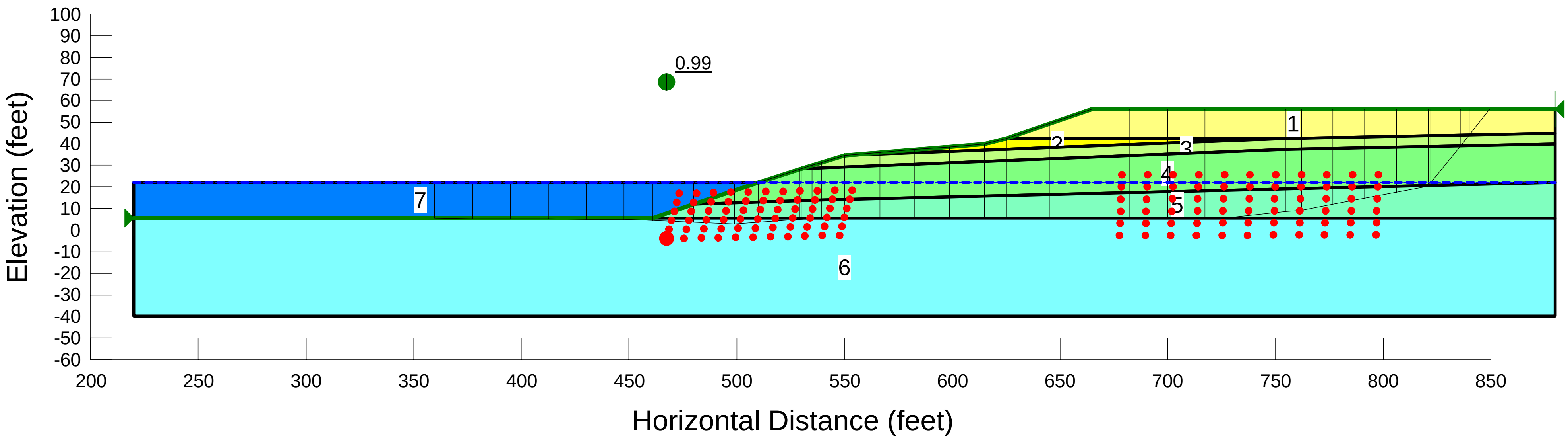
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Full Yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.35

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	—	—



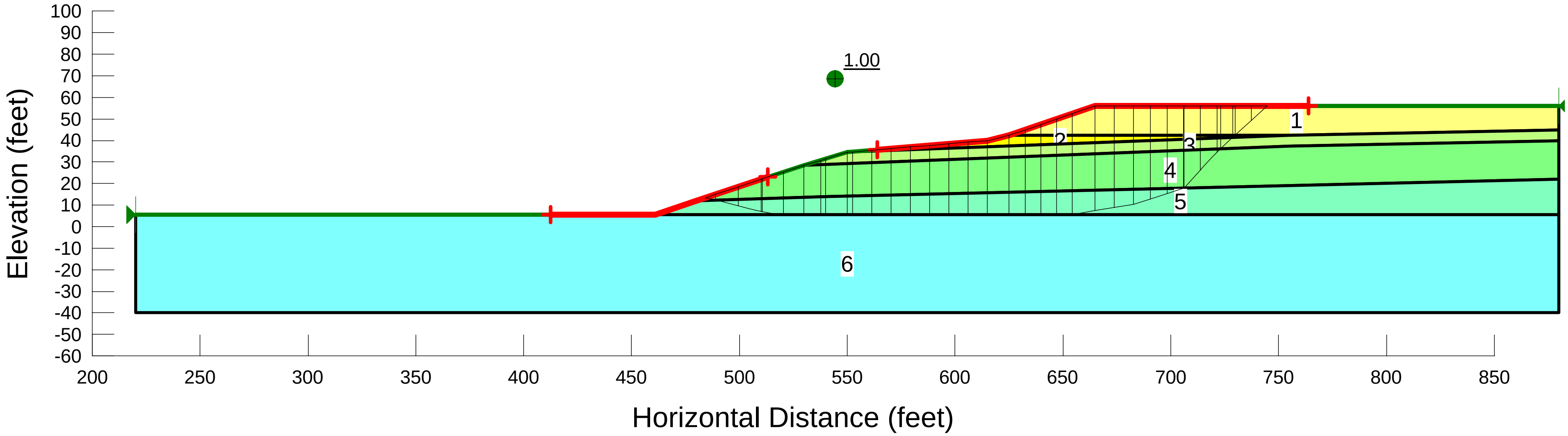
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Full Yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.235 g
Factor of Safety: 0.99

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	—	—



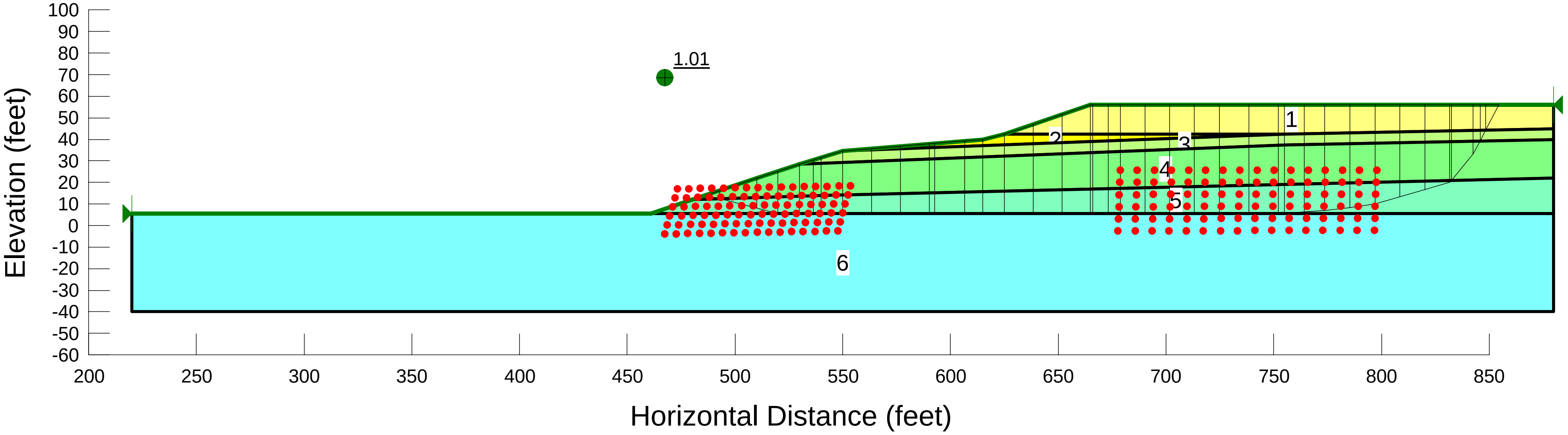
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South empty Yield.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.28 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	____	____



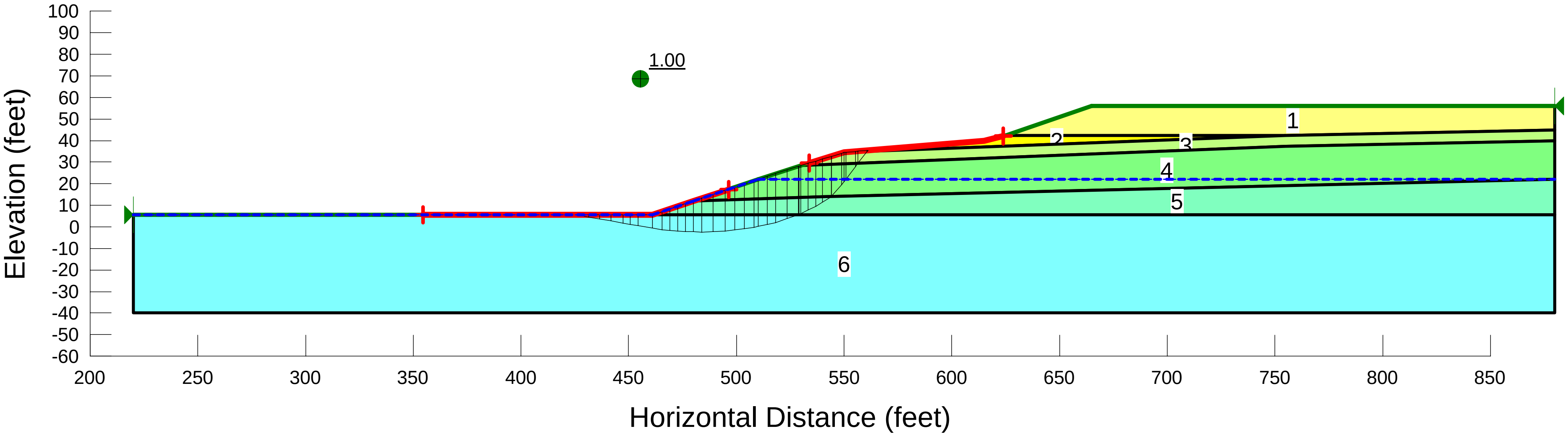
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South empty Yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.25 g
Factor of Safety: 1.01

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	____	____



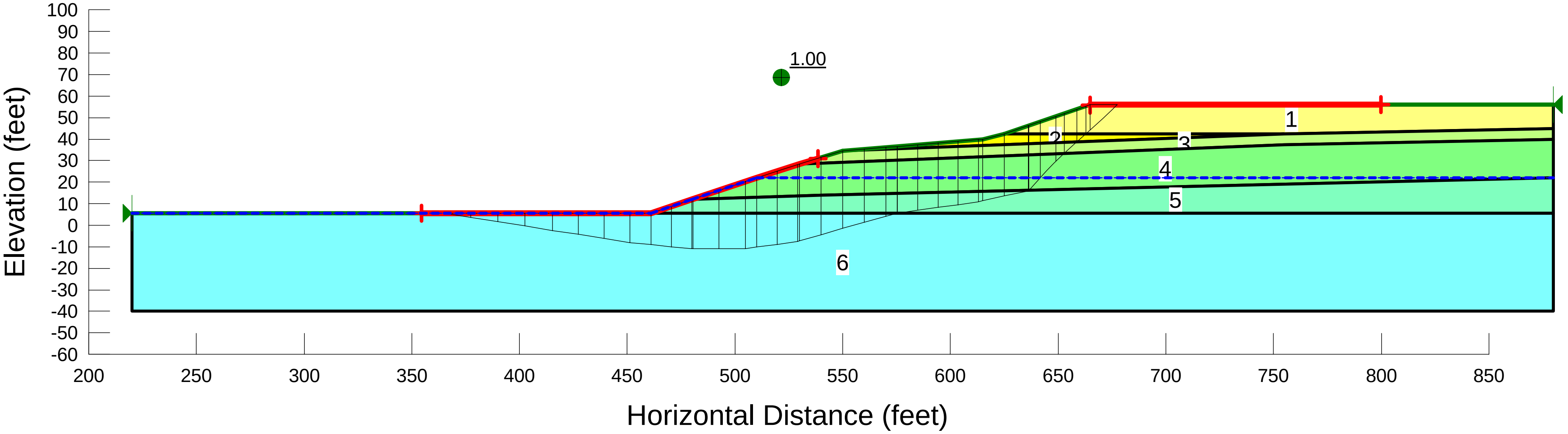
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Lower_Drawdown Yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.235 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	____	____



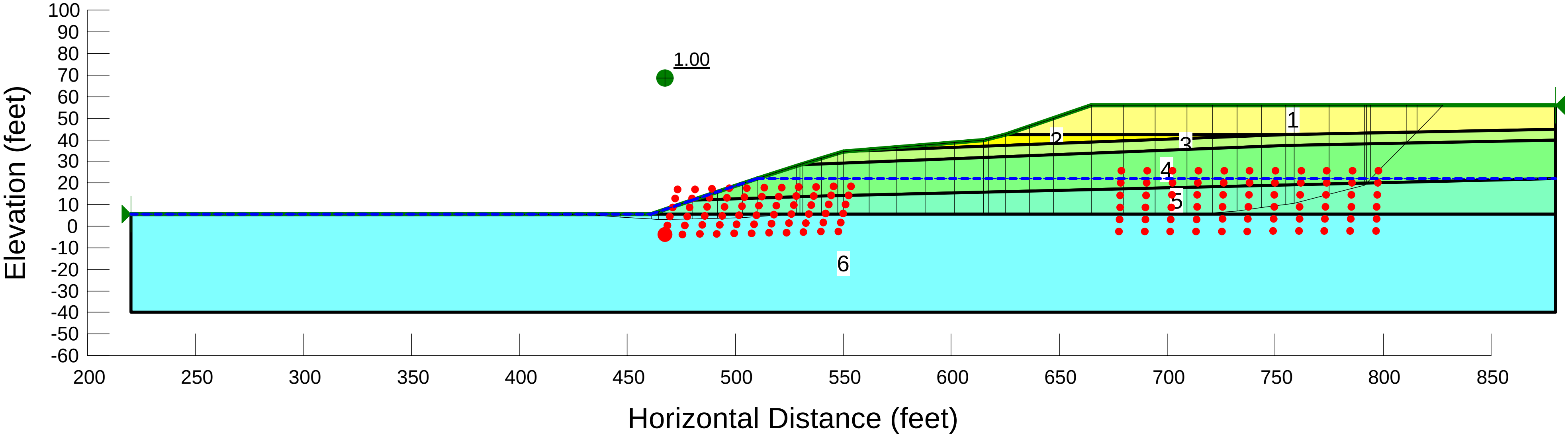
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Overall_Drawdown Yield A.gsz
Date: 3/28/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.28 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	____	____



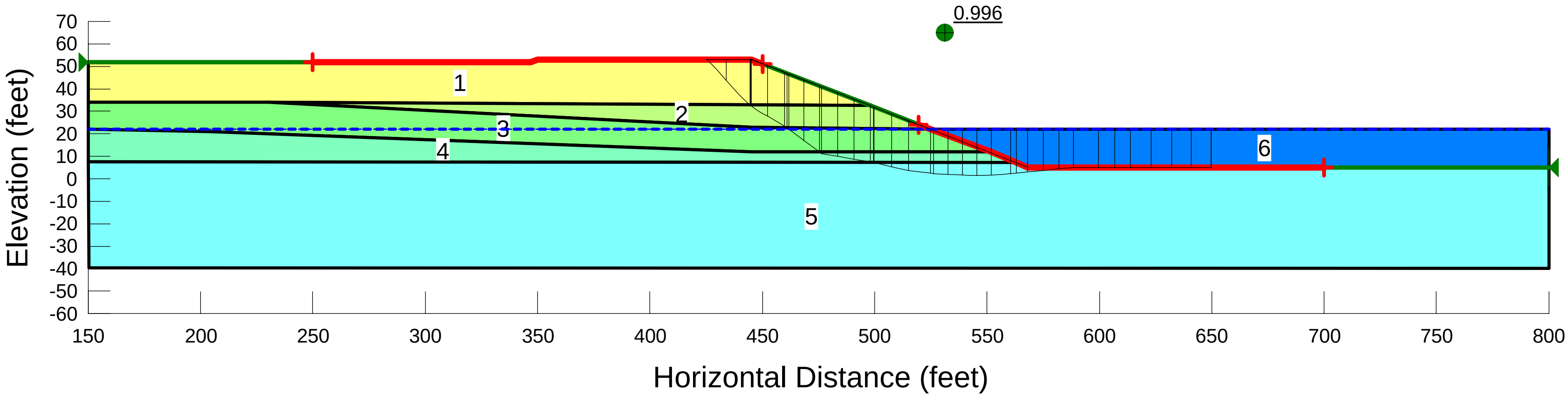
Aspen 1/Rock Creek, Sacramento
Project No. 4381.07
Cross Section C-C' South
File Name: Mayhew C-C' South Overall_Drawdown Yield.gsz
Date: 3/28/2011
Method: Spencer
Tension Crack Option: None
Percentage Wet: 1
Horizontal Seismic Load: 0.225 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	CLAY/SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT/SILT	110	800	0
4	GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SAND/SILTY SAND	125	0	36
7	Water	62.4	___	___



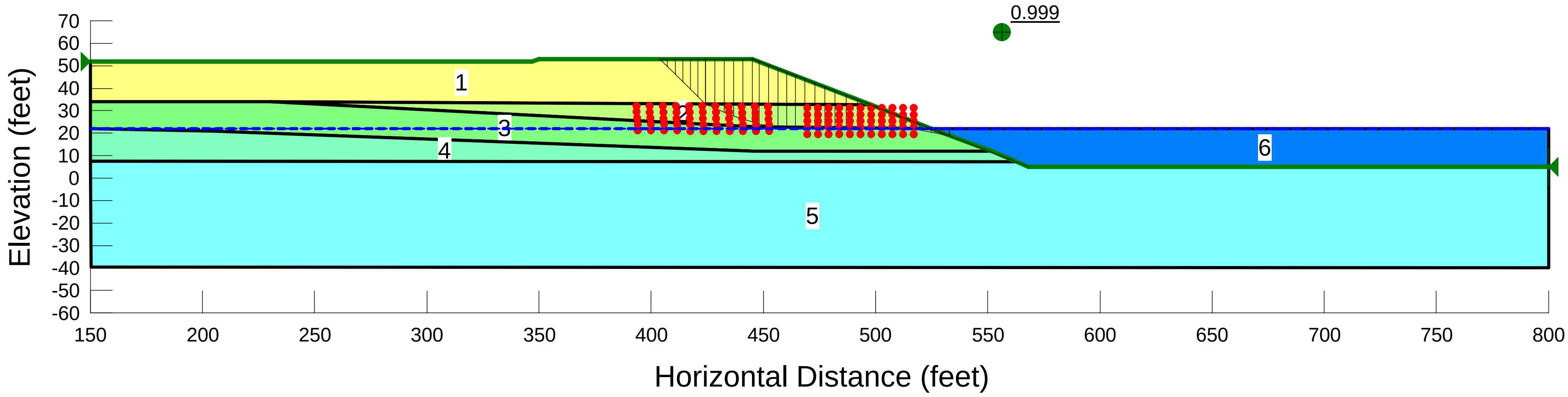
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Full Yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0.2 g
Factor of Safety: 0.996

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	800	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1280	0
5	SILTY SAND	125	0	36
6	Water	62.4		



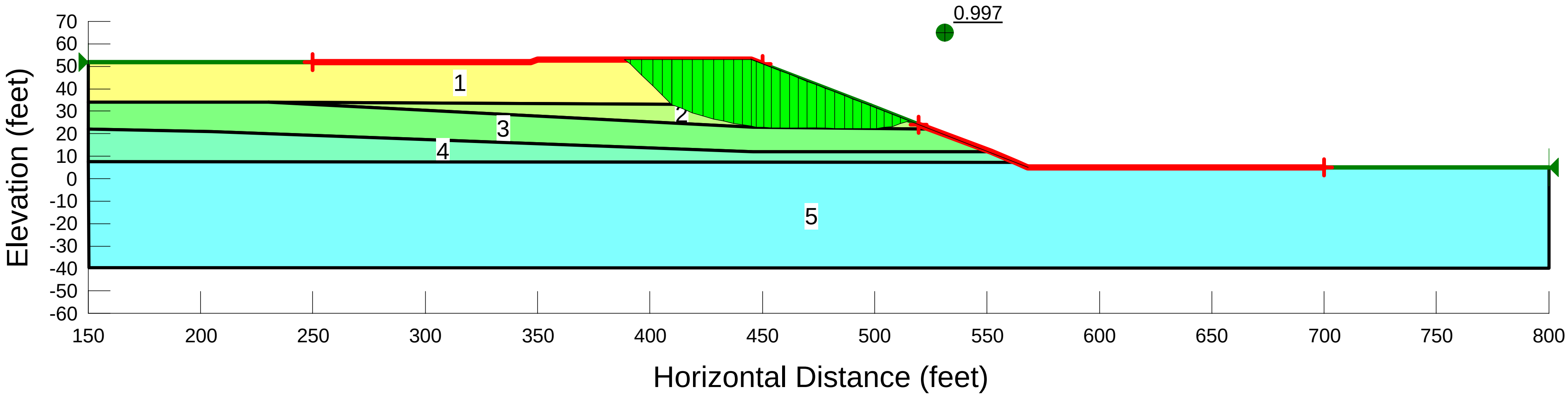
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Full Yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.2 g
Factor of Safety: 0.999

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	800	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1280	0
5	SILTY SAND	125	0	36
6	Water	62.4		



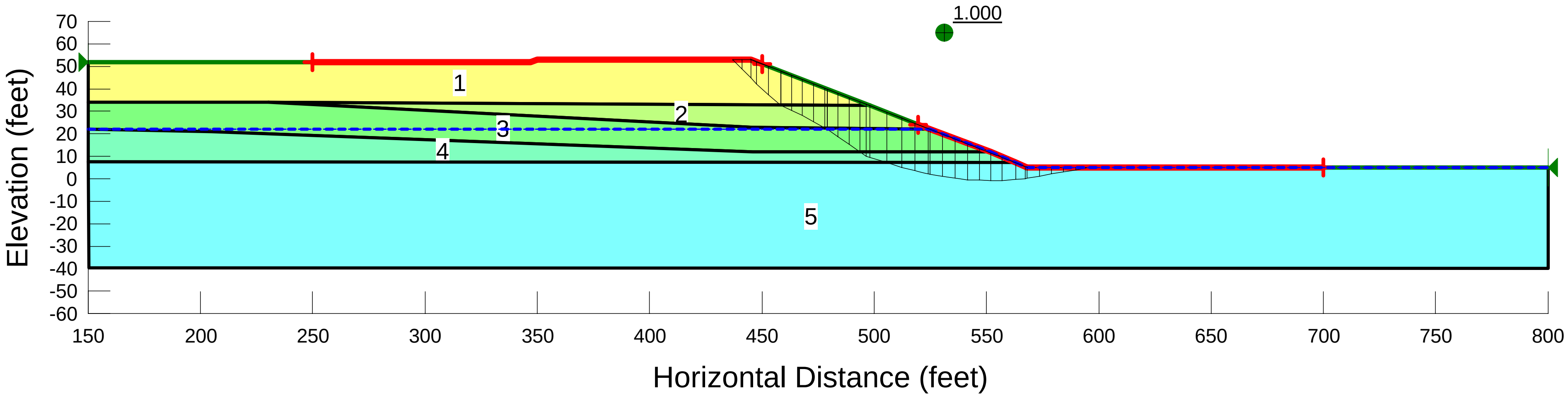
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Empty Yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.215 g
Factor of Safety: 0.997

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	800	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1280	0
5	SILTY SAND	125	0	36
6	Water	62.4		



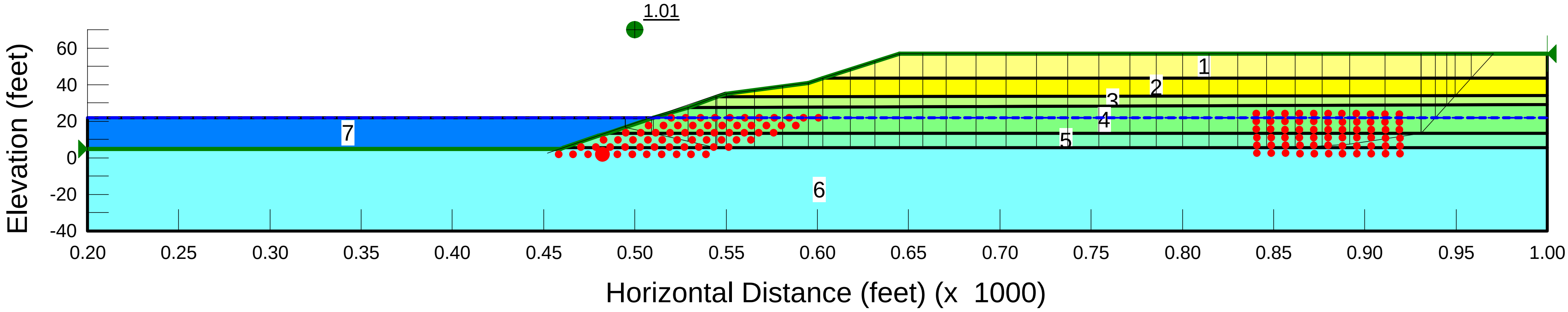
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section D-D'
File Name: Mayhew D-D' Static Drawdown Yield.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: Search
Horizontal Seismic Load: 0.165 g
Factor of Safety: 1.000

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SILTY & CLAYEY SAND	120	0	32
2	SANDY SILT	110	800	0
3	SAND/GRAVEL	125	0	45
4	CLAY/SILT	100	1280	0
5	SILTY SAND	125	0	36
6	Water	62.4		



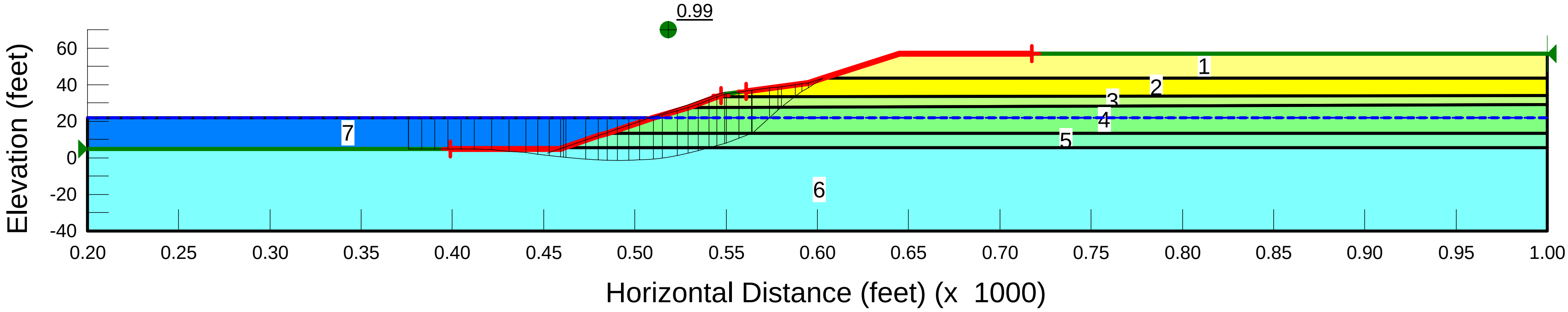
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static full yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.23 g
Factor of Safety: 1.01

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



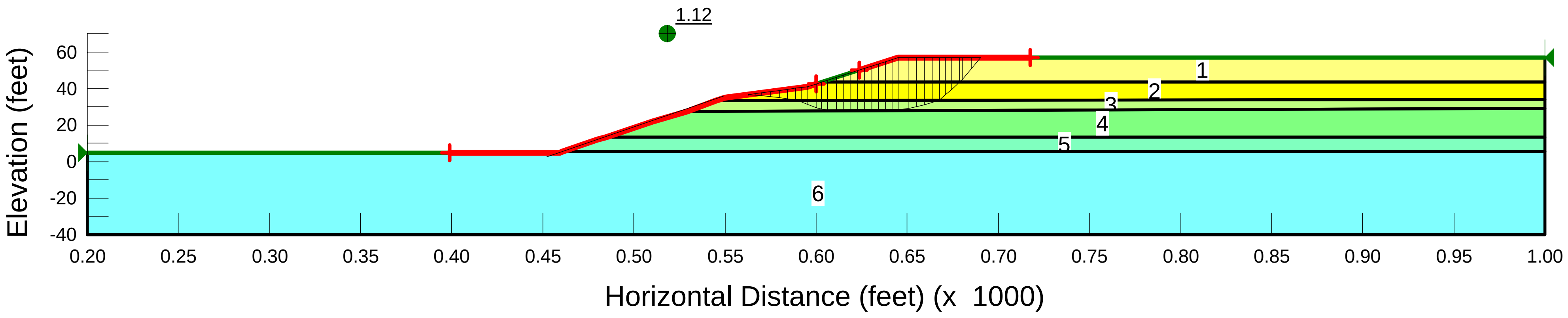
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static full yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.28 g
Factor of Safety: 0.99

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



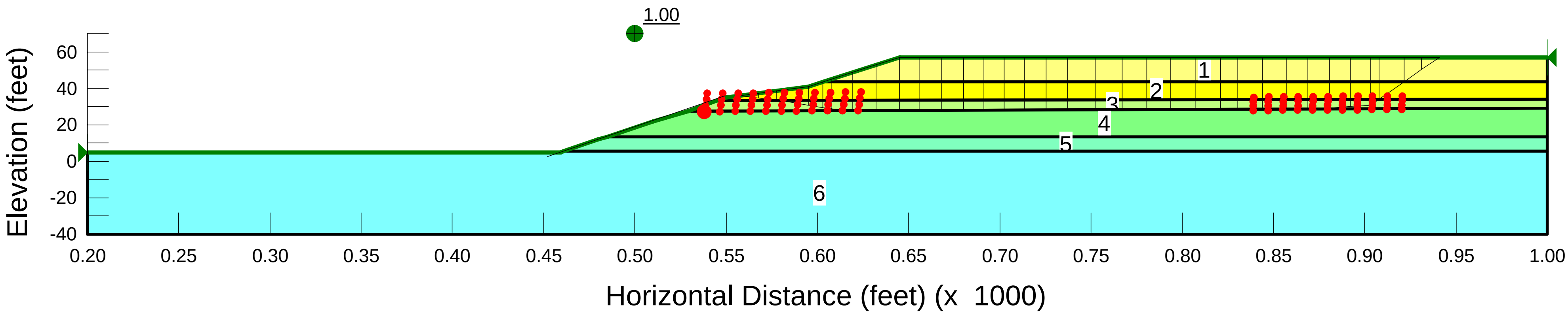
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static Empty yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.3 g
Factor of Safety: 1.12

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



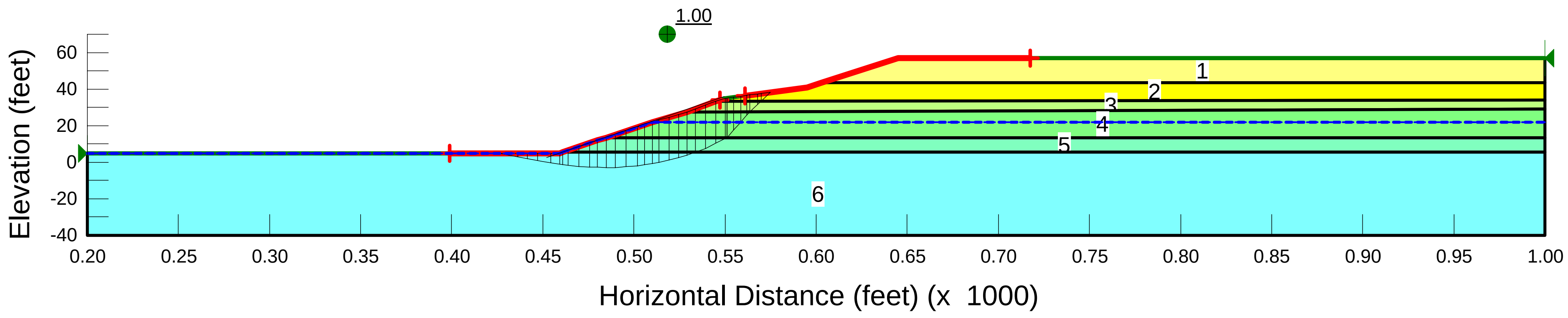
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static Empty yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.265 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



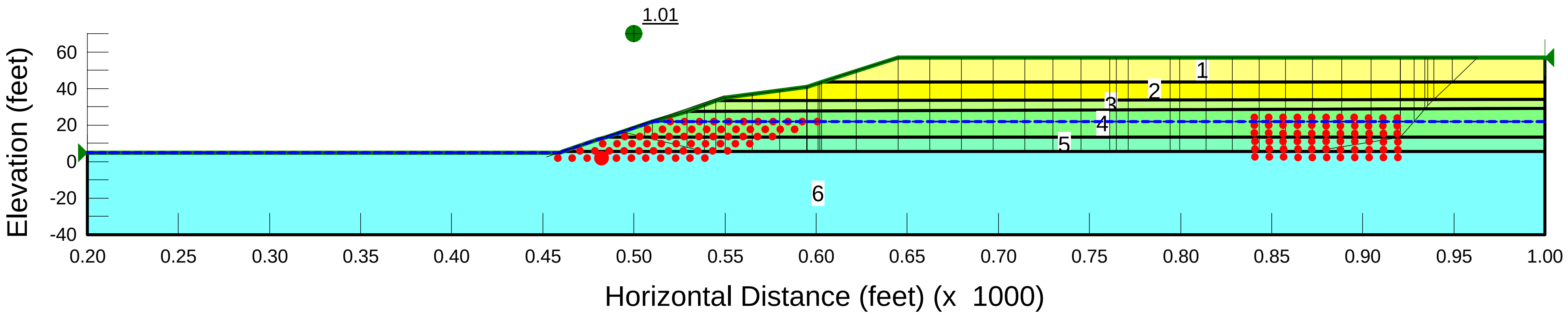
Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static drawdown yield A.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.22 g
Factor of Safety: 1.00

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



Aspen 1 - New Brighton Project
Project No. 4381.07
Cross Section E-E'
File Name: Mayhew E-E'_Static drawdown yield B.gsz
Date: 3/31/2011
Method: Spencer
Tension Crack Option: None
Horizontal Seismic Load: 0.23 g
Factor of Safety: 1.01

Material No.	Description	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degrees)
1	SANDY SILT	120	1200	0
2	SILTY SAND	120	0	35
3	SANDY SILT	110	800	0
4	SAND/GRAVEL	125	0	45
5	CLAY/SILT	100	1280	0
6	SILTY SAND	125	0	36
7	Water	62.4	—	—



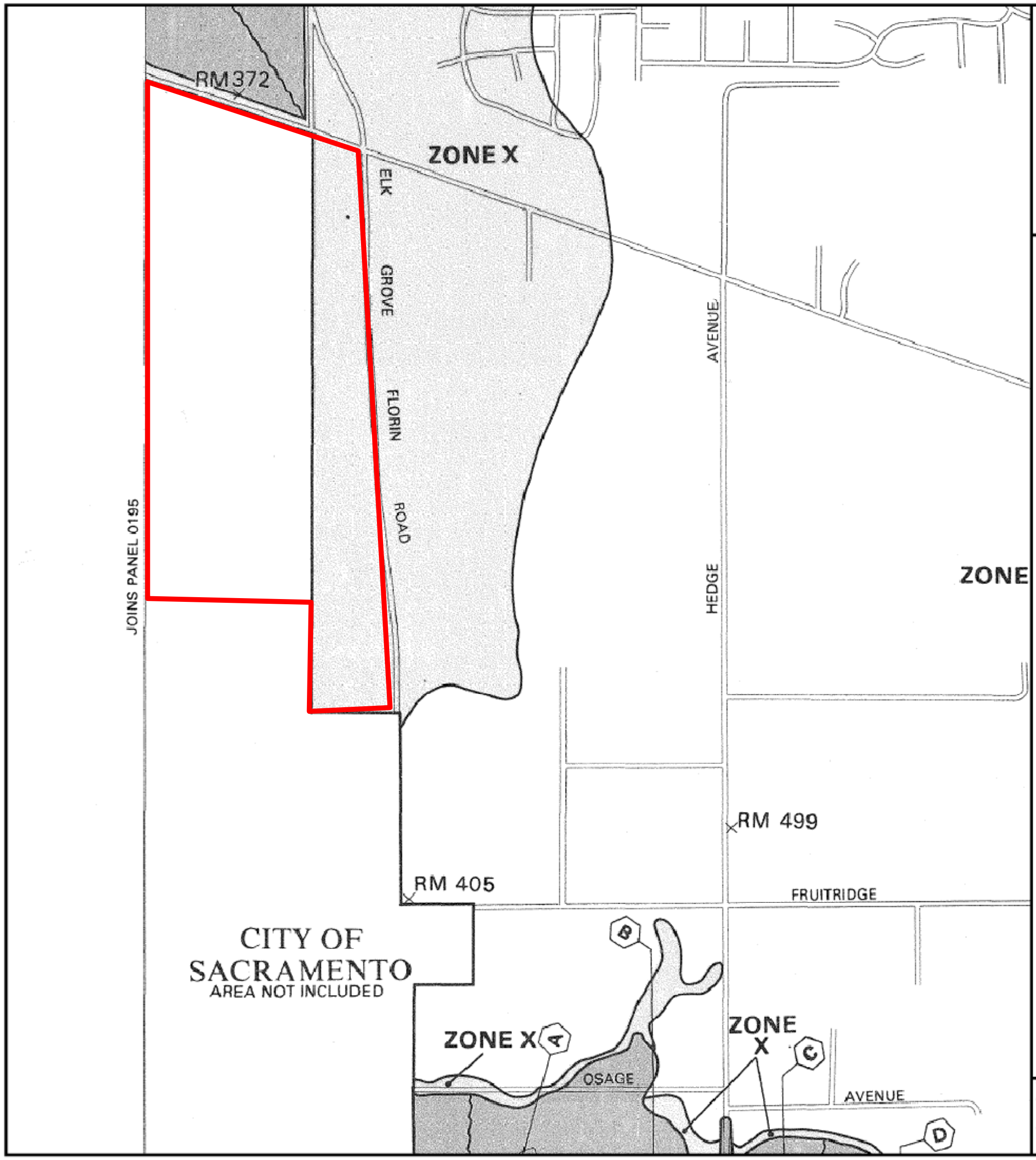
DISTRIBUTION

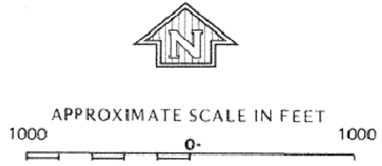
4 copies:	Mr. Mark McLoughlin StoneBridge Properties 3600 American River Drive, Suite 160 Sacramento, California 95864

QUALITY CONTROL REVIEWER:

Ramin Golesorkhi, Ph.D.
Geotechnical Engineer

APPENDIX M





NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SACRAMENTO
COUNTY,
CALIFORNIA
(UNINCORPORATED AREAS)

PANEL 215 OF 705
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
060262 0215 E

MAP REVISED:
JULY 6, 1998

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX N

Environmental Noise Assessment

Aspen I – New Brighton Project

City of Sacramento, California
BAC Job #2009-013

Prepared For:

StoneBridge Properties, LLC.

c/o: Mr. Mark McLoughlin
3600 American River Drive, Suite 160
Sacramento, California 95864

Prepared By:

Bollard Acoustical Consultants, Inc.

Paul Bollard

Paul Bollard, President

April 14, 2011

BOLLARD
Acoustical Consultants

TABLE OF CONTENTS

INTRODUCTION

The Aspen I – New Brighton Project (project) proposes the development of residential, commercial, school, park, and open space uses, as well as an urban farm on the former Teichert Aggregates Aspen 1 mining site in the City of Sacramento, California. The City of Sacramento General Plan land use designation for the project site is "Mining Reuse" within the traditional neighborhood medium density and suburban center category. The specific project site location and surrounding land uses are shown on Figure 1. The proposed conceptual development plan is shown on Figure 2.

The project applicant, StoneBridge Properties LLC, has retained Bollard Acoustical Consultants, Inc. (BAC) to conduct an analysis of potential noise impacts due to and upon the proposed project. This report contains the results of that analysis, including noise level data collected by BAC, analysis methodology, applicable noise standards, and other supporting information.

ACOUSTICAL BACKGROUND AND TERMINOLOGY

Noise is simply described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, called Hertz (Hz).

Discussing sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel (dB) scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure), as a point of reference, defined as 0 dB. Other sound pressures are compared to the reference pressure and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. There is a strong correlation between the way humans perceive sound and A-weighted sound levels. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment for community exposures. All sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise. Definitions of acoustical terminology are provided in Appendix A.

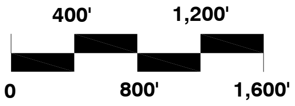
Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors, day-night average level (L_{dn}) and the community noise equivalent level (CNEL), and shows very good correlation with community response to noise for the average person. The median noise level descriptor, denoted L_{50}, represents the noise level which is exceeded 50% of the hour. In other words, half of the hour ambient conditions are higher than the L_{50} and the other half are lower than the L_{50} .

Figure 1
Project Vicinity

Legend:

🟥 : Project Site Boundary

🟨 : Existing Conveyer Belt



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Acoustical Consultants

Figure 2

Aspen I Project
Conceptual
Development Plan

Legend:

- 🟫 Multi Family Residential (25 units/net acre target)
- 🟧 Residential Mixed Use (30 units/net acre target)
- 🟥 Commercial (0.25 ~ 2.0 FAR)
- 🟦 School (Underlying Residential Zoning)
- 🟨 Urban Farm
- 🟩 Open Space
- 🟩 Park
- 🟧 30' x 90' Interior (Minimum) - SFR
- 🟧 45' x 90' Interior (Minimum) - SFR
- 🟨 50' x 100' Interior (Minimum) - SFR
- 🟨 55' x 100' Interior (Minimum) - SFR

200' 600'
0 400' 800'

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Acoustical Consultants

The L_{dn} is based upon the average noise level over a 24-hour day, with a +10 dB weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. Where short-term noise sources are an issue, noise impacts may be assessed in terms of maximum noise levels, hourly averages, or other statistical descriptors.

Another common descriptor is the CNEL. The CNEL is similar to the L_{dn}, except it has an additional weighting factor. Both average noise energy over a 24-hour period. The CNEL applies a +5 dB weighting to events that occur between 7:00 p.m. and 10:00 p.m., in addition to the +10 dB weighting between 10:00 p.m. and 7:00 a.m. associated with L_{dn}. Typically, the CNEL and L_{dn} result in similar results for the same noise events, with the CNEL sometimes resulting in reporting a 1 dB increase compared to the L_{dn} to account for noise events between 7–10 p.m. that have the additional weighting factor.

Effects of Noise on People

The perceived loudness of sounds and corresponding reactions to noise are dependent upon many factors, including sound pressure level, duration of intrusive sound, frequency of occurrence, time of occurrence, and frequency content. As mentioned above; however, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. Table 1 shows examples of noise levels for several common noise sources and environments.

It is generally recognized that an increase of at least 3 dB of similar sources is usually required before most people will perceive a change in noise levels in the community, and an increase of 5 dB is required before the change will be clearly noticeable. A common practice is to assume that a minimally perceptible increase of 3 dB represents a significant increase in ambient noise levels. This approach is very conservative, however, when applied to noise conditions substantially below levels deemed acceptable in general plan noise elements or in noise ordinances.

Table 1
Typical A-Weighted Sound Levels of Common Noise Sources

Decibels	Description
120	Jet aircraft at 100 feet / Threshold of Pain
110	Riveting machine at operators position
100	Shotgun at 200 feet
90	Bulldozer at 50 feet
80	Diesel locomotive at 300 feet
70	Commercial jet aircraft interior during flight
60	Normal conversation speech at 5 - 10 feet
50	Open office background level
40	Background level within a residence
30	Soft whisper at 2 feet
20	Interior of recording studio

Source: Egan 1972

Perception of Changes in Noise Levels

Table 2 is based upon recommendations made in August 1992 by FICON to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these criteria have been applied to other sources of noise similarly described in terms of cumulative noise exposure metrics such as the L_{dn}.

Table 2
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project, L_{dn}	Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: FICON 1997

According to Table 2, an increase in noise from similar sources of 5 dB or more would be noticeable where the ambient level is less than 60 dB. Where the ambient level is between 60 and 65 dB, an increase in noise of 3 dB or more would be noticeable, and an increase of 1.5 dB or more would be noticeable where the ambient noise level exceeds 65 dB L_{dn}. The rationale for the Table 2 criteria is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance.

Effects of Vibration on People and Structures

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities (PPV) in inches per second (in/sec).

CRITERIA FOR ACCEPTABLE NOISE AND VIBRATION LEVELS

City of Sacramento General Plan

The Noise Element of the City of Sacramento General Plan contains the following policies applicable to the proposed project (City of Sacramento 2009). The Table labeling conventions used below replicates those used in the City's General Plan.

EC 3.1.1 **Exterior Noise Standards.** The City shall require noise mitigation for all development where the projected exterior noise levels exceed those shown in Table EC 1, to the extent feasible.

Table EC 1 - Exterior Noise Compatibility Standards for Various Land Uses

Land Use Type	*Highest Level of Noise Exposure That Is Regarded as "Normally Acceptable"* [a] *(Ldn* [b] *or CNEL*[c]*)*
Residential—Low Density Single Family, Duplex, Mobile Homes	60 dBA[d,e]
Residential—Multi-family	65 dBA
Urban Residential Infill[f] and **Mixed-Use Projects**[g]	**70 dBA**
Transient Lodging—Motels, Hotels	65 dBA
Schools, Libraries, Churches, Hospitals, Nursing Homes	70 dBA
Auditoriums, Concert Halls, Amphitheaters	Mitigation based on site-specific study
Sports Arena, Outdoor Spectator Sports	Mitigation based on site-specific study
Playgrounds, Neighborhood Parks	70 dBA
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75 dBA
Office Buildings—Business, Commercial and Professional	70 dBA
Industrial, Manufacturing, Utilities, Agriculture	75 dBA

SOURCE: Governor's Office of Planning and Research, *State of California General Plan Guidelines 2003*, October 2003

a. As defined in the *Guidelines*, "Normally Acceptable" means that the "specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements."

b. L_{dn} or Day Night Average Level is an average 24-hour noise measurement that factors in day and night noise levels.

c. CNEL or Community Noise Equivalent Level measurements are a weighted average of sound levels gathered throughout a 24-hour period.

d. dBA or A-weighted decibel scale is a measurement of noise levels.

e. The exterior noise standard for the residential area west of McClellan Airport known as McClellan Heights/Parker Homes is 65 dBA.

f. With land use designations of Central Business District, Urban Neighborhood (Low, Medium, or High) Urban Center (Low or High), Urban Corridor (Low or High).

g. All mixed-use projects located anywhere in the City of Sacramento

Because the project is a Mixed-Use Project, the Table EC1 standard that would apply to the residential components of this project affected by transportation noise sources is the 70 dB Ldn standard.

EC 3.1.2 **Exterior Incremental Noise Standards.** The City shall require noise mitigation for all development that increases existing noise levels by more than the allowable increment shown in Table EC 2, to the extent feasible.

Table EC 2 - Exterior Incremental Noise Impact Standards for Noise-Sensitive Uses (dBA)

Residences and buildings where people normally sleep [a]		Institutional land uses with primarily daytime and evening uses [b]	
Existing L_{dn}	**Allowable Noise Increment**	**Existing Peak Hour L_{eq}**	**Allowable Noise Increment**
45	8	45	12
50	5	50	9
55	3	55	6
60	2	60	5
65	1	65	3
70	1	70	3
75	0	75	1
80	0	80	0

SOURCE: Federal Transit Administration, *Transit Noise Impact and Vibration Assessment*, May 2006

a. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.

b. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material.

EC 3.1.3 **Interior Noise Standards.** The City shall require new development to include noise mitigation to assure acceptable interior noise levels appropriate to the land use type: 45 dBA L_{dn} for residential, transient lodgings, hospitals, nursing homes and other uses where people normally sleep; and 45 dBA L_{eq} (peak hour) for office buildings and similar uses.

EC 3.1.4 **Interior Noise Review for Multiple, Loud Short-Term Events.** In cases where new development is proposed in areas subject to frequent, high-noise events, (such as aircraft over-flights, or train and truck pass-bys), the City shall evaluate noise impacts on any sensitive receptors from such events when considering whether to approve the development proposal, taking into account potential for sleep disturbance, undue annoyance, and interruption in conversation, to ensure that the proposed development is compatible within the context of its surroundings.

EC 3.1.5 **Interior Vibration Standards.** The City shall require construction projects anticipated to generate a significant amount of vibration to ensure acceptable interior vibration levels at nearby residential and commercial uses based on the current City or Federal Transit Administration (FTA) criteria.

EC 3.1.8 **Operational Noise.** The City shall require mixed-use, commercial, and industrial projects to mitigate operational noise impacts to adjoining sensitive uses when operational noise thresholds are exceeded.

EC 3.1.9 **Compatibility with Park and Recreation Uses.** The City shall limit the hours of operation for parks and active recreation areas in residential areas to minimize disturbance to residences.

EC 3.1.10 **Construction Noise.** The City shall require development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on these uses, to the extent feasible.

EC 3.1.11 **Alternatives to Sound Walls.** The City shall encourage the use of design strategies and other noise reduction methods along transportation corridors in lieu of sound walls to mitigate noise impacts and enhance aesthetics.

EC 3.2.1 **Land Use Compatibility.** The City shall limit residential development within the 65 dBA CNEL airport noise contour, or in accordance with plans prepared by the Airport Land Use Commission, and shall only approve noise-compatible land uses.

EC 3.2.2 **Hazardous Noise Protection.** The City shall discourage outdoor activities or uses in areas outside the 70 dBA CNEL airport noise contour where people could be exposed to hazardous noise levels.

Sacramento City Code

The Sacramento City Code Chapter 8.68 Noise Control sets limits for exterior noise levels on designated residential property and interior noise levels pertaining to multiple dwelling units (Table 3). The ordinance states that exterior noise shall not exceed 55 dB during any cumulative 30-minute period in any hour during the day (7 a.m. to 10 p.m.) and 50 dB during any cumulative 30-minute period in any hour during the night (10 p.m. to 7 a.m.). The ordinance sets somewhat higher noise limits for time intervals of shorter duration; however, noise in residential areas must never exceed 75 dB during the day and 70 dB at night.

Section 8.68.080.E (Exemptions) states that Noise sources due to the erection (including excavation), demolition, alteration or repair of any building or structure between the hours of seven a.m. and six p.m., on Monday, Tuesday, Wednesday, Thursday, Friday and Saturday, and between nine a.m. and six p.m. on Sunday; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order. The director of building inspections may permit work to be done during the hours not exempt by this subsection in the case of urgent necessity and in the interest of public health and welfare for a period not to exceed three days. Application for this exemption may be made in conjunction with the application for the work permit or during progress of the work.

Table 3
City of Sacramento Noise Ordinance Standards for Agricultural and Residential Property

Cumulative Period	Standards (dB) Day (7 a.m.-10 p.m.) / Night (10 p.m.-7 a.m.)
Exterior Noise Standards [1, 3]	
30 min/hr	55 / 50
15 min/hr	60 / 55
5 min/hr	65 / 60
1 min/hr	70 / 65
Never to exceed	75 / 70
Interior Noise Standards [2, 4]	
5 min/hr	45
1 min/hr	50
Any period of time	55

[1] Noise created over the designated period at any location may not cause the noise levels on a designated agricultural or residential property to exceed these standards.

[2] Noise created over the designated period in an apartment, condominium, townhouse, duplex, or multiple dwelling units may not cause the noise level in a neighboring unit to exceed these standards.

[3] Exterior noise limits must be reduced by 5 dBA for impulsive or simple tone noises, or for noises consisting of speech or music.

[4] If the ambient level exceeds the fifth noise level category for exterior noise standards, the maximum ambient noise level shall be the noise limit for the category.

Source: City of Sacramento Municipal Code Sections 8.68.060 & 8.68.070

The following activities are specifically exempted from the provisions of the City of Sacramento Noise Ordinance:

A. School bands, school athletic and school entertainment events. School entertainment events shall not include events sponsored by student organizations.

B. Outdoor gatherings, public dances, shows and sporting and entertainment events provided said events are conducted pursuant to a discretionary license or permit by the city or county.

C. Activities conducted on parks and public playgrounds, provided such parks and public playgrounds are owned and operated by a public entity.

D. Any mechanical device, apparatus or equipment related to or connected with emergency activities or emergency work.

E. Noise sources due to the erection (including excavation), demolition, alteration or repair of any building or structure between the hours of seven a.m. and six p.m., on Monday, Tuesday, Wednesday, Thursday, Friday and Saturday, and between nine a.m. and six p.m. on Sunday; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order. The director of building inspections may permit work to be done during the hours not exempt by this subsection in the case of urgent necessity and in the interest of public health and welfare for a period not to exceed three days. Application for this exemption may be made in conjunction with the application for the work permit or during progress of the work.

F. Noise sources associated with agricultural operations provided such operations take place between the hours of six a.m. and eight p.m.; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order.

G. Any mechanical device, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during period of adverse weather conditions or when the use of mobile noise sources is necessary for pest control; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order.

H. Noise sources associated with maintenance of street trees and residential area property provided said activities take place between the hours of seven a.m. and six p.m.

I. Tree and park maintenance activities conducted by the city department of parks and community services; provided, however, that use of portable gasoline-powered blowers within two hundred (200) feet of residential property shall comply with the requirements of Section 8.68.150 of this chapter.

J. Any activity to the extent provisions of Chapter 65 of Title 42 of the United States Code, and Articles 3 and 3.5 of Chapter 4 of Division 9 of the Public Utilities Code of the state of California preempt local control of noise regulations and land use regulations related to noise control of airports and their surrounding geographical areas, any noise source associated with the construction, development, manufacture, maintenance, testing or operation of any aircraft engine, or of any weapons system or subsystems which are owned, operated or under the jurisdiction of the United States, any other activity to the extent regulation thereof has been preempted by state or federal law or regulation.

K. Any noise sources associated with the maintenance and operation of aircraft or airports which are owned or operated by the United States. (Prior code § 66.02.203)

EXISTING AND FUTURE NOISE ENVIRONMENTS IN THE PROJECT VICINITY

Existing Noise Sources Affecting the Project Site

The existing ambient noise environment in the project area is defined primarily by traffic on South Watt Avenue and Jackson Road, commercial/light industrial activities to the southwest, L&D Landfill operations to the south, and operations at the Teichert Perkins facility to the north. Existing and proposed operations at the transfer station to the west, and intermittent aircraft over-flights associated with Mather Airport also affect the project site, but to a lesser extent. The project site is not appreciably affected by noise generated within the existing business area bordering the southeast corner of the project (along South Watt Avenue), or by activities on the parcel adjacent to Jackson Road labeled “NAP” on Figure 2.

An existing aggregate conveyor belt system is located on the project site at the position indicated on Figure 1. Noise from this equipment, which is associated with operations at the existing Teichert Perkins facility to the north, contributes to the ambient noise environment on the portions of the project site located in close proximity to the conveyor belt.

Future Noise Sources Affecting the Project Site

To ensure that noise mitigation measures developed for the project will continue to be effective in the future, noise impacts are typically evaluated at a point in time 20 years in the future. Noise sources which may be present 20-years into the future are evaluated in this analysis.

Noise sources which will *almost certainly* be present 20-years into the future will include traffic on South Watt Avenue and Jackson Road, future commercial activities at the northeast corner of the project, intermittent aircraft operations associated with Mather Airport, and traffic on internal roadways within the Aspen I - New Brighton development.

Noise sources which will *likely* be present 20-years into the future include activities the commercial and industrial area to the southwest (although some specific uses within that area will likely change), intermittent agricultural operations at the proposed Community Farm area in the southwest, and operations the transfer station to the west.

Noise sources which *may* be present 20-years into the future include activities the existing Teichert Perkins facility, including ongoing operation of the conveyor belt system located on the project site.

Noise sources which will *not likely* affect the Aspen I - New Brighton development 20-years into the future include activities at the existing L&D Landfill to the south.

Methodology for Assessing Existing and Future Noise Environments

A combination of visual and noise level measurement surveys, use of existing acoustical literature, and application of accepted noise prediction methodologies were used to quantify the existing and future ambient noise environments in the project vicinity. A separate discussion of the effects of each of the major noise sources identified above on the project site is included in the following section.

General Ambient Noise Environment within the Project Site

To generally quantify the existing ambient noise environment in the project area, long-term (continuous) ambient noise level measurements were conducted at six locations around the project perimeter in March and April of 2009. The locations of the continuous noise monitoring sites are shown on Figure 3.

In addition to the long-term surveys, short-term noise monitoring was conducted at six (6) locations on the project site (see Figure 3). These short term sites were used to assist in the identification of noise levels for specific noise sources (i.e. existing conveyor belt operation and Teichert Perkins Facility Operations).

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute. The results of the long-term ambient noise measurement surveys are summarized in Table 4. Appendix B shows a complete listing of the long-term monitoring results, and Appendix C shows a graphical representation of the data. The Table 4 data indicate that existing noise levels at the project site vary, depending on location of the noise monitoring site to the major project area noise sources.

Figure 3

On-Site Noise
Measurement Locations

Legend:

△ Long Term Noise Measurement Sites

○ Short Term Noise Measurement Sites

🟫 Multi Family Residential (25 units/net acre target)

▨ Residential Mixed Use (30 units/net acre target)

🟥 Commercial (0.25 ~ 2.0 FAR)

▨ School (Underlying Residential Zoning)

▨ Urban Farm

▨ Open Space

🟩 Park

🟧 30' x 90' Interior (Minimum) - SFR

🟧 45' x 90' Interior (Minimum) - SFR

🟨 50' x 100' Interior (Minimum) - SFR

🟨 55' x 100' Interior (Minimum) - SFR

400' 1,200'

0 800' 1,600'

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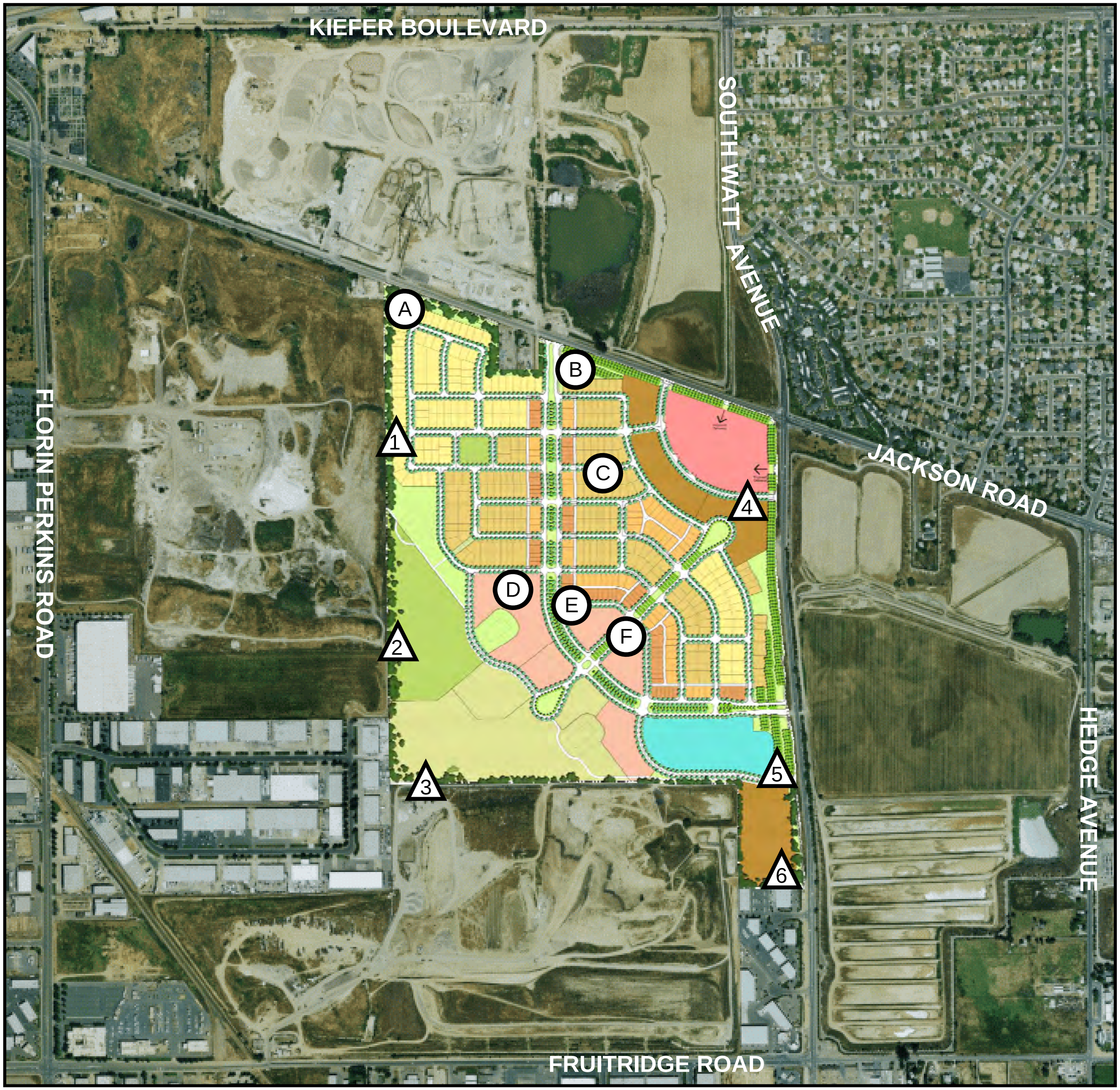

Table 4
Measured Ambient Noise Levels
Aspen I - New Brighton Project Site – City of Sacramento

	Daytime (7 am to 10 pm)		Nighttime (10 pm - 7 am)		
Site[A]	**L_{50}**	**L_{max}**	**L_{50}**	**L_{max}**	**L_{dn}**
1	43-56	57-73	46-56	56-68	57
2	42-56	56-70	45-55	56-67	57
3	44-60	59-81	42-59	53-68	60
4	45-51	61-76	45-54	59-66	58
5	60-67	72-83	48-66	70-79	69
6	49-57	63-77	41-57	61-72	60

[A] See Figure 3 for noise measurement locations

Source: Bollard Acoustical Consultants, Inc. (BAC)

Existing and Future Traffic Noise Levels

To describe noise levels because of traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The FHWA model is based upon the Calveno reference noise factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

Average daily traffic (ADT) volumes were obtained from DKS Associates Transportation Engineers. Truck percentages, the Day/Night traffic split, and vehicle speeds were obtained from BAC field observations, traffic counts, and noise measurement results. The FHWA Model inputs and results are contained in Appendices D-F. Table 5 shows the predicted existing traffic noise levels at a reference distance of 100 feet from the roadway centerlines, as well as the distances to the unshielded L_{dn} contours. It should be emphasized that the Table 5 data do not include any shielding which will be present from intervening topography following completion of site grading.

Table 5
Predicted Existing and Future Traffic Noise Levels
Aspen I - New Brighton Project, Sacramento California

	Ldn @ 100 feet		Distance to Unshielded Future + Project Ldn Contours, feet		
Roadway	**Existing**	**Future + Project**	**60 dB**	**65 dB**	**70 dB**
Jackson Road	67	74	822	382	177
South Watt	71	75	971	451	209
Internal Parkway	N/A	61	113	52	24

Source: FHWA-RD-77-108 with inputs from, Caltrans, DKS Associates, Fehr and Peers, and Bollard Acoustical Consultants 2009

Note that the these levels have not been adjusted to account for site topography, which reduces both the noise level and distances to contours dramatically in locations which will be substantially depressed relative to the roadways.

As noted above, the Table 5 data do not account for the considerable topographic shielding which is present on the site currently, and which will be present on the project site following completion of site grading. Specifically, the proposed residential lots located nearest to Jackson Road will be depressed below that roadway by approximately 10 to 17 feet, with the proposed residential lots nearest to South Watt Avenue ranging from approximately 2 to 20 feet below that roadway elevation.

Analysis of the ambient noise measurement data revealed that existing site topographic shielding currently provides approximately 7 dB of traffic noise reduction at the portions of the project site which are depressed relative to either South Watt Avenue or Jackson Road. BAC used that data in conjunction with proposed site grading plans and the FHWA Noise Barrier Analysis Model to compute the degree of noise reduction provided by topographic shielding which can be expected following site grading. That analysis was conducted at receptors identified as being representative of groups of residences proposed within the Aspen I - New Brighton project.

Three (3) receptors were selected to model representative locations along Jackson Road, five (5) receptors were modeled along South Watt, and two (2) were modeled along the interior parkway. The receptor locations are identified on Figure 4. The results of the topographic shielding analysis for those 10 receptors are provided in Table 6 for cumulative plus project conditions. Based on those results, the approximate locations of the future 60 dB Ldn traffic noise contours were plotted on Figure 4. The Table 6 data and Figure 4 contours represent shielding provided by the elevation differences between the roadways and receivers.

Figure 4

Receptors Analyzed for Traffic Noise and Future Traffic Noise Contours (Adjusted for Site Grading)

Legend:

- ▬ ▬ 60 dB Ldn Contour (Approximate)
- △# Modeled Receiver
- 🟫 Multi Family Residential (25 units/net acre target)
- 🟧 Residential Mixed Use (30 units/net acre target)
- 🟥 Commercial (0.25 ~ 2.0 FAR)
- 🟦 School (Underlying Residential Zoning)
- 🟨 Urban Farm
- 🟩 Open Space
- 🟩 Park
- 🟧 30' x 90' Interior (Minimum) - SFR
- 🟧 45' x 90' Interior (Minimum) - SFR
- 🟨 50' x 100' Interior (Minimum) - SFR
- 🟨 55' x 100' Interior (Minimum) - SFR

400' 1,200'

0 800' 1,600'

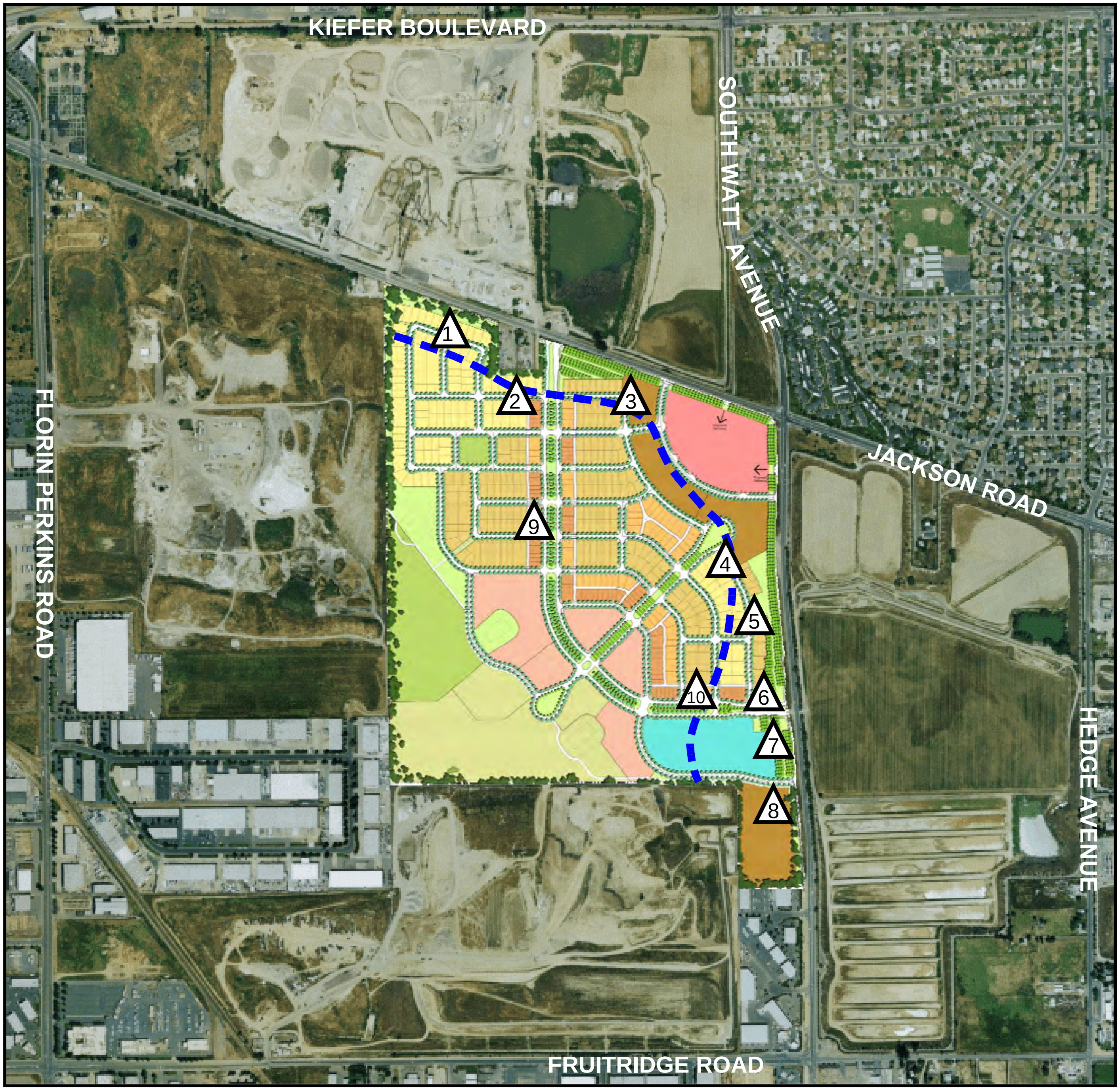

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Table 6
Predicted Future Traffic Noise Levels at Representative Residential Uses After Accounting for Site Grading

Receptor	Description	Future Ldn without Shielding	Topographic Shielding	Future Ldn with Topographic Shielding
1	Nearest Residential to Jackson	70	-6	64
2	Second row of residences[1]	65	-5	60
3	High Density Residential in NE corner	70	-7	63
4	Residential adjacent to park	69	-8	61
5	Residential adjacent to tunnel	72	-6	66
6	Residential adjacent to Parkway	70	-3	67
7	Future School Site	73	0	73[2]
8	High Density Residential south of Parkway	73	0	73[2]
9	Residential along Parkway - S. of Jackson	63	-3	60
10	Residential along Parkway - W of Watt	60	-3	57

Source: FHWA-RD-77-108 with inputs from DKS Associates and Bollard Acoustical Consultants 2009.

1 – Receptor 2 represents residences which are set back one block from the first-row residences and partially shielded from traffic noise by those residences.

2 – Locations 7 & 8 would be exposed to higher traffic noise levels due to reduced topographic shielding relative to other areas of the development site.

The Table 6 data indicate that, due to the considerable acoustic shielding which will result from site grading, the proposed residential areas will be exposed to future traffic noise levels below the 70 dB L_{dn} standard applicable to infill developments. However, portions of the proposed high-density residential development sites in the southeast quadrant of the project are predicted to exceed 70 dB L_{dn}, as are portions of the proposed school site. In addition, elevated second-floor facades of the residential uses proposed nearest to either Jackson Road or South Watt Avenue will not benefit from the same degree of shielding as first-floor outdoor activity areas. Within second-floor bedrooms of those residences, future traffic noise levels could potentially exceed the City of Sacramento 45 dB L_{dn} interior noise level standard. As a result, additional analysis of proposed exterior and interior noise mitigation measures is required to ensure that sufficient noise attenuation is included in the project design to achieve satisfaction with applicable City of Sacramento noise standards. A discussion of recommended noise mitigation measures for potentially impacted residential areas is provided in a later section of this report.

Aircraft Noise

Mather Airport is located approximately 15,000 feet (3 miles) east of the project site, as indicated on Figure 5. Figure 5 also shows the locations of the future 60 dB CNEL contours for Mather Airport (Master Plan and Theoretical Capacity contours). Although aircraft operations associated with Mather Airport can be audible from the project site, due to the considerable distance to that airport the noise contours shown Figure 5 indicate that the project site is located well beyond the future 60 dB CNEL noise contours. As a result, the project site is not considered to be adversely affected by noise from Mather Airport operations and no project-specific noise mitigation measures would be warranted for this noise source.

Future On-Site Commercial and Farm Uses

The proposed future commercial and farm uses within the project site will include noise-generating components. Specifically, noise generated by commercial uses typically results from truck deliveries to loading docks, mechanical ventilation, and parking lot movements. Agricultural operations typically include very intermittent use of farm machinery, typically tractors, during periods of plowing, spraying, and harvesting.

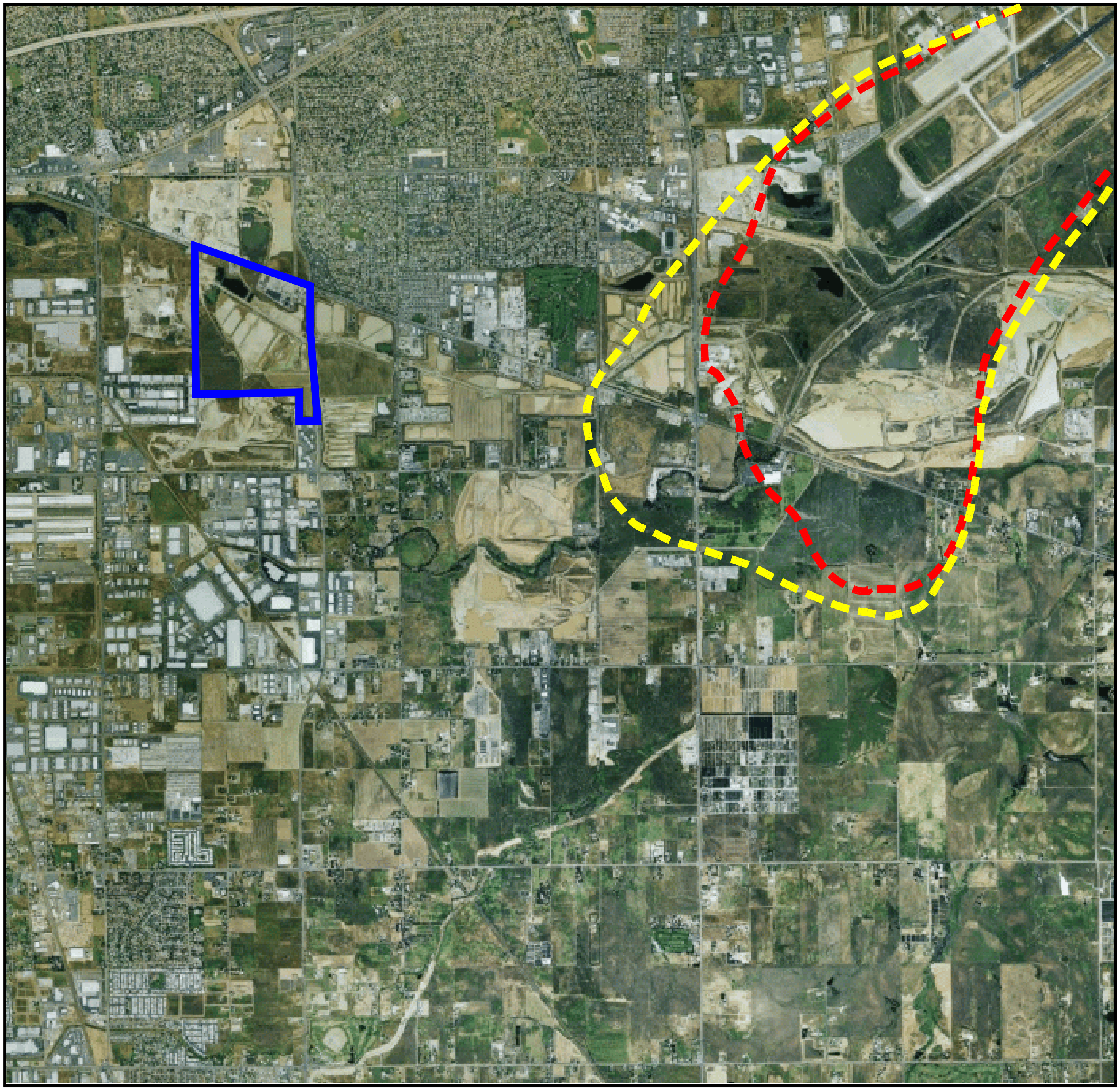
Because site plans for the proposed commercial uses have not yet been developed, the evaluation of specific noise levels at proposed residences within the project site cannot practically be accomplished. However, once such plans have been developed, such an analysis should be conducted and appropriate noise mitigation measures included in the design of the commercial area. A similar assessment of potential noise effects associated with the operation of the Urban farm should be conducted when more information is available for that component of the project.

Figure 5

Future Mather Airport
Noise Contours

Legend:

- 🟦 : Project Site Boundary
- 🟥 : 60 dB CNEL Master Plan
- 🟨 : 60 dB CNEL Theoretical Capacity



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Florin-Perkins Material Recovery Facility / Transfer Station Noise

The Florin-Perkins Material Recovery Facility / Transfer Station (transfer station), is located on the east side of Florin-Perkins Road, south of Jackson Road, immediately west of the Aspen I - New Brighton project site. Figure 6 shows the location of the transfer station relative to the Aspen I - New Brighton project site, and that operations at that facility would occur at least 1,000 feet from the project property boundary.

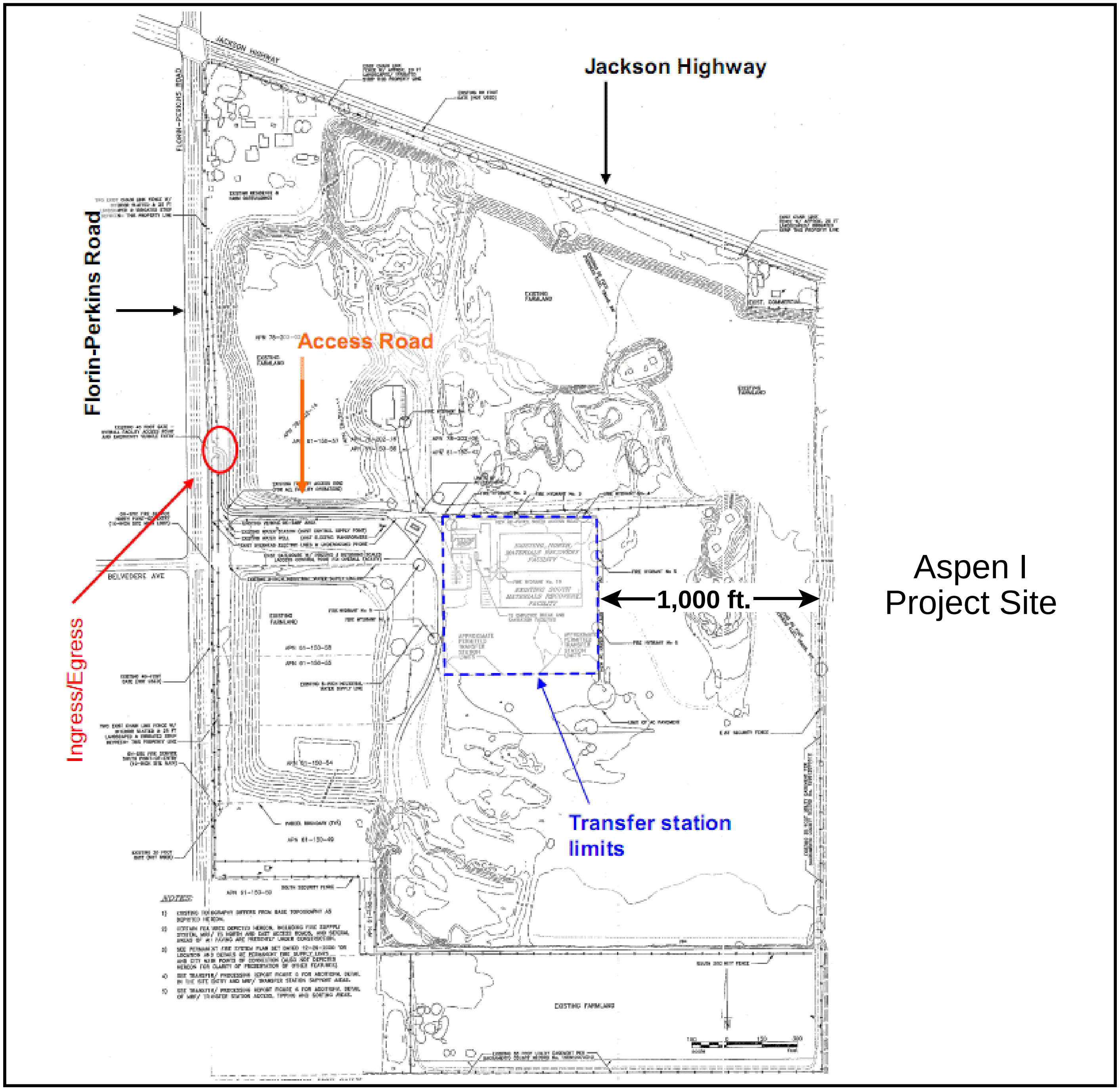
According to the Initial Study (I.S.) prepared for this facility by Sacramento County Department of Environmental Review and Assessment (DERA) in 2008, the site has been used as a material recovery facility and transfer station in the past but is not currently in use. The I.S. was prepared because an application was received to reopen this facility to allow for the operation of a Large Volume Transfer Station and a Materials Recovery Facility at this location. The information contained in that I.S. was used to prepare the following evaluation of potential noise generation at the Aspen I - New Brighton project site.

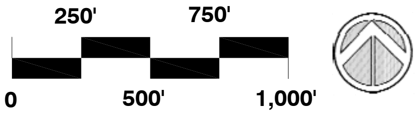
The primary source of continuous, or non-intermittent, noise will reportedly be from processing operations. It was estimated that these operations would produce sustained noise levels of up to 70 dB Leq in the processing area of the Facility. The processing area will be approximately 50 feet away from the tipping access area, where the noise level is expected to be attenuated to approximately 60 dB for the transfer station users. A sustained level of 70 dB Leq at a reference distance of 50 feet from the processing area would be attenuated to approximately 42 dB Leq at the Western boundary of the Aspen I - New Brighton Site. Median (L50) noise levels are always lower than average (Leq) values because the loudest half of the hour is effectively filtered, and the logarithmic nature of the decibel scale causes that loudest half of the hour to elevate average levels above median levels. Therefore, it is likely that Median noise levels associated with processing area activities would be less than 40 dB L50 at the Aspen I - New Brighton project site.

The I.S. reported that sources of transient (non-continuous), noise would include recycled material transfer to containers (such as glass and metal transfer), back-up horns on trucks and facility operations equipment, and Engine noise (during acceleration) from operations equipment and MRF/ LVTS users. The I.S. indicated that these sources could produce maximum noise levels in the range of 85 to 90 dB Lmax in close proximity to those sources. Assuming those levels were reported for a reference distance of 25 feet, maximum noise levels received at the Aspen I - New Brighton project site would be attenuated to approximately 50-55 dB Lmax. Because predicted median (L50) and maximum (Lmax) noise levels associated with the transfer station would be below both daytime and nighttime standards of the City of Sacramento Noise Ordinance, no additional noise mitigation measures would be warranted for this noise source.

Figure 6

Florin Perkins Material Recovery Facility / Transfer Station Location





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Teichert Perkins Facility Noise

The Teichert Perkins facility is located on the north side of Jackson Road, as indicated in Figure 1. The facility includes a ready-mix plant, a rock processing plant, two asphalt plants, stockpiles of processed aggregates, and associated facilities. An aerial photograph of the Teichert Perkins facility is shown in Figure 7a. Operations at the Perkins facility vary depending on demand for aggregate products. Although the facility is permitted to operate 24-hours per day, historic / typical operations at the various components of the facility have been reported as follows:

Rock Plant:	4 a.m. to 3:30 p.m. Monday – Friday.
	Maintenance Shift is 10:30 p.m. – 4:30 a.m.
	Winter shut-down for repairs is typically December – March.
	Last 24-hour operations were in Fall of 2005.
	Current surge pile maintained at approximately two weeks of production capacity.
Asphalt Plants:	6 a.m. to 4 p.m. normally, up to 7 days a week as needed.
	24-hour per day operations permitted when required.
	24-hour per day operations occurring currently.
	Winter shut-down for repairs is typically December – March.
Ready-mix Plant:	6:30 a.m. to 4:30 p.m. normally, up to 7 days a week as needed.
	24-hour per day operations permitted when required.
	Winter shut-down for repairs is typically December – March.

Because the Teichert Perkins facility is permitted to operate 24-hours per day, this report addresses the potential for 24-hour operations at the Perkins facility to adversely affect proposed noise-sensitive land uses on the Aspen I - New Brighton project site.

To quantify the noise emissions of the Perkins facility, BAC conducted noise level measurements at ten (10) locations on the Perkins facility site on May 27, 2009. The Perkins Plant equipment was operating normally during the noise measurement surveys. The measurement results were used with the supplemental on-site short-term measurement data to identify the approximate locations of the 50 and 55 dB L_{50} noise contours for the most significant noise sources present at the Perkins facility. Those particular contours were selected for this analysis since the 55 and 50 dB L_{50} values represent the City of Sacramento Noise Ordinance daytime and nighttime noise level standards, respectively.

Figure 7a shows the approximate locations of the 50 dB L_{50} noise standards for the various components of the Teichert Perkins facility, including the rock plant, asphalt plants, and ready-mix plant. Figure 7b shows just the 50 and 55 dB L50 noise contours for the rock plant, as that is the most significant noise source within the Perkins facility affecting the proposed development. The Figure 7a and 7b contours should be considered approximate as there are several factors which affect the transmission of sound from the Perkins facility to the Aspen I - New Brighton project site. Those factors include the operating parameters of the Teichert Perkins equipment, atmospheric conditions (temperature, wind, relative humidity, gradients, etc.), and intervening topography.

Because portions of the Aspen I - New Brighton site are substantially depressed relative to the elevation of the Perkins Facility, some of the Teichert Perkins equipment is partially or completely shielded from view at the project site, thereby resulting in a reduction in noise. At other locations, however, elevated equipment (such as elevated screens at the Rock Plant), is still visible even in the depressed portions of the site. Although an effort was made to account for as many factors associated with the propagation of sound from the Teichert Perkins facility to the Aspen I - New Brighton site, the contours shown on Figures 7a and 7b should, nonetheless, be considered approximate.

The noise contours shown on Figures 7a and 7b extend by varying amounts into the Aspen I - New Brighton project site. Those contours specifically indicate that the project area is not appreciably affected by noise from asphalt plant operation at the Teichert Perkins facility, but that it is significantly affected by noise from the Rock Plant equipment. Because noise from the rock plant could exceed the City of Sacramento 55 and 50 dB L_{50} daytime and nighttime noise level standard, respectively, and noise from the ready-mix plant could exceed the City's nighttime noise standard, consideration of additional noise mitigation measures for these sources will be necessary for any noise sensitive land uses proposed within the 55 and 50 dB L_{50} noise contours identified in Figures 7a and 7b. A discussion of noise mitigation recommendations follows in a subsequent section of this report.

Figure 7A

Teichert Perkins Facility Location and Locations of 50 dB L_{50} Noise Contours (appx.)

Legend:

50 dB L50 Noise Contours

- - - Rock Plant

- - - Asphalt Plants

······ Ready Mix Plant

🟫 High Density Residential

🟧 Commercial Mixed Use/ High Density Residential

🟥 Commercial

🟦 School (Underlying Residential Zoning)

🟨 Urban Farm

🟩 Open Space

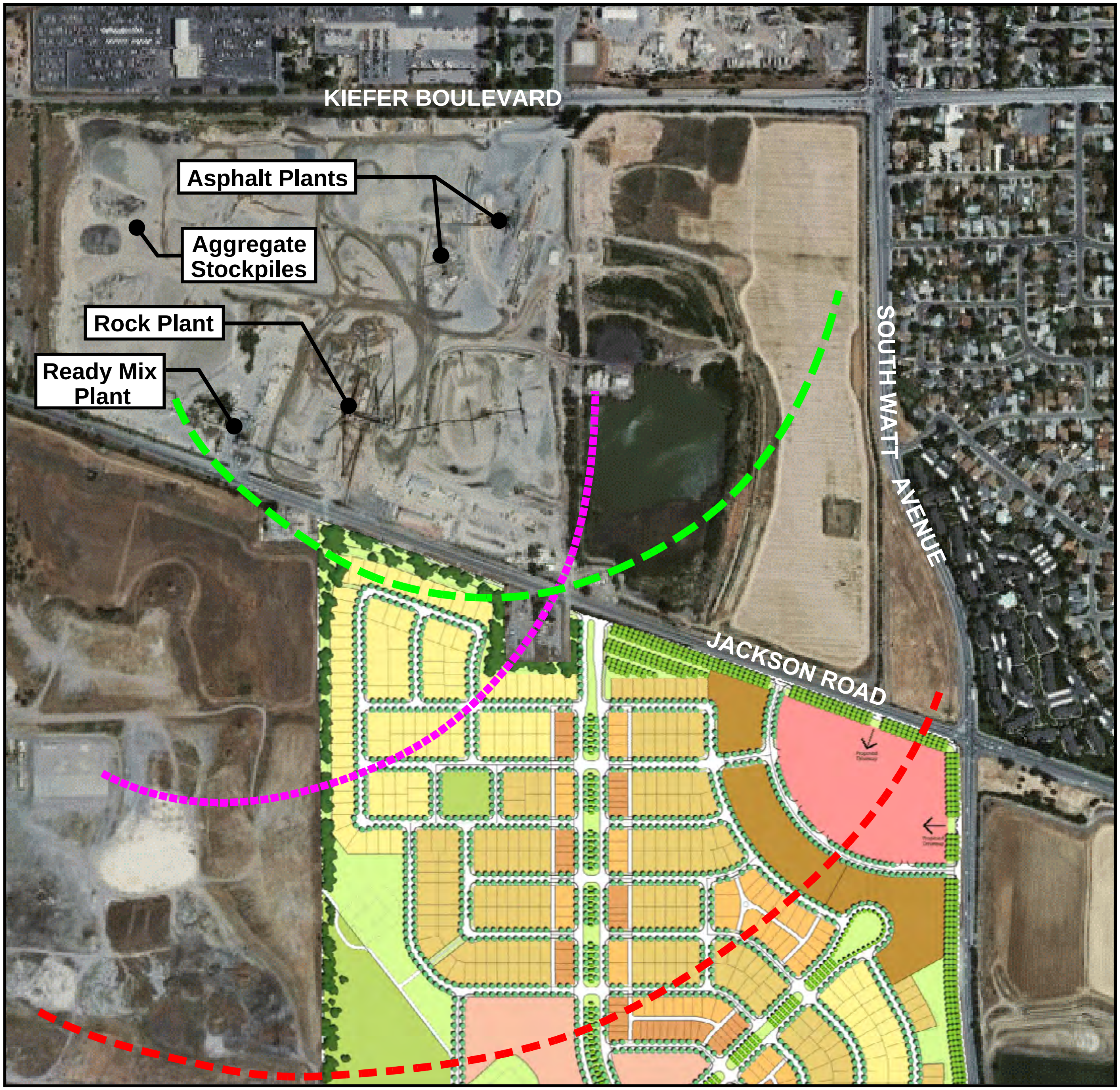
🟩 Park

🟧 30' x 90' Interior (Minimum) - SFR

🟧 45' x 90' Interior (Minimum) - SFR

🟨 50' x 100' Interior (Minimum) - SFR

🟨 55' x 100' Interior (Minimum) - SFR



250' 750'

0 500' 1,000'

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Figure 7B

Teichert Perkins Facility Location and Locations of 50 and 55 dB L_{50} Rock Plant Noise Contours (appx.)

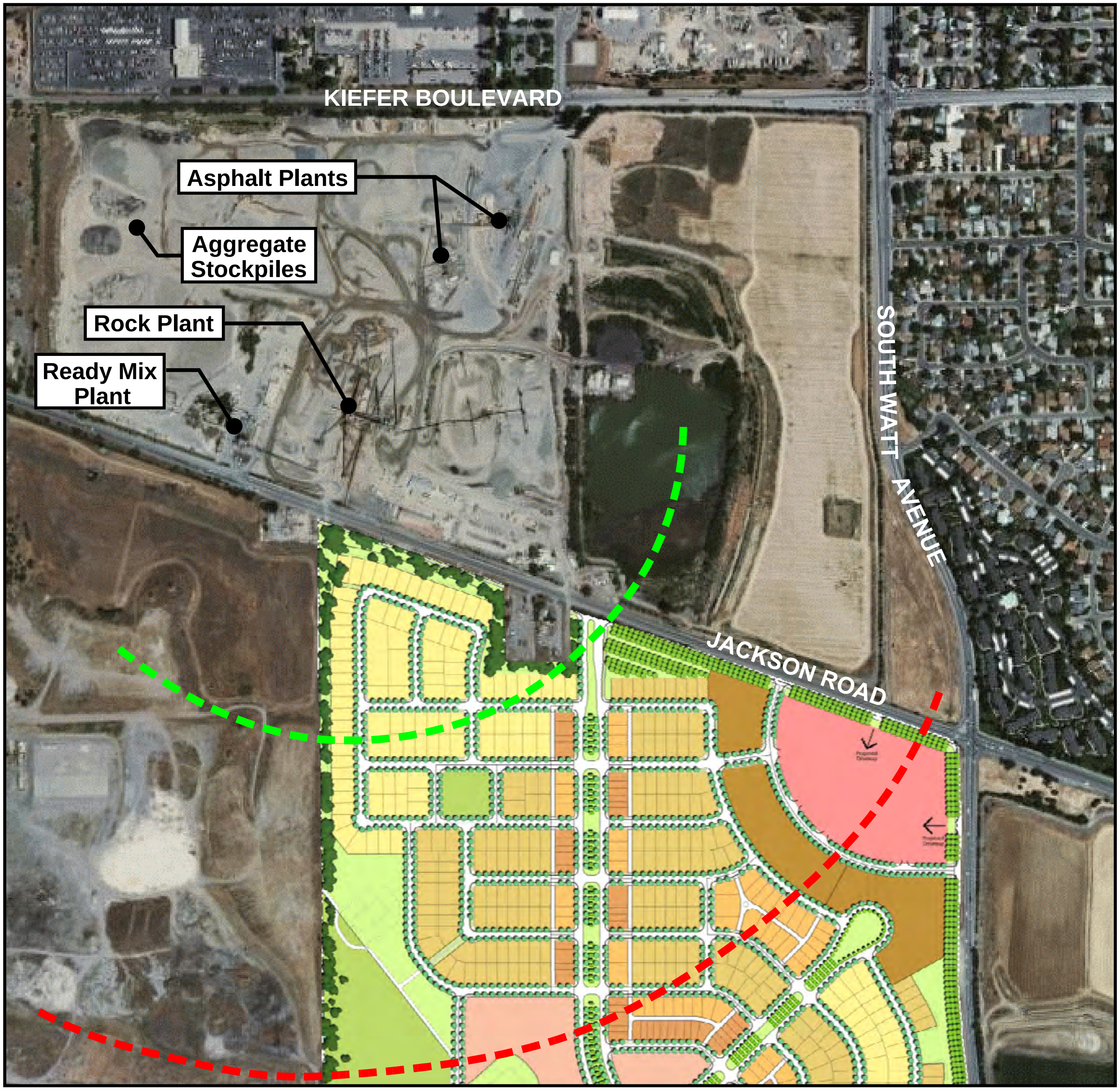
Legend:

Rock Plant Noise Contours

- - - 50 dB L50

- - - 55 dB L50

■ High Density Residential
■ Commercial Mixed Use/ High Density Residential
■ Commercial
■ School (Underlying Residential Zoning)
■ Urban Farm
■ Open Space
■ Park
■ 30' x 90' Interior (Minimum) - SFR
■ 45' x 90' Interior (Minimum) - SFR
■ 50' x 100' Interior (Minimum) - SFR
■ 55' x 100' Interior (Minimum) - SFR



250' 750'
0 500' 1,000'

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Construction Noise

During the construction phases of the project, noise from on-site construction activities would add to the noise environment in the immediate project vicinity. Activities involved in construction would generate maximum noise levels ranging from 85 to 90 dB at a distance of 50 feet. Noise would also be generated during the construction phase by increased truck traffic on area roadways. A significant project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from construction sites. This noise increase would be of short duration, and provided construction activities occur during daytime hours, construction activities would be exempt from the provisions of the City of Sacramento Noise Ordinance (Page 10, Provision "E"). Because on-site construction activities are proposed to adhere to the City's requirements, no adverse on-site construction noise effects are identified for this project.

Off-site project construction would include the creation of a drainage channel from South Watt Avenue to east of Mayhew Road, including the storage of soil generated by the channel excavation at the Mayhew Acquisition site. In addition, off-site construction would include the transfer of fill material from the Aspen III borrow area for Aspen I site grading. The locations of the drainage channel, borrow areas, and soil placement areas are identified on Figure 10.

Heavy earthmoving equipment including scrapers, graders, compactors, off-road trucks, excavators, and water trucks will be utilized for the channel construction, borrow area material transfer, and soil placement. As with on-site construction activities, noise generated during these off-site construction activities would generate maximum noise levels ranging from 85 to 90 dB at a distance of 50 feet. Median noise levels would be approximately 80 dB L_{50} at the 50 foot reference distance.

If off-site construction were to occur during daytime hours, the noise generation of those activities would be exempt from the city and county noise ordinance provisions. If, however, off-site construction activities were to occur during nighttime hours, it would be subject to the 50 dB nighttime noise level standard of the City and County of Sacramento at existing residential uses.

Because construction equipment and locations will be variable, the noise generation of off-site construction activities will similarly be variable. Using standard sound propagation algorithms the distance to the 50 dB L_{50} exterior noise level contour was conservatively computed to be approximately 1,400 feet from off-site construction areas utilizing the above-described heavy earthmoving equipment, not accounting for shielding provided by the depressed construction area. Therefore, any nighttime off-site construction activities occurring within 1,400 feet of an unshielded existing residence could result in noise impacts relative to the City and County of Sacramento nighttime noise standards.

BAC conducted a visual survey of all residences located within 1,400 feet of the channel construction, borrow areas, and soil storage areas shown on Figure 10 to determine the degree of shielding which could be expected from the depressed elevation of the construction areas. From that survey, it was determined that only the 3-4 existing residences located on Newton

Drive would be potential exposed to excessive noise levels during nighttime channel construction activities. Specifically, noise generated during nighttime channel construction activities would be approximately 60 dB L_{50} at these residences. As a result, drainage channel construction activities should be limited to daytime hours when within 1,400 feet of existing residences located on Newton Drive. If a beltline is used to transport soil and aggregate materials from the off-site construction areas rather than haul trucks, the noise generation of the beltline would be negligible and not subject to the 1,400 foot setback requirement.

With respect to nighttime construction activities within the borrow areas identified in Figure 10, the visual survey revealed that, in addition to the existing residences on Newton Drive, there are residential locations north of Jackson Highway, Hedge Avenue, and Fruitridge Road which are within 1,400 feet of the borrow area and only partially shielded by intervening topography. As a result of the proximity of these sensitive areas to the proposed borrow area, and the lack of shielding which would be provided to many of these areas, nighttime construction activities within 1,400 feet of unshielded locations are not recommended. As with the channel construction, if a beltline is used to transport soil and aggregate materials from the off-site construction areas rather than haul trucks, the noise generation of the beltline would be negligible and not subject to the 1,400 foot setback requirement.

With respect to nighttime construction activities within the Mayhew Acquisition soil storage areas identified in Figure 10, the visual survey revealed that there is one residence on the south side of Jackson Highway which could potentially be affected. As a result of the proximity of this sensitive area to the proposed soil storage area, and the lack of shielding which would be provided to this area, nighttime construction activities within 1,400 feet of this residence are not are not recommended. Again, if a beltline is used to transport soil and aggregate materials from the off-site construction areas rather than haul trucks, the noise generation of the beltline would be negligible and not subject to the 1,400 foot setback requirement.

Noise Generated at Commercial and Light-Industrial Uses to the Southwest

As indicated in Figure 1, there are existing commercial and light-industrial land uses to the southwest. Specific businesses located in this area include, but are not limited to, Kearney's Painting and Collision Repair, Ultimate Linings (spray on truck bed linings), Simas Woodworking, American Stripping, SMI Transmissions, Aramark, and Elevator Controls. During BAC field surveys, it was noted that some of those uses generate clearly audible noise levels at the Aspen I - New Brighton project site, and that noise generated by what appears to be a cyclone at American Stripping was particularly elevated.

Continuous noise measurement Site 3 (See Figure 3) was located closest to the existing businesses in question. Appendix C-3 indicates that, between the hours of 6 am and 5 pm, a marked increase in noise was noted. This is believed to be due for the most part to the cyclone at American Stripping. Using that noise level data, the approximate locations of the 55 and 50 dB L_{50} noise contours were plotted for these businesses, and those noise contours are provided in Figure 8. Because the noise generation of cyclone is steady-state and not intermittent, it is subject to the more restrictive L50 standards, rather than the higher Lmax standards.

The noise contours shown on Figure 8 indicate that the project area is affected by noise generated within this business park. Inspection of the project development plan shown in Figure 2, however, reveals that the portion of the project site nearest this industrial noise source is proposed for use as a Community Park and urban farm, which are not noise-sensitive. As a result, no adverse noise impacts are identified from the existing noise sources located in the light industrial area adjacent to the southwest corner of the Aspen I - New Brighton project site.

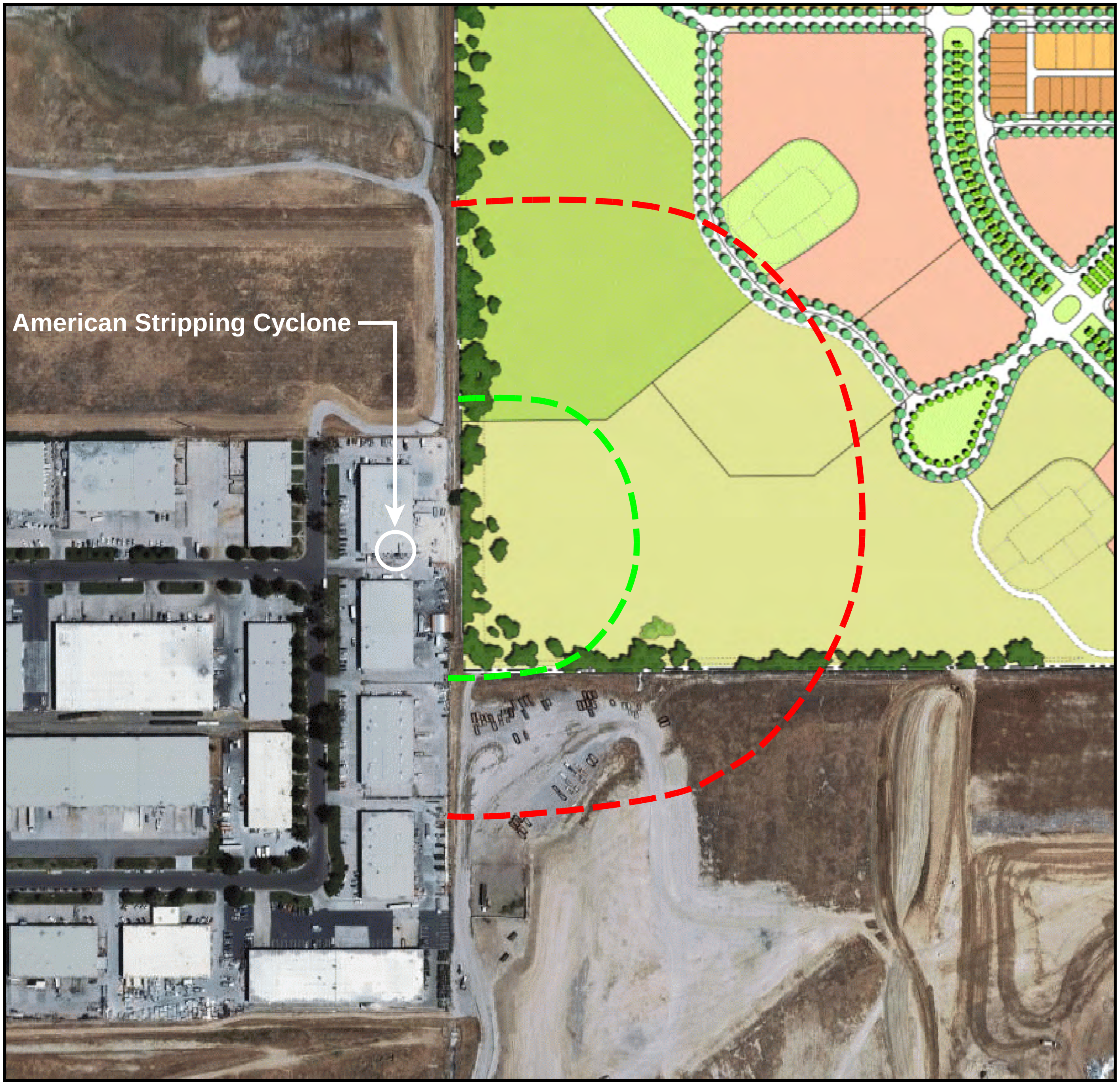
Figure 8

Businesses Near the SW Project Corner and Location of 50 and 55 dB L_{50} Noise Contour (appx.)

Legend:

American Stripping Noise Contours

🟥 - - -	50 dB L50
🟩 - - -	55 dB L50
🟫	High Density Residential
🟧	Commercial Mixed Use/ High Density Residential
🟥	Commercial
🟦	School (Underlying Residential Zoning)
🟨	Urban Farm
🟩	Open Space
🟩	Park
🟧	30' x 90' Interior (Minimum) - SFR
🟧	45' x 90' Interior (Minimum) - SFR
🟨	50' x 100' Interior (Minimum) - SFR
🟨	55' x 100' Interior (Minimum) - SFR



125' 375'
0 250' 500'

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Vibration

Extensive field inspections of both the project site and neighboring uses revealed no discernable sources of vibration which would adversely affect future sensitive land uses located within the project area. In addition, the project does not propose any appreciable sources of vibration, so vibration impacts either due to the project, or upon the project, are not anticipated. As a result, no vibration mitigation measures would be warranted for this project.

Noise Generated by Ongoing Operation of Aggregate Conveyor Belt on the Project Site

As noted previously, the conveyor belt that supplies raw aggregate materials to the Teichert Perkins facility currently runs through the Aspen I - New Brighton project site. The conveyor typically begins operations the same time as the Perkins Rock plant, and continues to operate an hour after the Rock Plant stops to clear the belt of aggregate material.

To quantify the noise emissions of the conveyor belt, BAC conducted noise level measurements at locations near the operating conveyor on April 29, 2009. The conveyor measurement results were used to identify the approximate locations of the 50 and 55 dB L_{50} noise contours for that equipment, which are shown on Figure 9. The 55 and 50 dB L_{50} values represent the City of Sacramento Noise Ordinance daytime and nighttime noise level standards, respectively.

The noise contours shown on Figure 9 cover a substantial portion of the Aspen I - New Brighton project site. Because noise from the conveyor would exceed the City of Sacramento 55 and 50 dB L_{50} daytime and nighttime noise level standards, respectively, consideration of additional noise mitigation measures for these sources will be necessary at such a time as project development encroaches within the 55 and 50 dB L_{50} noise contours identified in Figure 9. A discussion of noise mitigation recommendations follows in a subsequent section of this report.

Project-related Increase in Off-Site Traffic Noise Levels

Appendices E and F contain the FHWA Highway Traffic Noise Prediction Model inputs and predicted traffic noise levels with and without the project. Specific comparison of Appendices E-1 to F-1 indicates that daily traffic volumes on Jackson Road and South Watt Avenue would increase by approximately 3,200 and 8,800 vehicles due to the project. These increases translate to percentages of 6% and 18%, respectively. Because a doubling of traffic volume (100% increase) is required to achieve a 3 dB increase in traffic noise, the project related increases in traffic noise on these two roadways would be considerably less than 3 dB. Specifically, traffic noise increases on Jackson Road and South Watt Avenue are predicted to be 0.3 to 0.7 dB Ldn, respectively. Because these increases are below the City of Sacramento thresholds shown in Table EC-2, no adverse noise impacts are identified at off-site locations due to project-related increase in off-site traffic noise levels.

Figure 9

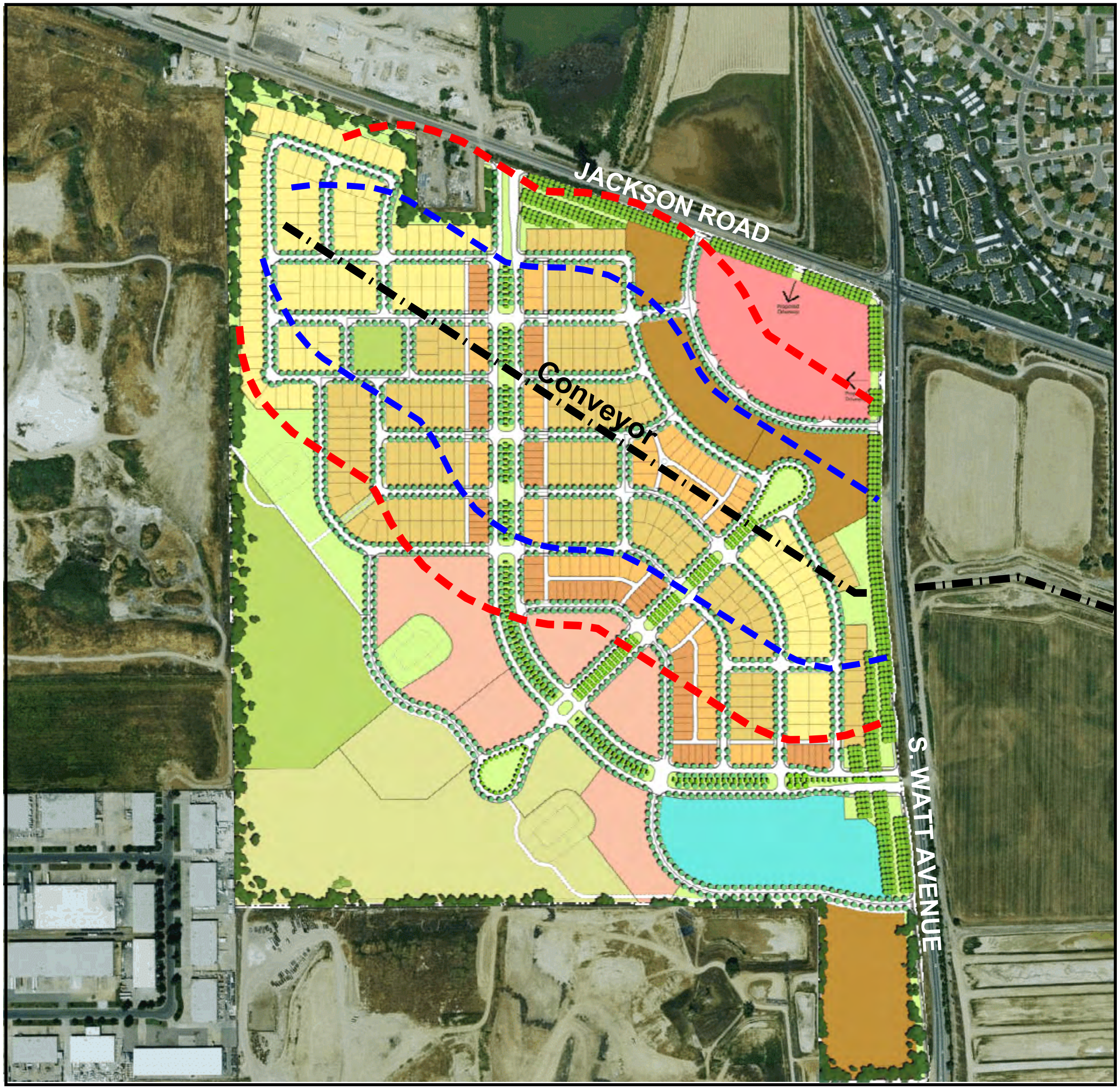
Conveyor Belt Noise Contours

Legend:

Conveyer Belt Noise Contours

- 50 dB L50
- 55 dB L50

- High Density Residential
- Commercial Mixed Use/ High Density Residential
- Commercial
- School (Underlying Residential Zoning)
- Urban Farm
- Open Space
- Park
- 30' x 90' Interior (Minimum) - SFR
- 45' x 90' Interior (Minimum) - SFR
- 50' x 100' Interior (Minimum) - SFR
- 55' x 100' Interior (Minimum) - SFR



200' 600'
0 400' 800'

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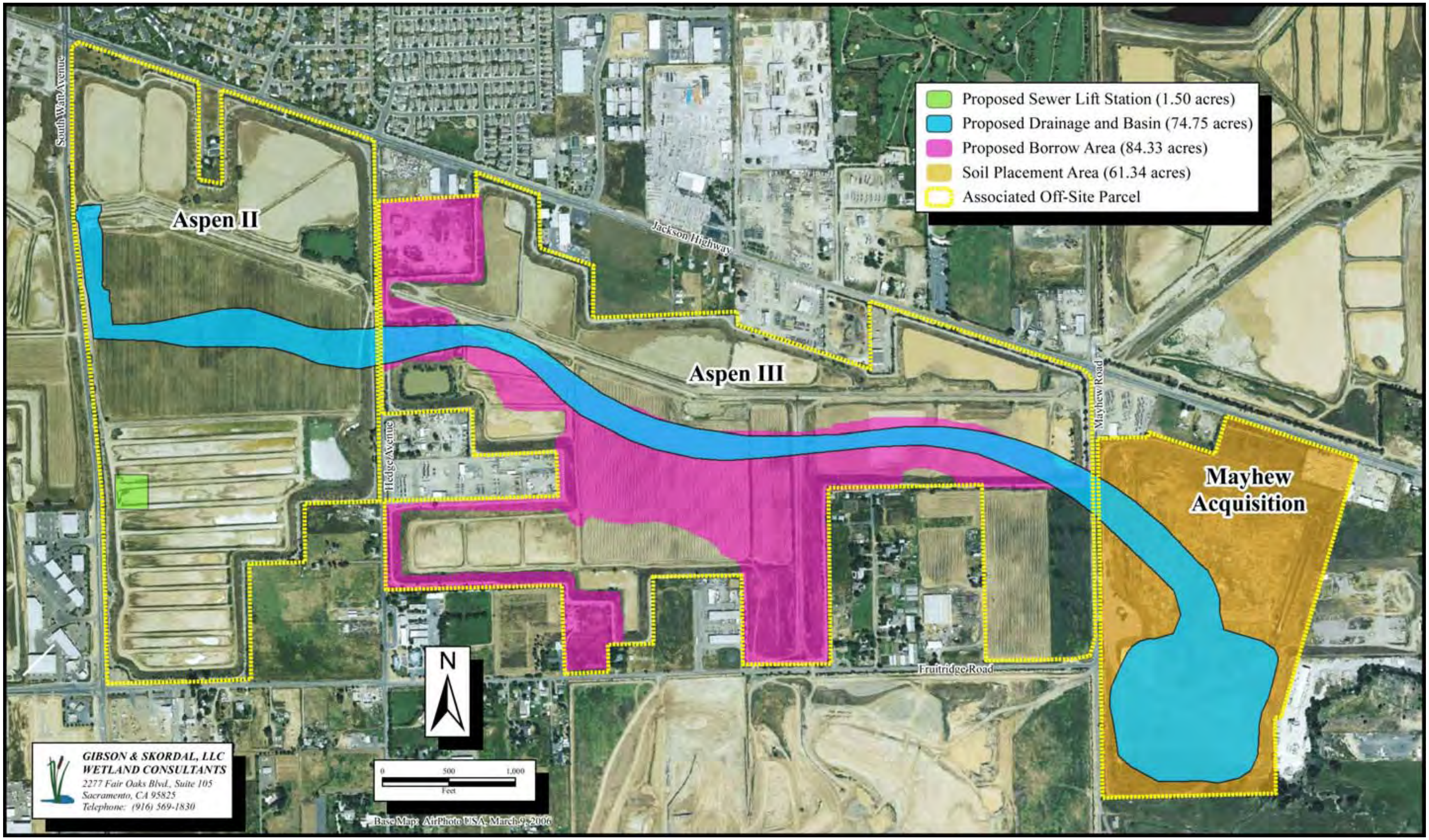
Figure 10

Offsite Drainage Channel & Borrow Area



Base Map: AirPhoto USA, March 9, 2006

NOISE IMPACT SUMMARY

This analysis concludes that the proposed Aspen I - New Brighton development will not be adversely impacted by some existing noise sources in the project vicinity, whereas others may generate noise levels in excess of applicable City of Sacramento noise standards. A summary of noise impacts considered both potentially significant and less than significant follows. Where potentially significant noise impacts have been identified, noise mitigation options and recommendations are provided in the following section.

Noise Impacts Considered Less-Than-Significant

The following specific noise impacts have been evaluated and determined to be less than significant. No additional noise mitigation measures would be warranted for these less-than-significant impacts.

1. Project-related traffic noise level increases at off-site noise-sensitive areas.

2. Mather Airport noise at proposed noise-sensitive land uses proposed within the project site.

3. Florin-Perkins Material Recovery Facility / Transfer Station Noise.

4. Project Construction Noise.

5. Noise generated by existing businesses near the southwest corner of the project site (e.g. American Stripping).

6. Project-generated vibration affecting off-site sensitive areas and vibration generated by existing uses in the project vicinity affecting the proposed project development.

Noise Impacts Considered Potentially Significant

The following specific noise impacts have been evaluated and determined to be potentially significant. Additional noise mitigation measures would be warranted for these potentially-significant impacts.

1. Jackson Road and South Watt Avenue traffic noise levels may exceed City of Sacramento interior noise standards at some proposed residential areas located near those roadways, and South Watt Avenue traffic noise is predicted to exceed 70 dB Ldn at portions of the site designated for High-Density Residential uses and the proposed school site.

2. Noise generated by operations at the Teichert Perkins facility, including conveyor belt operations at the Aspen I - New Brighton site, exceeds City of Sacramento noise standards at some proposed residential areas within the project site.

NOISE MITIGATION OPTIONS AND RECOMMENDATIONS

As noted in the previous section, potentially-significant noise impacts have been identified for this project due to both off-site traffic noise and noise generated at the Teichert Perkins facility. The following provides a discussion of noise mitigation fundamentals and specific noise mitigation measures geared toward reducing identified impacts to a level of insignificance.

Noise Mitigation Fundamentals

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. The appropriate acoustical treatment for a given project should consider the nature of the noise source and the sensitivity of the receiver. The problem should be defined in terms of appropriate criteria (Ldn, L_{50}, or Lmax), the location of the sensitive receiver (inside or outside), and when the problem occurs (daytime or nighttime). Noise control techniques should then be selected to provide an acceptable noise environment for the receiving property while remaining consistent with local aesthetic standards and practical structural and economic limits. Fundamental noise control techniques include the following:

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally about 4 to 6 dB per doubling of distance from the source. For this project, setbacks have been included in the form of wide center medians on the major internal roadways and landscape areas along South Watt Avenue.

Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 3-4 lbs./square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line of sight to all significant noise sources.

Earth, in the form of berms, or the face of a depressed area, is also an effective barrier material. This project design makes extensive use of topography and site grading to serve as both visual and acoustic barriers to nearby traffic and some on-site noise sources associated with the Teichert Perkins facility.

There are practical limits to the noise reduction provided by barriers. For traffic noise, a 5 to 10 dB noise reduction may often be reasonably attained. A 15 dB noise reduction is usually difficult but sometimes possible to attain, but a 20 dB noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall may provide additional attenuation over that attained by a solid wall alone due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons over solid barrier walls alone.

Site Design

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise level caused by reflections. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise. As an example, carports or garages can be used to form or complement a barrier shielding adjacent dwellings or an outdoor activity area. Similarly, one residential unit can be placed to shield another so that noise reduction measures are needed for only the building closest to the noise source. Placement of outdoor activity areas within the shielded portion of a building complex, such as a central courtyard, can be an effective method of providing a quiet retreat in an otherwise noisy environment. Patios or balconies should be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield sensitive uses.

Another useful option in site design is the placement of relatively insensitive land uses, such as commercial uses, between the noise source and a more sensitive portion of the project. Examples include development of a commercial strip along a busy arterial to block noise affecting a residential area. This measure has been incorporated in the northeast project quadrant, where commercial uses are proposed at the intersection of two noisy roadways (Jackson Road and South Watt Avenue). If existing topography or development adjacent to the project site provides some shielding, as in the case of an existing berm, knoll or building, sensitive structures or activity areas may be placed behind those features to reduce noise control costs. As discussed above, the project site has been designed to take advantage of existing topographic shielding.

Site design should also guard against the creation of reflecting surfaces which may increase onsite noise levels. For example, two buildings placed at an angle facing a noise source may cause noise levels within that angle to increase by up to 3 dB. The open end of "U"-shaped buildings should point away from noise sources for the same reason. Landscaping walls or noise barriers located within a development may inadvertently reflect noise back to a noise-sensitive area unless carefully located. Avoidance of these problems while attaining an aesthetic site design requires close coordination between local agencies, the project engineer and architect, and the noise consultant.

Building Design

When structures have been located to provide maximum noise reduction by site design or barriers, noise reduction measures may still be required to achieve an acceptable interior noise environment. The cost of such measures may be reduced by placement of interior dwelling unit features. For example, bedrooms, living rooms, family rooms and other noise-sensitive portions of a dwelling can be located on the side of the unit farthest from the noise source.

Bathrooms, closets, stairwells and food preparation areas are relatively insensitive to exterior noise sources, and can be placed on the noisy side of a unit. When such techniques are employed, noise reduction requirements for the building facade can be significantly reduced, although the architect must take care to isolate the noise impacted areas by the use of partitions or doors.

Noise Reduction by Building Facades

When interior noise levels are of concern in a noisy environment, noise reduction may be obtained through acoustical design of building facades. Standard residential construction practices provide 10 to 15 dB noise reduction for building facades with open windows, and approximately 25 dB noise reduction when windows are closed. Thus a 25 dB exterior-to-interior noise reduction can be obtained by the requirement that building design include adequate ventilation systems, allowing windows on a noise-impacted facade to remain closed under any weather condition.

Where greater noise reduction is required, acoustical treatment of the building facade is necessary. Reduction of relative window area is the most effective control technique, followed by providing acoustical glazing (thicker glass or increased air space between panes) in low air infiltration rate frames, use of fixed (non-movable) acoustical glazing or the elimination of windows on the noisiest facades.

Noise transmitted through walls can be reduced by increasing wall mass (using stucco or brick in lieu of wood siding), isolating wall members by the use of double- or staggered- stud walls, or mounting interior walls on resilient channels. Noise control for exterior doorways is provided by reducing door area, using solid-core doors, and by acoustically sealing door perimeters with suitable gaskets. Roof treatments may include the use of plywood sheathing under roofing materials.

Whichever noise control techniques are employed, it is essential that attention be given to installation of weather-stripping and caulking of joints. Openings for attic or subfloor ventilation may also require acoustical treatment; tight-fitting fireplace dampers and glass doors may be needed in aircraft noise-impacted areas.

Use of Vegetation

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of traffic noise. Thus the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.

Sound Absorbing Materials

Absorptive materials such as fiberglass, foam, cloth and acoustical tiles or panels are used to reduce reflections or reverberation in closed spaces. Their use in exterior environmental noise control may reduce reflections between parallel noise barriers or other reflective surfaces. Maintenance of absorptive materials used outdoors may be difficult, as most such materials are easily damaged by sunlight and moisture. Their application as an outdoor noise control tool is limited to special cases where the control of reflected noise is critical and where the material is sufficiently durable.

Noise-Reducing Paving Materials (Rubberized Asphalt)

Studies conducted for the Sacramento County Department of Environmental Review and Assessment and Transportation Department to determine the noise reduction provided by rubberized asphalt have been completed in recent years. Those studies indicate that the use of rubberized asphalt on two County roadways appears to have resulted in an average traffic noise level reduction of approximately 4 dB over that provided by conventional asphalt.

The European Commission Green Paper, published in the June 1997 edition of Noise/News International, cites the following on Page 87:

> Low-noise porous road surfaces have been the subject of much research. These porous road surfaces reduce both the generation and propagation of noise by several mechanisms - which can be related to the open structure of the surface layer. Results have shown that the emission noise levels can be reduced from levels generated on equivalent non-porous road surfaces by between 3-5 dB(A) on average; by optimizing the surface design, larger noise reductions are feasible. At present, the cost of porous asphalt surfacing is higher than conventional surfaces (for resurfacing, but for new roads, the cost is minimal), but may drop as contractors gain experience with porous surfaces. The material is also less durable. However, improvements are being made to durability and, in many countries, these materials are already being used as part of normal road construction in noise-sensitive areas.

Project-Specific Noise Mitigation Recommendations for Identified Traffic Noise Impacts

As noted in Table 6 and as shown in Figure 4, future traffic on Jackson Road and South Watt Avenue is predicted to generate elevated noise levels at portions of the project site located nearest to those roadways. The potential for adverse noise impacts would be present within second-floor rooms of proposed low-density residences despite extensive shielding of traffic noise by intervening topography at first-floor areas. In addition, the City's 70 dB L_{dn} exterior standard applicable to infill residential uses is predicted to be exceeded at portions of the proposed High-Density residential development site at the southeast portion of the Aspen I - New Brighton site. As a result, additional reduction of traffic noise would be required for this project for those two affected areas. The applicant has expressed a desire to avoid the use of solid noise barriers as mitigation options where possible. As a result, this analysis considers such barriers only after all other options.

The project has been designed with front-loaded residences proposed along major internal roadways. The benefit of this design is that outdoor activity areas (backyards typically), are located further from the roadway and those areas are shielded from roadway noise by the residence, which serves as an effective noise barrier. As a result, no adverse noise impacts are identified for residences located adjacent to the internal project roadways.

The following specific traffic noise mitigation measures are recommended for this project:

A. **Building Façade Improvements.**

All second-floor windows of residences constructed within 250 feet of the centerline of either South Watt Avenue or Jackson Road from which those roadways are visible shall have a minimum Sound Transmission Class Rating of 33.

B. **Mechanical Ventilation.**

Mechanical ventilation should be provided for all residences constructed in traffic noise environments exceeding 60 dB Ldn (see contour on Figure 4). This measure will allow occupants of those residences to close doors and windows as desired for additional acoustical isolation.

C. **Site Design for Medium and High-Density Residential Uses.**

The medium and high-density developments proposed along South Watt Avenue shall be designed to maximize the setback between that roadway and proposed common outdoor activity areas. In addition, those common outdoor activity areas shall be located so as to be completely shielded from view of South Watt Avenue by intervening structures or topography.

D. **Site and Construction Design for Proposed School Use.**

The proposed school shall be designed to maximize the setback between school classroom areas and South Watt Avenue. In addition, school classrooms shall be designed to provide an exterior to interior noise level reduction sufficient to reduce traffic noise levels within classrooms to 45 dB Leq or less during hours in which school is normally in session.

E. **Disclosure Statements.**

All prospective residents of residences located within 250 feet of either Jackson Road or South Watt Avenue should be provided statements disclosing that both roadways are substantial noise sources and that variation in traffic conditions or atmospheric conditions can result in variations in perceived noise levels.

Project-Specific Noise Mitigation Recommendations for Identified Noise Impacts Associated with Teichert Perkins Facility Operations

As noted in Figures 7a and 7b, existing operations at the Teichert Perkins facility generate noise levels in excess of the City of Sacramento noise level standards for new residential uses at portions of the project site. The specific areas which are potentially impacted are those areas of the project site which are proposed for residential uses within the noise contours shown on Figure 7a for nighttime operations of all plants (rock, asphalt, and ready-mix), and on Figure 7b for daytime and nighttime operation of the rock plant. If the Teichert Perkins facility will continue to be in operation as residences are constructed within the noise contours shown on Figures 7a or 7b, additional mitigation measures would be required for theses noise sources.

As previously discussed, the most significant of the Teichert Perkins noise sources in terms of impact upon the Aspen I - New Brighton project site is the Rock Plant. Because much of the crushing and screening equipment associated with that plant is elevated, the degree of screening of that elevated equipment achieved by site topography and grading is negligible. As a result, options for mitigating noise generated at the Perkins facility at the Aspen I - New Brighton are few. Therefore, mitigation measures would need to be implemented at the Teichert facility in order to reduce Teichert-generated noise levels to a state of compliance with City of Sacramento noise ordinance standards.

The following specific noise mitigation measures apply if operations of the Teichert Perkins facility will continue to occur after the construction of residences within the noise contours shown on Figure 7.

A. Disclosure Statements.

All prospective residents of residences located within the noise contours shown on Figure 7 should be provided statements disclosing that operations at the Teichert Perkins facility can and do occur at night, and that variations in those operations or atmospheric conditions can result in variations in perceived noise levels.

B. Implementation of Source Noise Controls at Teichert Perkins Rock and Ready-Mix Plants.

Project development shall not extend into the noise contours shown on Figures 7a or 7b until such a time as either operations at the Teichert Perkins facility have ceased, or until a Comprehensive analysis of the specific noise generation of each major component of the Teichert rock and ready-mix plants has been undertaken to identify appropriate source noise control treatment options, and such treatments have been implemented. The focus of such options is the overall reduction in noise generation of those plants such that noise levels received within the Aspen I - New Brighton development would ultimately satisfy the Sacramento Noise Ordinance Standards during daytime and nighttime hours, respectively. Source noise control measures which shall be considered include the following:

1. Suspension of acoustic curtains adjacent to the noisiest plant equipment.
2. Complete or partial enclosure of the noisiest plant equipment.
3. Ensuring that all screen-decks utilize quiet technology such as urethane screens.
4. Line aggregate chutes and hoppers with heavy urethane sheets to both dampen the metal structures and minimize impact noise associated with aggregates falling onto metal surfaces.
5. Utilize alternatives to backup beeper warning devices such as strobes, radar based systems, growlers, etc.
6. Replacement of older noisier equipment with quieter equipment.

Project-Specific Noise Mitigation Recommendations for Identified Noise Impacts Associated with Ongoing Operation of the Teichert Conveyor Belt

As noted in Figure 9, existing operation of the Teichert Perkins facility conveyor belt on the Aspen I - New Brighton site generates noise levels in excess of the City of Sacramento noise level standards for new residential uses at portions of the project site. The specific areas that are potentially impacted are proposed residential areas of the project site within the 50 dB L_{50} noise contours shown on Figure 9. If the Teichert Perkins facility conveyor will continue to be in operation as residences are constructed within the Aspen I - New Brighton project site, additional noise mitigation measures would be required for the conveyor-generated noise.

The following specific noise mitigation measures apply if operation of the Teichert Perkins facility conveyor system on the Aspen I - New Brighton site will continue to occur during construction of residences within the noise contours shown on Figure 9.

A. Disclosure Statements.

All prospective residents of residences located within the noise contours shown on Figure 9 should be provided statements disclosing that operations at the Teichert conveyor operations can and do occur during both daytime and nighttime hours, and that variations in those operations or atmospheric conditions can result in variations in perceived noise levels.

B. Relocation of Conveyor System.

At such a time as development within the project site is projected to encroach into the noise contours shown on Figure 9, the conveyor system could be relocated to a position closer to Jackson Highway to create a greater buffer between the current residential construction and the noise impact contours of the conveyors. While this measure would shift the noise impact zone of the conveyors further to the north of the site, allowing more of the site to be developed prior to reaching that impact zone, it would not by itself decrease the actual noise generation of the conveyor system. As a result, eventually additional noise mitigation measures would be required as development moves closer to the relocated conveyor system.

C. Construction of Earth Berms and / or Noise Barriers Adjacent to the Conveyor System.

At such a time as development within the project site is projected to encroach into the noise contours shown on Figure 9, either with the conveyor system in its current configuration, or following relocation of the conveyor (mitigation option B above), a solid noise barrier could be constructed adjacent to the conveyor system to further reduce noise levels at residences constructed within the project site. Such a barrier could take the form of an earthen berm, solid wall, or combination of berms and walls. The noise reduction provided by such a barrier would depend on the relative heights of the conveyor, top of barrier, and nearby residences, as well as the relative distances between the conveyor and noise barrier, and distance from noise barrier to receiver.

The existing transfer point between two segments of the conveyor is elevated, but the typical height of the majority of the conveyor system is approximately 3-4 feet above ground. At positions near the conveyor transfer point, the reference noise level measured at a distance of 60 feet was 75 dB L_{50} At locations removed from the transfer point, the measured reference noise level at this same distance was 72 dB L_{50}. The degree of noise reduction required of the noise barrier will depend on the proximity of the residences to the operating conveyor, as well as the proximity of those residences to the conveyor transfer point.

For example, if construction of residences is to occur as close as 200 feet from the operating conveyor, the noise level from the conveyor prior to construction of the barrier would be approximately 64 dB L_{50} at that 200 foot distance. Assuming the conveyor would continue to operate at night, a noise barrier reduction of 14 dB would be required to achieve satisfaction with the City of Sacramento nighttime Noise Ordinance standard of 50 dB L_{50}.

As noted previously, a noise barrier can be expected to provide a noise reduction of 5 dB once it intercepts line of sight between the noise source and receiver. As a general rule, each additional foot of noise barrier height beyond that required to intercept line of sight will provide an additional noise reduction of 1 dB. Because a barrier approximately

5 feet in height would likely intercept line of sight between future residences and the typical conveyor segments (i.e. non-elevated transfer segment of the conveyor), a total barrier height of approximately 14 feet may be required to reduce conveyor noise to a state of compliance with City of Sacramento nighttime noise standards for a residence 200 feet from the operating conveyor. If, however, the nearest residence was 300 feet from the conveyor, a barrier approximately 12 feet in height would be necessary to provide the required noise reduction.

Due to the number of permutations associated with distance between residences and conveyor segments, conveyor type, elevation of receiver relative to conveyor elevation, distance between conveyor and noise barrier, and distance between noise barrier and receiver, it is impractical to provide analysis of each combination of these variables. However, noise barriers could be used in conjunction with setback limitations to effectively maintain conveyor noise levels within compliance of City noise standards until such a time as the conveyor operations may cease at the Aspen I - New Brighton site. To predict more exact barrier heights, more specific geometry of the various components which affect noise barrier performance is required.

CONCLUSIONS

The Aspen I - New Brighton site is located in close proximity to several sources of noise. Innovative site design which includes several noise mitigation measures has prevented noise impacts from all but two of the major project area sources of noise: specifically, traffic and Teichert Perkins operations. Traffic noise impacts can be feasibly mitigated through improvements to residential building façade construction and location of common outdoor activity areas of medium and high-density residential uses in areas shielded from excessive traffic noise. Mitigation of noise associated with the Teichert Perkins facility is a considerably more challenging undertaking due to the magnitude of the noise impact resulting from nighttime operations at the Perkins facility. Nonetheless, feasible measures can be developed with cooperation between StoneBridge Properties LLC and Teichert Aggregates, both of whom share the same parent company, Teichert Inc.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT$_{60}$	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

Appendix B-1

Rock Creek Project
24hr Continuous Noise Monitoring at Site 1
Thursday, March 19, 2009

Hour	Leq	Lmax	L50	L90
0:00	46	55	45	43
1:00	47	59	46	44
2:00	48	66	47	45
3:00	49	68	47	45
4:00	49	64	49	47
5:00	53	61	52	50
6:00	56	66	56	54
7:00	56	65	56	55
8:00	56	65	54	51
9:00	52	69	49	47
10:00	49	61	49	46
11:00	49	66	48	46
12:00	53	73	49	45
13:00	49	67	49	47
14:00	50	70	48	45
15:00	46	61	43	41
16:00	51	70	44	41
17:00	46	57	44	41
18:00	46	63	43	41
19:00	45	61	43	41
20:00	47	61	44	42
21:00	49	64	46	45
22:00	49	65	48	46
23:00	48	66	46	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	56.2	45.5	51.1	56.3	45.9	50.7
Lmax (Maximum)	73.0	57.4	64.9	68.2	54.6	63.4
L50 (Median)	56.0	42.7	47.2	55.8	45.2	48.4
L90 (Background)	55.0	40.5	44.8	54.4	43.3	46.4

Computed Ldn, dB	57.2
% Daytime Energy	65%
% Nighttime Energy	35%

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Appendix B-2

Rock Creek Project

24hr Continuous Noise Monitoring at Site 2

Thursday, March 19, 2009

Hour	Leq	Lmax	L50	L90
0:00	45	55	45	42
1:00	46	59	45	44
2:00	47	65	46	44
3:00	48	66	47	45
4:00	49	57	49	47
5:00	53	58	52	50
6:00	56	67	55	54
7:00	56	63	56	54
8:00	55	68	53	48
9:00	50	67	48	45
10:00	52	67	48	45
11:00	50	65	47	45
12:00	47	57	45	43
13:00	48	62	47	44
14:00	47	56	47	44
15:00	45	58	44	41
16:00	46	66	43	41
17:00	45	58	43	40
18:00	46	63	42	39
19:00	44	66	42	40
20:00	47	66	44	41
21:00	50	70	46	44
22:00	48	59	47	46
23:00	47	65	46	43

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	56.2	44.1	50.0	55.9	45.3	50.3
Lmax (Maximum)	70.0	55.7	63.4	67.2	54.6	61.2
L50 (Median)	55.9	41.5	46.2	55.3	44.7	48.1
L90 (Background)	54.4	39.1	43.7	53.6	42.4	46.0

Computed Ldn, dB	56.7
% Daytime Energy	61%
% Nighttime Energy	39%

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Appendix B-3

Rock Creek Project
24hr Continuous Noise Monitoring at Site 3
Thursday, March 19, 2009

Hour	Leq	Lmax	L50	L90
0:00	42	54	42	40
1:00	44	53	43	41
2:00	45	55	44	42
3:00	47	58	47	44
4:00	48	57	48	46
5:00	51	68	50	47
6:00	59	64	59	58
7:00	61	68	60	59
8:00	60	71	59	57
9:00	60	65	59	58
10:00	60	81	59	57
11:00	59	68	59	57
12:00	59	72	58	56
13:00	60	69	59	56
14:00	61	68	60	58
15:00	60	69	58	56
16:00	58	72	58	56
17:00	56	61	57	37
18:00	47	66	44	35
19:00	45	62	44	36
20:00	47	59	45	38
21:00	47	63	46	40
22:00	47	62	45	43
23:00	45	59	44	40

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61.0	44.7	58.3	58.8	42.4	51.1
Lmax (Maximum)	80.6	58.9	67.5	67.6	53.1	58.7
L50 (Median)	60.4	44.0	55.1	58.7	41.7	46.7
L90 (Background)	59.1	35.1	50.4	57.6	40.2	44.6

Computed Ldn, dB	59.6
% Daytime Energy	90%
% Nighttime Energy	10%

Appendix B-4

Rock Creek Project

24hr Continuous Noise Monitoring at Site 4

Thursday, April 16, 2009

Hour	Leq	Lmax	L50	L90
0:00	50	64	49	46
1:00	48	59	46	44
2:00	48	60	45	43
3:00	49	63	46	43
4:00	50	61	48	44
5:00	54	66	53	48
6:00	55	66	54	52
7:00	52	64	51	49
8:00	51	71	49	47
9:00	49	61	48	46
10:00	49	64	48	46
11:00	50	66	49	47
12:00	50	63	49	47
13:00	50	60	49	47
14:00	52	76	48	46
15:00	52	76	47	44
16:00	49	70	46	44
17:00	47	63	45	43
18:00	49	62	48	44
19:00	50	61	49	46
20:00	50	62	49	47
21:00	51	65	49	47
22:00	50	61	49	47
23:00	52	63	50	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	52.2	46.9	50.2	54.8	47.6	51.3
Lmax (Maximum)	76.3	60.5	65.6	66.4	59.3	62.7
L50 (Median)	51.3	45.4	48.4	53.8	45.1	48.9
L90 (Background)	48.6	43.3	46.1	51.5	43.1	45.9

Computed Ldn, dB	57.5
% Daytime Energy	57%
% Nighttime Energy	43%

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Appendix B-5

Rock Creek Project

24hr Continuous Noise Monitoring at Site 5

Thursday, April 16, 2009

Hour	Leq	Lmax	L50	L90
0:00	60	71	55	46
1:00	57	70	49	43
2:00	57	71	48	42
3:00	59	79	54	44
4:00	61	74	58	48
5:00	65	75	63	56
6:00	67	75	66	60
7:00	67	74	67	59
8:00	71	99	65	58
9:00	63	75	62	55
10:00	62	72	60	54
11:00	61	74	60	54
12:00	62	74	60	54
13:00	63	74	61	55
14:00	63	80	61	55
15:00	62	73	60	54
16:00	63	81	61	56
17:00	64	83	63	55
18:00	64	73	63	55
19:00	64	82	62	51
20:00	62	73	61	53
21:00	63	72	62	52
22:00	62	72	61	52
23:00	62	72	59	51

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	71.0	61.5	64.4	66.8	57.1	62.2
Lmax (Maximum)	98.7	71.6	77.0	79.4	70.3	73.3
L50 (Median)	66.6	59.8	61.9	66.5	47.6	57.1
L90 (Background)	58.9	51.4	54.7	60.2	41.9	49.1

Computed Ldn, dB	69.0
% Daytime Energy	74%
% Nighttime Energy	26%

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Appendix B-6

Rock Creek Project

24hr Continuous Noise Monitoring at Site 6

Thursday, April 16, 2009

Hour	Leq	Lmax	L50	L90
0:00	51	65	48	40
1:00	47	61	41	36
2:00	47	64	41	37
3:00	47	63	43	40
4:00	50	61	48	42
5:00	55	68	54	50
6:00	58	68	57	54
7:00	57	68	56	53
8:00	55	63	54	50
9:00	56	75	54	51
10:00	56	63	56	52
11:00	56	65	55	52
12:00	56	67	56	53
13:00	57	66	56	53
14:00	58	77	57	53
15:00	57	73	55	51
16:00	57	73	55	52
17:00	57	73	56	51
18:00	52	65	50	45
19:00	52	72	49	45
20:00	51	64	50	47
21:00	53	69	51	49
22:00	53	72	51	49
23:00	53	66	51	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	58.1	50.9	55.8	57.7	47.1	52.6
Lmax (Maximum)	76.7	63.3	68.9	71.7	60.5	65.2
L50 (Median)	56.6	48.9	54.0	57.2	41.2	48.3
L90 (Background)	53.2	44.8	50.4	54.3	36.3	43.9

Computed Ldn, dB	59.6
% Daytime Energy	77%
% Nighttime Energy	23%

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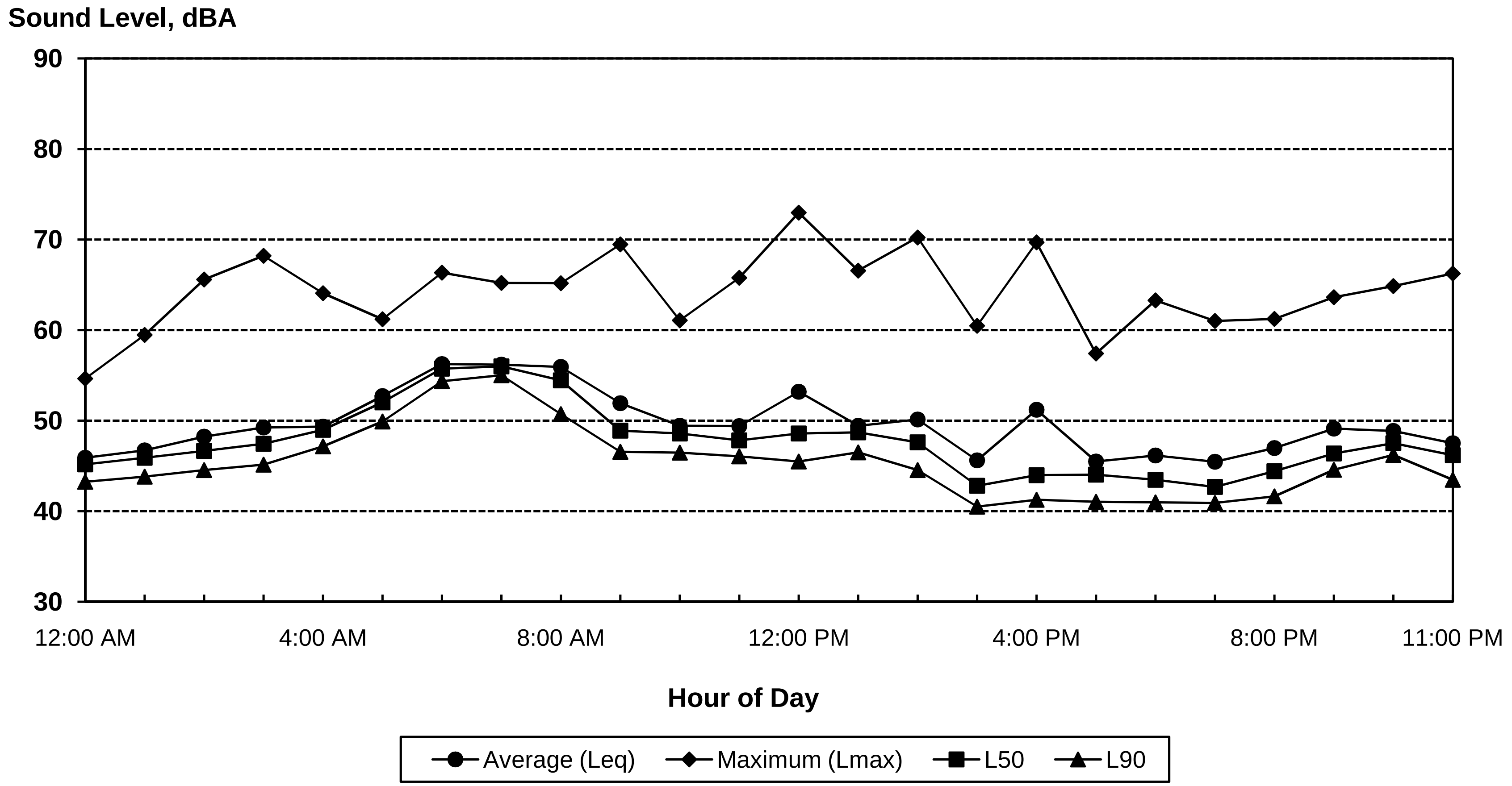
Appendix C-1
Rock Creek Project
24hr Continuous Noise Monitoring at Site 1
Thursday, March 19, 2009



Ldn: 57 dB

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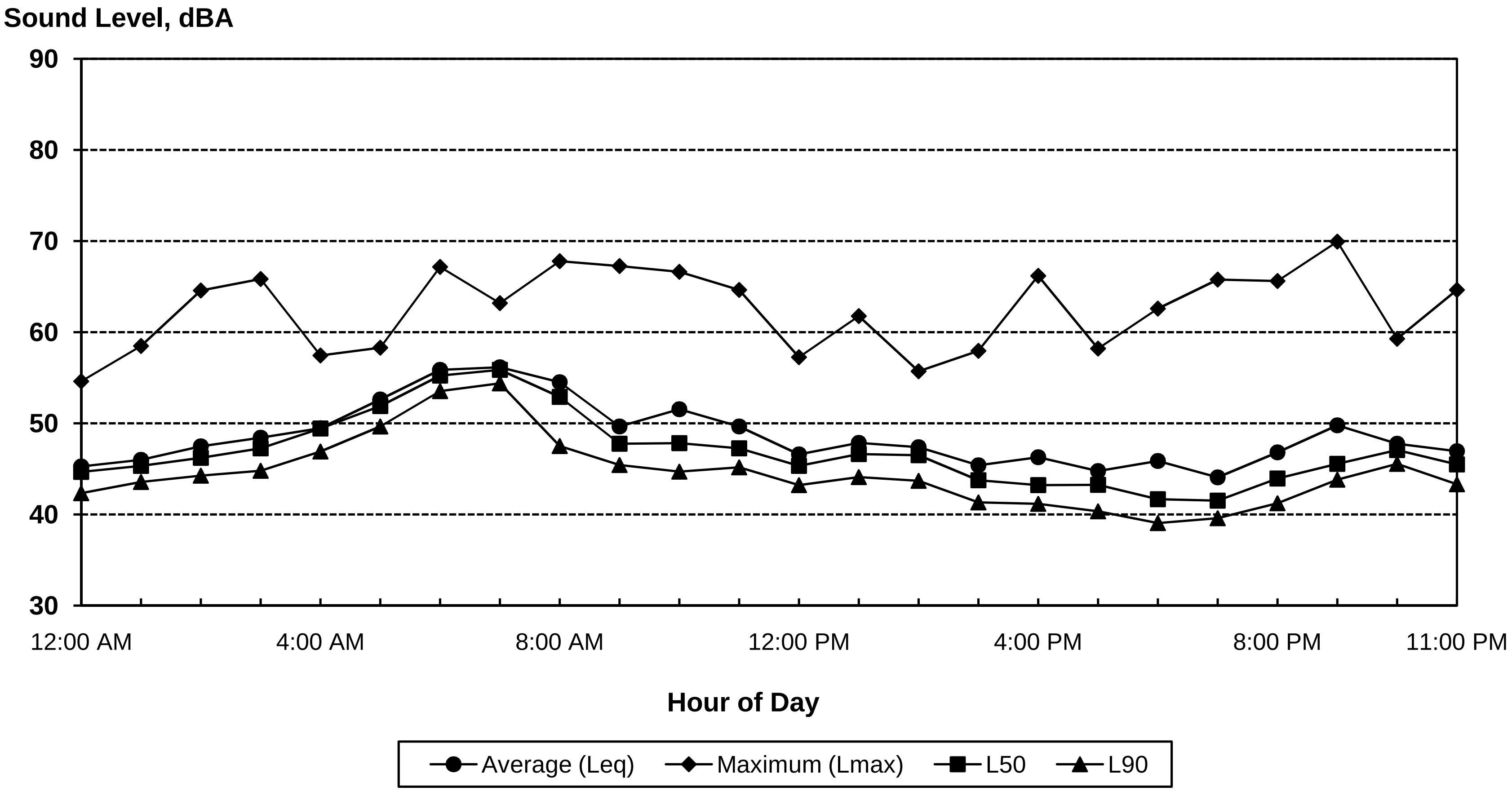
Appendix C-2
Rock Creek Project
24hr Continuous Noise Monitoring at Site 2
Thursday, March 19, 2009



Ldn: 57 dB

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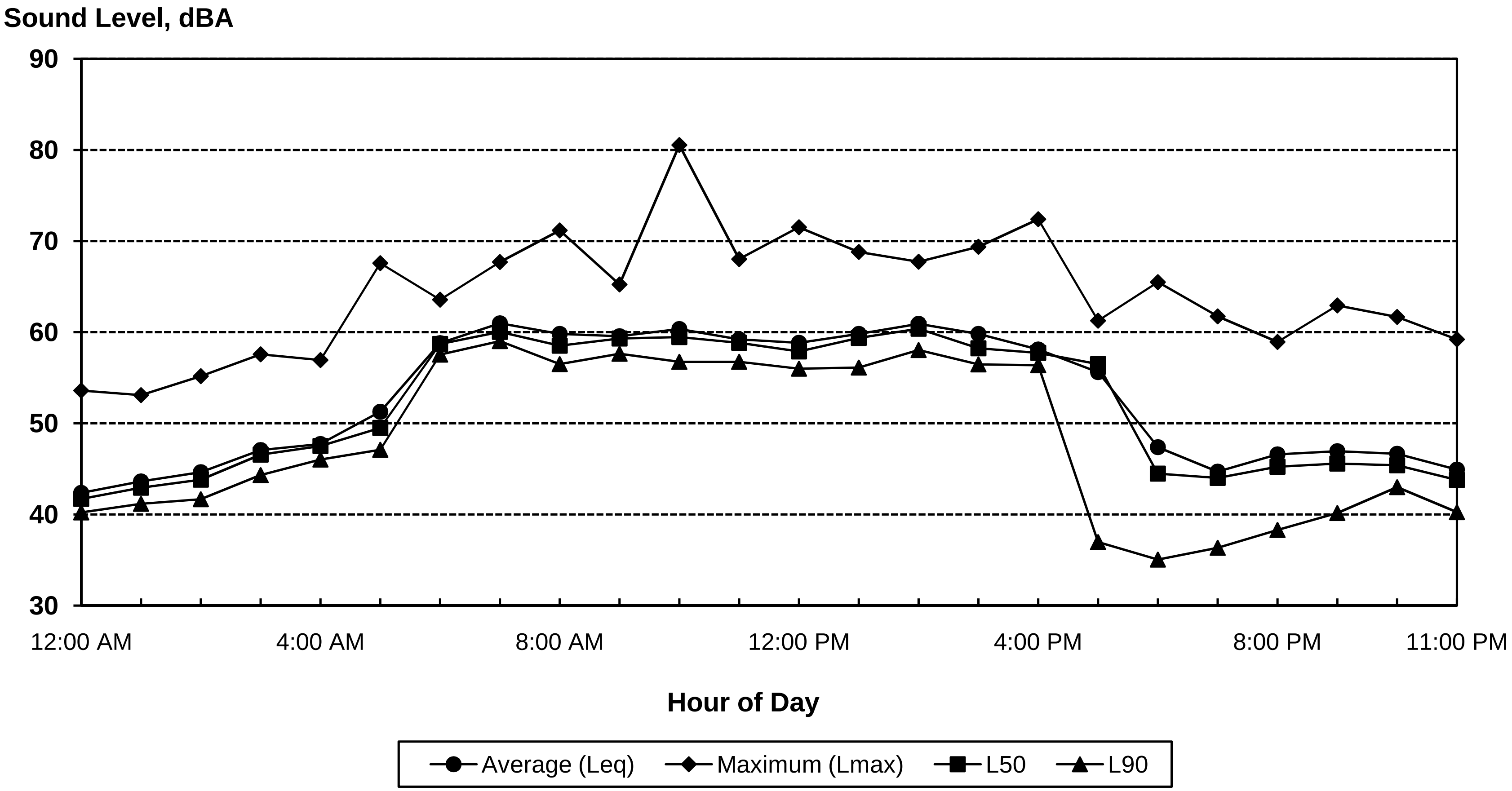
Appendix C-3
Rock Creek Project
24hr Continuous Noise Monitoring at Site 3
Thursday, March 19, 2009



Ldn: 60 dB

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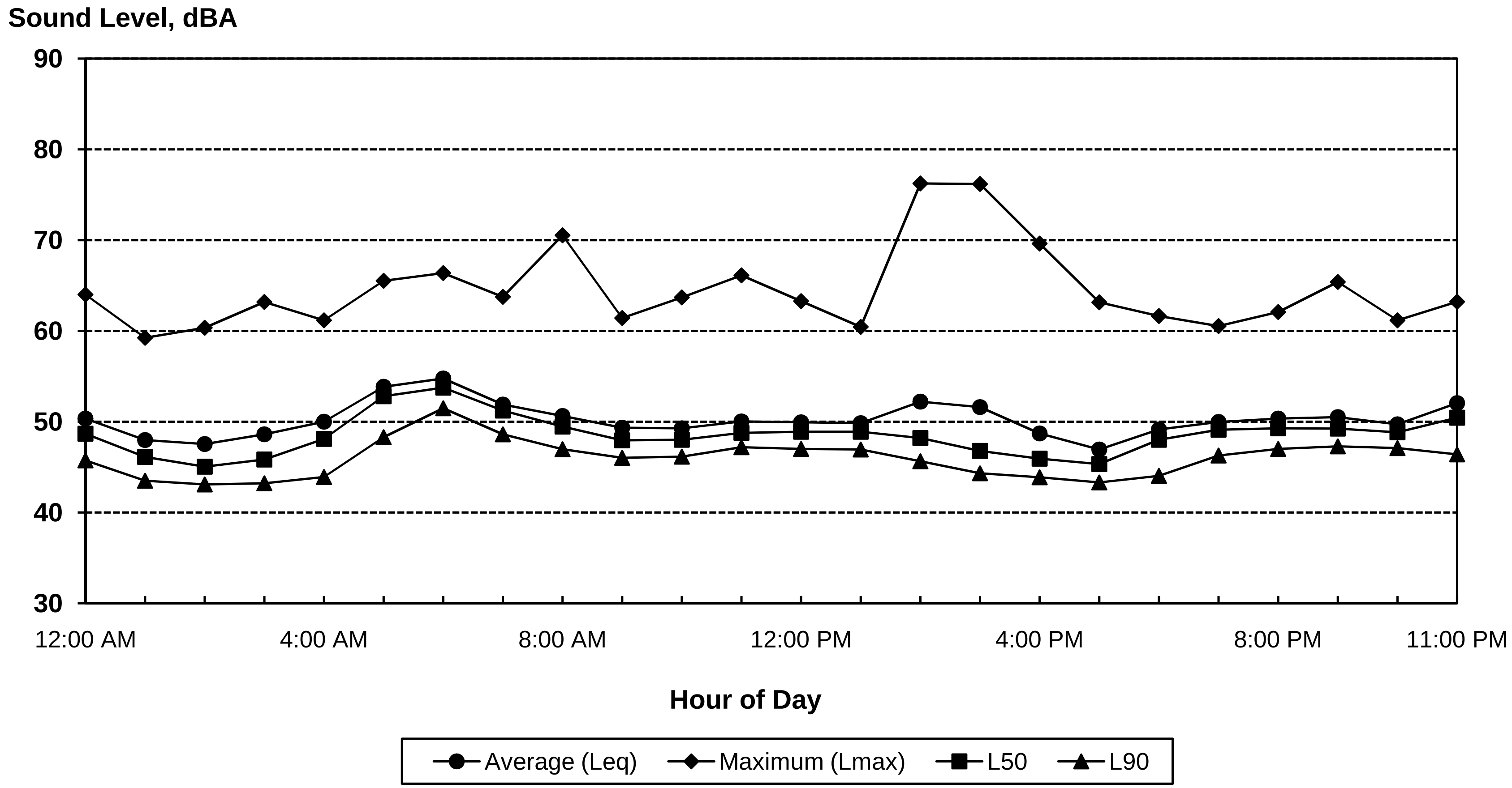
Appendix C-4
Rock Creek Project
24hr Continuous Noise Monitoring at Site 4
Thursday, April 16, 2009



Ldn: 58 dB

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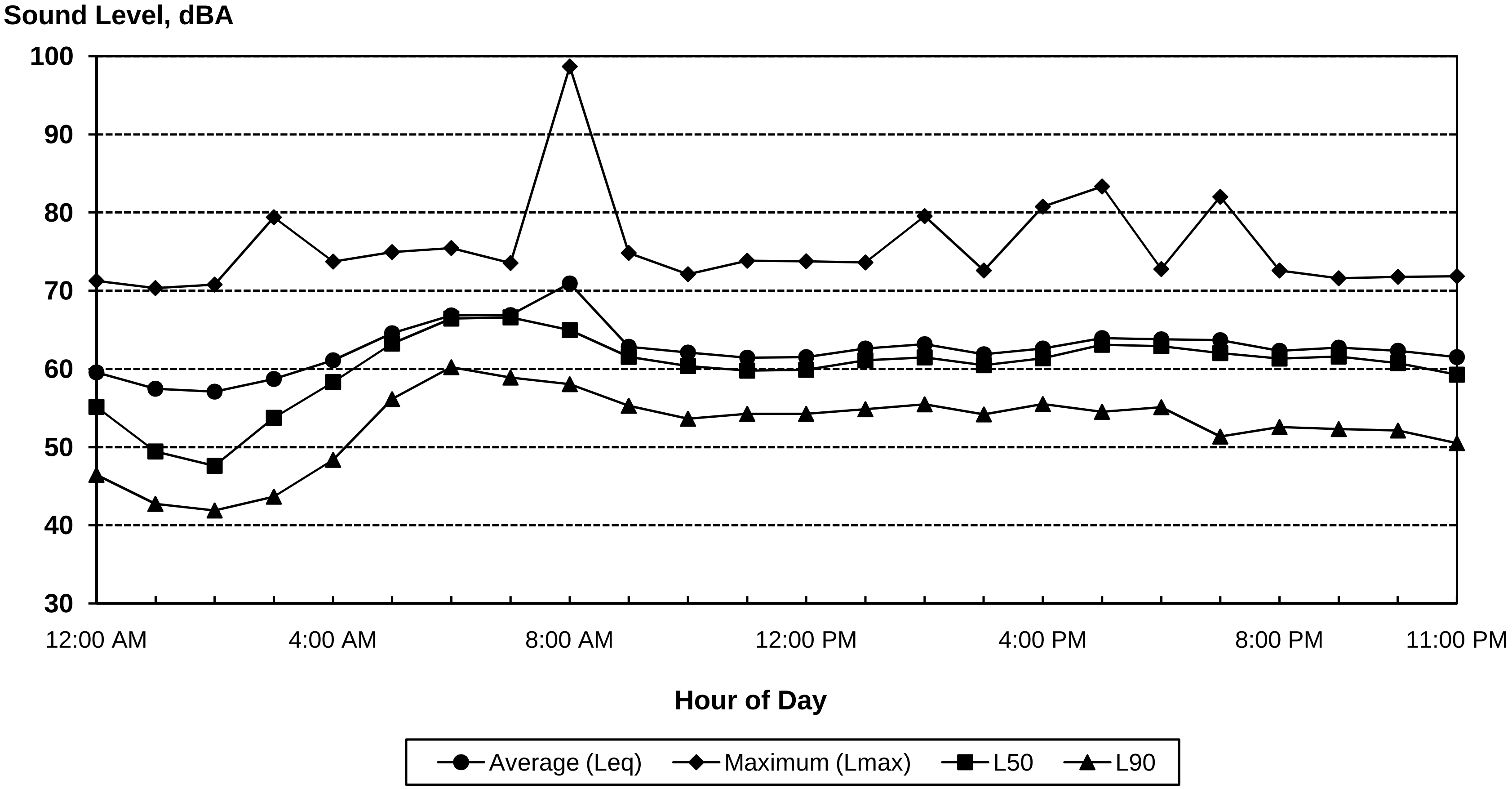
Appendix C-5
Rock Creek Project
24hr Continuous Noise Monitoring at Site 5
Thursday, April 16, 2009



Ldn: 69 dB

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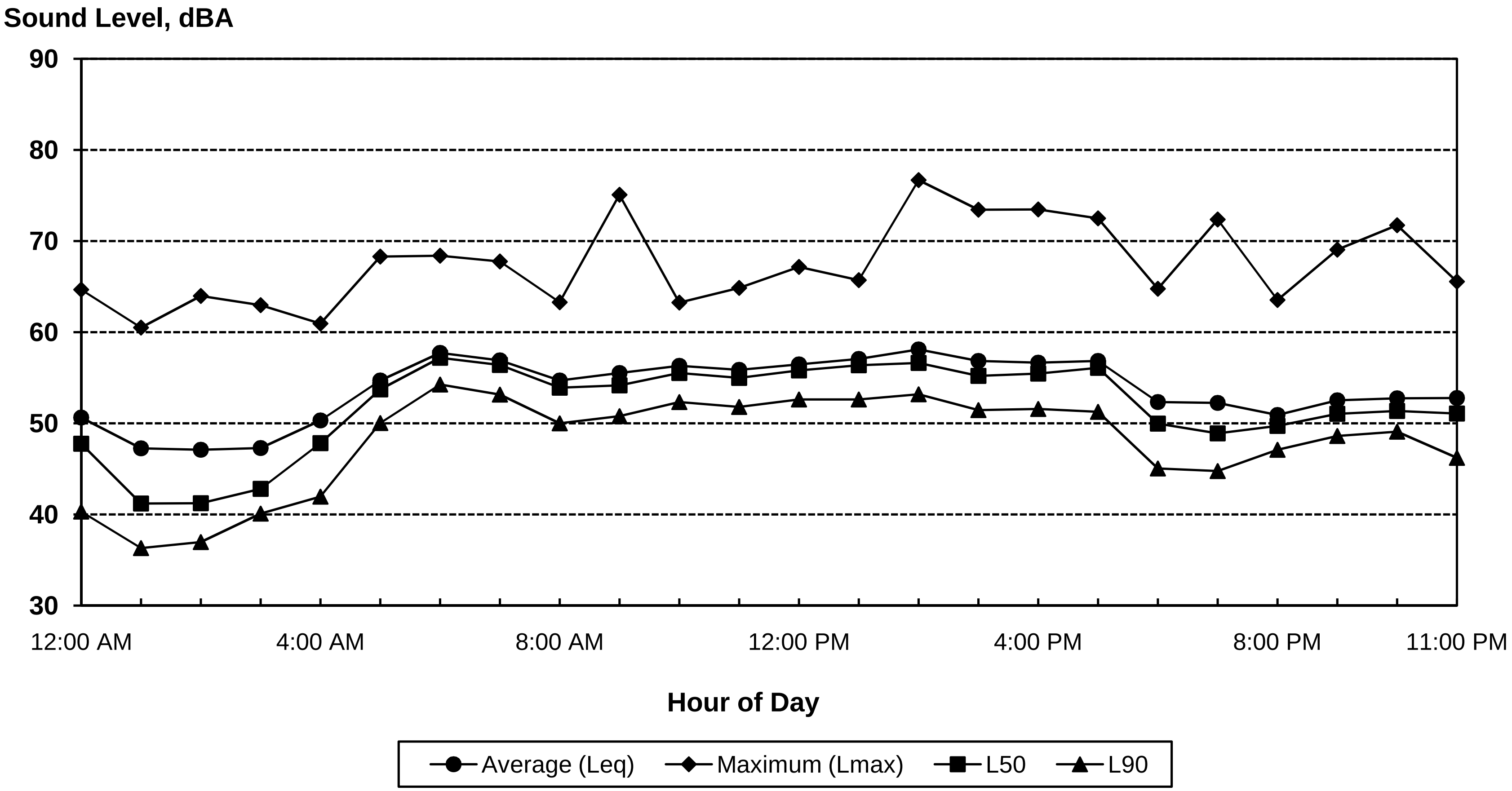
Appendix C-6
Rock Creek Project
24hr Continuous Noise Monitoring at Site 6
Thursday, April 16, 2009



Ldn: 60 dB

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Appendix D-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2009-013 Aspen I Project
Description: Existing Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	10,343	80		20	3	6	50	100	
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	23,737	80		20	5	6	55	100	

Appendix D-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #:	2009-013 Aspen I Project
Description:	Existing Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	63	56	63	67
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	68	63	67	71

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Appendix D-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #: 2009-013 Aspen I Project
Description: Existing Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

			------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	29	62	133	286	617
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	58	125	269	579	1248

Appendix E-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2009-013 Aspen I Project
Description: Cumulative No-Project Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	46,953	80		20	3	6	50	100	
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	48,311	80		20	5	6	55	100	

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Appendix E-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #: 2009-013 Aspen I Project
Description: Cumulative No-Project Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	70	63	70	73
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	71	66	71	75

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Appendix E-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #:	2009-013 Aspen I Project
Description:	Cumulative No-Project Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

			------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	79	169	364	785	1692
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	93	200	432	930	2005

Appendix F-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2009-013 Aspen I Project
Description: Cumulative with Project Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	50,325	80		20	3	6	50	100	
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	51,515	80		20	5	6	55	100	
3	Internal Parkway	South of Jackson Road	8,100	80		20	2	2	35	100	
4	Internal Parkway	West of South Watt Avenue	7,200	80		20	2	2	35	100	

Appendix F-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #:	2009-013 Aspen I Project
Description:	Cumulative with Project Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	70	63	70	74
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	71	66	71	75
3	Internal Parkway	South of Jackson Road	58	51	56	61
4	Internal Parkway	West of South Watt Avenue	58	51	56	60

Appendix F-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #:	2009-013 Aspen I Project
Description:	Cumulative with Project Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

			------- Distances to Traffic Noise Contours -------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Jackson Road	Florin Perkins Rd. to S. Watt Ave.	82	177	382	822	1772
2	S. Watt Avenue	Jackson Rd. to Fruitridge Rd.	97	209	451	971	2092
3	Internal Parkway	South of Jackson Road	11	24	52	113	243
4	Internal Parkway	West of South Watt Avenue	10	22	48	104	224

Appendix G-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2009-013 Aspen I Project
Description: Cumulative with Project Conditions
Ldn/CNEL: Ldn
Hard/Soft: Soft

Receiver	Roadway Name	Receiver Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Shielding Offset (dB)
1	Jackson Road	Nearest LDR to Jackson	50,325	80		20	3	6	50	165	-6
2	Jackson Road	Second Row LDR	50,325	80		20	3	6	50	400	-5
3	Jackson Road	NE Corner LDR Residences	50,325	80		20	3	6	50	185	-7
4	South Watt Avenue	LDR Adjacent to Park	51,515	80		20	5	6	55	230	-8
5	South Watt Avenue	LDR Adjacent to Bikeway Tunnel	51,515	80		20	5	6	55	150	-6
6	South Watt Avenue	LDR Adjacent to Parkway	51,515	80		20	5	6	55	200	-3
7	South Watt Avenue	MDR South of Parkway (A1-8)	51,515	80		20	5	6	55	125	0
8	South Watt Avenue	HDR South of Parkway (A1-9)	51,515	80		20	5	6	55	125	0
9	Internal Parkway	LDR South of Jackson	8,100	80		20	2	2	35	70	-3
10	Internal Parkway	LDR West of S. Watt	7,200	80		20	2	2	35	100	-3

Appendix G-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Predicted Levels

Project #:	2009-013 Aspen I Project
Description:	Cumulative with Project Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

Receiver	Roadway Name	Receiver Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Jackson Road	Nearest LDR to Jackson	61	54	61	64
2	Jackson Road	Second Row LDR	56	49	56	60
3	Jackson Road	NE Corner LDR Residences	59	52	59	63
4	South Watt Avenue	LDR Adjacent to Park	58	53	57	61
5	South Watt Avenue	LDR Adjacent to Bikeway Tunnel	63	57	62	66
6	South Watt Avenue	LDR Adjacent to Parkway	64	59	63	67
7	South Watt Avenue	MDR South of Parkway (A1-8)	70	65	69	73
8	South Watt Avenue	HDR South of Parkway (A1-9)	70	65	69	73
9	Internal Parkway	LDR South of Jackson	57	50	56	60
10	Internal Parkway	LDR West of S. Watt	55	48	53	57

Appendix G-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Noise Contour Output

Project #:	2009-013 Aspen I Project
Description:	Cumulative with Project Conditions
Ldn/CNEL:	Ldn
Hard/Soft:	Soft

			------- Distances to Traffic Noise Contours -------				
Receiver	Roadway Name	Receiver Description	75	70	65	60	55
1	Jackson Road	Nearest LDR to Jackson	33	71	152	327	705
2	Jackson Road	Second Row LDR	38	82	177	382	822
3	Jackson Road	NE Corner LDR Residences	28	60	130	281	605
4	South Watt Avenue	LDR Adjacent to Park	28	61	132	284	613
5	South Watt Avenue	LDR Adjacent to Bikeway Tunnel	39	83	179	387	833
6	South Watt Avenue	LDR Adjacent to Parkway	61	132	284	613	1320
7	South Watt Avenue	MDR South of Parkway (A1-8)	97	209	451	971	2092
8	South Watt Avenue	HDR South of Parkway (A1-9)	97	209	451	971	2092
9	Internal Parkway	LDR South of Jackson	7	15	33	71	153
10	Internal Parkway	LDR West of S. Watt	7	14	30	66	142

Appendix H-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2009-013
Project Name: Aspen I Project
Roadway Name: Jackson Road - Elev 53
Location(s): R1

Noise Level Data:

Year: Cumulative Plus Project
Auto L_{dn}, dB: 67
Medium Truck L_{dn}, dB: 60
Heavy Truck L_{dn}, dB: 67

Site Geometry:

Receiver Description: R1 - Elev 43
Centerline to Barrier Distance (C_1): 95
Barrier to Receiver Distance (C_2): 70
Automobile Elevation: 53
Medium Truck Elevation: 55
Heavy Truck Elevation: 61
Pad/Ground Elevation at Receiver: 43
Receiver Elevation[1]: 48
Base of Barrier Elevation: 53
Starting Barrier Height 0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	-------------------- L_{dn}, dB --------------------				Barrier Breaks Line of Sight to…		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
53	0	61	55	62	**65**	Yes	Yes	No
54	1	60	54	62	**65**	Yes	Yes	Yes
55	2	60	53	62	**64**	Yes	Yes	Yes
56	3	59	53	61	**64**	Yes	Yes	Yes
57	4	58	52	61	**63**	Yes	Yes	Yes
58	5	58	51	60	**62**	Yes	Yes	Yes
59	6	57	50	59	**62**	Yes	Yes	Yes
60	7	57	50	59	**61**	Yes	Yes	Yes
61	8	56	49	58	**60**	Yes	Yes	Yes

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Appendix H-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2009-013
Project Name: Aspen I Project
Roadway Name: Jackson Road - Elev 53
Location(s): R2

Noise Level Data:

Year: Cumulative Plus Project
Auto L_{dn}, dB: 61
Medium Truck L_{dn}, dB: 54
Heavy Truck L_{dn}, dB: 61

Site Geometry:

Receiver Description: R2 - Elev 42
Centerline to Barrier Distance (C_1): 300
Barrier to Receiver Distance (C_2): 100
Automobile Elevation: 53
Medium Truck Elevation: 55
Heavy Truck Elevation: 61
Pad/Ground Elevation at Receiver: 42
Receiver Elevation[1]: 47
Base of Barrier Elevation: 53
Starting Barrier Height 0

Barrier Effectiveness:

		-------------------- L_{dn}, dB --------------------				Barrier Breaks Line of Sight to…		
Top of Barrier Elevation (ft)	**Barrier Height[2] (ft)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**	**Autos?**	**Medium Trucks?**	**Heavy Trucks?**
53	0	55	48	56	**59**	Yes	Yes	Yes
54	1	54	47	55	**58**	Yes	Yes	Yes
55	2	54	47	55	**58**	Yes	Yes	Yes
56	3	53	47	54	**57**	Yes	Yes	Yes
57	4	53	46	54	**57**	Yes	Yes	Yes
58	5	52	45	53	**56**	Yes	Yes	Yes
59	6	52	45	53	**56**	Yes	Yes	Yes
60	7	51	44	52	**55**	Yes	Yes	Yes
61	8	51	44	52	**55**	Yes	Yes	Yes

Appendix H-3

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2009-013
Project Name: Aspen I Project
Roadway Name: Jackson Road - Elev 54
Location(s): R3

Noise Level Data:

Year: Cumulative Plus Project
Auto L_{dn}, dB: 66
Medium Truck L_{dn}, dB: 59
Heavy Truck L_{dn}, dB: 66

Site Geometry:

Receiver Description: R3 - Elev 37
Centerline to Barrier Distance (C_1): 100
Barrier to Receiver Distance (C_2): 85
Automobile Elevation: 54
Medium Truck Elevation: 56
Heavy Truck Elevation: 62
Pad/Ground Elevation at Receiver: 37
Receiver Elevation[1]: 42
Base of Barrier Elevation: 54
Starting Barrier Height 0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	-------------------- L_{dn}, dB --------------------				Barrier Breaks Line of Sight to…		
		Autos	Medium Trucks	Heavy Trucks	Total	Autos?	Medium Trucks?	Heavy Trucks?
54	0	58	51	60	**63**	Yes	Yes	Yes
55	1	57	51	60	**62**	Yes	Yes	Yes
56	2	57	50	59	**61**	Yes	Yes	Yes
57	3	56	49	58	**61**	Yes	Yes	Yes
58	4	56	49	58	**60**	Yes	Yes	Yes
59	5	55	49	57	**59**	Yes	Yes	Yes
60	6	55	48	56	**59**	Yes	Yes	Yes
61	7	54	48	56	**58**	Yes	Yes	Yes
62	8	53	47	55	**58**	Yes	Yes	Yes

Appendix H-4

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2009-013
Project Name: Aspen I Project
Roadway Name: South Watt - Elev 50
Location(s): R4

Noise Level Data:

Year: Cumulative Plus Project
Auto L_{dn}, dB: 66
Medium Truck L_{dn}, dB: 61
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: R4 - Elev 30
Centerline to Barrier Distance (C_1): 130
Barrier to Receiver Distance (C_2): 100
Automobile Elevation: 50
Medium Truck Elevation: 52
Heavy Truck Elevation: 58
Pad/Ground Elevation at Receiver: 30
Receiver Elevation[1]: 35
Base of Barrier Elevation: 50
Starting Barrier Height 0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	**Barrier Height[2] (ft)**	**-------------------- L_{dn}, dB --------------------**				**Barrier Breaks Line of Sight to…**		
		Autos	**Medium Trucks**	**Heavy Trucks**	**Total**	**Autos?**	**Medium Trucks?**	**Heavy Trucks?**
50	0	57	53	58	**61**	Yes	Yes	Yes
51	1	57	52	58	**61**	Yes	Yes	Yes
52	2	56	51	57	**60**	Yes	Yes	Yes
53	3	56	51	56	**60**	Yes	Yes	Yes
54	4	55	51	56	**59**	Yes	Yes	Yes
55	5	55	50	55	**59**	Yes	Yes	Yes
56	6	54	50	55	**58**	Yes	Yes	Yes
57	7	54	49	54	**58**	Yes	Yes	Yes
58	8	53	49	54	**57**	Yes	Yes	Yes

Appendix H-5

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number:	2009-013
Project Name:	Aspen I Project
Roadway Name:	South Watt - Elev 40
Location(s):	R5

Noise Level Data:

Year:	Cumulative Plus Project
Auto L_{dn}, dB:	69
Medium Truck L_{dn}, dB:	63
Heavy Truck L_{dn}, dB:	68

Site Geometry:

Receiver Description:	R5 - Elev 28
Centerline to Barrier Distance (C_1):	90
Barrier to Receiver Distance (C_2):	60
Automobile Elevation:	40
Medium Truck Elevation:	42
Heavy Truck Elevation:	48
Pad/Ground Elevation at Receiver:	28
Receiver Elevation^1:	33
Base of Barrier Elevation:	40
Starting Barrier Height	0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	**Barrier Height^2 (ft)**	**-------------------- L_{dn}, dB --------------------**				**Barrier Breaks Line of Sight to…**		
		Autos	**Medium Trucks**	**Heavy Trucks**	**Total**	**Autos?**	**Medium Trucks?**	**Heavy Trucks?**
40	0	62	57	63	**66**	Yes	Yes	Yes
41	1	61	56	63	**65**	Yes	Yes	Yes
42	2	61	55	62	**65**	Yes	Yes	Yes
43	3	60	54	61	**64**	Yes	Yes	Yes
44	4	59	54	60	**63**	Yes	Yes	Yes
45	5	59	53	60	**63**	Yes	Yes	Yes
46	6	58	53	59	**62**	Yes	Yes	Yes
47	7	58	52	58	**61**	Yes	Yes	Yes
48	8	57	51	58	**61**	Yes	Yes	Yes

Appendix H-6

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:	Job Number:	2009-013
	Project Name:	Aspen I Project
	Roadway Name:	South Watt - Elev 30
	Location(s):	R6
Noise Level Data:	Year:	Cumulative Plus Project
	Auto L_{dn}, dB:	67
	Medium Truck L_{dn}, dB:	62
	Heavy Truck L_{dn}, dB:	66
Site Geometry:	Receiver Description:	R6 - Elev 28
	Centerline to Barrier Distance (C_1):	140
	Barrier to Receiver Distance (C_2):	60
	Automobile Elevation:	30
	Medium Truck Elevation:	32
	Heavy Truck Elevation:	38
	Pad/Ground Elevation at Receiver:	28
	Receiver Elevation^1:	33
	Base of Barrier Elevation:	30
	Starting Barrier Height	0

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height^2 (ft)	-------------------- L_{dn}, dB -------------------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
30	0	63	58	65	**68**	No	No	No
31	1	62	58	64	**66**	No	No	No
32	2	62	57	62	**66**	No	No	No
33	3	62	57	61	**65**	Yes	Yes	No
34	4	62	57	61	**65**	Yes	Yes	No
35	5	61	56	61	**65**	Yes	Yes	Yes
36	6	60	56	61	**64**	Yes	Yes	Yes
37	7	60	55	60	**64**	Yes	Yes	Yes
38	8	59	54	60	**63**	Yes	Yes	Yes

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APPENDIX O

BOLLARD ACOUSTICAL CONSULTANTS, INC.
Acoustics ▸ Vibration ▸ Noise Control Engineering

July 29, 2011

Mr. Rod Stinson
Raney Planning & Management, Inc.
1501 Sports Drive
Sacramento, CA 95834

Subject: Discussion of combined (cumulative) contribution of noise from Teichert Perkins Plant and Jackson Highway as it affects the Aspen I project site.

Dear Rod,

Pursuant to your request, I have prepared the following brief discussion regarding cumulative contributions of aggregate plant and traffic noise to the project site noise environment:

> The cumulative contribution of noise from operation of the Teichert Perkins Plant and traffic on Jackson Highway is difficult to quantify. This difficulty arises from differences in the way noise is generated by these sources and differences in noise standards which are applied by the City and County of Sacramento to industrial (fixed) versus transportation (mobile) noise sources. Specifically, noise from the Teichert Perkins plant is generated from elevated positions with direct "view" of the project site from fixed (non-mobile) positions, is typically steady state (not time varying), and is subject to hourly performance standards. On the other hand, noise from traffic on Jackson Highway is mobile (moving point sources), time varying, generated at ground level locations which are substantially shielded from view of the project site, and subject to weighted 24-hour average noise standards (Ldn).
>
> The noise analysis prepared for this project quantifies the noise generation of each of the noise sources affecting the project site, and assesses noise impacts and mitigation measures of these sources. From a cumulative standpoint, noise generated by traffic on Jackson Highway and the Teichert Perkins Plant would be additive, but only in a narrowly defined area where the sound pressure levels of the two sources are within 10 dB of each other. When the sound pressure levels of the two sources are equal, the cumulative increase in ambient noise levels on the project site would be three (3) dB). Because the sound pressure levels of Jackson Highway traffic change hourly as traffic volumes on that roadway change, whereas the noise generation of the Perkins plant equipment is fairly constant when the plant is in operation, the locations on the project site where the cumulative increase in noise would approach 3 dB would shift over the course of the day.
>
> To summarize, the cumulative contribution of noise from the Perkins Plant and Jackson Highway would range from 0-3 dB on portions of the Aspen I project site closest to both of those sources. However, following implementation of the noise mitigation measures which were developed for each of these sources separately, the applicable noise standards of the City and County of Sacramento will be satisfied and the cumulative impact would be less than significant.

I hope that this discussion is helpful. Please call me at (916) 663-0500 if I can be of further assistance.

Sincerely,

Bollard Acoustical Consultants, Inc.

Paul Bollard

Paul Bollard, President